Enquiries Into Intellectual Property's Economic Impact

OECD

Cover image: The cover depicts a person holding a tablet that displays an infra-red image of a house. The innovations in the tablet are protected by a variety of intellectual property rights, including patents, design rights, and copyrights, all of which are discussed in this report.

ENQUIRIES INTO INTELLECTUAL PROPERTY'S ECONOMIC IMPACT

TABLE OF CONTENTS

FOREWORD

"Enquiries into Intellectual Property's Economic Impact" is a result of the combined expertise and effort of six parts of the OECD (Consumer Policy, Digital Economy, Science & Technology, Industry and Entrepreneurship, Tax Policy, and Trade). A component of the multidisciplinary OECD Project *New Sources of Growth: Knowledge-based Capital, Phase 2*, this report has its roots in an earlier horizontal project called *The Innovation Strategy*, delivered in 2010 and currently being updated. That report identifies ways in which governments can promote innovation to capitalise on its power to drive productivity and income growth forward. In the midst of that work, the economy entered into its worst slowdown in 70 years, leading to a follow-on project, *New Sources of Growth: Knowledge-based Capital, Phase 1,* aimed at identifying new drivers of growth. Building on seminal work from the staff of the United States Federal Reserve Board[1], this study identified a new class of capital assets – "knowledge-based capital" (KBC) such as R&D, design, software, data and intellectual property like patents and copyright – which are difficult to measure but critical strategic investments for retaining and building competitiveness. As KBC becomes recognised as a driver of new sources of growth, and as the ownership of KBC becomes commonplace across all sectors of the economy, a number of policy challenges emerge, as analysed in Phase 1.

Amongst these are policies to nurture and protect intellectual property (IP). Hereto now, in some countries IP mainly affected specific sectors like pharmaceuticals and artistic content. Mobile phone wars, for example, are a new development, and a mobile phone may have as many as 3 000 different patents. In addition, the development of technologies like digitisation and the Internet has brought consumers into more direct and frequent contact with copyright laws than ever before by making it far easier, faster, and cheaper to create, duplicate, and disseminate content. The aim of this second phase of work is to examine how those developments have interacted with IP and to develop analytical tools and collect information that will facilitate insights and analysis. The goal is to recognise IP's growing importance and ensure that it is as valuable and helpful as it can be to OECD economies. Now, more than ever, policy makers need to harness drivers of growth like the creativity and ideas contained in intellectual property to stimulate economic growth and foster social well-being.

Given the multidisciplinary nature of the work on KBC and intellectual property, the chapters of this report were discussed and declassified by a variety of OECD Committees, including the Digital Economy Policy Committee, the Committee for Scientific and Technological Policy, the Committee on Industry, Innovation and Entrepreneurship, and the Trade Committee. The content and comments contributed by the delegates to these OECD official bodies are gratefully acknowledged.

Many OECD staff contributed to this report. Jeremy West wrote Chapter 1 (Synthesis). Chapter 2 (Measuring the Technological and Economic Value of Patents) was written by Mariagrazia Squicciarini, Hélène Dernis, and Chiara Criscuolo. Chapters 3 and 4 (Approaches to the Protection of Trade Secrets and An Empirical Assessment of Protection for Trade Secrets) were authored by Douglas Lippoldt and Mark Schultz. Piotr Stryszowski wrote Chapter 5 (Copyright in the Digital Era). Chapter 6 (Design and Design Frameworks: Investment in KBC and Economic Performance) was written by Christopher Tucci and Tilo Peters with comments from Mariagrazia Squicciarini. Lucie Guibault and Thomas Margoni wrote Chapter 7 (Legal Aspects of Open Access to Publicly Funded Research) with guidance from Mario Cervantes and

Giulia Ajmone-Marsan. Niamh Dunne was the Rapporteur for the expert workshop and wrote Chapter 8 (Summary of the Expert Workshop). Chapter 9 (IP-Based Financing) was authored by Marco Antonielli with guidance from Jeremy West. The entire project benefited from Anne Carblanc's guidance. Alistair Nolan, who managed the KBC Phase 1 project, also provided valuable information and advice. Special thanks to Sarah Ferguson, Helen Maguire, and Jane Warren-Peachey for all of their invaluable administrative support, and to Kate Brooks for proofreading and creating the web page. The assistance of Joshua Yeremiyew, who helped with several of the diagrams and charts in the synthesis chapter, is also greatly appreciated.

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Finally, Walter Park kindly granted the OECD permission to use his patent rights index data. Peter Goodridge graciously provided supplementary data on investment in tangible and intangible assets in the United Kingdom.

CHAPTER 1. SYNTHESIS

This chapter provides the rationale and context for Enquiries into Intellectual Property's Economic Impact and highlights its most significant findings. In doing so, the chapter presents the major themes of the overall report, which are 1) the importance of various types of intellectual property as sources of growth and innovation in today's economies; and 2) the effects on IP systems and stakeholders of major developments such as content digitisation, the growth of the Internet, and globalisation.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

EXECUTIVE SUMMARY

Key challenges

- Copyright appears to be the type of IP that has been attracting business investment at the highest growth rate and it is undergoing statutory review in many countries, yet there are fewer empirical studies about copyright than about patents. Encouraging and enabling the collection and availability of more data on copyright would facilitate data-driven copyright policy. In fact, robust evidence on the use of IP rights generally and on their economic and social impacts is essential for sound IP systems. Presently, however, relatively little concrete evidence is available to support the common assumption that IP rights encourage greater innovation and creativity. More economic evidence is needed.

- At the same time, the copyright system could benefit from review and analysis with a view towards clarifying its underlying principles, as well as clarifying the standards for delineating the exclusive rights and exceptions to those rights that are informed by the principles. Such reviews and analyses could make the use of copyrighted works more transparent, consistent, and predictable.

- Young innovative firms have the strongest track record for creating jobs, but it has become harder for them to find financing. Making it easier to use IP (in particular patents and design rights) to obtain financing would help some young firms to drive job growth and spur innovation.

- To leverage the economic benefits of patents, take steps to improve the diffusion of patent information after publication, consistent with international norms.

- Initial work on trade secrets in this report suggests a link between trade secret protection and innovation, pointing to an issue which merits continued study.

General points

- **Intellectual property rights are exclusive rights** held by the owners of a variety of knowledge-based assets that qualify for legal protection under applicable IP laws. The main types of IP rights are patents, copyrights, design rights, trademarks, and geographical indications. Trade secrets are sometimes considered to be IP rights, too, though many countries do not expressly define them as such.

- **IP rights support innovation by making it a more worthwhile investment and encouraging knowledge diffusion**. The economic rationale for IP rights is that it is in everyone's long-term interest for people and businesses that create knowledge to have well-defined, enforceable rights to exclude third parties from appropriating their ideas, or the expression of their ideas, without permission. Failing to put restrictions on appropriating others' inventions and creations would dilute the rewards for investing in innovation, thereby reducing the incentives for making such investments. In addition, both *i)* disclosure requirements and time limits for exclusivity that are built into IP laws, and *ii)* IP rights' facilitation of licensing and other knowledge transfers, contribute to knowledge diffusion and thus to innovation.[2]

- **IP's overall role in economies has evolved** from a policy area that was mainly relevant to a handful of industries to a force that influences a wide swath of demand and sectors. Consequently, IP policy has become a more influential framework condition that affects not only innovation, but trade, competition, taxes, consumer protection, and other areas.

- Investment in IP-protected capital is growing faster than investment in tangible capital, and salaries in IP-intensive sectors are higher than in non-IP-intensive sectors. The available evidence on IP's aggregate role also shows that IP's economic importance has grown over time and that it remained resilient during the recent recession.

- **The context in which IP operates has been changing substantially**. IP frameworks and stakeholders have been and continue to be affected by a number of developments, including the rise of cloud computing, the growth of the Internet, digitisation, and globalisation. These have created both new challenges for IP, including the facilitation of piracy and industrial espionage, and new opportunities for it to stimulate inventions and creativity as well as to facilitate greater access to information and creative works. For example, new business models and research tools (based on, e.g., text/data mining, open access, and e-content) hold the promise of jobs, growth, and greater knowledge diffusion.

- **IP-based financing deserves attention**. Young firms contribute disproportionately to job creation. Among the most important factors affecting their success is the ease of access to financing. Capital is often relatively difficult for young firms to obtain because they do not have long histories of consistently repaying loans and they tend to lack traditional collateral. But some young firms have untapped resources in the form of IP, which – if it can be properly valued and if markets for IP-based financing are functioning well – can be used to persuade lenders and investors to provide financing. Indeed, a substantial body of empirical work has found that young, high-growth firms with IP assets receive more funding than firms without IP. Nevertheless, IP-based finance is significantly under-used, especially by SMEs that are most in need of it. One reason is a lack of opportunities to sell IP in secondary markets. While open source models may not be predicated on enforcement, in some countries a lack of effective IP enforcement can be another barrier to obtaining financing. Policy makers are striving to support IP markets in several countries. Generally, their efforts fall into two categories: *i)* supporting greater transparency of IP ownership and transfer information via disclosure requirements or measures to foster greater clarity in patent claims; and *ii)* creating new IP market infrastructures. Another approach that governments can take is to help manage the risks associated with collateralising IP. Government agencies and development banks can do that through risk-sharing mechanisms.

Points about particular types of IP rights

- **IP rights involve more than just patents; copyright and trade secrets have a bigger role than some might have thought**. Indeed, they are the most economically significant forms of IP rights in some respects, yet they have benefited from relatively less research, mainly because there is much less data available on them than there is on patents. It is inherently difficult to obtain data on trade secrets due to the fact that they lose their legal protection if they are made public; however, more could be done to improve data availability with respect to copyright. One possibility is to implement more measures designed to encourage voluntary copyright registration. Other potential actions include funding research and surveys to estimate the benefits of more registration, and changing the accounting rules that apply to creative industries to enable better data collection. This should be done while bearing in mind that under the Berne Convention registration is not mandatory.

- **Copyright's performance excels** in terms of the magnitude of investment it attracts, the growth rate of that investment, and job growth. Therefore, to the extent that this synthesis chapter devotes more space to copyright issues than to issues related to other types of IP rights, an important reason is that copyright's role in economies appears to be growing larger, faster. Note that, in much of the world, copyright protects a significant amount of software investment – sometimes more than in the rest of the 'creative industries'. Furthermore, although the report discusses the copyright intensive industries at some length, it is important to recognise that user generated content is now also a significant source of entertainment and information.

- **Several governments have embarked on a review of their copyright laws** to make sure they remain fit for the digital age, with the aim of ensuring that their legal frameworks maintain effective incentives for creators and all stakeholders in the value chain including intermediaries and to consider whether certain aspects of the copyright regimes need to be adapted to the 21st century. For example, such efforts have been undertaken in the United Kingdom, Ireland and Australia. The ways in which copyrighted material is being created, disseminated, and used have changed substantially due to digitisation and the Internet. As a result, a new dynamic amongst stakeholder interests has emerged, which has fuelled a debate about the effects of copyright law and particular provisions on the growth of a wide range of economic activities that depend upon digital networks and products.

- **Evidence that patents stimulate innovation is mixed**. Several surveys have shown that patents are not considered to be very effective in protecting innovations outside a small number of sectors. However, other reports indicate that growth in patent-intensive industries following the 2008-2009 recession outpaced growth in non-IP-intensive industries. In any event, studies still have not definitively concluded that stronger, broader patent rights are necessarily resulting in more innovation. Despite this mixed evidence, over the past 20 years or so patent rights have generally become broader and stronger, and there has been a surge in the number of patents granted.

- **Several ways to estimate the technological and economic value of patented inventions and the impact they may have on subsequent technological developments are provided** in this Report, making it possible to shed more light on the patent-innovation relationship. The Report proposes several indicators and illustrates what they can do with data from the European Patent Office. The illustrative results show that: *i*) the average technological and economic value of inventions protected by patents has eroded over time, at least through 2004, possibly reflecting application backlogs as well as strategic behaviours like defensive patent filings; *ii*) patented micro and nano technologies have the highest economic and technological value; and *iii*) Australia, Canada, Norway, South Africa, and the United Kingdom are the countries with the highest average technological and economic patent values.

- **Taking certain steps to improve disclosure and dissemination of the information contained in patent applications could boost the impact that patented inventions have on subsequent technological developments**. This would more fully achieve a primary purpose of the patent arrangement, namely to increase innovation and knowledge diffusion by granting exclusive rights. Countries can improve the quality of disclosures by more rigorously enforcing the disclosure laws that already exist. They can improve dissemination by encouraging and funding efforts by patent offices to digitise the application process and put databases of patent information online. In addition, a peer review system might be helpful because it is difficult for any individual patent examiner to be skilled in every area. Another idea is to reduce the lag between the date of filing and the date of publication (which is when public disclosure actually occurs). Shortening the lag, at least in fast-moving technology fields, could make disclosures more useful by making it more likely that the information they contain is still relevant.

- **A link between trade secrets and innovation is suggested by new OECD work**. This report presents an indicator of the stringency of protection of trade secrets, which provides a way to study the relationship between the strength of trade secret protection in an economy and that economy's performance. The indicator is used to test the hypothesis that more stringent trade secrets protection is associated with greater innovation and diffusion. The results show that there is indeed a positive and statistically significant relationship between the stringency of trade secret protection and indicators of innovation inputs. While these results do not mean that ever stronger rights and remedies will yield similar results, the positive and statistically significant relationships identified do indicate that adequately protecting trade secrets may be an appropriate policy for strengthening certain aspects of economic performance.

- **Evidence on the importance of design rights is scarce and mixed**. The number of industrial designs contained in applications has been growing. However, one of the few studies that have been performed on design IP found that while design is a significant part of the business model for 85% of UK businesses, a mere four percent of them use registered designs; another four percent use unregistered designs. Nevertheless, earlier work indicated that companies that were "effective users of design" (but not necessarily design *rights*) outperformed the UK stock market by 200 percent between 1994 and 2004. That raises questions about the effectiveness of design rights for motivating investment in design-related KBC.

Introduction: The Context and Motivation for Knowledge-based Capital Phase 2

Knowledge-based Capital Phase 1

New Sources of Growth: Knowledge-based Capital is a strategic priority of the OECD, as recognised by the 2012, 2013 and 2104 Meetings of OECD Council at Ministerial-level[3] and the Secretary General's Strategic Orientations.[4] It has benefited from the involvement of multiple committees and OECD Directorates, thereby enabling a multi-disciplinary analysis.

New Sources of Growth: Knowledge-based Capital was born out of insights from the OECD's Innovation Strategy (2010). *New Sources of Growth* began in 2011. Phase 1 provided evidence of the economic value of knowledge-based capital (see Box 1.1) as a new source of growth and identified current and emerging policy challenges. It drew on expertise from across the OECD and from streams of work on competition, corporate reporting, the efficiency of resource allocation, global value chains, innovation, knowledge networks and markets, measurement and taxation. Phase 1's main findings are summarised in Annex 1.1 to this Chapter.

Box 1.1 Knowledge-based capital and IP rights

Knowledge-based capital comprises a range of assets. These assets create benefits for firms but, unlike machines, equipment, vehicles and structures, they have neither a physical nor a financial embodiment. This intangible form of capital is, increasingly, the largest form of business investment and a key contributor to growth in advanced economies. The term KBC, as defined and used in this report, can be used interchangeably with the term "intangible assets."

Some but not all KBC is protected by IP rights, which are exclusive rights held by the owners of assets that qualify for legal protection under applicable IP laws. A significant portion of KBC is effectively 'open' in the sense that it is not protected by IP rights.

The value of KBC depends on how effectively it is used. The use of KBC that is protected by IP rights depends, in turn, on how effectively it is protected (so as to provide an incentive for creation and exploitation) as well as on ease of access and the level of transaction costs

The Purpose and Structure of Knowledge-based Capital Phase 2

Taking into account the outcomes of phase 1, phase 2 of the project focuses on three specific types of knowledge-based capital that need further explanation, hold the promise to generate growth and may warrant improved policy making: *i)* intellectual property; *ii)* data and data analytics; and *iii)* economic competencies (e.g. organisational capital, skills (human capital)).

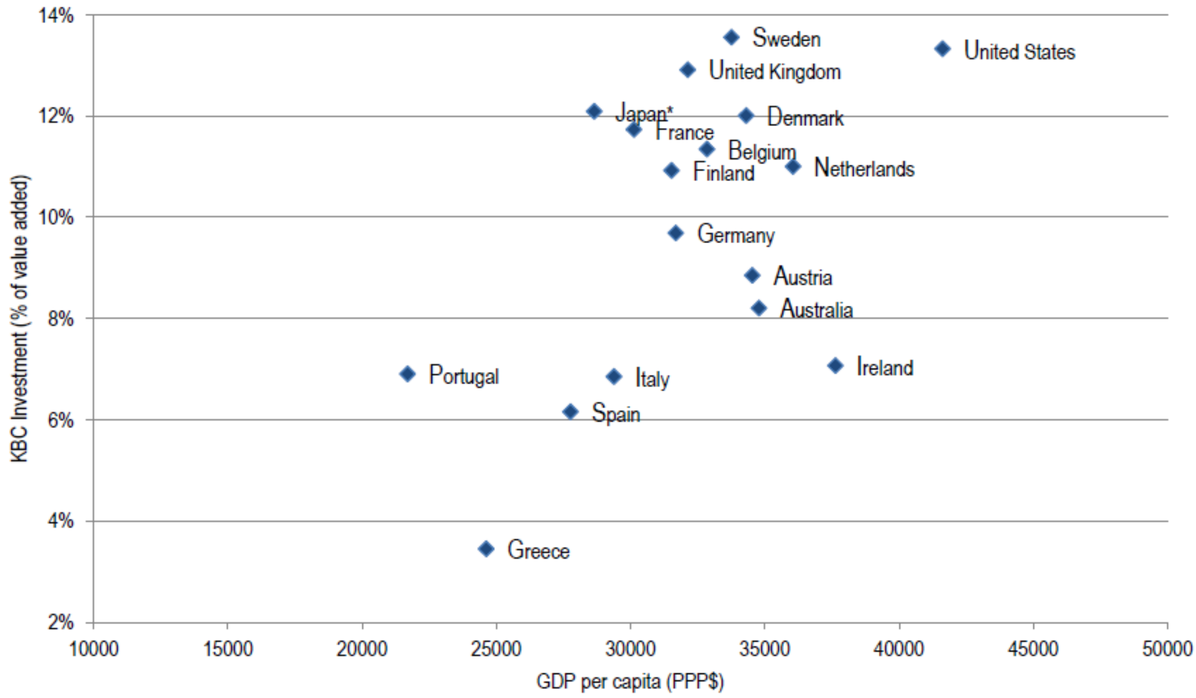
Phase 2 therefore encompasses three streams of work: *i)* Enquiries into Intellectual Property's Economic Impact; *ii)* Data-Driven Innovation – Unleashing Data for Growth and Well-Being; and *iii)* Economic Competencies. A stand-alone tax report, Taxation of Knowledge-based Capital: Non-R&D Investments, Average Effective Tax Rates, Internal vs. External KBC Development and Tax Limitations, has elements that relate to all three work streams.

Phase 2, conducted under the auspices of the Committee for Digital Economy Policy, involves seven other OECD Committees: the Committee on Fiscal Affairs, the Committee on Industry, Innovation and Entrepreneurship, the Committee on Consumer Policy, the Committee for Scientific and Technological Policy, the Health Committee, the Public Governance Committee, and the Trade Committee.

The context of phase 2's IP component: A changing landscape

One of phase 1's main findings was that business investment in knowledge-based capital is linked to growth and higher productivity. That link exists for two main reasons. First, in contrast to physical capital, once the initial cost of developing some types of knowledge is borne, the cost is not re-incurred when the knowledge is used again (in other words, KBC is "non-rivalrous"). That feature can create substantial economies of scale in production. Second, investments in many types of KBC create knowledge spillovers, which allow the benefits from an original investment to reverberate throughout multiple sectors of an economy. Studies have shown that business investment in KBC contributes 20 to 27 percent of average labour productivity growth in the European Union and the United States (OECD, 2013a at 6, 18, 20-22). As a share of GDP, the business sector in higher-income economies invests proportionally more in KBC. Figure 1.1, which is from the phase 1 report, illustrates that positive correlation (though it does not establish causality).

Figure 1.1. Business Investment in KBC and GDP per capita, average 2000-2010



Source: (OECD, 2013*a* at 16).

The two features underlying KBC's link to higher growth (non-rivalry and spillovers) contribute directly to another key finding of phase 1, which was that KBC has become more prevalent in OECD economies, not only spreading across many different industries but growing over time in the aggregate and developing into the largest form of business investment in an increasing number of countries (OECD, 2013*a* at 12, 13). Considering that KBC encompasses intangible assets like software, databases, R&D, worker training, market research, advertisement, and intellectual property, it is easy to see the point that KBC investment today is widespread. Furthermore, KBC is becoming a more tradable asset that is taking over the core of the global economy. Consider, for example, that most of the value in technology products and medicines is not in the physical materials with which those goods are made, but in the continuum of activities around the research, testing, and innovation required to develop them. Similarly, films, songs, and books are bought and sold not because of the form they take but because of the creativity they reflect. Even manufacturing staples like apparel can include substantial KBC, e.g. designs, in their value (Verdier, 2013.) As globalisation continues, the KBC inherent in those products is reaching, as well as emanating from, more and more markets. In countries such as the United Kingdom, Australia, Japan, the United States, and Canada, the significance of investment in KBC relative to investment in tangible capital has been growing for years (OECD, 2013*a* at 13).

Because so much KBC is protected by intellectual property rights, and given the findings that KBC is linked to growth and that it is becoming a more prevalent part of OECD economies, it is no surprise that IP-protected capital has taken on an increasingly prominent and extensive role in economic activity, as well. Whereas in some countries IP formerly had a smaller role and was considered relevant to a small number of sectors such as pharmaceuticals, information technology, music and books, IP's presence and influence are now economy-wide (OECD, 2013*a* at pp. 9, 47-48). Accordingly, IP is now a mainstream factor that has a substantial influence on economic performance in virtually every sector.

While IP's prominence has been growing, a number of developments have been significantly changing the way IP is created, disseminated, appropriated and used. Some of those developments, such as advances in digital technologies, have helped to make information more abundant, easier to access, and easier to store and copy. Those developments have also made it easier to obtain and distribute IP illegally. That accentuates the fact that IP rights are now more important than ever, as it is in everyone's long-term interest for stakeholders who create knowledge and artistic works to have well-defined, enforceable rights to exclude third parties from appropriating their ideas or the expression of their ideas without permission. This Report takes a closer look at IP's role in OECD economies while examining some of the most significant changes to the landscape in which it is operating. The Report targets several discrete areas rather than attempting to cover every possible issue.

This section begins with brief descriptions of the various types of IP rights and the incentives they provide. There is also a table that makes it easier to compare some of their important characteristics. These are followed by a description of the key developments that are affecting how IP systems are operating today.

Box 1.2 Intellectual Property Rights and the Incentives They Provide

IP rights are exclusive rights held by the owners of a variety of knowledge-based assets that qualify for legal protection under applicable IP laws. IP rights foster innovation, creativity, entrepreneurship, investment in knowledge-based assets, and growth. Types of IP and the incentives they bring about include:

- **Patents and utility models**, which mainly protect new technology-based inventions, i.e. products or processes that provide new ways of doing something or that offer new technical solutions to problems. Patents stimulate innovation by assuring inventors that qualifying inventions will not be used or sold legally without their permission, thereby enabling them (potentially) to recoup their investments and profit from them. Patents can also facilitate financing for start-ups by signalling that a firm has valuable assets. To obtain a patent, one must disclose the technical knowledge behind the invention, and patents eventually expire (generally 20 years after the filing date). Patents can enable further technological developments through the information they disclose. They also provide the security that can be necessary for licensing inventions.
- **Copyrights**, which protect and reward literary, artistic and scientific works, whatever may be the mode or form of their expression, including those in the form of computer programs and, in some jurisdictions, databases.[5] Note, however, that copyrights provide protection only against identical copies and non-original works, whereas industrial property rights (patents, design rights, and trademarks) provide wider protection that works against similar inventions or creations, too. Copyright laws also provide for certain exceptions and limitations. Their protections typically last 50-70 years after the death of the creator (and shorter periods for works whose term of protection is based on the date of fixation or communication to the public). Copyrights stimulate creativity by assuring individuals and businesses, large and small, that the original, expressive material they create will not be reproduced, adapted, communicated to the public, displayed, distributed or performed without their permission or otherwise used in a manner that violates the exclusive rights of the copyright owners. Copyright laws provide a foundation for and protect the opportunity of authors to obtain compensation, profit from, and take credit for the material that they create.
- **Design rights**, which protect new and/or original ornamental or aesthetic aspects of articles rather than their technical features. Designs render objects more appealing to consumers and increase their marketability or commercial value. By providing a measure of protection against unlicensed imitations, design rights promote investments in proprietary designs that create value for both consumers and businesses. Registered designs are generally valid for up to 15 years, but in some jurisdictions they are renewable up to a maximum of 25 years.
- **Trade secrets**, which encompass confidential business and technical information and know-how that a firm makes reasonable efforts to keep secret and that has economic value as a result.[6] Trade secrets do not have a fixed duration and can potentially last indefinitely. By offering a measure of protection for valuable information and relieving businesses of the need to invest in more costly security measures, some trade secret laws may encourage businesses to invest in the development of such information. Other trade secret laws focus solely on the prevention of misappropriation of trade secrets. Trade secret laws may also encourage businesses to engage in wider, though limited, dissemination of information than they otherwise would, such as by sharing sensitive information (subject to confidentiality agreements) with business partners. In that manner, trade secret laws can increase the likelihood of knowledge spill-overs.
- **Trademarks**, i.e. distinctive words, symbols and brand names that help customers identify and purchase products or services that meet their needs and expectations, e.g. in terms of quality or price. By protecting such words and symbols, trademark laws encourage businesses to invest not only in developing brand names, but in building strong reputations associated with those brands. Trademarks can be renewed indefinitely.

Geographical indications, which are signs used on goods having specific geographical origins and possessing qualities or reputations that are essentially attributable to the place of origin. Geographical indications differ from other types of IP rights in that they are a collective right rather than a unique right held by a particular individual or business. Geographical indication protection can be renewed indefinitely

Table 1.1. Characteristics of Different Forms of IP

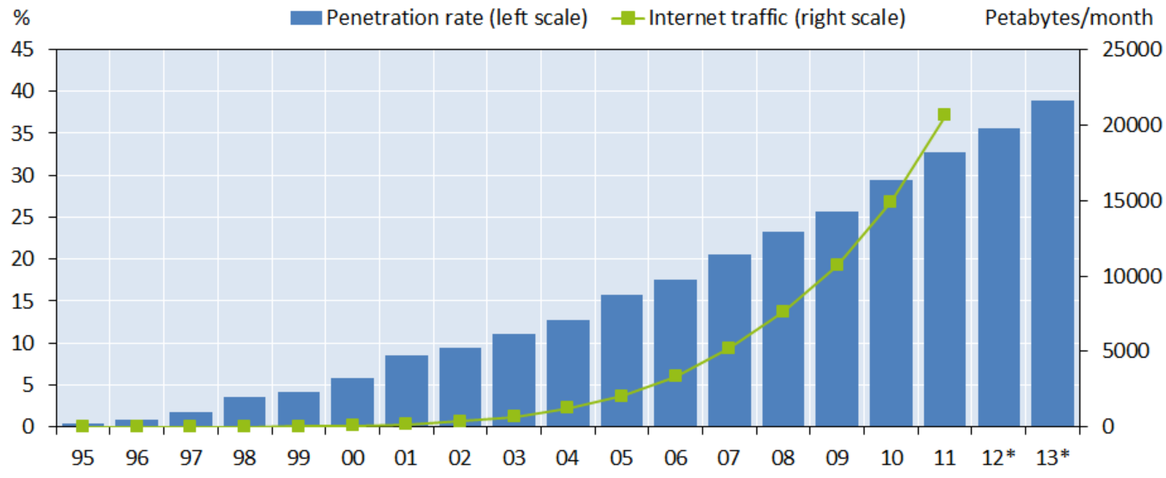
Trait \ IPR	Patent	Trade Secret	Copyright	Design Right	Trademark
Duration	Usually 20 years	Indefinite	Usually 50-70 years after creator's death	Not more than 25 years in most jurisdictions	Indefinite
Owner must disclose information	√			√ (if registered)	√
Protects against independent discovery	√				√
Protects against unauthorised production based on reverse engineering	√				
Protects work in progress		√	√		
Must be new or original	√		√	√	√
Must be useful	√	√			
Must be nonobvious	√				
Must be secret		√			
Must have value		√			
Registration fee	√		√ (if registered)	√ (if registered)	√ (if registered)
Legal enforcement cost	Expensive	Expensive	Expensive	Less expensive	Less expensive

The developments that have affected – and continue to affect – the generation, accumulation and exploitation of IP include:

Internet and Information and Communication Technologies (ICT). The growth of the Internet, including the mobile Internet, and advances in ICT capabilities have enhanced the interconnectedness of economic agents worldwide, facilitated information flows within and across countries, and fostered the development of the digital economy.[7] The Internet has enabled and encouraged innovation, new services and applications, and brought them to a global user base. As a result, the Internet has fundamentally altered the way people, businesses and governments interact. It is now an essential part of life in developed countries, as well as in many developing countries. At the same time, however, the Internet has provided opportunities for some to engage in unlawful conduct, including IP infringement.

The Internet's growth is depicted in Figure 1.2, which shows that almost 40 percent of the world's population today is connected to the Internet, whereas 15 years ago less than five percent was connected. Internet traffic has expanded even faster, reflecting higher volumes of data flow per user.

Figure 1.2. Worldwide Internet Users and Traffic, 1995 to 2013



Note: The Internet penetration rate is the number of people using the Internet as a share of the world population.

* Estimate.

Source: OECD (2014*a*), p.5 (citing International Telecommunication Union (ITU), Cisco VNI).

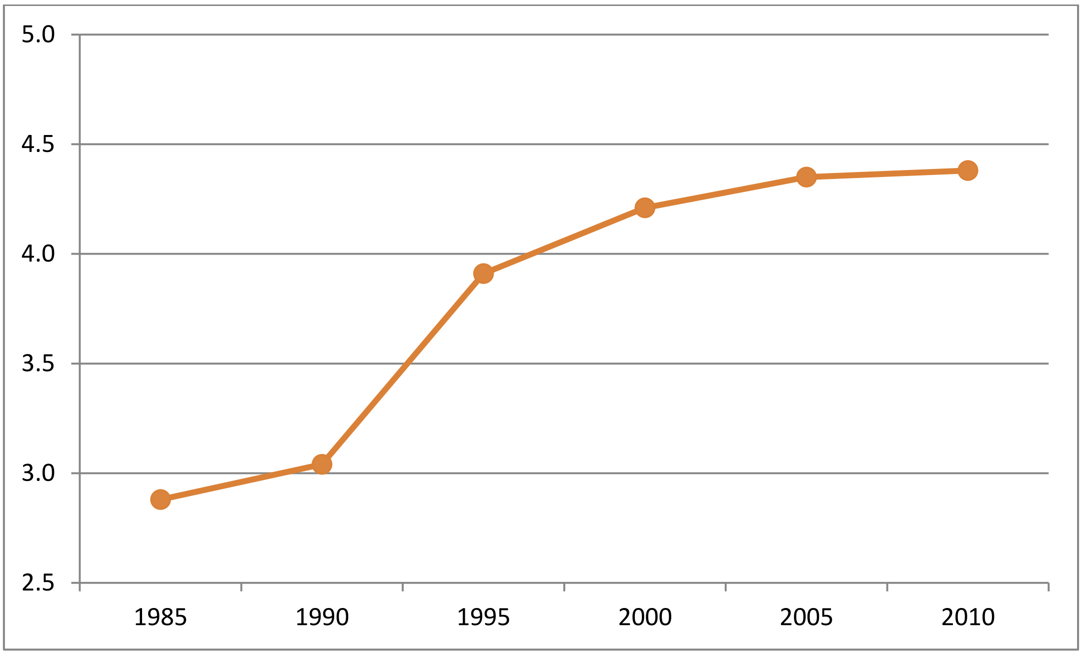
Meanwhile, advances in storage technology have enabled consumers to store more and more content, including on their mobile devices, enabling shifts in how, when, and where people consume, create, and share content that is, for the most part, protected by copyright.

The digitisation of content protected by copyright. Advances in ICT have also led to a world in which most commercial content, such as music, print media, and motion pictures, is digitised. The combination of digitisation and Internet growth has made production and distribution faster and cheaper, enabled new, innovative and successful businesses, and empowered the public to become creators and disseminators of countless new creative works and sources of information and entertainment. Great strides have already been made toward fulfilling the promise of digital technologies for creating, delivering, and consuming content legally. However, it has also made illegal copying and misappropriation of some creative works easier, instantaneous, free of charge, often profitable, and frequently without legal repercussions. The ease of misappropriation has led copyright owners to take new measures designed to strengthen and better protect their rights. They contend that, as a result of those measures, legitimate services are delivering a wide variety of works in a wide variety of formats to consumers. Other stakeholders argue that the measures have gone too far and are undermining legitimate exceptions for personal use and (in some jurisdictions) fair use, and are interfering with innovation. Meanwhile, the growth of digital content has also been accompanied by some confusion and frustration regarding the rules and terms of service in the online marketplace among consumers who may expect the same rights over digital copies that they have over physical copies (OECD, 2013*d*; Forbrukerrådet, 2007). Consumers would benefit from greater clarity about their rights and obligations under copyright laws and licensing terms found under terms of service and about how they can use digital products legally, safely and responsibly.

Stronger IP rights. While it is not universally a recent trend, IP rights have generally been growing stronger over the last 25 years. More types of inventions and creations have become eligible for protection (e.g. synthetically produced genetic material and computer software can be patented in certain countries, copyright protection has been extended to temporary copies in some jurisdictions, trademark scope has expanded to include "non-traditional" marks such as smells, colours, aural marks, and motion marks), the duration of copyright protection has generally been lengthened, some core and neighbouring rights have been added (e.g. with respect to copyright, a right of communication to the public/making available, digital performance rights, protection for technological protection measures, obligations concerning rights management information), as have measures designed to improve enforcement and legal remedies (e.g. border measures and ex officio powers for customs officers, pre-established/statutory damages, the creation of an Office of the United States Intellectual Property Enforcement Coordinator in the White House in 2013).[8] Some of these developments have resulted from obligations found in international agreements, such as TRIPS, the WIPO Copyright Treaty and the WIPO Performances and Phonogram Treaty.

The trend with respect to patent rights, for example, is expressed in Figure 1.3, using the OECD average of a well-known patent rights index.

Figure 1.3. Patent Rights Index, OECD Average Score*, 1985-2010



Source: Chart generated with data from Park (2008) (and subsequent updates).

*The OECD average was compiled with a data set including 32 of the 34 countries that are OECD Members as of 2014 (data for Estonia and Slovenia are not available; 1985 data for the Czech Republic, Hungary, and Poland, as well as 1990 data for the Czech Republic, are also unavailable and therefore are not included in the average).

The numbers on the Y axis estimate the strength of a country's patent protection regime on a scale of 1 to 5.The chart shows that the average strength of patent rights protection in OECD countries grew considerably through 2005 and then levelled off during the next five years.

To some extent, the enhancement of IP rights is a reaction to the other two broad changes that have been mentioned, Internet growth and digitisation. In other words, IP rights affect technology, and technology also affects IP rights. A recent report by The United States Department of Commerce (2013, p.

10), for example, identifies a list of “adjustments to copyright rights in the digital space” that have been implemented to enable IP owners to “exploit their rights effectively”:

> *In the United States, the most notable adjustments to copyright rights in the digital space have been the creation of a digital performance right for sound recordings; the application of the reproduction right to temporary digital copies; and the establishment of legal regimes regarding technological adjuncts to copyright, namely technological protection measures (TPMs) and rights management information (RMI). At the international level, there has also been explicit recognition of a “making available” right — i.e., the right to control making works available on demand to members of the public. Each of these adjustments represented an attempt to ensure that copyright owners retain the ability to exploit their rights effectively in the digital environment.*

The point of mentioning these changes to IP frameworks is that broader and stronger IP rights may encourage more IP to be generated, or greater creativity to develop[9], and that leads to certain questions that could interest policy makers: How much of that IP is translating into more innovation, jobs, creativity, and productivity? Are IP rights currently calibrated to maximise innovation and growth? If not, how can they be amended to achieve that goal? Alternatively, IP rights may still be too weak to keep pace with the disruptive changes that have affected some industries, e.g. those in the creative economy. The questions for policy makers remain the same in that case, though. Are IP rights currently maximising innovation and growth? If not, how can they be adjusted to achieve that goal? This Report does not attempt to answer such questions, but it does provide some tools and information that can help to develop answers.

The arrival of “big data”. Another effect of advances in ICT is that huge volumes of data and text from many sources can be more efficiently collected, sifted, analysed and reassembled into new forms to obtain a wide array of information and knowledge, and to identify correlations among different components of the text and data sets. ICT and big data have changed the way in which knowledge is created and, most importantly, appropriated and transferred. IP policies should balance the need to encourage further development of data analytics technologies, the need to preserve incentives for content creators and inventors, and the need for appropriate exceptions, such as for researchers under some circumstances.[10,11]

Globalisation. With trade liberalisation, greater trade flows, and more interdependence among economies, many business processes have been fragmented along global value chains (GVCs). Figures 1.4 and 1.5 illustrate how much GVC’s evolved between 1995 and 2009. The size of the circles represents the total amount of foreign value added embodied in an economy’s or a region’s total exports of goods and services for final demand (household and capital consumption). The arrows show the origin of the imported content and their thickness corresponds to the volume of the size of the flow they represent. Note that the arrows thicken substantially between 1995 and 2009, indicating countries’ greater dependence on imports.

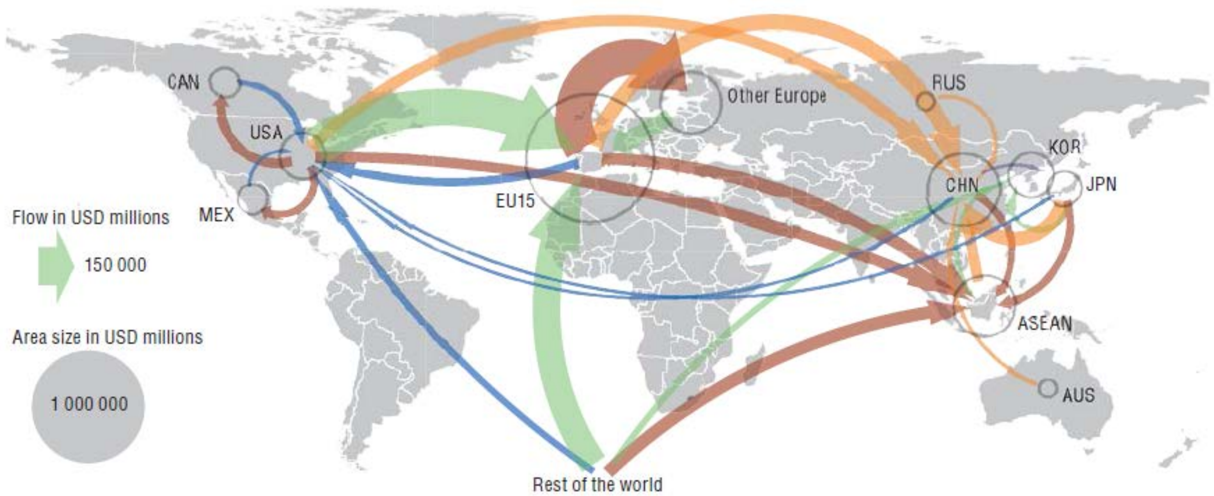
Figure 1.4. Foreign Value Added Content of Exports, 1995

Selected flows, by source country/region, USD millions, at current prices

Source: OECD, 2013c, p. 40.

Figure 1.5. Foreign Value Added Content of Exports, 2009

Selected flows, by source country/region, USD millions, at current prices



Source: OECD, 2013*c*, p. 41. See also ibid at pp. 250-251.

A consequence of globalisation is that different "parts" of a product may be subject to different IP regimes in different countries. This development calls for IP systems that are able to accommodate the more geographically diverse processes that businesses use to develop, manufacture, and distribute their products. In addition, globalisation has encouraged more companies that sell globally to file for IP protection in multiple jurisdictions. This is true not only for companies based in OECD countries, but for companies that are based in developing countries. As these companies strive to protect their KBC in the jurisdictions where they sell, they rely more and more on the capacity of IP systems in OECD countries.

Furthermore, at least with respect to copyright, the larger the number of separate territories in which a creative work is protected, the higher the transactions costs are for procuring global licenses (though collective rights management can mitigate this problem). Consumer frustration may arise when terms and conditions under which they access certain content do not permit the transmission of such content outside the licensed territory. Finally, globalisation and interconnectedness have raised the profitability of businesses that intentionally locate themselves in countries with weak IP protections so that they can execute business models that would be considered to be based on IP infringement in OECD countries.

Convergence in science and technology, as well as the rise of open access, are leading to greater intermingling of IP and more joint inventions. New technologies have been emerging out of the cross-fertilisation of different technological and scientific fields. As the work of biologists, engineers, physicists and people in many other fields becomes more integrated, scientists and entrepreneurs are finding themselves immersed in multiple IP disciplines. Synthetic biology is a good example. It involves silica modelling of DNA structures that are then created using real biological "parts" following a computer-aided design approach. Consequently, elements of biology (typically protected by patents) and computer programming (typically protected by copyright) are intermingled. In addition, phenomena such as open access[12] and open innovation have increased the frequency of joint inventions and authorships. It may not always be obvious how best to use IP frameworks to protect new hybrid technologies.

*Greater complexity at a fast rate***.** Today, products often rely on multiple inventions. An example is smart phones, which feature thousands of components, many of which are individually protected by IP rights, especially patents and registered designs. This fragmentation of IP rights may exacerbate problems like information asymmetries and hold-up, harming innovation and consumer welfare. Moreover, while products are growing more complex, technology is also changing quickly and that has implications for IP. Some industries have recently experienced a sharp acceleration in the pace at which innovation takes place and have adopted partitioning strategies to protect their inventions.[13] These lead to shorter product life cycles and possibly to patent congestion.[14]

In contrast, some firms use the pace of technological change as an alternative to heavy reliance on patent and registered design protection, staying ahead of competitors by innovating faster and making previous inventions obsolete quickly. Note that those firms are likely relying on trade secrets protection to some degree. The significance of that approach is reflected in some European innovation surveys that show patents and registered designs are not necessarily viewed as the most effective way to protect innovation. Instead, they reveal that most firms systematically consider lead time and secrecy to be more effective in protecting innovation (e.g. Arundel, 2001; Hall, et al., 2012).

Moreover, some innovators avoid heavy reliance on IP because they are concerned that it could slow innovation down. In their view, most innovation is incremental and if IP rights are too strong or too widely used, IP will retard progress by planting landmines and erecting tollbooths for subsequent inventors. This perspective originated with certain software hackers and academics and eventually helped to shape the development of open-software platforms like Linux, Android and Chrome OS.

Furthermore, the pace of innovation in some industries is raising doubts in the minds of some stakeholders about the universal suitability of IP systems for helping to solve major global challenges such as climate change. This was illustrated by the decision of Tesla Motors to open its patent portfolio, which Tesla said was a result of its disappointment with the slow pace of adoption of electric motor technology.[15]

Knowledge Networks and Markets. Knowledge networks and markets (KNMs) comprise the wide array of mechanisms and institutions facilitating the creation, exchange, dissemination and utilisation of knowledge in its multiple forms. The common defining feature of these mechanisms is that they provide critical services to actors in the innovation system throughout the process of exchanging knowledge and associated rights. These services range from searching and matching to relevant counterparties and knowledge objects, to evaluating, executing and enforcing agreements. Unprecedented levels of investment in KBC and information have driven the emergence of new KNMs for financing innovation and licensing IP, making it easier for start-up firms to secure the funding they need to develop their ideas (OECD, 2013b). For example, investment in KBC is encouraging new platforms (such as digital copyright exchanges[16]) that can make it easier, faster, and less expensive for firms, organisations and individuals to exchange knowledge and associated IP rights.

IP policy challenges (identified in phase 1 and elsewhere) that are addressed in phase 2/IP

The number and speed of the changes affecting innovative products and processes pose challenges to IP regimes. The phase 1 report identified many of those challenges. Other mainstream economic and policy dialogues have revealed several more. A subset of those challenges motivated the specific work undertaken in phase 2/IP.[17] That subset includes:

Estimating the economic significance of IP rights. Phase 1 showed that knowledge-based capital in general is an increasingly important component of today's OECD economies. But how much of that KBC takes the form of IP, and what can we do to improve our understanding of the relationship of IP systems for patent, copyright, design rights, and trade secrets to the performance of OECD economies? These questions are addressed in Chapter 2, Measuring the Technological and Economic Value of Patents, Chapter 4, An Empirical Assessment of the Economic Implications of Protection for Trade Secrets, Chapter 5, Copyright in the Digital Era: Country Studies, and Chapter 6, Design and Design Frameworks.

Developing tools to identify the prospective economic and technological value of inventions protected by patents. The challenge being addressed here is not so much a matter of estimating patents' financial value (although that problem requires attention, too), but rather their contributions to innovation. How can we determine whether that type of value has, on average, increased, decreased, or stayed the same over time? What methods are available to identify which sectors and countries tend to produce the most technologically valuable patents? These questions are addressed in Chapter 2, Measuring the Technological and Economic Value of Patents.

Identifying possible changes in society's net gain from IP systems and what, if anything, to do about them. IP rights effectively operate as an exchange between society and inventors/creators, rewarding innovative and creative work while giving society the benefits of greater technological and creative diffusion.[18] For example, governments award exclusive rights in the form of patents in exchange for the disclosure of the technology in the patent filing and the ability to use the invention freely after 20 years in most cases. Regarding copyrights, laws provide a framework that enables the author or copyright owner to prohibit unauthorised copying and dissemination, thereby encouraging the author or owner to create and to publish her creative work, and after a finite period the copyright expires and enters the public domain. Furthermore, the IP exchange may be affected by broad changes that have been taking place in OECD economies, such as the growth of the Internet, the proliferation of mobile devices, globalisation, the digitisation of content, and the growing importance of IP both to society and to rights holders. How does society benefit from existing IP regimes? How well does another form of KBC protection – trade secrets – perform in terms of spurring knowledge diffusion and growth? Do any policy adjustments need to be made to maximise IP's contribution as an ongoing source of growth in OECD countries? These questions were addressed by a group of 17 stakeholders who participated in a two-day Expert Workshop held in May 2014 as part of the phase 2/IP project. The discussions that took place at the Workshop are summarised in Chapter 8.[19]

Studying the mixed effects that IP systems may have on entry and innovation with respect to text and data mining. Although they may encourage innovation, creativity, and diffusion, IP systems today may occasionally obstruct those dynamics, as well. In an era of routine copying of digital text, data and images, some stakeholders are concerned that copyright law can hinder the emergence of certain types of Internet-based firms, e.g. businesses based on data or text mining. Likewise, some are concerned that copyrights and to some extent patents may impede scientists and other researchers who wish to use text and data mining techniques. Other stakeholders assert that any such problems are being addressed through innovative licensing strategies and market-based solutions or are already resolved through limitations such as enumerated exceptions or the fair use doctrine. These issues are addressed in Chapter 5, Copyright in the Digital Era: Country Studies, Chapter 7, Legal Aspects of Open Access to Publicly Funded Research, and Chapter 8, Summary of the Expert Workshop.

Determining how copyright regimes can continue to reward creativity and innovation as well as promote access by consumers and new businesses. Most commercial content is now legally available in a digital format. That development, paired with the worldwide growth of Internet usage, has made copying, distributing, and redistributing easier while making it harder to deter and prevent infringement. As a result, commercial content is often accessed and appropriated illegally. Ideally, copyright policies and Internet policies will work harmoniously and complementarily to promote creativity as well as innovation in the digital economy. Ensuring that they do is, in the words of United States Secretary of Commerce Penny Pritzker, “a critical and challenging task” (United States Department of Commerce Internet Policy Task Force, 2013, p. ii).

Indeed, a variety of stakeholders have expressed concern that copyright laws have not kept pace with evolving technology, and consequently several governments have conducted reviews of their copyright laws. In the United States, the Register of Copyrights testified before a Congressional subcommittee last year that although the United States’ copyright law is widely regarded as the most balanced in the world, it “is showing the strain of its age and requires [Congress’] attention”.[20] The Chairman of the House Judiciary Committee supports the idea of re-examining the law: “[I]t is my belief that a wide review of our nation’s copyright laws and related enforcement mechanisms is overdue. . . [T]here is wide agreement that the digital age has challenged our copyright laws in ways never imagined.”[21] Similarly, the EU’s Commissioner for Digital Economy and Society has noted that while there continues to be a need to protect intellectual property, copyright legislation also needs to be adapted to the digital era (Oettinger, 2015).[22]

Some academics have weighed in, as well, agreeing that copyright laws need to be reformed. For example, Gracz and di Filippi (2014) contend that copyright law has not adapted to the new reality of the Internet and digital technologies, resulting in the loss of its ability to regulate social dynamics concerning production, dissemination and access to creative works. “While copyright law has been, for many years, an effective body of law, constantly evolving to adapt to on-going technological advances and social or organisational changes, today, the copyright regime seems to have entered into a crisis, as the original rationale of the law has progressively been disrupted by the advent of Internet and digital technologies, and the radical change in contingencies that came along them” (ibid at 31).

Furthermore, a recent policy brief from the Lisbon Council states that “[c]opyright law is struggling to adapt to the dynamic of digital technologies” (Hargreaves & Hugenholtz, 2013, at 1). It elaborates that some researchers claim that copyright interferes with their work by obstructing text and data mining, cultural organisations are not sure how to make their archives legally available for digital public use, consumers have difficulty accessing content that should be available to them, creative industries cite the financial effects of Internet-based infringements, authors say they are not being paid, some firms contend it is too difficult to get cross-border licenses in Europe, and judges need more guidance on how to apply copyright laws in the digital, online world.

Others agree that changes are necessary but focus more on the need for better enforcement. For example, in a piece supporting proposed legislation to combat online piracy, Castro (2010) argues that more robust copyright enforcement in the digital realm would not only be desirable for content creators, but it would make consumers better off. A recent report by the United States Department of Commerce Internet Policy Task Force (2013, p. 41) takes a balanced approach, noting that "there are a number of respects in which the existing array of tools against infringement has become insufficient" and that "[t]he tools for protecting and enforcing rights must keep pace – as with rights and exceptions, they need regular updating."

Still other commenters believe the current laws are sufficiently flexible to enable adaptation to the digital age, at least within the EU. See, for example, Depreeuw & Hubin (2014) and Charles River Associates (2014). Indeed, there are academics and stakeholders who believe that copyright is not an obstacle either to the development of business on the Internet or to access to science and culture. Instead, they contend that most of the identified roadblocks are linked to other issues such as cultural traditions and linguistic differences, as well as certain commercial practices by IT companies themselves, differences regarding the level of taxation, or cross-border payment difficulties.

Thus digital technologies have presented new opportunities for creative industries and consumers but have also brought a host of complex legal and other challenges for creators, consumers, and policy makers. The resulting discussion too often has been characterised as a clash of two extreme positions. That is an oversimplification because the choices are not binary and, in reality, there are multiple positions. One of them is that digitisation and the growth of the Internet diminished copyright protection and effective enforcement, thereby harming incentives to fund, create, and distribute new artistic material. Another view is that copyright is impeding innovation, creativity, free expression, and emerging businesses, and limiting consumer access to and use of creative works, so there should be more exceptions. But there are multiple gradations of thought between those two poles. Moreover, value may be found in innovation outside of policy making or through voluntary activities in the private sector. Accordingly, there are also stakeholders who argue that new licensing strategies and access control technologies, for example, are overcoming the problems associated with digitisation and the Internet while providing consumers with access to a wider range of content than they have ever had. Recently, the debate appears to be shifting toward a thoughtful assessment of the current balance of rights, exceptions, and responsibilities in the copyright system, taking into account the interests of all stakeholders.

In particular, several governments have completed or initiated comprehensive reviews of their copyright laws. That group includes the following, among others:

- The United Kingdom's Prime Minister commissioned the Hargreaves Report, which looked into ways that the copyright regime might be reformed to work more effectively in the digital era (Hargreaves, 2011). The government implemented several of those reforms in 2014, including new exceptions for text and data mining for non-commercial research (Intellectual Property Office & Viscount Younger of Leckie , 2014), and for personal copying for private use and parody, character and pastiche, and an extended exception for quotation (Intellectual Property Office, 2014).
- In the United States, the Department of Commerce's Internet Policy Task Force observed in a July 2013 report that while "[d]igital distribution and a proliferation of consumer-friendly devices have given American consumers more choices than ever in how they access and enjoy copyrighted works . . . we face a renewed challenge to assure that copyright law continues to strike the right balance between protecting creative works and maintaining the benefits of the free flow of information."[23] As noted, the House of Representatives' Judiciary Committee is conducting a wide review of United States copyright laws and enforcement mechanisms to determine whether they need updating in the digital age.

- The European Commission (2012) is undertaking a process to modernise the copyright framework to make it suitable for the digital age.
- The Australia Law Reform Commission (2014) conducted an inquiry on copyright exceptions in the digital economy.
- The Dutch Ministry of Economic Affairs commissioned a law and economics research report exploring the possibility of introducing more flexibility into the system of exceptions and limitations in Dutch copyright law (Van der Noll, et al., 2012).
- Canada reformed its copyright law in 2012 to better account for the impact of the Internet and digitisation.[24]
- In 2013, Ireland’s Copyright Review Commission released a report weighing the possibility of modernising the copyright law (Copyright Review Commission (Ireland), 2013).

The public debate involves several difficult policy questions. The Internet has enabled the development of a vastly improved digital marketplace of creative works and more of them are becoming available to more people in new and diverse platforms. Still, more work remains to reach the full potential of the digital marketplace. How can governments provide an appropriate level of protection – one that will encourage creative expression and foster new, innovative firms whose legitimate business models depend on copyrighted digital content? At the same time, what can governments do to facilitate consumers’ lawful access to the broadest possible array of digital content? How have enhanced enforcement remedies actually affected creative content generation, consumption, dissemination, and innovation in the digital era? Should they be complemented by other measures (e.g. consumer education, more efficient markets for licensing digital content)? Are current statutory exceptions to copyright protection still adequate? How do those exceptions affect copyright owners, creative output, and social welfare? While those broad questions cannot be definitively answered anywhere, including in this Report, information that is helpful in addressing them appears in the Chapter 5, Copyright in the Digital Era: Country Studies, and Chapter 8, Summary of the Expert Workshop.

Are IP systems meshing well with open access initiatives? Internet growth, content digitisation, and expanding “big data” and data analytics capabilities have also affected the ways in which publicly funded research results are accessed, disseminated and used. It has become increasingly easy to share and process such information. Generally speaking, “open access” refers to greater access to scientific articles and data produced from publicly funded research, which can lead to more collaboration, greater dissemination of results, and increased engagement with society.[25]

Open access raises a number of IP policy questions, though, such as how to delimit research exceptions to copyright. Both the benefits and the risks of greater openness in science should be well understood, but the optimal degree of openness with respect to public research is not obvious. For example, competition drives excellence in science and innovation, but making all aspects of every researcher’s work publicly available would be detrimental to incentives to compete and therefore to the quality of the results. Researchers want to disseminate their papers widely and gain prestige, but they usually do not want to give away their underlying data for others to use.

How does IP affect the efficiency of research systems and the speed of knowledge diffusion? Other IP-related open access questions include how to define research exemptions, how to optimise licensing schemes for all stakeholders, data use and re-use, and IP rights for large datasets that are automatically generated by machines. These topics are discussed in Chapter 7, Legal Aspects of Open Science and Open Data and Chapter 8, Summary of the Expert Workshop.

Aims of Phase 2/IP

The main objectives for phase 2's IP project, in responding to the policy challenges set out above, may be summarised as:

- To identify better measurement techniques, statistics and indicators to underpin the analysis of IP's relationship to economic performance, innovation, productivity and growth

- To improve understanding of the role of IP in economic performance, innovation, productivity and growth

- To improve understanding of how digitisation, globalisation and the growth of the Internet are affecting IP use, enforcement, system effectiveness[26], and policy

The following section sets out the report's key findings in support of those objectives.

Key Findings

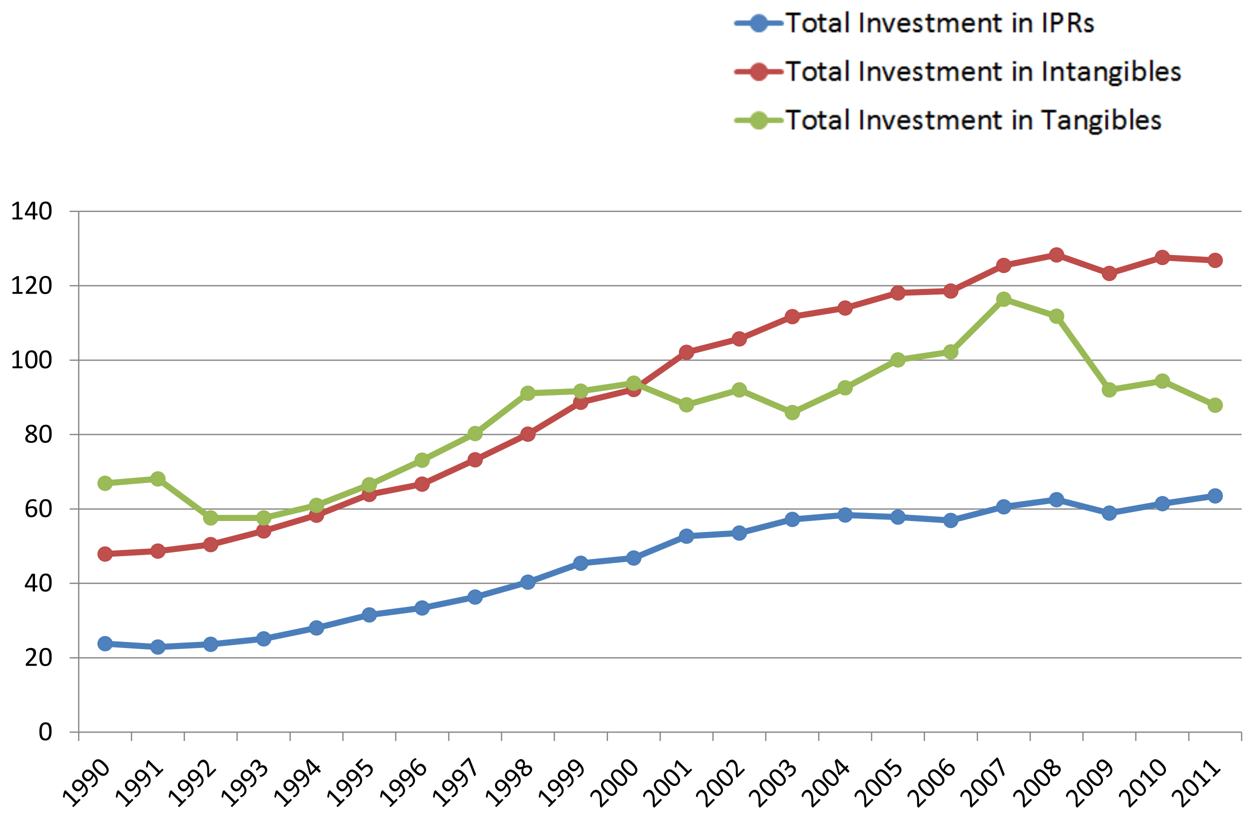
The Importance of IP to OECD Economies

Whether it is appraised in terms of its connection with investment in KBC, salaries, exports, or value added, intellectual property's economic impact is significant and has grown considerably over the past 25 years. Expanding not only in overall magnitude but across sectors, IP-protected capital has become an increasingly important component of advanced economies. Among the various types of IP, copyright stands out for the growth in and level of the investment it attracts, as well as its connection to job growth, according to the available data.

Looking at evidence on IP's aggregate role, three main points emerge: IP's economic importance has grown over time, investment in IP-protected assets was resilient during the recent recession, and that investment is growing much faster than investment in physical assets.

Figure 1.6, for example, illustrates all three of those points. It shows that total nominal investment in intangible assets protected by IP rights (represented by the blue line, which aggregates investments in copyrights, trademarks, registered and unregistered designs, and patents) in the United Kingdom was more than 2.5 times greater in 2011 than it was in 1990. It also shows that investment in IP rights barely declined after the financial crisis of 2008 and has since recovered. In addition, it shows that nominal investment in tangible assets was lower in 2011 than it was in 1998. Meanwhile, investment in IP-protected assets as a share of all investment in intangible assets held steady throughout the 21-year period at just under 50 percent in most years. Finally, total investment in IP-protected assets as a share of investment in tangibles grew from 36 per cent to 72 percent between 1990 and 2011 (see Table 2, as well). On the whole, the figure reveals that between 1990 and 2011 the United Kingdom transformed from a mainly tangibles-based economy to an economy driven primarily by intangibles, of which IP-protected assets are a major component. Note that the IP line does not include investment in assets protected by trade secrets.

Figure 1.6. Total UK Investment in Tangible and Intangible Assets, including IP (nominal billions of GBP)



Source: The figure is derived from data in Goodridge, Haskel, & Wallis (2014), pp. 9, 29 and from supplementary data kindly provided by Professor Goodridge.

WIPO data on worldwide IP filing trends, while different from data measuring monetary investment in IP, nevertheless suggest that the United Kingdom's experience is not unique, at least with respect to the points that IP's economic significance is growing and that it was resilient during the recession. Global filings for patents and registered designs declined in 2009, but they have recovered sharply and are now growing even faster than they were before the crisis. In 2012, patent filings grew by 9.2 percent, faster than any other annual increase in the past 18 years. Industrial design counts grew by an all-time record rate of 17 percent (WIPO, 2013).

Another report (United States Department of Commerce, 2012) also uses a different type of data but paints a picture of IP's overall economic significance that is roughly consistent with the reports from WIPO and the United Kingdom. Taking into account patents, trademarks, and copyright, this report identifies a group of 75 United States industries as IP-intensive. It then finds that there were 27.1 million jobs in those industries in 2010, which was 18.8 percent of all jobs in the United States economy. In terms of value-added, the IP-intensive industries contributed just over USD 5 trillion, or nearly 35 percent of GDP. Moreover, direct employment in the wake of the global financial crisis recovered 60 percent faster in IP-intensive industries than it did in non-IP intensive industries (comparing 2011 to 2010). Jobs in the IP-intensive sectors had higher average salaries, as well – 42 percent higher in 2010. What is more, IP-intensive industries exported more than 60 percent of all the merchandise exported by United States industries in 2010.

Similar or higher figures exist for the contributions of IP-intensive industries to the European Union's GDP (38.6 percent) and to total employment in the EU (77 million jobs, or 35 percent of the total), with average earnings in these industries around 40 percent higher than the overall average across the economy. Furthermore, IP-intensive industries account for more than 90 percent of all the merchandise exported from the EU (European Patent Office & OHIM, 2013). IP's economic resilience is also reflected in detailed service sector statistics on the IP "leasing" sector in the United States. Total revenues in the sector amounted to USD 20 billion in 2010, a four percent (nominal) increase over 2009, which is notable considering that the economy was in recession at that time (OECD 2013*b*, p. 11).

One more message that emerges from these numbers is that IP is no longer a boutique policy consideration, relevant to only a small number of industries. It has become more prominent as investment in intangible assets has gained ground on and, in some economies, overtaken investment in tangible assets. IP now reaches into more sectors than ever before. "IP is used everywhere in the economy, and IP rights support innovation and creativity in virtually every U.S. industry" (United States Department of Commerce, 2012). IP has reached a point where it warrants mainstream consideration, akin to competition, tax or trade policy.

Various types of data are also available on the *relative* economic significance of different types of IP rights. Table 1.2, for example, shows patterns of UK market sector investment in copyright, design, trademarks, and patents from 1990 to 2011.

Table 1.2. UK Market Sector Investment in Tangibles, Intangibles, and IPRs (nominal £billions)

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
Investment in Patents	2.9	3.3	4.3	5.1	5.2	5.8	5.9	5.8	5.9	6.3
Investment in Copyright	9.2	14.0	22.1	29.3	26.7	28.6	29.9	27.0	29.1	30.1
Investment in Registered Design	1.0	1.0	1.4	1.7	1.7	1.9	1.9	1.8	1.8	1.9
Investment in Unregistered Design	5.9	6.1	8.3	10.1	10.6	11.3	11.5	11.1	11.1	11.2
Investment in Trademarks	4.8	6.7	10.2	11.7	12.7	13.2	13.4	13.1	13.5	14.0
Total Investment in IPRs	23.8	31.1	46.3	57.8	56.9	60.6	62.5	58.9	61.4	63.5
Total Investment in Intangibles	47.9	63.9	92.1	118.1	118.6	125.5	128.3	123.3	127.6	126.8
Total Investment in Tangibles	66.9	66.5	93.8	100.1	102.2	116.4	111.8	92.0	94.4	87.9

Source: Goodridge, Haskel, & Wallis (2014), pp. 9, 29 and supplementary data kindly provided by Professor Goodridge. Note that trade secrets are not included in this table.

The table reveals several notable facts about investment in particular types of IP in the economy of the United Kingdom:

- Investment in patents is quite small relative to investment in assets protected by copyright, unregistered design, and trademarks. In 2011, investment in patents was just 21 percent of the investment in copyright, for example.

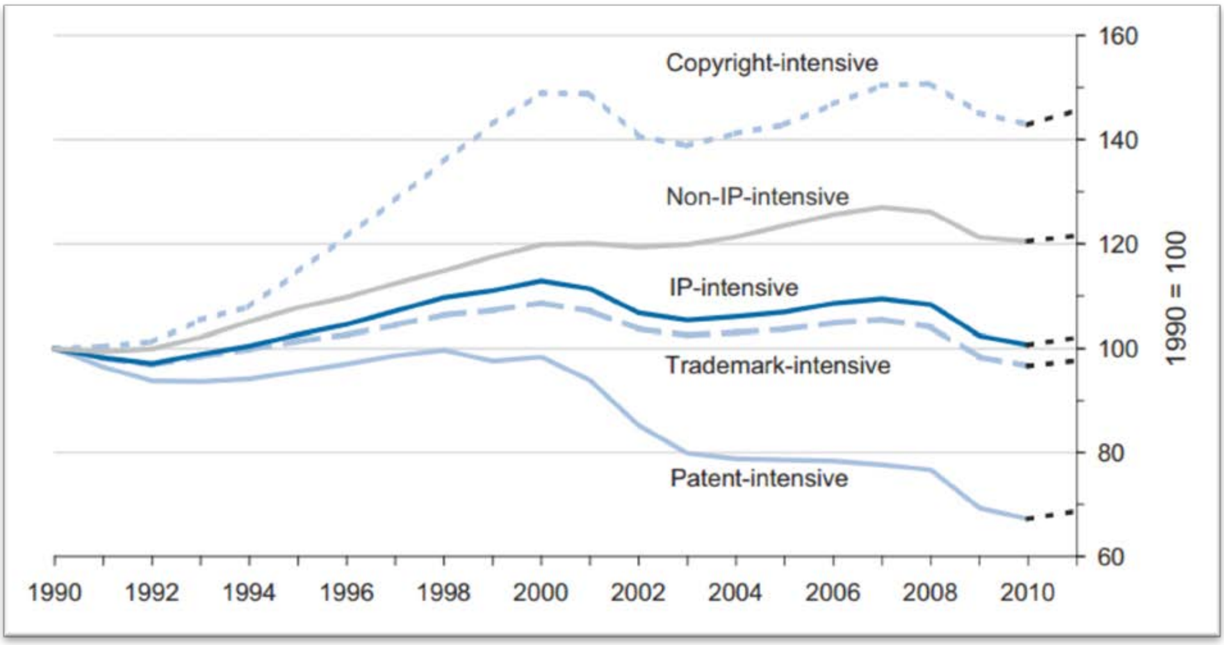
- Investment in copyright has grown more than investment in any other form of IP (with the possible exception of trade secrets), more than tripling on a nominal basis between 1990 and 2011. Growth in investment protected by trademark was a close second, growing slightly less than threefold during that period.

- Copyright, as of 2011, was by far the largest component of IP-protected investment (again, putting trade secrets aside as a possible exception), drawing more than twice the amounts invested in unregistered design and trademarks, respectively. Of all investment in IP rights, 47 percent was in copyright, 22 percent in trademark, 18 percent in unregistered design rights, 10 percent in patents, and three percent in assets protected by registered design rights.

- Investment in unregistered designs is substantial, approaching the level of investment in trademarks.

Copyright also has a strong showing in employment data from the United States. Figure 1.7 shows that job growth in copyright-intensive industries far outpaced that in trademark and patent-intensive industries from 1990 to 2011. In fact, employment contracted in the latter industries during that period, and markedly so with respect to the patent-intensive group.

Figure 1.7. Indexed Employment in IP-Intensive US Industries, 1990-2011



Source: (United States Department of Commerce, 2012, p. 40). Note that the Figure does not account for design right- intensive or trade secret-intensive industries.

Notably, copyright protects a significant amount of software investment in much of the world (especially where software is mostly not patentable) and, in terms of employment and gross value added, the IT, software, and computer services sector sometimes overshadows the rest of the ‘creative industries’ (Department for Culture, Media & Sport, 2014).

To the extent that this chapter devotes more space to copyright issues than to issues related to other types of IP, a key reason is that according to the available data, copyright’s dynamic role in economies appears to be more prominent than that of other kinds of IP.

Copyrights

Whereas patents protect ideas, copyrights protect the expression of ideas. But both forms of IP address the same underlying problem: if anyone is free to use or copy the inventions and creations of others, then the incentive to produce those inventions and creations dwindles. Effective copyright protection motivates creative outputs as well as their legitimate dissemination to the public.

Analysis of copyright’s role in economic performance is significantly hindered by a lack of data (see section 3.7). Chapter 5 of this Report provides an indication of copyright’s performance, though, with a set of 12 country studies.[27] Those studies illustrate how copyright-intensive industries[28] have performed, in terms of the value added and employment they provided[29], as they adapted to Internet growth, content digitisation, and globalisation. While the adaptation process is necessarily incomplete because technology will continue to evolve, the country studies suggest on the whole that the economic performance of copyright-intensive industries has been stable so far. When one considers that the period studied[30] includes a substantial and sustained global economic downturn, the “stable” performance takes on a more impressive aura.

Most of the countries in the sample reported positive growth, on average, in the value added generated by copyright-intensive industries. That corresponds with a total change (across the whole time range examined for each country, not per annum) in the share of GDP for the copyright-intensive sectors that ranged from a decline of 1.5 percent to an increase of 0.9 percent.

Employment figures for the copyright-intensive industries paint an overall similar, stable picture. During the analysed periods in the sample countries for which data are available, the number of employees in copyright-intensive sectors either grew or underwent a slight contraction. In the most recent year for which data are available (depending on the country), the copyright-intensive industries employed 2.3 to 5.6 percent of the workforce.

Patents

Global filings for patents are now growing faster than they were before the financial crisis struck. In 2012, they grew by more than 9 percent, the fastest annual increase in 18 years (WIPO, 2013, p. 6). The number of patents granted worldwide also grew in 2012. The increase of 13.7 percent over 2011 propelled the total above one million for the first time. Moreover, approximately 8.7 million patents were in force in 2012 (ibid at 7).

In addition, during the past few years, companies have paid previously unheard of amounts to acquire other companies’ patent portfolios. In some cases, buyers simply buy an entire patent-rich firm. For example, Google acquired Motorola and its extensive collection of patents for more than USD 12.5 billion (though, in the end, Google kept only Motorola’s patent portfolio, selling off other parts of the business, and it estimates that the portfolio cost between 2.5 to 3.5 billion (Helft, 2014)). Nortel auctioned off its patent portfolio for USD 4.5 billion.

While trends in patent filings and grants, as well as their market value in some high profile transactions, begin to provide a sense of patents’ economic significance, homing in on their relationship with innovation is a more elusive goal. It introduces a great deal of complexity. The effects of patents on innovation vary substantially from industry to industry, making it difficult to describe the relationship in universal terms. But it can be said that when academics started to examine the role that patents play in innovation in the 1980s, they found that patents were less crucial than many had believed. Firms in only a small number of industries, such as the chemical and pharmaceutical industries, tended to mention patents as an important factor in motivating their R&D investments. Elsewhere, patents were not considered to be very effective in protecting innovations (Levin, et al., 1987).

A later study showed that most firms rely on patents the least among various methods for protecting the returns from their inventions, whereas secrecy and lead time are used most heavily (Cohen, et al., 2000, based on a survey of nearly 1500 R&D labs in the United States manufacturing sector). Indeed, while results varied by sector, the authors concluded with respect to product innovations that “patents are unambiguously the least central of the major appropriability mechanisms overall” and that “in no industry are patents identified as the most effective appropriability mechanism” (Cohen, et al., 2000 at 9).[31] In another survey (Jankowski, 2012), more businesses in the United States identified trademarks and trade secrets as important forms of IP protection than any other. Copyrights were third, followed by patents.

Nevertheless, there has been a surge in the number of patents issued during the past 20 years or so.[32] A possible explanation for that is simply that there has been a sizeable increase in innovative activity, so there is more to patent. Several empirical studies have cast doubt on greater innovation as the primary cause, though. Instead, the studies attribute the patent surge to factors such as declining patent application fees and growing pressure to build up large patent portfolios for the purpose of negotiating with other patent holders.[33] Furthermore, the picture is muddled by the fact that China has been the main engine behind the surge in recent years (WIPO, 2013, pp. 3, 49), which could reflect either greater innovation taking place there or that globalisation has strengthened Chinese inventors’ incentives to file for patent protection – or both.

In principle, patents encourage innovation in several ways. First, they give inventors greater incentives to invent by providing a measure of protection against imitators, who might otherwise let the inventor do all the hard and costly work of developing a technology and then simply copy it, making it difficult for the inventor to earn an attractive return. Second, in exchange for that protection, patents require the inventor to tell the public that the technology exists, to explain how it works, and to forfeit exclusive rights to the invention after a fixed period (usually 20 years). That enhances the process of knowledge diffusion by helping others to understand the invention and improve upon it or incorporate it in a new invention of their own. In other words, there is a technology spill-over effect that stimulates new ideas. Another benefit of disclosure is that it tends to decrease redundant R&D investments by firms who might otherwise continue trying to develop exactly the same technology. Finally, patents add to knowledge diffusion by facilitating exchanges via licensing agreements.

A number of countries began to strengthen their patent rights in the 1980s and have generally continued to do so. As a result, patentability extended into new fields, the rights themselves were enhanced, and they generally became easier to obtain. Commentators began to raise concerns in the late 1990s that too many patents were being issued, that their claims were too broad, and that the rights they conferred on patent holders were too strong.[34] The result, the critics claimed, was that innovation was actually being discouraged because it had become so difficult and costly to identify the patents that might be relevant to an invention and to pay for any necessary licenses.

Mark Lemley (2008) asserts that companies in some sectors have responded with an unexpected approach: They ignore patents.

> [B]oth researchers and companies in component industries simply ignore patents. Virtually everyone does it. They do it at all stages of endeavour. From the perspective of an outsider to the patent system, this is a remarkable fact. And yet it may be what prevents the patent system from crushing innovation in component industries like IT. Ignoring patents, then, may be a 'workaround' that allows the innovation system to function in the face of overbroad patent protection.[35]

Many empirical studies have been conducted to analyse the effects of changes in patent protection. Some of them concluded that while stronger patent rights contribute to a significant increase in the number of patents granted, they have little effect on R&D expenditures, which suggests that they are not boosting innovation significantly.[36] Other studies suggested that expanding patent rights into new areas like software led to a kind of patent stampede, in which firms rushed to collect patents on existing technologies for use as bargaining chips in licensing negotiations (Bessen & Hunt, 2004). Still others found that policy changes such as raising the amount of compensation awarded in patent infringement litigation are not perceived by firms as having a significant impact on their innovative activity (Motohashi, 2004). Finally, a recent OECD study using panel regression techniques to assess determinants of private sector innovative activity, proxied by R&D expenditure, across 19 countries found that strengthening patent rights had no statistically significant effect on firms' R&D investment (Westmore, 2013, pp. 21).

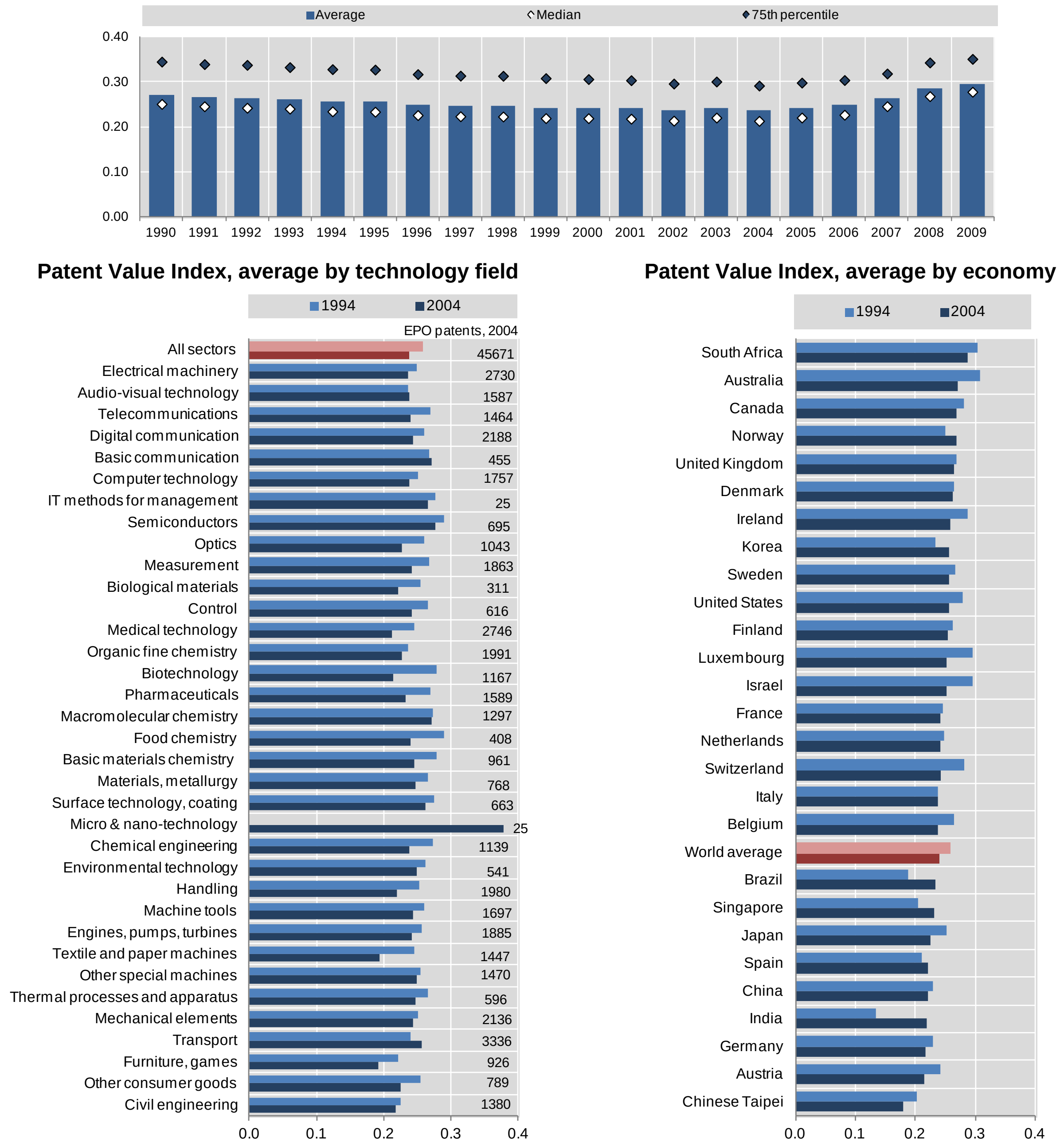
To help shed more light on the patent-innovation relationship, Chapter 2 of this Report provides a way to estimate the technological and economic value of patented inventions and the impact they may have on subsequent technological developments by proposing 13 indicators.[37] The indicators use measurable factors such as patent family size, backward citations, forward citations, and patent renewal. These factors enable analysis at the individual patent level as well as at the aggregate patent portfolio level. They can be used to study policy-relevant topics such as: firms' innovation strategies and performance; enterprise dynamics, including the drivers of enterprise creation and of mergers and acquisitions; the determinants of productivity; the output of R&D activities and the returns to R&D investments; and the output of universities and public research organisations. The Chapter therefore paves the way for future work that could better illuminate the contribution of patents to innovation and productivity.

So far, the indicators developed in Chapter 2 have been "test-driven" with statistics compiled from patent applications filed with the European Patent Office (EPO) during the period 1990-2009 and sorted according to the country of residence of the applicants.[38] Each indicator suggests that some countries have relatively strong innovative abilities and that some have relatively average or weak abilities. The results vary from indicator to indicator. But Chapter 2 also includes an experimental composite index that is based on a group of several relevant factors, whereas the other indicators look at only one factor at a time. OECD researchers generated results using three different definitions for this composite index, and those results were consistent in that they all suggest (again, this takes into account only EPO data):

- The average technological and economic value of inventions protected by patents has eroded over time, at least through 2004.[39] There might be a number of reasons for that erosion, including procedural aspects like patent application backlogs as well as strategic behaviours like defensive patent filings
- Patented micro and nano technologies have the highest economic and technological value (although there is a relatively small number of observations in that sector)
- Australia, Canada, Norway, South Africa, and the United Kingdom are the countries with the highest average technological and economic patent values.

The graphical results derived from one of the three versions of the composite index[40] appear in Figure 1.8 for illustrative purposes.

Figure 1.8. Composite Index of Patent Value, 1990-2009



Note: The composite index of patent value is based on the average value of its normalised component, by cohort of filing date and technology fields. The average by economy is provided only for economies with more than 50 patents reporting the index in 2004. The index is based on patent applications filed with the European Patent Office during the period 1990-2009. The economies listed in the "Patent Value Index, average by economy" refer to the country of residence of the applicants. The index does not intend or enable a comparison of the value of national patents of different economies.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

It must be emphasised that these results are a function of the particular data set and time period used. The purpose of showing them here is to provide an example of what the composite indicator can do. It is certainly possible that the results will be substantially different when data from another patent office and/or from another time period are used in the indicator algorithms.

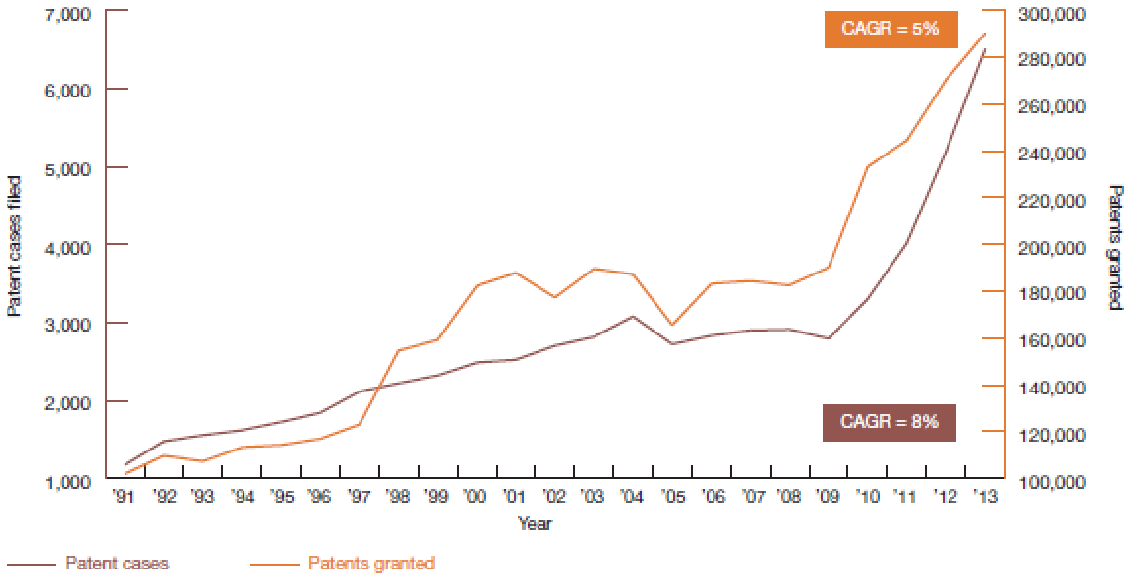
As mentioned above, the patent value indicators could be used to study a variety of research topics of potential interest to policy makers. In fact, the OECD’s Economics Department has already used them as part of an econometric study of the extent to which changes in the patent stock are associated with flows of capital and labour to patenting firms (OECD, 2014*b*). Specifically, the study used the radicalness indicator (roughly defined as measuring how different an invention is from existing inventions) in concluding that when firms add patents that have higher-than-average radicalness scores, they experience larger-than-average increases in employment, capital stock, and turnover, among other factors. The study also found that young firms are more likely to file radical patents than older firms (OECD, 2014*b*, p. 26 and Tables 7 and B7).

The indicators could also be used, for example, to learn more about patent assertion entities (PAEs) and the environments in which they operate. That type of work has not been done, nor is it planned at the OECD, but it is an example of the indicators’ many potential applications. PAEs are firms that generally do not invest in research, apply for patents or use patents to produce goods and services, but rather acquire patents and use them to generate licensing revenues through negotiation and litigation. PAEs were traditionally viewed as benign or even beneficial entities that help small inventors to profit from their inventions. More recently, the behaviour of some PAEs has raised concerns that they are exploiting low quality patents (meaning patents with inaccurate claims or patents awarded for inventions that are not genuinely novel or non-obvious), combined with the high cost of litigation in patent systems, to achieve unjustified settlements. Such behaviour could increase the cost of the affected products and retard innovation.

PAEs can be aggressively litigious, using infringement lawsuits, and the threat of filing them, to persuade or force other firms to pay for licenses. The impact of PAEs in some jurisdictions, particularly the United States where patent litigation is very expensive and courts do not traditionally require the loser to pay the cost of litigation, raises questions about the economic nature of the patents that PAEs use to drive their business model. Do they tend to have relatively high technological and economic value? Relatively low values? Do they merit the incomes they are generating in settlements and infringement awards?

Litigation statistics suggest that these questions are worth investigating. A report by the United States Government Accountability Office (2013) found that the number of defendants in patent infringement lawsuits increased by nearly 130 per cent between 2007 and 2011, with PAEs responsible for about 20 per cent of the lawsuits during that period. A newer study by PricewaterhouseCoopers (PwC) (2014) indicates that the latter figure has already risen substantially since 2011. It shows that PAEs now account for 67 percent of all new patent lawsuits in the United States – and that has happened during a period when growth in the total number of patent lawsuits filed is outpacing growth in patents granted (see Figure 1.9). In other words, there is more patent litigation than ever, and a large and increasing share of it is due to PAEs.

Figure 1.9. Growth in Patent Case Filings versus Patents Granted (US), 1991-2013

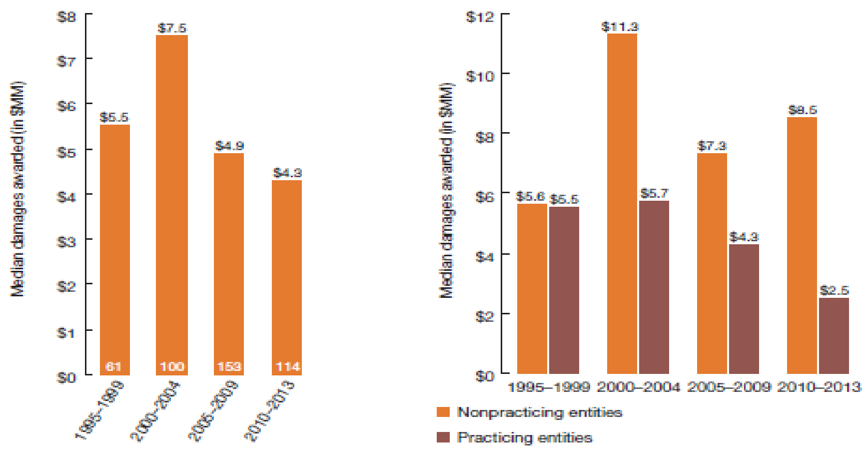


Years are based on September year-end.

Source: PricewaterhouseCoopers (July 2014), based on data from United States Patent and Trademark Office, Performance & Accountability Report Fiscal Year 2013, and United States Courts, Judicial Facts and Figures 2012.

In addition, the PwC study shows that while the median monetary award in patent lawsuits is generally declining, the median award to PAEs has been growing since 2005 and is now more than three times higher than the median award to practising entities (see Figure 1.10).

Figure 1.10. Median Damages Awarded in United States Patent Lawsuits, Practicing v. Non-Practising Entities



Median damages adjusted for inflation to 2013 dollars. Number of identified decisions is indicated within the respective columns of the left panel.

Source: PricewaterhouseCoopers, 2014 Patent Litigation Study (July 2014).

These trends add up to a substantial impact. A new study by Bessen and Meurer (2014) finds that more than 5,000 companies were named as defendants in lawsuits by PAEs in the United States in 2011 alone and that they incurred more than USD 29 billion in direct costs as a result. Most of the defendants were SMEs, i.e. the type of firms that tend to contribute greatly to productivity and job growth but are least able to cope with the cost of lawsuits (Hargreaves, 2011, p. 10).

Concerns about PAEs are spilling over into the European Union. In 2013, 16 large technology companies from around the world sent an open letter to EU Member States warning that draft procedural rules for a new Unified Patent Court could encourage PAEs to ramp up abusive litigation in Europe.[41] However, much remains unknown about PAEs, the net effect of their activities, and what the future holds for them. Recent changes to the jurisprudence and patent laws of the United States have weakened the position of PAEs in litigation, for example, by limiting the availability of injunctions against infringers, providing new alternatives to challenge a patent's validity, increasing the likelihood that a wrongfully accused defendant can recover its fees, and requiring heightened economic evidence to support damages requests. Implemented as a component of an econometric study, the patent value indicators might help to shed some light on the nature of the patents that PAEs are using to collect their royalties.

Trade secrets

The term "trade secrets" essentially means confidential business and technical information and know-how that a firm makes reasonable efforts to keep secret and that has economic value as a result. (See Chapter 3, Approaches to the Protection of Trade Secrets.) Estimating the economic value of trade secrets is challenging due to the secrecy requirements. However, some indications of their value and importance do exist. Almeling et al. (2010), for example, estimate that the annual cost of trade secret theft to United States firms is as high as USD 300 billion. Interviews with members of the European Chemical Industry Council have revealed that misappropriation of a trade secret or confidential business information often costs a firm up to 30 per cent of its revenue and sometimes much more (CEFIC, 2012). A panellist in the workshop noted that there is considerable anecdotal evidence that trade secrets can be worth substantial amounts, insofar as violation can lead to large damages actions or settlements (Chapter 8 of this Report). For example, in a case in which an alleged spy from Huawei was criminally indicted for having stolen trade secrets from Motorola, the latter claimed that the R&D costs of the stolen information exceeded USD 600 million (Anderlini, 2010).

Moreover, in a recent European Commission-sponsored survey of more than 500 businesses, 75 per cent of the respondents ranked trade secrets as "strategically important to their company's growth, competitiveness and innovative performance" (European Commission, 2013). That ranking was consistent across firms of all sizes, including SMEs. Furthermore, surveys by Cohen, et al. (2000) and (Jankowski, 2012) show that firms rate secrecy as being among the very most important means of protecting innovation. In many countries, the relative ease of use and lack of registration requirements for trade secrets have led SMEs to rely on trade secrets as the default mode of IP protection (Brant and Lohse, 2013). Another factor that may contribute to their popularity among SMEs is that, unlike copyright and patent law, trade secrets law is not especially technical.

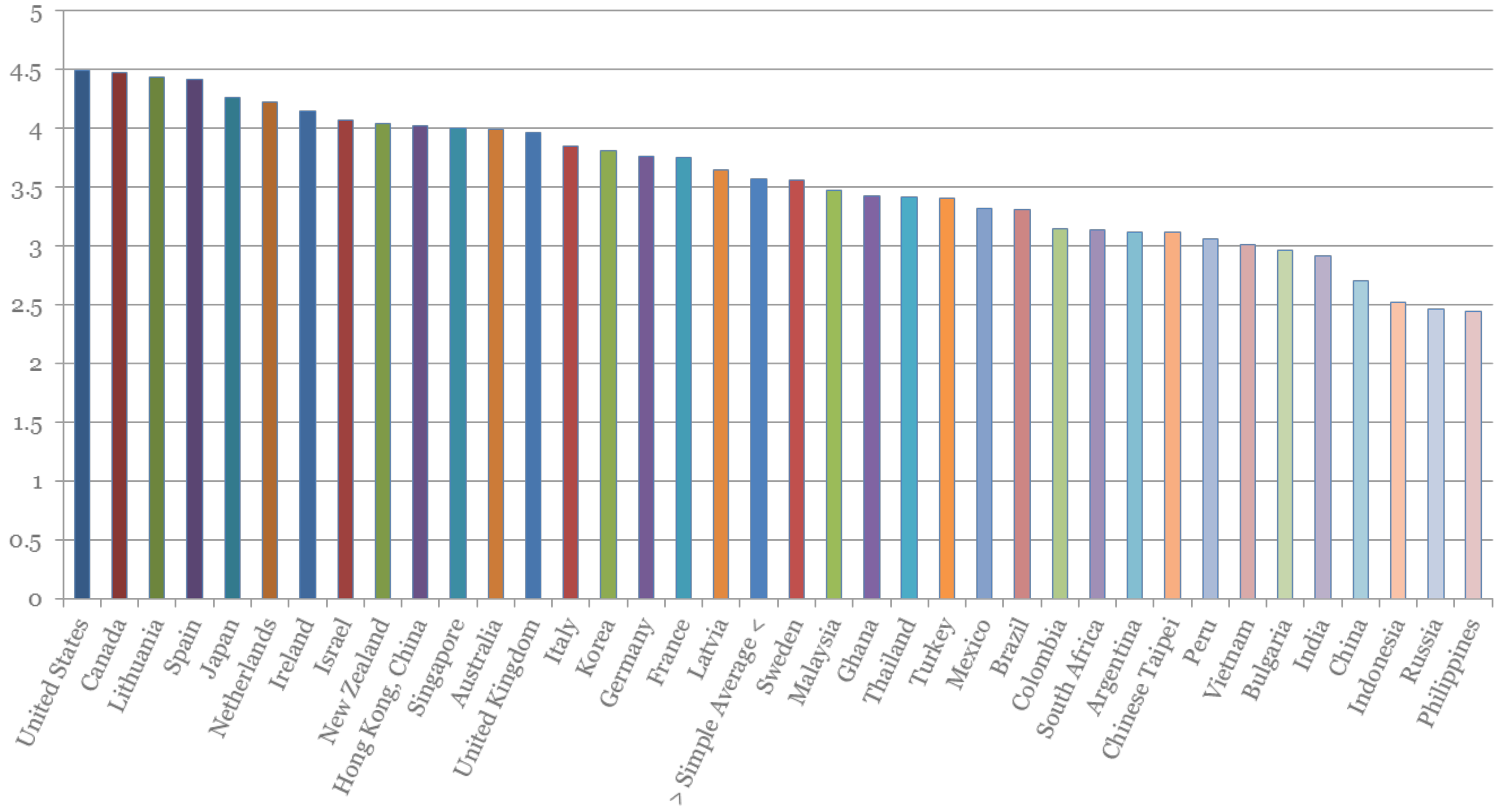
In theory, trade secret protection encourages investment in R&D and the development of commercially valuable information in various interdependent ways. First, it can make the fruits of that investment more appropriable (by deterring employees, business partners and third parties from misappropriating or misusing information that qualifies as a trade secret).[42] Second, trade secrets can provide competitive advantages and therefore motivate investment in them through the enticement of supra-competitive profits (Lemley, 2011). For example, a trade secret might cover a cost-saving production process or a unique product. Third, in some cases trade secrets motivate investment in R&D and valuable knowledge by serving as an alternative or a complement to patent protection. This can occur, for instance, when KBC does not meet the requirements for obtaining a patent, a patent is considered too expensive to procure and maintain, or seeking one is deemed undesirable due to the disclosure requirement (Maskus, 2000; Friedman, et al., 1991). Trade secrets can also provide protection during the developmental phase prior to a formal patent application. In some cases, firms prefer to use trade secrets protection due to their immediate availability and/or potentially lower costs (e.g. see Arundel, 2001; Cohen et al., 2000).

To provide a means of examining the relationship between the strength of trade secret protection in an economy and that economy's performance, the OECD developed an indicator of the stringency of protection of trade secrets (the Trade Secrets Protection Index, or TSPI), which is presented in Chapter 3, then updated and expanded in Chapter 4. Using a broad sample of OECD and non-OECD countries, the TSPI reveals some similarities among them, notably with respect to the definition and scope of trade secrets. However, it also shows that there are many, and more substantial, dissimilarities concerning the implementation of protection for trade secrets. For example, differences are particularly pronounced in evidence gathering and discovery, protection of trade secrets during litigation, technology transfer requirements and the effectiveness of legal systems with respect to enforcement. That diversity is reflected in the wide range of scores in the TSPI.

The overall index scores for 2010, the most recent year for which data are available, are shown in Figure 11 below. OECD countries tend to have relatively high scores (reflecting stronger protection), while Indonesia, Russia and the Philippines are all relatively low. The words "high" and "low" are not intended to carry positive or negative connotations, though. The index's function is descriptive, not normative, so the scores it produces are neither grades nor ratings. Rather, the score is strictly an objective measure of the stringency of protection.

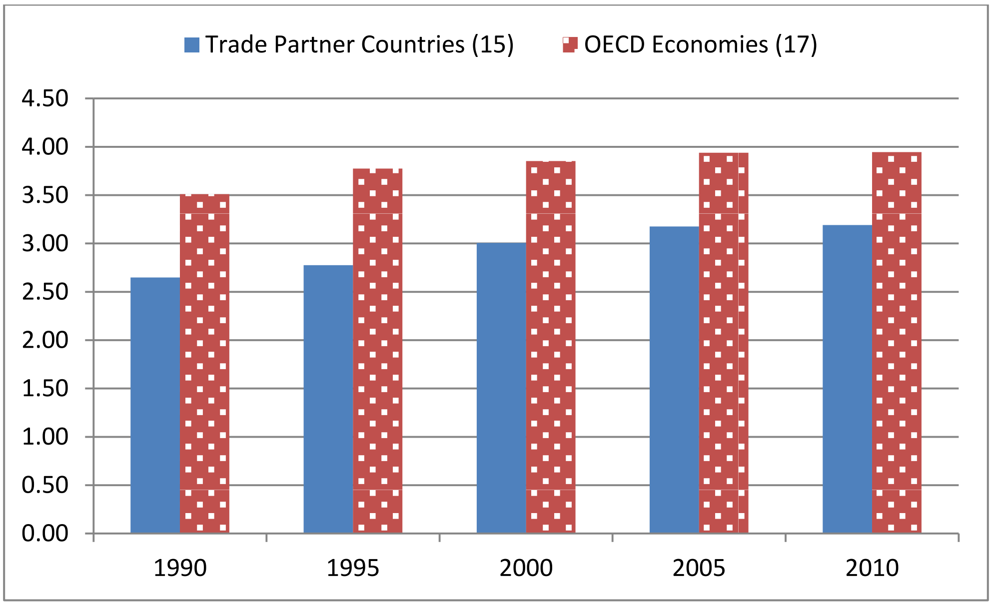
Whereas Figure 1.11 provides a static view, or snapshot, of the TSPI in a particular year, Figure 12 provides a dynamic view over 20 years. The overall average TSPI score increased incrementally in each period, but not all countries' TSPI scores grew at the same rate. There is a significant gap between the scores of the OECD economies and the trade partner countries in the sample. That gap has narrowed over time, though it remains significant. The OECD economies' scores gradually rose before stabilising in the 2005-2010 period. The average partner country scores, on the other hand, increased substantially following the TRIPS Agreement in 1995.

Figure 1.11. Trade Secrets Protection Index, by Economy, 2010



Source: Derived from Chapter 4, Figure 4.1.

Figure 1.12. Trade Secrets Protection Index, Average Score by Country Group and Year



Note: This figure presents a balanced panel of economies in each group for which data were available in each of the years shown. Inclusion in the OECD group is based on each country's membership status as of 2010. Country coverage is as follows:

Trade partner economies: Argentina; Brazil; China; Chinese Taipei; Colombia; Ghana; Hong Kong, China; India; Indonesia; Malaysia; Peru; Philippines; Singapore; South Africa; Thailand;

OECD countries: Australia; Canada; France; Germany; Ireland; Israel; Italy; Japan; Korea; Mexico; Netherlands; New Zealand; Spain; Sweden; Turkey; United Kingdom; United States.

Source: Chapter 4, Figure 4.2.

The scores in Figures 1.11 and 1.12 are interesting in and of themselves, but the TSPI's greatest value is in what the scores make possible: an empirical examination of the effect of trade secret protection on economic performance, including innovation. The variations in implementation of protection may influence firm-level decision-making and may have implications for some aspects of economic performance, especially innovation. Consequently, the development of the TSPI is a foundation for studying the impact of the stringency of trade secret protection on economies.

Such quantitative work is all the more important because economic theory on the expected outcomes from a strengthening of IP rights is inconclusive (Maskus, 2000; Primo Braga, 1990). Stronger rights may motivate stakeholders to increase innovation and access to innovation, expanding markets to the benefit of users as well as producers of IP. Even so, stronger rights might wind up creating or increasing market power such that rights holders have an incentive to constrain access and/or retard further innovations, possibly with little economic benefit to society as a whole. Therefore, empirical analysis is needed to test the hypothesis that more stringent protection of trade secrets is associated with greater innovation and diffusion. While such effects cannot be examined directly due to the lack of data, it is possible to study (with standard regression analysis) whether changes in the TSPI are related to net changes in economic indicators at an aggregate level while controlling for other factors.

That work is undertaken in Chapter 4, which uses an expanded time range, updated data, and a larger sample of countries to assess the economic implications of variations in the TSPI.[43] While Chapter 4 avoids making policy recommendations, it does present policy-relevant findings based on countries' actual experiences with trade secrets protection. That information may help policy makers to identify and choose among policy options for improved economic performance with respect to trade secrets.[44]

The main conclusions of Chapter 4 are that 1) the TSPI scores vary significantly both among countries at particular points in time, and within countries over time; 2) overall, the stringency of trade secrets protection grew substantially in the sample countries between 1985 and 2010; and 3) there is a positive and statistically significant relationship between the stringency of trade secret protection and indicators of innovation inputs (including R&D expenditure and R&D personnel as a share of the labour force) and international economic flows of investment and trade. (See Table 4.4 in Chapter 4.) Trade secret protection may therefore have implications for domestic innovation, international technology transfer and access to technology-intensive inputs and related products.

It must be stressed that what has been found is association, not necessarily causality. The results do not mean that ever stronger protection, for example, will yield similar results. Nonetheless, the positive and statistically significant relationships identified do indicate that adequately protecting trade secrets may be an appropriate policy for supporting certain key aspects of economic performance. Taken together, the information presented in Chapters 3 and 4 may assist policy makers in identifying options for using trade secret laws and policies to improve economic performance.

Design rights

By improving aesthetic features such as shape, configuration, pattern, or ornament, designs make products more appealing to consumers. Design rights therefore primarily concern the appearance of products, rather than their technical features. When a design is protected, the owner receives an exclusive right against unauthorised copying or imitation. In most countries, designs have to be registered to benefit from protection under industrial design laws, but certain jurisdictions, such as the United Kingdom and the European Union, also grant rights for unregistered designs (and those rights are typically more limited[45]).[46].

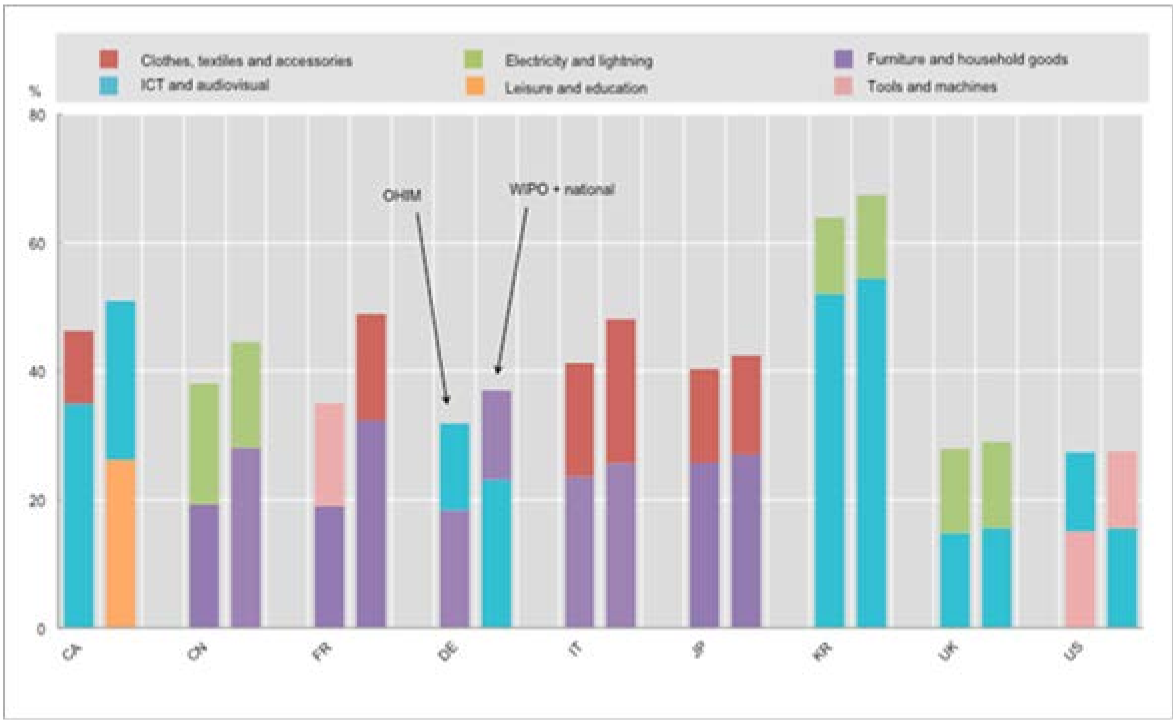
There is not a great deal of in-depth research available on the effect of design rights on economic performance at the firm, industry, or economy-wide levels. However, there are indications that design rights are becoming more important. Global design counts (the number of industrial designs contained in applications) rebounded sharply after 2009 and reached an annual growth rate of 17 percent in 2012 (WIPO, 2013, p. 10). That corresponded to a total of 1.22 million designs filed worldwide. Much of the growth was due to an increase in applications filed at the State Intellectual Property Office of the People’s Republic of China. Approximately 2.7 million registered industrial designs are in force around the globe (ibid). In the United Kingdom, Hargreaves (2011) not only characterised the design sector as important and growing, but as already being the largest source of intangible investment in the economy. The global growth of design rights will likely be strengthened by developments such as 3-D printing, which has the potential to shift design infringement out of factories to anywhere there is a personal computer and a 3-D printer.

To provide a closer look at the nature and economic impact of design and design rights, Chapter 6 explores the primary areas of design activity in a subset of 8 OECD countries plus the People’s Republic of China, compares traits of design protection regimes in those economies, and reviews evidence on how firms perceive the importance of design rights. It also surveys the literature on measures of design inputs and outputs. The chapter is intended to be exploratory rather than comprehensive or conclusive. It should therefore be considered as an initial step towards the possibility of a broader and deeper analysis of design-related issues.

The chapter observes that measurement problems abound with respect to design. For example, estimating the resources that go into developing designs is challenging because it is not entirely clear what should count as designs and design-related activities. The word “design” is applied to activities that range from engineering to art (Lawson, 2006). Designs can fulfil a number of different purposes that vary both among and within firms. Designs in some firms are used only in connection with particular products, for instance, whereas in other firms they play a part in entire processes. In fact, designs are sometimes not directly related to developing a product or service, but concern something else such as corporate branding (Walsh, 1996).

By looking at data on registered designs, however, it is possible to gain some understanding of the types of products that attract the most investment in design IP. Figure 1.13 shows the top design categories for each country in the sample used in Chapter 6, based on design filings at OHIM and at WIPO plus national IP offices. As one would expect, given design rights' focus on aesthetics, consumer goods are most prominent in the figure.

Figure 1.13. Top Two Design Application Fields, by Country, 2009-11



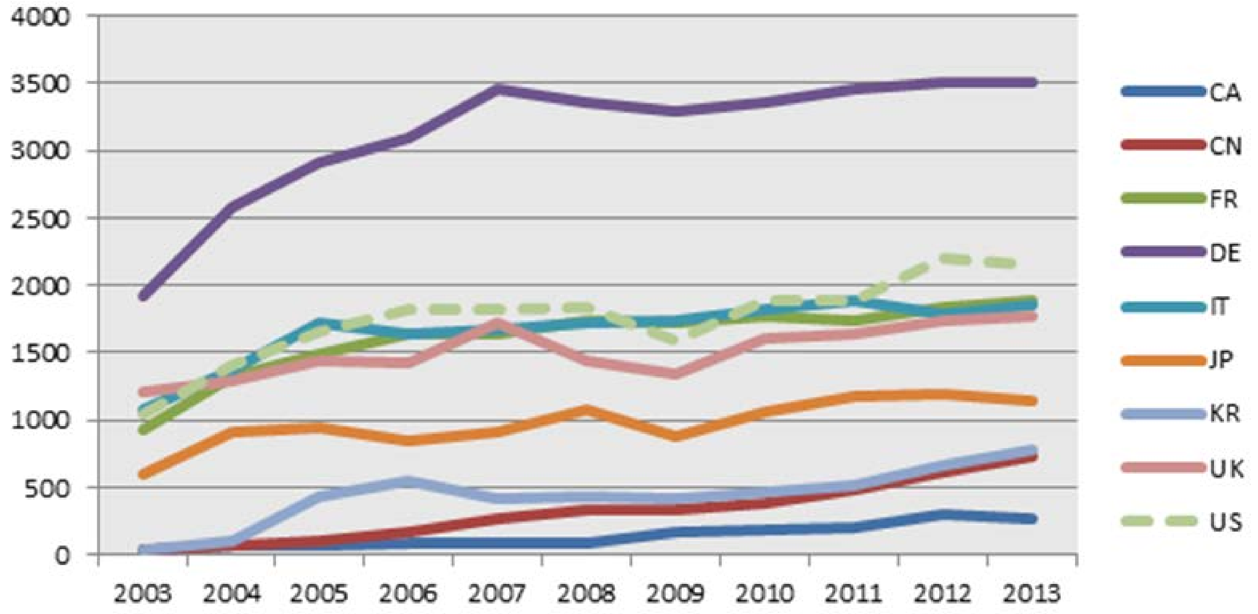
Source: Chapter 6, derived from OECD Science, Technology and Industry Scoreboard 2013, p. 187.

Although several international treaties affect design rights, such as the Paris Convention, the Berne Convention and The Hague Agreement, Chapter 6 shows that there are nevertheless substantial differences in the design rights frameworks of the sample countries. For example, the German and French laws place relatively more emphasis on authors' and inventors' rights, and courts in those countries tend to be faster and more proactive in protecting design rights. Furthermore, France's Institut National de la Propriété Industrielle has implemented a simplified procedure for registering designs. In Italy, the IP code contains a special provision to cope with the problems related to the short life cycle of a product and the processing time for the design application: the exclusive right takes effect from the date of filing the application, so the design holder has the right to base a legal action from the filing application date in order to guarantee effective protection in substantially disputed situations. Statistically, disputes on models and designs are very frequently dealt with in summary or urgent proceedings characterised by faster decisions. In most cases, the fast decision is not followed by an ordinary trial process.

The procedures in France and Italy contrast with the situation in the United Kingdom, which appears to be caught in a negative feedback loop regarding registered designs. UK inventors favour secrecy and lead time over registered design rights for protecting their designs. But relying on lead time tends to cause shorter product cycles which, in turn, make it less worthwhile to undertake the burdensome application process for registering designs. Consequently, relying on secrecy and lead time instead becomes even more attractive. The result is the comparatively low rate of design registration in the UK that we saw earlier in Table 2, UK Market Sector Investment in Tangibles, Intangibles, and IPRs (see also Chapter 6, citing BOP Consulting, 2011).

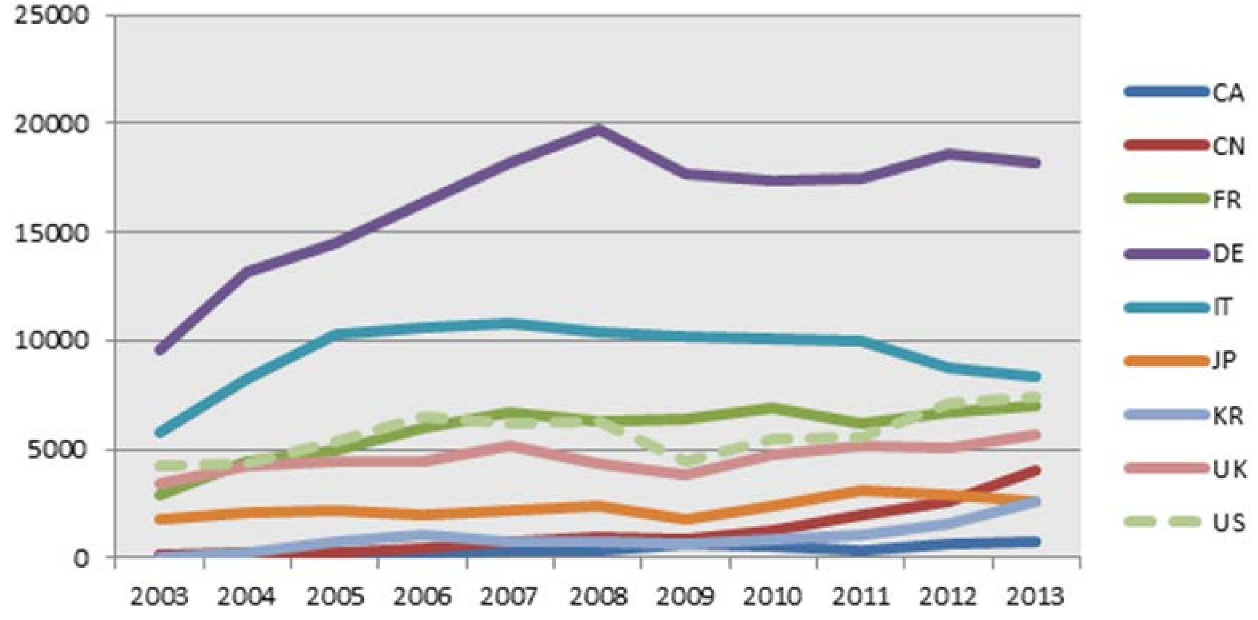
Looking at trends in OHIM design applications and OHIM registered designs among the nine countries studied in Chapter 6, we can see in Figure 1.14 that applications from most countries gradually increased over the past ten years.[47] During the same period, the total number of designs registered with OHIM from the leading countries of origin (Germany, Italy, France, US) grew at first, then levelled off or even dipped (Figure 1.15). Note, however, the substantial growth in registered designs from the People's Republic of China and Korea.

Figure 1.14. OHIM Design Applications by Country of Origin



Source: Chapter 6, Figure 6.5.

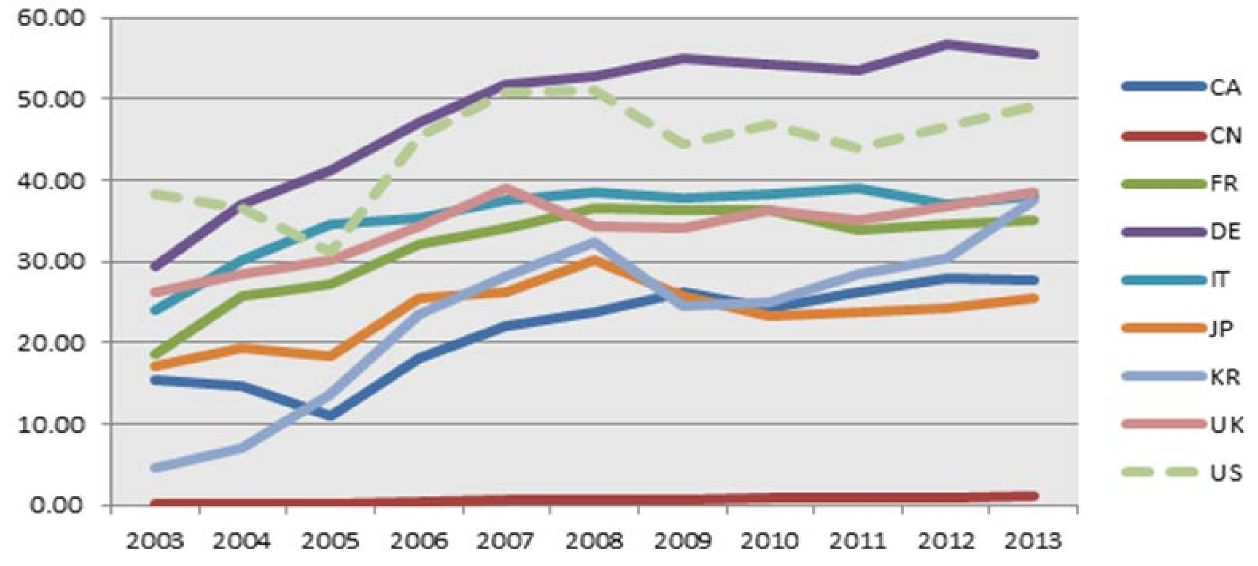
Figure 1.15. OHIM Registered Designs by Country of Origin



Source: Chapter 6, Figure 6.6.

While the two figures immediately above provide an indication of the relative magnitudes of design activity in the sample countries, it is difficult to draw from them a clear impression of which countries are relatively more and less design-intensive, given the fact that the countries vary so much in population and GDP. Figure 1.16 offers a perspective on design activity that is normalised on a per capita basis.

Figure 1.16. Combined OHIM and USPTO Design Stocks by Country of Origin per Million Inhabitants



Source: Chapter 6, Figure 6.9.

Now we can see that Germany has led consistently since 2004 in registered design output per capita, with the US not far behind. Meanwhile, Korea experienced the strongest growth. (China's normalised trend remains very low throughout the period due to the size of its population.)

Chapter 6 also surveys the literature and summarises the qualitative and quantitative methods used to measure resources devoted to design at the firm level (see Chapter 6, for more detail). The methods range from a binary inquiry on whether there is an aesthetic design group within the firm to surveys that request estimates on design spending. Likewise, the chapter includes summaries of the methods used in the literature for correlating design inputs with various outputs (see Chapter 6). For example, the methods include correlating design inputs with sales growth, profit margins, and stock market performance.

Most of the studies do not focus on design IP, but rather on design activity in general. However, one study did isolate the impact of design IP, and the results showed that they have a weak effect. While eighty-five percent of the UK businesses surveyed by The Design Council (2009) indicated that design was a significant part of their business model, 66 percent did nothing to protect their IP (regardless of whether it was a design or something else). A mere four percent used registered designs. Another four per cent used unregistered designs. That means not even ten percent of the businesses that consider design important use formal design protection measures.[48]

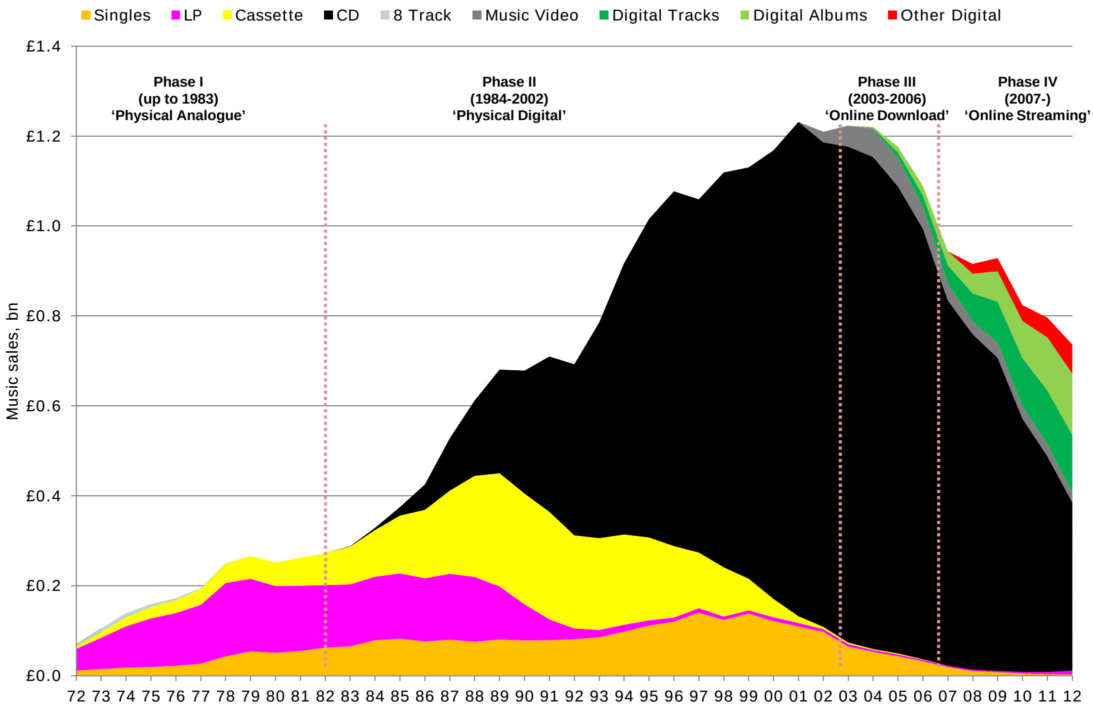
Why is firm reliance on design IP so low, at least in the UK? The answer may have something to do with the administrative burden of filing coupled with the brief commercial lifespan of many designs, mentioned earlier. But that cannot explain the fact that firms do not rely much on unregistered design rights, either. Moreover, in an earlier study, The Design Council (2005) found that companies that were "effective users of design" outperformed the UK stock market by 200 percent between 1994 and 2004.[49] Notably, the study determined which firms used designs effectively not by looking at whether or how they used design IP, but primarily by looking at which firms were nominated for and won design awards. Their financial performance, combined with what we know about how few of them are using design IP, leads to several questions. Are design rights necessary? What motivation do they provide for investing in design-related KBC? Should the framework be changed to make design rights more meaningful? The UK studies notwithstanding, though, Chapter 6 also shows that there has been, overall, a modest rise in registered designs among the sample countries, so those questions can be answered confidently only with the help of more studies, both within and outside of the UK.

How Internet Growth and Digitisation Are Affecting Stakeholders and IP Systems

The growth of the Internet in terms of traffic, bandwidth, and reach, in combination with digitisation, has had considerable effects on IP owners, consumers, and intermediaries, as well as on IP laws and the enforcement of those laws. Those effects have been significant enough that some commentators have gone so far as to argue that IP laws are no longer relevant or necessary in the Internet era. That, however, is not a consensus view. In fact, the OECD Council has stated that "effective protection of intellectual property rights plays a vital role in spurring innovation and furthers the development of the Internet economy" (OECD, 2011).

With that in mind, consider Figure 1.17, which illustrates how digitisation and then the Internet have changed the ways in which people access, listen to and pay for copyrighted content– in this case, music in the United Kingdom. It also captures the waves of innovation that brought one technological improvement after another to this sector.

Figure 1.17. The Evolution of Music Sales in the United Kingdom, by Format, 1972-2012



Source: BPI (2013).

Such changes, while carrying forward a wave of new and innovative business models, do not necessarily translate into profits, net gains for economies, greater productivity or greater consumer surplus, at least not immediately. The adoption of new technologies can take time. In the music sector, what online digital downloads did to CDs, streaming is now doing to downloads. According to data from a North American music sales tracking system, 2013 was the first year since Apple's iTunes store launched in 2003 that digital download sales declined. Streaming services, meanwhile, are growing (Bond, 2014), but revenues from streaming are still well below download and CD sales. Consequently, in the United Kingdom at least, as Figure 1.17 above shows, total revenues across all music formats were falling through 2012. That is not due to changing formats alone (though it may be true that customers spend less on average when they stream or download than they did when they bought CDs). The major culprit is likely to be piracy, which was greatly enabled by digital technologies. It is, however, difficult to obtain accurate and objective data on the precise magnitude of piracy that is taking place.[50] Furthermore, other factors may have contributed to a decline in sales, too, such as demographic shifts and increased competition (OECD, 2005).

In any event, although the declining revenues have raised questions about whether artists and some music labels can make enough money from streaming to survive, streaming models are still evolving and growing. Indeed, as IFPI points out, "The music business continues to expand into new markets and create new business models, attracting more users to digital music services and bringing artists to a wider global audience."[51] While global recorded music revenues fell 3.9 percent in 2013, there are signs that the decline is stabilising. Recorded music revenues in Europe and Latin America grew 0.8 percent in 2013.[52]

Moreover, the number of customers who pay for music streaming in the United States rose from 8 million in 2010 to 28 million in 2013 (Bond, 2014), and Spotify's paid subscriber base climbed from 12.5 million to 15 million during the last two months of 2014 alone (Cookson, 2015).

Chapter 5 of this Report provides a broader overview of some of the new business models that have been enabled by digitisation and the Internet. Some models, such as streaming film and television programming services and MMOG (massively multiplayer online game) services, use advances in digital technology to deliver content in new ways. Other types of businesses, such as e-reader device makers and developers of game apps for mobile phones, take advantage of the portability offered by the mobile Internet. Still others, again including the mobile game app developers but also businesses such as Spotify and Netflix, use business models that rely on web-based ads or subscriptions to generate revenue rather than unit sales.

Some of these new business models have brought very substantial benefits to consumers and have accordingly been rewarded with great financial success. Apple's iTunes Store, for example, is available in 119 countries and puts more than 26 million songs at the disposal of its customers. A music selection of that size would be impossible in a physical media, bricks-and-mortar retail store format. The iTunes Store also contributes to the popularity of iPhones, iPods and iPads. Apple's market value has soared as a result, eclipsing the value of some major countries' entire stock markets (Trotman, 2014). As Chapter 5 further points out, Facebook users have shared some 250 billion photos on the platform, while 100 hours of video are uploaded for sharing on YouTube every minute.

Another effect of digitisation and Internet growth is that it has led several countries to adjust their copyright laws. For example, some countries have implemented exceptions for temporary copying because Internet use would be severely impeded without them. One has added an exception for text and data mining (which would not be possible without digitisation) while several have implemented exceptions for cloud computing.

Chapter 5 reports on the legal settings and mainstream policy dialogues in 12 diverse jurisdictions, noting that all of them have amended, or are considering amending, their copyright exemption frameworks in light of the changes brought on by digitisation and the Internet. For example, the United Kingdom recently amended its copyright law to introduce a specific exception that allows text and data mining for non-commercial research purposes without the right holder's prior authorisation. In contrast, legislators in some countries, such as Israel and the United States, do not necessarily have to consider amending their laws every time there is a significant technological change that affects copyright. That is because their laws include an open norm for considering new unlicensed uses. It is left to the courts to determine whether a particular use qualifies as an exception or not, consistent with national laws and international treaty obligations. Because technology is constantly developing, certain other countries have considered, or are considering, adopting open norms, too. See Box 1.3.

Box 1.3 Open Norms in Effect or Under Consideration in Some OECD Countries

- The United States has had a flexible standard for copyright exceptions for many years. The "fair use" doctrine was originally developed by the courts and then codified in § 107 of the Copyright Act (1976). The doctrine is characterised by an open-ended list of purposes for which the use of a work may be regarded as fair, and by four factors to be considered in determining whether other particular uses are fair: 1) the purpose and character of the use, including whether such use is of a commercial nature or is for non-profit educational purposes; 2) the nature of the copyrighted work; 3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and 4) the effect of the use upon the potential market for or value of the copyrighted work.
- Article 19 of Israel's Copyright Act of 2007 contains an open-ended fair use defence that can be invoked in a wide variety of cases and situations. The article is modelled after section 107 of the United States' Copyright Act (1976).
- Canadian law contains a flexible fair dealing exception that was updated in 2012. It is now considered by some commentators to be comparable to the United States' fair use doctrine (Geist, 2013, at 157-86).
- Australia has a fair dealing exception, but the courts have interpreted it less broadly than United States and Canadian courts have interpreted the fair use and fair dealing exceptions, respectively, in effect there. The Australian Law Reform Commission recently considered whether exceptions and statutory licences in the Copyright Act 1968 are suitable in the digital environment and whether further exceptions should be recommended. In its Final Report (Australian Law Reform Commission, 2014), the ALRC examined the comparative pros and cons of introducing a fair use defence or amending the fair dealing defence. It recommended that Parliament introduce a fair use exception.
- The Netherlands commissioned a study that considered the law and economics of adding an open norm to its copyright law in 2012 (van der Noll, 2012). However, the Dutch Government has not indicated any action to implement the recommendations in the Report.

Some countries have also adjusted their copyright frameworks in light of the higher incidence of piracy that digitisation and the Internet have enabled. For instance, Korea and the United Kingdom have introduced special police units to combat online piracy. Italy and the United States have passed new laws that make it possible to block websites that host copyright-infringing content.

There have also been some controversial legislative reactions to the impact of the Internet and digitisation on established copyright owners. Several countries have enacted or proposed amendments to their copyright laws[53] that create an ancillary copyright to the benefit of online publishers. The result is that certain material used by Internet-based news aggregating services could be infringing.

For example, Spain's law[54] imposes a compulsory license whenever a web site provides even a small fragment of a newspaper article. It also requires permission from the news publisher for the reuse of any photo posted to a periodically updated website. Spain's competition authority quickly criticised the law when it was proposed (Comisión Nacional de los Mercados y la Competencia, 2014). It noted that the main justification given for the proposal is to compensate the original news sites with "fair compensation" for the "direct competition" that occurs between them and the news aggregators, who do not share the costs that the "creative effort" entails. However, the competition authority found it questionable that there was any such direct competition, that any compensation was appropriate, or if there was, that it should flow toward the original sites. The latter is finding recognised that appearing in news aggregator results will drive more Internet traffic toward the original site than it would otherwise get. The authority also noted that the law would create a barrier to access for companies that want to enter the market for content aggregation.

Of course, copyright is not the only form of KBC protection that is affected by the rise of digital technologies and the Internet. Just as those factors facilitated piracy, for instance, they also made it easier for company insiders and third parties to disseminate trade secrets rapidly (and not necessarily legally, as hacking and industrial espionage were also facilitated). Moreover, digital technologies like 3-D printing, in combination with the Internet, may greatly facilitate design rights infringement by eliminating the need for a traditional factory to produce goods using infringing designs; instead, all that will be needed is an Internet connection, a computer, and a 3-D printer.

With respect to patents, digitisation and the Internet have made it easier to access, search and sort the information contained in patents and that has unquestionably improved dissemination of that knowledge. This not only helps the public, but possibly patent examiners, too. Consequently, it might improve the quality of the patent examination process and therefore of the patents themselves. As patent offices digitise their patent literature, put more of it in searchable databases, and make those databases available on the Internet, it becomes easier for the public and patent examiners to search for, find, and determine what the prior art is. On the other hand, though, the Internet makes it easier to advertise and sell infringing items like counterfeit pharmaceuticals.

The Internet and digitisation have also opened up new opportunities to organise and publish the content of research projects, scientific publications and large data sets, so as to make them immediately available to other scientists, researchers, and potential users in the business community and society in general. In addition, digital technologies allow the collection of large amounts of data that can be the basis of scientific experiments and research, helping to make science increasingly data-driven. Consequently, it is now technologically possible to access, use and re-use research, articles and datasets at no or extremely low marginal cost and speed the transfer of knowledge amongst researchers and across scientific fields. That, in turn, can lead to new ways of collaboration and new research domains. However, publishing high quality, peer-reviewed scientific articles in reputable journals, and making that information available online in an organised, reliable and searchable manner, comes at a cost. Someone has to pay, even when the research itself is publicly funded, and the ability to recoup costs is part of what copyright facilitates. The interplay between copyright and open access to publicly funded research results is further discussed later in this chapter.

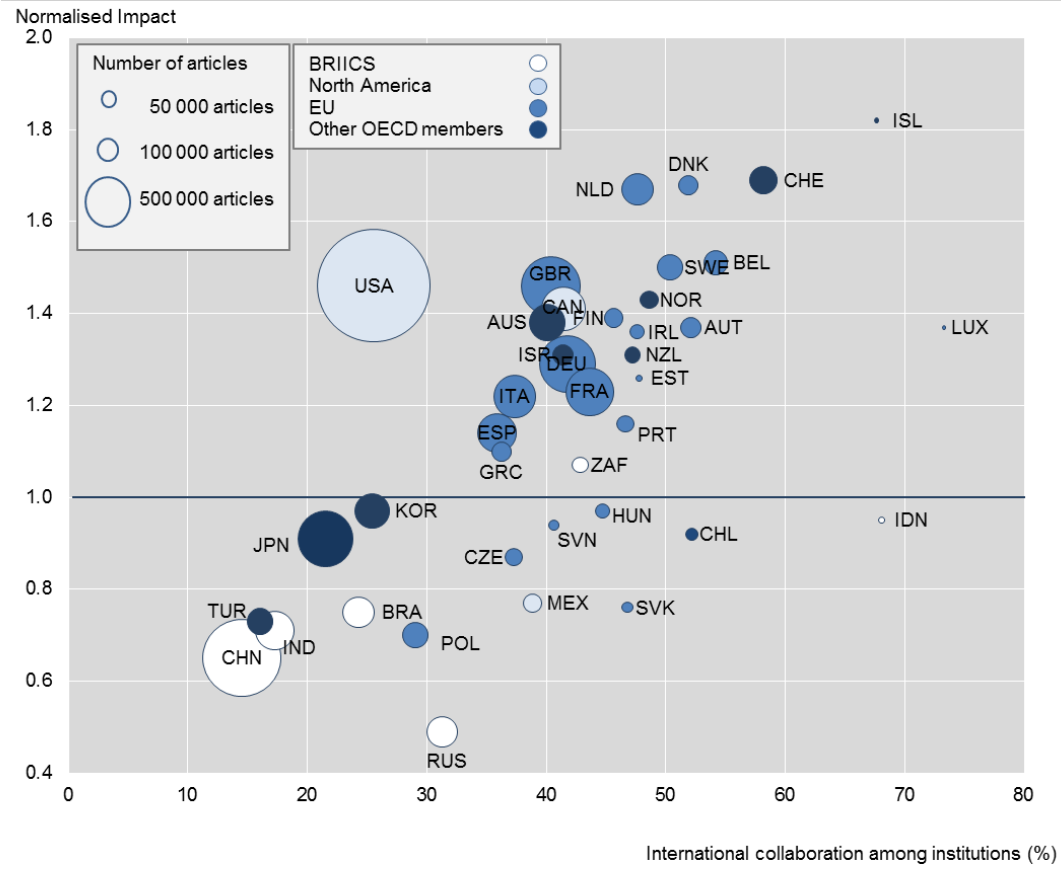
The net overall effects on an economy from Internet growth and digitisation are hard to disentangle from other factors, such as the recession that began in 2008. New Internet-based business models are adding to the recession's impact on older firms by helping to push them out of the market, but at the same time those new firms are generating jobs. The traditional publishing sector in the United States, for example – bookstores, printers, newspaper and magazine publishers – has shed 400,000 jobs since 2008. During the same time, Internet publishers and web search firms added 76,000 jobs. Clearly that is preferable to a loss of 400,000 jobs with no offsetting gains, but it is hard to know how many publishing jobs were lost due to the Internet firms' entry as opposed to the recession or other factors. Trying to figure out how consumers have fared while adjusting to these changes adds another layer of complexity. This much is clear, though: the Internet publishing and search salaries are nearly twice as high, on average, as the newspaper publishing salaries (about USD 80,000 versus USD 46,000).[55]

The Merits and Means of Open Access to Publicly Funded Research Results

Internet growth and digitisation, along with advances in "big data" and data analytics (see the other phase 2 report, *Data-Driven Innovation for Growth and Well-Being*), have also affected the ways in which publicly funded research results are accessed, disseminated and used. Digital technology is unquestionably bringing more and more possibilities to create, read, share, use and re-use scientific articles and data. That information is often covered by IP laws.[56] Open access (OA) principles, which aim to make the outputs[57] of publicly funded research more widely accessible and available for copying, use, re-use and further distribution in digital formats (while preserving authors' rights to control the integrity of their work and to be credited)[58], therefore raise a number of IP-related questions. One of the most important is how to define research exceptions for protected material. (Open Access is explored in detail in Chapter 7, Legal Aspects of Open Access to Publicly Funded Research.)

The significance of such questions should not be underestimated. Scientific research is vital to solving global challenges such as climate change, disease, and security issues. Access to research data not only increases the returns from public investment in confronting those challenges, but it also reinforces open scientific inquiry, encourages diversity of thought, allows a more accurate validation of research results, and leads to the advancement of knowledge in new fields (OECD, 2014). Prompt and cost efficient access to publicly-funded scientific research therefore promotes general economic and social welfare (OECD, 2007; European Commission, 2007). Furthermore, to the extent that OA leads to greater collaboration among researchers from different institutions and countries, it can also lead to outputs that have a stronger influence in their field. Figure 1.18 shows that there is a positive association between international collaboration and the impact of scientific publications:

Figure 1.18. The Impact of Scientific Production and the Extent of International Scientific Collaboration, 2003-11



Note: Whole counts of internationally co-authored documents. The normalised impact is derived as the ratio between the average number of citations received by the documents published by authors affiliated to an institution in a given economy and the world average of citations, over the same time period, by document type and subject area. The international institutional collaboration indicator is based on the proportion of documents involving institutional affiliations with other countries or economies, as a proportion of documents attributed to authors with an affiliation in the reference economy. Single-authored documents with multiple affiliations across boundaries can therefore count as institutional international collaboration.

Source: OECD, 2013*c*, p. 60; data available at http://dx.doi.org/10.1787/888932890314.

Box 1.4 sets out more information about the benefits that open access to publicly funded research results can offer for research and innovation.

Box 1.4 Rationales for Open Access to Publicly Funded Research

- Improved efficiency in science: OA can increase the effectiveness and the productivity of the research system by: 1) reducing duplication and costs of creating, transferring and re-using data; 2) allowing more research from the same data; 3) multiplying opportunities for domestic and global participation in the research process;
- Increased transparency and quality in the research validation process, by allowing replication and validation of scientific results to a greater extent;
- Faster knowledge transfer: OA can reduce delays in the publication of articles and data sets and accelerate the progression from research to innovation;
- More knowledge spillovers to the economy: better access to the results of publicly funded research can foster spillovers and boost innovation across the economy. The disclosure and release of public and scientific data may promote the development of innovative products and services in firms as well as increase awareness and conscious choices among consumers;
- Greater effectiveness in overcoming global challenges: global challenges call for co-ordinated international actions. OA may promote collaborative efforts and faster knowledge transfer, leading to better understanding and potentially to the identification of solutions for challenges such as climate change and ageing populations;
- More engagement by citizens in science and research: OA initiatives may promote awareness and trust in science among citizens. In some cases, greater citizens' engagement leads to participation in scientific experiments and data collection.

Source: OECD, 2013*e*; European Commission, 2012*a*.

Accordingly, OA principles have been viewed with increasing favour by some policy makers, research funding agencies, higher education institutions and researchers. Sometimes that favour is reflected in generally applicable laws and sometimes in the policies of individual organisations. Furthermore, the measures taken do not always reflect all OA principles, e.g. they might cover only access and not reproduction or re-use (OECD, 2014*c*).

OA initiatives undertaken in Europe and the United States will be summarised presently, but first it is useful to briefly explain the two main ways in which OA principles can be put into action. One, known as the "Golden Road", requires authors to pay the cost of publishing their publicly funded outputs in journals that provide free open access. The other, called the "Green Road", permits authors to publish their publicly funded works via traditional channels but requires the authors to self-archive and to provide access to those works by making their own e-prints free for everyone. The Golden Road is considered preferable by OA advocates because it tends to entail fewer restrictions on authors. That is because authors are more likely to retain only limited rights when they publish in traditional, non-OA subscription journals. Therefore self-archived, Green Road articles typically come with a licence that restricts what readers can do with the material. Moreover, it is not necessarily easy for readers to determine from the licenses what those restrictions are (see Chapter 7, Guibault, 2011, at 137-167).

The European Commission is in the process of implementing OA principles, which are reflected in its model grant agreement for the Horizon 2020 research programme. The Commission is promoting OA not only for scientific publications, but for their underlying data. Accordingly, the model agreement requires recipients to deposit the data and associated metadata that are necessary to validate published results (as well as the scientific publications themselves) in a research data depository and to take measures that allow third parties to access, mine, exploit, reproduce and disseminate that data at no charge. However, the Horizon 2020 OA policy is not binding on Member States, which leaves Europe with a number of inconsistent national OA policies instead of one consistent policy. The spectrum of approaches includes, for example, a mandatory Golden Road for publications and data (Research Councils of the United Kingdom) and a Green Road for publications only (Germany) (Chapter 7).

In the United States, a White House Directive requires all federal agencies that spend more than USD 100 million on research and development to come up with plans to make the published results of their federally funded R&D freely available to the public. It directs agencies to use a 12-month post-publication embargo period as a guideline for making research papers publicly available.[59] There is also a pending bill, the Fair Access to Science and Technology Research (FASTR) Act, which is similar to the Directive but cuts the embargo period to six months and would carry the weight of a statute. The Directive expressly states that each affected agency's "plans must also describe, to the extent feasible, procedures the agency will take to help prevent the unauthorised mass redistribution of scholarly publications." In other words, the agencies must ensure access, but they should also try to restrict copying and sharing. FASTR, meanwhile, mandates Green Road OA but says nothing about Golden Road OA. See Chapter 7 of this Report for more information on the relevant aspects of IP regimes and OA approaches in a sample of jurisdictions.

UNESCO (2012) has, incidentally, issued Policy Guidelines for the Development and Promotion of Open Access that explain what OA is and provide practical steps for governments, institutions and funding agencies that wish to put OA policies in place. The guidelines are not prescriptive, but rather aim to promote OA by facilitating more knowledgeable decisions to adopt OA policies and strengthen national research systems.

One way to gauge the actual impact of OA is to compare the number of citations that OA publications receive with the number received by non-OA publications. The academic literature contains several studies that make such comparisons (e.g. UNESCO, 2012; Swan, 2010; Wagner, 2010; OpCit Project, 2012). Most of them demonstrate that OA has the effect of increasing citations. However, there is no consensus on the intensity of that increase. A minority of the studies do not show any citation advantage at all for OA publications (Davis et al., 2008; Fradsen, 2009; Lansingh & Carter, 2009).

Academics are not the only groups that can potentially benefit from greater OA, though. The demand from the business sector and individual citizens to access research results is significant. For example, the usage data from PubMedCentral (the online repository of the United States National Institutes of Health, where an OA policy is in effect) show that 25 percent of the daily unique users are from universities, but 17 percent are from companies, 40 percent are individual citizens and the rest are from government or other categories (UNESCO, 2012).

Chapter 7 of this Report explores the interplay between OA policies and IP laws in a sample of jurisdictions, reaching a number of conclusions and raising several questions:

- The explosive growth in data volumes will probably not make copyright protection either more or less relevant than it is now, provided that the criteria for copyright protection are applied strictly (either in the form of an 'originality' requirement or that of being an 'author's own intellectual creation').

- However, in countries with laws that protect databases, the growth in data may bring about a trend towards private appropriation of databases. If that happens, applying OA principles to publicly-funded scientific output will become more important.

- The increase of machine-generated data in science (e.g. scientific sensors) may raise certain challenges, especially the question of whether such data meet the criteria for IP protection.

- A related challenge might be the use of machine-generated data to identify rights owners. Ideally, the machine-generated data will not qualify as protectable subject matter so that it will in principle be free for everyone to use for the purpose of identifying rights owners.

- Another concern is the lack of clarity in national or supra-national legal frameworks. Legal frameworks are being adapted to promote OA in several jurisdictions. Researchers and scientists need to understand exactly what is allowed and forbidden in order to make legitimate use of OA. The frameworks are not always easy to navigate, though. For example, the European Union's Information Society Directive gives copyright owners the exclusive right to reproduce their works, communicate them to the public and distribute them. Notably, the Directive allows Member States to make an exception for situations in which a protected work is used for the purpose of illustration for teaching or scientific research. However, the exception is optional, and that has led not only to varying approaches from country to country within the EU but to vagueness, because there is no single, clear standard even among the countries that have implemented the exception (Guibault, 2010, at 55-66; Triaille, 2014, at 403).

- An unresolved issue is how the ownership of rights to articles and data, as well as the applicable licensing terms, affect OA when the research is funded by public/private partnerships. When governments partner with external organisations on research projects, the ownership of the resulting outputs is regulated by contract. Depending on a number of factors – the law, relative bargaining power, the organisation's policies – copyright ownership may wind up entirely in the hands of the external partner. The author rarely retains it, but who owns the rights greatly affects how the outputs will be published – traditional channels, Green Road OA, or Golden Road OA.

While an objective of OA is to make access and use of publicly funded articles and data cost-free to users, doing so is not costless. Someone still has to pay to support peer reviews, the publishing process, archiving, etc., and it is often the authors who pay. However, many agencies in countries that implement OA policies are setting aside funding to help researchers at institutions meet mandates for OA publishing. Smaller countries, smaller institutions and academic societies, though, may face additional funding hurdles.

Meanwhile, the private sector is making progress with OA initiatives. Initially threatened by OA publishing, scientific publishers are now developing business models of their own for OA and offering new data curation and storage services. Moreover, new research data start-ups are challenging established publishers, creating pressure to innovate in the publishing sector (see Chapter 7, "Promoting a New Era of Scientific Discovery", DSTI/ICCP(2014)16/CHAP8, in the other phase 2 report, *Data Driven Innovation for Growth and Well-Being*).

It is critical for OA initiatives to achieve a good balance between openness and protection/control, so as to promote sharing without reducing the incentives to conduct research and compete. For example, OA to scientific publications may not necessarily involve access to data and the associated right of use and re-use and vice-versa. Free licensing solutions, such as the Creative Commons 4.0 licence[60], are available and enhance openness in data without the loss of control over ownership.

Consumer Protection and Copyright in the Digital Era

Because digital content products are often subject to copyright protection, the OECD Committee on Consumer Policy's work in establishing policy guidance for digital content products adds another dimension to the broader discussion on the impact that copyright systems are having and how they are functioning in the digital era. The Committee on Consumer Policy examined trends and consumer policy challenges in the acquisition and use of digital content products, focusing on those that consumers store, access or receive in an electronic (i.e. intangible) format. That resulted in an analytic report (OECD 2013d) and ultimately policy guidance (OECD 2014e) which recommends that consumers be provided with clear and conspicuous information about functionality, interoperability and geographic limitations, and with effective protection against misleading or unfair commercial practices.

With the spread of broadband, easy-to-use mobile devices and online and mobile payments, products such as books, music, films, videos and games are increasingly supplied and acquired by consumers in an electronic format via the Internet and other ICT channels (such as mobile operators' networks) through streaming, downloading or cloud computing platforms. While such technological advances are providing consumers with many new possibilities to legitimately copy, share, transform and transfer a wide range of high quality intangible digital content products, their ability to do so is often limited by: *i)* copyright laws; *ii)* the terms and conditions in end-user licensing agreements (EULAs); *iii)* other terms of service provisions; and *iv)* technical measures (commonly referred to as "digital rights management" [DRM]) that limit or prevent product access and usage across the consumer's devices.

Such limitations can vary significantly from one product to another. For example, the period over which a consumer may be able to use a product may be limited or indefinite; the number of times a product (such as a piece of music or an e-book) can be accessed, streamed or downloaded may be limited; and there may be conditions or limitations for sharing a product with others, including friends or family members. Further, consumers may be unable to play, listen, or watch a product on different devices. Moreover, consumers may not always be able to access a product that they have acquired in one jurisdiction while travelling in another; they may be unable to acquire an intangible digital content product offered by businesses located in other jurisdictions. The latter limitations are, in many instances, due to geographical licensing restrictions or other specific limitations placed on products by suppliers.[61] There are market incentives to overcome these challenges, but solutions have not yet been created and implemented in all markets.

Surveys reveal that a vast majority of consumers are often unaware of the limitations just mentioned and generally expect to enjoy the same rights with digital content products that they have with physical goods. This is partly due to the fact that consumers are often unsure about what is permitted under existing copyright law and how the law applies in different circumstances.[62] Moreover, consumers tend not to read EULAs, which often contain complex and lengthy terms and conditions that are not always easily accessible prior to making a purchase (European Commission, 2011).

A number of misleading commercial practices have been reported. These practices include, for example, businesses' failure to provide conspicuous, adequate and timely information to consumers about product access and usage, and suppliers pushing product updates without prior notification (Europe Economics, 2011).

Knowledge Diffusion from Patents and Trade Secrets

Among the benefits that IP rights bring to economies is their ability to stimulate knowledge diffusion. Whether it occurs via a disclosure requirement in an application process, through a licensing agreement, or by way of a partnership arrangement bound by confidentiality agreements, knowledge diffusion is facilitated by IP. In this section we will explore and compare the diffusion effects from patents and trade secrets. As we will see, inventors sometimes have a choice between these two forms of protection, so it can be interesting to examine what drives their decisions and what the resulting effects on diffusion are.

Note that diffusion depends on more than just disclosure. It requires dissemination, too. Thus, in the context of the patent system, for example, diffusion requires more than just the act of providing information in a patent application. It also depends on that information being made available to the public, and on the public accessing and using that information.

It is also important to bear in mind that IP covers a huge variety of KBC. That can lead to some special, and perhaps counterintuitive, situations. For example, the greater knowledge diffusion that results from patents is generally assumed to be a desirable effect because it enables further innovation. There are circumstances, though, when society may at least arguably be better off if proprietary knowledge remains out of the public's reach. Consider a recent case: calls for Google to make its search engine algorithm transparent so that greater competition might be stimulated in European Internet search and advertising markets (Vasagar & Fontanella-Khan, 2014). Although the functional core of Google's algorithm has been known for years (Brin & Page, 1998; Page, et al. 1999), certain aspects of the algorithm are held as trade secrets. Some of them are designed to thwart search engine optimisers, which are services that aim to boost a site's rank in search results by attempting to understand a search engine's methods and manipulate them to distort the results in a client's favour. Critics of the idea that Google should be required to disclose its full algorithm contend that the result would not only be bad for Google, but for everyone. The optimisers would obtain complete knowledge of how the algorithm works, and with that information in their hands, Google's search results would soon become distorted and unreliable (McGeer, 2014; Pasquale, 2010, at 350; Grimmelmann, 2010, at 454).

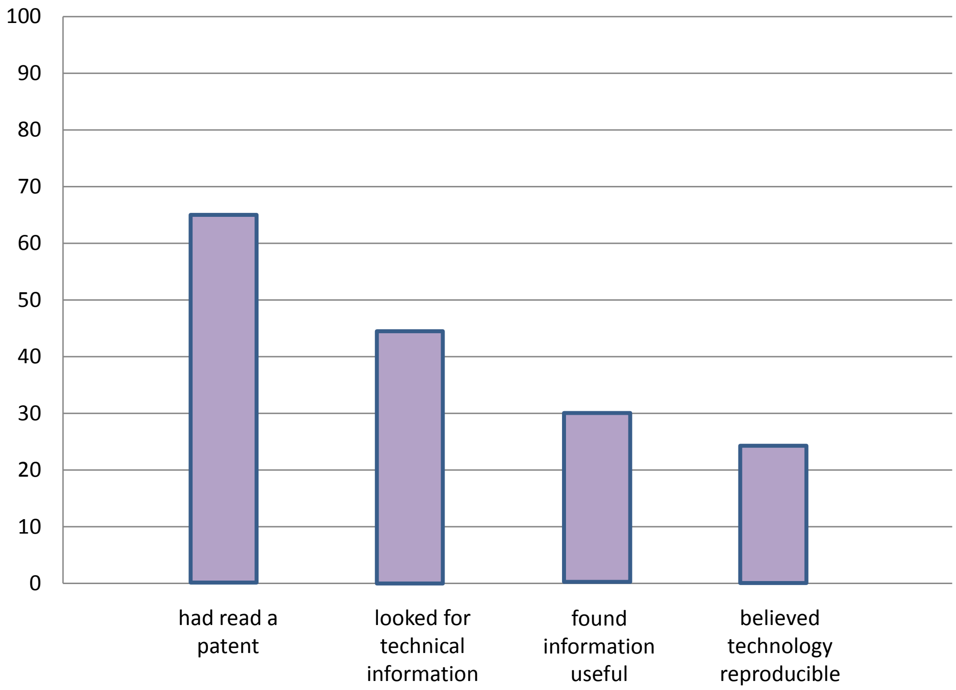
There are undoubtedly several other exceptional situations in which knowledge diffusion would probably be harmful to society. Information about how to build bioweapons or other weapons of mass destruction, for example, comes to mind.

Patent disclosure and diffusion

The disclosure requirement is a key component of the exchange built into the patent system: in principle, exclusivity is granted to inventors during the short and medium term while the information disclosure facilitates knowledge diffusion and more innovation in the medium and longer term. In essence, patent disclosure requirements call for information that is sufficient to enable a person skilled in the art to replicate the invention. But a wide array of other information can be found in patent applications, too. Beyond the technical information, there is legal and business information. That makes patent information potentially useful to different audiences for different purposes. Researchers, potential licensees, competitors, policy makers, and patent examiners may all find helpful information in patents applications.

It is not clear that disclosure is a very effective means of diffusing knowledge in practice, though. Empirical results vary from sector to sector and by firm size, but the overall extent to which reading patents promotes follow-on innovation is not known. There is also some evidence that the quality of disclosure is inadequate in some instances (Chapter 8). In one study, Ouellette (2012) surveyed about 200 nanotechnologists. Sixty-four percent of the respondents had read a patent, and 60 percent of those who had read patents for scientific (i.e. non-legal) reasons said that they had found useful technical information. Accordingly, the survey indicates that patent disclosures are certainly not useless, insofar as some scientists get some value from the information disclosed.

Figure 1.19. Responses of Nanotechnologists to Questions about Patent Disclosures (% positive)



Source: Ouellette (2012).

However, 36 percent of respondents had never read a patent and 40 percent of those who had read a patent for technical reasons did not find any useful information. Furthermore, 62 percent of the patent readers thought that the patents they read did not provide sufficient disclosure for a nanotech researcher to recreate the invention. Ouellette's work suggests that the quality of disclosure could be significantly improved and casts doubt on whether the existing 'enablement' requirements are meaningful. Fromer (2009, at 560) notes that "a good deal of evidence suggests that technologists do not find [that patents] contain[] pertinent information for their research."

Another problem is that certain strategic behaviours by patentees can degrade knowledge diffusion. For example, so-called "thesaurus patents" are applications that have been drafted in ways that make it harder to understand the invention, or even simply to discover it through a computerised word search in the first place. Furthermore, applicants have an incentive to disclose no more about how to reproduce the invention than the bare minimum required by the law.[63]

But it is critical that disclosures are as useful as lawmakers intended them to be. We have seen that intangible assets are becoming an ever-more important component of OECD economies. And we will see in section 3.6 that IP is becoming an increasingly important source of financing for SMEs, which generate a disproportionate share of job growth. Those financing markets, like all markets, depend on information to function well. "It is crucial that patent data is seriously useful in order to make markets work. If intangible capital is the foundation of the economy for the next century, then it is necessary to have a well-functioning information system in place: hiding such vitally important data will not help progress" (Chapter 8, paraphrasing remarks by Tony Clayton).

A counterbalancing factor is that digitisation and the growth of the Internet have been especially beneficial for the dissemination aspect of diffusion. By digitising their application processes and putting databases of their patent information online, patent offices around the world have made substantial progress in improving access to patent information (Chapter 8). Not only that, but the information can be obtained faster, more affordably, and it is searchable, as well. By encouraging and funding these efforts by patent offices, governments can help to ensure that economies are getting the maximum amount of knowledge diffusion from their patent systems.[64]

Several other ideas for improving the utility of patent disclosures emerged at the expert workshop held in connection with this report (Chapter 8). One recommended approach is simply to put more effort into applying the disclosure laws that we already have. Greater time and resources could be devoted to scrutinising the adequacy of disclosure during the patent examination stage, to ensure that, for instance, the patented technology is reproducible by a person skilled in the art. In addition, a peer review system might be helpful because, although patent examiners have scientific backgrounds, it is difficult for anyone to be skilled in every area. Another possibility concerns the lag between the date of filing and the date of publication (when disclosure occurs). That lag can be considerable, and may seem even longer in fast-moving fields. Reducing the lag, at least in some technology areas, could make disclosures more useful by ensuring that the information is still fresh.

Trade secrets and diffusion, and a comparison with diffusion from patents

It may seem counterintuitive, but some knowledge diffusion may be expected to result from trade secret protection. Trade secrets are confidential, but they are commercial, too. The laws therefore anticipate and accommodate a certain degree of protected disclosure. By providing a legal framework for safeguarding firms' valuable and secret information, including remedial measures in case of a breach, laws covering trade secrets can give firms the confidence and security they need to collaborate more closely with business partners. Thus, trade secrets owners are sometimes willing to share sensitive knowledge with other firms (subject to licensing and/or confidentiality agreements). Moreover, when employees switch jobs, even though non-compete agreements may limit the amount of information they can share with their next employer, the employees may be able to share some useful know-how that is related to the trade secrets but is not actually part of them (Lemley, 2011).

In principle, however, one might expect a smaller diffusion effect from trade secrets than from patents. Patents require the invention to be disclosed to the public, whereas trade secrets protection is premised on keeping the invention secret (or sharing it, at most, only with business partners that are subject to confidentiality agreements). In addition, patents eventually expire, putting the invention they once protected into the public domain. Trade secrets, on the contrary, can endure indefinitely. Although trade secret laws do not prohibit reverse engineering, firms are unlikely to rely on trade secret protection for their valuable knowledge if it is easy to reverse-engineer and if they can choose patent protection instead.[65] Finally, the diffusion effect associated with patents can stem from both licensing agreements and the disclosure requirement in the application process, whereas there is obviously no disclosure requirement for trade secrets.

On the other hand, it has been discussed already that patent disclosures are not necessarily optimal. Furthermore, patent protection might be used in combination with trade secret protection in a manner that inhibits the beneficial effects of disclosure requirements. For example, if even a person skilled in the relevant discipline would be unable to reproduce an invention despite having all of the patent documentation at hand, e.g. because the inventor has revealed the absolute minimum necessary to obtain the patent but has kept some crucial know-how secret, then the owner has essentially bundled patent protection with trade secret protection. That strategy, if successful, would obviously restrict the intended benefits of the patent disclosure system. Nevertheless, it seems difficult to conclude that patents' average knowledge diffusion effect is smaller than that of trade secrets.

This point is theoretical, though – and it must remain theoretical – because empirical data on trade secrets is scarce due to their non-public nature. We simply cannot know the number or value of trade secrets in an economy, how long they have existed, or how much knowledge they diffuse, because they are hidden from public view. What we do know is that firms generally say they rely more on secrecy than on patents (though in certain sectors, like pharmaceuticals, the opposite is true),[66] and there is evidence that the main reason businesses use trade secrets instead of other forms of IP protection is to avoid having to disclose valuable information to the public (European Commission, 2013). If it is correct that one should expect a greater knowledge diffusion effect from patents than from trade secrets, and governments want to encourage such diffusion because it fosters innovation and growth, then it could be worth considering what can be done to make filing for patents more appealing to firms when they have a choice between trade secrets and patents.[67]

Part of that consideration would necessarily involve the subject of cost, which is another factor that motivates some firms – particularly innovative SMEs – to favour trade secrets protection over patent protection (Brant and Lohse, 2013). It is clearly important for SMEs to have an affordable means of protecting their valuable KBC. Granted, there may be a relatively higher societal cost with trade secrets in that they probably generate less diffusion than there would be with a patent. However, that may be preferable than not getting the innovation at all. Furthermore, when inventors opt for trade secrets protection instead of a patent, they leave the door open for subsequent inventors to innovate in ways that might have infringed the patent. Finally, making patents substantially cheaper might encourage a surge of low quality, low value patent applications.

IP-Based Financing Deserves Attention

OECD data covering 2001 to 2011 indicate that, although young firms account for only 17 percent of total employment, they contribute disproportionately to job creation – 45 percent of the total – across a group of 15 OECD countries that were studied (OECD, 2013*c*, p. 198).[68] However, there was substantial variation within the sample, a fact that highlights the importance of national policies and business environments in encouraging the formation and development of new businesses. Among the most important factors affecting the success of young firms is the ease of access to financing. Capital is often relatively difficult for young firms to obtain because they do not have long histories of consistently repaying loans and they tend to lack collateral – or at least what banks have traditionally viewed as collateral. But some young firms have untapped resources in the form of IP, which – if it can be properly valued and if markets for IP-based financing are functioning well – can be used to persuade lenders to provide financing.

This is a timely issue because even though young firms are responsible for so much job creation, it became even harder for them to obtain financing between 2007 and 2012 (OECD, 2013c, p. 200). Of course, not all start-ups need or merit external capital, and not all of them have IP. But due to the financial crisis, banks were unable or less willing to provide loans to young, innovative start-ups, and venture capital firms became more risk-adverse. The financiers therefore focused on more mature businesses, leaving an important source of job creation underfunded. If IP-based financing had been less constrained and more developed, it could have made the difference between success and failure for young firms with promising IP. Policy makers interested in job growth may benefit from taking a closer look at what is constraining IP-based financing and what can be done to unleash it. That is the purpose of Chapter 9 of this Report.

Chapter 9 notes that asymmetric information, moral hazard, and certain other features of innovation have the combined effect of driving interest rates for financing innovation higher than for other types of financing. Those factors also lead to inefficiently low funding for innovative firms, in part because the factors make it harder to use KBC as collateral. Knowledge-intensive start-ups and young SMEs are probably the most financially constrained, essentially because they lack tangible capital and track records.

They are therefore the ones that would stand to benefit the most if IP-based financing were more widely available.

IP can facilitate financing, especially for SMEs, in two ways. First, IP can serve as a signal of a firm's quality (both managerial and technological) and potential, helping to reduce information asymmetries between internal managers and external investors. Second, IP can boost profitability because it confers exclusive rights to use inventions or creations, which can lead to competitive advantages. If there is a well-functioning secondary market for IP, IP can also be sold off if the firm that owns it has trouble repaying its loans. In other words, IP can serve as collateral in debt financing.

Chapter 9 further explains that debt financing connected to IP (i.e. mainstream and IP-backed lending and securitisation, IP sales and lease backs, and venture debt) is growing, but the lack of data prevents researchers from determining its actual size. In any event, large firms use debt financing more than smaller firms in IP-intensive sectors, due to the complexity of these transactions and the fact that large firms more often have IP that is already commercialised and earning a return. Smaller firms must rely more on equity financing, in which angel investors or venture capitalists recognise and estimate the present value of IP assets that have not necessarily begun to generate profits yet. A substantial body of empirical work has found that young, high-growth firms with IP assets receive more funding than firms without IP.

Nevertheless, IP-based finance is significantly under-used, especially by SMEs that are most in need of it (Brassell & King, 2013). One major reason for that stems from a lack of opportunities to sell IP in a secondary market, which is due to both uncertain redeployability and immature IP markets (Brassell & King, 2013; European Commission, 2014).

Policy makers are striving to support IP markets in several countries. Generally, their efforts fall into two categories*: i)* supporting greater transparency of IP ownership and transfer information via disclosure requirements or measures to foster greater clarity in patent claims; and *ii)* creating new IP market infrastructures. Transparency and reliability in IP markets require greater attention because they are currently undermined by insufficient information on IP ownership and transfers, as well as by uncertainty over the legal protection and technological breadth of IP rights (Harhoff, 2009; Brassell & King, 2013; Terroir, 2014). To promote transparency in ownership and transfers information, new disclosure requirements could be introduced, for example through reporting regimes managed by IP offices. An example of this type of measure is President Obama's announcement of an executive action in June 2013 to increase transparency in the patent system by requiring patent owners and applicants to provide the USPTO with up-to-date information on the attributable owner of patents and patent applications.[69] Examples of measures to create new IP market infrastructures are the UK's Copyright Hub, an online licensing and copyright education platform, and Denmark's IP Marketplace, an online market where IP owners and buyers can list, buy, sell, and license intellectual assets.[70]

Another approach that governments can take is to help manage the risks associated with the collateralising IP. Government agencies and development banks can do that through risk-sharing mechanisms. Those mechanisms must allow IP to count as a credit-scoring enhancement. Alternatively, governments could support the formation of IP insurance companies, though it remains unclear exactly how best to do so.

Building awareness and trust within SMEs and the financial sector with regard to IP-based financing is also crucial to facilitate the rise of IP as a full-fledged asset class. Awareness of the potential value of IP for obtaining financing is a stubborn constraint. As we have seen, for most firms, registered forms of IP are not the method of choice for protecting intellectual assets. Instead, they tend to rely on secrecy, complexity, and/or first mover advantages. This is especially true of young, innovative firms (OECD, 2011; Brassell & King, 2013). Policy makers can help by designing and implementing awareness campaigns and by increasing the reliability of valuation standards and corporate reporting of IP assets.

Better Copyright Data Will Enable Data-Driven Copyright Policy

Part 3.1 showed that, where comparative data are available, investment in copyright has grown more than investment in any other form of IP, that it is the largest component of IP-protected investment, and that job growth in copyright-intensive industries has been much better than that in trademark and patent-intensive industries. Nevertheless, patents have received far more scholarly attention than copyright (WIPO, 2011, Chap. 2, p. 75). One reason for that discrepancy is that while patent-related data is plentiful, given the requirement of filing a patent application, less information about copyright is publicly available. Researchers go where the data are, and patent systems have plenty of data. To enable better-informed policy making decisions, copyright has some catch up to do.

The relative lack of copyright information is mainly due to the fact that most copyrights are not registered in most countries. There are some databases, thanks to public registration systems in some countries as well as certain private sector organisations. But they do not provide comprehensive coverage of all copyrighted works and they tend to be incompatible with one another (U.S. Dept. of Commerce, 2013, at 89-94). Consequently, it is harder to determine systematically even quite basic information about copyrights, such as how many there are and who owns them. Ideally, policy decisions about all forms of IP, including copyright, would be supported by reliable data and objective analysis, so more investment in collecting and measuring copyright data is worth considering.[71]

This issue was discussed at the Expert Workshop (see Chapter 8) and there was uncharacteristically broad agreement among the panellists that the lack of copyright data is a significant problem that needs to be addressed. As one speaker said, policy makers need to help generate the data, not just consume it.

What can be done? One possibility is to implement more measures designed to encourage voluntary registration. The main purpose of copyright registration is to create an official record of the date, owner and content of a work so that there is always a reliable basis on which to adjudicate legal claims concerning the work. But an added benefit of registration is that it could help to alleviate the dearth of data on copyright that is impeding quantitative analysis of its benefits and weaknesses.

Other possibilities include funding research and surveys to estimate the benefits of more registration, and changing accounting rules that apply to creative industries to enable better data collection.

Effective Tax Rates on Investments in IP

Phase 2's tax component, a stand-alone report entitled "Effective Tax Rates on Investments in Different Types of Knowledge-based Capital", provides a framework for modelling effective tax rates for different types and for different business uses of KBC (OECD, 2014d). The types of KBC include, for example, computerised information, innovative property including R&D, and economic competencies. The different business uses of KBC are *i)* self-constructed for long term use; *ii)* self-constructed for sale; and *iii)* acquired KBC. Part of the report addresses design features of KBC taxation, including deductibility of expenses, taxation of future income at reduced rates (e.g. "patent boxes"), treatment of losses, and various types of tax relief such as tax allowances and credits. Ultimately, the report shows differences in effective tax rates across different types and uses of KBC. It then provides suggestions on how governments can more cost-effectively direct their fiscal efforts to support the private sector in creating KBC.

The tax report notes, among other things, that tax incentives to encourage R&D must be carefully designed to ensure they benefit all companies undertaking innovation investments, including SME's and start-up companies. It also observes that while KBC investments that fall into the category of R&D benefit from tax subsidies in many countries, other types of KBC investment generally do not have specific tax incentives. But non-R&D KBC may have potential positive spillovers, too, which would merit government incentives.

Other Policy Challenges in Need of Further Study

Planned Work on Measuring Patent System Quality[72]

The OECD's Economics Department in collaboration with the Directorate for Science, Technology and Innovation (DSTI) is designing a data collection exercise to facilitate the construction of new policy indicators related to patent rights. This exercise is organised around two main pillars. First, a questionnaire is being developed which aims to collect detailed information on countries' rules, laws and standards, as well as capacities, for reviewing patent applications, granting patents, litigating validity and infringement cases, and determining outcomes in those cases.

Second, the Secretariat expects to produce a proposal by March 2015 for a project that will identify the key features of patent systems that influence economic outcomes and summarise a new indicator.

The remainder of this section of this chapter suggests, in order of priority, a number of other policy challenges that are not addressed, or that are only partly addressed, in the phase 2/IP report.

Leveraging the Patent Value Indicators to Gain Further Insights on Innovative Activity

As mentioned above, when statistics compiled from patent applications filed with the European Patent Office were fed into the patent value indicator algorithms developed in Chapter 2, the results varied from indicator to indicator. However, by looking at all of the indicators' results, one could compile country profiles from which a more comprehensive picture of each country's innovative strengths and weaknesses, to the extent that they are reflected in patenting activity, would emerge. One must bear in mind the earlier discussion about the limits of the association between patenting and overall innovation, but nevertheless, data from other patent offices and expanded time horizons could be fed into the indicators to enrich the results. Furthermore, by linking the indicator data to data related to countries' industrial structure and framework conditions, it would also be possible to identify and analyse the factors and conditions that foster (or hinder) the high-value patenting activity and hence the competitiveness of firms, industries, and economies. Those additional projects have not been undertaken, but now that the indicators have been created it would be possible to do them.

IP Bundles

In the past, firms that used IP tended to rely more frequently on one particular type, and to the extent that they owned multiple kinds of IP, they may have been used in very distinct parts of the firm's business operations. For example, pharmaceutical companies relied primarily on patents (and still do), while soft drink makers relied heavily on trade secrets. Media companies could rely almost exclusively on copyright while maintaining trademarks on their brand names. Today, more companies use a bundle of IP rights to protect their KBC. For instance, in-house software used in product design and manufacturing is common at larger firms and is typically protected by copyright, while the products themselves may be protected by patents, trademarks, and/or even more copyrights. Indeed, there is evidence suggesting that firms worldwide increasingly rely on the joint use of patents, trademarks, and industrial designs (OECD, 2013*c*, p. 186).

How are firms using bundles of different types of IP to be maximally competitive? How do the different types of IP interact and complement each other? Are those interactions promoting or harming innovation? Why do firms sometimes specifically choose *not* to use certain types of IP to protect their KBC?

Sub-topics include:

- **Introduction to IP Portfolios** – What do companies with multiple types of IP typically use the different types for? In other words, why do they choose one form of IP protection over another for a given invention, creation or idea? Is it more common in today's economy than it was in the past for firms to have substantial amounts of multiple types of IP? If so, what drove that change? How do the different types of IP interact and complement each other? Are those interactions promoting or harming innovation?

- **Strategic Use of IP Portfolios** – Do companies sometimes use multiple types of IP in ways that provide greater-than-optimal protection? If there are loopholes or faults in the frameworks, what should be done to fix them? In what ways are the different types of IP and associated policies working well together? How are those complementarities stimulating or inhibiting greater innovation?

The Competition/IP Interface

There is no shortage of challenges for policy makers at the intersection of competition and IP regimes. These include: how to make the FRAND concept clearer and more enforceable (FRAND means "fair, reasonable, and non-discriminatory"; holders of standard-essential patents sometimes commit to FRAND terms for licensing their patents before their technology is incorporated into the standard), hold-up and reverse hold-up in standard-setting situations, reverse-payment settlements in the pharmaceutical industry, and the behaviour of patent aggregators and how to monitor and analyse their acquisitions to protect competition, given that markets for the relevant products might not even exist yet. There have also been claims that patent assertion entities sometimes use their patents in a manner that violates competition laws (Carrier, 2013; Guniganti & Knox, 2013; Wyatt, 2013).

Collaborative Innovation

New technologies have been emerging out of the cross-fertilisation of different fields, such as the combination of biology and computer programming to form synthetic biology technologies. In addition, open innovation and open access have increased the frequency of joint inventions and authorships. Not all IP systems currently handle collaborative efforts to invent very well. When there are multiple contributors to an invention and/or their contributions overlap, it is not necessarily obvious how to allocate IP rights in all regimes, though it is in some. This is an issue for both patents and copyrights. How economically significant is the problem? Is there a best approach? Can we identify regimes where the allocation of rights are clearly delineated and encourage others to align with those best practices?

Patent Thickets

A patent thicket is a high density of patent rights issued in a certain technical area, which creates an overlapping web of IP rights that must be navigated in order to commercialise a product. The potential difficulties caused by a patent thicket could be amplified if there is low patent quality (meaning inaccurate patent claims and patents that are not genuinely novel or non-obvious). Patent thickets are most frequently mentioned as a concern in high tech and complex product industries, like ICT. A 2013 report commissioned by the United Kingdom's Intellectual Property Office, for example, found "overwhelming evidence that patent thickets arise in specific technology areas" and its econometric analysis shows that the density of patent thickets in given technology areas correlates with reduced entry into patenting in those areas (Intellectual Property Office, 2013). The degree to which thickets retard innovation, however, remains unclear, as high tech and ICT industries continue to innovate, develop, and grow rapidly. Moreover, there can be over-lapping patent rights even in the case of a well-defined patent scope on perfectly valid patents (Shapiro, 2001). Cross licensing arrangements and patent pools have been identified as tools that can help with navigating patent thickets.

Conclusion

This chapter has provided an overview of the report, highlighting the key findings related to the main themes: the importance of IP as a source of growth and innovation and the effects on IP systems and stakeholders of several major developments, especially content digitisation and the growth of the Internet. The overview shows that in spite of substantially changed technological and economic conditions, IP remains vitally important to innovation, employment, and growth. Those changed conditions have, however, created a number of challenges that stakeholders are working through. It is clear that having more complete data on IP to serve as an underpinning for policy discussions would be extremely helpful. However, so would deeper thinking about what IP’s fundamental purpose is because debates about optimal frameworks also need to be grounded by clear principles and standards. Those are not always apparent in IP discussions, particularly where copyright is concerned. Yet copyright appears to be the most economically significant type of IP, it seems to be the form of IP that has been most affected by digitisation and the Internet, and it generates the most controversy.

ANNEX SUMMARY OF PHASE 1'S MAIN FINDINGS

At the start of 2011 the OECD began work on a two-year project entitled **New Sources of Growth: Knowledge-based Capital**. The motivation for the project was two-fold. The first was to examine in depth a finding highlighted by the OECD's 2010 **Innovation Strategy**, namely that many firms that innovate do not invest in R&D. Instead, innovation in such firms is based on investments in a wider range of intangible assets – knowledge-based capital (KBC). Secondly, the NSG-KBC project aims to help governments and policy analysts better understand the determinants of growth. Today, the importance of growth can barely be overstated. The drawn-out nature of the global crisis, sluggish macro-economic conditions in many OECD economies, weak labour markets and burgeoning public debt have all added urgency to the search for new sources of growth. Furthermore, rapidly ageing populations, combined with natural resource constraints, mean that the future of growth in advanced economies will increasingly depend on productivity-raising innovation. Drawing on inputs from across the OECD Secretariat, the work summarised in this synthesis report aims to provide evidence of the economic value of knowledge-based capital as a new source of growth and to improve understanding of current and emerging policy challenges.

KBC results from business investment in non-physical assets such as research and development (R&D), data, software, patents, new organisational processes, firm-specific skills and designs. In many OECD countries, business investment in KBC has increased faster than investment in physical capital (machinery, equipment, buildings). In some countries, business investment in KBC significantly exceeds investment in physical capital.

KBC and growth

Inherent features of KBC are growth-promoting, and various forms of evidence link business investment in KBC to growth and productivity change. Unlike physical capital, KBC can foster growth because the initial cost incurred in developing certain types of knowledge is not re-incurred when that knowledge is used again. This can lead to increasing returns to scale in production. Investments in many forms of KBC – such as R&D, design and new business processes – also create knowledge that spills over into other parts of the economy, again spurring growth. Growth accounting studies for the European Union and the United States show that business investment in KBC contributes 20% to 27% of average labour productivity growth. And during the global crisis, investment in KBC has been relatively resilient. KBC is also transforming the determinants of competitive success for firms. For instance, in the automotive sector, the cost of developing new vehicles is increasingly dominated by software, with high-end vehicles relying on millions of lines of computer code.

As overall business investment in KBC increases – and because of KBC's particular economic features, especially its intangible nature – certain key policy settings need to be updated. Ensuring that policies are up to date and conform to good practice is essential in the fields of taxation, innovation, entrepreneurship, competition, corporate reporting and intellectual property. This also holds for policies that enable the exploitation of data as an economic asset. The rising importance of KBC also amplifies the importance of some framework policies already understood to be essential, such as education. Getting the key framework conditions right, while a challenge, is in fact a low-cost step for policy makers in fiscal terms.

Innovation

The breadth of the assets that make up KBC points to the need for policy makers to adopt an enlarged concept of innovation, beyond the conventional view in which R&D is pre-eminent. Other assets such as organisational capital and design, and the ability to create value from data, are important arenas of innovation and productivity growth that often require specific policy action. Well-designed support measures – such as those that facilitate access to finance for innovative firms – along with frameworks that foster collaboration to innovate, supply-side measures that support KBC investments in areas of highest social return, and the redesign of some long-standing innovation programmes, are all important. And demand-side policy – particularly innovation-oriented competitive public procurement – could help support KBC investments that also meet public needs. Policy stability – keeping policy uncertainty to a minimum – is also important.

Entrepreneurship and business development

The accumulation and optimal use of KBC requires experimentation (for instance with new business models and organisational forms) in firms of all sizes. Evidence from thirteen OECD countries for 2001-11 shows that young firms (*i.e.* below five years of age), many of which use KBC intensively, accounted for 18% of total employment but generated 47% of all new jobs created. Policy should make it easier for firms to develop and commercialise new ideas by lowering the costs of failure and encouraging firms to take risks and experiment with potential growth opportunities. All this requires well-functioning product and labour markets. Also essential are bankruptcy laws that do not overly penalise failure (reducing the stringency of bankruptcy legislation from the highest to the average level in the OECD could raise capital flows to patenting firms by around 35%) and well-functioning systems of debt and early-stage equity finance. Indeed, the countries that invest more in KBC are those that reallocate resources to innovative firms more effectively. As a share of gross domestic product (GDP), the United States and Sweden invest about twice as much in KBC as Italy and Spain, and patenting firms in the United States and Sweden attract four times as much capital as similar firms in Italy and Spain. Macroeconomic and political uncertainties are also likely to hinder business investment in KBC.

Taxation

A wide variety of tax policies affect innovation and growth, as examined in previous OECD publications such as *Tax Policy Reform and Economic Growth* (2010). Work reported here focuses on effects on KBC investment by multinational enterprises (MNEs) of limited corporate income tax on returns on investment. R&D tax incentives play a central role in many countries in encouraging investment in KBC. However, the effective tax rate on such investments depends also on other aspects of the tax regime, including not only explicit government policies (such as ‘patent boxes’) but also the cross-border tax planning strategies now widely used by MNEs. New analysis is provided that finds that overall tax relief for R&D by MNEs, when factoring in relief resulting from cross-border tax planning by MNEs, could well be greater than governments foresaw when their R&D tax incentives were designed. The study considers how MNEs are able to transfer KBC to offshore holding companies, and how interactions of tax systems may encourage the use of KBC in foreign rather than domestic production. Consequently, countries may be losing tax revenue from the commercialisation of subsidised R&D and foregoing some potential domestic knowledge spillovers associated with production (while still gaining the benefits of knowledge spillovers from the subsidised R&D performed locally). Furthermore, ‘stand-alone’ firms that are not part of a multinational group of companies, and thus are unable to adopt cross-border tax-planning strategies, may be placed at a competitive disadvantage, relative to MNEs, in undertaking and exploiting R&D. The findings add to arguments for:

- *Targeting R&D tax credits on ‘stand-alone’ firms without cross-border tax planning opportunities.* This message is further supported by other OECD analysis showing that fiscal incentives may favour less dynamic incumbents at the expense of dynamic young firms.

- *Reducing unintended tax relief for MNEs on the exploitation of KBC through international co-operation.* New work to address base erosion and profit shifting (BEPS) should take into account growth in the importance of KBC and intra-group trade in intangibles.

- *Recognition of the risk that the increasing reliance of countries on tax incentives for R&D could, in some cases, increase foregone tax revenue without resulting in ‘incremental’ R&D (i.e. additional R&D spurred by the incentive) and without increasing income from R&D commercialisation. In this environment, it is essential to pay careful attention to the design of R&D tax credits to reduce these risks.*

- *Gathering more data to estimate the amounts of income being shifted to no-/ low-tax countries through MNE tax planning involving KBC, given potentially significant implications of this planning for countries’ public finances.*

Competition policy

Industries founded on KBC raise new issues for competition policy. This is particularly true for the digital economy. Never before have leading firms grown so large so quickly, and the nature of competition also differs in some respects from other sectors. Some experts have observed, for example, that unlike traditional manufacturing sectors, the digital economy’s most meaningful competition takes place among platforms created by companies that use very different business models, rather than among companies that all follow more or less the same model. Apple, Google and Microsoft illustrate that point, as they all compete in the market for mobile phone operating systems but each has a different business model. Competition *among* platform providers may therefore be more important to innovation and consumer welfare than competition *within* platforms (such as rivalry among companies that create apps for the iPhone). Competition policy should: properly account for inter-platform competition; promote the elimination of unnecessarily anti-competitive product market regulation; and include the effective enforcement of competition law, which will protect and encourage innovation.

Intellectual property rights

High-quality intellectual property rights (IPR) are an increasingly important framework condition. The rise of KBC is shifting IPRs from a largely technical area that is important to a few sectors to an area with economy-wide prominence. Concerns are growing that not all facets of IPR are well suited to this more pervasive role and that some intellectual property regimes have not kept pace with technological change (many copyright systems were designed for a world of paper and print and may inhibit new digital services). In a world increasingly based on knowledge assets:

- IPR systems must be coupled with pro-competition policies and efficient judicial systems.

- Steps should be taken to address the erosion of patent quality (i.e. the accuracy of patent claims and whether patents reflect genuinely novel innovations). OECD data suggest that patent quality across the OECD area has eroded steadily over the last decade.

- There is a need for greater mutual recognition and compatibility across IPR systems internationally (for instance to permit cross-border copyright licensing). Better understanding is needed of how firms combine different IPRs (not only patents, but also trademarks, design rights and copyrights) in their overall innovation strategies.

Capturing value in global value chains

The geographic fragmentation of production chains is a salient feature of the global economy. Investment in KBC plays an important role in global value chains (GVCs) and international competitiveness. The highest level of value creation in a GVC is often found in upstream activities such as concept development, R&D or the manufacture of key parts and components and in certain downstream activities such as marketing, branding or customer service. These activities all involve KBC and define the extent to which firms generate the value available through GVCs. *Getting policies and framework conditions right is important to ensure that high-value jobs are created and maintained in GVCs.* China, Brazil and other emerging economies are also making concerted efforts to help their businesses develop KBC.

Financial markets

In traditional debt markets, tangibles (assets such as equipment and structures) have well-defined market prices and readily serve as collateral. While there are innovations in the securitisation of debt using KBC, more could be done (for instance by facilitating robust markets for intellectual property). The increasing importance of KBC underscores the need for market-enhancing policy instruments to address shortfalls of early-stage risk capital that affect young KBC-intensive firms and the need for better ways for firms to communicate the value of KBC in their business models.

Corporate reporting

The value of many of the world's most successful companies resides almost entirely in their KBC. In 2011, for example, physical assets accounted for only about 13% of the value of Nestlé, the world's largest food company. Across countries, there is a positive correlation between the market value of firms and investment in KBC. Nevertheless, corporate financial reports provide limited information on companies' investments in KBC. This may hinder corporate finance and governance. Governments might: *i)* support better corporate disclosure by establishing voluntary recommendations and guidelines or by backing private-sector reporting initiatives; *ii)* create mechanisms to facilitate companies' reporting of investments in KBC; *iii)* introduce frameworks for auditors; *iv)* engage in international co-ordination to improve international comparability of data and information supplied by companies; and *v)* promote the establishment of asset classifications that would increase consistency in data collection and reporting.

Measurement

A fuller understanding of innovation and growth, and the design of better policy, require governments to do more to measure investments in KBC and to agree on common measurement guidelines. Current international accounting standards, such as the System of National Accounts, capture a number of KBC investments, such as software and R&D, but efforts to develop guidelines for robust and comparable measurement should continue. This will require significant investment in the statistics needed to measure reliably all the forms of KBC referred to in this report. In the short to medium term countries are encouraged to develop additional measures via satellite accounts to maintain the international comparability of GDP. This will help to improve understanding of growth and productivity. As an indication of the potential impact of better measurement, accumulated investments in KBC (not measured in GDP) amounted to around USD 4.1 trillion in the United States in 2007. In fact, around 40% of growth is still an unexplained "residual", and better measurement of KBC can help fill a part of this gap.

Using data as an economic asset

Creating economic value from large data sets is at the leading edge of business innovation, while companies that base key decisions on data analytics outperform other firms. While there is no clearly optimal policy in this fast-evolving field, it is evident that to unlock major economic benefits all OECD governments must do more to implement coherent policies in the fields of privacy protection, open data access, information and communications technology (ICT) infrastructure and ICT-related skills.

Education and training

Growing business investment in KBC amplifies the importance of getting human capital policies right. Human capital is the foundation of KBC: software, for example, is essentially an expression of human expertise translated into code. The rapid evolution of different parts of the KBC-intensive economy inevitably generates skills shortages. Research in the United States suggests a shortfall of some 1.5 million managers and analysts with adequate understanding of the business benefits of data. The NSG-KBC project highlights the importance of policies to balance skills supply and demand efficiently (as elaborated in the OECD Skills Strategy). Public-private partnerships can also help to better align curricula and programmes with the needs of business. And given highly constrained public finances, in countries where educational attainment is already high, efforts to improve the quality of education will often be a priority.

The rise of KBC has profound implications for employment and earnings inequality. A KBC-based economy rewards skills and those who perform non-routine manual and cognitive tasks, but may also reward investors (who ultimately own much of the KBC) over workers (in the United States, for instance, wages as a share of GDP are at an all-time low). Rising investment in KBC can create winner-takes-all opportunities for a few, while entire occupational categories can be replaced by machines and software. KBC changes the demand for skills, and to the extent that workforce skills can adjust rapidly to new technologies, aggregate growth will be enhanced without greatly exacerbating income inequality. Major societal challenges will certainly arise as driverless vehicles, machine-based X-ray diagnostics, automated report-writing, and many similar advances in digital technology become widespread.

NOTES

1 C. Corrado, C. Hulten and D. Sichel (2006), "Intangible Capital and Economic Growth," Federal Reserve Board Discussion Series 2006-24, available at: www.federalreserve.gov/pubs/feds/2006/200624/200624pap.pdf; Leonard Nakamura (2008), "Intangible Assets and National Income Accounting," Federal Reserve Bank of Philadelphia Working Paper No. 08-23, available at: http://philadelphiafed.org/research-and-data/publications/working-papers/2008/wp08-23.pdf; C. Corrado, C. Hulten and D. Sichel (2009), "Intangible Capital and U.S. Economic Growth", Review of Income and Wealth, Series 55, No.3, September, available at: www.conference-board.org/pdf_free/IntangibleCapital_USEconomy.pdf.

2 Note that non-exclusive frameworks like open source and public domain are also important for creativity and innovation because they provide a common ground on which creativity and innovation – using private or exclusive rights – can flourish. For example, the publication policies of firms like IBM show how publication to prevent patenting can be used successfully to establish technology standards which customers and others can use. Research commissioned by the UK's Intellectual Property Office (www.create.ac.uk/blog/2014/12/10/create-event-reflects-on-value-of-the-public-domain/) shows how the use of public domain creative material raises the commercial attractiveness of investment in new creative work. Non-exclusive frameworks complement, rather than compete with, IP rights.

3 See www.oecd.org/general/ministerialcouncilmeeting2012-chairssummary.htm; www.oecd.org/mcm/chairssummary-oecdministerialcouncilmeetingmcm29-30may2013-itsallaboutpeoplejobsequalityandtrust.htm; and www.oecd.org/mcm/mcm-2014-chair-summary.htm.

4 See www.oecd.org/mcm/C-MIN(2013)1-ENG.pdf; and www.oecd.org/about/secretary-general/MCM-2014-Strategic-Orientations-SG.pdf.

5 In some countries, creative expression created by producers of sound recordings as well as performers are protected under "related rights" or "neighbouring rights" regimes in national copyright laws, but they are considered part of the copyright "community".

6 Many countries do not define trade secrets expressly as IP, even though they are covered under the TRIPS Agreement (Agreement on Trade-Related Aspects of Intellectual Property Rights, the first international agreement to protect trade secrets expressly). Most countries protect trade secrets under a civil statute, while a growing number also provide supplementary protection under criminal law. In common law countries, the protection of trade secrets was founded on common law court decisions and precedent about agreements between employers and workers or between business partners. See Chapter 3, Approaches to the Protection of Trade Secrets.

7 This should not be interpreted as suggesting that the effects of ICT development on KBC, including IP, are limited to ICT industries themselves. ICT development is facilitating KBC in many other areas of the economy, as well, like banking, agriculture, and scientific research.

8 *See*, *e.g.* OECD (2013*a*), p. 50 ("Recent decades have seen a trend for countries to strengthen patenting regimes in favour of patent holders."); Chapter 4 of this Report (showing that trade secrets protection has grown stronger in both OECD and non-OECD countries over the past 25 years); Chapter 5 of this Report (see in particular country studies of Australia, Canada, Japan, and Korea); Sell (2003), at p. 63 (noting that "Over time, the scope of subject matter eligible for copyright protection has broadened considerably" and

that, for example, "[u]nder TRIPS computer programs are protected as 'literary works'" and that "[w]hile some users of copyrighted information have protested this expansion of copyright, the recent trend has been to protect more rather than less."); International Trademark Association Factsheet, "Types of Protection: Nontraditional Trademarks" ("Traditionally, a mark will consist of a word, logo, or a combination of both... However, over time other elements besides words, logos or graphic designs have served to identify the source of goods or services, thus serving the function of marks. These are called nontraditional marks."), available at www.inta.org/TrademarkBasics/FactSheets/Pages/NontraditionalTrademarksFactSheet.aspx; see also Copyright Term Extension Act of 1998 (amending 17 U.S.C. §§ 108, 203(a)(2), 301(c), 302, 303, 304(c)(2) to extend copyright term in the United States from life of the author plus 50 years to life of the author plus 70 years); Directive 2011/77/EU (extending the term of copyright protection for performers and sound recordings to 70 years in the EU); WIPO Copyright Treaty and WIPO Performances and Phonogram Treaty (also known as the WIPO "Internet Treaties," these treaties entered into force in 2002 and "update and supplement the major existing WIPO treaties on copyright and related rights, primarily in order to respond to developments in technology and in the marketplace" (www.wipo.int/copyright/en/activities/internet_treaties.html) by adding anticircumvention protection, protection against tampering with rights management information, a communication to the public/making available right, and by harmonising performers' rights – changes that the International Intellectual Property Alliance describes as requiring signatories to "upgrade their copyright laws" (www.iipa.com/wipo_treaties.html)); Gilson & LaLonde (2005). Of course, not every development has moved in the same direction. For example, the United States Supreme Court recently held that an abstract idea does not become patent-eligible merely because someone implements it through a generic computer. Alice Corp. v. CLS Bank International, 573 U.S. ___ (2014). Although the opinion does not mention the word "software," it is expected to restrict patent rights for software. See Graham (2014) (quoting Professor Mark Lemley: "I expect that holding to invalidate the majority of all [U.S.] software patents in force today."), available at www.law.com/sites/articles/2014/06/19/cls-bank-ruling-a-big-deal-for-valley-software-patents/.

9 See CISAC (2014), at 57-58 (indices of creativity correlated with the strength of national IP system); but see Hargreaves (2011), at 19, ("Economic evidence is clear that the likely deadweight loss to the economy exceeds any additional incentivising effect which might result from the extension of copyright term beyond its present levels.").

10 Big data also raises concerns about potential effects on employment and about the need to improve skills in the work force, as well as about trust (an umbrella term that includes privacy, cybersecurity, and consumer protection), which are discussed in detail in Chapters 5 and 6 of the other main phase 2 report, *Data-Driven Innovation for Growth and Well-Being*.

11 That there is a real possibility that IP policies in OECD countries do not always succeed in striking such a balance is suggested by a number of recent legal reforms and government or government-sponsored studies that address the balance. See, e.g., Canada's Copyright Modernization Act 2012, which enacted amendments whose rationale was both to strengthen the ability of copyright owners to control the uses of their online works and to improve the copyright law's ability to spur creation and innovation and to support new business models in the digital age. As noted in Chapter 5 of this Report, discussants at public consultations on copyright modernisation in Canada were asked what sorts of copyright reforms would best foster innovation and creativity. *See also* Van Der Noll, et al. (2013) (an economic study on flexible copyright commissioned by the Dutch Ministry of Economic Affairs, Agriculture and Innovation); European Commission (2014) (Expert Group's report on text and data mining); Hargreaves (2011); Chapters 7 and 8 of this Report.

12 Open access commonly refers to efforts to make the outputs of publicly funded research more widely accessible in digital format to the scientific community, the business sector, and society in general. See Chapter 7.

13 Partitioning strategies involve subdividing one (sometimes major) innovation into pieces and seeking to patent them as separate inventions. (Giarratana & Fosfuri, 2007).

14 Patent congestion is a term that essentially means an overload of patent applications that results in less rigorous patent examinations. (Caillaud & Duchêne, 2011).

15 Specifically, CEO Elon Musk announced that Tesla "will not initiate patent lawsuits against anyone who, in good faith, wants to use our technology." Finley (2014) (noting that Tesla CEO Elon Musk's "stance underscores the sentiment–widely held in Silicon Valley–that today's technology moves too fast for the U.S. patent system"). Musk added that Tesla will continue to file for patents, but when they are granted, Tesla will "put them into what is essentially an open source category". Ibid.

16 Examples of digital copyright exchanges include the Copyright Hub in the United Kingdom and SIPX in the United States.

17 Given the multitude of IP policy challenges that are in need of attention and that many, if not all, of them are complex, they could not all be adequately addressed in one project. This report, therefore, is not an attempt to do that. Instead, it is an effort to make progress in certain key areas. A list of challenges that are not addressed here and that remain ripe for further study is presented near the end of this chapter.

18 Here "society" is intended to mean society in an economy-wide sense, not consumers alone, so the societal benefits we focus on are factors like innovation, productivity, and GDP growth. Also, the exchange concept is weaker with respect to copyright than patents, but there is still a give and take in the sense that copyright protection eventually expires and certain exceptions apply to it, but copyright also provides a stronger incentive to create and disseminate content.

19 The summary of the Workshop reflects the information exchanged among the parties at that event. The views presented at the Workshop and reflected in the summary are the experts' own and do not necessarily represent the views of the OECD or any of its Member countries.

20 Pallante (2013) (also noting that "authors do not have effective protections, good faith businesses do not have clear roadmaps, courts do not have sufficient direction, and consumers and other private citizens are increasingly frustrated" and that "Congress should approach the issues comprehensively over the next few years as part of a more general revision of the statute).

21 Robert Goodlatte, interviewed by Tamlin Basin in Patent, Trademark & Copyright Law Daily, "Copyright Review Process Will Continue into 2015; Education and Circumvention Will Be Next Issues Examined" (August 20, 2014), available at www.bna.com/copyright-review-process-n17179894026/; see also http://judiciary.house.gov/news/2013/04242013_2.html (in which Chairman Goodlatte acknowledges that "[t]here is little doubt that our copyright system faces new challenges today" due to digitisation and the Internet).

22 Commissioner Oettinger (Oettinger, 2015) stated: "The other sector we have to look at is copyright. In a digital era, copyright legislation need[s] to be adapted, which will not be easy. On the one hand, we have to preserve and foster our European culture and therefore protect the intellectual property. On the other hand, there is an internet community which has other interests. In our reform we therefore . . . need to find a reasonable balance between the rights of the producer, creator and users."

23 United States Department of Commerce Internet Policy Task Force (2013), p. iii. The report further explains that "[i]t is time to assess whether the current balance of rights, exceptions and responsibilities – crafted, for the most part, before the rapid advances in computing and networking of the past two decades – is still working for creators, rights holders, service providers, and consumers. The Internet must continue to support a legitimate market for copyrighted works as well as provide a platform for innovation and the introduction of new and dynamic services that drive digital commerce." Ibid.

24 Copyright Modernization Act, S.C. 2012, c.20, available at http://laws-lois.justice.gc.ca/eng/annualstatutes/2012_20/FullText.html.

25 As a result of the work on the other main pillar of phase 2, which is the report entitled "Data-Driven Innovation – Unleashing Data for Growth and Well-Being", we will propose to develop an OECD Council Recommendation on open access to data in collaboration with CSTP and GOV that would merge other open data-related OECD Council Recommendations, in particular the OECD (2008) *Council Recommendation on Enhanced Access and More Effective Use of Public Sector Information* developed by CDEP in 2008 and the OECD *Principles and Guidelines for Access to Research Data from Public Funding* developed by the CSTP in 2005.

26 An "IP system", as the term is used in this report, is the law and policy framework that governs IP rights. "Effectiveness" refers to how well the IP system promotes technological and artistic creation and diffusion, as well as innovation.

27 The 12 jurisdictions studied in Chapter 5 are Australia, Canada, Chile, Egypt, the European Union, Italy, Japan, Korea, Poland, Switzerland, the United Kingdom, and the United States.

28 The copyright-intensive industries are defined separately for each of the 12 jurisdictions studied, using a methodology developed by WIPO (2003). In some cases that methodology was subsequently refined and the updated methodologies are discussed in Chapter 5, as well. The original WIPO study identified nine core copyright-intensive industries: press and literature; music, theatrical productions, and operas; motion pictures and videos; radio and television programming; photography; software and databases; visual and graphic arts; advertising; and copyright collective management societies.

29 Using value added and employment data for copyright intensive industries to measure copyright's economic importance is a rough approximation. It is an overestimate because it gives copyright the credit for all of the economic activity in these industries. On the other hand, it is an underestimate because it assigns no value to the non-economic (cultural) contributions made by copyrighted works, nor does it capture the innovation that copyright enables.

30 The analysed period varies from country to country, but only the timeframes for Egypt and Japan do not include the 2008 financial crisis or the years that followed it.

31 A handful of industries, however, reported greater patent effectiveness concerning product innovations. These included medical equipment, drugs, special purpose machinery, computers, and automobile parts. Ibid at 10 and Tables 1.1 and 1.2.

32 The number of patents granted annually around the world tripled from about 400,000 in 1995 to almost 1.2 million in 2012 (WIPO, 2013, p. 48, Figure A.1.2.1).

33 See, e.g., (Eaton, et al., 2004) at 48 (concluding that almost two-thirds of the roughly six percent annual growth in European patents between 1991 and 2000 was caused by a decline in EPO application fees); (Bessen & Hunt, 2004) (contending that US manufacturing firms were adding software patents to their portfolios not as a result of more innovation but simply because software had become patentable and the firms were using them to intimidate potential entrants, make competitors pay royalties, and defend themselves from infringement lawsuits); (Hall & Ziedonis, 2001) (finding that the doubling of patenting rates over a decade in the semiconductor field reflected firms' desire to bulk up their patent portfolios in order to blunt innovation-blocking strategies by rivals that owned other technologies necessary for making semiconductor chips).

34 See, e.g., Merges (1999); National Academy of Sciences (2004) at 41-49. Consider the comments of an executive from Texas Instruments, as well: "TI has something like 8000 patents in the United States that are active patents, and for us to know what's in that portfolio, we think, is just a mind-boggling, budget-busting exercise to try to figure that out with any degree of accuracy at all." Testimony of Frederick

Telecky, US FTC/DOJ Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy (28 February 2002), available at www.ftc.gov/opp/intellect/020228ftc.pdf (quoted in Kahin (2004) at 211). If a company with the resources of Texas Instruments cannot afford to determine what it has in its own patent portfolio, one can imagine how hard it could be for small potential entrants to determine their risk of triggering a patent infringement lawsuit; *but see* Walsh, et al. (2003) at 285 (finding that threats of patent infringement are not deterring much biomedical research, if any at all).

35 Lemley (2008) (the quotation is from the abstract of the online version of the article, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=999961&download=yes).

36 Jaumotte & Pain (2005) at 49 (finding that an increase of one unit in their model's IPR index was associated with an increase of just over five percent in R&D spending but was also estimated to raise the total number of patents by over 30 percent).

37 Please note that Chapter 2 refers to the technological and economic value of patented inventions as "patent quality." However, the term "patent quality" can also mean other things, such as the likelihood that a patent will survive a validity challenge in court. That is a different concept. To avoid confusion, the Synthesis chapter refers to "technological and economic value" instead of "quality".

38 The data are based only on patents granted by EPO; they do not include patents granted by national patent offices. The analysis therefore allows no performance comparison of various patent offices.

39 See Chapter 2, Measuring the Technological and Economic Value of Patents. The downward trend in technical and economic value can be seen in the composite index charts between the years 1990 and 2004, as well as in the charts that break the index down by technology fields and countries from 1994 to 2004. Data beyond 2004, though shown in the composite index charts, is unreliable because it suffers from a timeliness problem. That is due to the five-year citation window used to compile the data. In other words, after 2004 there is a reduced number of observations, which prevents a reliable measure.

40 This definition uses four components: the number of forward citations (up to 5 years after publication); patent family size; number of claims; and the patent generality index. Only granted patents are covered by the index.

41 The letter, dated 26 September 2013, is available at: http://graphics8.nytimes.com/packages/pdf/business/26trolls-letter.pdf.

42 See Kitch (1980) (arguing that the greater appropriability comes about due to a decrease in the risk of theft); Friedman, et al. (1991) (attributing greater appropriability to lower costs of protection where trade secret laws are clear and enforcement is effective).

43 The sample is expanded to 37 countries and a 25-year range (1985-2010).

44 Please note that, like virtually all indicators, the TSPI is not without certain limitations, which are acknowledged in Chapters 3 and 4. The TSPI captures stringency of protection only for those elements that are expressly described in Chapters 3 and 4. Although there is a positive association of those aspects with key indicators of economic performance and it appears fairly robust, that does not mean that all of the possible complexities of the relationship were captured or that conclusions can be extended to other aspects not covered in this Report. Instead, the chapters present an indication that protection for the TSPI-covered elements of trade secrets appears to be positively associated with the areas of economic performance considered in the chapters (selected innovation and international economic indicators).

45 For example, in the United Kingdom, the legal protection afforded to Registered Designs lasts up to 25 years and applies to both two and three dimensional designs, whereas the protection granted to unregistered Design Rights expires sooner and applies only to three dimensional designs.

46 Different jurisdictions use different terms for registered designs, such as registered community designs, design models, design patents, and industrial designs. However, regardless of the terminology used, a design must be new and distinctive to be protected under the applicable law.

47 Note that OHIM began to accept filings for design rights in 2002, so these figures show the early phases of the OHIM protection regime. Some of the increase in applications and the stock of registered designs over the time period shown may reflect the initial novelty and subsequent maturation of the OHIM regime rather than an increase in design activity.

48 Incidentally, the same study found that copyright and trademark protection were used by more firms (26% and 12%, respectively), while only 3% used patents.

49 *See also* Hertenstein, et al. (2005) (finding that "good industrial design is related to corporate financial performance and stock market performance").

50 Hargreaves (2011) at 73 ("we have not found either a figure for the prevalence and impact of piracy worldwide or for the UK in which we can place our confidence"); U.S. Department of Commerce, 2013, at 39 (noting that "copyright infringement over the Internet has proven difficult to quantify"); see also OECD (2008) and Stryszowski (2009).

51 IFPI's "Global Statistics: Facts and Stats" web page, at www.ifpi.org/facts-and-stats.php (last visited 26 September 2014); *see also* IFPI (2014).

52 Ibid.

53 Such laws have been enacted in Germany and Spain, are pending in Israel, and have been proposed in France.

54 Congreso de Los Deputados, Proyectos de Ley 121/000081 Art. 32.2 (21 de febrero de 2014), p. 8; Chappell (2014).

55 Data as of April 2014. See New York Times, "How the Recession Reshaped the Economy, in 255 Charts," 5 June 2014, available at www.nytimes.com/interactive/2014/06/05/upshot/how-the-recession-reshaped-the-economy-in-255-charts.html. Data come from the United States Bureau of Labor Statistics' Current Employment Statistics program.

56 Copyright virtually always applies to publications, but not necessarily to research data, because the latter typically lack the element of originality that is essential for copyright protection. In the European Union, Japan, and South Korea, however, *sui generis* database rights also exist and can apply to research data.

57 Those outputs include articles, monographs, raw data, metadata, digital representations of pictorial and graphical materials and scholarly multimedia material (see Chapter 7 of this Report).

58 See Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (October 2003), available at: http://oa.mpg.de/lang/en-uk/berlin-prozess/berliner-erklarung/.

59 See www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf.

60 *See* https://creativecommons.org/licenses/by/4.0/.

61 More information on product access and usage limitations can be found in the Committee on Consumer Policy's 2013 analytic report *Protecting and Empowering Consumers in the Purchase of Digital Content Products* OECD (2013d).

62 See Pallante (2013) at 5 ("[T]he public is very confused. Many of you have told me that your constituents have no idea what to do with copyright, whether they are teachers, private citizens in their homes, higher education institutions"); see also www.consumerfocus.org.uk/policy-research/digital-communications/copyright.

63 The Federal Trade Commission held a series of hearings in 2008-09 that addressed these and many other issues related to the notice provided in patents. See Federal Trade Commission (2011) at p. 15 ("The ability of third parties to foresee evolving claims depends on the extent to which the specification provides effective notice of the range of claims that ultimately might issue. The disclosure requirements of [35 U.S.C.] Section 112 (written description and enablement) provide protection against undue broadening of claims through additions and amendments. Panelists from the IT industry expressed concern about how well these protections allow them to foresee claims that might issue. One reason is the perceived lax enforcement of the Section 112 requirements for IT patents."); ibid at 110 & n.230 ("One concern raised repeatedly during the hearings was that claims frequently use terms with no apparent definition or explanation in the specification. Clarity would be added, and notice improved, if applicants were pressed to include definitions or contextual explanations of key terms. . . . [T]he PTO's just-issued Supplementary Examination Guidelines take a substantial step in this direction" (citing 76 Federal Register at 7,166, which encourages applicants to use glossaries as a best practice in patent application preparation)); ibid at 128 ("The lack of a common, predictable terminology, already identified as a concern affecting patent clarity, particularly in IT, also undermines effective patent searching. Panelists noted that variation in the terms used to describe inventions can limit the effectiveness of electronic database searches and called for 'taxonomical advances' to better represent the 'intellectual space' to be searched."); see also National Academy of Sciences (2004) at p. 63 ("While alternative means of technological diffusion . . . are exceedingly robust, some features of the legal system make a patent a less than ideal vehicle for communicating technical information in a timely way despite the requirement that it be written to enable a person of ordinary skill in the art to practice the invention. First, a patent is written by an attorney or a patent agent to persuade an examiner to grant and a court to uphold a property right of the desired scope. Beyond the minimum disclosure required by the patent statute, the applicant has no incentive to disclose information that would be useful to a potential competitor...").

64 Incidentally, such efforts also improve the patent examination process. By linking their databases, patent offices can improve the prior art searches that take place during their examinations. More thorough searches lead to higher quality patents (in the sense that the patents are more likely to withstand legal challenges to their validity).

65 Not all patentable KBC could be protected as a trade secret, and not all KBC that could be protected by trade secrets would be patentable. However, some KBC could be protected by either one. In referring to a choice between patents and trade secrets here, we are referring only to situations where the nature of the KBC makes such a choice possible. Sometimes the nature of the asset provides a clear indication that there is only one type of appropriate protection. Patents generally offer protection for technological inventions that are useful, novel and non-obvious. Trade secret protection is generally available for a broad range of commercial information that is useful and not widely known, but it need not be novel. The broad scope covers subject matter that may not be patentable such as know-how.

66 Arundel, 2001 (finding that European firms, especially smaller ones, tended to prefer trade secrets protection to patent protection); Cohen, et al., 2000 (reaching similar conclusions based on a survey of US firms).

67 Patents and trade secret laws provide different ways of protecting KBC. Not all patentable KBC could be protected as a trade secret, and vice-versa. However, some KBC could be protected by either one (though never both) and the inventor's choice will affect the degree of knowledge diffusion that accrues to society.

68 These figures differ slightly from those reported in the Entrepreneurship and Business Development section of the Annex to this chapter because the Annex refers to a different (slightly smaller) sample of countries.

[69] See www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-task-force-high-tech-patent-issues.

[70] See www.copyrighthub.co.uk and www.ip-marketplace.org.

[71] See National Research Council of the National Academies (2013) (describing a wide range of copyright questions, calling for greater investment in data collection and suggesting approaches that would facilitate it, with the objective of enabling better empirical research to inform decisions about the copyright system in the digital age).

[72] Please note that this work on patent *system* quality is quite different from the work in Chapter 2 of this report, which is about the technological and economic value of *individual* patents and patent portfolios. The term "patent system" here refers to the legal and policy regime that governs the way patents are awarded, used, and enforced in a jurisdiction.

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CHAPTER 2. MEASURING THE TECHNOLOGICAL AND ECONOMIC VALUE OF PATENTS

This chapter proposes a set of indicators that assess the economic and technological value of patented inventions, as well as the impact they might have on subsequent technological developments. The proposed measures can facilitate analysis both at the level of individual patents and at the aggregate patent portfolio level. The chapter thus lays a foundation for potential work on policy-relevant challenges such as quantifying patents' contributions to innovation and growth; identifying the types of firms that bring high value patents to the market; improving financing for innovative firms; comparing firms' innovation strategies and performance; and measuring the output of R&D activities and the returns to R&D investments.

So far, the indicators have been "test-driven" with statistics compiled from patent applications that were filed with the European Patent Office during the period 1990-2009. Each indicator suggests that some countries have relatively strong innovative abilities and that some have relatively average or weak abilities. Several experimental composite indices, based on groups of relevant factors, generated consistent results. They all suggest that a) the average technological and economic value of inventions protected by patents has eroded over time; b) patented micro and nano technologies have the highest value; and c) Australia, Canada, Norway, South Africa, and the United Kingdom tend to generate patents with the highest average value.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

ABSTRACT

This work contributes to the definition and measurement of the technological and economic value of patents. It proposes a wide array of indicators capturing the technological and economic value of patented inventions and the possible impact that these might have on subsequent technological developments. The measures proposed build extensively upon recent literature, rely on information contained in the patent documents, and are calculated on patent cohorts defined by the combination of the technology field and the year of filing of patents. This is done to account for possible time- and technology-related shocks. The description of the indicators is accompanied by statistics compiled on patents from the European Patent Office, as well as tests aimed at addressing the sensitivity of the measures to alternative specifications and the correlations that may exist among them. The indicators proposed, which can be constructed on all patents, have the advantage of relying on a homogeneous set of information and of being comparable across countries and over time. To facilitate their compilation on data from other Intellectual Property (IP) offices, the SQL-based program codes used to calculate the indicators are also supplied. The paper is further accompanied by a dataset – to be obtained upon request – containing the indicators calculated on EPO patent documents published during the period 1978-2012, as well as some cohort specific statistics (i.e. main moments and key percentiles).

EXECUTIVE SUMMARY

This work contributes to the definition and measurement of the technological and economic value of patents. It proposes a number of indicators and an experimental composite indicator aimed at capturing the technological and economic value of patented inventions, and the possible impact that these might have on subsequent technological developments. The measures proposed build extensively upon recent literature and rely on information contained in the patent documents.

The description of each indicator is accompanied by statistics compiled on patents from the European Patent Office (EPO), as well as tests aimed at showing the sensitivity of the measures to alternative specifications and the correlations that may exist among different indicators. The measures proposed, which can be constructed on any patent, have the advantage of relying on a homogeneous set of information and of being comparable across countries and over time.

The proposed measures aim to facilitate analysis both at the level of the individual patent and at the aggregate patent portfolio level. They are intended to help address policy-relevant questions related to topics such as: firms’ innovation strategies and performance; enterprise dynamics, including the drivers of enterprise creation and of mergers and acquisitions; the determinants of productivity; financing innovative enterprises; the output of R&D activities and the returns to R&D investments; R&D depreciation; and the output of universities and public research organisations.

Introduction

It has been long argued that the "quality" of patented inventions varies widely from patent to patent and that the likelihood to patent inventions of a given quality varies at both firm and industry levels (Scherer, 1965). Simple as it may seem, the concept of patent quality has over time acquired a wide array of meanings. The many definitions that exist are not exclusive, nor do they perfectly overlap, and users tend to bridge them into somewhat intuitive notions of quality. For patent attorneys and engineers a high quality patent can be a well written patent, whose content is clearly described, or a patent protecting a major invention rather than an incremental step or technology. Legal scholars conversely tend to interpret quality as the ability of a patent to withstand a legal challenge without being invalidated. For economists a good patent is generally one that fulfils the key objectives of the patent system, i.e. to reward and incentivise innovation while enabling diffusion and further technological developments (see Guellec and van Pottelsberghe de la Potterie, 2007, for a discussion).

Recently, there has been much discussion about patent quality, its meaning and definitions, as well as how to measure it in practice and what it entails for innovation, entrepreneurship and technology development[73].Whatever the definition of patent quality proposed, most stakeholders seem to agree about the necessity to "raise the bar", i.e. to raise the overall quality level of patents granted worldwide. Low patent quality is widely perceived to generate uncertainty, to lower incentives to innovate, to stifle technology development and to trigger a number of market failures that ultimately harm innovation, entrepreneurship, employment and growth, as well as consumers' welfare (see Hall et al., 2003, for a discussion). For instance, it is well known that patents increase the likelihood of obtaining venture capital and securing liquidity (Hall and Harhoff, 2012). However venture capitalists would not finance firms against which patent infringement cases have been raised by another company or by a non-practising entity (NPE)[74]. As the likelihood of getting challenged in court is related to factors like the extent to which patent claims are narrowly or broadly defined and the technological details of the patented invention, i.e. to patent quality-related features, increasing the quality of these intellectual property rights (IPR) would help mitigate market failures triggered by low patent quality.

This chapter starts from the premise that patent quality means the technological and economic value of patented inventions (hereinafter, "patent value"). It contributes to the measurement of patent value and the possible impact it might have on subsequent innovations. The chapter proposes a wide array of indicators which mirror different – albeit often interrelated – aspects of patent value, sometime having a mainly technological (e.g. backward citations) or preponderantly economic connotation (e.g. patent renewals), or both (e.g. forward citations, generality). Also, depending on the indicator considered, the meaning of patent value might be closer to that of private value or of social value. Addressing these conceptual issues in more detail would go beyond the scope of this paper and its main empirical focus. Interested readers are invited to refer to citations in the paper and to the OECD Patent Statistics Manual (2009) for more information on the indicators and their possible interpretation.

The indicators proposed use pieces of information contained in the patent documents and are compiled in such a way as to take into account the possible shocks that can occur over time in different technology fields - for example, the sudden rise in patent application in some areas. The measures proposed rely extensively upon recent literature and on earlier work carried out by the OECD Working Party on Industry Analysis. All the indicators detailed in the present document can be constructed for all patents applied under any jurisdiction, and have the advantage of relying on a homogeneous set of information. This makes them generally comparable across countries and over time, and therefore suitable for cross-country analysis.

The patent-based indicators herein should nevertheless be considered as proxies, since they do not contain information about market transactions or the real use of the (patented) technologies. Moreover, almost all the measures detailed in the present work are retrospective in nature, and can only be compiled ex-post, i.e. once the pieces of information they rely upon are included in the patent file. Also, the length of period of observation for certain indicators inevitably depends on the underlying patent information from which they are constructed. For instance, indicators based on backward citations, i.e. the citations to prior art made in a patent, require a much shorter window of observation, and are thus more timely, than measures based on forward citations i.e. the citations a patent receives from subsequent patents, which are subject to ‘truncation’ effects.

The figures and statistics shown in the present document have been compiled using EPO patent applications data contained in the April 2012 version of the EPO Worldwide Patent Statistical Database (PATSTAT) and are presented according to the year in which the patent was filed, and according to the country of residence of the applicants. The choice to focus on patent applications filed at one patent office only is motivated by the awareness that intellectual property offices have to comply with country-specific legislations and with a wide array of administrative regulations. These may ultimately lead to office-specific practices and to differences in terms of e.g. patent classes assigned to applications, propensity to cite prior art, and number and length of claims contained in a patent document. Considering data from several offices at a time would thus inevitably lead to biased indicators, as (at least) part of the figures would be due to differences in office practices and regulations, rather than to the value of the patents considered. Patent value indicators relying on data belonging to intellectual property offices other than the EPO can nevertheless be easily calculated, as the piece of information on which the indicators rely are contained in all patent files applied worldwide. Future research will investigate the differences that may arise from the use of diverse data sources, and its main determinants.

In this paper, statistics are generally presented in the form of normalised indexes ranging between zero and one. These are obtained by dividing the initial results by the maximum score obtained by any patent in the same year and technology field cohort. Moreover, and in order to reduce the potential distortion that the presence of extreme values, i.e. spurious outliers, may cause, indexes are sometime constructed over a 98% winsorized distribution. This entails transforming the indicators below the 1st percentile into values corresponding to the 1st percentile, and having the indicators above the 99th percentile set to the 99th percentile.

Unless otherwise specified, technology fields are defined according to Schmoch’s (2008) classification (as updated in 2010 and 2011) which relies on the International Patent Classification (IPC) codes contained in the patent documents. This taxonomy features six main technology sectors, subdivided into 35 fields of balanced size, structured so as to maximise within-sector homogeneity and across-sector differences[75]. Using alternative technology classifications would change the value of the indicators and the statistics proposed.

The following sections describe the proposed thirteen indicators according to the same format. Each time, an outline of the type of information provided by the indicator at hand is accompanied by the relevant literature on which it relies. An operational definition of the indicator follows, as well as a brief description of the way it has been constructed, and a discussion of possible challenges and shortcomings. Descriptive statistics showing the value that the indicator takes over time and across countries and technology fields complement this part.

The original working paper[76] (of which this chapter is an excerpt) contains the program codes used to build the indicators and is accompanied by a database containing the indicators proposed, calculated at the individual patent level. The working paper also includes a number of robustness tests aimed at better understanding the behaviour of the indicator, as well as its sensitivity to alternative specifications.

Supplying the dataset and the program codes to compile the indicators aims at facilitating a peer review of the indicators proposed, and trigger an open source-like development, whereby users might help to fine-tune the indicators, test their robustness, and verify their ability to capture the economic and technological value of patented inventions.

Patent scope

Background and definition

The scope of patents is often associated with the technological and economic value of patents. Lerner (1994) observes that the technological breadth of patents in a firm's portfolio significantly affects the valuation of the firm, and that broad patents are more valuable when many possible substitutes in the same product class are available. Matutes, Régibeau and Rockett (1996) also look at patent protection regimes, and in particular at the length and scope[77] of patent protection, and suggest that the scope of a patent should be used to foster the early disclosure of fundamental innovations.

The index proposed here follows Lerner (1994) and defines the scope of a patent in terms of the number of distinct 4-digit subclasses of the International Patent Classification[78] the invention is allocated to. For each patent document *P*, the patent scope index is defined as:

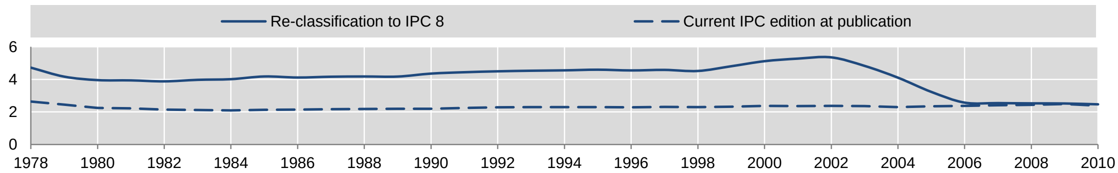
$$SCOPE_P = n_p \; ; \; n \in \left\{IPC_1^4; \dots ; IPC_i^4; IPC_j^4; \dots ; IPC_n^4\right\} \,\&\, IPC_i^4 \neq \; IPC_j^4,$$

where n_p denotes the number of distinct 4 digit IPC subclasses listed in the patent *p* document. Data refers to the latest edition of the IPC (8th edition). The index is normalised according to the maximum scope value of the patents in the same cohort, with cohorts being defined according to year of filing and technology field. The larger the number of distinct 4-digit IPC classes, the broader the scope index, and the higher the potential technological and market value of a patent[79].

Indicator overview

In PATSTAT, IPC codes of patent documents are converted into the latest available edition of the IPC classification, i.e. 8th edition, entered into force in 2006. Patents based on previous editions of the IPC classification have thus been re-classified accordingly. Also, due to the emergence of new technologies, sometimes no one-to-one correspondence exists between old and new IPC editions, and older IPC codes may correspond to many IPC 8th edition codes. Hence, patents filed before the mid-2000s may feature a broader range of IPC-7 codes than later patents: five codes on average for patents filed in 2000 compared to around 2.5 codes per patent in the late 2000s. As can be seen from the figure below, each IPC code in force at the date of patenting has been allocated in PATSTAT to around two codes of the IPC 8th edition.

Figure 2.1. Average number of IPC classes per EPO patent document, by IPC edition

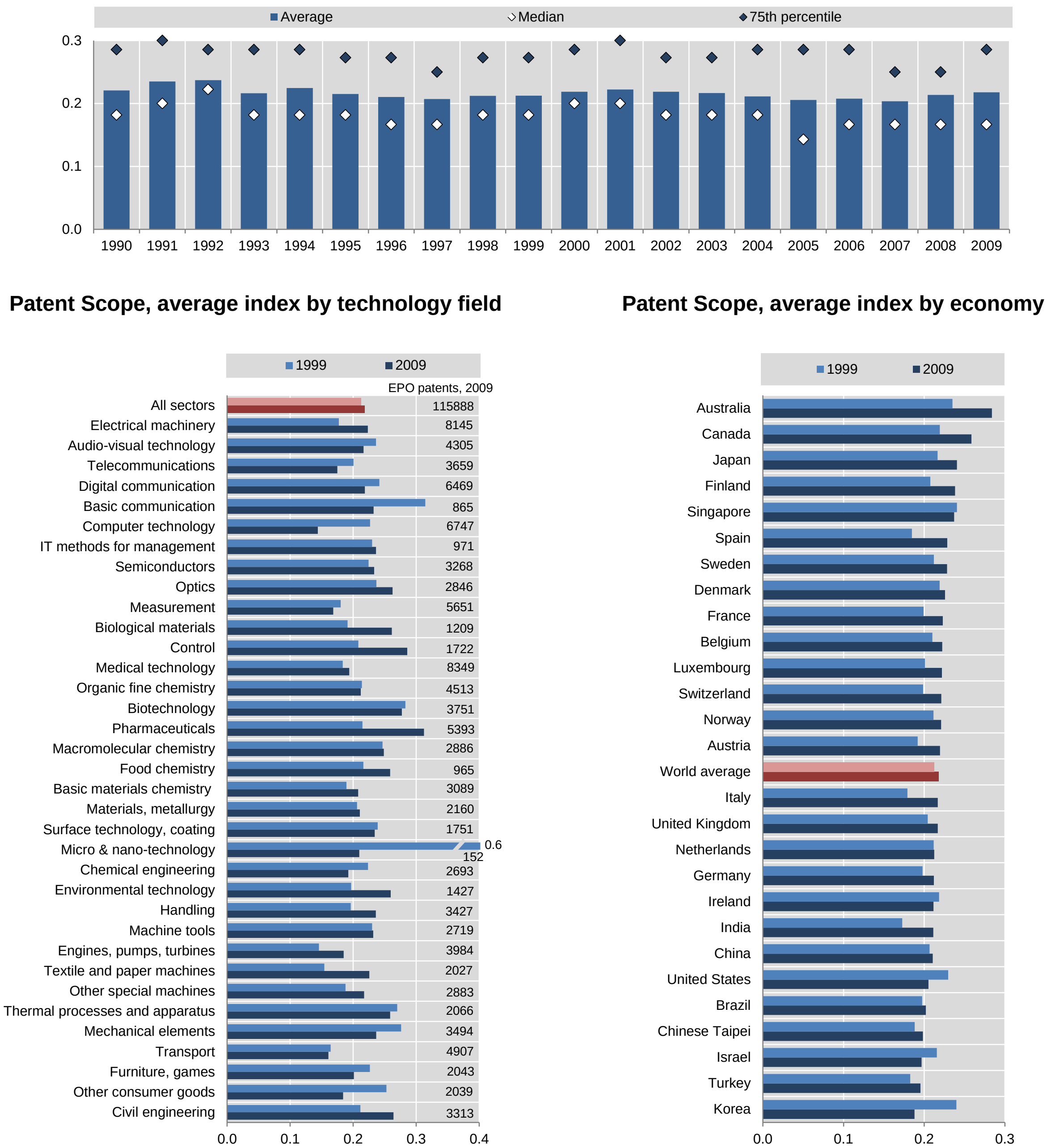


Source: OECD, calculations based on PATSTAT (EPO, April 2012) and OECD, Patent database, October 2012.

As a consequence, the patent scope index tends to be overestimated before the mid-2000s. For example, the patent scope index of micro- and nano-technology patents gets seemingly divided by three between 1999 and 2009.

Patents in the pharmaceuticals, control-technologies or biotechnology fields conversely report the largest indices in 2009, corresponding to 0.31, 0.29 and 0.26 respectively, as compared to 0.21 on average observed for all patents. Australia, Canada, Japan and Finland rank above the world's average patent scope index in 2009.

Figure 2.2. Patent Scope, index, 1990-2009



Note: The patent scope index is normalised according to the maximum scope value of the patents in the same cohort (filing date and technology fields). The average by economy is provided only for economies reporting the index for more than 200 patents in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Patent family size

Background and definition

Owing to the Paris Convention (1883), applicants have up to 12 months from the first filing of a patent application (typically in the country of origin) to file applications in other jurisdictions regarding the same invention and claim the priority date of the first application. The set of patents filed in several countries which are related to each other by one or several common priority filings is generally known as patent family. The value of patents is held to be associated with the geographical scope of patent protection, that is, with the number of jurisdictions in which patent protection has been sought (Lanjouw et al., 1998) and large international patent families have been found to be particularly valuable (Harhoff et al., 2003). Applicants might be willing to accept additional costs and delays of extending protection to other countries only if they deem it worthwhile.

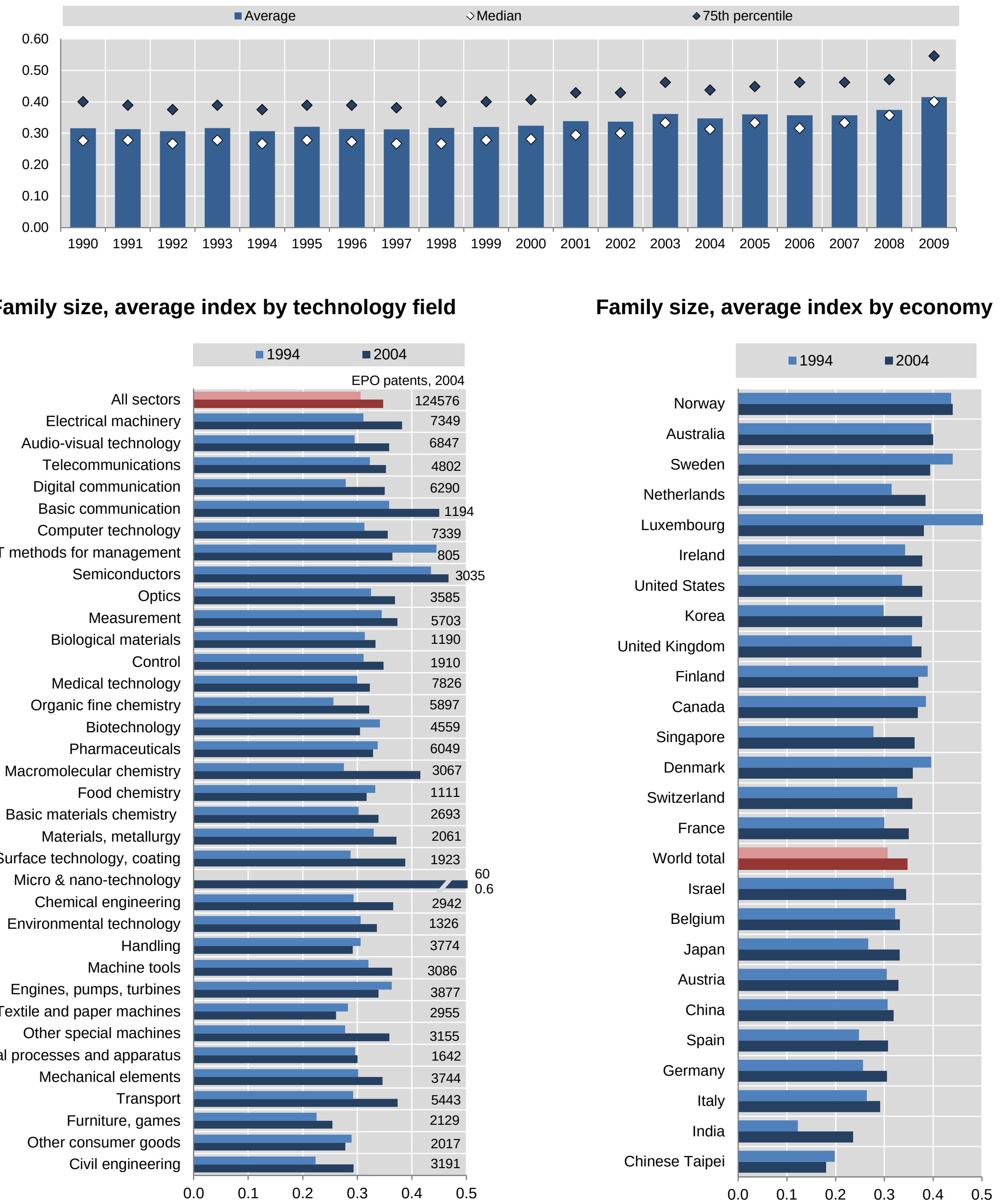
The size of patent families is proxied here by the number of patent offices at which a given invention has been protected. Because of differences in the legal procedures of offices worldwide, and of the delays that these might determine, patent family related indicators may suffer from timeliness. The family size index presented here has been normalised with respect to the maximum value exhibited by other patents in the same cohort, with cohorts that are determined by the pair technology–year.

Indicator overview

The statistics shown below relate to EPO patents only. Filing for a European patent allows obtaining protection in all the countries designated in the European Patent Convention (EPC) that have been indicated in the application. A granted EPO patent ultimately represents a "bundle" of national patents, and needs to be validated by the different national patent offices for it to be protected in the designated EPC member countries (OECD, 2009). Patents applications filed to the EPO are by their very nature more prone to broader geographical coverage, i.e. exhibit larger patent families than patents applied for in national patent offices. Hence, compiling patent family indicators over patents originated in e.g. Japan or the United States would very likely lead to different results.

As knowledge about the size of a patent family depends on the delays of publication of the patent offices involved, patent family indicators calculated on recent years may not provide an accurate picture of the geographical breadth of patented inventions. Hence, although the normalised family size index shown below seems to have increased over time, also and especially in recent years, the figures relating to 2004 onwards should be interpreted with care, as they may suffer from truncation. With respect to breadth of the patent families of different technological fields, it emerges that, along with the patents in the micro- and nano-technology fields, patents in the semi-conductors and basic communication technologies are, on average, the most broadly protected worldwide, in 2004. Country-wise, data seems to suggest that patents originating from Norway, Australia, Sweden and the Netherlands tend to get the most extensive coverage worldwide (in 2004).

Figure 2.3. Family size, index, 1990-2009



Note: The family size index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The index has been winsorised to correct for extreme values. The average by economy, provided only for economies with more than 200 patents reporting the index in 2004. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Grant lag

Background and definition

Recent evidence (Harhoff and Wagner, 2009; Régibeau and Rockett, 2010) suggests the existence of an inverse relationship between the value of a patent and the length of the grant lag period - defined as the time elapsed between the filing date of the application and the date of the grant. This literature puts forward a revealed preference argument whereby applicants try to accelerate the grant procedure for their most valuable patents, e.g. by means of well documenting their applications and following closely the work of the patent office. Harhoff and Wagner (2009) find that more controversial claims lead to slower grants and that well-documented applications are approved faster. In addition Régibeau and Rockett (2010) suggest that the time required to reach a granting decision depends on the effort made by the filing party, and remark the importance of accounting for the position of patents in the technology cycle. They conclude that important patents are approved more quickly, and the granting delay decreases as industries move from the early stage of their innovation cycle to later stages. Anecdotal evidence gathered from patent examiners tends to support such empirical findings.

The grant lag index we propose builds on these recent insights. It relies on patents that are stratified by year and technology field and is defined as follows: for each patent *p*, the grant lag index $Grant_{Pi}$ is:

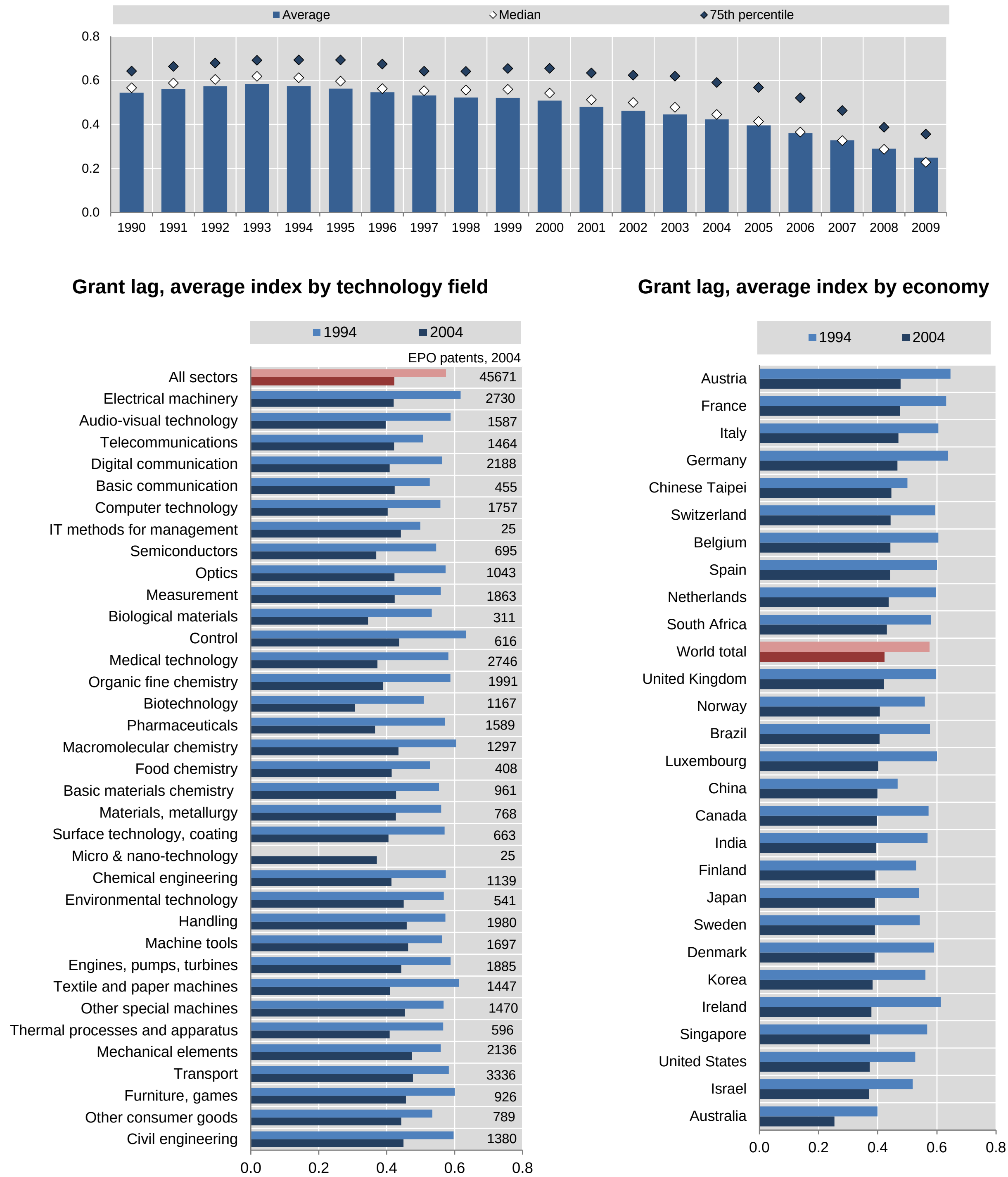
$$Grant_{Pi} = 1 - \Delta t / Max(\Delta t_i)$$

where Δt is the number of days elapsing between application and granting date; and $Max(\Delta t_i)$ is the maximum number of days it has taken any patent belonging to the same cohort *i* to be granted. The normalisation of the index attempts to control for the possible examination backlogs and increasing workload that may characterise certain years. By construction, the grant lag index is highest when the decision to grant has been taken very rapidly relative to the other patents in the cohort.

Indicator overview

The way the grant lag index has been constructed leads truncation to artificially lower the values of the index for the last available years. For the latest cohorts in fact, e.g. from 2005, the maximum grant lag that can be observed will never be larger than a few years, e.g. six years in the case of patents applied in 2005. This leads to grant lag index values that are seemingly much smaller than those observed in previous years, where much larger variation characterises the time elapsed between the filing date of the application and the date of the grant.

Figure 2.4. Grant lag, index, 1990-2009



Note: The grant lag index is compiled according to the maximum grant lag of patents in the same cohort (filing date and technology fields). The index has been winsorised to correct for extreme values. The average by economy is provided only for economies with more than 50 patents reporting the index in 2004. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Backward citations

Background and definition

In order to evaluate the novelty of the innovation seeking patent protection, patent applicants are asked to disclose the prior knowledge on which they have relied. This entails listing the possible patents, scientific work and other sources of knowledge at the basis of the invention. Such references, also called backward citations, are then checked by the patent examiner during the technical examination. They can be integrated by means of citing additional relevant prior art, or otherwise removed, if deemed unrelated to the invention under exam (see Alcacer and Gittelman, 2006, in this respect). Backward citations are used to assess an invention's patentability and define the legitimacy of the claims stated in the patent application (OECD, 2009). At the EPO, backward citations are classified according to their relevance for the patent under exam. Of particular importance are "X" and "Y" citations, as they may question the inventive step of the filed patent (X references if taken alone; Y references if combined with others).

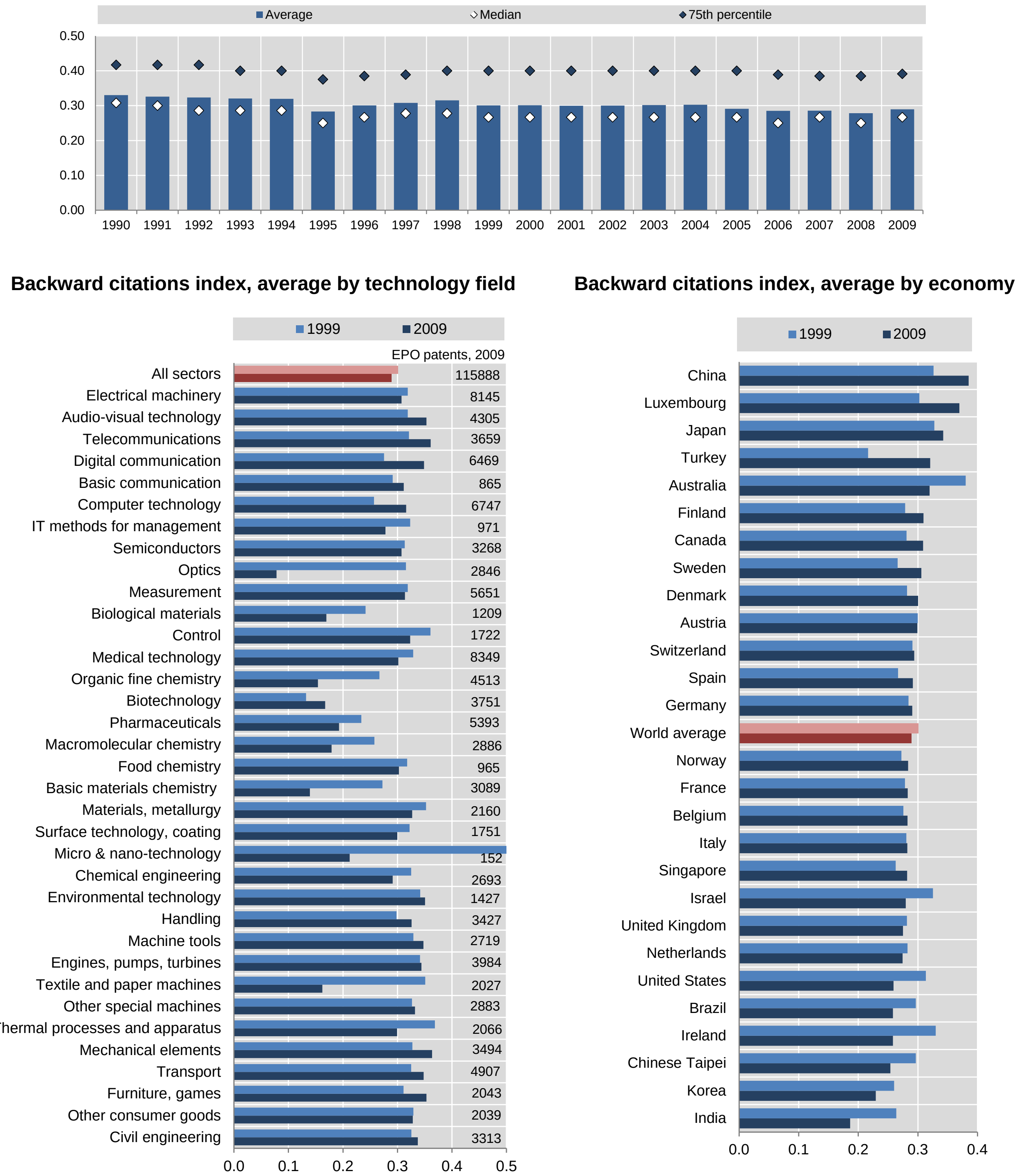
Indicators based on the number of citations made to prior patents and prior non-patent literature in a patent can help assess the degree of novelty of an invention and investigate knowledge transfers in terms of citations networks (see e.g. Criscuolo and Verspagen, 2008). In addition, aggregating citation data at the country, technology or firm level may be informative of the dynamics of the inventive process. Controlling for self-citations - i.e. citations made to inventions belonging to the same agent – further allows assessing the technological cumulativeness of a firm, i.e. the extent to which new inventions rely on the company's prior innovative activities. Backward citations either to the patent or to non-patent literature (e.g. scientific papers) have been found to be positively related to the value of a patent (Harhoff et al., 2003). However, large numbers of backward citations may signal the innovation to be more incremental in nature (Lanjouw and Schankerman, 2001)[80]. Finally, it is worth remarking that, as citation practices and disclosure rules may differ across patent offices, indicators compiled from alternative data sources are generally not comparable.

In the statistics shown below the number of backward citations per patent is normalised according to the maximum value received by patents in the same year-and-technology cohort. References to non-patent literature have been excluded from the count, whereas self-citations have not.

Indicator overview

The backward citation indicator does not suffer much from truncation, as backward citations are typically included in the patent document within the first two years since application. The figure shown below suggests that the distribution of the backward citation index is generally left skewed and that it does not change much over time. Average values are always around 0.3 and 75th percentile values are around 0.4. This implies that the average patent features 30% of the maximum number of backward citations contained in the patents belonging to the same cohort. It further entails that the distribution of backward citations has a very long right tail, as can also be seen from the 2009 figures shown below.

Figure 2.5. Backward citations index, 1990-2009



Note: The backward citations index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The index has been winsorised to correct for extreme values. The average by economy is provided only for economies with more than 200 patents reporting the index in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Citations to non-patent literature (NPL)

Background and definition

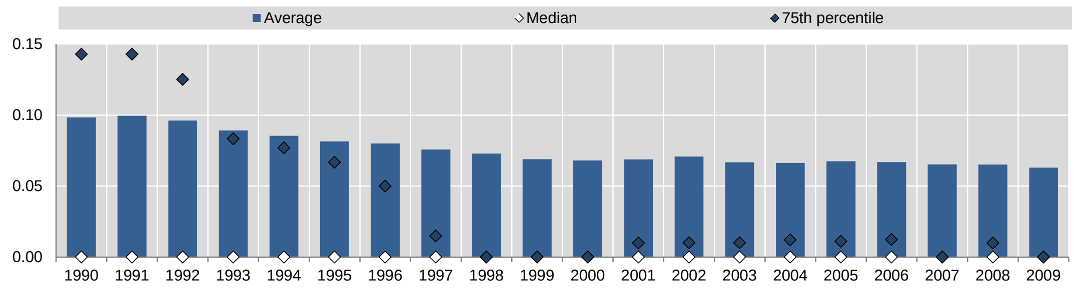
Most patent applications include a list of references – citations – to earlier patents and to non-patent literature (NPL), e.g. scientific papers that set the boundaries of patents' claims for novelty, inventive activity and industrial applicability. Non-patent literature consists of peer-reviewed scientific papers, conference proceedings, databases (e.g. DNA structures, gene sequences, chemical compounds, etc.) and other relevant literature. References are added to reflect the prior art that inventions have built upon. Backward citations to NPL can be considered as indicators of the contribution of public science to industrial technology (Narin et al., 1997). They may reflect how close a patented invention is to scientific knowledge and help depict the proximity of technological and scientific developments (Callaert et al., 2006). Cassiman et al. (2008) suggest that patents that cite science (i.e. NPL) may contain more complex and fundamental knowledge, and this in turn may influence the generality of patents. Branstetter (2005) further finds that patents citing NPL are of significantly higher value than patents that do not cite scientific literature.

Indicator overview

The citation to NPL index is calculated here as the number of NPL citations included in a patent divided by the maximum number of NPL citations of patents belonging to the same year and technology cohort. The NPL index captures the relative importance of NPL citations in a patent document vis-à-vis the other patents in its cohort. We further calculate a NPL share index which reflects the propensity of a patent document to cite NPL relative to the whole prior art cited in that same document. This index has been normalised, so that it always ranges between zero and one. References to certain types of NPL such as patent abstracts and commercial patent databases have in both cases been excluded.

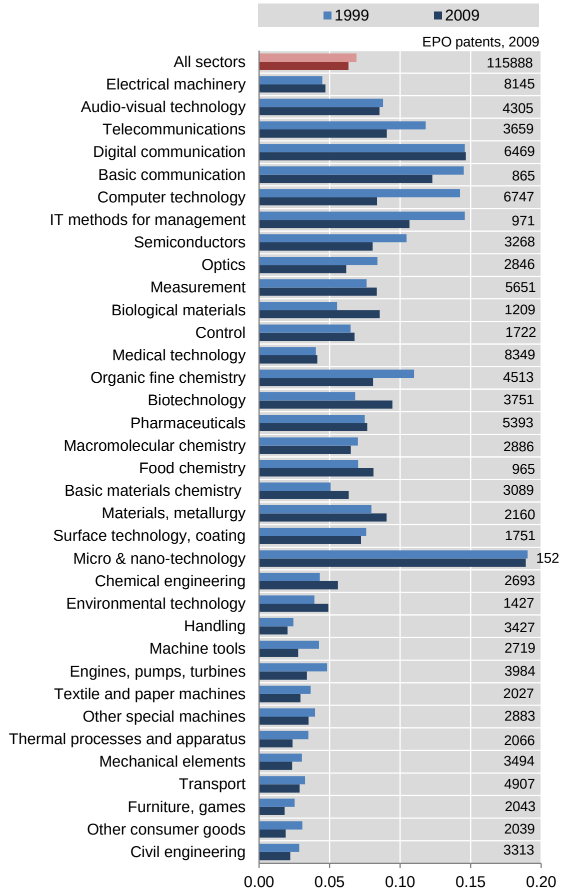
The NPL index and NPL share index do not suffer much from truncation – NPL citations represent a subset of the backward citations included in a patent document. As the citations to NPL index chart shows, the majority of patents generally do not cite any non-patent literature as prior art, the distribution of NPL citations is skewed and it features a very long right tail. Over the 1998 to 2009 period relatively very few patents cite NPL, and the 75th percentile values of the NPL index are often zero or anyway very close to zero.

Figure 2.6. Citations to NPL, index, 1990-2009

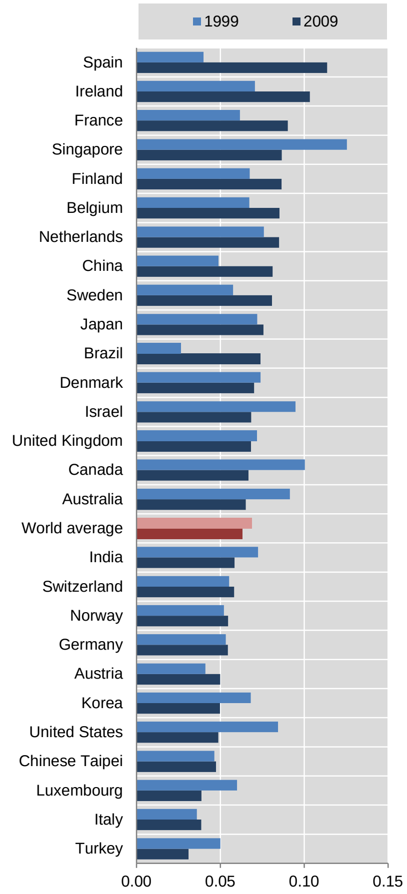


The charts of NPL index by technology field and by country highlight that different technologies and countries seemingly rely on non-patent literature to a different extent. This may mirror differences in countries' technological specialisations, and in the stage of development of technologies.

Citations to NPL, index, average by technology field



Citations to NPL, index, average by economy



Note: The NPL citation index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The index has been winsorized to correct for extreme values. The average by economy is provided only for economies with more than 200 patents reporting the index in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Claims

Background and definition

Claims determine the boundaries of the exclusive rights of a patent owner, given that only the technology or aspects covered in the claims can be legally protected and enforced. The number and content of the claims thus determine the breadth of the rights conferred by a patent (OECD, 2009). Moreover, as the structure of the patent fee is generally based on the number of claims contained in the document, a large number of claims might also imply higher fees. Hence, the number of claims in a patent document may not only reflect the technological breadth of a patent, but also its expected market value: the higher the number of claims, the higher the expected value of the patent (Tong and Davidson, 1994; Lanjouw and Schankerman, 2001[81], 2004).

We propose here a claim-based indicator that relies on EPO patent data stratified by year of filing and technology field. We further construct an indicator of the number of claims over backward citations. We do so following Lanjouw and Schankerman (2001b), who suggest that backward citations are a sign that a patent belongs to a relatively well-developed technology area, and that property rights are less uncertain. For brevity, we call this latter index the “adjusted” index.

In the statistics below the indicator of the number of claims per patent, as well as the indicator capturing the number of claims over backward citations, has been normalised with respect to the maximum value of the patents in the same cohort.

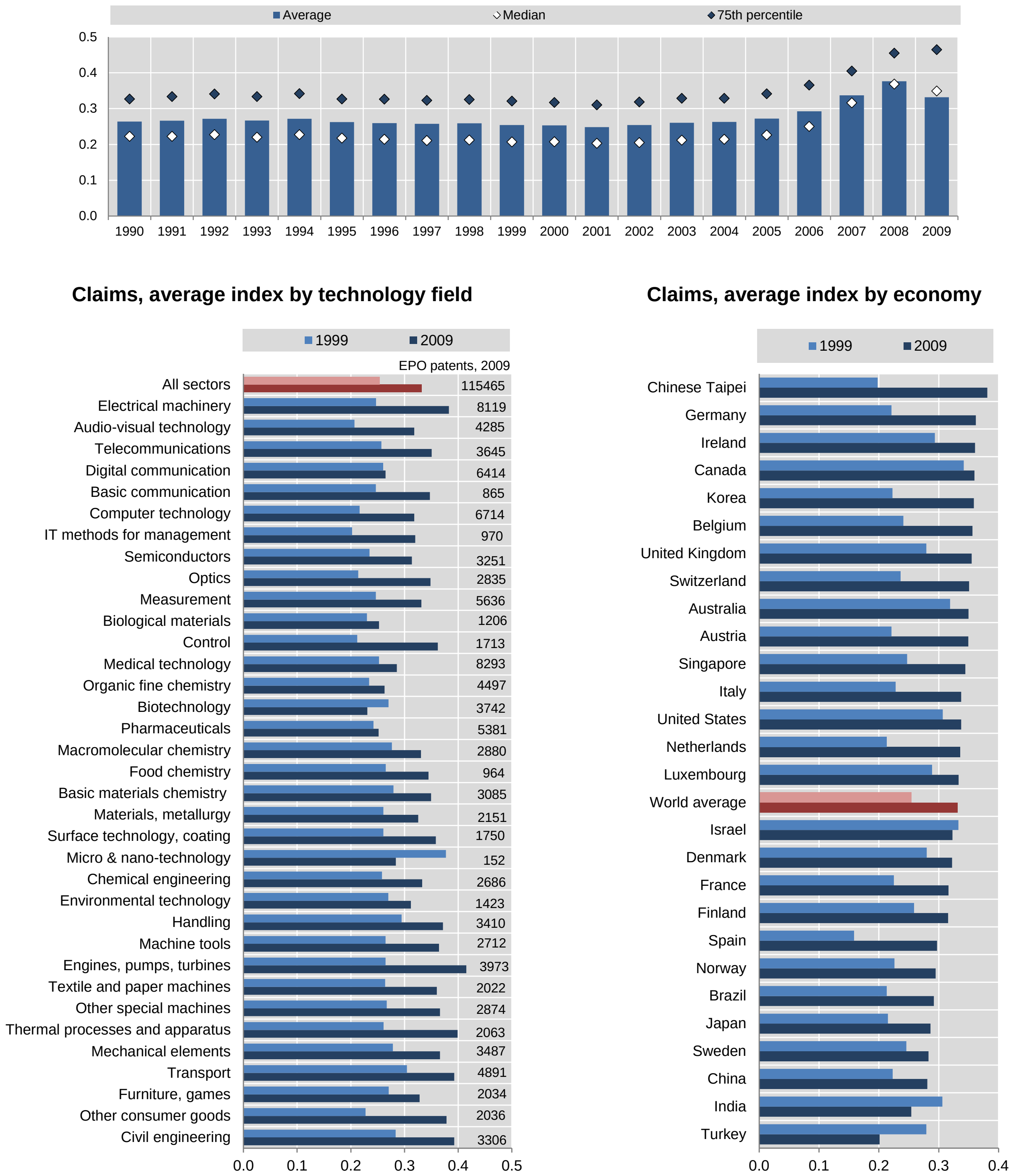
Indicator overview

The number of claims contained in a patent very much depends upon the rules and regulations of different patent offices. Therefore, indicators relying on claims may vary depending on the data source used. For instance, because of the *one claim rule* which prevailed in Japan until 1975, applications to the Japan Patent Office still have a significantly lower number of claims than those of patents filed in other offices. Moreover, the number of claims in a patent is influenced by the claim-related fees structure and the changes that may have happened over the years. For instance, in the case of EPO patents, before 1st April 2008 excess claims fees amounting to EUR 45 were charged starting from the 11th claim. After that date, excess claims fees have been raised to EUR 200 but charged starting from the 16th claim.

The claim indicator may be sensitive to truncation, given that claims are reviewed during the examination process, e.g. claims may be dropped or redefined by examiners. Hence, latest patent cohorts, where a relatively higher number of patents may still be under examination, may feature higher mean values of the index.

Technology fields seem to vary in the average number of claims per patent. The same happens by the time patent claims by country are considered. Caution should be used when comparing the 1999 and the 2009 figures, as higher averages of the normalised indicator (displayed below) might simply reflect the different type of distributions that claims exhibit over time. For instance, on average biotech patents feature 22 claims per patent in 1999 and 13 in 2009, and the standard deviation of the distribution of claims is above 16 in 1999 and 12 in 2009. Conversely, micro and nano-tech patents contain on average 20 claims in 1999 and only 12 in 2009, and the standard deviation of their distributions goes from 17 in 1999 to 8 in 2009.

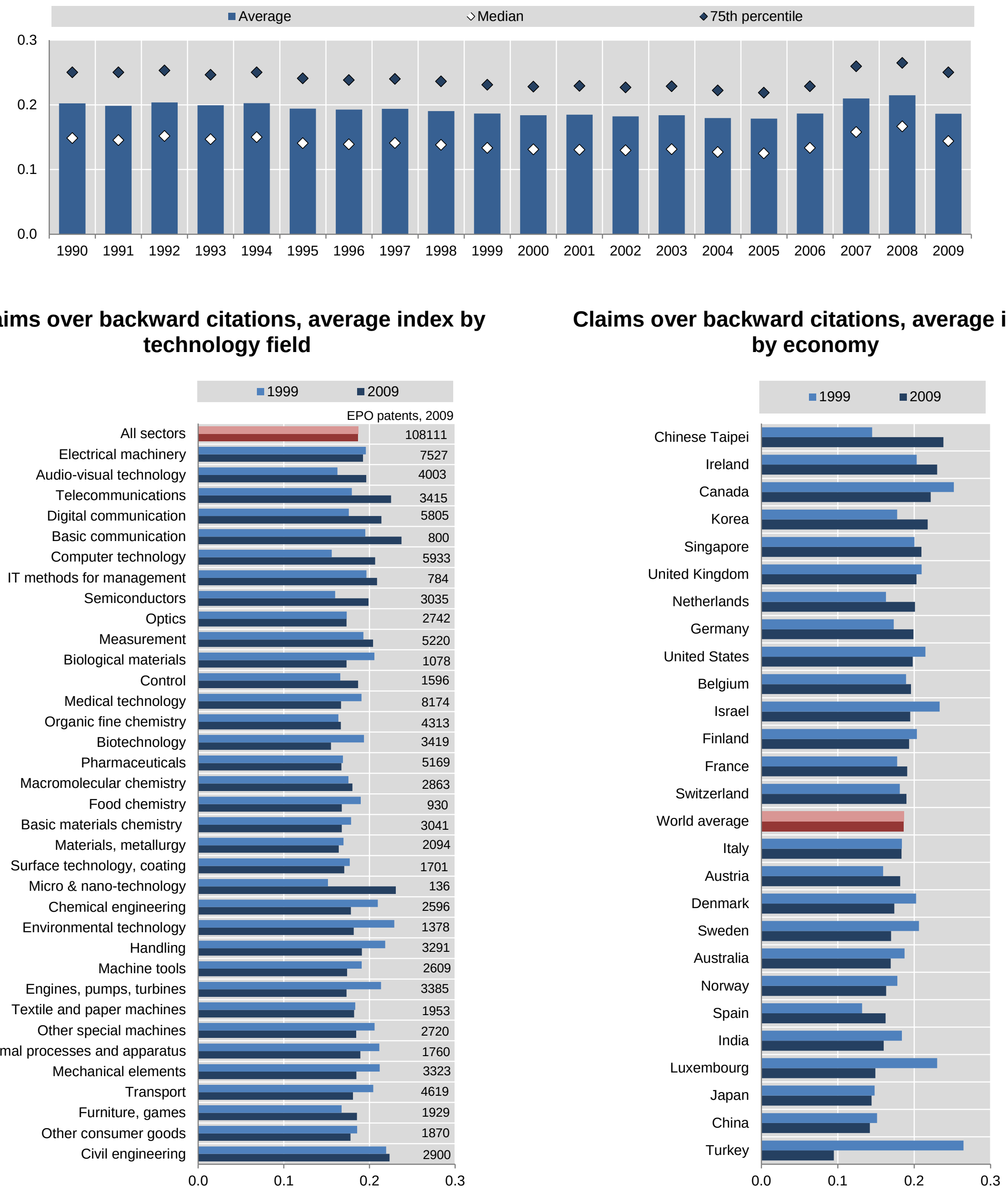
Figure 2.7. Number of claims, index, 1990-2009



Note: The claims index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The index has been winsorized to correct for extreme values. The average by economy is provided only for economies with more than 200 patents reporting the index in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Figure 2.8. Claims over backward citations index, 1990-2009



Note: The adjusted claims index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The average by economy is provided only for economies with more than 200 patents reporting the index in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Forward citations

Background and definition

The number of citations a given patent receives (forward citations) mirrors the technological importance of the patent for the development of subsequent technologies, and also reflects, to a certain extent, the economic value of inventions (see Trajtenberg, 1990; Hall, et al., 2005; Harhoff et al., 2003). The guidelines for examination in the European Patent Office require that the references to prior art are classified according to their relevance for the patent application in question. While prior art can be cited as documents defining the non-infringing state of the art in a technology field, there also exist three types of citations that restrict the patentability of a patent application. These are:

- X citations: documents that are particularly important when taken alone, to the point that a claimed invention cannot be considered novel (where "novel" means new, i.e. not previously known or used by others);

- I citations: documents that are particularly important when taken alone, to the point that a claimed invention cannot be considered to involve an inventive step or to be non-obvious. The inventive step/non-obvious requirement means that, to be patentable, an invention must not be an obvious variation or combination of previously known subject matter and has to 'adequately' differ from the state of the art[82];

- Y citations: documents that are particularly relevant if combined with one or more documents of the same category, as such a combination would be obvious to a person skilled in the art.

Forward citation counts presented here are based on EPO patents citations and take into account patent equivalents – that is, patent documents protecting the same invention at several patent offices (see Webb et al., 2005). Forward citations are counted over a period of five or seven years after the publication date. Publication typically occurs 18 months after the filing date of the patent. The windows for observation used should allow capturing the different citation patterns of the technology fields considered. However, the 5/7 years citation lag decreases the timeliness of the indicator: only patents published up to the mid 2000s can thus be considered.

Counts also include self-citations following the findings of Hall et al. (2005) suggesting that self-citations are generally more valuable than citations from external patents. Statistics are shown both with respect to the total number of citations received (all categories of citations) and for citations received as X, I or Y. X-I-Y forward citations signal the cited patent to be of higher technological value. The number of forward citations can be written as:

$$CIT_{i,T} = \sum_{t=P_i}^{P_i+T} \sum_{j \in J(t)} C_{j,i} \text{ ; } T \leq 5 \text{ or } T \leq 7$$

where $CIT_{i,T}$ is the number of forward citations received by patent application *i* published in year P_i within *T* years from its publication (in the present case, within five years). $C_{j,i}$ is a dummy variable that gets value 1 if the patent document *j* is citing patent document *i*, and 0 otherwise. *J(t)* is the set of all patents applications published in year *t*. The number of forward citations per patent has been normalised with respect to the maximum value observed in the cohort (i.e. in the group of patents filed in the same year and belonging to the same technology field).

Indicator overview

In the mid-2000s, new guidelines for EPO examiners recommended keeping to the legally most relevant citations (i.e. to those potentially invalidating part of the application, i.e. X and Y citations) and to reduce references to "the general state of the art" (type A citations).

Moreover, in 2012 EPO introduced the new citation category I in the PATSTAT database, to distinguish those citations that are particularly relevant for the novelty of a patent (i.e. code X) from those that are particularly important in order to assess the inventive step involved (i.e. code I).

Table 2.1. below shows all the search codes that can be attributed to a patent citation, according to EPO rules. These encompass codes signalling the extreme relevance of prior art for the patent under examination, as well as codes cited for a better understanding of the invention (i.e. code T).

Table 2.1. Search codes allocated to patent citations, EPO

X	Particularly relevant documents when taken alone (a claimed invention cannot be considered novel)
I	Particularly relevant documents when taken alone (a claimed invention cannot be considered to involve an inventive step)
Y	Particularly relevant documents if combined with one or more other documents of the same category – such a combination being obvious to a person skilled in the art
A	Documents defining the general state of the art (but not belonging to X, I or Y)
O	Documents which refer to non-written disclosure
P	Intermediate documents - documents published between the date of filing of the application being examined and the date of priority claimed
T	Documents relating to the theory or principle underlying the invention (documents which were published after the filing date and are not in conflict with the application, but were cited for a better understanding of the invention)
E	Potentially conflicting documents – Any patent document bearing a filing or priority date earlier than the filing date of the application searched but published later than that date, and the content of which would constitute prior art
D	Documents cited in the application (i.e. already mentioned in the description of the patent application)
L	Documents cited for other reasons (e.g. a document that may throw doubt on a priority claim)

Note: Category "I" was introduced in 2012. The former X category was split up into 2 categories: X and I. Up to three codes can be allocated to a citation (e.g. AD, XD, XP, YP, APD, XPD).

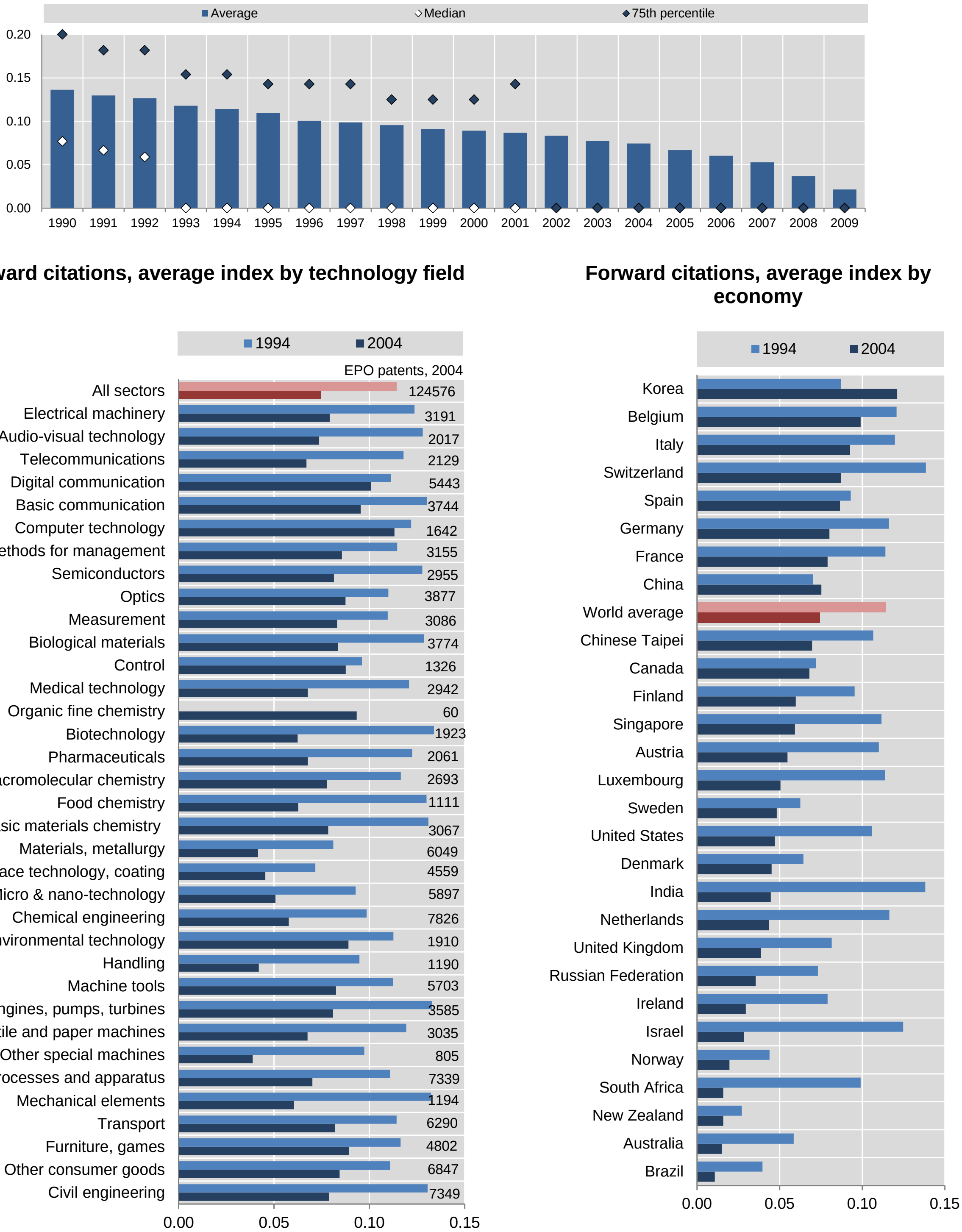
Source: EPO, PATSTAT data catalog, April 2012.

The forward citation index has decreased over time throughout the period considered, although the statistics related to the last 5 to 7 years should be interpreted with care, due to truncation. The way median and 75th percentile values behave signal that distributions have become progressively more dispersed over time, and that only a very small subset of patents typically receives a large number of forward citations.

Moreover the charts by technology field and by country further highlight the substantial heterogeneity that characterises forward citation patterns, and the changes that seem to have occurred over time. The increasing number of patents filed over the years, coupled with the progressively greater dispersion of forward citation distributions and the different maturity of the technology fields considered may help explain the stylised facts that emerge.

Korea, Belgium, Italy, Switzerland and Spain appear as top scoring countries in terms of average forward citation index by country for the year 2004 when all citations are taken into account as well as when only X, I, and Y citations are considered. No similarly consistent picture can be obtained at the technology field level, where "Computer technology" scores highest in terms of forward citation index in 2004 and "Surface technology, coating", "Micro and nano-technologies" and "Mechanical elements" appear the most cited when X, I, and Y citations only are considered.

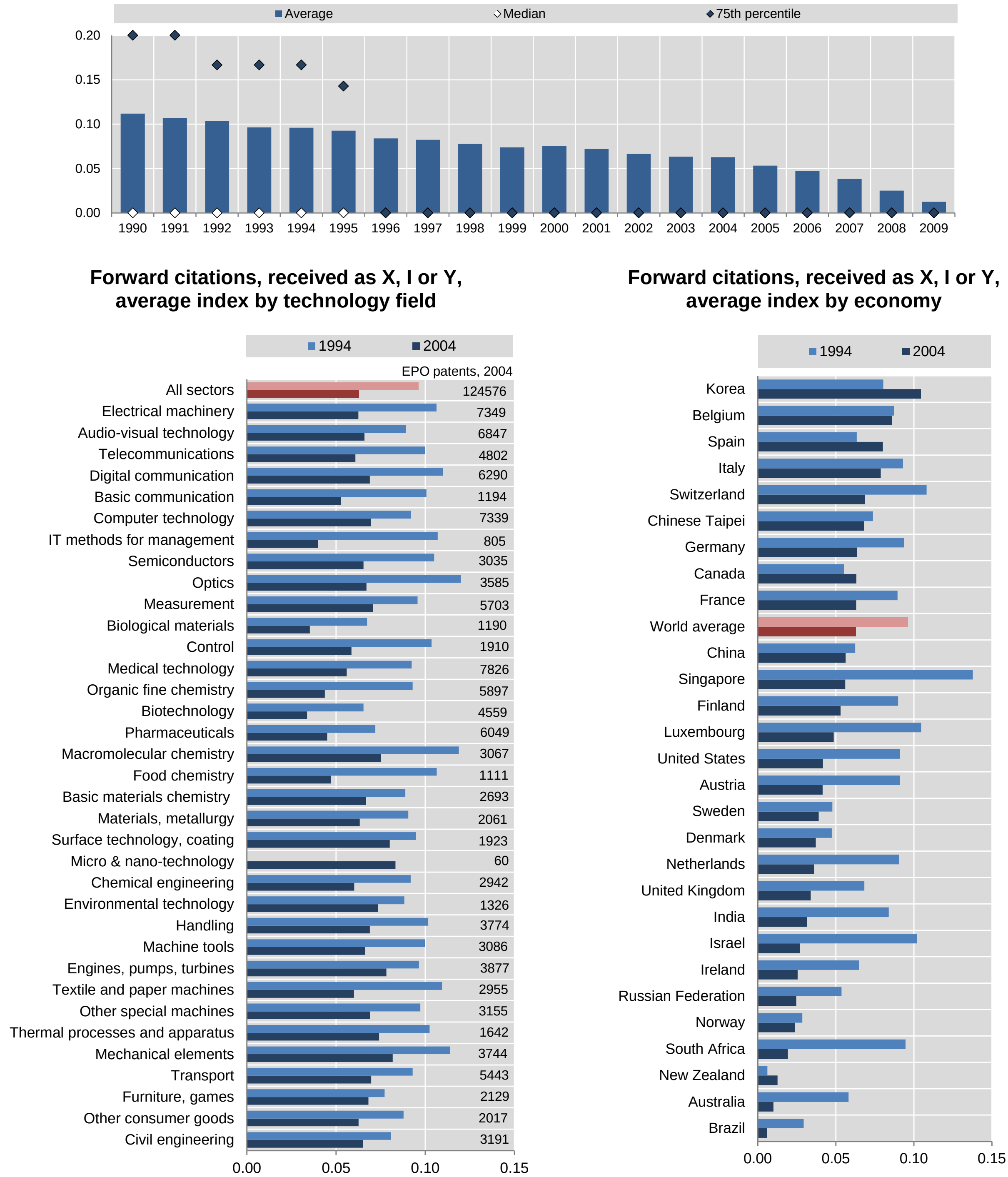
Figure 2.9. Forward citations, index, 1990-2009



Note: The forward citations index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The index has been winsorised to correct for extreme values. The average by economy is provided only for economies with more than 100 patents reporting the index in 2004. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Figure 2.10. Forward citations, citations received as X, I or Y, index, 1990-2009



Note: The forward citations index is normalised according to the maximum family size of the patents in the same cohort (filing date and technology fields). The index has been winsorised to correct for extreme values. The average by economy is provided only for economies with more than 100 patents reporting the index in 2004. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Breakthrough inventions

Background and definition

Breakthrough inventions are high-impact innovations which serve as a basis for future technological developments, new products or services. Breakthrough inventions have been found to be strongly associated with entrepreneurial strategies and with further technological development, and are at the centre of many recent studies.

Ahuja and Lampert (2001) explore the relationship between the organisation of established firms and the creation of breakthrough inventions. To this end, they define breakthrough inventions as the top 1% of cited patents (i.e. the most highly cited patents) and find that three organisation-related “traps” generally hinder breakthrough inventions: the familiarity, the maturity and the propinquity traps[83]. Srivastava and Gnyawali (2011) investigate the tension between value creation and value protection, and find that the quality and diversity of the technological resources of a firm are positively correlated with breakthrough innovations. Kerr (2010) relies on Ahuja and Lampert’s definition of breakthrough invention in order to investigate the speed at which clusters of technology-related inventions migrate spatially in the aftermath of breakthrough inventions. He finds evidence in support of significantly higher patenting growth in cities and technologies where breakthrough inventions have occurred. Finally, Popp at al. (2012) analyse the return to R&D in some energy technology sectors and find, among other results, that high value (i.e. breakthrough) patents may induce subsequent innovations in those sectors.

We follow here the definition of breakthrough invention *à la* Ahuja and Lampert, i.e. as the top 1% cited patents. Similarly to the way in which the different forward citation indicators have been constructed, breakthrough inventions may also be identified by means of restricting the type of citations considered to those coded as X, I and Y.

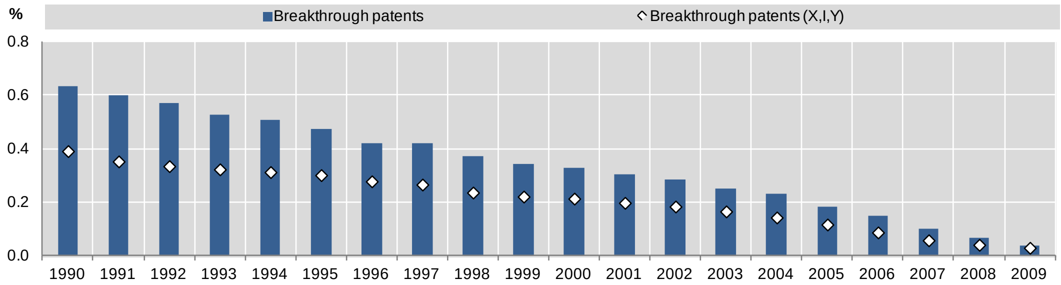
Statistics related to breakthrough indicators built on all citations, as well as on X, I and Y citations only are shown below. Counts of breakthrough inventions are aggregated at the country and at the technological field level using fractional counts.

Indicator overview

Being built on forward citations, the breakthrough invention indicators also suffer from timeliness: a 5 (or 7) year period after publication needs to be allowed to identify the top cited patents in a certain technology field and year cohort.

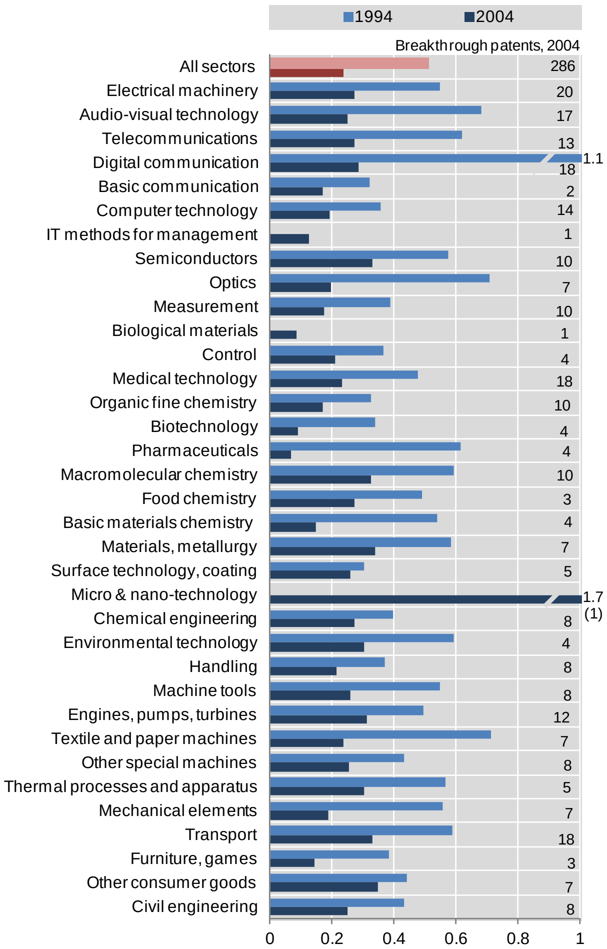
From the figure below, it can be seen that the share of breakthrough patents in the total number of patents has persistently decreased over time. This may be due to the distribution of patents across technology fields and to the fact that a proportionally higher number of patents never get cited: as the overall number of cited patents decreases, also the number of top 1% cited patents decreases.

Figure 2.11. Share of breakthrough patents in total, 1990-2009

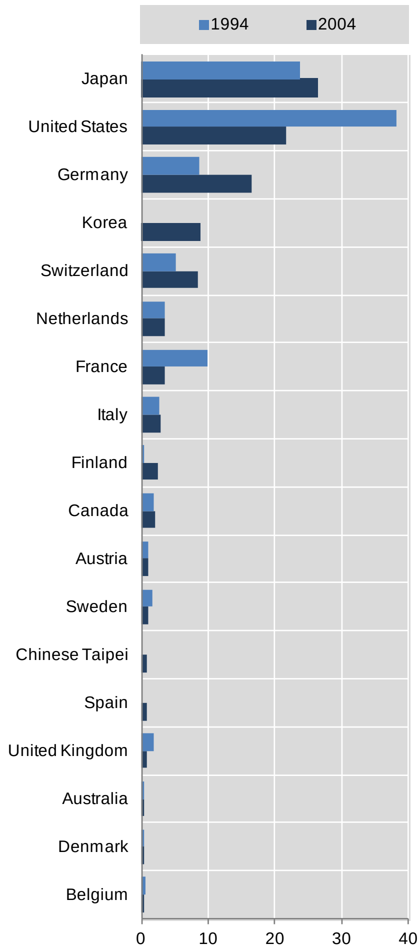


Technology fields seem to differ markedly with respect to the number of breakthrough inventions they feature, with Japan, the United States, and Germany that most contribute to generate breakthrough inventions. New entrants like Korea also appear in 2004.

Share of breakthrough patents in total, by technology field (percentages)



Share of economies in breakthrough patents, percentages



Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Generality index

Background and definition

Forward patent citations can be used to assess the range of later generations of inventions that have benefitted from a patent, by means of measuring the range of technology fields – and consequently industries - that cite the patent (Bresnahan and Trajtenberg, 1995). The patent generality index *à la* Trajtenberg et al. (1997) has been used in a variety of studies aimed to e.g. identify general purpose technologies (Hall and Trajtenberg, 2004); investigate the role of universities as sources of commercial technologies (Henderson et al., 1998); study participation and rent sharing in patent pools (Layne-Farrar and Lerner, 2011); and understand the functioning of the market for innovation and the way patent rights are enforced (Galasso et al, 2011).

The patent generality index proposed here is based on a modification of the Hirschman-Herfindahl Index (HHI) and relies on information concerning the number and distribution of citations received (forward citations) and the technology classes (IPC) of the patents these citations come from. Differently from the way in which generality has been calculated in previous studies (e.g. Hall et al, 2001b) we consider all IPC classes contained in the citing patent documents and account for the number and distribution of both 4-digit and *n*-digit IPC technology classes contained in citing patents, where *n* refers to the highest level of disaggregation possible (e.g. A61K 31/5575). Citation measures are built on EPO patents and patent equivalents have been consolidated. Forward citations cover all categories of citations, and are restricted to a 5-year citation window.

Let X be the focal patent with Y_i patents citing the focal patent X, with $i = 1, \ldots, N$ and let β_{ji} be defined as follows:

$$\beta_{ji} = \frac{T_{ji}^n}{T_i^n}$$

where T_i^n is the total number of IPC *n*-digit classes in y_i

T_{ji}^n is the total number of of IPC *n*-digit classes in the j^{th} IPC4 digit class in y_i and

$j=1\ldots M_i$ is the cardinal of all IPC4-digit classes in y_i

Our generality index is defined as:

$$G_X = 1 - \sum_{j=1}^{M_i} \left(\frac{1}{N} \sum_{i=1}^{N} \beta_{ji} \right)^2$$

As $\beta_{ji} = \frac{T_{ji}^n}{T_i^n}$, the generality index can be rewritten as:

$$G_X = 1 - \sum_{j=1}^{M_i} \left(\frac{1}{N} \sum_{i=1}^{N} \frac{T_{ji}^n}{T_i^n} \right)^2$$

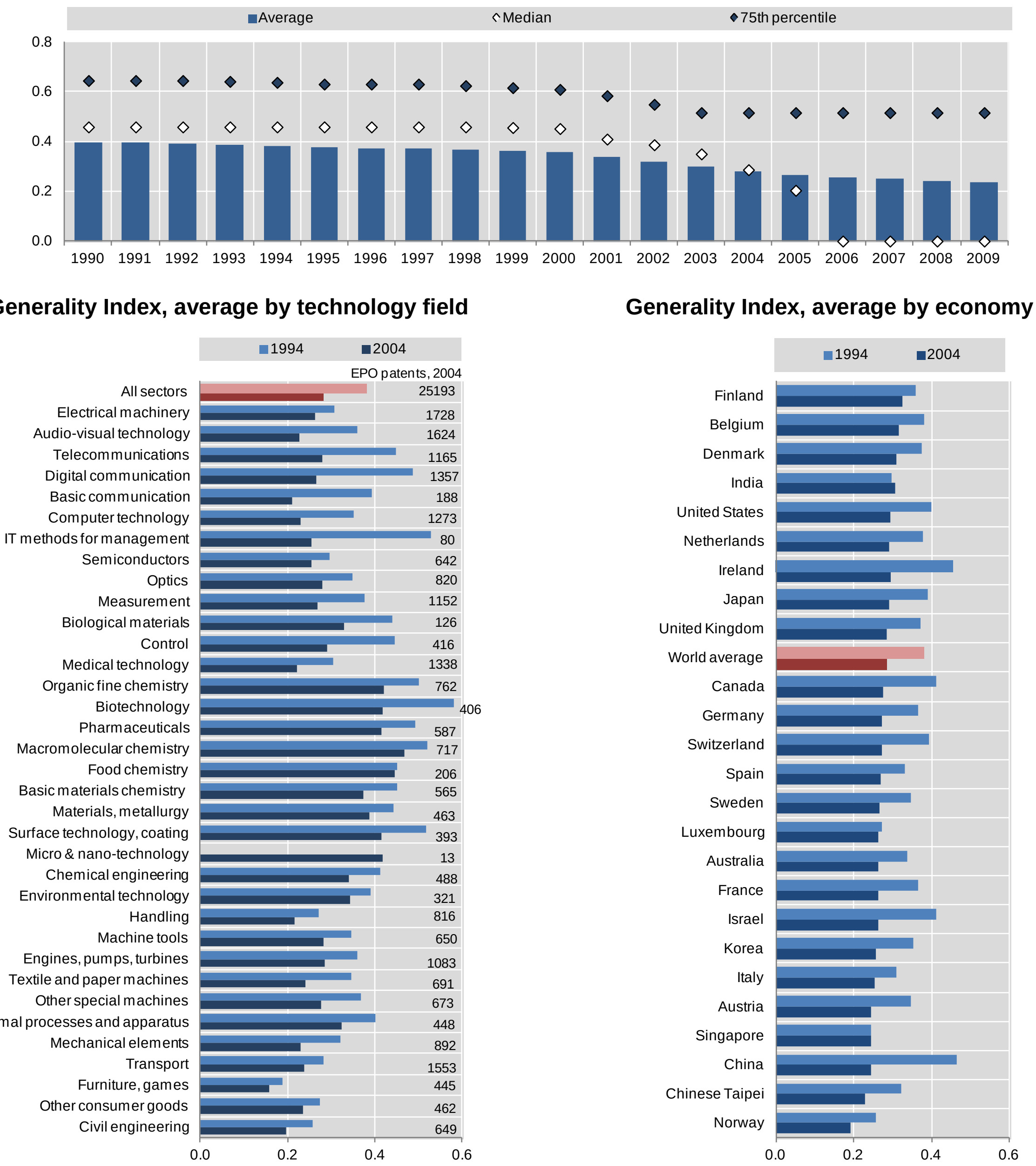
Which has a denominator equal to $T_i^n * N$.

Indicator overview

The proposed generality index is defined between zero and one, and the measure is high if a patent is cited by subsequent patents belonging to a wide range of fields – i.e. the considered invention has been relevant for a number of later inventions, and not only in its own technology class. Conversely, if most citations are concentrated in a few fields the generality index is low, i.e. close to zero. As suggested by Hall et al. (2001a), the generality measure may be biased when the number of patents on which it is based is small. However, as we account for all IPC *n*-digit classes contained in the citing patent documents our denominator becomes $T_i^n * N$, and our generality indicator suffers less from this small number of observation bias.

Generality measures strongly depend on the patent classification scheme used: the finer the level of classification the higher the measures. Moreover, the generality index treats technologies that are closely related but are not in the same class in the same way as they treat very distant technology fields. This may lead to overestimate or underestimate the generality of patents (Hall and Trajtenberg, 2004).

Figure 2.12. Generality index, 1990-2009



Note: The average by economy is provided only for economies with more than 20 patents reporting the index in 2004.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Originality index

Background and definition

Patent originality refers to the breadth of the technology fields on which a patent relies. The patent originality measure, first proposed by Trajtenberg et al. (1997), operationalises this concept of knowledge diversification and its importance for innovation: inventions relying on a large number of diverse knowledge sources (i.e. on patents belonging to a wide array of technology fields) are supposed to lead to original results. Patent originality has been used in a wide range of studies, e.g. on the creation of venture-backed start-ups (Gompers et al., 2005); the duration and outcome of the patent examination procedure at the European Patent Office (Harhoff and Wagner, 2009); and the value of post-merger patents *vis-à-vis* pre-merger ones (Stahl, 2010).

Building on Hall at al. (2001b), we define the originality indicator as:

$$Originality_P = 1 - \sum_{j}^{n_p} {s_{pj}}^2$$

where s_{pj} is the percentage of citations made by patent p to patent class j out of the n_p IPC 4-digit (or 7-digit) patent codes contained in the patents cited by patent p. Citation measures are built on EPO patents and account for patent equivalents.

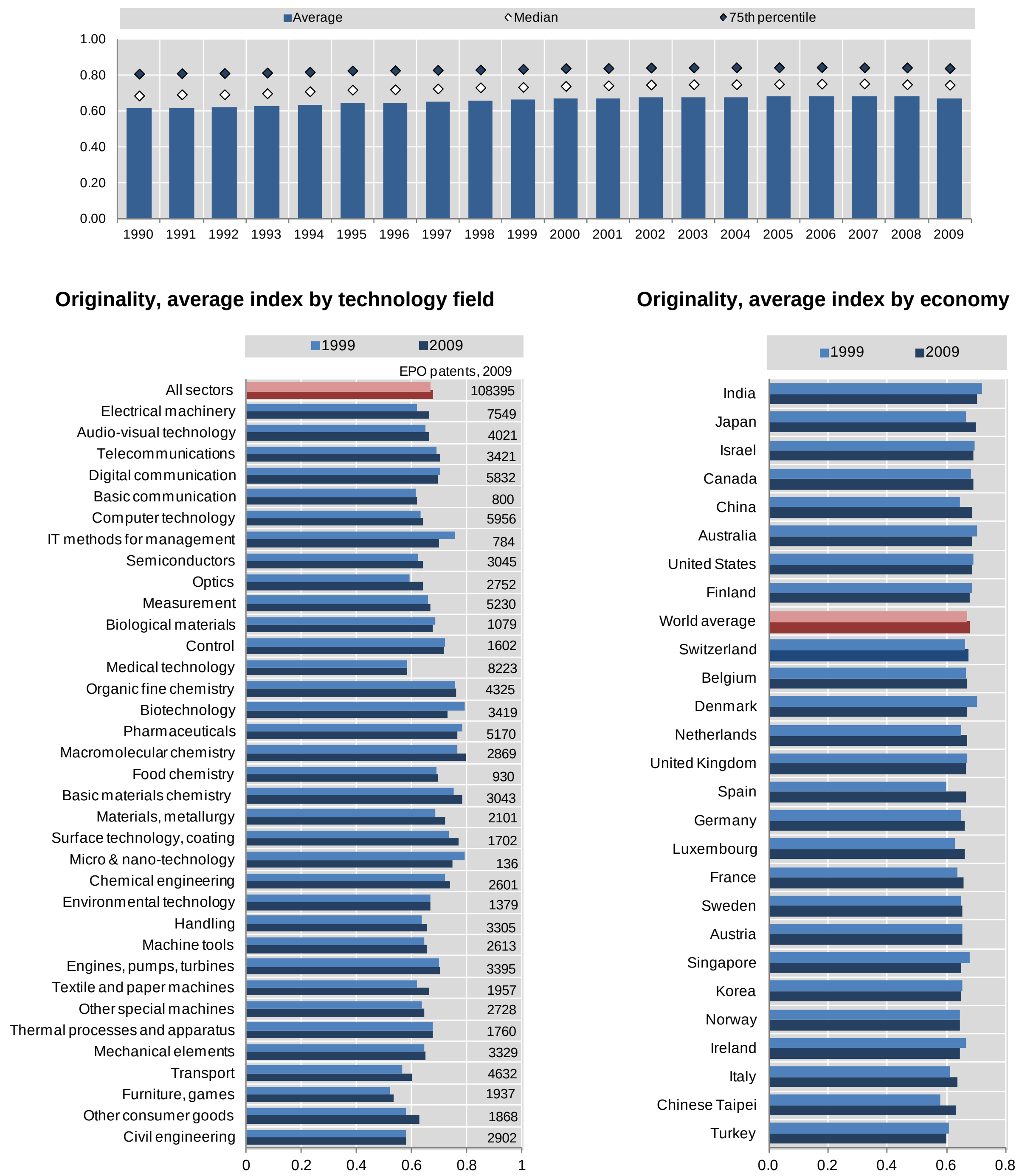
The construction of the patent originality indicator follows a logic that is very similar to the one used to construct the generality index, the main difference being that generality measures rely on forward citations, whereas originality relies on backward cites. The specification proposed here further differentiates the generality and the originality indicators, as the former accounts for the distribution of 7-digit subclasses within the 4 digit classes they belong to, as well as for the distribution of the 4-digit classes contained in citing documents; whereas the latter only accounts for the distribution of citations made at the 4-digit (or 7-digit, in the alternative specification proposed) level.

Indicator overview

Differently from Hall at al. (2001b), we rely on all the IPC classes contained in the patent documents that the focal patent cites, and compute the indicator at the 8-digit level. We do so in order to minimise the bias typically arising when the number of citations is small.

The figures below show statistics related to the patent originality index, i.e. to values of the patent originality indicator normalised with respect to the maximum value of patents in the same technology and year cohort. As can be seen, patent originality index values and distributions seem to have remained pretty stable over the years, although denoting a progressive small increase. This is not true however for the different technology fields, which appear to vary greatly in the extent to which they rely or broad or narrow prior art. Country specific differences in the average values of the index also emerge, although they are not as marked as those noted by technology field. It is also worth noticing that both the indices by sector and those by country barely change between 1999 and 2009.

Figure 2.13. Originality index, 1990-2009



Note: The average by economy is provided only for economies with more than 200 patents reporting the index in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Radicalness index

Background and definition

Although the concept of radicalness may appear intuitive and easy to grasp, as it evokes something completely different from what exists, defining and measuring the technological radicalness of inventions remains challenging. An index of patent radicalness has been proposed by Shane (2001), where the radicalness of a patent is measured as a time invariant count of the number of IPC technology classes in which the patents cited by the given patent are, but in which the patent itself is not classified. He argues that the more a patent cites previous patents in classes other than the ones it is in, the more the invention should be considered radical, as it builds upon paradigms that differ from the one to which it is applied.

This definition has been adapted in this paper to account for the relative weight of each 4-digit technology class contained in the cited patents. The indicator has further been normalised with respect to the total number of IPC classes listed in the backward citations, so that its value ranges from zero to one. This entails that the overall number of citations, i.e. the denominator of the index, corresponds to the count of citations at the most disaggregated level available, e.g. H05B 41/231. The numerator instead reflects the number of the IPC 4-digit classes contained in the cited documents, weighted by the times these classes appear at the more disaggregated level. The OECD radicalness indicator *à la Shane* is therefore compiled as follows:

$$Radicalness_P = \sum_{j}^{n_p} CT_j / n_p \ ; \ IPC_{pj} \neq IPC_p$$

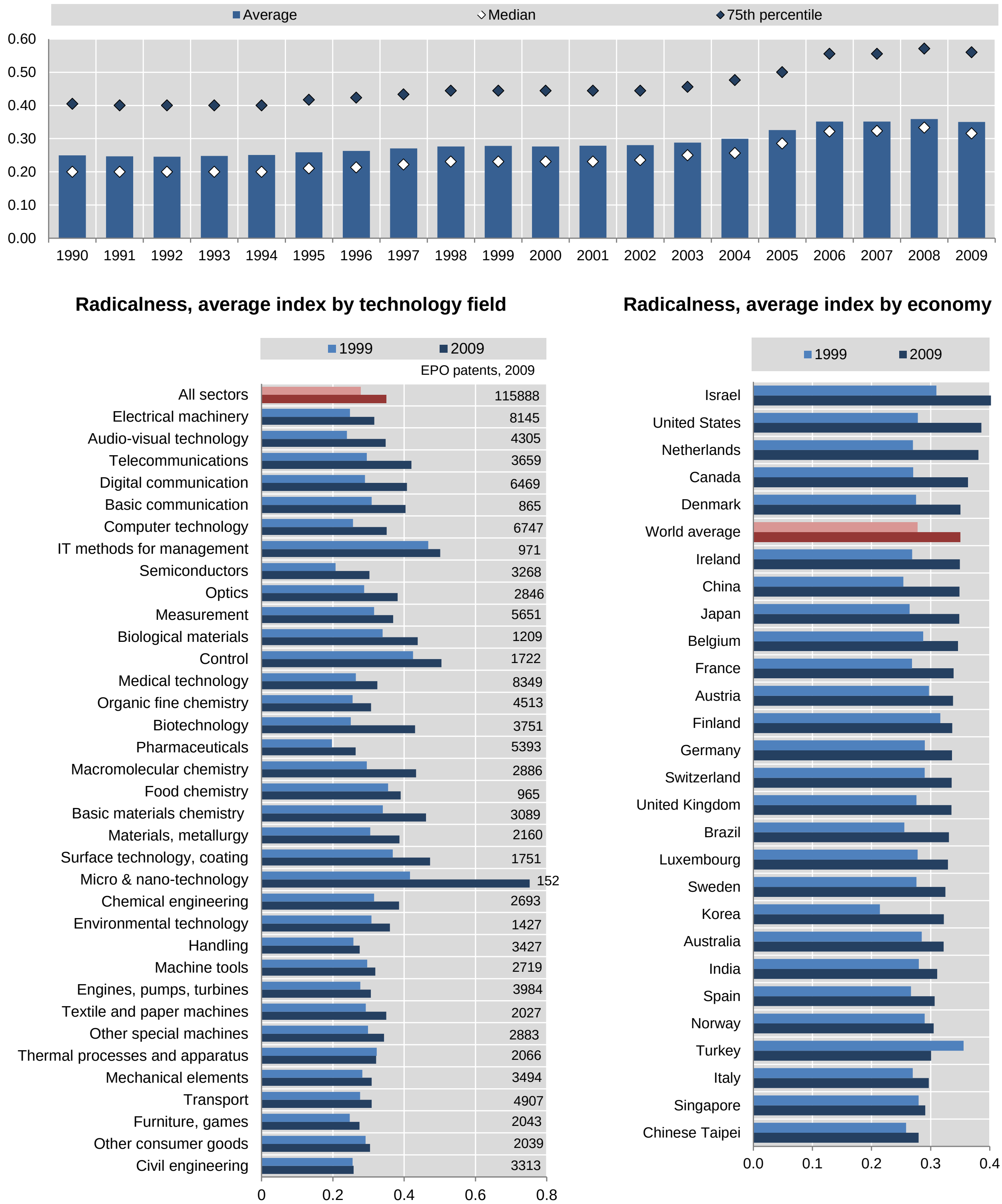
where CT_j denotes the count of IPC-4 digit codes IPC_{pj} of patent *j* cited in patent *p* that is not allocated to patent *p*, out of *n* IPC classes in the backward citations counted at the most disaggregated level available (up to the 5th hierarchical level). The higher the ratio, the more diversified the array of technologies on which the patent relies upon.

Indicator overview

The indicator proposed by Shane (2001) is fundamentally backward-looking in nature as it captures the radicalness of a patent in terms of the extent to which it differs from the predecessors it relies upon. It nevertheless remains silent about whether a patent is also radical compared to other patents filed in the same field during the very same period – that is whether it is ‘unique’ compared to contemporaneous inventions – and with respect to the change that the invention might have brought about in terms of subsequent technological developments.

Dahlin and Behrens (2005) conversely propose a definition of radicalness that relies on the novelty, uniqueness and impact on future technological developments that patented inventions might have. They analyse the citation patterns observed before, during and after the filing of a patent, in order to assess whether it can be considered a radical invention. However the indicator they propose is binary in nature, i.e. a patent is considered radical or not, and does not assess the degree of radicalness of an invention. Continuous indicators rather than discrete ones nevertheless prove extremely useful to assess, among others, the overall value of patent portfolios, and the innovative activity and output of firms over time. The OECD is currently working with external experts to propose and operationalise a definition of radicalness that builds on Dahlin and Behrens’ work and takes into account radicalness with respect to previous, contemporaneous and future developments. The ultimate goal is to construct a continuous radicalness indicator that can be calculated for all patents. Waiting for these new developments, the indicator shown below follows the radicalness definition by Shane (2001).

Figure 2.14. Radicalness index, 1990-2009



Note: The average by economy is provided only for economies with more than 200 patents reporting the index in 2009. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

Patent renewal

Background and definition

The renewal of a patent signals that the invention described in the patent document is still useful, i.e. that it has some value, as no rational agent would be willing to pay money for a right that is worthless.

Information about the renewal of patents has been used in a wide array of studies, which generally suggest that more valuable patents are renewed for longer periods (e.g. Pakes, 1986). Following the pioneering work of Pakes and Schankerman (1984), patent renewal data have been used to estimate the private value of patent protection. These models rely on the assumption that patent owners make profit-maximising renewal decisions, and that patent renewals' rates can be used to estimate the private value of patent protection. Patent renewal data have also been used to weight patent counts, and to obtain more precise measures of innovative output. This is the path followed by e.g. Lanjouw, Pakes and Putnam (1998), who hold that more valuable inventions generate larger and/or longer lived patent families. More recently, Svensson (2012) investigates the relationship that exists between the commercialisation and the renewal of patents, and finds a positive correlation between commercialisation and the use of patents for defensive purposes on the one hand and patent renewal on the other hand. He further finds that the value of patents influences both commercialisation and renewal decisions.

The OECD patent renewal indicator corresponds to the simple count of years during which a granted patent has been kept alive, i.e. the latest year in which it has been renewed or until it has lapsed or has been withdrawn. Years are counted starting from the year in which a patent has been applied.

Indicator overview

The box 2.1. below highlights the patent codes used to measure patent renewal. In the case of patent renewals no robustness checks are presented, as the indicator is the simple count of years during which a patent has been renewed.

Box 2.1. Identifying the length of patent renewal

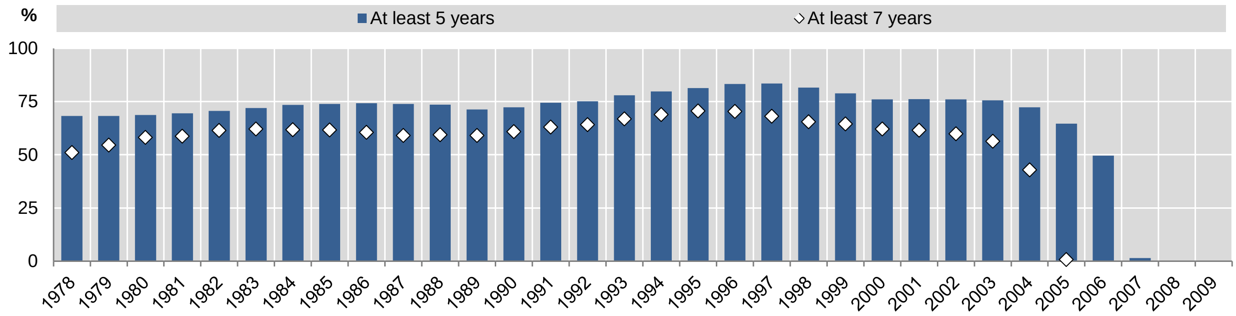
The EPO worldwide legal status database (INPADOC) contains information related to any administrative act or action concerning a patent document, from application onwards, including the post-grant phase. A variety of codes is typically allocated to each legal event, as it depends on the specific patent authority responsible for the act or action. The codes listed below refer to events related to EPO patent applications only. For alternative patent authorities, other codes apply.

List of events relating to the length of EPO patent renewal in the INPADOC legal status database

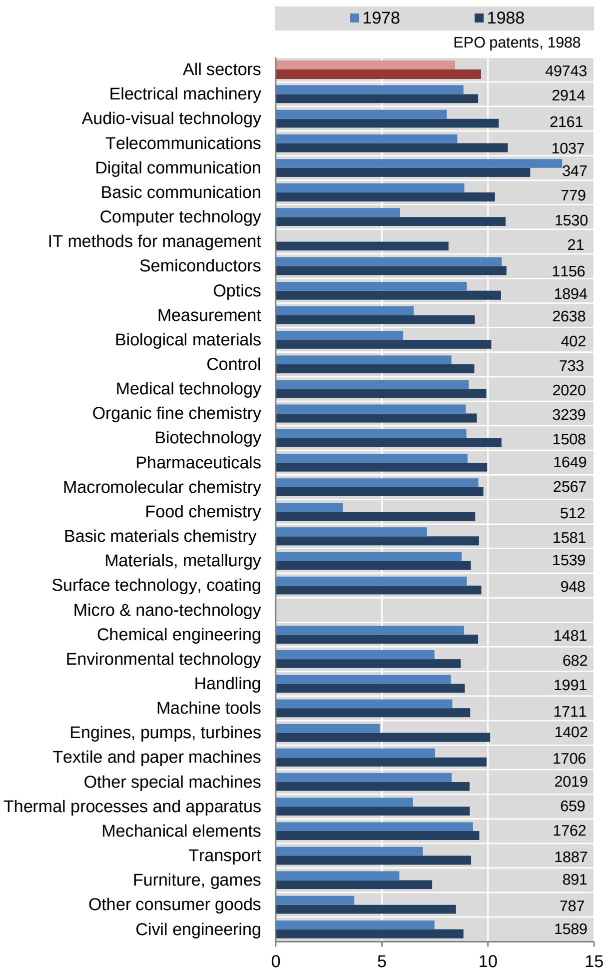
The life duration of a patent can be assessed by the latest legal event that occurred, namely the withdrawal, the renewal (payment of fees) or the lapse of patents. Hence, it is critical to respect the events' chronology for each patent in the database.

- **Granted EPO patent:** *Publn_first_grant = 1* (in PATSTAT, PAT_PUBLN table);
- **Renewed EPO patent:** *prs_code* = **PGFP** (*annual fees paid to national office*) and latest *payment date*;
- **Withdrawn EPO patent:** *prs_code* = **18D** (*patent deemed withdrawn*) or *prs_code* = **18W** (*patent withdrawn*) and either *date in force* or *withdrawal date* variables; **D18D** and **D18W** codes cancel the former 18D and 18W events. If any D18D or D18W event occurred after 18D or 18W, then the patent is not considered as withdrawn;
- **Lapsed EPO patent:** *prs_code* = **PG25** (*lapsed in a contracting state announced via postgrant information from national office to EPO*) and earliest *date in force*.

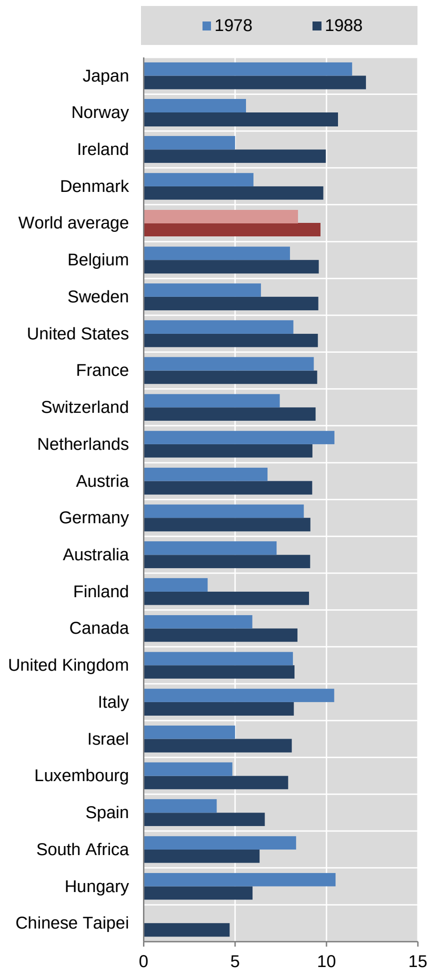
Figure 2.15. Share of patents renewed at least 5 or 7 years in total granted patents, 1978-2009



Patent renewal, average duration of patents in number of years, by technology field



Patent renewal, average duration of patents in number of years, by economy



Note: The average by economy is provided only for economies with more than 50 patents filed in 1998 and renewed. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

Source: OECD, calculations based on PATSTAT (EPO, April 2012) and INPADOC Legal Status (EPO, April 2012), October 2012.

The top figure above shows the percentage of patents renewed for at least 5 (or 7) years, by year cohort. This is done to minimise the effect of truncation over the statistics proposed, as patents have a life of up to 20 years.

Patent value: composite index

Background and definition

Patent value indicators try to capture both the technological and the economic value of innovations, and are typically based on patent citations, claims, patent renewals and patent family size. They are considered meaningful measures of research productivity and are found to be correlated with the social and private value of the patented inventions. The difference in average patent value across firms is generally associated with the market's evaluation of firms, including their market capitalisation, the assessments made by financing institutions and prospective acquirers, and so on.

The patent value composite index presented here is an experimental one and may be subject to further refinement. The patent value index is a composite indicator based on four to six dimensions of patents' underlying value: forward citations; patent family size; number of claims; generality index; plus backward citations and grant lag. It builds on Lanjouw and Shankerman (2004) and incorporates the generality measure, and a measure accounting for the length of the examination process (i.e. the grant lag index). All components are normalised according to patent cohorts stratified by year and technological field and are given equal importance (no weights).

Three alternative definitions of the experimental patent value indicator are proposed, in order to better see the impact of the grant lag index and the backward citations index on the indicator:

i. ***Patent value index 4*** – 4 components: number of forward citations (up to 5 years after publication); patent family size; number of claims; and the patent generality index. Only granted patents are covered by the index.

ii. ***Patent value index 4b*** – 4 components, bis: number of forward citations (up to 5 years after publication); patent family size; corrected claims; and the patent generality index. Only granted patents are covered by the index.

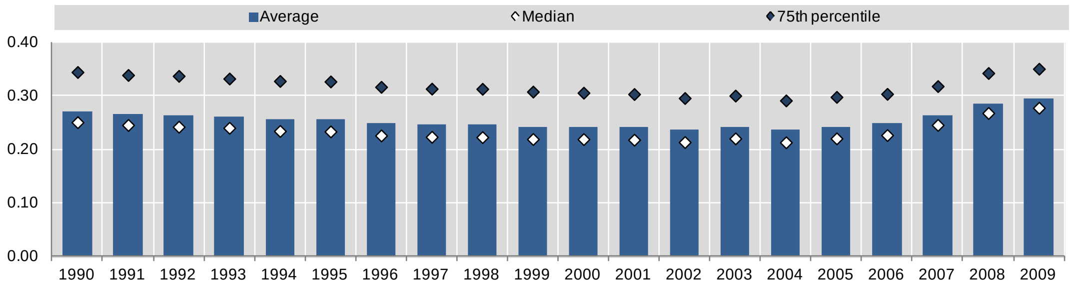
iii. ***Patent value index 6*** – 6 components: covers the same components as above, plus the number of backward citations and the grant lag index.

Indicator overview

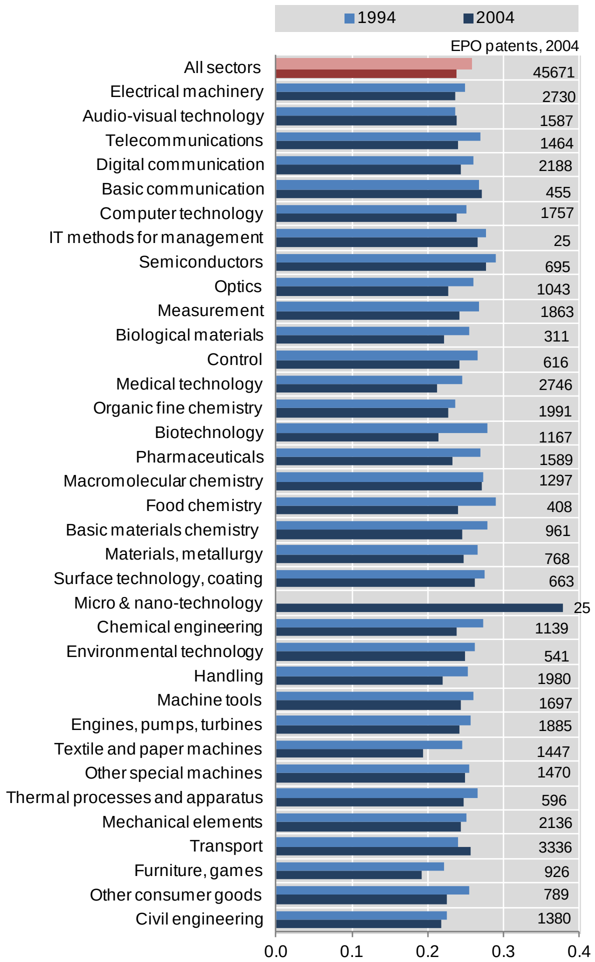
As the patent value measure proposed is based on indicators like forward citations and grant lags, it suffers from timeliness. It should also be noted that using alternative data sources, e.g. US Patent and Trademark Office or Japan Patent Office, different methodologies or observation periods may affect patents' scores, countries' rank and sectors' positions.

The three specifications proposed exhibit somewhat different time trends, although not marked ones. Whatever the specification though, micro and nano technologies seemingly feature the highest patent value - although the numbers rely on a very small set of observations. South Africa, Australia, Canada, Norway and the United Kingdom appear as top patent value countries according to all specifications proposed.

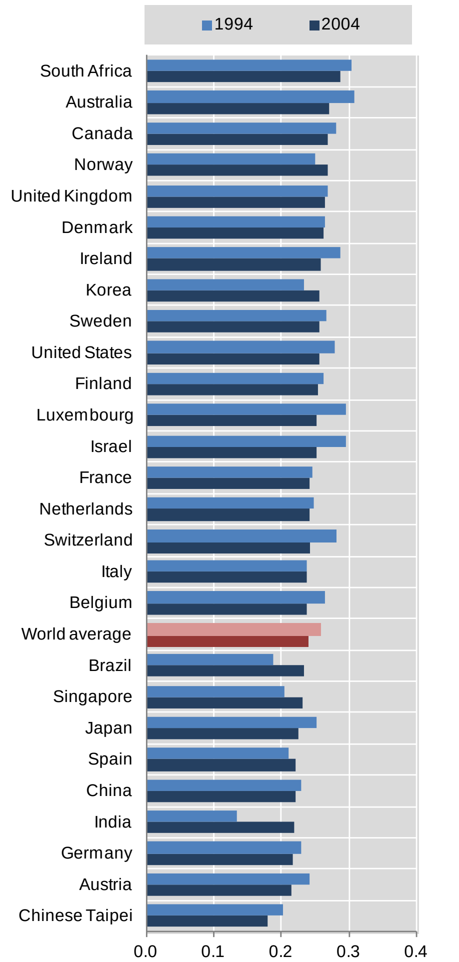
Figure 2.16. Patent Value Index (4) Index, 1990-2009



Patent Value Index (4), average by technology field



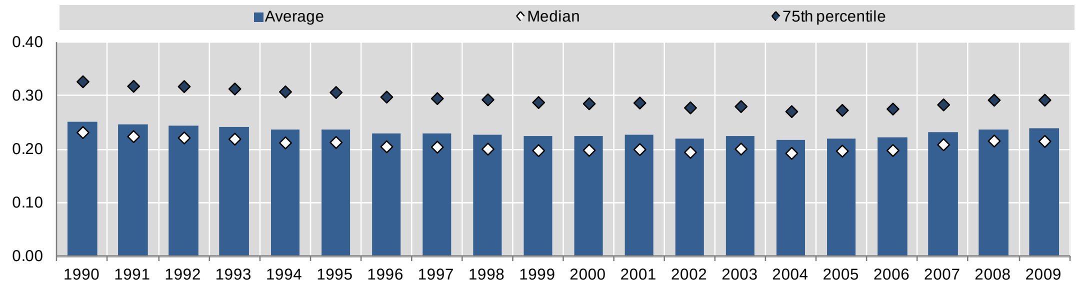
Patent Value Index (4), average by economy



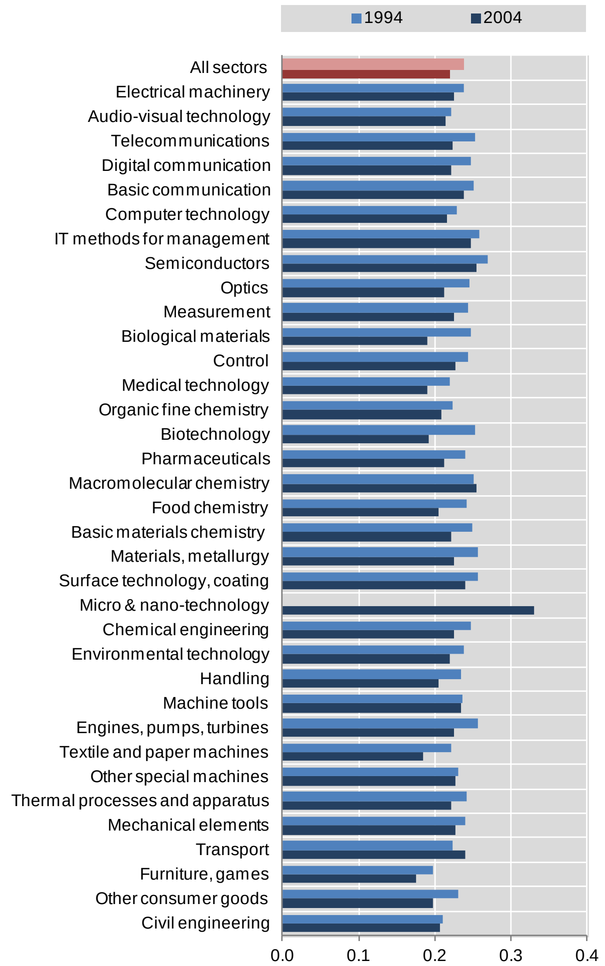
Note: The patent value composite index is based on the average value of its normalised component, by cohort of filing date and technology fields. The average by economy is provided only for economies with more than 50 patents reporting the index in 2004.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012. The small numbers on the right hand of the average by technology table show the number of observations on which statistics rely.

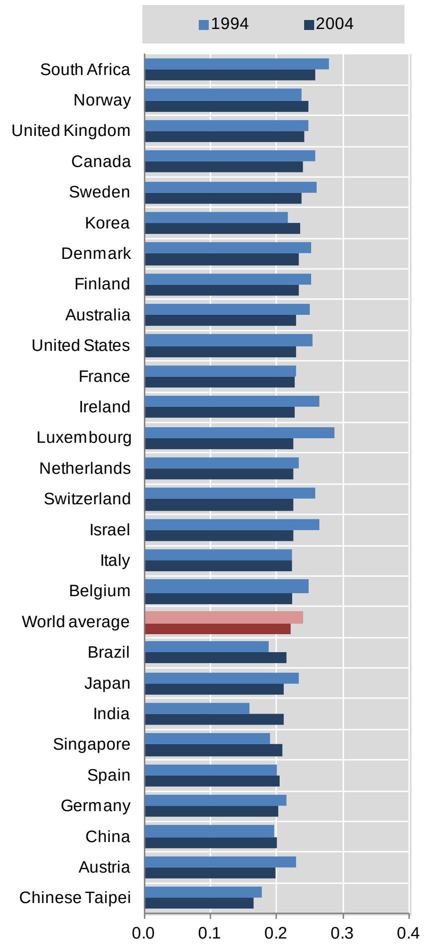
Figure 2.17. Patent Value Index (4b), 1990-2009



Patent Value Index (4b), average by technology field



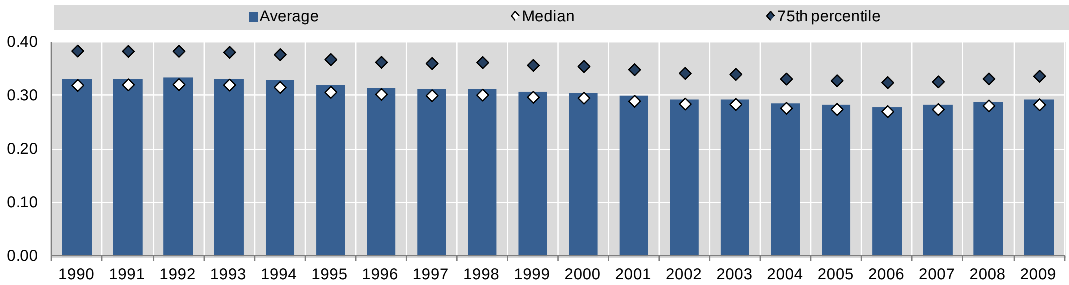
Patent Value Index (4b), average by economy



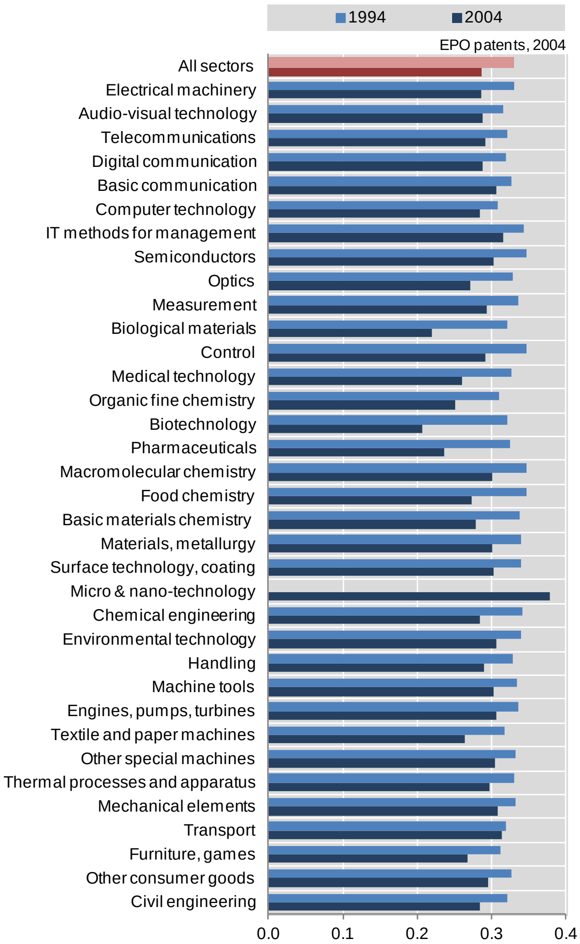
Note: The patent value composite index is based on the average value of its normalised component, by cohort of filing date and technology fields. The average by economy is provided only for economies with more than 50 patents reporting the index in 2004.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

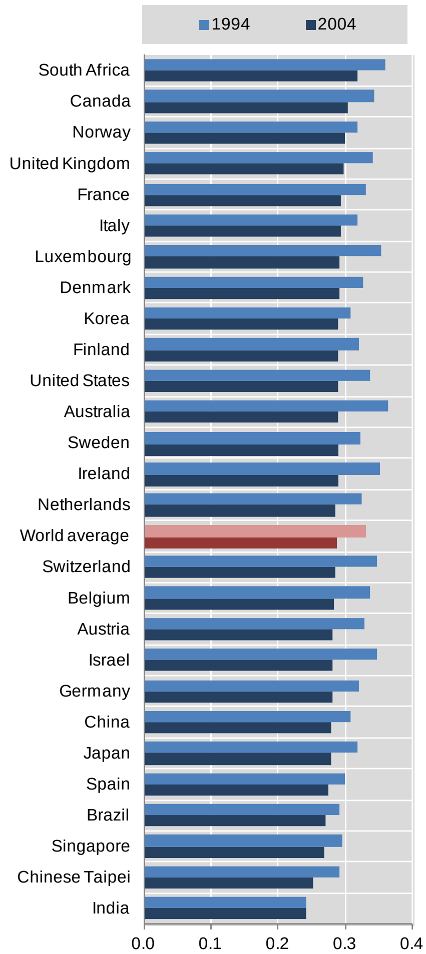
Figure 2.18. Patent Value Index (6), 1990-2009



Patent Value Index (6), average by technology field



Patent Value Index (6), average by economy



Note: The patent value composite index is based on the average value of its normalised component, by cohort of filing date and technology fields. The average by economy is provided only for economies with more than 50 patents reporting the index in 2004.

Source: OECD, calculations based on PATSTAT (EPO, April 2012), October 2012.

It should be noticed that the original formulation of Lanjouw and Schankerman (2004) weighted the different components of the composite indicator using factor analysis. The OECD experimental patent value indicators conversely assume all components to play an equally important role, i.e. they are assigned equal weights. This choice is motivated by the results of the exploratory analysis carried out when designing the indicator, which suggests that weights differ across technology fields and depend on the time span considered. Hence, for comparability purposes the composite value indicators presented here assign equal importance to all components, and we leave it to future empirical analysis to determine the coefficients that would best mirror the relative importance of the different value factors.

Needless to say, while the experimental OECD indicator tries to summarise a complex and multidimensional issue like patent value, it nevertheless suffers from the typical drawbacks of all composite indicators, and should therefore be interpreted with care[84].

ANNEX TECHNOLOGY FIELDS

The IPC-Technology concordance table developed by the WIPO in 2010 and revised in 2011 has been used to group patents by main technology fields. The taxonomy is articulated in 6 sectors and 35 fields, as follows:

1. Electrical engineering

1. Electrical machinery, apparatus, energy
2. Audio-visual technology
3. Telecommunications
4. Digital communication
5. Basic communication processes
6. Computer technology
7. IT methods for management
8. Semiconductors

2. Instruments

9. Optics
10. Measurement
11. Analysis of biological materials
12. Control
13. Medical technology

3. Chemistry

14. Organic fine chemistry
15. Biotechnology
16. Pharmaceuticals
17. Macromolecular chemistry, polymers
18. Food chemistry
19. Basic materials chemistry
20. Materials, metallurgy
21. Surface technology, coating
22. Micro-structural and nano-technology
23. Chemical engineering
24. Environmental technology

4. Mechanical engineering

25. Handling
26. Machine tools
27. Engines, pumps, turbines
28. Textile and paper machines
29. Other special machines
30. Thermal processes and apparatus
31. Mechanical elements
32. Transport

5. Other fields

33. Furniture, games
34. Other consumer goods
35. Civil engineering

Source: WIPO, 2011.

NOTES

73. Among the many initiatives discussing these issues there have been the Knowledge Networks and Markets (KNM) "*Expert Workshop on Patent Practice and Innovation*" organised at the OECD in May 2012, and the *Patent Quality Workshop* organised in May 2012 by the European Patent Office's (EPO) Economic and Scientific Advisory Board (ESAB), in which the OECD participated. The report of the EPO-ESAB workshop can be found at www.epo.org/about-us/office/esab/workshops.html
74. Non-practicing entities, also known as patent assertion entities, are firms that hold patents that they do not use in order to produce or "practice" (i.e. "non-practicing" or "non-competing" firms). See Geradin at al. (2012) for a discussion about non-practicing entities and their possible role as patent owners.
75. Annex 1 lists the technology fields considered, whereas a detailed list of the IPC classes contained in each technology field can be found at www.wipo.int/ipstats/en/statistics/patents/pdf/wipo_ipc_technology.pdf
76. Mariagrazia Squicciarini, Hélène Dernis & Chiara Criscuolo, "Measuring Patent Quality: Indicators of Technological and Economic Value," OECD Science, Technology and Industry Working Papers 2013/03, available at http://dx.doi.org/10.1787/5k4522wkw1r8-en.
77. The definition of scope in Matutes et al. (1996) differs from Lerner's (1994) and refers to both legal- and product-related aspects. In terms of product definition, scope refers to the type of protection granted to the innovator with respect to the possible uses of the basic technology.
78. The International Patent Classification provides for a hierarchical system for the classification of patents and utility models according to the areas of technology they pertain to. See www.wipo.int/classifications/ipc/en
79. The definition of scope adopted here is completely unrelated to the extent to which claims may be narrowly or broadly defined, as the word 'scope' may also seem to imply.
80. Harhoff et al. (2003) explicitly discuss this argument with patent lawyers and examiners and find them not to be supportive of it.
81. Lanjouw and Schankerman (2001a) investigate the cost of engaging in litigations over intellectual property assets and find that patents with more claims and more citations by subsequent patentees are substantially more likely to be involved in litigations. They suggest patent claims to be an indicator of the value of patents and of the technology or product "space" protected by the patent.
82. The term "inventive step" is predominantly used in Europe, while "non-obviousness" is predominantly used in the United States.
83. The familiarity trap refers to favouring familiar technological solutions over unfamiliar ones; the maturity trap refers to favouring mature technologies over emerging ones; the propinquity trap is a condition that relates to the originality of the technological solution used, and consists in trying to modify an available technology rather than focusing on novel solutions.
84. See OECD and EC-JRC 2008 manual on composite indicators for an exhaustive discussion.

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CHAPTER 3. APPROACHES TO THE PROTECTION OF TRADE SECRETS

This chapter takes stock of the protection of trade secrets in a sample of economies, taking into account the legal framework in each, including the scope, coverage and remedies available. To facilitate the stocktaking, the chapter develops an indicator of the stringency of trade secrets protection. The chapter therefore provides information and tools that are necessary to set up the following chapter, which uses the indicator to assess the economic performance implications of variations in the stringency of protection, with both qualitative and quantitative methods.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

ABSTRACT

This chapter takes stock of the available legal protection for trade secrets (undisclosed information) in a broad initial sample of countries. Drawing on national and international material, the chapter develops and presents an indicator of the stringency of protection of trade secrets (the Trade Secrets Protection Index) and provides an assessment of variation in the available protection. The result is a finding that while the sample countries have some similarities, notably with respect to definition and scope of trade secrets, they have many more substantial dissimilarities with respect to implementation of protection for trade secrets. For example, differences are particularly pronounced in evidence gathering and discovery, protection of trade secrets during litigation, technology transfer requirements and the effectiveness of legal systems with respect to enforcement. This diversity is reflected in the wide range of scores in the Trade Secrets Protection Index. Such variation in the stringency of protection for trade secrets may influence firm-level decision-making and may have implications for some aspects of economic performance (in particular, in relation to innovation).

EXECUTIVE SUMMARY

This background chapter takes stock of the available legal protection for trade secrets (undisclosed information) and presents a method for the assessment of the stringency of available protection. The objective is to better understand the nature of the protection and how it might vary across a broad initial sample of countries. This information will provide an essential input for the second phase of the project that considers the relationship of the stringency of trade secrets protection to relevant aspects of economic performance (Chapter 4).

The chapter prepares the foundation for the work by defining trade secrets and presenting the international framework. Trade secrets are defined, essentially, as concerning information that is secret, that has commercial value because of its status as secret, and that is the subject of reasonable efforts to protect the secrecy. This definition is in line with the approach presented in the World Trade Organization’s Agreement on Trade-Related Aspects of Intellectual Property Rights, the first multilateral agreement to require protection for trade secrets. The chapter then moves to consider the current economic and legal literature, which is fairly substantial in terms of legal scholarship but less complete with respect to economic analysis.

Using a structured comparative approach, the chapter examines national legal regimes for a diverse sample of countries (including the BRICS, five other partner countries and 11 OECD countries). Drawing on national and international material, the chapter develops and presents an indicator of the stringency of protection of trade secrets (the Trade Secrets Protection Index). The chapter provides a taxonomy of elements of protection for trade secrets, text tables describing the main characteristics of the regimes in the sample countries, and detailed narrative overviews for the trade secrets legal regimes in the BRICS and OECD countries in the sample.

The result of this assessment is a finding that while the sample countries have some similarities, notably with respect to definition and scope of trade secrets, they have many more substantial dissimilarities with respect to implementation of protection for trade secrets. For example, differences are particularly pronounced in evidence gathering and discovery, protection of trade secrets during litigation, technology transfer requirements and the effectiveness of legal systems with respect to enforcement, among other differences. This diversity is reflected in the wide range of scores in the preliminary Trade Secrets Protection Index. Such variation in the stringency of protection for trade secrets may influence firm-level decision-making and may have implications for some aspects of economic performance (in particular, in relation to innovation).

The next chapter expands the sample and focuses on economic analysis. It is based on dual approaches: a qualitative assessment and a quantitative assessment. Its objective is to examine empirically the relationship between the stringency of protection for trade secrets and performance concerning the types of economic indicators that may be hypothesised to be responsive to variation in protection of trade secrets. Such an assessment may help policy-makers in the identification of policy options for improved economic performance with respect to trade secrets.

Introduction

This background chapter takes stock of the available legal protection for trade secrets and presents a method for the assessment of the stringency of available protection. The objective is to better understand the nature of the protection and how it might vary across a broad initial sample of countries. This information will provide an essential input for the second phase of the project that will consider the relationship of the stringency of trade secrets protection to relevant aspects of economic performance.

The present chapter is structured around an introduction, five substantive sections, and a conclusion. In section 2, the chapter prepares the foundation for the work by defining trade secrets and presenting the international framework. It then moves to consider the current legal and economic literature. The following section presents an overview of the method employed in the analysis. Using a comparative approach, the fifth section of the chapter examines national legal regimes for the initial sample of countries. Drawing on the national and international material, the chapter proposes a set of elements for inclusion in an indicator of the stringency of protection of trade secrets. The subsequent section presents an implementation of this method for the sample countries. The conclusions provide some observations on the results and next steps[85].

The work has employed a sampling approach in order to gauge the variation in available trade secret protection. The sample of countries is structured to capture diversity in terms of: (1) approaches to protection of trade secrets (i.e. in terms of civil, criminal and common law), (2) geography (e.g. country location, size and endowments), (3) income level (upper middle and high income countries) and (4) country grouping (i.e. OECD or partner status). A further constraint was availability of data needed to conduct the research. The resulting sample covers the BRICS and five other partner countries plus a sample of 11 OECD countries, including: Australia, Brazil, Bulgaria, the People's Republic of China, Colombia, France, Germany, India, Israel, Italy, Japan, Korea, Malaysia, New Zealand, Peru, Russian Federation, Singapore, South Africa, Sweden, United Kingdom and United States. The chapter focuses on the situation in these countries for the most recent period available, generally 2010.

The International Framework and the Definition of Trade Secrets

The countries in the sample are all members of the World Trade Organization (WTO) and are subject to the provisions of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). The TRIPS Agreement was the first international agreement to protect trade secrets expressly (Box 3.1.). The approach laid out in the TRIPS Agreement is based on the notion that protection against unfair competition should include protection for undisclosed information. In presenting this approach, the TRIPS Agreement makes reference to the prior-existing protection against unfair competition as presented in the Paris Convention for the Protection of Industrial Property (Box 3.2.), a convention that is administered by the World Intellectual Property Organization.

Although trade secrets are confidential, they are also commercial. For a trade secret to have any practical value, the owner usually must share it in order to collaborate with a limited group of employees and business partners. Laws thus expect and account for a certain amount of protected disclosure, within a constrained circle. Nevertheless, even if trade secrets are not "secret" in the strictest sense of the term, they must in fact remain non-public and known only to a limited number of people. The definition of trade secrets thus is broadly similar among countries, addressing their dual nature as confidential but commercial.

Box 3.1. The TRIPS Agreement on Undisclosed Information

Protection of undisclosed information is addressed in Article 39 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO). This agreement entered into force on 1 January 1995 and established an international standard requiring WTO Members to protect undisclosed information including agricultural and pharmaceutical test data.

Section 7: Protection of Undisclosed Information, Article 39

1. In the course of ensuring effective protection against unfair competition as provided in Article 10bis of the Paris Convention (1967), Members shall protect undisclosed information in accordance with paragraph 2 and data submitted to governments or governmental agencies in accordance with paragraph 3[86].

2. Natural and legal persons shall have the possibility of preventing information lawfully within their control from being disclosed to, acquired by, or used by others without their consent in a manner contrary to honest commercial practices[87] so long as such information:

(a) is secret in the sense that it is not, as a body or in the precise configuration and assembly of its components, generally known among or readily accessible to persons within the circles that normally deal with the kind of information in question;

(b) has commercial value because it is secret; and

(c) has been subject to reasonable steps under the circumstances, by the person lawfully in control of the information, to keep it secret.

3. Members, when requiring, as a condition of approving the marketing of pharmaceutical or of agricultural chemical products which utilise new chemical entities, the submission of undisclosed test or other data, the origination of which involves a considerable effort, shall protect such data against unfair commercial use. In addition, Members shall protect such data against disclosure, except where necessary to protect the public, or unless steps are taken to ensure that the data are protected against unfair commercial use.

Source: Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), WTO.

The similarities among countries in defining trade secrets correspond well with the three requirements of Article 39 of TRIPS. In fact, on this matter, TRIPS reflected then-current practice in many countries and it has shaped subsequent law-making. In practice, the TRIPS requirements for trade secrets are now generally applied in law as follows:

- *Secrecy*. The information protected must actually be secret. Secrecy need not be absolute. The trade secret owner may share the information with employees and business partners. Secrecy requires instead that the information must not be readily publically accessible and that it is revealed to others only under conditions that maintain secrecy with respect to the broader public[88].

- *Commercial Value*. The information must have economic value as a result of its being secret. Trade secret law most typically protects commercial information; that information must derive some utility from being kept secret.

- *Reasonable Efforts to Maintain Secrecy*. The information must be the subject of reasonable efforts on the part of the rights holder to maintain its secrecy. By its nature, a trade secret claim arises when measures to protect the secret have failed. Thus, the law does not require one who claims a trade secret to be entirely successful at protecting it. However, the law does require the owner to make some efforts to maintain secrecy. In national laws, the necessary effort is often broadly described as "reasonable," in keeping with Article 39 of TRIPS. However, some countries impose more specific, additional obligations, which might be characterised as a particular implementation of the broad reasonableness requirement. For example, some common law countries require that the defendant have a contractual or implied obligation to keep the information secret. Other countries require written agreements with recipients and confidentiality notices.

These three conditions define trade secrets in a manner covering a potentially very large scope of economic activity[89]. Still, the resulting definition has potentially important practical implications as pointed out by Maskus (2000), who notes that trade secrets "are not protected against learning by fair means, such as independent creation, reverse engineering or reading public documents." In other words, trade secrecy does not provide an exclusive right to use of the information, so long as a second party obtains the information fairly or it enters the public domain by fair means. Thus, unlike patented inventions or copyright protected content, trade secrets are not protected for a statutory time limit and they can run out in the regular course of competition. The range of subject matter covered by trade secrets may be open-ended, though often trade secrets fall into one of two broad categories: technical information (e.g. technical plans and formulae) and confidential business information (e.g. customer lists and marketing strategies) (Almeling et al., 2010).

The TRIPS Agreement requires that WTO members put in place national systems to protect trade secrets against acts of unfair competition (Sandeen, 2011). WTO members comply with this obligation in a variety of ways. The fact that TRIPS Article 39 does not set forth a detailed regime for protection is associated with substantial variation between countries in the means employed to provide the TRIPS - mandated protection. In some instances, countries have implemented express legislation. In others, the obligation is met by laws that include misappropriation via such means as breach of contract, inducement of others to breach contracts and acquisition by third parties of information known to be disclosed dishonestly (or where it was negligent not to know). This variation can affect the ways businesses and workers conduct their affairs and thus there are reasons to believe that the legal protection of trade secrets may have important economic effects.

Box 3.2. Paris Convention for the Protection of Industrial Property, Articles 1 and 10*bis*, 1967[90]

In protecting Trade Secrets, the TRIPS Agreement references the protection provided in the Paris Convention against unfair competition. Article 10bis of the Paris Convention highlights the nature of protection against unfair competition. Article 1 of the Paris Convention is included here to provide context concerning what is meant by "union" (see article 1.1). Article 1 also defines the scope of industrial property originally covered, which the TRIPS Agreement extends by explicitly providing for protection of undisclosed information.

Selected articles of the Paris Convention

Article 1: Establishment of the Union; Scope of Industrial Property

(1) The countries to which this Convention applies constitute a Union for the protection of industrial property.

(2) The protection of industrial property has as its object patents, utility models, industrial designs, trademarks, service marks, trade names, indications of source or appellations of origin, and the repression of unfair competition.

(3) Industrial property shall be understood in the broadest sense and shall apply not only to industry and commerce proper, but likewise to agricultural and extractive industries and to all manufactured or natural products, for example, wines, grain, tobacco leaf, fruit, cattle, minerals, mineral waters, beer, flowers, and flour.

(4) Patents shall include the various kinds of industrial patents recognised by the laws of the countries of the Union, such as patents of importation, patents of improvement, patents and certificates of addition, etc.

Article 10bis: Unfair Competition

(1) The countries of the Union are bound to assure to nationals of such countries effective protection against unfair competition.

(2) Any act of competition contrary to honest practices in industrial or commercial matters constitutes an act of unfair competition.

(3) The following in particular shall be prohibited:

(i) all acts of such a nature as to create confusion by any means whatever with the establishment, the goods, or the industrial or commercial activities, of a competitor;

(ii) false allegations in the course of trade of such a nature as to discredit the establishment, the goods, or the industrial or commercial activities, of a competitor;

(iii) indications or allegations the use of which in the course of trade is liable to mislead the public as to the nature, the manufacturing process, the characteristics, the suitability for their purpose, or the quantity, of the goods.

Source: World Intellectual Property Organization.

Literature Review

The legal and economic literature on trade secrets is relatively limited in quantity and scope compared to the literature regarding other forms of intellectual property. The portions most relevant to this chapter fall into two categories: *i)* conceptual theories of trade secret law and *ii)* economic assessments regarding the effects of trade secret law.

The Conceptual Debate Regarding Trade Secret Law

There is a robust debate in the legal literature as to whether trade secret law is based on relational obligations (for example, contract, employment status, or fiduciary duty); property rights; fairness and equity; or unfair competition law tort or delict. A fifth position offered by Bone (1998) and characterised by Claeys (2011) as "trade secrecy nihilism" contends that trade secret law lacks any unified theory, but is rather a collection of approaches and norms regarding the protection of business information. Claeys (2011) and Risch (2007) survey this debate in the context of current US law, Richardson et al., (2012) examine the historical evolution and debate among various conceptions in the law of the England and other common law jurisdictions, while Knobel (2000) provides an example of the debate in the context of South African law, where trade secret protection is based on the ancient Roman Lex Aquilia. Views of the basis for trade secret protection vary both within and between countries. For example, Claeys (2011), in contrast to Bone (1998), contends that the proprietary account does the best job of explaining the structure of trade secret protection in the United States, including rights and remedies. By contrast, Gurry (2012) explains that under English law trade secrets are protected by an action for breach of confidence under a relationship-based view of trade secrecy.

The differing conceptions of trade secret law result from different normative and conceptual premises. The US Supreme Court observed, citing John Locke and Blackstone, that the "perception of trade secrets as property is consonant with a notion of 'property' that extends beyond land and tangible goods and includes the products of an individual's 'labour and invention.'"[91] The Court further observed that "[t]rade secrets have many of the characteristics of more tangible forms of property"[92]; in particular, the Court noted that they are alienable in various ways, which is a hallmark of property rights. Some scholars contend that trade secrets cannot be property because they do not provide exclusive rights against the world (Bone, 1998). However, Claeys describes trade secrets as simply a different form of property right, like water rights rather than rights in land (Claeys, 2013). In this conception, they are usufructory rights, which confer rights to use a resource and to be free from interference with use, but which do not confer the right to exclude those who derive benefits from the resource by their *independent* efforts. By contrast, some jurisdictions ground trade secret rights in duties between the parties. Thus, for example, UK trade secrecy law sanctions breaches of confidence where the information was imparted in confidence, thus giving rise to a duty (Gurry, 2012).

The answer to this debate regarding the conceptual basis for trade secret law can be consequential. For example, the US Supreme Court's conclusion that trade secrets are protected as property had the implication that the US Government's forcing of disclosure of such information may require compensation under the US Constitution. Whereas, most European countries do not conceive of trade secrets as property and, therefore, they are not subject to the EU Enforcement Directive, which is also significant. The Enforcement Directive provides for certain procedures and remedies that facilitate the investigation and pursuit of intellectual property claims, for example.

Economics and Trade Secret Law

Incentives

The economic literature describes the economic justification for trade secret law in terms of the incentives it provides. It describes three types of incentives. First, it provides incentives to invent and to invest in the development of valuable business information. Second, it relieves businesses of the need to invest in some costly measures to prevent breach of security. Third, it encourages businesses to engage in wider (albeit limited) dissemination of information than they otherwise would, thus increasing the likelihood of knowledge spillovers. Given the importance of trade secrets in many economies (Box 3.3.), the potential impacts of such incentives would appear to be significant.

A number of studies indicate that protection of trade secrets can encourage the development of inventions and valuable information by helping to secure the return on the investment in creating such innovations. Kitch (1980) characterises the incentive in terms of risk reduction: trade secrets are particularly at risk from theft because they have a low rate of depreciation. Friedman et al. (1991) similarly view the incentive effect as increasing the return to research and development by lowering the cost of protection. Others see the incentive function as similar to patents, where trade secrets essentially serve as a substitute for patents where the latter are unavailable or too expensive. Maskus (2000) and Friedman et al. (1991) argue that that trade secrets can substitute for patents and provide incentives to innovate, where: 1) an invention is unpatentable, but hard to imitate, such that there is value in keeping the information confidential (e.g. a customer list), 2) a firm may prefer to avoid the public disclosure required by a patent, and 3) where a firm may wish to avoid the cost of obtaining a patent. Still others see the incentive-to-invest arising from competitive effects. Lemley (2011) observes that protection of trade secrets can help innovators to maintain a competitive advantage such as might be obtained via a unique process of production or product; this can contribute to profitability and thereby provides incentives for further investment in innovation.

Some scholars critique the incentive-to-invest account. Risch (2007 and 2011) points out that trade secrets can only protect information that firms already can, and do, keep secret. They thus create no new ability to keep information secret. He argues that firms already have an incentive to invest in creating secret information. In this view, trade secret protection has a relatively small marginal effect on investment in research and development. They serve to assure firms that they may be able to secure an injunction to “rescue” a secret that that is threatened, stolen, or disclosed, or to secure damages. Bone (1998) also critiques the incentive-to-invest theory as overestimating benefits and underestimating the cost of keeping secrets.

Other studies point to a second justification for trade secrets, noting that the provision of adequate legal protection reduces the need to invest in inefficient and costly protection for trade secrets beyond the requirements of the law. As Friedman et al. (1991) observe, the availability of trade secret protection discourages use of less efficient alternative approaches to protection (e.g. hiring only family members or paying wage premia to prevent employee movement) and also inefficient activity by competitors to discover trade secrets (e.g. bribery or espionage). As Risch (2007) points out, both trade secret owners and competitors are channelled into more efficient behaviour. The owner optimises, rather than maximises, security. The competitor spends less money in attempting to appropriate the secret.

A third justification for trade secrets found in the literature relates, somewhat ironically, to their effects in encouraging knowledge dissemination, at least as compared to absolute secrecy. As Lemley (2011) argues, trade secret protection enlarges the circle of people to whom it is safe to reveal information. Thus employees who may eventually depart are more likely to have the opportunity to learn from the trade secret. Even if they do not misappropriate the original secret, they may benefit from their enhanced stock of knowledge, as may future employers. Risch (2007) also contends that the incentives to rely on legal rather than physical means to guard secrets encourage owners to employ lesser levels of protection, thus increasing the likelihood of “leakage,” and subsequently knowledge dissemination. In a further study, Png (2012a) found that some US states enacting increased trade secret protection may have experienced relatively modest declines in the mobility of postgraduate engineers and scientists (e.g. due to enforcement of contractual requirements concerning non-competition); this in turn might slow the pace spillover effects. However, this effect might be mitigated depending on presumptions states make related to possible disclosures (e.g. depending on whether they apply a doctrine of “inevitable disclosure”). Moreover, the possible costs to innovation due to any reduction in spillovers from reduced mobility of these most-qualified personnel may be off-set to some extent by the benefits to innovation from increased incentives to invest in R&D.

Box 3.3. References to the Economic Importance of Trade Secrets

While the secrecy requirements make it difficult to estimate the economic value of trade secrets, some indications are available from the literature[93]. Some estimates for the United States in the past decade, for example, put the annual cost of trade secret theft to US firms as high as USD 300 billion (Almeling et al., 2010). In a further example, interviews with members of the European Chemical Industry Council revealed that misappropriation of a trade secret or confidential business information could often entail a loss of revenue for a firm of up to 30% and sometimes much more (CEFIC, 2012). Clearly, businesses suffer when trade secrets are compromised. They risk potential losses to reputation, image, goodwill, competitive advantage, core technology and profitability (ASIS, 2007; Hogan Lovells, 2010; USTR, 2012).

This point is underscored in a recent EC-sponsored survey of 537 businesses in Europe (EC, 2013). Among survey respondents, 75% ranked trade secrets as "strategically important to their company's growth, competitiveness and innovative performance." This reliance on trade secrets applied to firms of all sizes including small and medium size enterprises. The main reason cited by business (52%) for use of trade secrets over other forms of intellectual property protection was to avoid public disclosure of valuable information. In many countries, the relative ease of use and lack of registration requirements for trade secrets have led innovative small and medium size enterprises to rely on trade secrets as the default mode of intellectual property protection (Brant and Lohse, 2013). Moreover, unlike copyright or patent protection, trade secret law is not a particularly technical body of law.

The growing importance of trade secrets is underscored by recent government initiatives to improve protection. For example, in 2012, the European Commission released an indicative roadmap for an initiative to improve protection of trade secrets and confidential business information from misappropriation and misuse by third parties[94]. In 2013, the United States released the "Administration Strategy on Mitigating the Theft of US Trade Secrets", which included a set of action items for improved protection domestically and internationally[95].

Patent Versus Trade Secrets Protection

There is an extensive body of literature on the trade-offs between patents and trade secrets at both the institutional and firm level. Pooley (1997, 2012 update, pp. 32-40), for example, offers advice to firms wishing to protect their intellectual assets in which he highlights differences in protection between patents and trade secrets. He notes that often the nature of the asset provides a clear indication of the appropriate protection. Patents generally offer protection for specific technological inventions that are useful, novel and non-obvious. The patent process can be time consuming and expensive, requiring public disclosure of the idea. But, within the bounds of strictly defined claims, once a patent is issued, it offers the prospect of market exclusivity for a specific period. Trade secret protection is generally available for a broad range of commercial information that is useful and not widely known, but need not be novel. The broad scope covers subject matter that may not be patentable such as know-how. Provided appropriate efforts are made to ensure secrecy, trade secrets offer the possibility of protection without a limitation on duration, though not against independent discovery by a competitor or inadvertent disclosure by the owner[96]. Nonetheless, in many instances the innovators seeking protection for an idea face a choice in the type of protection they will seek.

The choice of protection can have social welfare implications. On the one hand, as Friedman et al. (1991) point out, patents offer the social welfare advantage of encouraging disclosure with all the positive spillover effects that may result. On the other hand, Cugno and Ottoz (2006) offer a model where trade secrecy is more socially optimal, because of the independent invention defence, which exists at all times with respect to a trade secret, but is either limited or non-existent in patent law[97]. As a result, trade secret owners may have fewer opportunities to charge supra-competitive prices.

The empirical literature shows that firms tend to rely heavily on trade secrets. Arundel (2001) found that European firms tended to prefer trade secrets to patents, with the preference more pronounced among smaller firms. Cohen et al. (2000) found similar results in a survey of US firms. An econometric study by

Png (2012b) exploited variation among the laws of the US states and included construction of a simple index of trade secret protection. He found that between 1976 and 2006 US states that enacted trade secrets laws tended to experience increases in research and development expenditure (R&D) by high-tech and large manufacturing firms. At the same time, there was a tendency among such firms to reduce their reliance on patenting. Maskus (2012, p. 237) points out that trade secrets, in principle, can play an important role in developing countries where they offer a readily available form of protection for incremental innovation for which patents may not be available, financially viable or profit maximising.

Method

In order to pursue the economic analysis in the next phase of the present project, an indicator for the stringency of trade secrets protection is needed. The availability of such an indicator will permit comparisons of the stringency of trade secrets protection against relevant aspects of economic performance while controlling for other conditions. The strategy employed here is to take stock of the broad range of elements of legal protection for trade secrets, to consolidate this inventory into a list of elements that captures the key features of protection and that can generally be determined empirically, and then to compile an index based on these elements grouped into distinct components each representing a key aspect of protection. Rather than developing multiple indicators, a single index can offer the opportunity for various levels of analysis. The combined index score can be considered when an indicator of overall protection is appropriate or the index can be disaggregated into the key components for consideration of specific aspects of protection of trade secrets.

The analysis considers two sets of “elements” in order to gauge the variation in the available trade secrets protection and develop an index as a tool for use in the subsequent economic analysis. First, in order to determine the basic legal framework, the authors examined laws on the books and key cases that directly or indirectly relate to trade secret protection. This was done using the original laws, standard legal references and related expert commentary. Secondly, the functioning of the legal system was considered in relation to enforcement of trade secret protection in practice and in relation to alternative protection strategies. This was done via consideration of existing international indicators (e.g. available from World Economic Forum or Fraser Institute, among others), the academic literature, standard legal references and related expert commentary[98].

The research design for this project presented a preliminary list of candidates for each of the two sets of elements. The elements were chosen for three reasons: (1) the presence or absence of these elements could allow one to make meaningful statements about the stringency of rights with respect to trade secrets; (2) they could represent significant differences among the laws of various countries; and (3) they may plausibly have marginal effects on the costs faced by firms (e.g. with respect to necessary secrecy measures) or their innovation-related decisions (e.g. regarding foreign direct investment (FDI) or resources devoted to research). Certain of these elements are referenced in the TRIPS Agreement, such as the protection of undisclosed pharmaceutical or agricultural chemical test data submitted in relation to marketing approval (Article 39.3)[99]. However, it is not within the scope of this chapter to draw any specific assessment with respect to the TRIPS Agreement.

In implementing the research design, the preliminary list of elements was refined through an interactive process taking account of findings from our examination of the sample countries. The priority objective in this was to ensure coverage of key elements of the system of protection of trade secrets. Some new elements were added in this regard (e.g. with respect to availability of injunctions to eliminate wrongful head starts) and others were refined (e.g. the element for availability of emergency search to preserve and obtain proof was refined to take into account whether *ex parte* searches are available and who does them). Once coverage of key elements was ensured, a further consolidation of the elements was undertaken to avoid redundancy in the final set, to give particular focus to dimensions where there is variability between countries, and to ensure that internationally comparable information on the selected elements could be obtained via reasonable research efforts.

The research design takes the various legal means for protecting trade secrets and abstracts and generalises them into a set of common, comparable elements. The resulting elements are still recognisable, meaningful and useful descriptions of legal provisions, but they are no longer bound to the context of a particular legal system. When the researchers examined a country's laws, they identified and isolated these elements regardless of labels – any law that directly[100] addresses trade secrets is covered, regardless of whether it explicitly mentions "trade secrets" or undisclosed information and whether it exclusively addresses trade secrets (in many cases, labour laws, tort laws, unfair competition laws, criminal codes, and procedural codes were all relevant). The research also identified these elements without regard to where they were found – it examined all legal methods for protecting trade secrets, such as statutory law, common law, administrative remedies, and laws of general application. The key consideration was identifying an objective indication of whether the element existed in a country's laws and how it was implemented.

The methodology employed here allows for effective cross-country comparisons despite considerable differences among legal systems. As a long-standing tradition of comparative law scholarship recognises, it is possible to readily and clearly identify common points of law between countries despite very different legal systems[101,102]. The next section of this chapter surveys the situation for each country in the sample on the basis of the refined list of elements and considers similarities and points of divergence across the sample.

Survey of Legal Provisions and Practices

The results of the survey of legal provisions and practices are documented in *Annex 1: Country Charts and Preliminary Index Scoring* (Schultz & Lippoldt, 2014). The Annex presents results with respect to: source of law, definition and scope; covered acts; definition of duties and misappropriation; restrictions on liability; remedies; enforcement, investigation and discovery, and related regulations; and expert characterisation of the operation of the system in practice.

The survey of legal provisions confirms that there is great variation among approaches to trade secret protection. The laws of various countries are harmonised at a high level of generality only. The following discussion briefly surveys similarities and differences among the trade secret laws of various countries.

Similarities among Countries

As discussed in the Introduction, countries have similar definitions of trade secrecy due to the nature of trade secrets and the requirements of TRIPS. Beyond the similarities to the broad, three-part definition set forth in Article 39 of TRIPS, however, there are several other points of similarity among the trade secret laws of the countries surveyed in this chapter.

- *Scope*. The scope of trade secret protection, while not the same in every country, follows certain well-defined categories. These categories are (1) technical information; (2) confidential business information; and (3) know-how. Technical information typically includes industrial processes, blueprints, formulae, and similar information regarding technology. Confidential business information typically includes customer lists (at least to the extent they include truly non-public information), financial information, business plans and similar information regarding the operation of a business. Know-how includes information about methods, steps and processes for achieving efficient results. Most countries recognise the first two categories (although they often treat them the same).

Know-how is a term commonly used both in discussion of proprietary information and in agreements, but enjoys less formal recognition as a separate, defined category of trade secrets.

- *Defences.* Independent creation of a trade secret, where the defendant created a trade secret without access or reference to the plaintiff's trade secret, is explicitly or implicitly a universally recognised defence. Reverse engineering is also widely explicitly recognised as permissible and likely to be permissible in almost all cases.
- *Third Party Liability.* A third party that receives trade secrets with knowledge or reason to know that they were provided in violation of trade secret law is typically liable. Third parties that innocently and unknowingly receive trade secrets are less commonly liable, but they are still subject to injunctions in some jurisdictions.
- *Remedies.* Very broadly speaking, trade secret protection provides for civil remedies of injunctions and damages. However, this category is as much a source of variation as similarity and is thus discussed below. While the laws on the books provide for these remedies, they vary widely in specifics and practical availability.

Key Points of Divergence

As foreshadowed above, the lack of a comprehensive international standard results in substantial variation among the legal systems with respect to trade secrets. The points of divergence are more numerous than the points of similarity. The following are key points of divergence among the laws of the countries studied:

- *Civil vs. Criminal.* A basic point of variation is whether a country protects trade secrets primarily through civil law, criminal law, or both – or, in some cases, administrative law.
- *Scope.* The most commonly protected category of trade secret is technical information. Most countries also protect confidential business information, and typically do not distinguish it from technical information. This equal treatment of technical information and confidential business information, however, does not necessarily prevail in every country[103].
- *Duty.* Systems vary in how duties are imposed. In some instances, trade secret protection applies only where a defendant breaches a contractual or implied duty of confidentiality. In other instances, in addition to cases of breach of duty, trade secret law also applies where the secret was wrongfully obtained. In other instances, trade secrets are protected as intellectual property rights (IPRs). In those cases, the owner simply has exclusive rights to use them, without being required to show breach of duty or misappropriation, subject to the rights of others to independently develop or reverse engineer them.
- *Remedies.* Remedies vary widely in details and practical availability. One reason for the variance is that trade secret remedies tend to reflect national practice more than other intellectual property remedies, which have often been harmonised because of various international or transnational obligations, such as the European Union's Enforcement Directive. Thus, the types of damages available tend to depend largely on how the law of a particular country defines and awards damages. The availability of injunctive relief is partly a matter of national practice, but also a matter of the amount of proof required. Remedies such as seizure and return of materials are also typically matters of national law practice.

- *Evidence Gathering and Discovery.* Obtaining proof in trade secret cases is challenging. By their very nature, trade secrets constitute information that is not readily ascertainable and that can be hidden. Thus, evidence that a defendant has wrongfully obtained a trade secret may be similarly non-public and hidden. Moreover, a defendant may wish to keep trade secrets confidential for reasons other than legal liability – it too may wish to gain a commercial advantage against all competitors other than the original owner.

For these reasons, proof of trade secret theft is often solely or largely in the possession of the defendant and closely guarded. There is some danger that the defendant can effectively destroy such evidence if it becomes aware of a lawsuit. It also may be necessary to conduct an in-depth investigation to determine what was taken, how it was taken, by whom, and what has been done with it. These issues may not be readily apparent from easily accessible sources. It thus may be difficult to build a case without assembling documents, physical evidence, and conducting interviews.

Various references in the literature indicate that the ability to gather evidence in a trade secret case is crucial. Yet, the approaches vary widely among countries. This variation is largely a matter of national procedural law and practice in civil cases generally. On one end of the spectrum of discovery laws and practice is the United States, with its very broad disclosure rules and practice. These rules and practices make it easier to prove a case, but are often criticised as greatly increasing the expense and duration of litigation. Toward the other end of the spectrum are many civil law countries, where pre-trial discovery is limited, typically confined to documentary evidence, and done under the direct supervision of the court. At the furthest end of the spectrum may be China, which has extremely limited discovery, but where, according to experts, courts prefer original, documentary evidence to prove a case, which is very difficult to obtain without extensive discovery.

Another point of variation in evidence gathering rules and practices is the availability of a preliminary, emergency action to preserve proof. Many, but not all, countries have emergency, pre-trial procedures to preserve evidence. In their broadest forms, these procedures (often called “Anton Piller” orders after the English case from which many common law countries take their procedure) allow a party to obtain ex parte approval to conduct a search of a prospective (i.e. before a case begins) defendant’s premises and to seize relevant evidence.

Under the broadest form of this procedure, available in a limited number of countries, a plaintiff may obtain a search on an ex parte basis and send a representative to direct the search. Plaintiffs in trade secret cases value these features, as the lack of advance warning prevents a prospective defendant from concealing evidence. Also, the presence of plaintiff’s representative at the search makes it much more likely that the search finds relevant evidence because of the plaintiff’s expertise and detailed knowledge of the trade secret. However, these features are not available in most countries surveyed. In fact, several countries have no preliminary search procedure at all.

While the interest of a plaintiff in securing evidence may be key to many trade secret cases, several jurisdictions have moved to balance plaintiffs’ needs against defendants’ rights. The experience of the United Kingdom and other jurisdictions has raised concerns that a plaintiff may, ironically, use preliminary procedures to misappropriate a defendant’s secrets or interfere with its business (Andrews, 1987). Thus, authorities have clarified that courts should not grant such orders routinely. For example, the Chief Justice of the Australian Federal Court issued “Federal Court Practice Note No. 24—Search Orders (also known as “Anton Piller Orders”)” (5 May 2006) to curb perceived abuses of such orders.

- *Duty of Employees.* Employees are typically, but not everywhere, under an implied duty of confidentiality during the term of employment. Express agreements to keep information confidential are enforceable during the term of employment. There is wide variation as to what an employee’s duties are after termination of employment. Some jurisdictions will continue to impose an implied duty after the end of employment, but many will not. Many restrict enforcement of express contracts for confidentiality after employment as well. A typical restriction on both express and implied duties is that they do not apply to general skills and knowledge and cannot interfere with the employee's ability to make a living.

- *Non-Compete Agreements.* The enforceability of post-employment non-competition agreements varies widely[104]. Such is also the case with non-competition agreements between commercial entities. Most typically, they are enforceable only if reasonable with respect to duration and geographic scope. However, stricter regulation of enforceability, length, and scope is also the rule in some countries. Non-compete agreements between commercial entities are also subject to competition law. This chapter does not address competition regulation, as it does not appear to affect trade secret protection uniquely, but rather applies to commercial agreements generally.

- *Protection of Secrets during Litigation.* Trade secret litigation may expose the plaintiff's confidential information to security risks. First, the plaintiff needs to prove the existence of a trade secret. The evidence submitted may expose the secret. Second, proving that the defendant possesses the trade secret may require putting evidence on the record that further exposes the secret. Finally, the court may need to discuss aspects of the secret in its orders and opinions.

Laws and procedures can mitigate these risks from litigation. A court may hold hearings "in camera"—closed hearings open only to the parties, typically. The court may seal the record, thus blocking public access to it. The court might also physically secure evidence, such as by locking it in a safe. It may also restrict the access of the defendant and its personnel and agents to trade secrets (e.g., access might be limited to the lawyers on the case). Finally, a court may redact portions of its published opinions or choose not to publish the opinion at all.

From the commentary in the literature, it appears that the availability of these measures greatly affects the risk in bringing a trade secret action. Without sufficient protection, a lawsuit could leave a plaintiff worse off. A defendant may actually guard a trade secret, as it may confer an advantage over the defendant's and plaintiff's mutual competitors. Thus, the prospect of a trade secret lawsuit in a country with insecure court procedures could require a choice between not filing a suit and allowing a single competitor to exploit one's secret, and filing a suit and exposing the secret to all competitors.

Although litigation security measures appear important to effective trade secret protection, there is wide variation in the availability and effectiveness of such measures among countries. Some countries routinely provide in camera hearings, while others do not. There is also variation with respect to whether defendant and all of its agents have full access to the record.

- *Data Exclusivity.* Data exclusivity is a form of protection related to trade secret law. Data exclusivity provisions govern the use of data submitted for regulatory approval of chemicals – particularly pharmaceuticals and agricultural chemicals. There is a wide variance among countries in how they implement these regimes. Most countries reviewed in this chapter protect test data for new chemical entities from disclosure or from use by competitors seeking regulatory approval for their own products for a term of years after regulatory approval[105]. Some countries also protect data submitted to obtain approval for new uses (as opposed to entirely new products), but many do not.

- *Technology Transfer Regulations.* In the 1960s and 1970s, many countries adopted technology transfer laws regulating inbound technology licenses[106]. These laws were intended to ensure that foreign investors transferred know how to local enterprises and workers. They typically required registration of agreements and often gave regulatory agencies the power to disapprove substantive terms that interfered with technology transfer. Such provisions often affected trade secrets. For example, some provisions prohibited indefinite length confidentiality provisions. Others prohibited provisions that restricted the use of trade secrets after the expiration of the agreement or that required return of materials containing trade secrets.

This review highlights a number of fields of law as they relate to trade secrets protection. From this, it appears that *general legal system quality* may be particularly relevant in the case of trade secret protection across the countries surveyed. Although the quality of the legal systems varies widely between countries, it is a characteristic that plays an important role in trade secret protection. First, protection of trade secrets is often put into practice through generally applicable causes of action such as contract enforcement, labour law or tort actions. Reliable enforcement of contracts and property rights and the impartiality of the courts are thus important to a trade secret regime. Second, trade secret owners are particularly dependent on recourse to courts in the event of an appropriation because of the great vulnerability of trade secrets. Once widely disclosed, they are extinguished. Thus, a prospective developer or owner of a trade secret must be cognizant of how swift, reliable and predictable the courts are in case its own attempts to maintain secrecy are breached.

A Deeper Look at Countries in the Survey

The foregoing comparison based on the Annex 1 charts highlights the substantial diversity among the survey countries. In order to consider the origins of this diversity and its impact on the operations of the legal systems for protection of trade secrets, a more detailed examination is carried out for the BRICS and OECD countries. This is presented in Annex 2: *Detailed Overviews for the BRICS and a Sample of OECD Countries* (Schultz & Lippoldt, 2014). The narrative discussions in Annex 2 serve to give a rich and full sense of the issues that trade secret protection addresses and the common and diverse ways in which countries address them.

Based on the international comparisons in Annex 2, a hierarchy of trade secret challenges emerges which might be characterised as follows:

- *"Ordinary" Trade Secret Appropriation*. These problems result from departing employees or business partners taking information or from opportunistic competitors seizing an opportunity to illicitly obtain information.

- *Corporate Espionage*. These problems result from more systematic schemes by competitors to infiltrate a competitor's operations through such actions as planting employees, bribery or extensive infiltration of computer systems or electronic eavesdropping.

- *State Sponsored Corporate Espionage.* Increasingly, some governments are expressing grave concerns regarding government-sponsored systematic schemes to appropriate trade secrets.

Ordinary trade secret appropriation is typically addressed through civil enforcement. Evidence of the wrong is often in the possession of the trade secret owner or relatively easy to obtain. The laws of the countries surveyed all address the problem of departing employees and other parties who appropriate trade secrets by breaching contracts or other duties. This issue is typically addressed through a variety of means – trade secret law, breach of contract, and/or labour law. There is greater divergence in addressing the opportunistic behaviour of parties who do not have a prior relationship with the trade secret owner. Most typically, the law addresses such actions as misappropriation. Not all countries recognise an action for misappropriation. For example, common law jurisdictions take a relationship-based view of trade secrecy, and thus some, for example New Zealand and India, do not recognise a civil action for misappropriation.

The challenge of corporate espionage highlights the importance of criminal law for addressing difficult problems of gathering evidence. A much smaller number of countries in the sample offer criminal remedies. As the narratives show, where available, criminal law offers useful investigative tools against systematic espionage such as “sting” operations and large-scale, long-term operations that are beyond the means and authority of individual trade secret owners. In some jurisdictions, such as Germany, criminal remedies play an important role in supplementing the limited discovery available in civil cases.

Another point that emerges from the narratives in Annex 2 is that the stringency of trade secret protection in countries with relatively well-developed statutory protections can be undermined by specific requirements and implementation factors. For example, China and Russia have fairly well-defined legal protections, but the stringency of those protections is partly offset by weaknesses in implementation and additional, unusual evidentiary requirements. In other countries, including Brazil, stringency of the laws on the books is sometimes inconsistent with the approaches used in specific areas such as technology transfer or data exclusivity.

Trade Secret Protection Index

From the foregoing discussion, it is clear that there is significant variation in the available protection for trade secrets across this initial sample of countries. The next phase of this work, presented in Chapter 4, expands the sample and considers the relevance of such variation for certain aspects of economic performance, particularly those related to innovation. As noted above, in order to conduct a quantitative assessment of the relationship, it is useful to have an indicator for the stringency of available trade secrets protection. This section presents a preliminary version of an indicator developed for this purpose: the Trade Secrets Protection Index (TSPI).

The development of the TSPI proceeded based on several considerations. First, five components were designated as representing key aspects of protection of trade secrets that also emphasise features where there is some variation across countries that may influence the stringency of protection. Second, the relevant entries from the refined list of elements (i.e. from Annex 1) were grouped under the appropriate component heading. The elements were phrased to enable scoring based primarily on objective criteria, supplemented in some cases by qualitative information as necessary (e.g. in certain areas related to system operation). Third, in order to ensure coherence across the components, the authors opted for an integrated index approach rather than multiple indicators. (The TSPI can be disaggregated into its components if a focus on certain aspects is helpful for a particular discussion.) Fourth, the index was designed to emphasise transparency with scores supported by a text chart for each country and verifiable references. Fifth, the index is designed to provide an indication of the stringency of available protection; it aims to be neutral in this assessment. In other words, a higher or low score reflects the strength of protection and not an assessment of the appropriate level of protection.

It bears emphasis that the index’s function is descriptive, not normative, and the scores it produces are thus neither grades nor ratings. Rather, the score is strictly a measure of stringency of protection. As a measurement tool, the TSPI simply measures. Additional empirical work or subjective assessment will determine whether a particular measurement is associated with particular outcomes or should be assigned a particular adjective[107].

The initial implementation of the TSPI is for a single time period for the sample countries[108]. Econometrically, this will permit cross-sectional analysis. However, in future, subject to available resources, the index could be deepened to include multiple time periods and additional countries. This would permit use of more powerful econometric techniques for dynamic assessments based on panel data for a broader set of countries. Moreover, the dynamics of the protection for trade secrets could be compared with those for protection of other types of intellectual property (e.g. patents) in order to gain a more integrated view of their effects.

The development of this index is a pioneering effort in the analysis of protection of trade secrets. However, it should be noted that a variety of similar indices exist in the literature covering various types of intellectual property. For example, Ginarte and Park (1997) and Park (2008) employed laws-on-the-books approaches to examine protection of patents, trademarks and copyright. Also, the Fraser Institute (2012) and World Economic Forum (2012), among others, have developed substantial sets of relevant systemic indicators for use in economic analyses. Such indicators have been utilised in a number of studies conducted by the Working Party of the Trade Committee and other parts of OECD[109].

Index Composition

Chart 3.1. presents the detailed composition of the index and its scoring. The index is structured around five main components:

1. Definitions and coverage
2. Specific duties and misappropriation
3. Remedies and restrictions on liability
4. Enforcement, investigation & discovery; data exclusivity
5. System functioning and related regulation

The approach to scoring provides up to one point for each of the five main components of the index and a maximum total score for the index of five points. However, as can be seen in the Chart, the number of elements covered by each of the main components of the index varies widely. For example, the definition and coverage of trade secrets protection comprises 12 elements, whereas the system functioning and related regulation comprises 4 elements. In order to maintain balance across the five components of the index, the scoring for the various elements under each of the five main components was normalised to ensure equal weighting. In other words, the elements for each main component add up to a maximum score of one[110].

TSPI - Index Results

Table 3.1. presents – for the initial sample – the total scores by country according to various weighting schemes. The three weighting schemes are:

1. Equal weights across the components (20% each x 5);
2. 40% for Enforcement, investigation & discovery; data exclusivity and 60% split evenly among the other components; and
3. 40% Remedies and restrictions on liability and 60% split evenly among the other components.

Interestingly, the three weighting schemes yield similar country rankings as shown by the high scores for the Spearman rank correlation coefficients in the table. In other words, according to this indicator, the use of alternative weighting schemes does not substantially change the country rankings. Thus, in the absence of a compelling rationale for unequal weights, the authors have opted to employ equal weights[111].

Under the equal weights approach, the scores range from a low of 2.47 (Russia) to a high of 4.49 (United States). Figure 3.1. provides an overview of the scores across the countries covered in the sample for each of the TSPI components and for the TSPI as a whole. The OECD countries tend to have relatively high total scores, though partner countries such as Singapore and Malaysia have scores, respectively, falling within or just below the OECD range. Other developing countries, including Brazil, Colombia, South Africa and Peru, deliver total scores above 3.0. Four countries in the initial sample have total scores below 3.0: Bulgaria, China, Russian Federation and India.

A review of the scores for the individual components of the index (Figure 3.1) reveals different country rankings for each component, reflecting the variation in the manner countries construct and operate their trade secrets regimes. In particular, the component for “System functioning and related regulation” reveals a different mix of countries near the top of the rankings than for the total. For example, Sweden emerges as having the highest score among the European nations, whereas for some other components its relative score is lower. For certain other individual components of the index, countries such as Brazil, Bulgaria, Colombia and Singapore appear among the top 5 or 6 countries in the rankings. With the exception of Singapore, however, the total scores for these countries fall outside of the range for OECD country scores. This reflects weakness in their scores for certain other components of the TSPI.

The breakdown by component reflects the particularly low scores for the Russian Federation, Brazil and India with respect to system functioning and related regulation. This highlights implementation challenges faced by these countries. A number of OECD countries, as well as Singapore and South Africa, delivered relatively stringent protections in the handling of duties and misappropriation related to trade secrets. The United States’ high score was reinforced in part by relative strengths in the components referring to remedies and enforcement and related provisions[112].

The variation in the component scores highlights the different combinations of legal provisions and practices that countries exhibit to arrive at a given TSPI total score. The Spearman rank correlation is relatively high (0.828) between the scores for overall system functioning and the TSPI total scores. The Spearman rank correlation is also relatively high (0.719) between the scores for the component “specific duties and misappropriation” and the TSPI total scores. That is, country rankings are relatively consistent in the scores for these two components and the TSPI total scores. However, the country rankings vary significantly with respect to the other three components relative to their total scores. For example, a country without criminal statutes addressing trade secrets may have a low score in remedies, but strong scores for “specific duties and misappropriation” and “enforcement, investigation and coverage” and a relatively high TSPI total score. Another country, may have a similar TSPI total score, but arrive at that level via a higher score in “remedies and restrictions on liability” due in part to having criminal statutes addressing trade secrets.

Conclusions

Anchored by a review of a broad sample of countries, this international comparative examination of protection of trade secrets highlights the role played by the TRIPS Agreement Article 39 in orienting WTO Member countries in the basic definition and scope of trade secrets. At the same time it underscores the wide range of approaches employed by the sample countries in the implementation of their TRIPS obligations with respect to protection of trade secrets. This conclusion is supported by a structured empirical assessment of the legal regimes in the sample countries. One important contribution of this chapter is the presentation of the underlying information drawn from the Annexes of the underlying background paper and the taxonomy of trade secrets these materials embody. The charts and taxonomy provide a clear, objective point-by-point basis for making comparisons among countries.

From the review of the sample countries, some specific areas of divergence can be identified. For example, differences exist with respect to gathering of evidence, protection of trade secrets during litigation, technology transfer and effectiveness of enforcement via the legal systems. With respect to the procedures available for gathering evidence, some jurisdictions provide for emergency actions to preserve proof, but many do not. Furthermore, no two systems of discovery are quite the same, and many are quite weak. The ability to protect secrets during litigation also varies substantially between countries. Some developing countries, including several BRICS, have laws intended to facilitate technology transfer, which in some cases may cut across certain aspects of the ability to protect trade secrets. Moreover, across the sample of countries, variation in the effectiveness of the legal systems is likely to have significant effects on enforcement. Such diversity in protection of trade secrets can be reasonably expected to influence firm-level decision-making.

In anticipation of subsequent analysis in Chapter 4, this chapter presents results for a preliminary sample using a new indicator for assessing the stringency of available protection: The Trade Secrets Protection Index (TSPI). The diversity of approaches to protection in trade secrets across the sample countries is reflected in the scores for the TSPI, indicating that the stringency of protection for trade secrets also varies. This variation may matter materially for the operation of firms and, hence, may influence certain aspects of economic performance (in particular, in relation to innovation), topics that will be considered in the coming economic analysis.

Chart 3.1. Trade Secrets Protection Index

Components and scoring	Score range	Normalised score
1. Definition and Coverage	**0-13**	**0-1**
a) Scope		
• If scope covers all confidential business information, subject to: 1) deriving value from secrecy and 2) the owner's reasonable efforts to maintain secrecy, score = 1; If scope also subject to requirement that information is imparted to the recipient in confidence, score = ½	0,1	
b) Additional Elements of Definition		
• Inventory of trade secrets required (requirement=0; no requirement=1)	0,1	
• Must be reduced to writing (requirement=0; no requirement=1)	0,1	
• Must be identified as a trade secret to recipient (requirement=0; no requirement=1)	0,1	
• Written notice to recipient required (requirement=0; no requirement=1)	0,1	
c) Acts covered as civil infringement:		
• Breach of duty (not covered=0, partially covered=½[113], covered=1)	0,1	
• Wrongful acquisition or misappropriation (not covered=0, covered=1)	0,1	
• Third party liability for acquisition with knowledge or reason to know (not available=0, available=1)	0,1	
• Third party liability for acquisition without knowledge - enjoin "innocent parties" (not available=0, available=1)	0,1	
d) Acts covered by criminal law		
• Breach of duty (not covered=0, partially covered=½, covered=1)	0,1	
• Wrongful acquisition or misappropriation (not covered=0, covered=1)	0,1	
• Third party liability for acquisition with knowledge or reason to know (not available=0, available=1)	0,1	
• Third party liability for acquisition without knowledge, enjoin "innocent parties" (not available=0, available=1)	0,1	

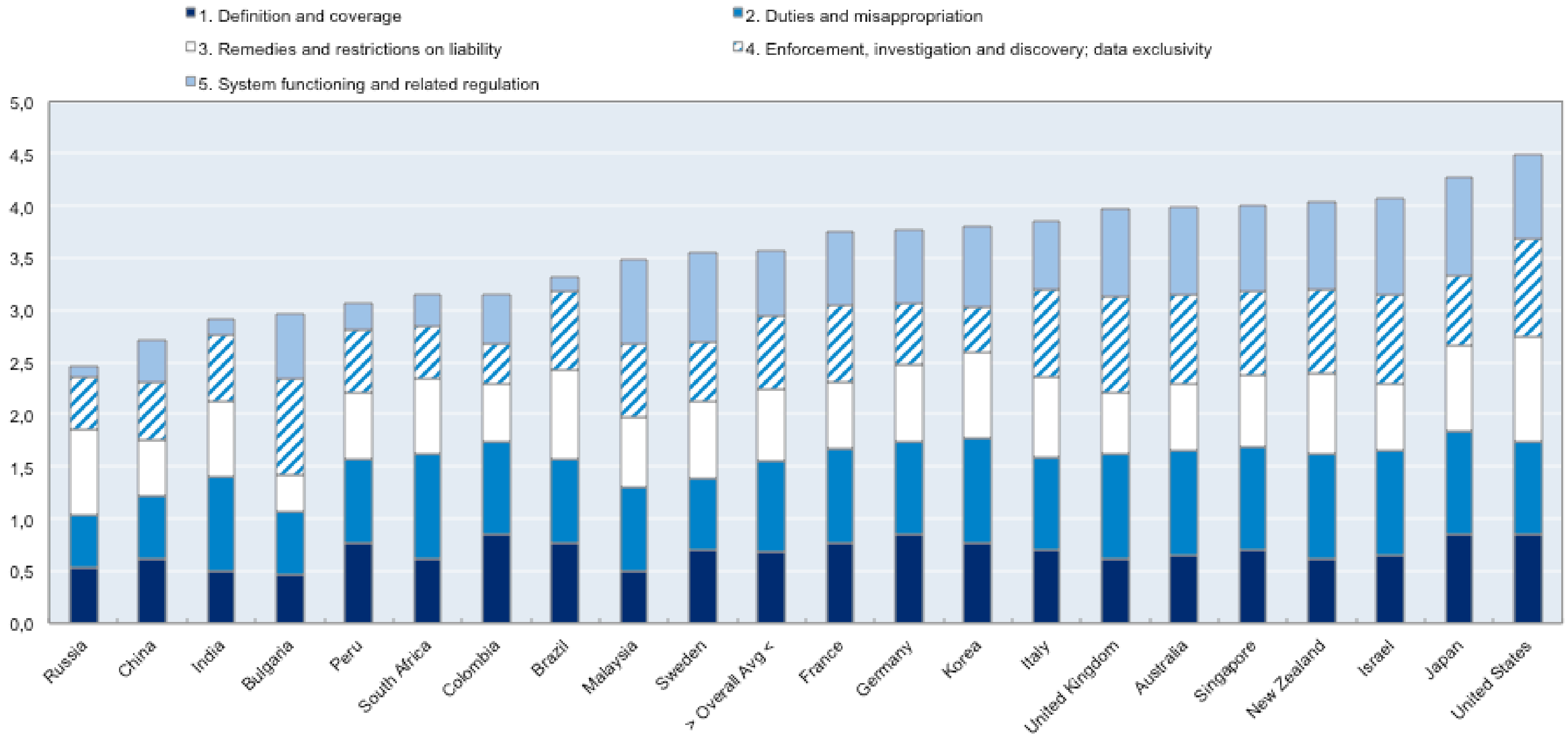
Chart 3.1. Trade Secrets Protection Index (continued)

Components and scoring	Score range	Normalised score
2. Specific duties and misappropriation[114]	**0-5**	**0-1**
• Commercial relationship (covered if arising from: express agreement ½ + implied duty ½)	0,1	
• Current employment relationship (covered if arising from: express agreement ½ + implied duty ½)	0,1	
• Past employment relationship (covered if arising from: express agreement ½ + implied duty ½)	0,1	
• Restrictions on post-relationship duty of confidentiality (if any restrictions on matters beyond general skills and knowledge, by relationship: commercial ½ + employment ½)	0,1	
• Validity of contractual restrictions on competition (if unenforceable=0, significant limitations=½ (e.g., limited by time or place for either commercial or post-employment situations), generally enforceable=1)	0,1	
3. Remedies and Restrictions on liability	**0-11**	**0-1**
a) Restrictions on liability		
• Additional elements of proof in infringement claims (if none: civil=½ + criminal=½, criminal ½ point; score 1 if there no criminal law and civil score is ½)	0,1	
b) Civil remedies		
• Preliminary injunction (if available = 1, if not = 0)	0,1	
• Ex parte action available under preliminary injunction (if available = 1, if not = 0)	0,1	
• Permanent injunction (if available = 1, if not = 0)	0,1	
• Injunction to eliminate wrongful head start (if available = 1, if not = 0)	0,1	
• Delivery or destruction of infringing materials (if available = 1, if not = 0)	0,1	
• Compensatory damages (direct or out of pocket damages or consideration of profits or other damages= 1)	0,1	
• Yielding of defendant's profits (if available = 1, if not = 0)	0,1	
• Availability of punitive or statutory damages (if available = 1, if not = 0)	0,1	
c) Criminal remedies		
• Fines, damages or loss of assets (if not available = 0, if minimal per expert opinion= ½, if substantial = 1)	0,1	
• Jail sentence (if available = 1, if not = 0)	0,1	

Chart 3.1. Trade Secrets Protection Index (continued)

Components and scoring	Score range	Normalised score
4. Enforcement, investigation and discovery; data exclusivity	**0-6**	**0-1**
a) Enforcement, investigation and discovery		
• Emergency search to preserve and obtain proof (unavailable=0, available but with significant restrictions= ½ (e.g., conducted solely by an official or 3rd party expert), readily available=1)	0,1	
• Ex parte emergency search availability (unavailable=0, available but with significant restrictions=½, readily available=1)	0,1	
• Pre-trial discovery (unavailable=0, documentary only or strict limitations = ½, ready availability of documentary and interrogatories = 1)	0,1	
• Protection of confidentiality of trade secrets in litigation (none=0, partial= ½, fully available=1)	0,1	
b) Data exclusivity		
• Drugs (years: 0=0; 0.1-3=1/3; 3.1-7.9=2/3; >8=1)	0,1	
• Agricultural chemicals (years: 0=0, 0.1-4.9=1/3, 5-8=2/3; > 8=1)	0,1	
5. System functioning and related regulation	**0-4**	**0-1**
• Technology transfer: registration requirement (none=1; one or more = 0)	0,1	
• Technology transfer: substantive review or regulation (none=1; one or more = 0)	0,1	
• Fraser Institute score for *Legal System and Security of Property* Rights (score ranging from 0 to 10, divided by 10)[115]	0,1	
• Expert characterisation of the operation of the protection in practice (NB, based on internationally recognised or peer-reviewed sources; see country charts for details) (Negative = 0; none = ½; positive = 1)	0,1	
		======
Index Total		**0-5**

Figure 3.1. Trade Secrets Protection Index, by component and country, 2010



Note: The data for this figure reflect updates prepared for Chapter 4 and therefore differ slightly from the results presented in the original background paper (Schultz and Lippoldt, 2014).

Table 3.1. Trade Secret Protection Index, Statistics and Total Scores, Alternate Weights, 2010

Country	Total Scores, by weighting scheme		
	Equal weights; 20% for each component	40% for Enforcement, investigation & discovery; data exclusivity; 60% divided equally among the other components	40% for Remedies and restrictions on liability; 60% divided equally among the other components
Australia	3,99	4,07	3,79
Brazil	3,31	3,42	3,56
Bulgaria	2,96	3,37	2,68
China	2,71	2,72	2,71
Colombia	3,15	2,84	3,04
France	3,76	3,75	3,61
Germany	3,76	3,55	3,73
India	2,92	2,99	3,10
Israel	4,08	4,13	3,85
Italy	3,85	3,93	3,85
Japan	4,27	4,04	4,22
Korea	3,81	3,41	3,88
Malaysia	3,48	3,48	3,46
New Zealand	4,04	4,04	4,00
Peru	3,06	3,06	3,09
Russian Federation	2,47	2,48	2,87
Singapore	4,00	4,01	3,86
South Africa	3,14	2,98	3,27
Sweden	3,56	3,40	3,58
United Kingdom	3,97	4,12	3,71
United States	4,49	4,55	4,62
Average Score	3,56	3,54	3,55
Max	4,49	4,55	4,62
Median	3,76	3,48	3,61
Min	2,47	2,48	2,68
Standard Deviation	0,55	0,55	0,50
Coefficient of Variation	0,15	0,16	0,14
Correlation Coefficient (equal weight scores versus alternate schemes)		0,949	0,950
Spearman Rank Correlation (equal weight ranking versus alternate schemes)		0,930	0,939

Note: The data for this figure reflect updates prepared for Chapter 4 and therefore differ slightly from the results presented in the original background paper (Schultz and Lippoldt, 2014).

NOTES

85 This chapter is based on OECD Trade Policy Paper No. 162 (Schultz & Lippoldt, 2014). There are two substantial annexes available in the original edition. Annex 1 provides a snapshot of the key elements of trade secret protection in each of the sample countries. Annex 2 provides a detailed overview of trade secrets protection in the BRICS and OECD countries covered by the sample.

86 These paragraph references refer to paragraphs 2 and 3 of Article 39 of the TRIPS Agreement.

87 At this point in the original text, there is a footnote, numbered 10, that states:
For the purpose of this provision, “a manner contrary to honest commercial practices” shall mean at least practices such as breach of contract, breach of confidence and inducement to breach, and includes the acquisition of undisclosed information by third parties who knew, or were grossly negligent in failing to know, that such practices were involved in the acquisition.

88 Moreover, as Pooley (1997) notes, the idea need not be unique to its owner. Several competitors could have developed the same idea via independent innovation and sought to protect it as a trade secret. This possibility is one factor differentiating trade secrets from patents.

89 For descriptive convenience this chapter will employ the term “trade secrets” as encompassing “undisclosed information.”

90 The Paris Convention entered into force on 26 April 1970. These articles remained unchanged in the subsequent edition of the Paris Convention (1979).

91 Ruckelshaus v. Monsanto Co., 467 U.S. 986, 1002-1003 (1984).

92 *Ibid*.

93 For example, barriers to accurate quantification include issues such as lack of internationally-standardised valuation methodology for undisclosed information and reluctance of many firms to identify publicly the value of their secret assets.

94 The roadmap is available on-line at the following location (as of 3 April 2013):
http://ec.europa.eu/governance/impact/planned_ia/docs/2013_markt_002_trade_secrets_en.pdf.

95 This strategy is available on-line at the following location (as of 3 April 2013):
http://www.whitehouse.gov/sites/default/files/omb/IPEC/admin_strategy_on_mitigating_the_theft_of_u.s._trade_secrets.pdf.

96 Pooley (1997, 2012 update, p. 34) notes contrasts between patents and trade secrets with respect to subject matter, requirements, definition, disclosure, protection, duration, expense, risk and marketability. He also points out (ibid, p. 40) that depending on the nature of the innovation the choice between copyright and trade secret protection may be easier for innovators: copyright protects only the form of expression of your ideas, whereas trade secrets protection extends to the idea itself.

97 The United States recently incorporated a prior user rights defence into its patent law with the passage of the America Invents Act in 35 U.S.C. § 273, which may provide protection to independent inventors in certain, limited circumstances. However, independent invention after the date that a patent is filed never constitutes a defence.

98 Litigation statistics are not covered directly in the proposed assessment. This is in part due to lack of readily-available information for many countries. For example, while US legal records are searchable via systems such as Pacer or Lexis, the coverage of such systems varies significantly across countries around the world. Many countries do not have the capacity to provide ready on-line access to court case information. This would be a practical limit on the ability to ensure extensive geographic coverage for purposes of the present study. In addition, litigation statistics present difficulties in interpretation related

to institutional context. For example, without additional contextual information, it may not be clear whether a low number of cases indicates that compliance is high, enforcement is lax or another factor is driving developments. Thus, such an assessment could prove resource intensive to implement. While in principle a review of legal case outcomes has the potential to yield new insights into court-related aspects of trade secret enforcement, such an approach was determined to exceed the scope of the present analysis.

99 The various elements of trade secrets protection retained for the present analysis are characterised individually and in combination. In the discussion and annexes for this report, data on the various elements are reported and may be employed for further analyses either separately or in various alternative combinations.

100 Laws that only incidentally sanction trade secret theft were not covered. For example, theft, breaking and entering, trespass, extortion, battery and other wrongful acts may be committed in the course of appropriating trade secrets, and various laws sanction such acts. However, such laws are only relevant where they sanction such acts *because* they involve trade secrets. For example, this project would not account for a law that imposes liability for the theft of a sheet of paper if that law does not address the existence or value of the trade secret printed on that piece of paper.

101 For example, common law jurisprudence may contain definitions and standards that are as clear, precise and well-established as those in civil codes. Courts in several common law countries consistently cite and apply a three factor definition of trade secrecy established in the English case of Coco v. A.N. Clark Eng'rs Ltd., [1969] RPC 41: “First, the information must itself … must ‘have the necessary quality of confidence about it.’ Secondly, that information must have been imparted in circumstances importing an obligation of confidence. Thirdly, there must be an unauthorised use of that information to the detriment of the party communicating it.” See Annex 1 and Annex 2 of Schultz & Lippoldt (2014) for further details.

102 In another example, civil law systems may evolve approaches to a new problem as clearly and readily as do common law systems. For example, since 2000 French courts have increasingly extended the offense of “breach of trust” under Article 314-1 of the French Criminal Code to cover intangible information, thus allowing the prosecution of employees and others for trade secret misappropriation. See Christophe Garin, “Customer poaching can now be punished by criminal courts on the ground of breach of trust,” Lexology (24 May 2012) at: www.lexology.com/library/detail.aspx?g=e11830fd-5222-4084-afdd-a160047f2fec . See Annex 2 of Schultz & Lippoldt (2014) for further details.

103 For example, specific provisions of French criminal law sanction the disclosure of technical information by employees and managers, but not confidential business information. However, in recent years generally-applicable provisions of French criminal law have been used to prosecute the disclosure and misappropriation of confidential business information, so the distinction may be fading in this particular instance.

104 The OECD has also considered this issue in the context of knowledge networks and markets. For example, a paper on *Knowledge Flows and the Mobility of Skilled Employees: An International Perspective on the Role of Non-Compete Agreements and their Legal Enforcement* examined these issues in 2012 [DSTI/EAS/STP/NESTI/TIP(2012)10, Fernando Galindo-Rueda].

105 While there is some variation among countries in the specifics of such protection, in the case of agricultural chemicals many developed countries have established minimum effective terms of five to ten years.

106 For a comprehensive, recent review of these laws, see Padmashree Gehl Sampath and Pedro Roffe, “Unpacking the International Technology Transfer Debate: Fifty Years and Beyond,” *ICTSD Working Paper* (June 2012), available at: http://ictsd.org/downloads/2012/07/unpacking-the-international-technology-transfer-debate-fifty-years-and-beyond.pdf (as of 15 August 2013).

107 The index avoids summative descriptive assessments such as whether protection is “comprehensive” or “well-established.” The accumulation of elements and the resulting score speaks to such issues more precisely than any subjective assessment, and does so in a replicable, generalisable manner.

108 Due to a lack of recent-period data for some countries, 2010 is the most recent year covered by this iteration of the TSPI. Therefore, please note that events may occur subsequent to the period covered here.

There is an on-going court case in Europe, for example, that has potential implications for certain aspects of the balance of rights between protection of commercially sensitive information submitted to public authorities and access to information relevant to environmental concerns. See Judgment of the General Court of the European Union, Case T-545/11, Stichting Greenpeace Nederland and PAN Europe v European Commission (8 October 2013).

109 Several Trade Committee studies considered policies for protection of intellectual property rights in relation to relevant economic performance indicators. OLIS references include: TD/TC/WP(2003)10/FINAL, TD/TC/WP(2004)31/FINAL, TAD/TC/WP(2007)19/FINAL and TAD/TC/WP(2010)12/FINAL. Subsequent OECD *Trade Policy Working Papers* were published as: Park and Lippoldt (2003); Park and Lippoldt (2005); Park and Lippoldt (2008); and Cavazos, Lippoldt and Senft (2010).

110 For example, component 4 *Enforcement, investigation and discovery; data exclusivity* is comprised of six elements. The value for the component 4 score can range from 0 to one. In the final calculation of the score for the overall component, the scores for any given element would be no more than 1/6 of one point. This would be the case, for example, for data exclusivity for drugs or data exclusivity for agricultural chemicals (each would contribute no more than 1/6 of one point to the component score).

111 A similar weighting approach and rational was employed by Ginarte and Park in developing their widely-cited Patent Rights Index. See Ginarte and Park (1997, pp. 288-89) for their discussion of weighting considerations.

112 Annex Table A1 (Annex 1) in Schultz & Lippoldt (2014) provides the detailed scoring for each element and component of the index for each country. In the event a user would like to consider alternative approaches to constructing indicators, these data will provide the essential building blocks (e.g., for recombining various elements or reweighting the components).

113 E.g. the duty of confidentiality might be imposed on employees, fiduciaries and third parties with access to information. Partial coverage might arise if under a country's legal regime licensees cannot be covered.

114 The treatment of duties is split within this framework. General coverage of duties is scored under index component 1 (Definitions & Coverage). Component 2 responds to the availability of recourse for specific duties. This permits a detailed assessment, ensuring the indicator responds to variation in key elements.

115 The Fraser Institute (2012, pp. 3 and 273-5) score for *Legal System and Security of Property Rights* is a composite indicator produced annually. Scores can range from 0 to 10. Based on objective indicators and expert assessments, it takes into account judicial independence, impartiality of courts, protection of property rights, military interference in the rule of law and politics, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, reliability of the police and business costs of crime. For details see Annex 1 of the original report (Schultz and Lippoldt, 2014) and www.freetheworld.com/reports.html.

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This annotated reference list reviews the main material from the legal and economic literature on trade secrets. The OECD team has added annotations based on their assessments: key articles are marked with an asterisk (*) and many of the references have comments in italics on the nature or utility of the item. Appended to the references from the literature is a reference listing of key laws and precedent.

Overview: Literature References

This initial scan of the literature found that the economic literature on trade secrets is relatively limited in quantity and scope. It largely falls into three categories: *i)* fundamental economic theories of trade secret law*; ii)* theoretical and empirical examination of the trade-offs between patent and trade secret protection; and *iii)* theoretical and empirical examination of how trade secrecy protection affects firm structure and employee relationships. The legal literature is more expansive in terms of quantity, although much of it is somewhat distant for the purposes of the present project with respect to assessment of economic implications. Also, the United States legal regime for trade secrets is disproportionately represented in the literature.

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SELECTED LAWS AND PRECEDENT

This section lists the most significant statutes governing trade secrets in the jurisdictions conveyed. In the case of common law jurisdictions with few or no statutes governing trade secrets, this listing contains citations to significant cases.

Australia

Statutes

- Australia Therapeutic Goods Act 1989
- Agricultural and Veterinary Chemicals Code Act 1994

Cases

- Coco v. A.N. Clark (Engineers) Ltd. [1969] RPC 41 (English law)
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Brazil

Statutes

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China

Statutes

- Article 10, Unfair Competition Law of the People’s Republic of China (promulgated by the Standing Comm. Nat’l People’s Cong., Sept. 2, 1993, effective Sept. 2, 1993
- Article 22 of the Labour Law
- Article 43 of the Contract Law

France

Statutes

- Article L. 621-1 of the Intellectual Property Code
- Article L. 1227-1 of the Labour Code
- Article 1392 of the Civil Code
- Article 226-13 of the Criminal Code
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Germany

Statutes

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India

Statutes

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Cases

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Israel

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Italy

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Japan

Statutes

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New Zealand

Statutes

- Section 230(2) of the Crimes Act 1961

Cases

- AB Consol. Ltd. v. Europe Strength Food Co. Pty. Ltd., [1978] 2 NZLR 515
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- SSC&B: Lintas New Zealand Ltd. v. Murphy & Anor, (1986) 3 NZCLC 99,546

Republic of Korea

Statutes

- Trade Secrets Act, Article 1, Para. 2.

Russia

Statutes

- Civil Code Article 1465 (2011)
- Civil Code Article 1466(2) (2011)
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South Africa

Cases

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Sweden

Statutes

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United Kingdom

Cases

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- House of Lords in Herbert Morris, Ltd. v. Saxelby, [1916] 1 AC 688
- Mustad v. Allcock and Dosen, [1963] 3 All ER 416
- Saltman Engineering Co. v. Campbell Engineering Co. Ltd. [1948] 65 RPC 203

United States

Statutes

- Espionage Act of 1996, as amended: 18 USC § 1831 and § 1832
- EPA Pesticide Registration Manual, Chapter 10 (2010),
- www.epa.gov/pesticides/bluebook/chapter10.html
- First Restatement of Torts § 737 (1939)
- Uniform Trade Secrets Act Section 1, available at:
- www.uniformlaws.org/shared/docs/trade%20secrets/utsa_final_85.pdf

ANNEXES

Due to the annexes' length, which extends to several hundred pages, interested readers are referred to the original version of this chapter, which is an OECD Trade Policy Working Paper (Schultz & Lippoldt, 2014), available at http://dx.doi.org/10.1787/5jz9z43w0jnw-en.

CHAPTER 4. AN EMPIRICAL ASSESSMENT OF THE ECONOMIC IMPLICATIONS OF PROTECTION FOR TRADE SECRETS

In this chapter, the indicator developed in Chapter 3 is used to assess the economic implications of variations in the stringency of protection in a larger sample of economies over an expanded time horizon. The assessment is based on dual approaches, one qualitative and one quantitative. This work – the first of its kind ever to be carried out with respect to trade secrets – delivers new insights on the importance of trade secrets protection to economic performance, including innovation and growth. Most importantly, the assessment leads to the finding that the stringency of trade secrets protection is positively related to indicators of innovation. The work also shows that the stringency of trade secrets protection grew substantially in the sample economies between 1985 and 2010.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

ABSTRACT

This chapter takes stock of the protection of trade secrets for a sample of 37 countries, provides historical data for the period since 1985, and considers the relationship of the stringency of the protection of trade secrets to relevant economic performance indicators. The chapter finds that there has been a notable increase in the stringency of trade secrets protection in a broad sample of countries during the period from 1985 to 2010. The chapter also finds a positive association between the stringency of trade secrets protection and key indicators of innovation and international economic flows. Further details of the methodology and additional country data can be found in the original version of chapter 3, which is an OECD Trade Policy Working Paper, available at http://dx.doi.org/10.1787/5jz9z43w0jnw-en.

EXECUTIVE SUMMARY

This chapter takes stock of the protection of trade secrets for a sample of 37 countries, provides historical data for the period since 1985, and considers the relationship of the stringency of the protection of trade secrets to relevant economic performance indicators. The chapter is structured around two main approaches: a qualitative assessment of relevant economic performance issues drawing on the literature and a quantitative assessment of the relationship between the Trade Secrets Protection Index and indicators of economic performance. The study employs the methodology for assessment of the stringency of trade secrets protection that was developed in chapter 3.

The assessment of the stringency of trade secrets protection across a broad sample of countries in recent decades found substantial variation between countries at specific points in time and in protection regimes of specific countries over time. The qualitative assessment then considered a number of potential areas where variation in trade secrets protection could influence economic performance. These included economic incentives for innovation, labour mobility, spillover effects and technological diffusion. The empirical assessment found that the stringency of protection in the developed countries rose in particular during the 1990s and then stabilised, while developing countries on average tended to rise throughout the entire study period. The quantitative assessment of the relationship of this increased stringency of protection to indicators of economic performance found a tendency for there to be a positive relationship. This includes indicators of innovation inputs and international economic flows of investment and trade. Through such relationships, trade secrets protection may have implications for developments in domestic innovation, international technology transfer and access to technology-intensive inputs and related products.

These findings represent a first step in the assessment of trade secrets protection. However, it should be noted that the relationships highlighted here reflect association but not necessarily causality. It is also necessary to note that the relationships identified in the empirical assessment apply to a specific sample during a specific time period and a certain range of variation. This does not mean that ever stronger protection, for example, will yield similar results. Nonetheless, the positive and statistically significant relationships identified do provide an indication that provision of adequate protection of trade secrets may be an appropriate element of a policy framework supporting certain key aspects of economic performance. Further research could contribute to confirming these findings and exploring the effects of trade secrets protection at sectoral and firm level.

Introduction

This chapter takes stock of the protection of trade secrets for a sample of 37 countries, provides historical data for the period since 1985, and considers the relationship of the stringency of the protection of trade secrets to relevant economic performance indicators. The paper is structured around two main approaches: a qualitative assessment of relevant economic performance issues drawing on the literature and a quantitative assessment of the relationship between the *Trade Secrets Protection Index* and indicators of economic performance. The study employs the methodology for assessment of the stringency of trade secrets protection that was developed in chapter 3. The chapter begins with an overview of the international framework for protection of trade secrets. It then provides sections treating each of the main themes in turn. The conclusions highlight policy relevant findings with respect to the implications of the stringency of protection available for trade secrets.

Overview: International Framework for Protection of Trade Secrets

The World Trade Organisation's (WTO) *Agreement on Trade-Related Aspects of Intellectual Property Rights* (TRIPS) Agreement was the first multilateral agreement to directly address trade secrets protection (Box 4.1.). The approach laid out in the TRIPS Agreement is based on the notion that protection against unfair competition should include protection for undisclosed information[116]. In presenting this approach, the TRIPS Agreement makes reference to the prior-existing protection against unfair competition as presented in the Paris Convention for the Protection of Industrial Property (1967), a convention that is administered by the World Intellectual Property Organization[117].

Guided by the provisions of Article 39 of the TRIPS agreement, the definition of trade secrets has tended to converge across the countries considered in this assessment. As noted in Chapter 3, definitions generally recognise a trade secret as information that is secret, has commercial value as a result, and is subject to reasonable efforts to maintain the secrecy. The concepts tend to be applied as follows:

- *Secrecy.* The information protected must actually be secret. Secrecy need not be absolute. Secrecy requires that the information must not be readily publically accessible and that it is revealed to others only under conditions that maintain secrecy with respect to the broader public[118].Thus, the trade secret owner may share the information with employees and business partners.
- *Commercial Value.* The information must have economic value as a result of its being secret and must derive some utility from being kept secret.
- *Reasonable Efforts to Maintain Secrecy.* The information must be the subject of reasonable efforts on the part of the rights holder to maintain its secrecy. By its nature, a trade secret claim arises when measures to protect the secret have failed. Thus, the law tends not to require one who claims a trade secret to be entirely successful at protecting it. In national laws, the necessary effort is often broadly described as "reasonable," in keeping with Article 39 of TRIPS[119].

Here is it important to note that trade secrecy does not provide an exclusive right to use of the information, provided that the second party obtains the information fairly or it enters the public domain by fair means. Thus, unlike patented inventions or copyright protected content, trade secrets are not protected for a statutory time limit and they can run out in the regular course of competition.

The scope of trade secret protection varies somewhat by country, but broadly concerns three categories of information: 1) technical information; 2) confidential business information; and 3) know-how. Technical information typically includes industrial processes, blueprints, formulae and similar information regarding technology. Confidential business information typically includes customer lists (in cases where they include truly non-public information), financial information, business plans and similar information regarding the operation of a business. Know-how includes information about methods, steps and processes for achieving efficient results. Most countries recognise the first two categories, often without differentiating them. Know-how is a term commonly used both in discussion of proprietary information and in agreements, but it enjoys less formal recognition as a separate, defined category of trade secrets.

As can be seen from Box 4.1., the TRIPS Agreement does not provide much guidance on the specifics of the national systems to be put in place to protect trade secrets. Consequently, countries employ a broad range of means to provide the TRIPS-mandated protection. In some instances, countries have implemented express legislation. In others, the obligation is met by laws that include misappropriation via such means as breach of contract, inducement of others to breach contracts and acquisition by third parties of information known to be disclosed dishonestly or where it was negligent not to know. This variation in means can affect the ways businesses and workers conduct their affairs and thus there are reasons to believe that the legal protection of trade secrets may have important economic effects.

Box 4.1. The TRIPS Agreement on Undisclosed Information

Protection of undisclosed information is addressed in Article 39 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO). This agreement entered into force on 1 January 1995 and established an international standard requiring WTO Members to protect undisclosed information including agricultural and pharmaceutical test data.

Section 7: Protection of Undisclosed Information, Article 39
[of the TRIPS Agreement]

1. In the course of ensuring effective protection against unfair competition as provided in Article 10bis of the Paris Convention (1967), Members shall protect undisclosed information in accordance with paragraph 2 and data submitted to governments or governmental agencies in accordance with paragraph 3.[1]

2. Natural and legal persons shall have the possibility of preventing information lawfully within their control from being disclosed to, acquired by, or used by others without their consent in a manner contrary to honest commercial practices[2] so long as such information:

(a) is secret in the sense that it is not, as a body or in the precise configuration and assembly of its components, generally known among or readily accessible to persons within the circles that normally deal with the kind of information in question;

(b) has commercial value because it is secret; and

(c) has been subject to reasonable steps under the circumstances, by the person lawfully in control of the information, to keep it secret.

3. Members, when requiring, as a condition of approving the marketing of pharmaceutical or of agricultural chemical products which utilize new chemical entities, the submission of undisclosed test or other data, the origination of which involves a considerable effort, shall protect such data against unfair commercial use. In addition, Members shall protect such data against disclosure, except where necessary to protect the public, or unless steps are taken to ensure that the data are protected against unfair commercial use.

Footnotes:

1. These paragraph references refer to paragraphs 2 and 3 of Article 39 of the TRIPS Agreement.
2. At this point in the original text, there is a footnote, numbered 10, that states:
   For the purpose of this provision, “a manner contrary to honest commercial practices” shall mean at least practices such as breach of contract, breach of confidence and inducement to breach, and includes the acquisition of undisclosed information by third parties who knew, or were grossly negligent in failing to know, that such practices were involved in the acquisition.

Source: Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), WTO.

Qualitative Assessment

This qualitative assessment is based on key themes emerging from the economic and business literature and available statistics on the issue of trade secrets protection. It describes the theoretical and perceived role of trade secrets in economic performance and innovation. Information on firm-level impacts is included, including with respect to small and medium size firms (SMEs) and start-ups. The relationship to national economic development is also considered. The evidence highlights the value of trade secrets, as well as the scope and nature of trade secret theft and misappropriation among competing firms.

Previous theoretical work points to several ways in which trade secret protection may incentivise investment in research and development (R&D) as well as the creation of commercially valuable information. First, such protection may increase the appropriability of the results from investment in the development of technical and confidential business information. It does this by deterring employees, business partners and third parties from misappropriating or misusing specific information meeting the trade secrets criteria. Kitch (1980) views this benefit in terms of reducing the risk of theft, while Friedman et al. (1991) emphasise that there is a reduction in the cost of protection in cases where the avenues of legal recourse are clear and effective (i.e. in the absence of such legal protection firms may need to invest more heavily in security measures). In either case, there is a potential for increased returns from R&D investment, and thus such innovation may be incentivised.

A further incentivising effect noted in the literature is the role that trade secrets may play in conferring competitive benefits. Lemley (2011) observes that firms may invest in developing trade secrets because the prospect of supra-competitive profits motivates them to do so. In this view, a trade secret may confer a competitive advantage through a production process that reduces cost or delivers a unique product. In addition, incentives may be associated with trade secrets as an alternative or complementary protection to patents. In cases where patents are legally unavailable, too expensive to maintain, or undesirable due to their disclosure requirement, Maskus (2000) and Friedman et al. (1991) argue that trade secrets can substitute for patents and provide incentives to innovate. Trade secrets can also provide protection during the developmental phase leading to a patent (i.e. prior to a formal patent application). In some cases (e.g. due to the immediate availability or potentially low costs), firms may even employ trade secrets as their preferred strategy for protection of their intangible assets (e.g. see Arundel, 2001, or Cohen et al., 2000).

On the other hand, in cases of weak protection for trade secrets, there could be more spillovers of R&D information amongst competitors. Such information may stimulate investment by firms in further internal R&D to complement the incoming information or to gain a first mover advantage. For example, a firm may need to have sufficient internal R&D to make use of external R&D, and vice versa (Lokshin et al., 2006). Weak appropriability could drive firms to pursue R&D in competitive races to develop products, relying on first mover advantage, temporary secrecy, or patents to secure an edge[120]. While this is a theoretical possibility, there are some indications that relatively stringent trade secrets protection may actually deliver an increased sharing of information among potential collaborators, as businesses are reassured that they can enforce their rights in the event of a breach of trust or misappropriation (Lemley, 2011). This potential was highlighted in a recent study commissioned by the European Commission (Baker & McKenzie, 2013), which included a survey of firms’ use of trade secrets. The survey found that while 60% of businesses share their trade secrets regularly or occasionally, among those that declined to share such information 40% cited fear of loss of confidentiality as the reason. Moreover, even in countries with relatively stringent trade secrets protection, there are usually exemptions or limitations on the definition and scope of trade secrecy that permit spillovers of general knowledge, skills and experience.

The availability of trade secrets protection may influence firms’ size and structure, as well their engagement in the labour market. If trade secrets protection is less stringent, then firms that depend on critical non-public information may be less willing to expand, as secrets are kept within a trusted circle (e.g. some family businesses). In such an environment, firms may be less willing to outsource manufacturing or to engage in joint ventures. Labour market implications are further highlighted via two studies of the United States (Png, 2012a and 2012b). He found that some US states enacting increased trade secret protection may have experienced relatively modest declines in the mobility of postgraduate engineers and scientists (e.g. due to enforcement of contractual requirements concerning non-competition);

this in turn might slow the pace of spillover effects. However, Png (2012b) found that enactment of a trade secret law in US states was associated with a significant increase in R&D spending. Other studies point to implications for spillovers in that less stringent trade secrets protection may cause firms to attempt to retain employees by attempting to prevent employee movement by paying employees wage premia or hiring relatives (Sherwood, 1990). More stringent trade secret protection may also impede employee mobility by: (a) enforcing non-compete provisions[121] or (b) imposing confidentiality obligations on ex-employees that make them less valuable to new employers[122].

There are some indications that innovative small and medium size enterprises (SMEs) may be particularly reliant on trade secrecy as protection for their intellectual assets (Brant and Lohse, 2013). Subject to reasonable efforts on the part of such firms to maintain the required secrecy, in many jurisdictions trade secrets protection is readily available without burdensome administrative requirements and in some cases may be maintained at comparatively low cost[123]. While patents may be appropriate for protecting some types of intellectual property – as in cases where a new technology is readily discerned by competitors upon the release of a product into the market, they can also be more costly in terms of time and resources[124]. For example, in addition to filing and maintenance fees and administrative requirements, patenting may expose SMEs to risks of litigation (Lanjouw and Schankerman, 2004)[125]. Thus, in cases where trade secrets protection is adequate and appropriate, its use may prove advantageous for certain SMEs.

The availability of trade secrets protection may also play a role in international diffusion of technologies and other information via foreign direct investment (FDI) or trade. Firms may be more likely to invest or trade in a country that protects trade secrets, particularly where that investment requires the business to reveal or develop trade secrets (e.g. in cases where tacit knowledge is employed in the implementation of patent-protected processes). In entering a market, firms face a choice of engaging a local partner or starting a subsidiary. The stringency of trade secret protection may affect this choice by making a firm more or less willing to share product information and sales techniques with a local partner (CREATe, 2012). In the literature on intellectual property rights (IPR) protection and FDI, there is some evidence that firms respond positively to availability of such IPR protection (e.g. Park and Lippoldt, 2008). In addition, firms in different sectors or employing different technologies may respond differently to the availability of particular types of protection. Thus, trade secrets protection may have economy-wide effects as well as sector or technology-specific effects in relation to FDI or trade.

In terms of the interaction with alternative forms of intellectual property rights, there is a clear potential relationship to patent protection. As noted above, firms that depend on patent protection may tend to rely on trade secrets protection during the developmental stage of the technology (Png, 2012a). However, in some specific cases of technological innovation, firms may forgo patent protection entirely and rely exclusively on trade secrets protection. For example, this may be the case with process innovation where the resulting product is difficult to reverse engineer. The effect may depend on practical aspects of protection under each form of protection[126]. As a legal matter, not all inventions or information that can be kept secret are patentable. In terms of release of a product on the market, not all patentable aspects of the innovations that it may embody can be kept secret, which is a requirement for trade secret protection.

Getting a handle empirically on the effects of trade secret protection is challenging due to the very nature of trade secrets as being secret by definition. In addition, firms are reluctant to report trade secret theft. Even where there are legal actions, the civil litigation and criminal prosecution rates could have a variety of meanings. A lack of litigation could mean that the law is effectively deterring abuses or that trade secret owners or prosecutors view the law as ineffective and legal action as futile. Similarly, high rates of litigation could signal widespread disrespect for the law by defendants or confidence on the part of plaintiffs and prosecutors. In order to take a step towards untangling the economic implications of such issues, the quantitative assessment that follows will consider the relationship between the stringency of trade secrets protection and certain key economic indicators.

In light of the costs of continued abuse of trade secrets, a number of OECD Members have initiatives underway to address concerns about uncertainty or gaps in protection. With respect to some dimensions of protection, these initiatives seek to harmonise and develop minimum standards. For some stakeholders, the motivation for such reforms is a goal of reducing the complexity of managing trade secrets protection across international boundaries and promoting market opening effects in cases where businesses are currently precluded entry due to vulnerability of their operations to trade secrets abuse[127]. Two notable efforts currently underway concern the European Union and the United States. In the case of the European Union, the European Commission launched in November 2013 a draft directive intended to help harmonise key aspects of civil law protection across the EU Member countries. The directive would provide for a common definition of trade secrets; means through which victims of trade secret misappropriation could obtain redress (e.g. offering protection of secrecy during court proceedings); and remedies (e.g. damages, recall and destruction of infringing products, and availability of injunctions)[128]. In 2013, the United States released the "Administration Strategy on Mitigating the Theft of US Trade Secrets", which included a set of action items for improved protection domestically and internationally[129]. Among other actions, the strategy would promote prosecution of abuses[130], development of industry-led best practices, review of laws, diplomatic engagement and public awareness.

Trade Secrets Protection Index

Index Composition

In order to measure the extent of the variation in stringency of available protection for trade secrets, the Trade Secrets Protection Index (TSPI) was developed in Chapter 3. Chart 4.1. presents the detailed composition of the index and its scoring. The index is structured around five main components:

1. Definitions and coverage
2. Specific duties and misappropriation
3. Remedies and restrictions on liability
4. Enforcement, investigation & discovery; data exclusivity
5. System functioning and related regulation.

The approach to scoring provides up to one point for each of the five main components of the index and a maximum total score for the index of five points. However, as can be seen in Chart 4.1., the number of elements covered by each of the main components of the index varies widely. For example, the definition and coverage of trade secrets protection comprises 13 elements, whereas the system functioning and related regulation comprises 4 elements. In order to maintain balance across the five components of the index, the scoring for the various elements under each of the five main components was normalised to ensure equal weighting. In other words, the elements for each main component add up to a maximum score of one[131]. Overall, the index is designed to capture information on the stringency of the available protection in a manner that is internationally comparable[132].

As noted in Chapter 3, the TSPI is designed with several considerations in mind. First, the five components represent key aspects of protection of trade secrets where there is some variation across countries that may influence the stringency of protection. As part of an initial survey, its scope is intentionally very broad. Second, the elements of the TSPI were structured to enable scoring based primarily on objective criteria, supplemented in some cases by qualitative information as necessary (e.g. in certain areas related to system operation). Third, in order to ensure coherence across the components, the index employs an integrated index approach rather than separate indicators. Fourth, the presentation of the index emphasises transparency, with scores supported by a text chart for each country and verifiable references. Fifth, the index is designed to provide an indication of the stringency of available protection; it aims to be neutral in this assessment. In other words, a higher or low score reflects the strength of protection and not an assessment of the appropriate level of protection. While the TSPI measures stringency, it does not provide an indication of what level of stringency is optimal. (Policy makers will need to determine the appropriate level of protection taking into account their local institutions and conditions[133]) The index's function is descriptive, not normative, and the scores it produces are thus neither grades nor ratings. Rather, the score is strictly a measure of stringency of protection. As a measurement tool, the TSPI simply measures its target subjects.

TSPI Survey of Countries: Results for an Expanded Sample

For the economic assessment, the TSPI sample has been expanded from the original edition in Chapter 3 to cover sixteen additional countries drawn from around the world, including developed and developing countries[134]. The detailed scoring for each element of the TSPI for all of the countries in the sample can be found in the Annex Table. In addition, a presentation of the framework for trade secrets protection in each of the countries newly added to the sample can be found in the Annex Chart, as can an updated entry for New Zealand[135]. (Charts covering each of the countries in the original sample can be found in Chapter 3, Annex.) The sample has also been deepened to include a time dimension. Depending on data availability, each country's situation is measured at five year intervals starting as early as 1985[136].As of 2010, the countries in the sample are all members of the WTO and subject to the provisions of the TRIPS Agreement.

For the year 2010, the expanded sample has a profile that is similar to the original sample as described in Chapter 3. The scores in the expanded sample range from 2.5 to 4.5 points, with a median of 3.6 (Table 4.1.)[137]. Despite the significant gap between the high and low scores, the overall dispersion of the scores is fairly modest. The sample was also tested for the impact of two alternative weighting schemes, one giving double weighting to *enforcement, investigation, discovery and data exclusivity*, and another giving double weighting to *remedies and restrictions on liabilities*. These alternate weighting schemes did not alter the country rankings significantly as can be seen from the Spearman Rank Correlation coefficients. Thus, by this standard, the TSPI with equal weights appears to be a robust indicator for the relative underlying trade secret protection.

In Figure 4.1., the country rankings for the TSPI can be seen as of 2010, ranging from a high score in the United States to a low score for the Philippines. The OECD countries tend to have higher rankings in the table than the partner countries. In 2010, all of the countries have TSPI scores of 3 or above, with the exception of Bulgaria, India, the People's Republic of China, Indonesia, Russia and the Philippines. Table 4.2. and Figure 4.1. present the composition of the TSPI scores for each country in the sample as of 2010. The area of *duties and misappropriation* has the highest average scores and shows a fairly high degree of alignment. The areas of *enforcement, investigation and discovery; data exclusivity* and *system functioning and related regulation* have the lowest average scores, with wide variation in the scores and particular weakness in a few developing and transition economies.

The evolution of the TSPI over time is presented in Figure 4.2. and Table 4.3. As can be seen from the Table, the overall average score increased incrementally in each period. The Figure highlights an important perspective on the composition of these changes. There is a significant gap between the scores of the OECD and the trade partner countries in the sample. Over time this gap has closed somewhat, but remains significant. The OECD scores gradually rose before stabilising during 2005 and 2010. Figure 4.2 reflects substantial increases in the average partner country scores in the period following the entry into force of the TRIPS Agreement. Figure 4.3. presents the evolution over time, by economy and year. From this visual perspective, notable strengthening – here defined as sustained changes of greater than one point from 1990 to 2010 – can be readily seen for economies such as Brazil, China, Korea, Mexico, Spain, Chinese Taipei, and Thailand. In addition, certain transition economies demonstrated notable increases in their scores during the period since 1995 including Lithuania and the Russian Federation. In the cases of China and Russia, their accession to the WTO may have played a role in promoting availability of more stringent protection for trade secrets over the past decade. Analytically, the availability of the multiple observations for each economy permits assessment of the relationship of increased stringency of trade secrets protection to relevant indicators of economic performance over time, an issue discussed in the next section of the chapter.

Figure 4.4. presents two illustrative scatter plots for the full pooled sample to highlight the basic relationship of the TSPI to two key variables for economic performance. The first is real R&D per capita (Panel A) and the second is real foreign technological services (Panel B, shown with the variables as natural logarithms). For each economy and time period, each point in the charts represents the TSPI score and the level for the variable of interest. As indicated by the upward sloping trend lines, the patterns in each panel provide an indication of a simple positive correlation between TSPI stringency and the variables of interest. The trendline in Panel A accounts for about a quarter of the variation in the plot and the trend line in Panel B accounts for about one-fifth of the variation in the plot. However, a more rigorous examination of the data, controlling for other factors, is required to obtain a robust assessment. This is the object of the next section.

Quantitative Assessment

Maskus (2000), Primo Braga (1990) and others have noted that economic theory is inconclusive on the expected outcomes from a strengthening of intellectual property rights; empirical analysis is required to complement the theoretical perspectives. A strengthening of rights may promote market expansion effects as rights holders are better able to leverage their intellectual property. Thus, such reforms may motivate stakeholders to increase innovation and access to innovation in a manner that tends to benefit users as well as producers of intellectual property. However, reforms could in theory increase the market power of rights holders such that they have an incentive to constrain access and exploit their existing stock of innovation, possibly with little economic benefit to society as a whole.

Similarly with respect to trade secrets, one might expect improved protection of trade secrets to improve the ability of the owners to appropriate economic benefits from their secrets. However, the incentives for further innovation, exploitation and diffusion of <u>new</u> trade secrets could in theory be diminished somewhat by a strengthened availability of protection for <u>existing</u> trade secrets (despite their fragility). Consequently, empirical analysis can play an important role in assessment of trade secrets reforms. It is needed in order to test the hypothesis that greater stringency of protection contributes to increased innovation and diffusion of trade secrets. Due to lack of data availability, the quantitative empirical assessment presented below does not look at these market effects directly, but rather it considers the associated net changes in economic indicators at an aggregate level while controlling for other factors.

Thus, building on the expanded TSPI sample, the following quantitative assessment considers variation in trade secret protection in relation to an illustrative set of relevant economic performance indicators. The modelling is based on standard regression analysis, using an approach similar to that employed in previous OECD studies on economic implications of the strengthening of IPR protection[138].The selection of economic indicators emphasises types of activity where effective protection of trade secrets may be reasonably hypothesised to play a role in promoting expanded activity. Where regression analysis is pursued, particular attention is focused on issues of auto-correlation and of endogeneity[139].

Methodological approach

The quantitative assessment explores empirically the potential relationships identified in the qualitative assessment. It considers these in a dynamic fashion using pooled regression analysis for the period from 1990 to 2010, though a number of assessments cover shorter time periods due to data limitations. The sample is an unbalanced panel in that the sample does not cover every country for every year. Due to indications of autocorrelation in the residuals (low Durbin-Watson test scores), the regressions were run using country fixed effects[140]. As feasible, all variables were entered as natural logarithms, with the result that the coefficients indicate the relationships in approximate percentage terms.

The regressions were set up using a standard linear regression model[141]:

$$\ln(\text{economic performance indicator}_{n,t}) = \alpha_0 + \alpha_1 \ln(\text{TSPI}_{n,t}) + \alpha_2 \ln(Z_{n,t}) + \text{Error term}$$

where n is country, t is time (year), and Z represents the control variables.

In all cases, the independent variable of interest is the TSPI. The dependent economic performance indicators of interest covered innovation inputs (R&D expenditure, researchers in R&D) and innovation-related international economic performance (real FDI inflows, total services imports, real technological services imports, and real merchandise imports). The control variables were selected based on indications of potential competing influences *vis-à-vis* trade secrets protection and include indicators of market openness and regulation, market size, income level, and human capital development. The protection of patent rights was considered as measured by the Park-Ginarte Patent Rights Index. The patent rights index is constructed in a manner similar to that of the TSPI[142]; details of its composition are presented in Chart 3. Chart 4 provides an overview of the underlying data sources for the variables.

In order to illustrate various relationships, the regression runs presented employ fairly diverse approaches. In the first run, the TSPI variable was lagged in order to test for endogeneity. In the second run, it was interacted with the Patent Rights Index to observe whether the combined indicator also exhibited a significant association with an indicator of economic performance. In the area of services, the two runs were implemented using first differences approaches. This was done to provide an indication as to whether change in the TSPI stringency over time affected the pace of change in imports in the sector.

Results

The results of the quantitative economic assessment are shown in Table 4.4 and Figure 4.5. The assessment begins with consideration of the relationship of trade secrets protection to R&D activity and then turns to international economic flows.

Table 4.4., parts (1) and (2), consider two aspects of the relationship of stringency of trade secrets protection to real economy-wide R&D expenditure (government and business) per capita[143] and R&D intensity as measured by R&D personnel as a share of the labour force. A positive and statistically significant relationship is found between trade secrets protection (lagged one period) and the indicator for R&D expenditure[144]. A similar – though slightly larger – association is found between the combined TSPI-patent rights indicator and R&D personnel as a share of the labour force. Among the control variables, GDP and GDP per capita, respectively, are statistically highly significant in each of the runs. Table 4.4., part (3), examines the relationship of real FDI inflows to TSPI, finding a particularly strong and positive association. A one percent change in the TSPI is associated with a nearly 1.5% change in Real FDI inflows (Figure 4.5.). Several control variables proved to be significant as well in this run, including GDP (market size), market regulation, and the share of the labour force with tertiary education.

Table 4.4., parts (4), (5) and (6), considers the relationship of trade flows to the stringency of trade secret protection. In all three cases the relationships were positive. For total services imports and foreign technological services, the relationship was stronger with respect to the change in pace (first differences) than to the simple flows. In other words, an increase in the stringency of trade secrets protection was associated with an increase in the rate of growth of services imports for the sample economies during this time period. This effect was particularly evident with respect to imports of foreign technological services. Among the control variables, GDP per capita and GDP, respectively, were positive and significant. Table 4.4., part (6) considers the relationship of TSPI stringency to real merchandise import flows. Here as well a positive and statistically significant relationship was found.

Overall, this initial round of exploration of the economic implications found a positive and statistically significant relationship between the increased stringency of trade secrets protection and indicators for innovation inputs and international economic flows. FDI inflows and real foreign technological services imports appear to be particularly sensitive to the stringency of trade secrets protection. The strength and consistency of the results across the various analytical approaches lends support to the hypothesis of a positive and fairly robust relationship of the TSPI to the types of economic performance considered here, at least with respect to the sampled economies and timeframe[145].

Conclusions

This assessment of the stringency of trade secrets protection across a broad sample of countries in recent decades found substantial variation between countries at specific points in time and in protection regimes of specific countries over time. The qualitative assessment then considered a number of potential areas where variation in trade secrets protection could influence economic performance. These included economic incentives for innovation, labour mobility, spillover effects and technological diffusion. The empirical assessment found that the stringency of protection in the developed countries rose in particular during the 1990s and then stabilised, while developing countries on average tended to rise throughout the entire study period. The quantitative assessment of the relationship of this increased stringency of protection to indicators of economic performance found a tendency for there to be a positive relationship. This includes indicators of innovation inputs and international economic flows of investment and trade. Through such relationships, trade secrets protection may have positive implications for developments in domestic innovation, international technology transfer and access to technology-intensive inputs and related products.

These findings represent a first step in the assessment of trade secrets protection. However, it should be noted that the relationships highlighted here reflect association but not necessarily causality. It is also necessary to note that the relationships identified in the empirical assessment apply to a specific sample during a specific time period and a certain range of variation. This does not mean that ever stronger protection, for example, will yield similar results. Thus, care is required in the interpretation of the results. Nonetheless, the positive and statistically significant relationships identified do provide an indication that provision of adequate protection of trade secrets may be an appropriate element of a policy framework supporting certain key aspects of economic performance. Further research could contribute to confirming these findings and exploring the effects of trade secrets protection at sectoral and firm level[146].

CHARTS, TABLES AND FIGURES

Chart 4.1. Trade Secrets Protection Index

Components and scoring	Score range	Normalised score
1. Definition and Coverage	**0-13**	**0-1**
a) Scope		
• If scope covers all confidential business information, subject to: 1) deriving value from secrecy and 2) the owner's reasonable efforts to maintain secrecy, score = 1; If scope also subject to requirement that information is imparted to the recipient in confidence, score = ½	0, 1	
b) Additional Elements of Definition		
• Inventory of trade secrets required (requirement=0; no requirement=1)	0, 1	
• Must be reduced to writing (requirement=0; no requirement=1)	0, 1	
• Must be identified as a trade secret to recipient (requirement=0; no requirement=1)	0, 1	
• Written notice to recipient required (requirement=0; no requirement=1)	0, 1	
c) Acts covered as <u>civil</u> infringement:		
• Breach of duty (not covered=0, partially covered=½[147], covered=1)	0, 1	
• Wrongful acquisition or misappropriation (not covered=0, covered=1)	0, 1	
• Third party liability for acquisition with knowledge or reason to know (not available=0, available=1)	0, 1	
• Third party liability for acquisition without knowledge - enjoin "innocent parties" (not available=0, available=1)	0, 1	
d) Acts covered by <u>criminal</u> law		
• Breach of duty (not covered=0, partially covered=½, covered=1)	0, 1	
• Wrongful acquisition or misappropriation (not covered=0, covered=1)	0, 1	
• Third party liability for acquisition with knowledge or reason to know (not available=0, available=1)	0, 1	
• Third party liability for acquisition without knowledge, enjoin "innocent parties" (not available=0, available=1)	0, 1	

Chart 4.1. Trade Secrets Protection Index (continued)

Components and scoring	Score range	Normalised score
2. Specific duties and misappropriation[148]	**0-5**	**0-1**
• Commercial relationship (covered if arising from: express agreement ½ + implied duty ½)	0, 1	
• Current employment relationship (covered if arising from: express agreement ½ + implied duty ½)	0, 1	
• Past employment relationship (covered if arising from: express agreement ½ + implied duty ½)	0, 1	
• Restrictions on post-relationship duty of confidentiality (if any restrictions on matters beyond general skills and knowledge, by relationship: commercial ½ + employment ½)	0, 1	
• Validity of contractual restrictions on competition (if unenforceable=0, significant limitations=½ (e.g., limited by time or place for either commercial or post-employment situations), generally enforceable=1)	0, 1	
3. Remedies and Restrictions on liability	**0-11**	**0-1**
a) Restrictions on liability		
• Additional elements of proof in infringement claims (if none: civil=½ + criminal=½, criminal ½ point; score 1 if there no criminal law and civil score is ½)	0, 1	
b) Civil remedies		
• Preliminary injunction (if available = 1, if not = 0)	0, 1	
• Ex parte action available under preliminary injunction (if available = 1, if not = 0)	0, 1	
• Permanent injunction (if available = 1, if not = 0)	0, 1	
• Injunction to eliminate wrongful head start (if available = 1, if not = 0)	0, 1	
• Delivery or destruction of infringing materials (if available = 1, if not = 0)	0, 1	
• Compensatory damages (direct or out of pocket damages or consideration of profits or other damages= 1)	0, 1	
• Yielding of defendant's profits (if available = 1, if not = 0)	0, 1	
• Availability of punitive or statutory damages (if available = 1, if not = 0)	0, 1	
c) Criminal remedies		
• Fines, damages or loss of assets (if not available = 0, if minimal per expert opinion= ½, if substantial = 1)	0, 1	
• Jail sentence (if available = 1, if not = 0)	0, 1	

Chart 4.1.. Trade Secrets Protection Index (continued)

Components and scoring	Score range	Normalised score
4. Enforcement, investigation and discovery; data exclusivity	**0-6**	**0-1**
a) Enforcement, investigation and discovery		
• Emergency search to preserve and obtain proof (unavailable=0, available but with significant restrictions= ½ (e.g., conducted solely by an official or 3rd party expert), readily available=1)	0, 1	
• Ex parte emergency search availability (unavailable=0, available but with significant restrictions=½, readily available=1)	0, 1	
• Pre-trial discovery (unavailable=0, documentary only or strict limitations = ½, ready availability of documentary and interrogatories = 1)	0, 1	
• Protection of confidentiality of trade secrets in litigation (none=0, partial= ½, fully available=1)	0, 1	
b) Data exclusivity		
• Drugs (years: 0=0; 0.1-3=1/3; 3.1-7.9=2/3; >8=1)	0, 1	
• Agricultural chemicals (years: 0=0, 0.1-4.9=1/3, 5-8=2/3; > 8=1)	0, 1	
5. System functioning and related regulation	**0-4**	**0-1**
• Technology transfer: registration requirement (none=1; one or more = 0)	0, 1	
• Technology transfer: substantive review or regulation (none=1; one or more = 0)	0, 1	
• Fraser Institute score for *Legal System and Security of Property* Rights (score ranging from 0 to 10, divided by 10)[149]	0, 1	
• Expert characterisation of the operation of the protection in practice (NB, based on internationally recognised or peer-reviewed sources; see country charts for details) (Negative = 0; none = ½; positive = 1)	0, 1	
		======
Index Total		**0-5**

Chart 4.2. Trade Secrets Protection Index Coverage, Expanded Sample, 1985-2010

Trade Partner Economies (20)	OECD Countries (17)
Argentina	Australia
Brazil	Canada
Bulgaria	France
China	Germany
Colombia	Ireland
Ghana	Israel*
Hong Kong, China	Italy
India	Japan
Indonesia	Korea
Latvia	Mexico
Lithuania	Netherlands
Malaysia	New Zealand
Peru	Spain
Philippines	Sweden
Russia	Turkey
Singapore	United Kingdom
South Africa	United States
Chinese Taipei	
Thailand	
Viet Nam	

Notes: The sample is an unbalanced panel. Not all countries are covered in every year.

* The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Chart 4.3. Composition of the Patent Rights Index

1)	Membership in International Treaties	Signatory	Not signatory
	-- Paris Convention and Revisions	1/5	0
	-- Patent Cooperation Treaty	1/5	0
	-- Protection of New Varieties (UPOV78 or 91)	1/5	0
	-- Budapest Treaty (Microorganism Deposits)	1/5	0
	-- Trade-Related Intellectual Property Rights (TRIPS)	1/5	0
2)	Coverage	Available	Not Available
	-- Patentability of pharmaceuticals	1/8	0
	-- Patentability of chemicals	1/8	0
	-- Patentability of food	1/8	0
	-- Patentability of surgical products	1/8	0
	-- Patentability of microorganisms	1/8	0
	-- Patentability of utility models	1/8	0
	-- Patentability of software	1/8	0
	-- Patentability of plant & animal varieties	1/8	0
3)	Restrictions on Patent Rights	Does Not Exist	Exists
	-- "Working" Requirements	1/3	0
	-- Compulsory Licensing	1/3	0
	-- Revocation of Patents	1/3	0
4)	Enforcement	Available	Not Available
	-- Preliminary Injunctions	1/3	0
	-- Contributory Infringement	1/3	0
	-- Burden-of-Proof Reversal	1/3	0
5)	Duration of Protection	Full	Partial
		1	$0 < f < 1$

-- where f is the duration of protection as a *fraction* of 20 years from the date of application or 17 years from the date of grant (for grant-based patent systems).

Overall score for Patent Rights Index: sum of points under (1) – (5).

Note: The index was developed by Walter Park and colleagues at American University (Ginarte and Park, 1997; Park, 2008).
Source: Park and Lippoldt (2008).

Chart 4.4. Data Sources

1. OECD (2013 and 2014), *OECD.Stat*, (database); doi: 10.1787/data-00285-en.

- GDP real in USD (2005) converted at purchasing power parity exchange rates

2. World Bank (2013 and 2014)

a. *World Governance Indicators*, on-line edition: http://info.worldbank.org/governance/wgi/index.aspx#home

- Government effectiveness

b. *World Development Indicators*, on-line edition, http://data.worldbank.org/data-catalog/world-development-indicators

- GDP deflator (for use in calculations of constant value)
- Population (for per capita calculations)
- Researchers in R&D, per million people (NB: 1996 data assumed constant, used for 1995)
- Resident and non-resident patent application data
- R&D as a percent of GDP
- Share of the labour force with tertiary education

3. Park (2008) and correspondence with the author, Walter Park, American University

- Patent rights index

4. UNCTAD http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx?sRF_ActivePath=P,5,27&sRF_Expanded=,P,5,27

- Foreign direct investment data

5. International Monetary Fund, Balance of Payments Statistics http://elibrary-data.imf.org/finddatareports.aspx?d=33061&e=170784

- Services imports, by sector

6. UN Comtrade Database http://comtrade.un.org/

- Merchandise trade data

7. Fraser Institute, *Economic Freedom of the World* dataset, 2013, www.freetheworld.com/release.html

- Chain-linked indices: Market regulation (area 5)

Table 4.1. Trade Secret Protection Index: Statistics Scoring Using Alternative Weights, 2010

	Total Scories, by Weighting Scheme		
	Equal weights: 20% for each component	40% for enforcement, investigation, discovery and data exclusivity; 60% divided equally amon the other components	40% for Remedies and restrictions on liability; 60% divided equally among the other components
Argentina	3.12	2.45	3.14
Australia	3.99	4.07	3.79
Brazil	3.31	3.42	3.56
Bulgaria	2.96	3.37	2.68
Canada	4.48	4.61	4.38
China	2.71	2.72	2.71
Colombia	3.15	2.84	3.04
France	3.76	3.75	3.61
Germany	3.76	3.55	3.73
Ghana	3.43	3.20	3.25
Hong Kong, China	4.03	4.06	3.93
India	2.92	2.99	3.10
Indonesia	2.52	2.00	2.69
Ireland	4.15	4.15	4.02
Israel	4.08	4.13	3.85
Italy	3.85	3.93	3.85
Japan	4.27	4.04	4.22
Korea	3.81	3.41	3.88
Latvia	3.64	3.46	3.64
Lithuania	4.44	4.47	4.35
Malaysia	3.48	3.48	3.46
Mexico	3.32	2.97	3.40
Netherlands	4.22	4.31	4.31
New Zealand	4.04	4.04	4.00
Peru	3.06	3.06	3.09
Philippines	2.45	2.46	2.69
Russia	2.47	2.48	2.87
Singapore	4.00	4.01	3.86
South Africa	3.14	2.98	3.27
Spain	4.42	4.36	4.34
Sweden	3.56	3.40	3.58
Chinese Taipei	3.12	2.72	3.36
Thailand	3.42	2.77	3.76
Turkey	3.41	2.83	3.47
United Kingdom	3.97	4.12	3.71
United States	4.49	4.55	4.62
Viet Nam	3.01	3.16	3.17
Overall Average	3.57	3.47	3.58
Max	4.49	4.61	4.62
Median	3.56	3.42	3.61
Min	2.45	2.00	2.68
Standard Deviation	0.59	0.69	0.52
Coefficient of Variation	0.17	0.20	0.15
Correlation Coefficient (equal weight scores versus alternate schemes)		0.94	0.96
Spearman Rank Correlation (equal weight scores versus alternate schemes)		0.92	0.96

Table 4.2. Trade Secrets Protection Index, by economy and component, 2010

Components and scoring	1. Definition and coverage	2. Duties and misappropriation	3. Remedies and restrictions on liability	4. Enforcement, investigation and discovery; data exclusivity	5. System functioning and related regulation	Totals
Normalised range	0-1	0-1	0-1	0-1	0-1	0-5
Argentina	0.81	1.00	0.64	0.08	0.60	3.12
Australia	0.65	1.00	0.64	0.86	0.84	3.99
Brazil	0.77	0.80	0.86	0.75	0.13	3.31
Bulgaria	0.46	0.60	0.36	0.92	0.62	2.96
Canada	0.69	1.00	0.82	1.00	0.97	4.48
China	0.62	0.60	0.55	0.55	0.40	2.71
Colombia	0.85	0.90	0.55	0.39	0.47	3.15
France	0.77	0.90	0.64	0.75	0.70	3.76
Germany	0.85	0.90	0.73	0.58	0.71	3.76
Ghana	0.62	1.00	0.55	0.50	0.77	3.43
Hong Kong, China	0.62	0.90	0.73	0.83	0.95	4.03
India	0.50	0.90	0.73	0.64	0.16	2.92
Indonesia	0.69	1.00	0.64	0.08	0.11	2.52
Ireland	0.62	1.00	0.73	0.83	0.97	4.15
Israel	0.65	1.00	0.64	0.86	0.93	4.08
Italy	0.69	0.90	0.77	0.83	0.65	3.85
Japan	0.85	1.00	0.82	0.67	0.94	4.27
Korea	0.77	1.00	0.82	0.44	0.78	3.81
Latvia	0.85	0.70	0.73	0.58	0.79	3.64
Lithuania	0.92	1.00	0.82	0.92	0.78	4.44
Malaysia	0.50	0.80	0.68	0.69	0.80	3.48
Mexico	0.77	0.70	0.73	0.39	0.74	3.32
Netherlands	0.85	0.70	0.91	0.92	0.85	4.22
New Zealand	0.62	1.00	0.77	0.80	0.85	4.04
Peru	0.77	0.80	0.64	0.61	0.25	3.06
Philippines	0.35	0.70	0.68	0.50	0.22	2.45
Russia	0.54	0.50	0.82	0.50	0.11	2.47
Singapore	0.69	1.00	0.68	0.80	0.83	4.00
South Africa	0.62	1.00	0.73	0.50	0.30	3.14
Spain	0.85	1.00	0.82	0.83	0.92	4.42
Sweden	0.69	0.70	0.73	0.58	0.86	3.56
Chinese Taipei	0.85	0.60	0.82	0.30	0.55	3.12
Thailand	0.85	0.70	0.95	0.17	0.75	3.42
Turkey	0.85	1.00	0.73	0.22	0.62	3.41
United Kingdom	0.62	1.00	0.59	0.92	0.84	3.97
United States	0.85	0.90	1.00	0.94	0.80	4.49
Vietnam	0.62	0.30	0.73	0.72	0.65	3.01
Overall Average	0.70	0.85	0.72	0.63	0.65	3.57

Table 4.3. Trade Secrets Protection Index, by economy and year, 1985-2010

	1985	1990	1995	2000	2005	2010
Argentina	2.16	2.19	2.18	3.16	3.12	3.12
Australia	3.81	3.81	4.00	4.01	4.00	3.99
Brazil	2.27	2.28	2.27	3.15	3.30	3.31
Bulgaria			2.65	2.64	2.63	2.96
Canada	4.12	4.14	4.43	4.44	4.42	4.48
China		0.90	1.78	2.22	2.69	2.71
Colombia	2.84	2.84	2.83	2.92	3.15	3.15
France	3.40	3.71	3.70	3.72	3.71	3.76
Germany	3.26	3.77	3.78	3.78	3.78	3.76
Ghana	3.24	3.32	3.33	3.29	3.41	3.43
Hong Kong, China	3.87	3.86	4.03	4.01	4.03	4.03
India	2.83	2.82	2.86	2.86	2.89	2.92
Indonesia	1.77	1.78	1.75	2.50	2.52	2.52
Ireland	3.76	4.01	4.04	4.04	4.15	4.15
Israel	3.59	3.53	3.59	3.82	4.08	4.08
Italy	3.54	3.56	3.53	3.56	3.85	3.85
Japan	4.06	4.07	4.17	4.17	4.17	4.27
Korea	2.16	2.19	3.08	3.69	3.82	3.81
Latvia			2.70	3.32	3.65	3.64
Lithuania			3.22	4.11	4.44	4.44
Malaysia	3.46	3.46	3.47	3.44	3.48	3.48
Mexico	1.67	1.95	3.34	3.32	3.33	3.32
Netherlands	3.87	4.21	4.22	4.24	4.23	4.22
New Zealand	3.59	3.60	3.62	3.62	4.04	4.04
Peru	2.64	2.66	2.93	2.98	2.99	3.06
Philippines	2.75	2.41	2.48	2.47	2.46	2.45
Russia			1.19	1.63	2.47	2.47
Singapore	3.76	3.76	3.79	3.79	4.01	4.00
South Africa	3.08	3.04	3.12	3.13	3.15	3.14
Spain	2.61	2.85	4.32	4.32	4.42	4.42
Sweden	2.28	3.54	3.55	3.55	3.55	3.56
Chinese Taipei	2.10	2.10	2.57	2.88	3.00	3.12
Thailand	2.28	2.29	2.27	2.28	3.44	3.42
Turkey	3.22	3.19	3.20	3.21	3.43	3.41
United Kingdom	3.47	3.83	3.85	3.98	3.98	3.97
United States	4.11	4.11	4.12	4.54	4.50	4.49
Vietnam					3.01	3.01
Overall Average	3.08	3.12	3.22	3.41	3.55	3.57

Table 4.4. Illustrative Modelling of Relationship of TSPI to Selected Economic Performance Indicators (All variables entered as natural logarithms)

	(1) Real R&D, per capita (constant USD, 2005)	(2) R&D personnel, as % of the labour force	(3) Real FDI inflows (constant USD, 2005)	(4) Change in real services imports, per capita (constant USD, 2005); **all variables entered as first differences**	(5) Change in real foreign technological services imports (e.g., licencing & royalty payments for intangibles), constant USD (2005); **all variables entered as first differences**	(6) Real merchandise imports (constant USD, 2005)
TSPI			1.494783 **	0.551834 **	1.380278 **	0.664822 **
			0.608775	*0.228515*	*0.568653*	*0.258105*
TSPI lagged 1 period	0.469547 **					
	0.195527					
Interact (TSPI x Patent Rights Index)		0.583355 **				
		0.248242				
GDP per capita (real, USD 2005)		0.782631 ***		2.047991 ***		1.231150 ***
		0.293873		*0.313472*		*0.097923*
GDP (real, USD 2005 ppp)	1.170749 ***		2.472000 ***		1.419025 **	
	0.128488		*0.279946*		*0.697704*	
Market Regulation (Fraser Institute)	-0.174773		1.412879 **		0.857275	0.426688
	0.304992		*0.664468*		*0.682397*	*0.285595*
Share of labour force with tertiary education			0.778480 ***			
			0.219858			
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Periods included	4	5	5	5	5	5
Years	1995-2010	1990-2010	1990-2010	1990-2010	1990-2010	1990-2010
Adjusted R2	0.987531	0.902006	0.953125	0.421721	0.407905	0.971826
Countries Covered (see note)	24	20	23	23	23	24
N	80	82	64	109	93	110

Note: Statistical significance is shown as follows: * p< 0.05, ** p< 0.01, *** p< 0.01. Standard errors are shown in italics. For each regression run (1 to 6), the country coverage is: (1) Australia, Canada, China, Colombia, France, Germany, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Russia, Singapore, South Africa, Spain, Sweden, Turkey, United Kingdom, United States; (2) Australia, Canada, China, France, Germany, Ireland, Israel, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Russia, Singapore, South Africa, Spain, Sweden, Turkey, United Kingdom; (3) Australia, Canada, China, Colombia, France, Germany, Indonesia, Ireland, Israel, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Russia, Singapore, South Africa, Spain, Sweden, Turkey, United Kingdom and United States; (4) Same as (3) above; (5) Same as (3) above; (6) Same as (1) above. The Patent Rights Index was only considered in the second regression run shown in the table, as part of the variable “Interact”.

Figure 4.1. Trade Secrets Protection Index, By Economy and Component, 2010

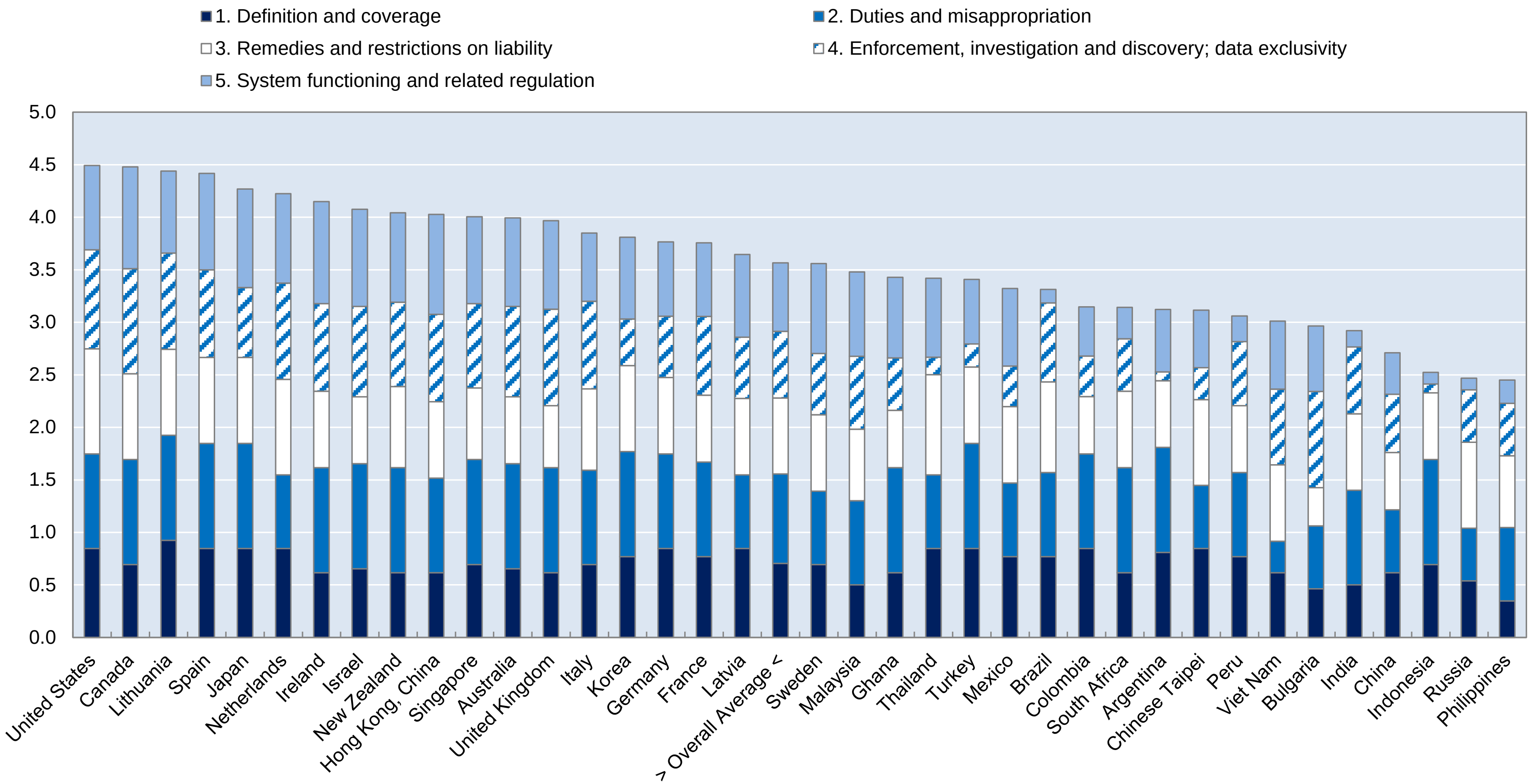
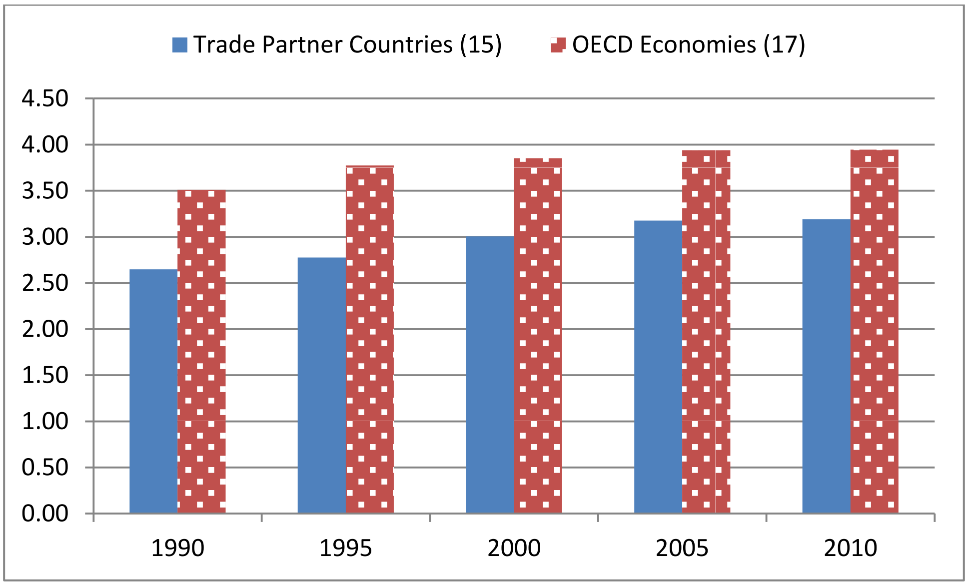


Figure 4.2. Trade Secrets Protection Index, average score by country group and year



Note: This chart presents a balanced panel of economies in each group for which data were available in each of the years shown. Inclusion in the OECD group is based on each country's membership status as of 2010. Country coverage is as follows:

<u>Trade partner economies</u>: Argentina; Brazil; China; Colombia; Ghana; Hong Kong, China; India; Indonesia; Malaysia; Peru; Philippines; Singapore; South Africa; Chinese Taipei; Thailand;

<u>OECD countries:</u> Australia; Canada; France; Germany; Ireland; Israel; Italy; Japan; Korea; Mexico; Netherlands; New Zealand; Spain; Sweden; Turkey; United Kingdom; United States

Figure 4.3. Trade Secrets Protection Index, by country and year

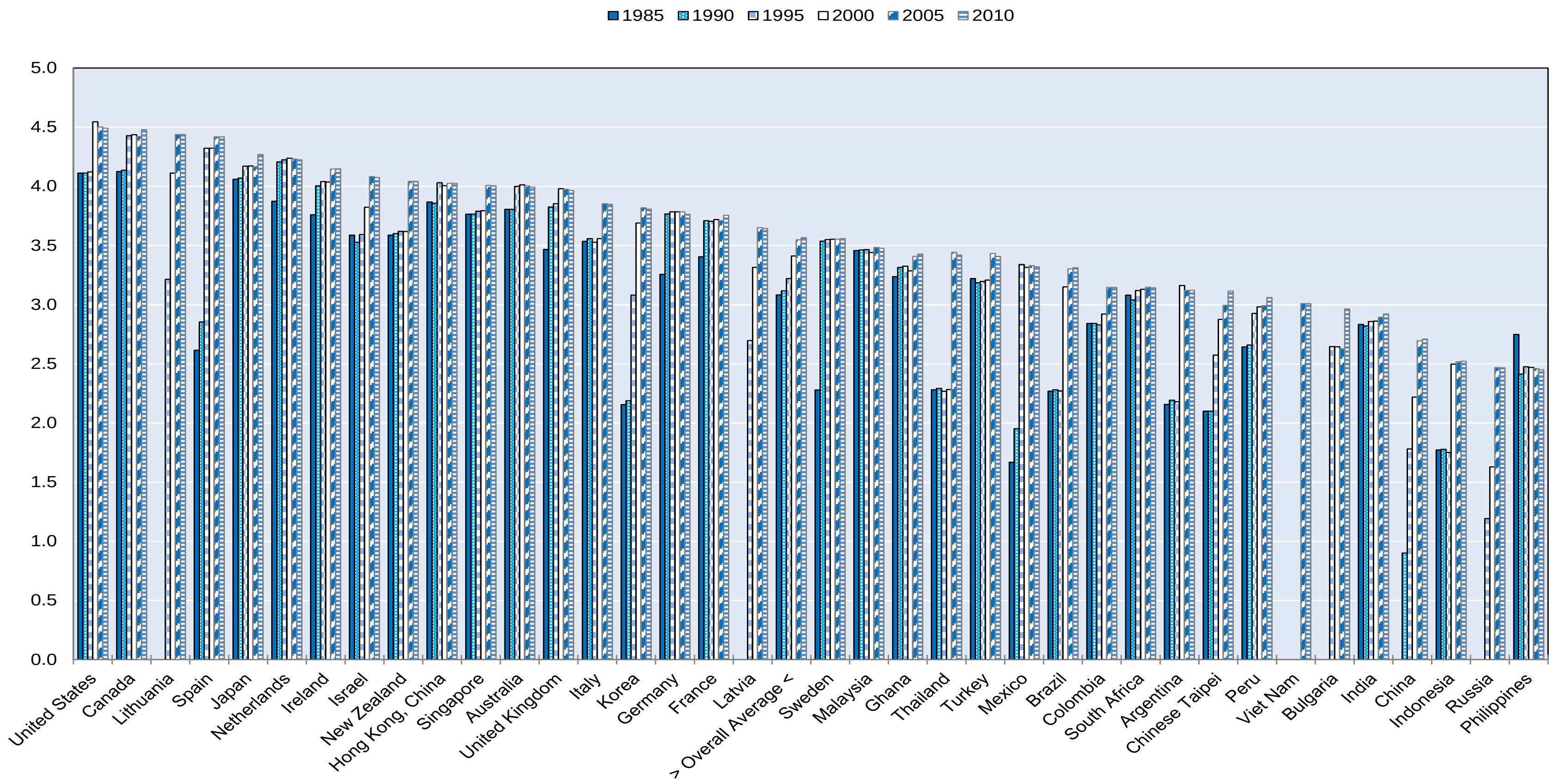
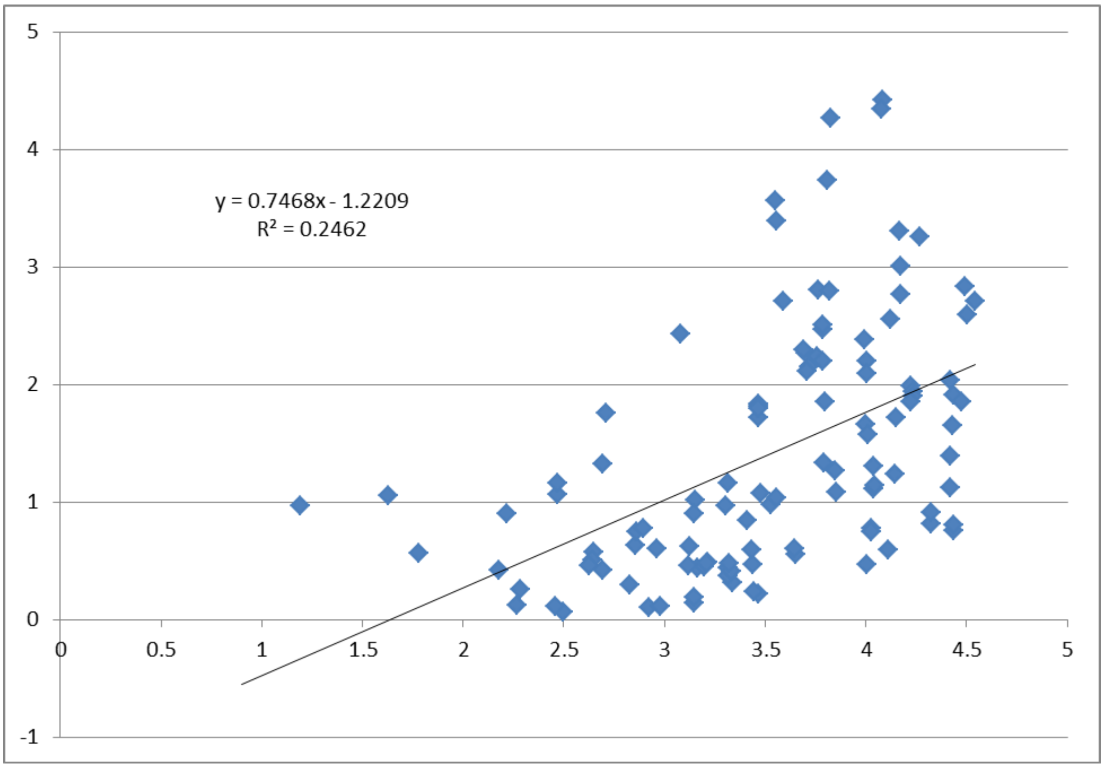


Figure 4.4. Illustrative Scatter Plots

Panel A. R&D as % GDP (vertical axis) and Trade Secrets Protection Index (horizontal axis)



Panel B. Real Foreign Technological Services Imports (log, vertical axis) and Trade Secrets Protection Index (horizontal axis)

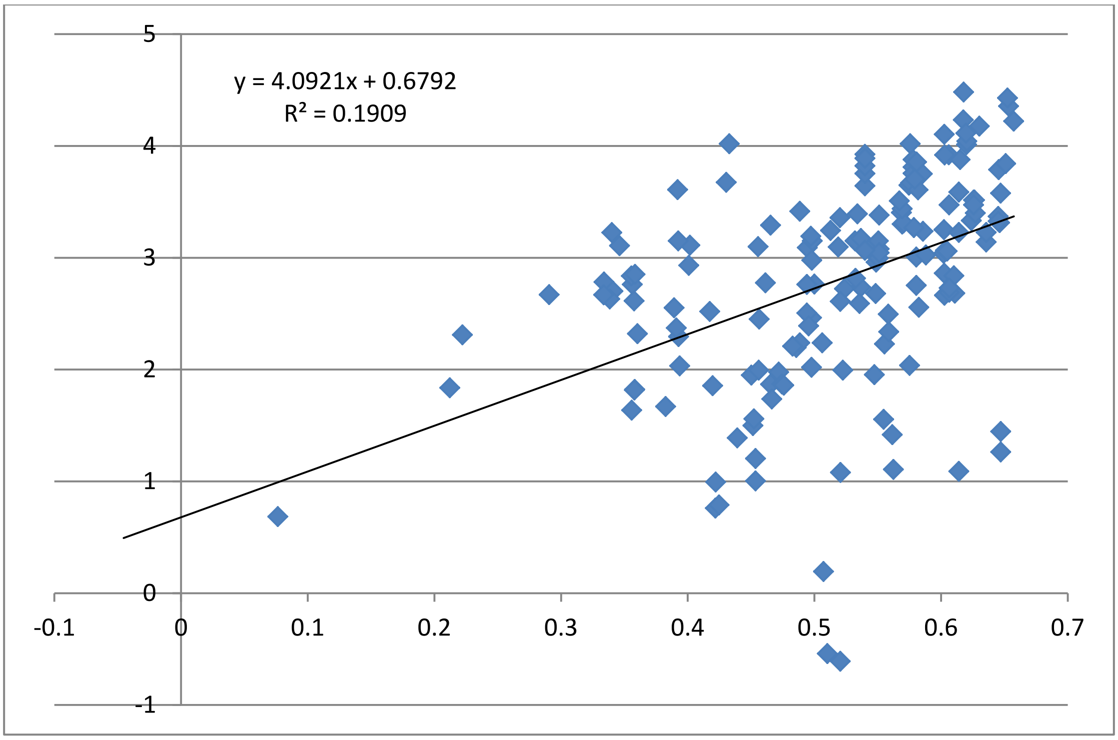
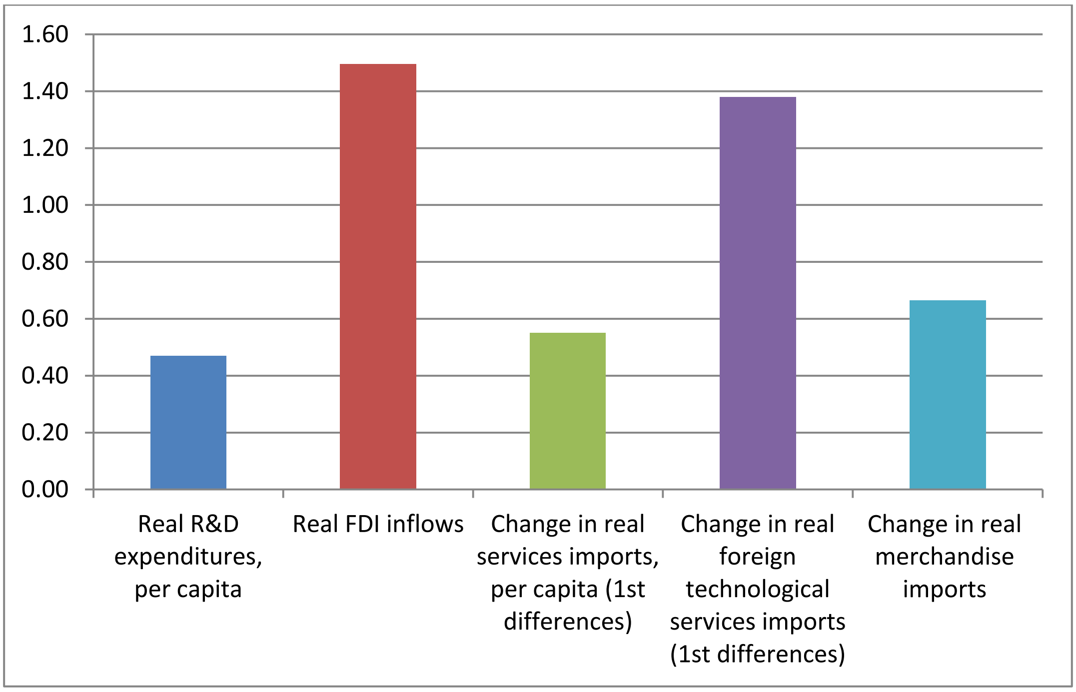


Figure 4.5. TSPI & Econ Performance, 1990 – 2010

(1% change in TSPI = x % change in…)



Note: The bars represent the coefficients from regression of various indicators of economic performance on the TSPI controlling for other factors. All variables entered as natural logarithms. For the iteration with real R&D expenditures per capita the TSPI was lagged one period. For the services runs the regression was calculated using first differences.

ANNEX

Due to the annex's length, interested readers are referred to the original version of this chapter, which is an OECD Trade Policy Working Paper, available at http://dx.doi.org/10.1787/5jxzl5w3j3s6-en (Lippoldt & Schultz, 2014).

NOTES

116 For descriptive convenience this chapter will employ the term “trade secrets” as encompassing “undisclosed information.”

117 See Chapter 3, section 2 for further details on the international framework for the protection of trade secrets.

118 Moreover, as Pooley (1997) notes, the idea need not be unique to its owner. Several competitors could have developed the same idea via independent innovation and sought to protect it as a trade secret. This possibility is one factor differentiating trade secrets from patents.

119 However, some countries impose more specific, additional obligations, which might be characterized as a particular implementation of the broad reasonableness requirement. For example, some common law countries require that the defendant have a contractual or implied obligation to keep the information secret. Other countries require written agreements with recipients and confidentiality notices.

120 This example highlights the importance of empirical research in considering the relationship of trade secrets protection to economic performance. For example, such competition could possibly lead to disincentives to invest, to inefficiencies (e.g. due to overlapping research) or to increased innovation building on knowledge spillovers, among other possibilities. The net effects can be difficult to determine in advance and it is necessary to examine the experience in practice.

121 Further discussion of non-compete provisions can be found in Chapter 3.

122 One important issue for mobility concerns investment by firms in training of employees. Firms cannot generally restrain employee use of general skills and knowledge (e.g. from training that is widely available). However, when a firm invests substantial time and resources in training an employee in its own technical products, courts in some jurisdictions may find that the firm has a legitimate business interest that may appropriately be protected via a limited non-compete clause in a labour contract (e.g. Swift, 2007). Where firms face high employee mobility, their incentive to invest in such training in principle could be supported by availability of this protection. Yet, validity of any claims may be difficult for an employer to demonstrate (e.g. Lester, 2001). Thus, some firms may utilise alternative approaches such as contractual requirements for employees to reimburse training costs under certain conditions (Lester, 2001) or payment of wage premia to discourage employee separations (Fosfuri et al., 2001), among other options.

123 Depending on the circumstances, this might be accomplished for example via such means as non-disclosure agreements with employees and commercial partners or basic digital or physical security measures.

124 Certainly, patents can play other important roles for some SMEs, such as cultivation of public recognition of a firm’s innovative capacity or mobilisation of new investor capital, among other possibilities.

125 With small patent portfolios, some SMEs may have limited bargaining power to settle with bigger players who confront them. Also, SMEs may tend to be less financially able to withstand an expensive legal challenge to a patent (e.g. from a non-practicing entity).

126 This is part of a larger discussion in the literature concerning approaches used by firms and others to appropriate returns on their investments and innovations. For example, see: Denicoló and Franzoni (2004) and Anton and Yao (2004), among others.

127 For example, some observers have expressed concerns on behalf of SMEs. These firms are known as being particularly reliant on trade secrets protection and may find increased opportunities for international expansion under improved conditions of protection for trade secrets.

128 The draft directive and related materials are available on line, here (as of 23 May 2014): http://ec.europa.eu/internal_market/iprenforcement/trade_secrets/index_en.htm#maincontentSec1 .

129 This strategy is available on-line at the following location (as of 3 April 2013): www.whitehouse.gov/sites/default/files/omb/IPEC/admin_strategy_on_mitigating_the_theft_of_u.s._trade_secrets.pdf.

130 A recent example of response to espionage and abuse of trade secrets can be found in a US Federal Government court case launched against five Chinese military officials for allegedly hacking into computers at five US companies. US officials are considering the possibility of reinforcing their response in light of such espionage, including potentially freezing assets or using individual sanctions such as visa restrictions, or possibly national-level action at the World Trade Organisation. Source: Wall Street Journal, 2014, "US to Rev Up Hacking Fight", 23 May.

131 For example, component 4 *Enforcement, investigation and discovery; data exclusivity* is comprised of six elements. The value for the Component 4 score can range from 0 to one. In the final calculation of the score for the overall component, the scores for any given element would be no more than 1/6 of one point. This would be the case, for example, for data exclusivity for drugs or data exclusivity for agricultural chemicals (each would contribute no more than 1/6 of one point to the component score).

132 The development of this index is a pioneering effort in the analysis of protection of trade secrets. However, it should be noted that a variety of similar indices exist in the literature covering various types of intellectual property. For example, Ginarte and Park (1997) and Park (2008) employed laws-on-the-books approaches to examine protection of patents, trademarks and copyright. Pugatch et al. (2014) developed an empirically based index of the strength of IPR protection, which also incorporated industry perspectives. Png (2012a and b) developed an indicator for use in his analytical work on trade secrets protection. Also, the Fraser Institute (2013) and World Economic Forum, among others, have developed substantial sets of relevant systemic indicators for use in economic analyses. Such indicators have been utilised in a number of studies conducted by the Working Party of the Trade Committee and other parts of OECD. Several Trade Committee studies considered policies for protection of intellectual property rights in relation to relevant economic performance indicators. OLIS references include: TD/TC/WP(2002)42/FINAL, TD/TC/WP(2004)31/FINAL, TAD/TC/WP(2007)19/FINAL and TAD/TC/WP(2010)12/FINAL. Subsequent OECD Trade Policy Working Papers were published as: Park and Lippoldt (2003); Park and Lippoldt (2005); Park and Lippoldt (2008); and Cavazos, Lippoldt and Senft (2010). More information on the construction of composite indicators can be found in OECD-EU (2008).

133 Note that alternative indicators of trade secrets protection could be developed for more specific, targeted policy development purposes; for example, one could focus exclusively on civil law in a future assessment. For readers interested in such exploration, the Annex table has the detailed country scoring information; readers can thus mix, match and recombine the numbers as they see fit. Moreover, additional aspects might be taken into account. For example, the transparency benefits from having a specific trade secrets statute might be noted or, for those not from a common law background, the challenge of understanding the protection afforded based on court precedent. Also, in the next stage of this line of research, a useful check on the construction of the TSPI would be to confirm the results using a principle components assessment.

134 The additional economies covered by this iteration of the TSPI include: Argentina; Canada; Ghana; Hong Kong, China; Indonesia; Ireland; Latvia; Lithuania; Mexico; Netherlands; Philippines; Spain; Chinese Taipei; Thailand; Turkey; and Viet Nam. Also, the scoring for certain of the countries originally covered in Chapter 3 has been updated throughout in light of newly available information and improved precision in the weighting.

135 Annex Table 1 provides the detailed scoring for each element and component of the index for each country. In the event a user would like to consider alternative approaches to constructing indicators, these data will provide the essential building blocks (e.g., for recombining various elements or reweighting the components).

136 For some transition countries, the observations start in 1990 (China) or 1995 (Bulgaria, Latvia, Lithuania and Russia).

137 The sample ranges are broader for earlier years, as can be seen below in Table 3.

138 See endnote 17.

139 With respect to endogeneity, there are a few technical options available to address these issues, if necessary. One option (used below in one model specification) is to lag time series by one or more periods.

140 In part, the choice of correction approach was made taking into account the sample sizes (e.g. see Clark and Linzer, 2012) and Hausman test results.

141 The regression analyses were run using Eviews software and a least squares method.

142 The Patent Rights Index is comprised of five components including: membership in international treaties, coverage by subject matter, restrictions on patent rights, enforcement provisions, and duration of protection. Scores for each component range from zero to one and the index total is calculated as the sum of the scores for the five components, which are equally weighted.

143 Ideally, the regression specified in part (1) would be run separately to consider Business Expenditure on R&D (BERD) instead of economy-wide R&D. However, this could not be done here due to lack of data (only 24 observations were available for the countries and time period covered here). The use of economy-wide R&D could lead to lower statistical significance or introduce a downward bias in the TSPI coefficient in comparison to use of BERD. This is because economy-wide R&D may include public sector and academic institutions where trade secrets might be expected to play less of a role as compared to businesses.

144 In this specification, the association between the TSPI and R&D expenditure appears robust to the lagging of the TSPI variable by one period. Further research could consider additional aspects of potential endogeneity. For example, it may be that accumulation of intellectual assets could fuel demand for further protection of intellectual property (here, taken as including trade secrets) such that there is a feedback effect (e.g. Lippoldt, 2011, p 188). Moreover, the relationships between the variables as dependent or independent (falling on the left or right hand of the models, as specified) could be explored, along with implications for policy formation.

145 In a future analysis, it could be useful to consider developments from an evolutionary perspective to determine whether the relationship of changes in stringency to economic indicators may be non-monotonic for different degrees of stringency.

146 For example, in relation to the stringency of trade secret protection, it could be useful to consider inter-industry variation in strategies for appropriating benefits from innovation and investment.

147 E.g. the duty of confidentiality might be imposed on employees, fiduciaries and third parties with access to information. Partial coverage might arise if under a country’s legal regime licensees cannot be covered.

148 The treatment of duties is split within this framework. General coverage of duties is scored under index component 1 (Definitions & Coverage). Component 2 responds to the availability of recourse for specific duties. This permits a detailed assessment, ensuring the indicator responds to variation in key elements.

149 The Fraser Institute (2012, pp. 3 and 273-5) score for *Legal System and Security of Property Rights* is a composite indicator produced annually. Scores can range from 0 to 10. Based on objective indicators and expert assessments, it takes into account judicial independence, impartiality of courts, protection of property rights, military interference in the rule of law and politics, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, reliability of the police and business costs of crime. For details see Annex 1 of the present report and www.freetheworld.com/reports.html.

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CHAPTER 5. COPYRIGHT IN THE DIGITAL ERA: COUNTRY STUDIES

This chapter illustrates how copyright-intensive industries are performing and evolving in light of the changes brought about by the growth of the Internet, digitisation, and an increasingly globalised market for digital content. The salient economic properties of digital content are explained and the main copyright-intensive industries are identified. A set of country studies then presents objective information on the economic significance of copyright in a sample of 12 economies over time[150]. In addition to characterising how copyright-intensive industries have fared, the country studies summarise the principal characteristics of each economy's copyright laws, as well as how and why they have evolved (if at all) in recent years. Finally, the country studies provide a summary of the mainstream policy dialogues currently taking place in each economy.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

EXECUTIVE SUMMARY

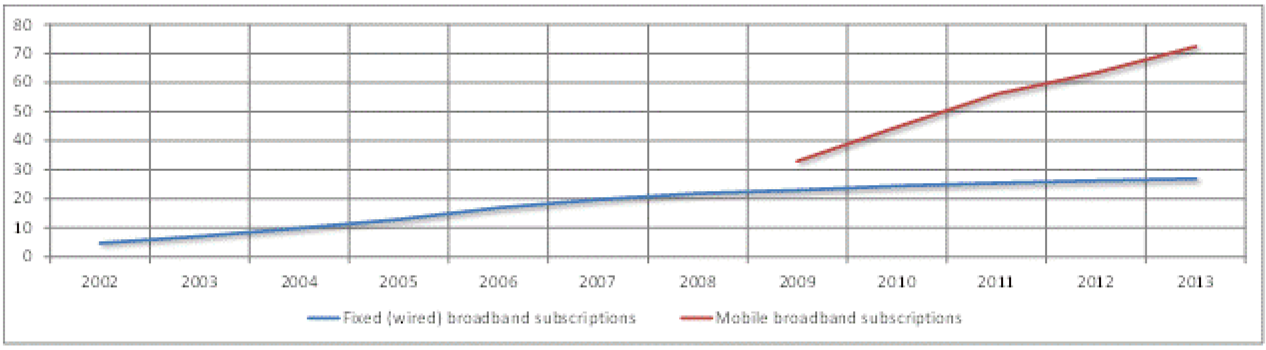
The technological revolution and the economic performance of copyright-intensive industries

The Internet and its ecosystem form an ever-evolving landscape, in which content producers and content users constantly face dynamic technological innovation and rapid commercial development. Long-predicted trends such as the convergence of previously distinct communication services are now occurring at a fast pace across all sectors of industry and having profound and widespread impacts on economies and societies.

The Internet is still growing strongly, particularly in the mobile segment. The average subscription rate of mobile broadband Internet access in OECD countries as a whole rose to 72% in December 2013, up from just 32% in December 2009 (Figure 5.1). In the fixed broadband category, growth of the Internet is slower, as might be expected given the widespread adoption of this technology. At the end of 2013, the average penetration rate of fixed broadband access in OECD countries was 27 per 100 inhabitants, versus 23 at the end of 2009, and versus 4.8 in 2002 (Figure 5.1.).

Figure 5.1. The recent development of broadband Internet

(OECD average, per 100 inhabitants)



Source: OECD Broadband Portal

The observed trends in the broadband penetration rates, especially fixed broadband, are a strong indication of the Internet's maturity in the OECD countries. Consequently, this general-purpose technology has impacted many industries, including the copyright-intensive ones.

It should be kept in mind that due to different statistical taxonomies from one country to the next, no macroeconomic picture of the copyright-intensive sector can be drawn that is strictly comparable across economies. Even though some correspondence tables can be found for the different taxonomies used in the economies analysed in this chapter, in many instances there are no straightforward equivalences between various industry classifications systems.

Nevertheless, some general indications can be presented based on the observed signals. These are *i*) the value added generated by the copyright-intensive industries and *ii*) the number of people they employ. However, caution should be used when comparing these results across economies, since they cannot be perceived as direct equivalents.

Concerning value added, over the past ten years the copyright-intensive industries have demonstrated overall good performance. In most of the analysed economies these industries reported positive growth of their value added. At the same time, due to higher growth in other sectors, the share of the copyright-based industries in total GDP remained rather stable ranging from a 1.5 percentage point (pp) decline to a 0.9 pp increase.

In most of the analysed countries, copyright intensive industries accounted for up to 5% of GDP at the end of the analysed period. (See Table 5.1.)

Table 5.1. Value added generated by copyright-intensive industries.

Economy	Analysed period	Development in absolute terms (change in value added)	Development in relative terms (change in GDP share)	Share in GDP (at the end of the analysed period)
Australia	2002-2012	9% growth (CAGR 0.8%)	1.5 percentage point (pp) reduction	5%
Canada	2003-2012	16.4% growth (CAGR 1.7%)	Remained stable	3.18%
Chile*	2009	*n.a.*	*n.a.*	1.58 %
Egypt*	2000	*n.a.*	*n.a.*	up to 0.5%
European Union	2010	*n.a.*	*n.a.*	4,2%
Italy	2008-2011	Growth	Remained stable	3,65%
Japan	1998, 2007	57% growth	0.9 pp increase	3,4%
Korea	2009-2011	36 % growth	0.8 pp increase	4,37%
Poland	2008-2011	Growth	Remained stable	4,17%
Switzerland*	1997-2011	Small growth (CAGR 0.3%)	Small reduction	0,3%
United Kingdom	2008-2012	15.6% growth	Increase	5,2%
United States**	2000 - 2012	70% (80%) growth (CAGR 4.52% (5%))	0.6 pp (0.4 pp) increase	4,7%

*) For Chile, Egypt and Switzerland: The available data are not compatible with WIPO (2003)

**) For the United States: Two alternative methodologies are applied to determine the copyright-intensive industries: ESA-USPTO (2010) and Siwek and IIPA (2004) (the figure representing the share in the economy using the latter methodology is in parentheses).

The available data on people employed by the copyright-intensive industries also point at their relative stability. In the most recent year for which data are available (depending on the economy), this sector accounted for 2.3% to 5.6% of total employment in the analysed economies. This share has been remained mostly stable through the analysed periods (Table 5.2.).

Table 5.2. Employment in copyright-intensive industries

Economy	Analysed period	Development in absolute terms (change in number of employees)	Development in relative terms (change in share of total employment)	Share in total employment (at the end of the analysed period)
Australia	2002-2012	Slight growth by 1.6%	Slight reduction by 1 percentage point (pp)	5.5% (2011)
Canada	2003-2012	11.3% growth (CAGR 1.3%)	Remained constant	2.9% (2012)
Chile*	2009	*n.a.*	*n.a.*	2.3 %
Egypt*	2000	*n.a.*	*n.a.*	*n.a.*
European Union	2010	*n.a.*	*n.a.*	3.2%
Italy	2008-2011	Slight reduction	Relatively stable	2.3%
Japan	1998, 2007	8.8% growth	0.4 pp increase	3%
Korea	2009-2011	13% growth	0.3 pp increase	3.1%
Poland	2008-2011	Slight reduction	Remained stable	2.3%
Switzerland*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
United Kingdom	2011-2012	Growth	0.5 pp increase	5,6%
United States**	2000 - 2011	Relatively stable	Relatively stable	3,0% (3.2%)

*) For Chile, Egypt and Switzerland: The available data are not compatible with WIPO (2003)

**) For the United States: Two alternative methodologies are applied to determine the copyright-intensive industries: ESA-USPTO (2010) and Siwek and IIPA (2004) (the figure representing the share in the economy using the latter methodology is in parentheses).

The generally non-negative performance of copyright-intensive industries suggests that this sector has, overall, managed to adapt to the continuous developments in technological infrastructure. In fact as technology continues to evolve, improve and expand, a growing number of services within the copyright-intensive sector rely on new, innovative business models that *i*) use the Internet as a new way to deliver content *ii*) take advantage of improved portability of content or *iii*) introduce other new ways of generating revenue.

Most new business models in that sector rely on the Internet as a **new way of content delivery**. The most well-known example is iTunes, the global digital media store operated by Apple that fully relies on the Internet to deliver content. Other examples of such business models (presented in greater detail in the main body of the paper) include Quickflix is Australia (subscriptions to streamed television shows), Stingray Digital Group in Canada (interactive online music broadcasting and distribution), Italian Chili-TV (Internet platform for movie streaming and downloads), NCSOFT Corporation in Korea (publisher of massively multiplayer online games) and Muzo.pl and muzodajnia.pl in Poland (on-line music retailer).

In addition, some new business models take advantage of **improved portability** of content thanks to growing penetration of mobile devices such as smartphones or tablets. This includes such firms like Kobo, a Canadian producer of e-book readers, and some Japanese companies that take advantage of the high penetration of mobile internet access in that country, such as Namco Bandai Games, which develops video games for mobile phones.

Moreover, some business models rely on **new ways of generating revenue** such as ad-based models and subscription-based models. These include successful subscription-based services such as Netflix and Japanese cell-phone novel providers. Another example is Canada's Têtes à Claques, a French-language comedy website that generates a large share of their revenues through ad campaigns, licensing the characters for labels of commercial products, etc.

To re-iterate, it seems that the copyright-intensive industries in the analysed countries are, have made efforts to adapt to the new challenges and opportunities introduced by the Internet, and that in many cases these efforts turned out to be successful. That is not to say that all individual sectors have fully adjusted, nor is it to say that piracy is not a significant problem, but the copyright-intensive industries as a group appear to be achieving stable results in terms of value added and employment, even though in some cases they grow at smaller rates than the overall economy. It is likely that negative effects on value added and employment from technological advances are being at least partially offset by newer, innovative business models that take advantage of the business opportunities offered by the Internet.

Evolving legal frameworks and the surrounding debates

In each analysed economy policy makers recognize the importance of **copyright-related legislation** as a tool to maximise innovation and creativity. These legal copyright frameworks were established well before the Internet revolution. Today each analysed economy has amended, currently amends or is going to amend its copyright legislative frameworks in order to bring these frameworks up to date with contemporary uses of technology. One of the first amendments was the *Digital Millennium Copyright Act* (DMCA) in the United States, enacted in 1998. In 2001 the European Union adopted the so-called Copyright Directive[151]. In Canada, the *Copyright Modernization Act* was passed in 2012. Numerous European countries have recently called for views for the debate, and several EU member states are conducting debates on that topic.

The most common areas of amendments and current debates that were identified in the analysed country studies are:

- scope of copyrights
- orphan works
- copyright limitations and exceptions
- copyright registration
- enforcement

It should be highlighted that there is a diverse set of views regarding optimal solutions in these areas, and at this stage it is virtually impossible to assess which solutions were optimal and which were not. In addition, this list of issues is not exhaustive, and in some economies there are several other copyright-related legal issues that were debated or are being currently debated in the context of the Internet revolution.

In the context of technological progress it is important to notice the issues related to the **scope of copyright,** particularly with respect to coverage of data and datasets. Indeed, rapid technological progress is likely to permit economic use (and hence monetisation) of data, just as creative content can be monetised today. Whereas all legal systems protect creative databases that constitute a creative compilation under copyright law, some analysed economies (the European Union, and consequently The United Kingdom, Italy and Poland) have also introduced additional legislation to cover non-creative databases that is intended to strengthen the rights of database creators.

The phenomenon of **orphan works**[152] is also debated in almost all the analysed economies. Although the issue of orphan works is not new, the emergence of the Internet and the resulting drastic reduction of cost of transforming creative content have made this problem particularly striking. There are several ways to address the legal treatment of orphan works. One existing solution is a kind of public license that can be granted by public authorities (e.g. copyright office) after a party demonstrates that it made considerable efforts to identify the rights owner. Such solutions were adopted in Canada, Japan and Korea. The EU countries currently adopt the EU Directive on orphan works that sets rules on certain permitted uses of such works, whereas Switzerland allows the use of such works contained in phonograms or audiovisual fixations with a prior notification of collective societies.

Several countries do not have an explicit policy on orphan works. These countries either: are discussing potential policies in this area (the United States), include orphan works in the public domain (Chile), or advise some pre-cautionary steps to mitigate the risk, such as checking the publication date and the date of author's death (Australia).

Concerning copyright **limitations and exceptions**, digital technology greatly reduces the cost of copying, distributing and transforming content, which has led to the availability of more copyrighted content and much wider usage of it than ever before and the corollary availability of pirated content. Policy makers have taken the view that consumers should have the flexibility to make reasonable uses of legitimately acquired copyrighted content in the digital age. All analysed economies have copyright limitations and exceptions frameworks to allow certain unlicensed uses of copyrighted materials, e.g. for personal use, review, criticism, parody, educational purposes, etc. To ensure that the legitimate interests of rights holders are respected, laws typically include limitations restricting such content from being used for commercial purposes or from interfering in markets for the original work. (Specific cases when copyright exemptions apply are discussed in greater detail in the main body of the paper.)

Two things should be kept in mind in the context of copyright limitations and exceptions. First, in all analysed economies the limitations and exceptions do not waive the author’s moral rights (such as the right of authorship, the right of integrity of work and the right of divulgation). Second, continuous technological progress keeps creating new possibilities for uses of copyrighted material, which in turn trigger discussions about new potential copyright limitations and exceptions.

Coming back to the issue of orphan works, some researchers point at **copyright registration** as a potential (partial) solution to this problem. Indeed, several analysed countries have introduced the option of copyright registration as a voluntary mechanism that will benefit the rights holder in case of potential disputes (Canada, Chile, Egypt, Italy, Japan, Korea, United States). Clearly, the orphan works regime is not tied to copyright registration in any of the analysed countries. However, it is noteworthy that most analysed countries decided to regulate at least one of these two areas: orphan works and copyright registration, which suggests there might be some interactions (for example complementarities) between these two areas (See Figure 5.2.).

Figure 5.2. Policies on orphan works and copyright registration*

Copyright registration	Explicit policy on orphan works: Yes (debated)	Explicit policy on orphan works: No
Possible	Canada Italy Japan Korea	Chile Egypt United States
Not possible	Poland Switzerland United Kingdom	Australia

* The orphan works regime is not tied to copyright registration in any of the analysed countries.

The advent of the Internet has resulted in growing access to information worldwide. However this also means that more and more consumers have access to pirated creative content. The legal and regulatory frameworks aimed at preventing digital piracy are key jurisdictional factors, as they affect the behaviour of the main market actors, but only to the extent that laws are enforced in practice. If the resources devoted to **enforcement** are inadequate or intellectual property rights are not otherwise enforced by public authorities, then the value of the laws and regulations to the rights holders is low (OECD, 2009b).

In the analysed economies, copyright infringement is generally pursued by the copyright owner. However, in some cases (e.g. commercial scale piracy) the infringement may also be subject to *ex officio* criminal proceedings. To address this issue, some countries have devoted special police units to counter online IP crime (United Kingdom, Korea). In addition, some countries have considered new legislation to block websites that host copyright-infringing materials (for example Italy and the United States).

Furthermore, many countries have been introducing liability for circumventing, and facilitating the circumvention of, technological protection measures that restrict access to copyrighted works and/or seek to preclude the infringement of digital copyrighted material (e.g. Canada, the EU, United States). These measures, required by some WIPO treaties[153], are broad in scope, and preclude 'descrambling', decrypting or acts that otherwise avoid, bypass, remove, deactivate or impair a technological measure.

In almost all the analysed economies there have been robust discussions of a broad range of issues related to "copyright in the age of the Internet". These discussions have involved the government, industry, academia, and civil society, and preceded amendments of copyright legislation in many areas, some of which are summarised above.

The copyright-intensive industries are an important participant in these debates. In all the analysed economies, these industries are also represented or complemented by a number of usually sector-specific associations (music, film and television, books and periodicals, software, visual arts, etc.). Apart from participation in the debate, these associations carry out several activities, including: *i)* collective rights management, *ii)* awareness raising campaigns in the area of copyright, concerning, e.g. security awareness and attitudes towards digital piracy, *iii)* data collection, and *iv)* promoting best practices.

Likely due to the ever-increasing rise and effect of piracy in the digital age[154], much of the copyright-intensive industries' effort seems to concentrate in the area of online copyright enforcement. In most cases it includes industry best practices to counter digital piracy (e.g. Korea, United Kingdom, United States).

Lastly, the industry is also an important source of information on data, including statistical data and research as well as qualitative information. Data and economic analyses provided by the industry are essential to understand the way the industry operates and to predict its future development.

Introduction and Background

The Internet has become a vital platform for delivering digital content such as movies, music, books, news, and software. Most importantly, the global reach of the Internet enables digital content to be nearly instantaneously delivered to any part of the world. This means that many of the barriers that constrain the exchange of physical content products (*e.g.* costly transportation, import tariffs) are significantly reduced or eliminated in the case of digital content. It also underscores the importance of copyright as an incentive mechanism for the creation and dissemination of digital content.

Digital content is flourishing on the Internet according to a range of indicators. Data also indicate that a significant portion of traffic is infringing, notwithstanding the fact that the vast majority of the most popular works are available legitimately online[155]. While official estimates are not available, Cisco has estimated that all forms of video (i.e. TV, video on demand, Internet, and P2P) will account for approximately 90 percent of total consumer Internet traffic by 2015 (Cisco, 2013). Another example is the recent rapid growth of sites that allow users to upload and share content on the Internet. It is estimated that the photo sharing site Flickr alone reached 1.6 million photos uploaded daily on average on its platform in 2013[156].

Policy makers continue to promote the creation and dissemination of digital content, and effective copyright policy (including its enforcement) is central to their success. The 2008 *OECD Seoul Declaration for the Future of the Internet Economy* (OECD, 2008) and the 2011 *OECD Council Recommendation on Principles for Internet Policy Making* emphasise that "effective protection of intellectual property rights plays a vital role in spurring innovation and furthers the development of the Internet economy" (OECD, 2011). While the global reach of the Internet has made the potential market for digital content very large, there is a debate as to whether existing laws and regulations cope well with rapid technological developments. Yet as the market for digital content has grown, so has the importance of implementing sound copyright policies.

There is a diverse set of views regarding the optimisation of copyright frameworks for the Internet age and different aspects are currently being debated at domestic and international levels. This chapter, prepared under the direction of the OECD Committee on Digital Economy Policy (CDEP), contributes to that debate. It describes copyright systems in a sample of diverse economies by presenting their economic and legal settings, as well as their current mainstream policy dialogues, in a set of objective country studies.

Scope of the chapter

This chapter presents several national experiences of how copyright frameworks have evolved in light of the digitisation of content and the growth of the Internet, providing context with business perspectives as well as information on the economic performance of copyright-intensive industries.

This chapter consists of three sections:

- Section one, *Copyright – An Economic Perspective*, begins with an introduction to copyrights and a summary of their economic rationale, provides an overview of key copyright industries, and briefly sketches the existing methodologies to quantify these industries. The overview uses the methodology developed by WIPO (2003) to classify copyright-intensive industries that was consequently used and elaborated in by ESA-USPTO (2012) and EPO-OHIM (2013).

- Section two, *Copyright and the Internet Revolution*, begins with a brief summary of technological developments over the past 20 years. It then gives a general presentation of new business models enabled by these technological developments and summarises the main legal issues that appear to have become more urgent in the digital era.

- Section three, *Country studies*, presents specific national experiences of how copyright has evolved and provides insights from the perspective of various stakeholders, taking into account national economic landscapes. Context can matter significantly; therefore the sample of economies is as diverse and representative as practicably possible to take into account differences among economies' legal and economic landscapes and other factors. The following economies have been included: Australia, Canada, Chile, Egypt, the European Union, Italy, Japan, Korea, Poland, Switzerland, the United Kingdom and the United States.

Copyright - An Economic Perspective - Definitions and scope

Copyright is a form of intellectual property rights (IPR) that grants the creator of an original work (creative work) certain rights over that work for a limited period of time. The copyright holder has an exclusive right to reproduce his or her work in forms such as printed publications or sound recordings, to distribute copies and translations, to broadcast the work or make it available, to license and/or lend it, to adapt it (*e.g.* to turn a book into a screenplay) or give performances based on the work[157].

Independently from economic rights, authors are granted moral rights, such as the right of authorship, the right of integrity of work, the right to be credited, and the right of divulgation. These rights can be maintained by the author even if the copyright has been transferred to a third party.

Types of works that are protected under most national copyright laws include the following: literary works (such as novels, short stories, poems, and any other fiction and non-fiction writings), dramatic works, musical works, artistic works (whether two-dimensional as drawings, paintings etc. or three-dimensional as sculptures, architectural works), maps and technical drawings (including cartographic works, plans, blueprints, diagrams etc.), photographic works, cinematographic works, and computer programmes and the creative aspects of databases. It should be highlighted that copyright applies to all original works, irrespective of the quality of their content. Copyrights do not cover ideas, procedures, methods of operation (know-how) or mathematical concepts.

Copyright protection is time-bound. Under the international agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) that is administered by the World Trade Organization (WTO), protection should last at least 50 years after the death of the author. There is a trend for countries to adopt longer terms than the minima required by TRIPS and the treaties administered by the World Intellectual Property Rights Organisation (WIPO)[158], *e.g.* a term of the life of the author plus 70 years, or at least 70 years from first publication if the author is not a natural person.

Copyright laws have been partially standardised through a set of international conventions. The Berne Convention was one of the first international agreements on copyright, accepted in 1886. Most of the articles of the Berne Convention were incorporated into the World Trade Organization's TRIPS agreement in 1995.

Today, in all economies where the Berne Convention standards apply, copyright is granted automatically, and does not require any official certification. Once a qualifying work is presented to the public in a physical form or secured on a medium (e.g. optical disc, computer file, painting etc.), the holder is automatically entitled to his or her exclusive copyright. Both the Berne Convention and TRIPS prohibit signatories from maintaining any formalities to the protection of copyright[159].

Economic rationale for copyrights

Before discussing the economic rationale for copyright, it is important to recall two key economic properties of creative works that make them fundamentally different from tangible goods. Specifically, creative works such as movies, books and musical compositions are *non-rival* and *non-excludable*. They are *non-rival*, which means that they can be used by many persons at the same time without the individual value of consumption being reduced. They are also *non-excludable*, which means that without appropriate legal rights it is usually very difficult for the authors to prevent unauthorised uses of the content (Watt, 2004).

These economic characteristics of creative works lead to some special features of markets for creative content. The non-rivalry of creative works, and the very low marginal cost of reproduction of most copyrightable property, especially in the digital era, means that without legal copyright protection the work would likely not exist (since a price close to marginal cost may not generate sufficient revenues to cover the fixed costs of creation). Thus the argument for copyright is that an incentive to create and disseminate must be fostered by giving the creator some control over how the creation can be used by others (Greenhalgh and Rogers, 2010). Authorial control through exclusive rights provides important economic incentives and gives the authors the possibility to make a living from their creative works. This in turn allows culture and creators to mutually flourish.

The economic rationale for copyright is that without this protection, others could free ride on the efforts of creators and hence suppress the supply of creative works. Accordingly, the lack of sufficient, well-established and properly enforced copyrights would discourage future investments in new literary, artistic and creative works. This clear economic rationale for copyright is well reflected in law. It is based on the fact that “an original book, film, music composition or any other literary and artistic work is difficult to create but easy to copy” (Raustiala and Sprigman, 2006).

The economic literature identifies an important trade-off related to copyright law: the balance between two different effects that emerge when the cumulative aspect of creation is taken into account. On the one hand, society needs enough protection so that, at any given moment of time, creative activities are undertaken. On the other hand, excessive protection could create market power and thus higher access prices, which would reduce the extent to which creative works are disseminated.

Putting it differently, if copyright protection is too strong, incentives to create are likely to be high, but access to works may become so expensive that dissemination, in economic terms, is suboptimal. On the other hand, if copyright protection is too weak, it is likely that too few creative works would be produced and/or that they would be of poorer quality. Authors would choose to engage their time and effort in other areas of activity.

As Landes and Posner (1989) summarised: “Copyright protection — the right of the copyright’s owner to prevent others from making copies — trades off the costs of limiting access to a work against the benefits of providing incentives to create the work in the first place. Striking the correct balance between access and incentives is the central problem in copyright law.”

In this context it should be also highlighted that what is “transacted” in copyrights is the right to access the intellectual property concerned, not the right to own the property itself. In other words, copyright is distinct from the means of delivery. A song is protected by copyright, but a music CD is a means of delivery. If you buy a music CD, you own that CD but you do not own the songs on it. What one gains under a copyright transaction, therefore, is the use of the work for certain purposes or for a particular length of time

Lastly, it has been noted by several researchers that copyright has remained one of the most pressing areas that is lacking profound, empirical, economic studies. While some such studies do exist (e.g. EPO-OHIM, 2013; ESA-USPTO, 2010; Japan Copyright Institute, 2009; Siwek-IIPA, 2004; The UK Department for Culture, Media and Sport, 2014), they focus on the statistical aspects. More detailed quantitative information on copyright is urgently needed to advance economic research in this area, and to provide applicable and workable guidance to policy makers (Watt, 2004; Png, 2006; Handke, 2012).

Copyright-intensive industries

There is a distinguished history in studies that have sought to assess the importance of industries reliant on copyright. The challenge to date has been to agree on which industries or which portion of industries should be considered ‘copyright industries’. In practice, this has been a function of the industries that supply work that is copyright protected and the available statistical data.

Creative work that is subject to copyright protection, as defined by TRIPS, is produced in various parts of the economy. To facilitate the quantitative analysis of copyright-related activities in the economy, WIPO (2003) introduced a methodology that distinguishes copyright-intensive industries and divides them into four main groups: *i*) core, *ii)* interdependent, *iii)* partial, and *iv)* non-dedicated support.

The core copyright-intensive industries are industries that are wholly engaged in creating, producing and manufacturing, performing, broadcasting, communicating and exhibiting, or distributing and selling works and other protected subject matter. WIPO identified the following nine groups as core copyright industries:

press and literature

music, theatrical productions, operas

motion picture and video

radio and television

photography

software and databases

visual and graphic arts

advertising services

copyright collective management societies.

In addition to the core copyright industries, WIPO also defines three groups of industries whose activity is related to copyright industries to some degree: interdependent, partial, and non-dedicated support industries.

- **Interdependent copyright industries** are industries that are engaged in production, manufacture and sale of equipment whose function is wholly or primarily to facilitate the creation, production or use of works and other protected subject matter.

- **Partial copyright industries** are industries in which a portion of the activities is related to works and other protected subject matter and may involve creation, production and manufacturing, performance, broadcast, communication and exhibition or distribution and sales.

- **Non-dedicated support industries** are industries in which a portion of the activities is related to facilitating broadcast, communication, distribution or sales of works and other protected subject matter, and whose activities have not been included in the core copyright industries.

Because interdependent, partial, and non-dedicated support industries are only partly engaged in copyright-related activities, only part of their employment and value added should be considered as copyright-intensive. To our knowledge there is no internationally agreed methodology for such exercise. Therefore, this report focuses only on WIPO’s “core” copyright industries (Gantchev, 2004).

Two things should be kept in mind when applying the list proposed by WIPO to specific national accounts tables. First, the WIPO definition is relatively old. Given technological progress and the evolution of business models and industry structures since 2003, in some instances this methodology may include industries that are no longer copyright-intensive. Consequently, some applied studies, such as those by the ESA-USPTO (2012) and by EPO-OHIM (2013), use narrower categories of copyright-intensive industries. For example, some activities related to the distribution of creative content, such as “wired telecommunications activities”, and “satellite telecommunications activities”, are considered by WIPO to be copyright-intensive, but are disregarded in the ESA-USPTO (2012) study.

Second, to be able to determine levels of employment and value added statistics for these industries, it is necessary to identify the list of core copyright-intensive industries within local classification systems. Even though some correspondence tables between different taxonomies can be found, in many instances there are no straightforward equivalences between various industry classifications systems. This could be due either to a lack of exact correspondence between the two classifications or due to different levels in the correspondence table.

To address these issues, the final list of copyright-intensive industries is defined for each country study separately. This is done based on the description of the ISIC codes in the WIPO (2003) study in order to determine which local industry codes provide the closest match. For transparency reasons, industry tables are provided at the end of each country study.

Finally, when looking at the economic impact of industries that produce, supply and distribute copyrighted creative works, two additional things should be kept in mind. First, as noted by Thorpe (2004), economic contribution studies are generous in that they ascribe economic contribution solely to copyright. It should be kept in mind that some of the activity of these industries might not be necessarily related to the copyrighted content. Second, the studies do not capture the broader cultural contributions made by copyright works. There are broader cultural externalities, whose impact is long term.

Copyright and the Internet Revolution - The changing landscape

The recent digital revolution and the emergence of the Internet in particular have had a strong impact on virtually all industries, including copyright-intensive industries (Kretschmer, 2012; OECD, 2013). In the context of copyright-intensive industries two specific areas of impact deserve a closer look: *i)* those elements of the Internet revolution that affect the content itself, such as content digitisation, fast transfer and cheap storage; *ii)* new business models that have been enabled by these technical changes[160].

Technological revolution

Today, advanced economies tend to shift their focus from physical items to intangible assets. Consequently, the importance of digital products grows, as they are providing a new impetus for economies following new technological developments, creative innovations and constant infrastructure improvements (OECD, 2012a). The three main components of this technological revolution are: (i) the digitisation of content, (ii) the rapid growth of high-speed communications infrastructure, and (iii) a dramatic decline in the cost of data storage.

Digitisation of content

Content digitisation is one of the main phenomena that affect the copyright-intensive industries. Today, digital creative content enters and changes many existing creative sectors as new technological advancements emerge. Some copyright-intensive industries use digital content as an alternative to the physical goods they offer (*e.g.* music recordings, films). Others provide completely new products (*e.g.* online computer games, entertainment and business software) that are uniquely digital.

The key property of digital content is its disembodied character. This results in a set of economic characteristics that make digital content particularly different from tangible goods. These differences are outlined in Table 5.3.

Table 5.3. Summary of key differences between tangible goods and digital content

Product feature	Tangible goods	Digital content
Marginal cost of reproduction	Positive	Mostly zero
Hardware dependence	Limited	Hardware dependent
Digital delivery	Impossible	Possible
Market scope	Geographically limited	Global

Marginal cost of reproduction. The main consequence of the non-physical form of digital content is its virtually negligible marginal cost of reproduction. It means that once created, digital content can be reproduced with relatively little cost and effort. Moreover, in most cases a copy of digital content offers the same quality as the original. In the case of a tangible product that contains some creative content (*e.g.* a book or an optical disc) the reproduction involves certain positive marginal costs of supply (*e.g.* materials used for production, costs of packaging, shipping etc.), and apart from its appearance may be quite different in quality from the original.

Hardware dependence. Hardware is a necessary support for all digital content (*e.g.* storage on a hard drive, optical disc, server or other device), and the potential utility that digital content offers to an end user cannot be derived without suitable hardware. Consequently, there are strong linkages and complementarities between hardware and digital products. In fact, trends in consumption of digital content closely follow the newest technological developments (OECD, 2012a).

Digital delivery. The disembodied character of a digital product permits its digital delivery, for example, via the Internet or local area networks. Possible digital delivery implies a significant reduction in the cost of acquisition of a digital product (*e.g.* through reduction or elimination of searching, transportation and storage costs) which in turn significantly facilitates the distribution process. At the same time, digital delivery poses distinct challenges to a sustainable and secure delivery structure (see for example: OECD, 2014).

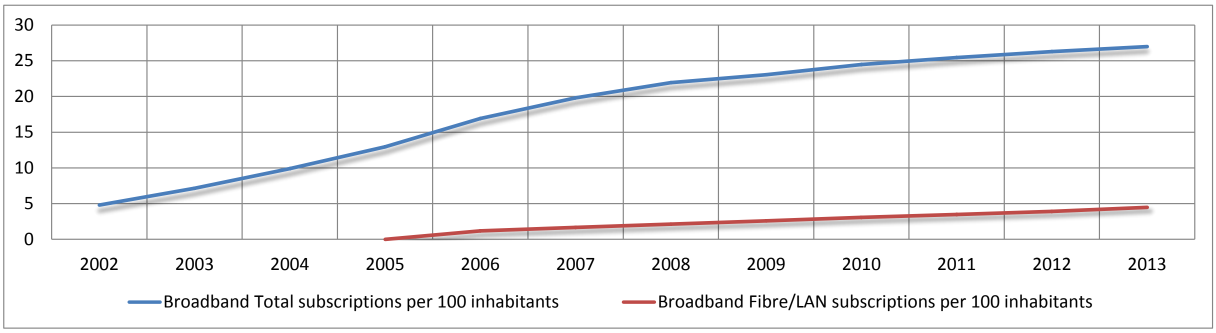
Market scope. The extensive development of global computer networks has enabled digital products to be instantaneously delivered to any part of the world (see *e.g.* BSA, 2007). This implies that the market for digital products has a potentially global scope and many of the barriers that constrain the exchange of physical products (*e.g*. costly transportation, import tariffs etc.) do not limit the exchange of digital products.

High speed communication infrastructures

High speed fixed and mobile networks are the core of the digital economy's infrastructure and enable the transfer and consumption of digitised creative content. Access has improved dramatically over the past decade (Figure 5.2) although important differences still remain between countries with regard to new high-speed network deployment (Figure 5.3.).

Figure 5.3. Fixed broadband subscriptions per 100 inhabitants

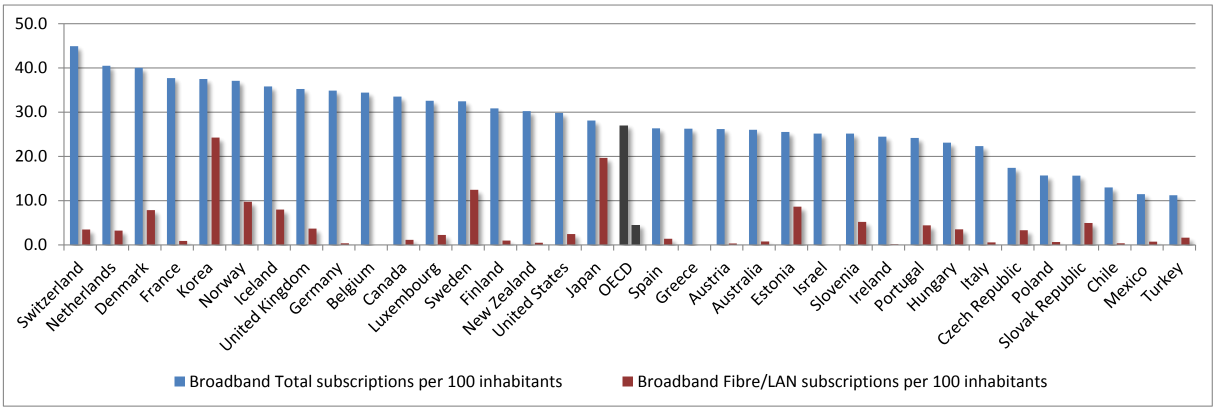
Total and fibre/LAN; 2002-2013; OECD average



Source: OECD Broadband Portal

Figure 5.4. Fixed broadband subscriptions per 100 inhabitants

Total and fibre/LAN, 2013

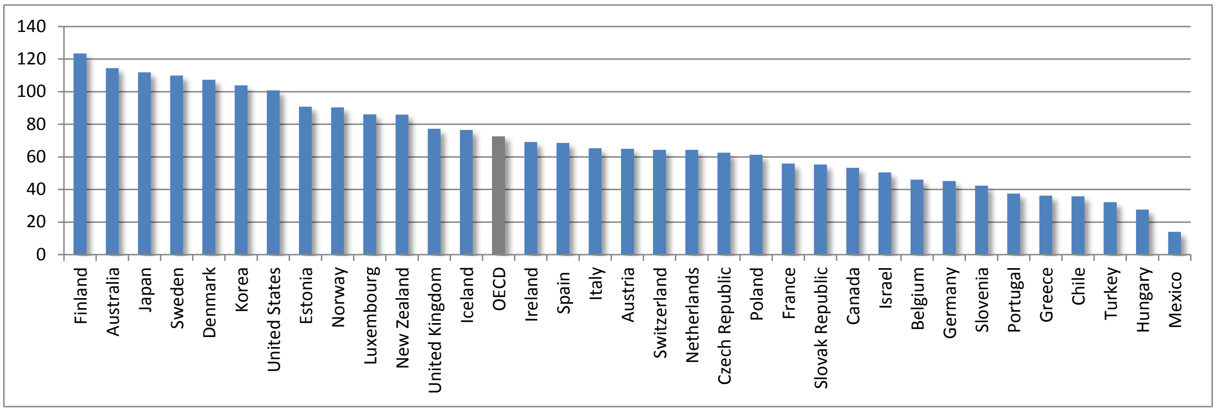


Source: OECD Broadband Portal

More recently there has been substantial growth in mobile broadband access, opening up new communication possibilities to people. Mobile broadband penetration has grown to almost 60% in the OECD area, according to 2013 data, and seven countries (Australia, Finland, Denmark, Japan, Korea, Sweden, the United States) now lie above the 100% penetration threshold meaning that there are some inhabitants of these countries that have more than one mobile broadband subscription for their smartphones, tablets and other devices (Figure 5.5.).

Figure 5.5. Mobile broadband subscriptions per 100 inhabitants

Standard mobile broadband and dedicated mobile data subscriptions, 2013

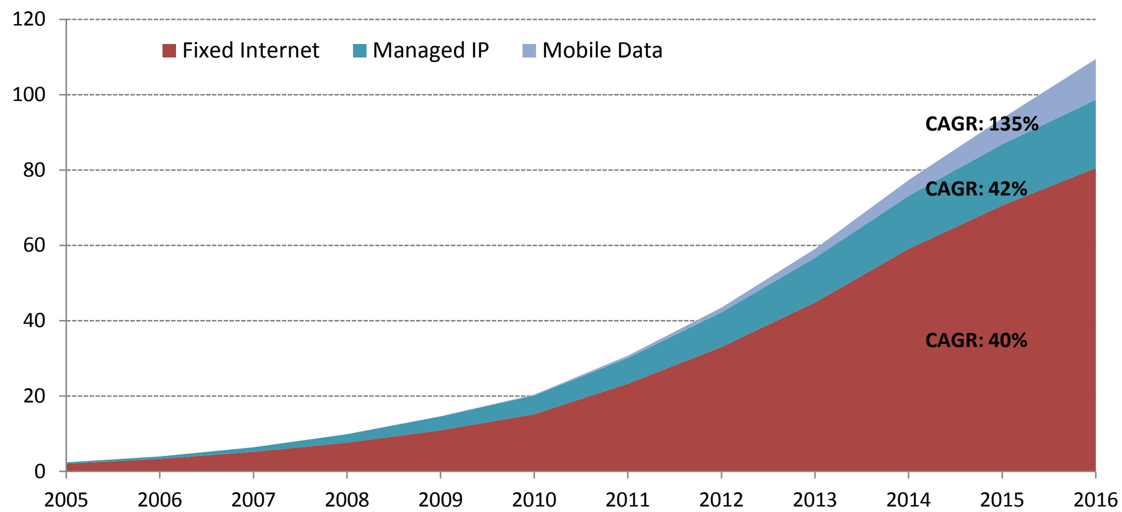


Source: OECD Broadband Portal

In 2013, the rate of mobile broadband subscriptions reached 72 subscriptions per 100 inhabitants in the OECD area. Mobile broadband subscriptions are growing at double-digit rates and it is expected that the number of mobile subscriptions will keep rising in the coming years, stimulated by user adoption of multiple devices (e.g. smartphones and tablets). In terms of data traffic, Cisco (2012) estimates that the amount generated by mobile telephones will reach almost 11 exabytes (billions of gigabytes) by 2016, i.e. almost doubling every year (see Figure 5.6). Given that mobile phone penetration (subscriptions per 100 inhabitants) exceeds 100% in most OECD countries and that wireless broadband penetration is at nearly 60% on average, this source of consumption of creative content data will grow significantly as smart phones (as opposed to ordinary mobile phones) become the prevalent personal device.

Figure 5.6. Monthly global IP traffic, 2005-16

In exabytes (billions of gigabytes)



Source: OECD (2013b) based on Cisco (2012). “Managed IP” is mostly Internet traffic within the autonomous networks of large organisations.

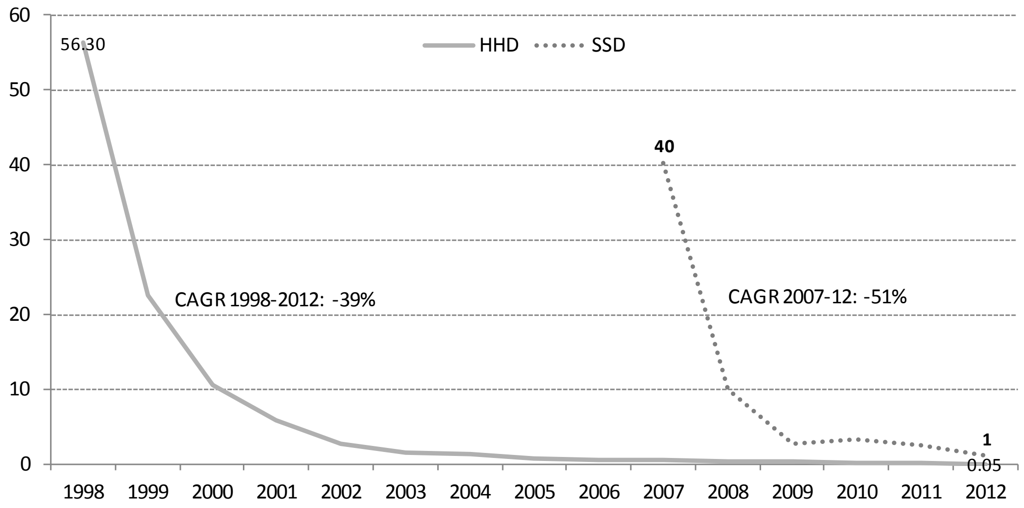
Data storage

While the above-mentioned technological developments mainly drive the transport and consumption of content, the actual use of digital creative content has been greatly facilitated by the declining cost of storage of digitised data, including copyrighted digital content. In the past, the cost of storage discouraged keeping content that was no longer, or unlikely to be, needed (OECD, 2011b). But storage costs have decreased to the point at which content can generally be kept for long periods of time, if not indefinitely.

This shrinking cost of storage of digital content is illustrated, for example, by the average cost per gigabyte of consumer hard disk drives (HDDs), which dropped from USD 56 in 1998 to USD 0.05 in 2012, an average decline of almost 40% a year (Figure 5.7). With new generation storage technologies such as solid-state drives (SSDs), the decline in costs per gigabyte is even faster. This means that consumers basically do not need to take the storage issues into account when demanding digital creative content. For suppliers it implies that their offer is no longer limited by storage costs.

Figure 5.7. Average data storage cost for consumers, 1998-2012

In USD per gigabyte



Note: Data for 1998-2011 are based on average prices of consumer-oriented drives (171 HDDs and 101 SSDs) from M. Komorowski (www.mkomo.com/cost-per-gigabyte), AnandTech (www.anandtech.com/tag/storage) and Tom's Hardware (www.tomshardware.com/). The price estimate for SSD in 2012 is based on DeCarlo (2011) referring to Gartner.

Source: OECD based on Pingdom (2011).

Booming volume of content

The impact on content diffusion of the technological changes presented above is visible in a number of statistics that illustrate the recent boom in on-line creative content. Examples of on-line images, songs and videos can provide some insights. It is useful to keep in mind the difference between – and corollary desirability of – professional content and amateur content in this context.

With respect to on-line (mostly amateur) images, the photo sharing site Flickr reached 1.6 million photos uploaded daily on average on its platform in 2013[161]. Other networks are also seeing tremendous growth in photographic content. In September 2013, Facebook announced that its users had uploaded a total of 250 billion pictures on the platform so far[162]. Another example is Instagram, which recently announced that its members had published 20 billion photos; on average, 60 million uploads per day[163].

Regarding commercial on-line music, the *iTunes Store*, one of the most popular on-line music stores, available in 119 countries, offers a selection of over 26 million songs[164]. Another on-line service, Spotify, offers commercial music streaming services with over 20 million tracks licenced globally, and adds on average over 20 thousand songs per day[165].

Concerning video, a good example of mostly amateur content is YouTube, one of the most popular video sharing sites on the Internet. In mid-2014 they reported that users watch over 6 billion hours of video each month on their platform. The site also reports that users upload 100 hours of video to YouTube every minute[166]. Film and TV content can be found on multiple download and streaming services. One example is Netflix, whose streaming-on-demand platform is reported to offer over ten thousand movies and TV titles on the US market[167]. In Europe, the MAVISE database organised by the EU's Office for Harmonisation in the Internal Market (OHIM) has identified 3695 on-demand services[168].

These examples highlight only the technology-enabled growth in volume of content, and do not take into account content quality. However, irrespective of the quality aspect, one should admit that such large volumes can be observed only on the Internet and are not attainable in the "off-line world".

New business models

Continuous developments in technological infrastructure, software solutions and hardware significantly improve market access and affect business innovation processes. As technology continues to evolve, improve and expand, more and more services introduce new business models, while other services offer combinations of traditional business models. Key innovations in recent years include the expansion of business models that:

- are based on the Internet as a new way of content delivery;
- take advantage of improved portability of content thanks to growing penetration of mobile devices such as smartphones or tablets, and
- adapted traditional ways of generating revenue from off-line to on-line models, such as ad-based models and subscription-based models.

In addition to the general discussion of new business models presented below, brief case studies of relevant individual business models will be discussed in the country studies section.

New delivery models

Rights holders have recognised that the Internet is a fast and convenient way to deliver content. Download and streaming services provide a variety of options to consumers, offering digital recorded content which can include individual music tracks, albums, TV episodes, special premium content, and videos etc. for purchase or streaming via computer, mobile phone or tablet, through a variety of delivery models. These services are present in virtually all sectors of the copyright-intensive industry, including audio visual works (e.g. TV and film), music, publishing, professional photography and video games.

Recorded music was the first copyright-intensive industry to confront the physical-to-digital transition. Even though the music industry in some countries (e.g. Canada) has been reporting declines of sales since the 2000s, more recently retailers have reported growth in sales volumes and in the geographical scope of their markets[169]. For example, in 2012 there were 2.3 billion single track downloads worldwide, an increase of 8% over 2011, and 210 million digital albums sold, up 16% over 2011 (IFPI, 2013). Another example is the iTunes store that was launched in 2003 in the US and it was followed by

Canada and several EU countries in 2004. Today the iTunes store with music is available in more than 150 countries.

In book publishing, digital technologies have been employed for a long time, but they took off only when end users were offered a satisfying reading experience. This happened in the past five years, after the introduction of sophisticated e-reading devices (See Box 5.1.).

Box 5.1. e-Books

The *e-book* is a book composed in or converted to digital format for display on a computer screen or handheld device.

Figures collected to date by national publishers associations suggest that e-book sales still make up only a small proportion (around 1% for 2010) of book sales in most OECD countries outside the United States. Figures for the United Kingdom suggest a slightly greater percentage of the book market represented by e-books (2-3%). Figures for the United States show e-books representing up to 8% of book sales in 2010. However, more notable than absolute revenue or percentage figures, are the recent dramatic rates of growth in OECD markets for e-books. On 19 May, 2011, Amazon announced that since April its sales of e-books had overtaken sales of all forms of print books combined. Starting in April it has sold 105 e-books for every 100 print books. This does not include downloads of free Kindle e-books, which if counted, push the e-book advantage even higher. Consumers spent an estimated USD 966 million on e-books in 2010. By 2015, the industry is anticipated to nearly triple to almost USD 3 billion.

There are a number of indications that e-books are not replacing demand for print books in the general “trade”, or “consumer” category. While there is insufficient data available at this stage to draw any concrete conclusions on trends, some of the recent figures from the industry indicate that e-books are stimulating demand for print books. Contrary to widespread belief, the publishing industry in the United States grew in both 2009 and 2010, aided by USD 1.6 billion in sales from e-books. Total estimated revenue for all US publishers rose 3.1% in 2010, to USD 27.9 billion, following a 2.5% increase in 2009. E-book sales across all publishing categories in the United States rose 29.4% in 2009 and 38.9% in 2010, and accounted for 5.8% of total industry revenue in 2010.

Source: OECD (2012b)

Visual arts are another sector where the technical possibility of digital downloads has profoundly reshaped existing business models and provided corollary opportunities for piracy. Today, online services, mainly websites and other platforms such as newsgroups, are frequently used to disseminate visual arts. In addition, the Internet also enabled the emergence of dedicated on-line databases containing specialised arts images. Sometimes images are disseminated without charge (*e.g.* Google images) or for a given fee through photo stock agencies (*NMR, Roger Viollet, Corbis, Magnum*, etc.) and microstocks (*Getty Images, Fotolia*, etc.) One potential difficulty for visual artists, however, has been the ease with which identifying metadata and other important information can be stripped from works in the online environment. This problem exacerbates the obstacles affecting visual artists’ efforts to protect and license their works.

The video game industry is another industry segment where the Internet acts as an efficient means of content delivery. Over the past several years, online games have become one of the fastest growing segments of the video game sector, spurred by rising broadband penetration and the inclusion of robust online capabilities in the current generation of consoles. Legitimate downloads of all types of games are widely provided by game publishers, as well as console and phone manufacturers. Today, the video game industry is characterised by the very large numbers of players who are able to simultaneously engage with each other and to play online. A 2013 study conducted for the industry revealed that 72% of gamers in the United States played some form of online game. This represents an increase in incidence of 5 percentage points among gamers from 2012 (NPD Group, 2013).

Improved portability

Improved portability is another area where technological progress affects business models in the copyright-intensive industries. Portable devices such as laptops, smartphones and tablets give users more opportunities to consume creative content delivered over the Internet (streamed or downloaded). In fact, according to a recent study, an average European has 2.6 screens against 1.4 three years ago (Let's Go Connected, 2013).

Improved portability is recognised by copyright-intensive industries that now offer services that work on all types of mobile devices, such as smartphones or tablets. These services provide streaming, cached content (temporarily downloaded to a device so users can listen even when offline), tracks, albums, videos and ringtones for use on mobile phones. Streaming services allow users to choose and listen to whatever music they like, on the go, while the caching of music means that it is possible to look through all playlists and load up favourites. Downloaded purchased tracks on mobile phones can also be transferred to other devices.

This category also includes mobile applications or 'apps' that work in conjunction with other complementary online services on an Internet-connected PC. Mobile games are a case in point (see Box 5.2.).

Box 5.2. Mobile games

Games is now the largest category of apps on *Apple's iOS App Store*, and game publishers regularly constitute the majority of the top ten app publishers on both the *iOS App Store* and the *Google Play store*, measured by revenue. Of the 20 most downloaded apps on the *iOS* platform (as of 7 June 2013), 12 were games, and of the 20 highest grossing apps, 15 were games. Games now claim 80% of the revenues on *Google Play* and 75% on *iOS*. In the second quarter of 2013, games accounted for roughly 45% of downloads from the *iOS App store*.

The business model for mobile games is moving from the pay to download to the so-called *freemium* mode, where games are downloaded for free, with micro-transactions and advertising providing revenues. It is estimated that in-game purchases will soon outpace download fees.

The mobile game market is expected to continue to grow as the penetration by smartphones and tablets expands. More people are playing games, including casual games, social games, and more-advanced multiplayer games. Simple, arcade-style games that involve puzzles, words, board and card games, game show and trivia continue to dominate the market because they are quick to learn and easy to play. The most popular mobile games are single-player board games, puzzles, and word games.

New sources of revenue

Over the past decade copyright-intensive industries have experimented with different revenue schemes in order to profit from digital consumption. These schemes vary from a total "paywall", where no content can be accessed without payment, to models where the whole content is available for free and the revenue is gathered from other sources, such as advertisements.

An illustrative example of a "paywall" can be found in the music industry, where there are numerous subscription based services. These services offer access to their entire catalogue to customers for a monthly fee. Many subscription services also come bundled with either an Internet or a mobile phone subscription. Other subscription services offer selected bundles of tracks or music albums for smaller subscription fees, or offer subscriptions on a daily or weekly basis, according to consumer preferences.

Subscription services are the fastest growing area in video and in digital music. In 2013 there were about 2500 video-on-demand services ago (Let's Go Connected, 2013). In digital music, there were at least 530 music subscription services in 2013 in the EU only (Enders, 2013). The rapid growth of subscription based services was largely driven by bundling deals with Internet Service Providers (ISPs) and mobile operators, an improved user experience, integration with social networks and a greater variety of price points.

In addition to the subscription-based services, where a payment is necessary to get access to the content, another observable trend is towards introducing a metered model, where copyright-intensive industries charge for access to certain content or services while also allowing casual visitors a certain amount of access. This strategy allows developing long-term paying customers, while also benefiting from the potential advertising revenue generated by visits by more spontaneous users. For example, in the news industry the *Financial Times* website, *FT.com,* only allows access to registered users and subscribers, and registered (but non-paying) users can only read up to ten articles per month. In addition, an online subscription provides many services, such as the ability to comment on articles, to write blog posts, have a personalised home page, and to have access to archives. These services provide readers with additional reasons to pay for subscriptions, while allowing others simply to peruse the news pages freely.

In a different approach, many services offer a free advertising-supported model where consumers sign up to a service and benefit from most of its functions, yet listen to (or watch) a certain number of ads. Most operators of ad-supported streaming models as well as the copyright owners whose works are being consumed hope to convert users to premium versions which offer additional functions and ad-free services.

Focus on legal frameworks

Copyright is a legal concept that is more than three centuries old, has been evolving over that time, and is codified in a set of international treaties[170], although the pace of development of the international regime has recently tended to slow down. The recent technological revolution and its impact on creative content significantly re-shaped the environment addressed by copyrights. Consequently, certain legal aspects might need re-visiting and some countries have amended or attempt to amend them. The analysis of various national experiences (presented in section four) distils five general areas of copyright legislation that have been the subject of discussion in the context of the Internet. They include:

- copyright limitations and exceptions
- scope of copyrights
- orphan works
- copyright enforcement
- copyright registration

There is a diverse set of views regarding the optimisation of these areas and different ways of dealing with these legal aspects are presented in the country studies section. That presentation is neither exhaustive nor is it necessarily universally representative; it presents those legal issues that were identified as relevant in most of the twelve analysed country studies. Clearly, in some economises there might be other copyright-related legal issues that are being currently debated in the context of the Internet revolution.

Limitations and exceptions

The technology-enabled ease of copying and transforming content calls for adequate legal solutions in this area. As noted in the Hargreaves Review, the copyright licensing process in the digital age can be overly expensive, difficult to use and access, insufficiently transparent, etc. (Hargreaves, 2011). According to the report it took nearly five years to the BBC to assemble the rights necessary to launch its popular iPlayer service. Such large cost of time and money that can be often borne by the industry becomes discouraging for individual users. Consequently, the technology enabled ease of copying and transforming content calls for legal frameworks that minimise these monetary and non-monetary transactions costs, especially in the area of small-scale, personal use.

Collective management organisations can be useful in bringing transaction costs down so that right holders can more easily manage their collections of content. Other flexible licensing arrangements such as micro-licensing and sublicensing can also create enhanced efficiency, as can effective databases that provide ownership and other information.

Another example of situations for which policy makers have introduced limitations and exceptions is where public benefits, or what economists call positive externalities, may be associated with copying copyrighted content. For example, specific and limited exemptions for the use of copyrighted material have been implemented for the purpose of research or study, judicial proceedings, parody or satire, and criticism or review.

Scope

Copyright may apply to a wide range of creative, intellectual, or artistic forms, or "works". Specifics vary by jurisdiction, but these can include poems, theses, plays and other literary works, motion pictures, choreography, musical compositions, sound recordings, live performances, paintings, drawings, sculptures, photographs, computer software, radio and television broadcasts, and industrial designs.

In the context of technological progress it is important to notice the issues related to data-protection by copyrights. Economic and social activities have long relied on data. Today, however, the technology has enabled a shift towards a data-driven socioeconomic model, in which data are a core asset that can create a significant competitive advantage and drive innovation, sustainable growth and development (OECD, 2013b). Data can be created by either people or machines (such as sensors gathering climate information, satellite imagery, digital pictures and videos, purchase transaction records, GPS signals, etc.). It is generated in many sectors of the economy, from healthcare to transport and energy, and stored in databases.

In the context of copyrights, it is necessary to distinguish between creative and non-creative databases because a different set of legal rules applies to each of them. Generally, legal systems protect creative databases that constitute a creative compilation under copyright law. Non-creative databases are those that do not include a component that could be considered creative and original, even though their creation required a certain level of effort or investment. However, the level of creativity required for copyright protection that makes the difference between a creative and non-creative database has not been defined internationally.

In addition, some countries grant legal protection for non-creative databases either through including them in their copyright legislation or by *sui generis* right (special right) to protect non-creative databases that do not meet the required level of creativity for copyright protection but which were made with substantial investment.

Orphan works

Orphan works have been referred to as copyrighted works whose rights holder cannot be identified and/or located after a thorough search[171].

The phenomenon of orphan works is not new, but the advent of new technologies has brought this issue to the forefront. Given the global nature of the Internet network and the booming volume of copyrighted content available online, an identification of the legitimate right holder of a particular copyrighted item often becomes impossible. As highlighted in a report prepared for the British Film Institute (BFI), the fact that “it is sometimes impossible to identify or locate the rights holder means that archives, libraries, museums, broadcasters, commercial operators and other media providers cannot ask for permission to make use of the orphan work and therefore digitisation projects and online access are hindered. Orphan works therefore remain unavailable to the general public, entombed in public or private archives, and new business models are hampered from making use of them” (KEA, 2011). An illustrative example is the development of digital libraries, which have a key role in preserving the copyrighted works and that are hampered by inability of identification of some of the copyrighted material (Iglesias, 2009).

Enforcement

The rapid development of the Internet implies that more people than ever before have access to practically any type of news or data. However, this technological progress also facilitates digital piracy, as users employ various web based workarounds and applications to distribute and exchange large amounts of pirated digital products instantaneously around the world. Hence, a significant volume of digital piracy occurs via the Internet, which is the main way to exchange of all types of digital information (OECD, 2009).

Piracy over the Internet is a significant problem that seems to be growing in many countries. According to the recent 301 Report by the US Trade Representative, on-line copyright infringement is a growing concern for virtually all copyright-intensive industries, in all formats including mobile telephones, tablets, flash drives, and other mobile technologies. In addition, some new forms of piracy emerge such as so-called “grey shards” (pirate servers). These servers offer players of cloud-based entertainment software unauthorised access to play copyrighted games. This access is generated through hacked software or circumvention of technological protection measures (USTR, 2014).

The local legal and regulatory frameworks are key factors in preventing digital piracy. Legal systems allow copyright holders to take legal action against infringing parties and to claim compensation for potential losses. A strong legal framework can reduce digital piracy, while a weak one could be viewed as tolerant towards these activities and allows piracy to flourish. This hypothesis seems to be confirmed by several studies by, that found that economies with strong copyright protection regimes tended to report lower rates of piracy (Van Kranenburg and Hogenbirk, 2003; Das, Mukhopadhyay and Bagchi, 2014).

However, legal frameworks are effective only to the extent that the laws are enforced in practice. If the resources devoted to enforcement are inadequate or intellectual property rights are not otherwise enforced by public authorities, then the value of the nominal laws and regulations to the rights holders is low. Even the nominally strictest law could therefore potentially have no impact on the scale of digital piracy.

In addition, the risk of discovery and subsequent legal action must also be considered in relation to the potential consequences that infringers may face, in terms of the amount of any expected monetary penalty or the likelihood and duration of possible jail sentences. For instance, if the expected consequences are small, then even a high risk of discovery may have little practical impact on counterfeiting and piracy activity (OECD, 2009). In fact, there is a significant difference, for instance, between a minor fine, and a criminal prosecution that eventually could result even in a prison sentence. In fact, according to a study by BSA – Harris (2007) potential legal consequences could discourage some individuals from exchanging pirated digital goods.

As a practical matter, digital piracy generally cannot be detected at national borders. The international flow of pirated digital products is more difficult to track by law enforcement agencies from sellers, via distributors, to producers, than the flow of physical goods. The large numbers of individuals involved present further challenges for effective international cooperation amongst enforcement agencies.

Copyright registration

The purpose of copyright registration is to place on record a verifiable account of the date, owner and content of the work in question, so that in the event of a legal claim, or case of infringement or plagiarism, the copyright owner can produce a copy of the work from an official government source. In this context copyright registration could be also seen as one of the potential solutions to the issue of *orphan works*. According to some researchers the currently observed increase in orphan works can be largely attributed to the fact that that copyright is automatically granted without any registration process (Netanel, 2008).

Registering a copyright should not be confused with granting a copyright. According to the Berne Convention (1886), copyright applies as soon as the work is published; registration does not strengthen or modify the copyright in any way.

COUNTRY STUDIES

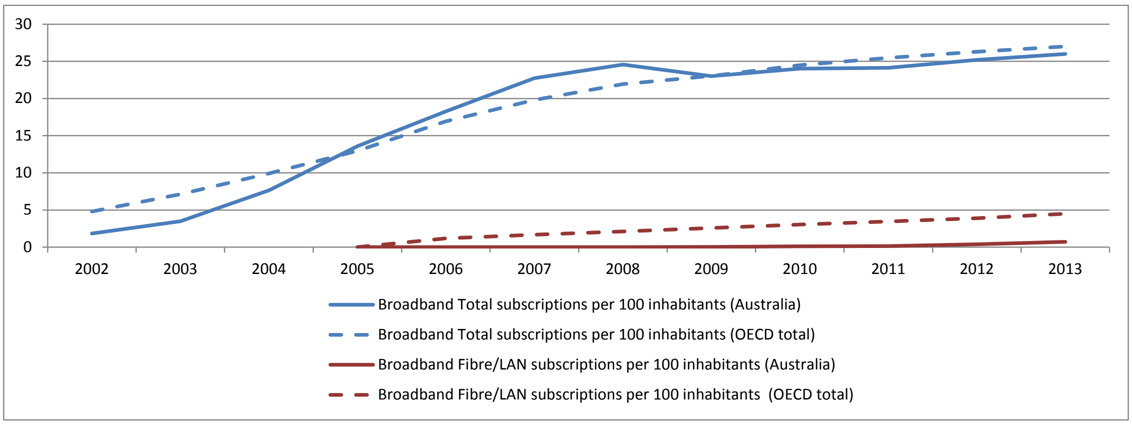
Australia

State of the Internet

In recent years access to broadband networks and the Internet has constantly increased in Australia. In terms of fixed broadband, penetration levels have been growing constantly and are slightly below the OECD average, reaching 26 subscriptions per 100 inhabitants in 2013. In addition, further deployments of fibre networks have taken place. Overall, however, deployment of fibre is still at an early stage in Australia and is below the OECD average (see Figure 5.8.).

Figure 5.8. Broadband penetration rates in Australia

2002-2013, per 100 inhabitants

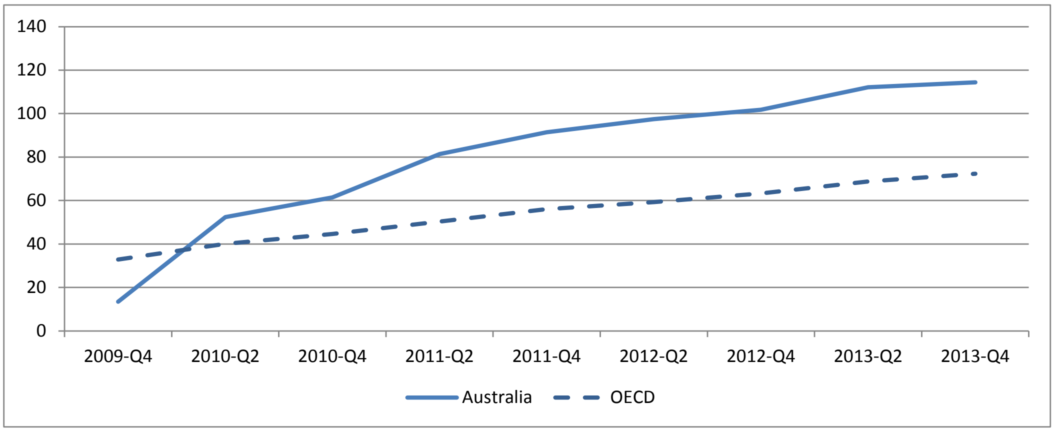


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in Australia, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has recently exceeded 100% in Australia, meaning that some customers have more than one mobile internet subscription (Figure 5.9.).

Figure 5.9. Mobile broadband subscriptions in Australia

2009-2013, per 100 inhabitants



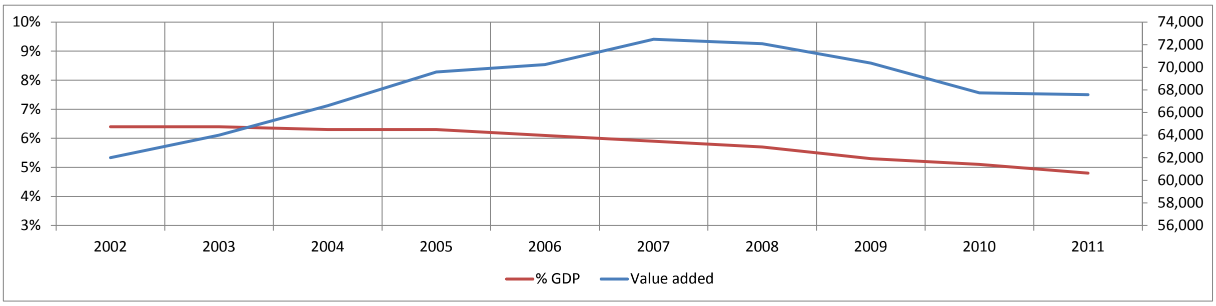
Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past ten years copyright-intensive industries in Australia have demonstrated overall satisfactory performance[172]. Between 2002 and 2011 the total volume of the copyright-based industries grew by 9%, at a much slower rate than the overall economy which grew by more than 50% during the same period. In absolute terms Australian copyright-intensive industries reported moderate rates of growth in the period 2001-2007, followed by a slow decline between 2008 and 2010. In 2012 the total contribution calculated for the core copyright-based industries was AUD 67.5 billion, accounting for 5% of Australia's GDP (Figure 5.10).

Figure 5.10. Added value of copyright-Intensive industries in Australia

2002-2012, AUD million (right axis) and % of GDP (left axis)

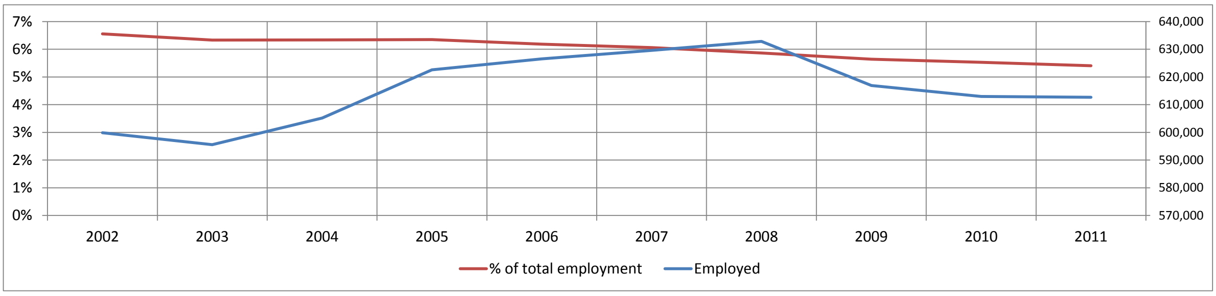


Source: PWC (2012) and Australian Bureau of Statistics, Australian Industry.

Employment: The total number of people employed in copyright-intensive industries represented 5.5% of all employed. Between 2002 and 2011, the overall share of people employed in copyright-intensive industries in total industry employees reported a slight reduction by one percentage point. The total employment reported some fluctuations over that period. In 2011 it amounted to 610,000, which was slightly more than the volume of employment in these industries in 2002 (Figure 5.11).

Figure 5.11. Employment in copyright-intensive industries

% of total employment (right axis) and total volume of employment (left axis)



Source: PWC (2012) and Australian Bureau of Statistics, Australian Industry.

Copyright-intensive industries and the Internet economy: The Internet profoundly re-shapes Australian industry by re-shaping existing business models and introducing brand new ways of business operation. According to existing estimates the broadly interpreted Internet economy contributed directly in 2010 AUD 50 billion to Australian GDP, which is 3.6% of total GDP of Australia (Deloitte 2011).

Australian copyright-intensive industries successfully leverage the technical opportunities offered by the Internet. For example in 2011 *JB HiFi*, the largest Australian music, video and games retailer introduced a web-based, platform agnostic streaming music service *JB Hi-Fi NOW*. Within six months after the launch JAB HiFi NOW has managed to achieve a very competitive position. For example, the daily iOS rankings for free Music apps on the Australian iTunes store shows *JB Hi-Fi NOW* app downloads consistently in the top 10-20 positions. According to Scott Browning, the marketing director at *JB Hi-Fi* the most important factor was "the cost of broadband, and the speed of download, [whereas] copyright laws don't impede *JB Hi-Fi* plans; in fact they help by providing a platform to build from."

In addition, there are several start-ups that took the advantage of the internet as the distribution channel. Examples include *Atlassian* (software) and *Quickflix* (television and film content) (See Box 5.3.).

Box 5.3. Australian creative businesses on the Internet: Atlassian, Quickflix

Atlassian is a worldwide leader in software development. Founded in 2002 it is well known for its tracking applications and team collaboration products. Currently its customers include: Boeing, Ikea, Cisco, Nike and Sony. It should be noted that instead of having traditional sales unit, *Atlassian* fully relies on the Internet as a sole sales platform team, and presents all prices, products information, support requests, as well as training materials and documentation on its web-site.

Quickflix is Australia's leading online movie company. It offers subscriptions to television shows and movies delivered as DVDs by mail or streamed instantly over broadband networks. Customers stream content via the internet, direct to their preferred viewing device, It has amassed a collection of more than 60,000 movie and television series titles and as of June 2013, had over 106,000 customers.

Legal landscape

Current copyright legislation: In Australia the legal issue of copyrights is regulated by the Copyright Act that was first passed in 1968 and amended several times.

Recent evolution: The Copyright Act 1968 framework was designed well before digital technology became a prevalent feature across society. A number of amendments have sought to bring the Act up to date with contemporary uses of technology. Many of these technologies have facilitated access to goods and services produced by copyright-related industries. Since 1968, there have been over 60 major or minor amendments to the Act. The most recent significant amendment to the Act was made in 2006 (Copyright Amendment Act 2006). Among other things, this amendment strengthened the anti-circumvention laws (against bypassing technical protection measures of content), and re-examined the issue of copyright exceptions, but it did not enable for personal copying of digital content, which was becoming a common practice at the time.

Duration of copyright: In Australia copyright protection generally ends 70 years following the death of the last living author[173].

Institutional setting: There is no copyright office in Australia. The two main institutions in the area of copyrights in Australia are: Attorney-General's Department and the Copyright Tribunal of Australia.

- *The Attorney-General's Department* of the Government of Australia administers the Copyright Act 1968. Within the Department, the Commercial and Administrative Law Branch, is responsible for developing copyright policy. The Attorney-General's Department consults a number of other agencies where necessary, including: the Department of Foreign Affairs and Trade, the Department of Communications, and the Department of Education amongst others.

- *The Copyright Tribunal of Australia* is an independent body administered by the Federal Court of Australia. It has jurisdiction with respect to licensing of copyright works.

Database protection: There is no sui generis database right in Australia. Databases that meet originality criterion are protected by copyrights.

Limitations and exceptions: The main concept of exceptions to copyright infringement in Australia is called "fair dealing". Fair dealing defines the scope of use of a copyrighted work that does not require a right holder's permission. In Australia fair dealing covers: non-commercial research and study purposes, review and criticism, parody and satire, "reporting the news", judicial proceedings or professional advice. In addition special exceptions in some cases are provided for libraries, archives, educational institutions, and persons with a disability.

Orphan works: There are no general exceptions for using orphan works in Australia. Potential users of creative content who cannot identify the copyright owner are advised to use a risk management approach[174].

Copyright registration: No registration is necessary for copyright protection in Australia

Enforcement: In Australia copyright infringement is generally a civil matter, which the copyright owner must pursue in court. Under certain circumstances, the infringement may also constitute a criminal misdemeanour or felony. In addition a notice in writing may be given to the Chief Executive Officer of Customs objecting to the importation of copies of copyright materials suspected to be infringing copies.

Current debate

Summary of current debate: The public debate on "copyrights in the age of the Internet" is relatively advanced in Australia. It has been taking place for several years, and gathered numerous experts from the government, academia, think tanks, industry and civil society.

With respect to public agencies, the Australian Law Reform Commission is a federal agency that reviews Australia's laws. It has recently published its report, "Copyright and the Digital Economy" that recommends the Government to introduce a fair use exception, relax statutory licensing provisions, and reassess the effectiveness of the retransmission scheme, amongst other things[175]. The Government is currently considering the ALRC's recommendations.

In addition, on 14 February 2014, the Attorney-General, Senator the Hon George Brandis, announced that the Government would be looking to address the issue of online piracy. This is likely to re-open the public debate in Australia on the general issues of secondary liability.

Industry associations and industry best practices: There are numerous industry associations in copyright-intensive industries in Australia. The main ones include: Australian Screen Directors Authorship Collecting Society (ASDAC), Australian Writers Guild Authorship Collecting Society (AWGACS), Copyright Agency Limited, Media, Entertainment & Arts Alliance, Music Rights Australia, Phonographic Performance Company of Australia (PPCA), Screenrights, Viscopy, Copyright Society of Australia, and the Australian Copyright Council.

These associations carry out a number of activities, including: collective rights management (ASDAC, AWGACS, PPCA, and Viscopy), countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities), awareness raising campaigns in the area of copyrights, and data collection.

Previous governments have sought to facilitate a self-regulatory code for internet service providers and rights-holders to deal with the issue of online copyright infringement and authorisation. The Australian industry has so far been unable to reach agreement on how such a code would work in practice with the main point of disagreement being who would bear the costs of any potential scheme.

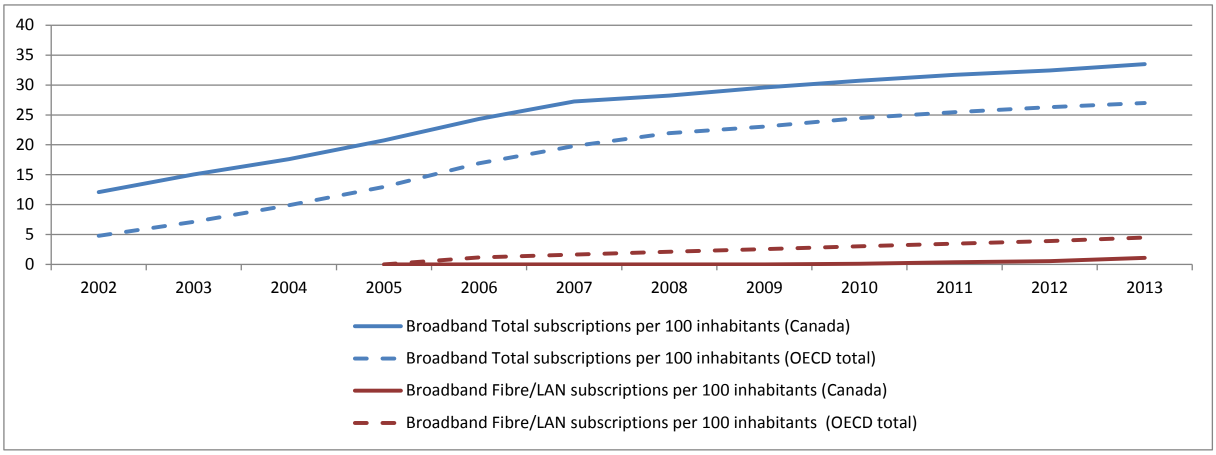
Canada

State of the Internet

In recent years access to broadband networks and the Internet has constantly increased in Canada. In terms of fixed broadband, penetration levels have been growing constantly and are well above the OECD average, reaching maturity. In addition, further deployments of fibre networks have taken place. Adoption of fibre/LAN subscription in Canada is still at an early stage and is below the OECD average (see Figure 5.12). Canadian operators more typically upgraded their networks via hybrid-fibre FTTN and cable DOCSIS 3.0 technologies. Overall coverage of networks at speeds of at least 30 Megabits per second reached 80% of households in 2013[176].

Figure 5.12. Broadband penetration rates in Canada

2002-2013, per 100 inhabitants

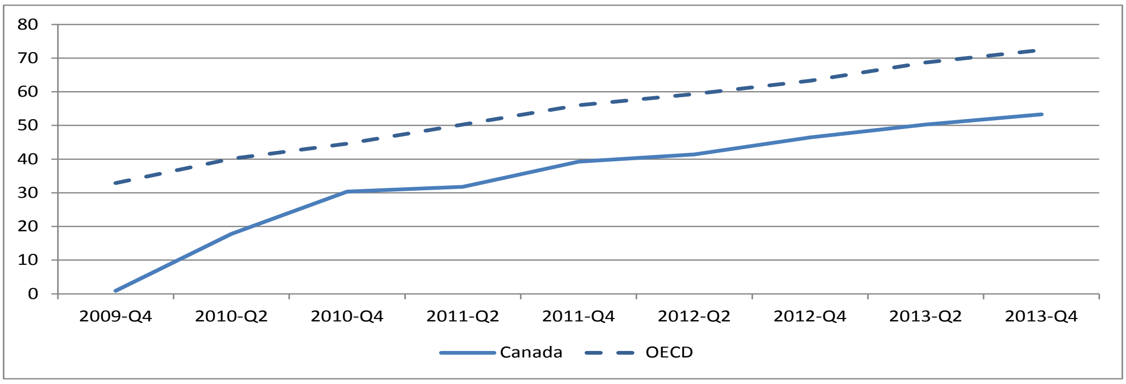


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in Canada, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has exceeded 40% in 2012 and has grown to almost 50% in Canada in 2013. However, this is still below the OECD average that reached close to 60% (Figure 5.13) in 2013.

Figure 5.13. Mobile broadband subscriptions in Canada

2009-2013, per 100 inhabitants

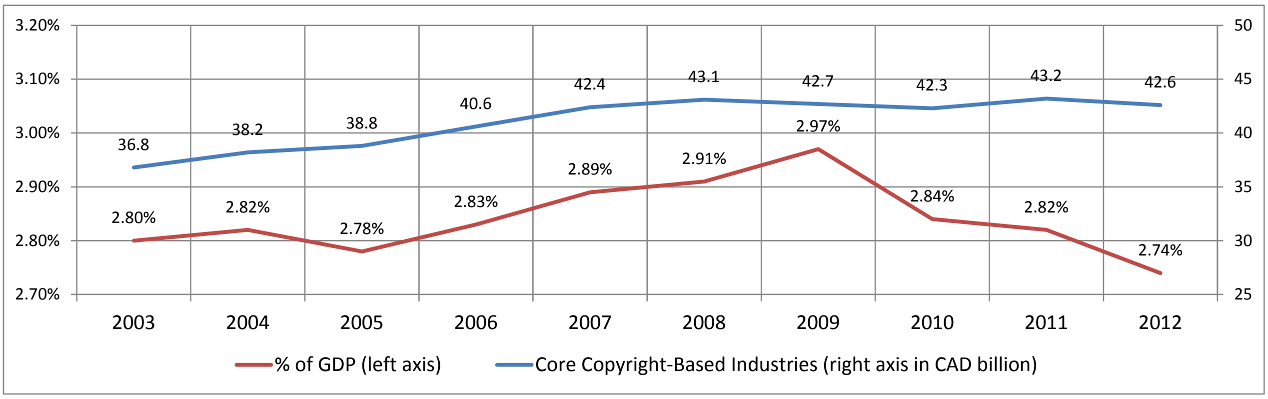


Source: OECD Broadband Portal

Copyright-based industries: Market overview

Value added: Between 2003 and 2012, Canada's core copyright-based industries have demonstrated performance comparable to the overall economy of Canada[177]. The contribution of the copyright-based industries to the Canadian GDP has increased by 15.9%, from CAD 36.8 billion in 2003 to CAD 42.6 billion in 2012. During the same period, Canadian GDP has increased by more than 18.5%. Furthermore, in terms of percentage contribution to the GDP, the share of core copyright-based industries in Canadian GDP has remained relatively constant around 2.84% on average during the period 2003 to 2012 (Figure 5.14).

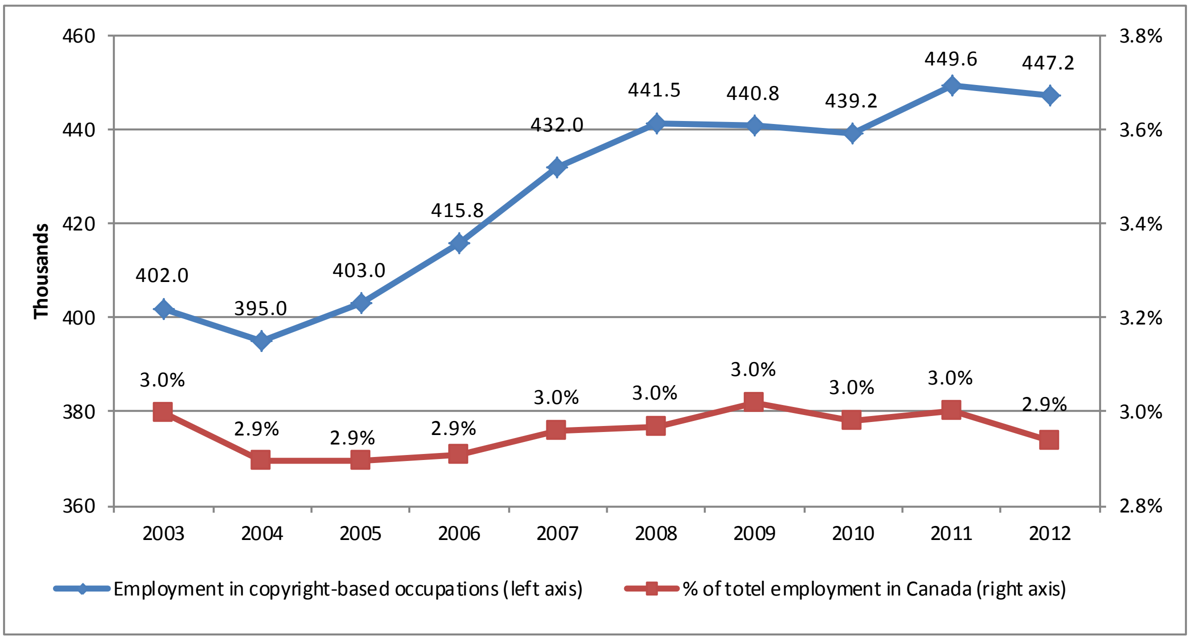
Figure 5.14. Added value of core copyright-based industries in Canada, 2003-2012



Source: Statistics Canada's key socioeconomic database (CANSIM 379-0031); for core copyright-based industries see Table 5.1.

Employment: Based on Statistics Canada Survey of Employment, Payrolls and Hours (SEPH), core-copyright based industries are found to be responsible for 2.9% of total employment in Canada in 2012, estimated at 447,226 jobs. Over the last ten years (2003-2012), the total number of people employed in copyright-based industries has increased by nearly 11.2% in comparison to more than 13.5% for the entire economy. Figure 5.15 below provides detailed description of the evolution of the level of employment in the copyright-based industries.

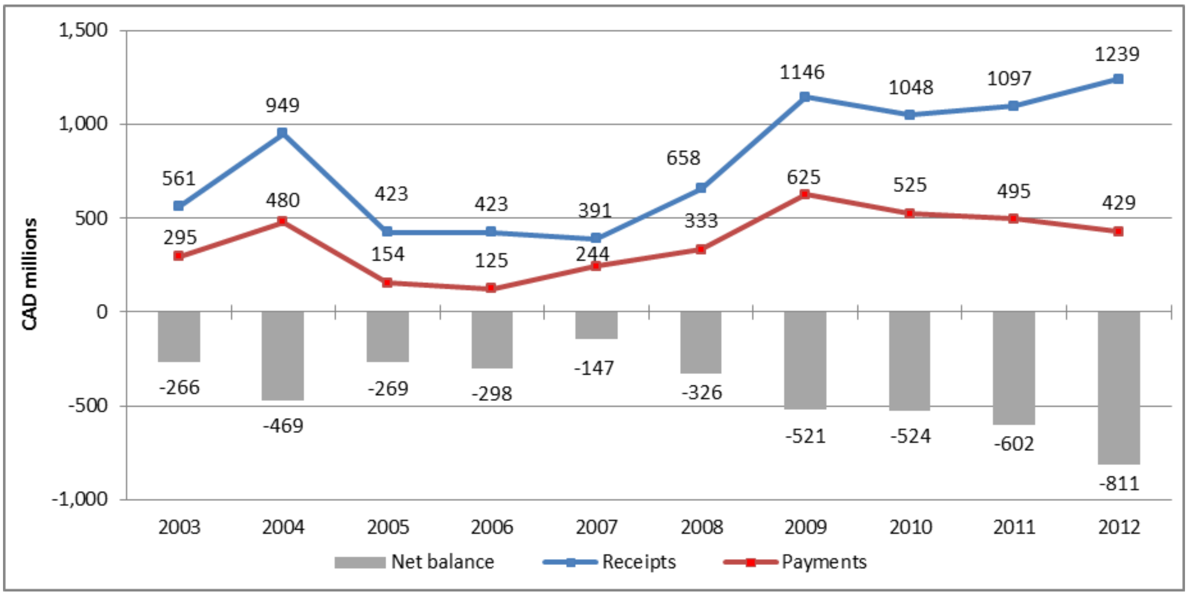
Figure 5.15. Employment in copyright-based industries in Canada, 2003-2012



Source: Statistics Canada's key socioeconomic database (CANSIM 281-0024); for core copyright-based industries see Table 5.1.

International exchange: International payments made and received was in a negative trade balance over the ten-year period observed for copyright and related rights services. Annual receipts increased by more than 45.4% between 2003 and 2012 from CAD 295 million to CAD 429 million. On the other hand, payments also grew by more than 120.9% over that period from CAD 561 million to 1,239 million CAD. (Figure 5.16.).

Figure 5.16. International Payments and Receipts in Copyright-Based Industry Services, Copyright and Related Rights, 2003 to 2012



Source: Statistics Canada's key socioeconomic database (CANSIM 376-0033).

Copyright-intensive industries and the Internet economy: Canadian copyright-intensive industries successfully leverage the technical opportunities offered by the Internet. The percentage of firms selling online is the highest in the information and cultural sector, at (35% in 2012) and in arts, entertainment and recreation industry sector (25.5% in 2012)[178]. At industry-level, there are several copyright-intensive industries that provide data that highlight the importance of the Internet as a medium of distribution of digital content in Canada. For example, for the music industry, the on-line sales revenues of recordings climbed from CAD 79.0 million in 2009 to CAD 92.4 million in 2011. Nevertheless, this did not offset the drop in sales of compact discs over the same period. Compact disc sales fell to CAD 195.1 million in 2011 from CAD 290.3 million in 2009. Total sales of recordings declined by 19.8% from 2009 to 2011, reflecting significant drops in sales by Canadian and non-Canadian artists[179]. For video games, online sales accounted for about a third of all revenue in 2013[180]. For the publishing industry, there is substantial evidence for growing consumer demand for e-books in Canada. According to some recent studies, 20% of book-buyers bought one or more e-books in 2013, up from 18% in 2012[181].

This growth in on-line sales was paralleled by emergence of numerous start-ups that took the advantage of the internet as a distribution channel. Examples include the companies Stingray Digital (music), Kobo (publishing), and the website Têtes à claques (TV) (See Box 5.4.).

Box 5.4. Canadian creative businesses on the Internet: Stingray Digital, Kobo, Frima Studio, Têtes à claques.

Stingray Digital Group is a media and entertainment company that focuses on interactive music broadcasting and distribution. The group has several services in its portfolio, including an interactive Internet service offering karaoke services, provision of subscription music services for businesses, and several digital pay TV and video-on-demand services. Founded in 2007, *Stingray Digital Group* reported a very high growth over the past years, including successful entries on the US and UK markets.

Kobo is the producer of Kobo eReader, the most popular e-book reader in Canada. In addition to hardware production, in July 2012 *Kobo* launched Kobo Writing Life, a platform that allows authors to direct self-publish their work, avoiding intermediaries.

Têtes à claques is a French-language comedy website. It was created in 2006, and today it is one of the most popular francophone websites in Canada. Following the series' success, its author, Michel Beaudet, has established a dedicated website to commercialisation of the characters that appear in *Têtes à claques* in (for example) ad campaigns, labels of commercial products, etc.

Sources: www.stingraydigital.com, www.kobo.com, www.tetesaclaques.tv

Legal landscape

Current copyright legislation: In Canada the legal issue of copyrights is regulated by the *Copyright Act* of Canada that was first passed in 1921 and amended several times.

Recent evolution: In 1997 Canada introduced into its legislation neighbouring rights protections for performers and producers of sound recordings, a statutory damages regime, new copyright exceptions and limitations and implemented the *Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations*.

In 2007, the federal government passed Bill C-59, the Unauthorised Recording of a Movie Act, which amended the Criminal Code to prohibit the recording of a movie in a movie theatre without the theatre owner’s consent, with an increased possible sentence if the act was committed for commercial purposes.

The most recent amendment was the *Copyright Modernization Act* in 2012. Among other objectives, it implements the World Intellectual Property Organization’s 1996 Internet Treaties. The rationale for these amendments was to provide a copyright framework that is forward-looking and flexible, that will help spur creation and innovation, and that supports new business models in the digital age. It also aimed to provide rights holders with new rights and tools for the digital environment, while giving individuals greater flexibility in using legitimately acquired materials and creating user-generated content.

For example, the new provisions promote creativity, innovation, and legitimate business models, and strengthen the ability of copyright owners to control the uses of their online works in order to prevent widespread illicit use. Such provisions include legal protection for rights management information and a new category of civil liability that targets those who enable online piracy. Copyright owners may choose to apply technological protection measures (TPMs), such as digital locks, to prevent unauthorised access to copyrighted material benefit from new protection against circumvention, or breaking locks. New rules also prevent the manufacture, importation, and sale of devices that can break digital locks. Software producers, video game and movie distributors, for example, rely on digital locks as part of their business model to protect the investment they make in developing products.

Duration of copyright: For works, copyright protection generally ends 50 years following the death of the last living author. For sound recordings, performances, non-dramatic cinematographic works, and anonymous works, copyright protection generally ends 50 years following the year of first publication. For communication signals, copyright protection ends 50 years following the year they were broadcasted.

Institutional setting: The two main institutions in the area of copyrights in Canada include: the Copyright Office and the Copyright Board.

The *Copyright Act* provides that the Copyright Office shall be attached to the Patent Office (which is part of the Canadian Intellectual Property Office). The functions of the Copyright Office are*: i)* to register copyrights and assignments and licences of copyright, and *ii)* to maintain the Register of Copyrights. The Office also provides very general information on the subject of copyright in Canada, but does not provide advisory or mediation services.

The Copyright Board is an independent, quasi-judicial tribunal that acts as an economic regulatory body. Under the *Copyright Act*, the Board is empowered to establish (either mandatorily or at the request of an interested party) the royalties to be paid for the use of copyrighted works when the administration of such copyright is entrusted to a collective-administration society. The Board also has the right to supervise agreements between users and licensing bodies, and issues licences when the copyright owner cannot be located.

Database protection: There is no *sui generis* protection of databases in Canada. Databases that meet the requirements for copyright protection are treated under copyright law like any other work. The definition of “compilation” in Canada explicitly includes “a work resulting from the selection or arrangement of data.” In addition, databases can be also protected by legislation on unfair competition and trade secrets.

Limitations and exceptions: In addition to various specific exceptions to copyright infringement that are tailored to particular uses in certain contexts, the Copyright Act includes a general exception to engage in “fair dealing” with copyright material, provided that it is undertaken in respect of one of a limited number of enumerated purposes (namely: research or private study; criticism or review; news reporting; education; and satire and parody), and provided that the use in question is “fair”. Whether a dealing is “fair” depends on a series of criteria set out by the courts, including the purpose of the dealing, the character of the dealing, the amount of the dealing, the nature of the work, available alternatives to the dealing and the effect of the dealing on the market of the work.

Orphan works: Section 77 of Canada’s Copyright Act comprises a supplemental licensing scheme for orphan works. In order to get a licence, an applicant must demonstrate that "reasonable efforts” to locate copyright holders were made. The licence is issued by the Copyright Board of Canada and is only valid in Canada for a specified amount of time and typically involves a royalty payment (either upfront to a collective society or to an owner if one emerges).

C**opyright registration:** Copyright registration is not required in Canada, although it confers certain procedural benefits in cases of copyright infringement. The cost of copyright registration is CAD 50 for an application filed online and CAD 65 for an application filed by any other means. To register a copyright, the applicant must submit an application form that includes information, including the name and address of the owner of the copyright; a declaration; the category of work; the title of the work; the name of the author.

Enforcement: Canada's IP enforcement agencies are the following:

The Royal Canadian Mounted Police (RCMP), the Canadian national police service, is responsible for enforcing intellectual property rights, including offences for copyright infringement. Criminal cases investigated as a matter of priority by this service relate to copyright piracy on a commercial scale by a manufacturer, wholesaler or importer.

The Public Prosecution Service of Canada (PPSC) is responsible for prosecuting offences under more than 50 federal statutes, including the *Copyright Act*, and for providing prosecution-related legal advice to law enforcement agencies, such as the RCMP.

The *Canada Border Services Agency* (CBSA): The *Combating Counterfeit Products Act* provides the following new powers to the CBSA: *i)* temporarily detain suspected counterfeit and pirated goods on their initiative or at the request of rights holders, *ii)* contact rights holders regarding suspected counterfeit or pirated shipments, and *iii)* provide rights-holders with information to facilitate a civil action.

Currently, the CBSA relies on the RCMP, or other government departments such as Health Canada, when counterfeit or pirated products are identified through the course of regular duties at the border in order for appropriate enforcement action to be undertaken. The CBSA will detain alleged counterfeit content when presented with a court order to this effect.

Current debate

Summary of recent debates: The public debate on "copyrights in the age of the Internet" seems to be relatively advanced in Canada. It has been taking place for several years, and gathered numerous experts from the government, academia, think tanks, industry and civil society.

Each time an amendment to the copyright regime is planned, a public debate takes place. For example, a study of the *Copyright Act*, entitled "Supporting Culture and Innovation", was concluded in 2002 and tabled in Parliament, as required by the *Copyright Act* [182].

More recently, in 2009, the Canadian Government launched public consultations on copyright policy. It provided a platform for several discussion themes that looked at various aspects of the planned reform, such as: "Copyright and You", "Test of Time", "Innovation and Creativity", "Competition and Investment" and "Digital Economy". For example, the theme "Copyright and You" looked for inputs on how Canada's copyright laws affect individual consumers and how should existing laws be modernised. The theme "Innovation and Creativity" asked discussants what sorts of copyright changes would best foster innovation and creativity in Canada. The debates informed the Government of Canada's modernisation of copyright legislation [183].

In 2014, the government launched its Digital Canada 150 initiative, which represents a comprehensive approach to taking full advantage of the opportunities of the digital age. The objective is that by 2017:

- The majority of consumers will have access to high-speed Internet at 5 megabits per second (Mbps) and to the latest wireless technologies;
- Consumers will be protected from online threats and misuse of digital technology;
- Canadians will have the skills and opportunities necessary to succeed in an interconnected global economy;
- The government of Canada will demonstrate leadership in the use of digital technologies and open data; and

- Copyright-intensive industries will have greater capabilities to seize digital opportunities, promote Canadian content and play a more prominent role in the global marketplace.

Industry associations: There are many industry associations in Canada, including in the music, film and television, books and periodicals, visual arts, videogames and broadcasting sectors. In light of the fact that Canada is a bilingual country, there are often associations whose activities focus on the English Canadian market and those whose activities focus on the French Canadian market[184]. These associations carry out a number of activities, including: *i)* lobbying, stakeholder coordination and engaging in public debate about copyright, *ii)* collective rights management, *iii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities), *iv)* awareness raising campaigns in the area of copyrights, and *v)* data collection.

Industry best practices Major Canadian Internet Service Providers (ISP) have voluntarily participated in a "notice and notice" regime for a number of years. Under this system, when an ISP receives a notice from a copyright holder that a subscriber might be infringing copyright, it forwards a notice to the subscriber. The identity of the subscriber may then be released with a court order. The *Copyright Modernization Act* includes a provision that formalises this system.

Chile

Copyright-intensive industries: Market overview

Value added: The existing dataset present only a general picture of copyright-intensive industries in Chile. According to the data presented by the Chilean National Council for Culture and the Arts on cultural industries in general, copyright-intensive industries contributed 1.58% of the GDP in 2009.

Employment: Unfortunately, there is no detailed datasets on copyright-intensive industries in Chile. The existing data published by the National Council for Culture and the Arts indicated that the copyright-intensive sector employed 2.3% of total employees in Chile.

Legal landscape

Current copyright legislation: In Chile the legal issue of copyrights is regulated by the Law N°17336 Intellectual Property Act that first passed in 1970, and amended several times.

Recent evolution: The main recent amendment was made in 2010 with the focus to counter digital piracy and protect the rights of content creators given the recent technological changes[185].

Duration of copyright: In Chile copyright protection generally ends 70 years following the death of the last living author.

Institutional setting: *Departamento de Derechos Intelectuales* (DDI) is the government special agency in charge of the Intellectual Property Record: Copyrights and Related Rights (Title IV Law N° 17.336 and its Regulations). Since its creation in 1970 the DDI depends on the *Dirección de Bibliotecas, Archivos y Museos* (DIBAM) and has the specific mission of manage the public records related with copyright and related rights, foster the protection of such rights and keep the fixations of the intellectual productions that make its collections contributing thus with the formation, development and sustainability de national culture of respect for the intellectual property.

The DDI has the following functions:

- To register intellectual works.
- To register acts and contracts of assignment or transfer of copyright and related and their termination.
- To register publishing contracts for literary works, judgments and pseudonyms.
- To issue relevant certificates.
- To examine queries and to issue reports for the privates and public services.
- To provide advice to the government in all matters related with copyright and related rights.

In addition, to the DDI, two other institutions have copyright-related functions. The National Council for the Culture and the Arts (CNCA) distributes grants to right holders and runs awareness campaigns. DIRECON, is responsible for copyright issues related to the foreign policy. It coordinates with relevant national agencies and participates and represents Chile in relevant international fora.

Database protection: There is no sui generis protection of databases in Chile. Databases that meet the requirements for copyright protection are treated under copyright law like any other work.

Limitations and exceptions: Chile adopted recently a system that permits in certain cases legal, unauthorised copying of copyrighted material. It includes for example creation of backup software copies or citations. The relevant provisions were introduced by the law N° 20.435 that amended the Intellectual Property Act in 2010. It includes the Title III called Limitaciones y Excepciones al Derecho de Autor y los Derechos Conexos[186].

Orphan works: There is no explicit policy for orphan works in Chile.

C**opyright registration:** Registration is voluntary and in case of infringement greatly facilitates potential judicial actions. The DDI holds the copyright register in Chile.

Enforcement: Chile's IP enforcement agencies are the following:

Police of Investigations of Chile (Policia de Investigaciones de Chile, PDI) established in 2008 its *Brigada Investigadora de Delitos de Propiedad Intelectual* (BRIDEPI), a dedicated unit to deal with intellectual property crimes.

The *National Council for Culture and the Arts* (CNCA) and the *Secretariat for the Prevention of Crime* have recently signed an agreement which, among other things, is going *i)* to facilitate the transfer of information necessary to efficiently combat crimes against intellectual property *ii)* to establish a list of crimes for which information is delivered quarterly.

Custom Authorities are in charge of the enforcement of the Title II Borders Measures for the enforcement of Intellectual Property Right Law N° 19912.

Current debate

Industry associations and industry initiatives: There are several industry associations in Chile, including industry groups in several sectors, and collective societies. The main ones include: International Federation of the Phonographic Industry – Chile, Motion Picture Licensing Corporation Chile, and SCD (Sociedad Chilena del Derecho de Autor). These associations carry out a number of activities, including: *i)* lobbying, stakeholder coordination and engaging in public debate about copyright *ii)* collective rights management, *iii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities) and awareness raising campaigns in the area of copyrights.

Several good examples of relevant industry initiative can be found in the area of education and outreach, such as the alliance between CERLALC, UNESCO and DDI "united for the education of children". This initiative provides essential educational tools for a child to learn about the importance of copyright and related rights and their societal impacts[187]. Another example that can be highlighted is the campaign "Protect your idea" that promotes the rules related to the enforcement. This campaign was a joint initiative of public and private institutions[188].

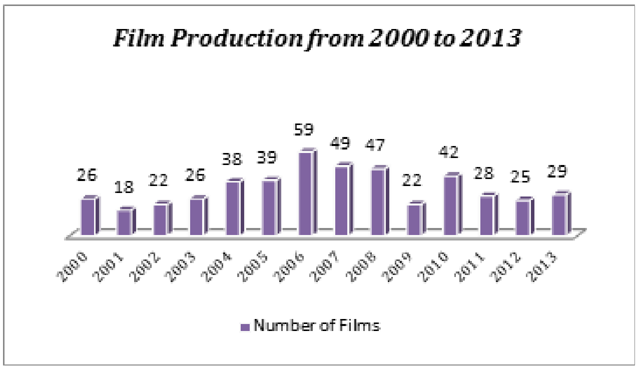
Egypt

Copyright-intensive industries: Market overview

The existing dataset present only a general picture of copyright-intensive industries in Egypt. In particular, lack of detailed statistics at the industry level does not permit to estimate the precise contribution of copyright-intensive industries to Egyptian GDP, and their share of employment using the WIPO (2003) classification method. Available studies suggest that copyright-intensive industries contributed to up to 0.5% of the Egyptian GDP in 2000 (WIPO, 2003 and Harabi, 2004)[189]. Available estimates provide also some picture of foreign trade of copyright-intensive sectors in Egypt with export volumes of USD 898 million in 2008 and import volumes of USD 602 million imports[190]. These statistics can be explained in terms of existence of the copyright-intensive industries implicitly in these exports and imports. Caution should be paid, when interpreting these results, since the presented data is rather old, and since not all copyright-intensive industries were taken into account.

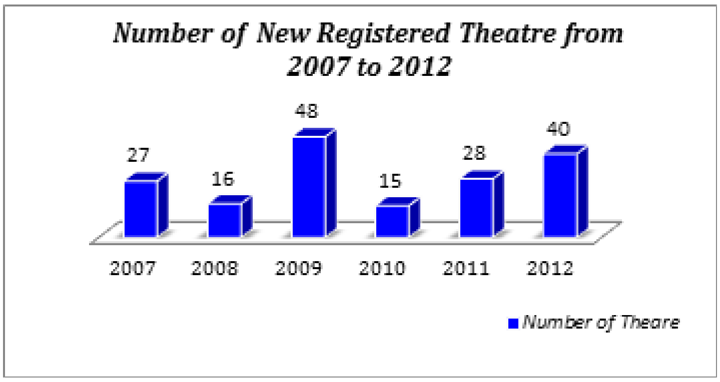
Some other available data present Egypt's developed markets for creative content, where copyright-intensive thrive. An illustrative example is the Egyptian movie industry that dominates Arabic movie production. Estimates suggest that the majority of all movies in Arabic are produced in Egypt (WIPO, 2003). It should be kept in mind that there are more than 422 million native speakers of Arabic according to UNESCO, but it is hard to assess the precise number[191]. Moreover, the cultural links between Arab countries go far beyond the common language and meld into literature, cinema, music and other media that are shared within the Arabic-speaking region. This is reflected in available data on the movie industry. Between 2000 and 2013 this industry produced yearly 34 movies on average, with some fluctuations over that period (Figure 5.17). Apart from exports to other countries, this production also supported domestic theatre sector that reported constant growth over the recent years (Figure 5.18).

Figure 5.17. Film production in Egypt, 2007 – 2012



Source: Based on information from the Egyptian Chamber of Cinema Industry

Figure 5.18. New theatre registrations in Egypt, 2007 – 2012



Source: Based on information from the Egyptian Chamber of Cinema Industry

Finally, some relevant insights on copyright-related activities of Egyptian ICT industry can be found in a survey based study of Egyptian SME's in the ICT sector by Hegazy and Gadallah (2013). Their study found that these enterprises are particularly active in terms of copyright licensing: 43% of the surveyed SMEs grant licensing in copyright and neighbouring rights, whereas 39% of them use copyright and neighbouring rights licenses granted by other firms (See Annex for more details).

Legal landscape

Current copyright legislation: In Egypt the legal issue of copyrights is regulated by the Law No. 82 (2002), Book 3 starting from the Article No. 138 to Article No. 188.

Duration of copyright: In Egypt copyright protection generally depends on the type of work. For authors of copyrighted work, copyright ends 50 years after their death (50 years calculated from the production or publishing date if the owner is not a person). For performers, copyrights end 50 years after the performance. For broadcasts, copyrights ends 20 years after broadcasting year.

It should be highlighted that this durations does not apply to moral rights, which do not expire in Egypt.

Institutional setting: In Egypt the Permanent Office for the Protection of Copyright at the Ministry of Culture is primarily in charge of copyright-related issues. In addition, the Broadcasting and Audio-Visual Work Protection Office at the Ministry of Information deals with audio-visual work, and the intellectual Property Rights Protection office at the Information technology industry development Agency (ITIDA) is in charge of software-specific issues.

Database protection: There is no sui generis protection of databases in Egypt. Databases that meet the requirements for copyright protection are treated under copyright law like any other work.

Limitations and exceptions: According to the Egyptian law (Article No. 171) the following cases of use for copyrighted material do not require copyright holder's approval:

- Use of work in family context or student gathering within the educational institution, to the extent that no direct or indirect financial remuneration is required;

- Making a single copy of the work for exclusive personal use, provided that such a copy shall not hamper the normal exploitation of the work, nor cause undue prejudice to the legitimate interests of the author or copyright holders. It should be highlighted that there are several exceptions to this case, such as: *i)* reproduction or copying works of fine, applied or plastic arts, unless they were displayed in a public place, or works of architecture*; ii)* reproduction or copying of all or a substantial part of the notes of a musical work; *iii)* reproduction or copying of all or a substantial part of a database or computer program.

- Making a single copy or an adaptation of a computer program for archiving purposes or to replace a lost, destroyed or invalid original copy (with rights holder's consent).
- Analysis of copyrighted work, excerpts, quotations, criticism, discussion or information.
- Reproduction based on protected works for legal or administrative purposes, provided that the source and the name of the author are mentioned.
- Reproduction of short extracts from a work for teaching purposes in educational institutions.
- A single copy of the work for documentation or archiving purposes in a dedicated archiving centre.
- Ephemeral reproduction of a work where such reproduction is made in relay, during a digital transmission of the work or in the course of a process of reception of a digitally stored work, within the normal operation of the device used by an authorised person.

Orphan works: There is no explicit policy for orphan works in Egypt.

C**opyright registration:** Copyright registration in Egypt is voluntary and in case of infringement greatly facilitates potential judicial actions. Most works can be registered at the Copyright protection office, Ministry of culture. In addition audio and video works can be registered with the Ministry of Information, some software work can be registered with the Information technology industry development Agency (ITIDA). Fees depend on the type of registered work, and vary between EGP 25 (USD 3.50) and EGP 500 (USD 70). See the Annex 2 for more details.

Enforcement: The Investigation Unit within the Ministry of Interior is dedicated to copyright infringement cases. In addition Egyptian Customs authorities are currently working on a mechanism for improved handling of imports and exports of pirated products.

Current debate

Industry associations and industry initiatives: There are several industry associations in Egypt, including industry groups in several sectors, and collective societies. These associations include:

- Egyptian Chamber of Cinema Industry (includes 1797 industrial institutions - companies)
- Society of Authors, Composers and Publishers of the Arab Republic of Egypt
- Alam El Phan (media group)
- Egyptian Chamber of Printing Industry
- Egyptian Chamber of Information Technology & Communication Industry
- El Massah
- Oscar for Production & Cinema Distribution
- El Nasr Film
- Arab Society for Cinema Production& Distribution
- El Sobki Film For Cinema Production
- Albatros Artistic Production &Distribution

- Egyptian Publisher Association (503 Member) (EPA)
- Egyptian Writers Union (Writers' Union of Egypt) (879 Member)
- The Egyptian Film Centre (CNC) (The National Film center)
- Media Production City (MPC)
- Rotana Group
- Cinema professions Syndicate
- Applied arts designers syndicates
- Syndicate of Actors
- Syndicate of Musicians
- Syndicate of Artists
- Syndicate of Artistic applied professions
- El Sobki Video Film
- New Century Production
- Al Adl Group
- United Brothers Cinema Production
- Film Clinic
- Karim Sobki Films/ Production & distribution
- Good News for Film & Music
- United Artistic Group
- Misr Cinema & Artistic Production
- GuirguisFawzi Films
- MISR Al-Alameya Films
- Film House

These associations carry out a number of activities, including:

- Collective rights management; done by the Society of Authors, Composers and Publishers of the Arab Republic of Egypt (SACERAU), a multi-disciplinary collective management body.
- Countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities).
- Awareness raising campaigns in the area of copyrights.
- Data collection.

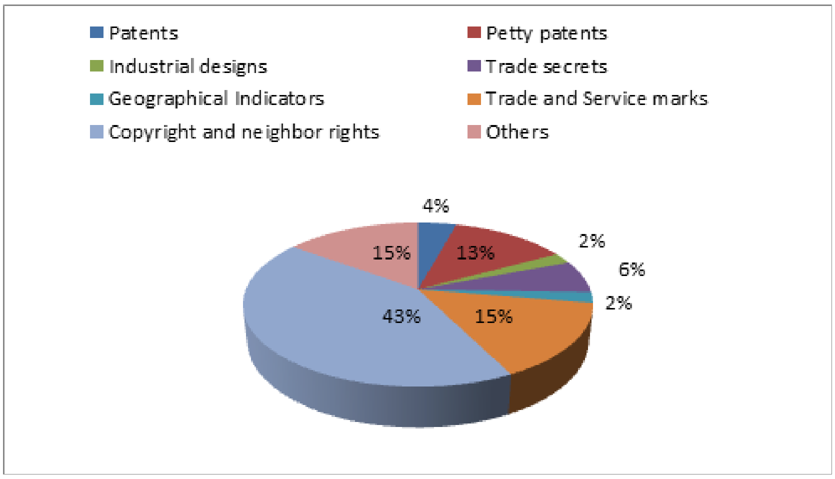
Concerning industry initiatives, an illustrative example is the Egyptian Publisher Association that has recently completed drafting of the rules of good practices for the publishing profession. It also held a number of training courses in co-operation with the German Goethe Institute. Currently new training programs are being developed in co-operation with the chamber of printing industry.

Egypt country study annex 1: Copyright-related activities in the Egyptian ICT industry (SMEs)

In the context of Egyptian copyright-related industry, some lessons can be drawn from a empirical study by Hegazy and Gadallah (2013), who surveyed micro, small and medium enterprises in the IICT field. In terms of value added they found that 53.5% out of all the responding firms reported their outputs to be used as inputs for other enterprises in the market, which reflect good backward and forward network integration among enterprises. This can be explained in high value added and hence more of injection in the GDP. In addition to 42.8% of the selected sample reported that the nature of their products is more a service than goods. Furthermore, about 86.6% of the surveyed enterprises stated that the intellectual property IPR of their products represents original efforts of these enterprises which reflect the importance of IPR in this industry. However, only 24.6% of the selected sample legally protected their intellectual assets.

As noted in Figure 5.19, 43% of the surveyed enterprises grant licenses in copyright and neighbouring rights, 15% in trade and service marks and 13% in petty patents. On the other hand, there is small number of enterprises responded report any information about the percentage of royalty out of their annual net profits they get it. Only 4 enterprises reported that they get less than one per cent as a royalty from licensing their intellectual products to others versus 16 enterprises get less five per cent and six enterprises ranged between three per cent and less than five per cent.

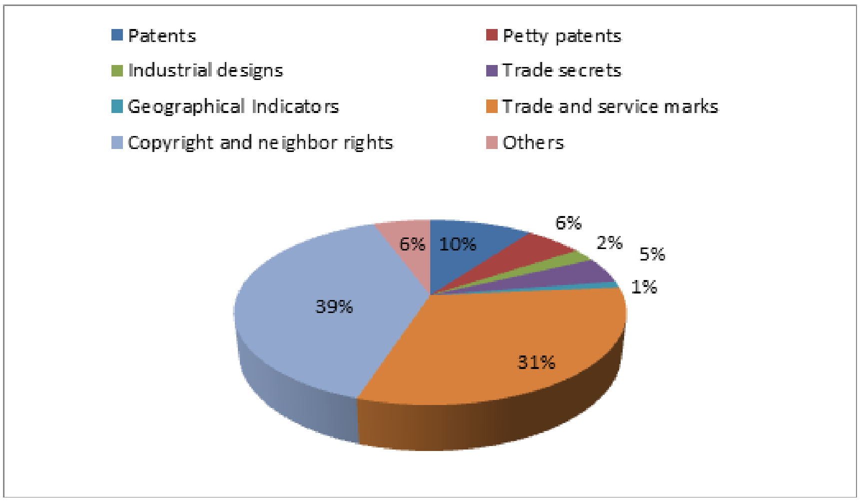
Figure 5.19. Distribution of licensing by surveyed micro, small and medium enterprises



Source: Hegazy and Gadallah (2013).

Concerning the exploitation of the intellectual property of other enterprises by the surveyed enterprises, about 26.2% of the sample reported that they produce based on a licensing from others. As illustrated in Figure 5.20, 39% of the surveyed enterprises grant licensing in copyright and neighbouring rights, 31% in trade and service marks, 10% in patents, 6% in petty patents and 5% in trade secrets.

Figure 5.20. Distribution of licensing by other enterprises to the surveyed ones



Source: Hegazy and Gadallah (2013).

To measure the return on R&D spending, Hegazy and Gadallah, (2013) surveyed the enterprises asking about the type of their innovation as results of R&D spending. 64.7% of the sample reported that they create new products while 10.7% of the sample told us that they succeeded in opening new markets for their products versus 5.9% of the sample to create new process of production. Accordingly, it was essential to ask them whether they depend on other enterprises to produce these innovations. Roughly 66.3% of the respondents in the sample clarified that their enterprises create the innovations totally rely on themselves versus 14.9% partially by other enterprises. Moreover, 48.6% of the respondents decided that their innovation had strong and positive influence on the performance of their enterprises, while the impact was moderate as 26.2% of the sample reported.

Table 5.4. Egypt country study annex 2: Copyright registration fees in Egypt

Copyright Protection Office, Ministry of Culture	
A certificate for a written text of a work or design formation	EGP 200 (USD 28)
A certificate for the performance of an audio, or audio-visual work of one unit or episode.	EGP200 (USD 28); fees depend on the number of episodes, provided that they do not exceed EGP 1,000 (USD 140)
A certificate for a recorded performance that does not exceed one hour	EGP 200 (USD 28)
A certificate for a recorded performance that does not exceed four hours.	EGP 500 (USD 70)
A certificate for an episode of a radio or TV broadcast.	EGP200 (USD 28); fees depend on the number of episodes, provided that they do not exceed EGP 1,000 (USD 140)

Broadcasting, Audio, and Audio-Visual Work Protection Office, Ministry of Information	
Audio works	
All kinds of speeches, symposiums and comments as well as political analyses and religious material	EGP 200 (USD 28)
Poetry, lyrics, short stories, dramatic works and the elements thereof as well as music and singing and the elements thereof	EGP300 (USD 42)
Audio-visual works	
Celebrations, occasions, evening shows, documentary films, shows, cartoons and graphics.	EGP400 (USD 56)
Tv series, sevenfold TV series, plays, as well as short and/or long movies	EGP 500 (USD 70)

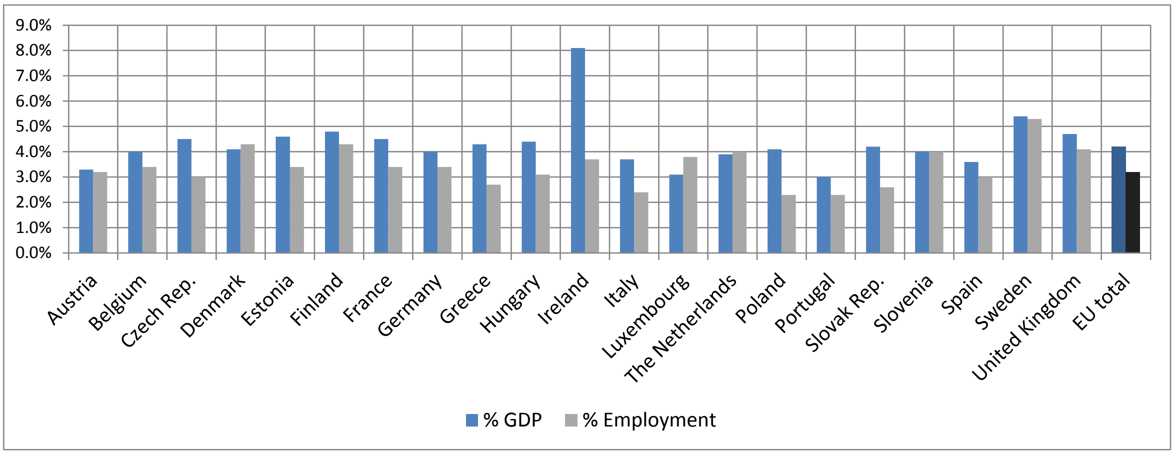
The Intellectual Property Rights Protection Office, Information Technology Industry Development Agency (ITIDA)	
Educational computer works (software and databases) used in all kinds and levels of education.	EGP25 (USD 3.50)
Computer works (software and databases) not related to education.	EGP 50 (USD 7)

The European Union

Copyright-intensive industries: Market overview

In 2010 the total contribution calculated for the core copyright-based industries[192] in the EU was 4.2% of total GDP. The total number of people employed (full time) in copyright-intensive industries represented 3.2% of all employees (Figure 5.21). The numbers varied across the EU member states. The highest contribution to the GDP was recorded for Ireland (8.1%), whereas the lowest for Portugal (3%), Employment rates ranged between 2.3% (Poland and Portugal) and Sweden (5.3%).

Figure 5.21. Added value and employment in copyright-intensive industries (2010, % of total)



Source: EPO-OHIM (2013).

Legal landscape

Current copyright legislation: The copyright law of the EU consists of a number of directives and aims to harmonise the differing copyright laws of the EU member states. The member states are obliged to include these directives into their national legal frameworks. Specifically, the relevant ones are the Directives of the European Parliament and of the Council on:

- collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market (2014/26/EU)
- certain permitted uses of orphan works (2012/28/EU)
- the legal protection of computer programs (2009/24/EC)
- rental right and lending right and on certain rights related to copyright in the field of intellectual property (2006/115/EC)
- the term of protection of copyright and certain related rights (2006/116/EC and 2011/77/EU)
- enforcement of intellectual property rights (Enforcement Directive, 2004/48/EC)
- on the resale right for the benefit of the author of an original work of art (2001/84/EC)
- on the harmonisation of certain aspects of copyright and related rights in the information society (Copyright Directive, 2001/29/EC)
- the legal protection of databases (96/9/EC).

- Council Directive 93/83/EEC of 27 September 1993 on the coordination of certain rules concerning copyright and rights related to copyright applicable to satellite broadcasting and cable retransmission (93/83/EEC)

Duration of copyright: Directive 2006/115/EC harmonised the term of protection of copyright setting it 70 years following the death of the last living author and neighbouring rights (50 years from the moment triggering the protection, e.g. the fixation of a phonogram). Directive 2011/77/EU extended the term of protection for performers and the producers of sound recordings to 70 years.

Database protection: The 1996 introduced Database Directive (96/9/EC) aims to provide harmonised copyright protection to databases in the EU. It introduces a new specific sui generis right for the creators of databases. According to this Directive databases that do not qualify for copyright protection, enjoy a 15-year protection.

Limitations and exceptions: The Copyright Directive outlines an exhaustive list of optional specific copyright exceptions which EU member states may introduce into national legislation. It includes, for example copies made for teaching or scientific research purposes, quotations for purposes such as criticism or review, caricature, parody or pastiche, etc[193].

Orphan works: Generally, the issue of orphan works has not been regulated so far the EU level. The Directive of the European Parliament and of the Council on certain permitted uses of orphan works (2012/28/EU) sets out common rules on the digitisation and dissemination of orphan works. The Directive will be implemented in the legislation of the Member States by the 29th October 2014.

Copyright registration: Copyright cannot be registered at the EU level. However, the EU copyright framework does not regulate the possibility to introduce voluntary registration of copyright works.

Enforcement: Article 8 of the 2001/29/EC Directive (InfoSoc Directive)[194] introduces provision that EC member states shall introduce in the area of on-line copyright enforcement. It calls for appropriate sanctions and remedies in respect of infringements of copyrights, effective enforcement, and enabling rights' holders to apply for an injunction against intermediaries whose services are used by a third party to infringe a copyright or related right.

The Directive on the enforcement of intellectual property rights (2004/48/EC) refers to all intellectual property rights including copyright and related rights. This Directive creates a level playing field for right holders in the EU by requiring all Member States to apply effective, dissuasive and proportionate remedies and penalties against those engaged in counterfeiting and piracy.

Current debate

Summary of recent debates: With the emphasis on completing the Digital Single Market to help deliver growth in Europe, the debate on copyright has intensified in Europe over the last few years, and gathered numerous experts from the member states' governments, industry (see below) and civil society (e.g. European Digital Rights, EDRI; The European Consumers' Organisation, BEUC).

The "Green Paper on copyright in the knowledge economy" provided a starting point for the debate[195] and triggered the copyright-related discussion in the EU.

This was in turn reflected in in several subsequent actions, such as the initiative Licences for Europe launched by the Commission in 2013. The initiative was launched in February 2013 with the objective to deliver industry-led solutions to address practical barriers to the circulation of content in the digital age. It involved active participation of numerous stakeholders, mostly from the copyright-intensive industries. At its closing session in November 2013, *Licences for Europe* participants made several pledges to overcome problems European citizens may face in four areas: cross-border access and portability of services; user-generated content and micro-licensing; audio-visual heritage and text and data mining.

Shortly after the *Licences for Europe* closing session, the EC launched official public consultations on the review of the EU copyright rules. The consultations have generated broad interest with more than 9500 replies received from a wide range of stakeholders including users, consumers, right holders, industry, collective management organisations and governments[196].

In addition, recently, numerous EU member countries have called for views for the debate, and several member states conduct debates on that topic.

Industry associations: There are many industry associations in The EU, including in the music, film and television, books and periodicals, visual arts, videogames and broadcasting sectors. The main ones include:

- Business Software Alliance (BSA)
- European Federation of Journalists (EFJ)
- European Grouping of Societies of Authors and Composers (GESAC)
- Federation Internationale des Acteurs (FIA)
- Federation of European Publishers (FEP - FEE)
- Interactive Software Federation of Europe (ISFE)
- International Federation of the Phonographic Industry (IFPI)
- International Video Federation (IVF)
- Sports Rights Owners Coalition (SROC)
- The European Newspaper Publishers' Association (ENPA)
- The Society of Audiovisual Authors (SAA)
- UNI Global Union media, entertainment & arts (UNI MEI)
- European Federation of Joint Management Societies of Producers for Private Audiovisual Copying (EUROCOPYA)
- Independent Music Companies Association (IMPALA)

These associations carry out a number of activities, including: *i)* lobbying, stakeholder coordination and engaging in public debate about copyright *ii)* collective rights management, *iii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities), *iv)* awareness raising campaigns in the area of copyrights, and *v)* data collection.

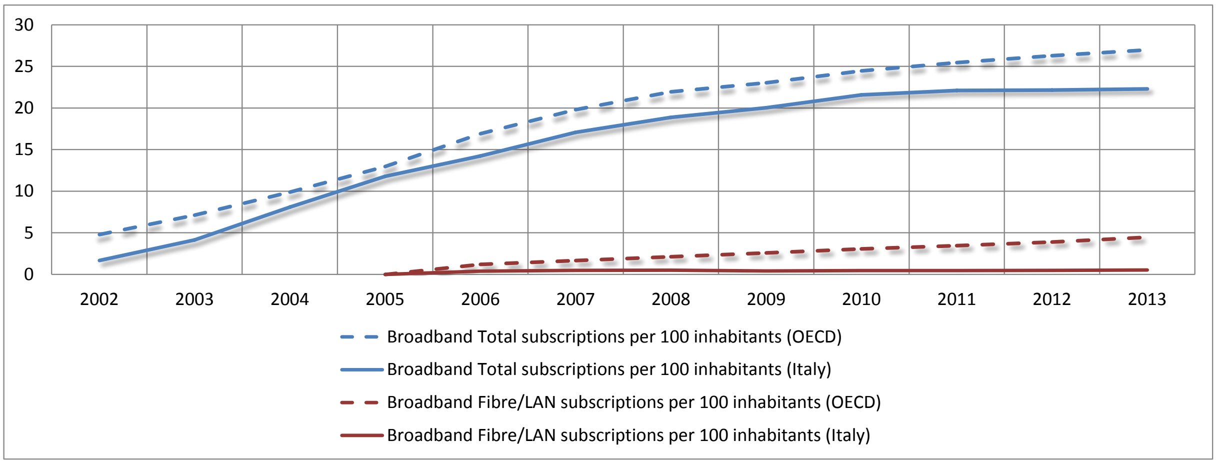
Italy

State of the Internet

In recent years access to broadband networks and the Internet has steadily increased in Italy. In addition, further deployments of fibre networks have taken place. Overall, however, broadband penetration rates and the deployment of fibre in Italy are still below the OECD averages (see Figure 5.22).

Figure 5.22. Broadband penetration rates in Italy

2002-2013, per 100 inhabitants

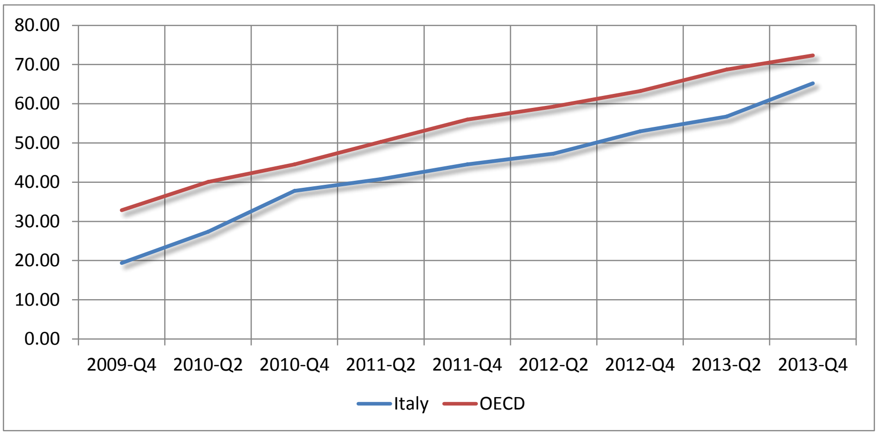


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in Italy, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has grown to 65% in Italy, which is at a comparable level with the OECD average that has grown to more than 70% (Figure 5.23).

Figure 5.23. Mobile broadband subscriptions in Italy

2009-2013, per 100 inhabitants



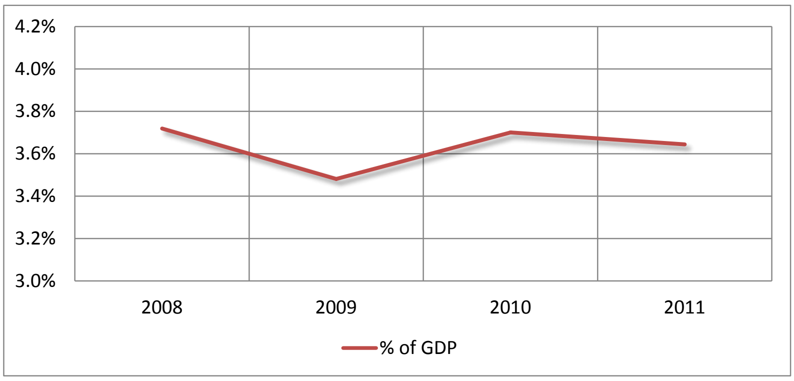
Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past years copyright-intensive industries in Italy have demonstrated overall stable performance[197]. Between 2008 and 2011 the total share of the copyright-based industries within the Italian economy remained rather stable, accounting for 3.65% of Italy's GDP in 2011 (Figure 5.24).

Figure 5.24. Added value of copyright-Intensive industries in Italy

2008-2011, % of GDP

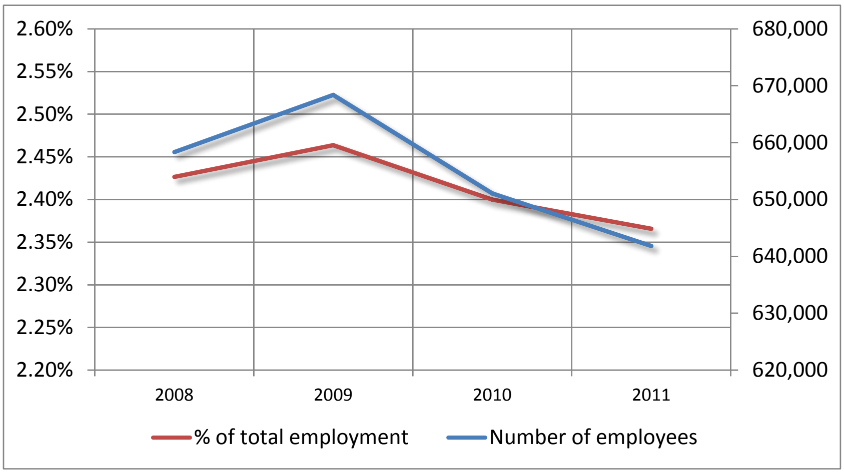


Source: Eurostat SBS database and EPO-OHIM (2013).

Employment: In 2011 the total number of people employed in copyright-intensive industries represented 2.3% of all employed by Italian industry. Between 2008 and 2011, the overall share of people employed in copyright-intensive industries in total industry employees remained relatively stable, reporting some small fluctuations. The total employment also reported some fluctuations over that period. In 2011 it amounted to 641,000, which was slightly less than the volume of employment in these industries in 2008 (Figure 5.25).

Figure 5.25. Employment in copyright-intensive industries

% of total employment (left axis) and volume of employment (right axis)



Source: Eurostat SBS database.

Copyright-intensive industries and the Internet economy: Italian copyright-intensive industries successfully leverage the technical opportunities offered by the Internet. Several of successful start-ups can be found in the music, gaming and video sectors (see Box). In addition Italian fashion industry also takes advantage of the copyrights in order to protect content and creations in addition to other, more conventional ways of IPR protection, such as design and trademarks (see Box 5.5.).

Box 5.5. Italian creative businesses on the Internet: Dropin, Chili-TV, Jaqard

Dropin is a "cloud recording studio" that can be accessed from a desktop or from a mobile device. Users of *Dropin* can create their own music, based on dedicated software and share it with other users. Users of *Dropin* include A artists, bands, and music professionals.

Chili-TV is, one of the most rapidly growing Italian legitimate platforms for movie streaming and downloads. Over the past few it has reached volume of content comparable to the biggest international competitors. *Chili-TV* builds its strategy on several pillars, including user-friendly design and quick service delivery, competitive pricing schemes and cooperation with main Italian national multimedia groups (RCS) and main players in other content distribution channels (e.g. UCI Cinemas).

Jaquard is an on-line personal styling community that brings together fashion and software industries. Based on a dedicated mobile app *Jaquard* facilitates information and advice exchange in the area of personal style and fashion. Questions that *Jaquard* community addresses are: "What could I wear with this?", "What looks similar with this?" and "What else is in this style?"

The term “lyrics” is one of top searched term on Google, which indicates that a large number of users people every month Google “lyrics” in order to get song’s lyrics for their music but since musiXmatch launched on the market it has changed consumer behaviors by allowing users to scan their music library to retrieve lyrics via *musiXmatch* apps. *musiXmatch*’s idea in early 2010 was to build the world’s largest lyrics catalog and have it licensed with Top Music Publishers like Sony/ATV,Warner Chappell, Universal Music Publishing Group, EMI Publishing, BMGChrysalis, Kobalt Publishing, and Harry Fox Agency for worldwide distribution. Currently musiXmatch is the most popular lyrics destination on mobile and connected devices with more than 20 million people in the world. musiXmatch provides also an Official Lyrics API (application program interface), empowering 3rd party companies and apps with musiXmatch’s lyrics catalog to the music market.

Sources: https://www.dropin.fm, http://www.chili-tv.it/, http://www.jaqard.com, http://musixmatch.com/resources/

Legal landscape

Current copyright legislation: In Italy the legal issue of copyrights is regulated by the *Diritto d'autore* (Copyright law) no. 633 of 22 April 1941. Over the years, the law of copyright has been updated through several national amendments and the transposition of European directives.

Recent evolution: Over the past years there have been several amendments of the Copyright Act. The main recent ones include:

- 1993: Introduction of private permitted use (see the point “Limitations and exceptions).
- 2004: Prohibition of peer-to-peer exchange of protected files regardless of the intended use of the shared file. The “Urbani Decree” dating back to 2004 established that even those making use of protected files for purely personal purposes may be liable to punishment; before the decree came into effect, there were no penalties for sharing files protected by copyright where the use was not for profit. The Urbani Decree was converted into Law 128 on 18 May 2004, with the introduction of alternative penalties (fines instead of prison as in the first draft of the decree) for the users caught in the act of breaching the copyright law.

- 2009: The Italian legislative decree of 8 June 2001 number 231 introduced criminal liability for companies, linked to the commission of certain crimes, made by managers or employees, which provides for pecuniary penalties and disqualification. Companies would survive their liability claims if they can prove that they have adopted and updated a specific document named “organisational model” aimed at the prevention of certain crimes. Law number 99 of 2009 extended the list of such crimes to certain offenses set forth in the Italian copyright law.

- 2013: By Law n. 112 of October 7, 2013 (published in G.U. of 8 October 2013, n. 236), the Article 15 of the Copyright Law was modified by adding the following last paragraph: “The public recitation of literary works effected, without purpose of gain, within public museums, libraries and archives, for the exclusive purpose of cultural promotion and valorisation of the same works, to identified on the ground of memorandums of understanding between SIAE and the Ministry of Culture is not to be considered as a public performance.”

- 2014: After a long parliamentary discussion, the Chambers approved a bill (Law 67/2014) decriminalising various offenses under the Italian law (it converts various offences into civil wrongs). Article 2 of the law excludes the IPR matters from the decriminalisation process.

- 2014: The Decree of June 20, 2014 by the Ministry for Heritage and Cultural Activities (MiBAC) (Official Gazette n.155 del 7-7-2014) has updated the amounts of private copying levies on recordable media and on apparatus provided with electronic memory.

Duration of copyright: In Italy copyright protection generally ends 70 years following the death of the last living author. In cases when rights are held by academia, non-profit organisation, or public institutions copyright protection ends 20 years from the first public presentation.

Institutional setting: In Italy the issues related to copyright are within the competencies of:

- The Ministry for Heritage and Cultural Activities and Tourism (MiBACT) at the Third Service Copyright and Supervision of the “Società Italiana degli Autori e Editori”(SIAE) of the Directorate General for libraries, cultural institution and copyright.

- The Presidency of the Council of Ministers at the Department for Information and Publishing

In addition, the *Guardia di Finanza* (Fiscal Police) is the main enforcement authority for most of the copyright sectors. The Fiscal Police deals with cases involving infringement of film, music, software and videogames, in cooperation with the “GAT” department, a special division dedicated to online fraud.

Database protection: In Italy if a database meets the originality criteria, it is treated as a literary work and is protected under the law of copyright. In addition, all databases in the Italy are protected by Act of 27 July 2001 on databases protection, which followed the directive 96/9/EC of the European Parliament and of the Council, of 11 March 1996 on the legal protection of databases.

Limitations and exceptions: Italian law allows for reproduction use of copyrighted material for private purposes. In addition existing regulations permit the use of copyrighted material for the purpose of criticism, parody, public debate and non-commercial teaching.

Orphan works: This area does not seem to be yet explicitly regulated by the Italian national legislation. Projects of new legislation that will comply with the directive of the European Parliament and of the Council on certain permitted uses of orphan works (2012/28/EU) are currently debated.

Copyright registration: Copyright can be registered in Italy before the Public Registry of Protected Works, held by the Ministry for Heritage and Cultural Activities (MiBAC), with the exception of movies and audio-visual work (for which a special registry provided for by law 1001/2010 is not operative as of yet) and with the exception of software. Software can be registered in the “Registro Pubblico Speciale per Programmi per Elaboratore”, held by SIAE ("Società Italiana degli Autori ed Editori”)

Enforcement: Concerning enforcement, most actions in this area are co-ordinated by the Fiscal Police (*Guardia di Finanza*) in co-operation with a special police department dedicated to online fraud (GAT). In 2013 GAT carried out some of the most effective and large-scale operations against online copyright infringements, with actions against some of most significant international illegal portals available in Italy, as well as investigations and seizures of some well-known Italian sites. Other successful actions taken by the Fiscal Police include actions against Italian linking sites, illegal streaming services with movies and television program and cyberlockers sites.

Regarding the enforcement-related legislation, the new regulation that came into force March 2014 enables Italian Communications Regulatory Authority (AGCOM) to order, after verifying the violation, the removal of content protected by copyright uploaded illegally on website hosted in Italy and to block access to website hosting massive piracy including those outside Italian jurisdiction[198]. On Sept. 26, 2014, the Administrative Court of Lazio referred to the Italian Constitutional Court a question regarding the constitutionality of AGCOM regulation in particular to check if blocking orders issued by an administrative body, such as AGCOM, comply with constitutional principles, including freedom of expression, economic freedom and proportionality.

Current debate

Summary of recent debates: The debate on the copyright in the age of the Internet seems to be relatively advanced in Italy. The main participants in the debate are the Italian government (Ministry for Heritage and Cultural Activities and Tourism, and the Presidency of the Council of Ministers), the regulator, AGCOM, the industry associations (see below) and consumers associations.

The two main topics that are currently debated are: the application of the rules of the new regulation issued by Italian Communications Regulatory Authority that came into force on March 2014, and the debate on potential reform of copyright at the EU level.

Industry associations: In Italy, there are several associations, industry chambers and collective management organisations of copyright-intensive industries in Italy. The main association is the public organisation "Società Italiana degli Autori ed Editori” (SIAE). In addition some of these associations are gathered in the associations of copyright-intensive industries, “Confindustria Cultura Italia”[199]. They include:

- IMAE (Performing Artists)
- Confindustria Radio Televisioni; CRTV (radio and TV broadcasting)
- Motion Picture Licensing Corporation Italy
- SCF Consorzio Fonografici (phonographic industry)
- Diritti Artisti IPAA (music and audio-visual industry)
- AGIS (Italian Show Business Association)
- ANICA (Italian Film Producer’s Association);
- FAPAV (Audio-visual and Multimedia Content Protection Federation);

- UNIVIDEO (Italian Union of Audio-visual Publishers);

These associations carry out a number of activities, including: *i)* collective rights management *ii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, and training of public authorities) *iii)* awareness raising campaigns in the area of copyrights, and *iv)* data collection.

Examples of best practices: In 2004, the Italian government promoted the so-called “Charter of Sanremo”- a code of conduct shared by the government and stakeholders to foster the availability of quality content and ensure the respect of digital rights - and to the revision of the “Urbani Decree” on downloading copyright music from peer-to-peer networks. In addition in June 2014, a, a self-regulatory initiative of IAB Italy, FPM and FAPAV was presented with the aim to combat piracy on the internet through blocking ads on illegal platforms.

Italy country study annex: Italian Broadcasting Industry in the Age of the Internet[200]

This annex presents television-related on-line content in Italy[201].

RAI.TV is the public broadcaster multimedia portal offering 15 TV channels and 10 radio channels in live streaming over Interne; 7 RAI Replay channels (streaming of last 7 day broadcast), on top of several thematic areas and programme sites with audio and video podcast of selected current and archive episodes. All content is available for free.

LA7.TV is the web portal of the Italian commercial TV channel La 7 offering for free streaming of all contents broadcast in the last 2 weeks (full episodes, in full screen and HD). Service is available free to PCs, interactive set top boxes and smart TVs.

MTV On Demand is the broadcaster’s streaming service offering programs broadcast on MTV channels. The free service also provides Internet exclusive content.

SKY On Demand is the video-on-demand service available to Sky’s subscribers equipped with My Sky HD set top box. Contents are available for one week after broadcast and include film, entertainment programs, TV series, documentaries, sport magazines and events, children’s programmes, events and concerts.

SKY GO is an app offering over 30 channels of Sky’s platform in streaming on second screens and mobile devices (pc, tablet, smartphone). Service allows access to Sky On Demand library of film, TV series, entertainment, documentaries, etc.

SKY Online is a subscription service open to everyone and offering in streaming to internet connected device a selection of Sky’s offer. Sky online, by using Internet as the main mean to access content, targets mainly digital native public.

VideoMediaset.IT, allows web users to watch entire episodes of Mediaset’s programmes, including the complete version of every newscast. The other programmes offered over the video portal, besides the entertainment programmes, include soap operas, current affairs and sports programmes, which can all be watched in high-quality full-screen mode. VideoMediaset content is also available on the main social networks along with snack-TV content.

Mediaset Rewind, On the main TV screen VideoMediaset is available as the catch-up TV service of the last 7 days, accessible through smartTV sets via internet broadband connection.

Infinity, is an OTT service with a library of 5000 titles - on demand, in HD and original version, with no commercial breaks – caters to multiple reception devices: pc, smartphone, smart TV, tablets and games consoles, including Playstation 3 and the X-box. Infinity is available to all users in fast developing market for the legal offer of OTT content.

Premium Play provides non–linear distribution across different platforms (personal computers, connected TV sets, HD decoders and X-box consoles, Ipad) and features over 2000 programmes (including news, sport, film, drama and entertainment). Every week, 200 new programmes are added afresh. The premium “Download & Play" service enables subscribers to download, save on the device memory and watch Mediaset’s on demand content without any internet connection, no additional charges and thus no territorial restrictions.

16mm.it collects and shares videos in a way similar to many other platforms on the web. Users can directly send their videos or respond to contests and calls to action on specific issues. To upload a video, users are asked to abide by 10 rules in the terms of reference. All videos are pre-vetted before going public. At present, 16 mm counts over 10.000 truly UGC videos, roughly 50 daily.

TIMvision is a multimedia video service accessible via Telecom Italia set top box or via ADSL and mobile connected devices (PC, smart TV, smartphone). TIMvision library contains thousands of film titles, sport events accessible on demand or via a dedicated App.

Additional AV offer not related to TV providers legally available over the Net in Italy include (NB: comprehensive not exhaustive list):

- ANICAONDEMAND: film, TV series and TV programs, documentaries, current and archive content;
- POPCORNTV: TV On-Demand service available on Pc/Mac, Apple and Android connected device, connected TV;
- SAMSUNG HUB: music, film, TV, games, eBooks, educational content especially optimised for Samsung devices;
- SONY ENTERTAINMENT NETWORK: allows access to high quality content via connected TVs, videogame consoles and BluRay readers;
- X-BOX LIVE: is the entertainment platform dedicated to Microsoft X-Box and allowing rental or buy of HD film and TV programs;
- APPLE ITUNES STORE: films on demand are accessible via the different iOs devices (iPhone, ’iPad, PC, Apple TV);
- GOOGLE PLAY STORE: mainly films, accessible via several connected devices (PCs, smartphones, tablets based on Android software), or over TV screens via Chromecast USB.

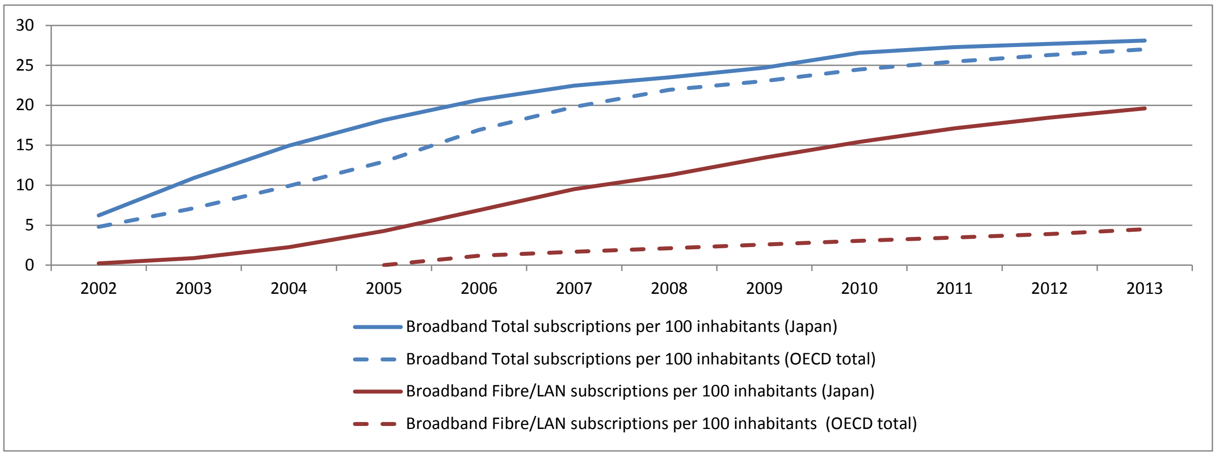
Japan

State of the Internet

In recent years access to broadband networks and the Internet has constantly increased in Japan. In terms of fixed broadband, penetration levels have been growing constantly and are well above the OECD average, reaching maturity. In addition, further deployments of fibre networks have taken place. Overall, deployment of fibre in Japan is at a very advanced stage and places Japan among top countries in the world (see Figure 5.26).

Figure 5.26. Broadband penetration rates in Japan

2002-2013, per 100 inhabitants

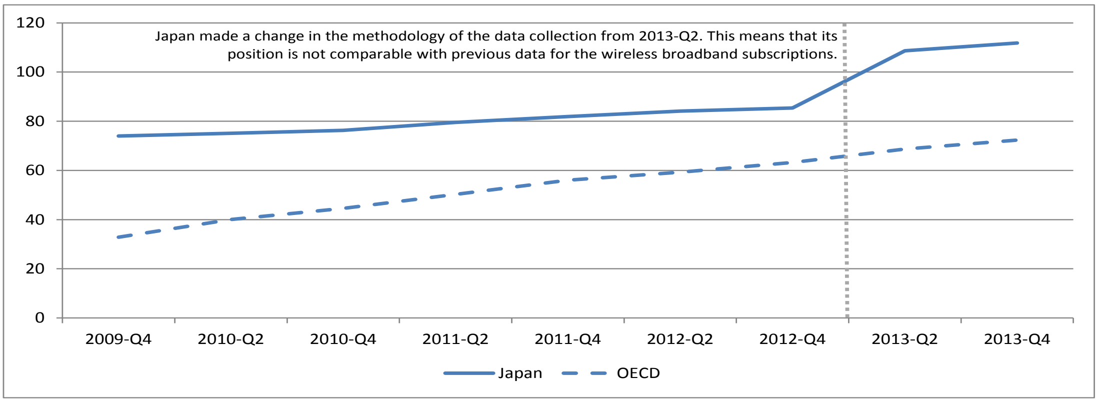


Source: OECD Broadband Portal

Mobile broadband access is opening up new communication possibilities to people as they are away from a fixed-line connection. In 2013 mobile broadband penetration in Japan has grown to 111.79%, meaning that some users have more than one subscription. This is well above the OECD average that has grown to 72.37% (see Figure 5.27).

Figure 5.27. Mobile broadband penetration rates in Japan

2009 Q4 – 2013 Q4, per 100 inhabitants



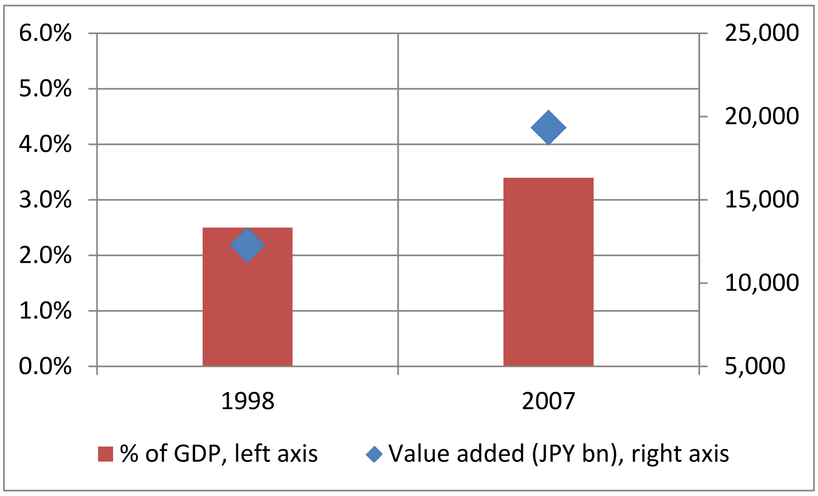
Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past years copyright-intensive industries in Japan have demonstrated generally good performance[202]. In 2007 the total contribution calculated for the core copyright-based industries was JPY 17 trillion, accounting for 3.2% of Japan's GDP (Figure 5.28).

Figuere 5.28. Added value of copyright-Intensive industries in Japan

2002-2012, JPY billion (right axis) and % of GDP (left axis)

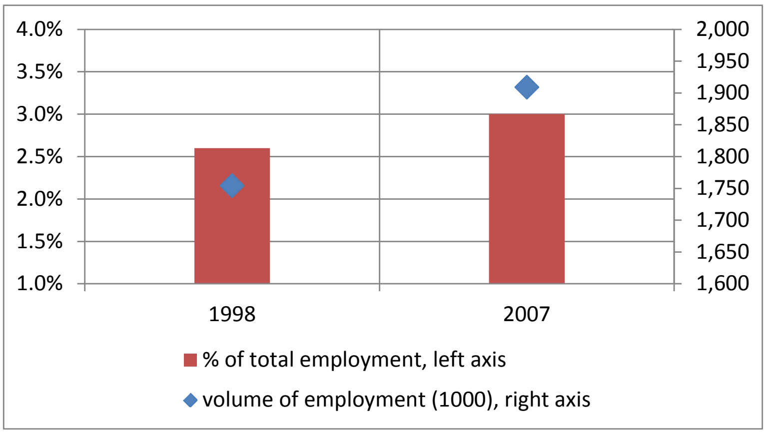


Source: Japan Copyright Institute, 2009

Employment: Between 1998 and 2007, the overall share of people employed in copyright-intensive industries in total industry employees reported an increase of 0.04 percentage point. In 2007 copyright-intensive industries in Japan employed 1.9 million people, which represented 3% of all employed (Figure 5.29).

Figure 5.29. Employment in copyright-intensive industries

volume of employment (left axis) and % of industry employment (right axis)



Source: Japan Copyright Institute, 2009

Copyright-intensive industries and the Internet economy: Japanese industries, including copyright-intensive industries, successfully leverage the technical opportunities offered by the Internet.

The percentage of firms selling online has been rising in Japan for the past years, and the existing forecast suggest that Japan will remain one of the most important e-commerce markets in terms of sales volumes[203].

A unique feature of Japan, compared to other OECD countries, is a very intense usage of mobile broadband. For example, the number of daily mobile users who accessing news and information from their mobile devices in Japan reached 57.6% in 2010, far more than in Europe and in the US[204]. This trend also affects copyright-intensive industries and was paralleled by emergence of numerous start-ups and business models took the advantage of the mobile Internet as the distribution channel. Examples include the emergence of a "cell-phone novel" (books) and a company NAMCO (games) (See Box 6).

Box 5.6. Japanese creative businesses on the Internet: cell-phone novels and Namco

A *cell-phone novel* is a literary work that is originally written on a mobile phone via text messaging. The content is sent directly, chapter by chapter, to users through paid SMS text messages, or through dedicated online subscription site. The Japanese publishing industry has quickly adopted cell-phone books into their product portfolio by offering them on their sites, popularising information about them and by offering prizes to authors of good quality cell-phone novels.

NAMCO is a Japanese corporation that is best known as a former developer of video games for mobile phones. Such games, mostly arcade-style, became large popularity in Japan in the early 2000s. *NAMCO* was very active on that market, introducing several innovative solutions, such as use of mobile phone camera to personalise characters that appear in games. In 2005 *NAMCO* merged with Bandai and continued to operate as Namco Bandai Games.

Legal landscape

Current copyright legislation: In Japan the legal issue of copyrights is regulated by the Copyright Act (No. 48) that was first passed in 1970 and amended several times.

Recent evolution: Copyright law in the Japan have been amended several times in order to meet the technological development, cope with changes in socio-economic landscape and to comply with the evolving international landscape[205]. The most recent amendment was made in 2012 (act No.43). This amendment introduced some additional provisions related to the so-called incidental use of copyrighted material. It also strengthened protection of copyright and related rights in order to increase the efficiency of countering piracy.

Duration of copyright: For cinematographic works, copyright protection generally ends 70 years following the publishing of the work, or 70 years since its creation (if it has not been made public within 70 years following its creation).

For other works, such as sound recordings, performances, books, etc. copyright protection generally ends 50 years following the death of its author, or 50 years since its first publication (if the author is unknown or if the copyright does not belong to an individual person).

Institutional setting: in Japan, the agency in charge of copyright issues is the Agency for Cultural Affairs which belongs to the Japanese Ministry of Education, Sports, Science and Technology (MEXT). Within the Agency most copyright-related tasks are assigned to its dedicated administrative unit, the Japanese Copyright Office (JCO).

Database protection: Original databases that "by reason of the selection or systematic construction of information contained therein, constitute intellectual creations" are protected by copyrights (Article 12-2). There is no legislation solely dedicated to copyright protection (sui generis) in Japan.

Limitations and exceptions: Japanese copyright law sets out a detailed set of cases when a copyrighted work can be used without rights holder authorisation. These include (for example): reproduction for private use, reproduction in libraries, quotations, reproduction in school textbooks, broadcasting and wire diffusion in school education programs, reproduction and public transmission for teaching materials at education institutions, etc[206]. For each case, Japanese legislation provides a detailed set of conditions to clearly define clearly the circumstances for legal, unauthorised use.

Orphan works: For use of orphan works, an application for a compulsory licence can be made to the Agency for Cultural Affairs (ACA). It is possible to issue a compulsory licence for works of a foreign author as long as the work will continue to be exploited within Japan.

Copyright registration: Copyright registration in Japan is voluntary, and can be done at the Agency for Cultural Affairs. It establishes presumption of facts contained in registration for use in court, in cases of copyright infringement or disputes.

Enforcement: Copyright infringement in Japan is generally a civil law matter and the prosecution takes place only upon the legal complaint of the right owner. In addition to a set of civil remedies, the Japanese legislation provides a list of penal sanction for copyright infringement, including imprisonment[207].

Current debate

Recent debates: The public debate on “copyrights in the age of the Internet” seems to be relatively advanced in Japan. An important forum for such debate is the Cultural Council Copyright Subcommittee[208] that works within the Agency for Cultural Affairs. The Subcommittee’s members come from the industry, academia, and legal sector. The discussions take place in different thematic working teams, and touch upon such specific subjects as content digitisation, types of contracts or remedies and litigation[209].

Whereas the debates that take place at the Subcommittee are rather specific and focus on detailed topics, the “Copyright White Paper” (Japan Copyright Institute, 2009) published by the Japanese Copyright Research and Information Center presents a general picture of Japanese copyright-intensive industries. It analyses the annual trends of various macroeconomic indices that describe the industry, which in turn positions the copyright industry in the national economy[210].

Industry associations: There are many industry associations in Japan, including in the music, film and television, books and periodicals, visual arts, videogames and broadcasting sectors. The main ones include[211]: *i)* Japanese Society for Rights of Authors, Composers and Publishers (JASRAC), *ii)* Japan Reproduction Rights Center (JRRC), *iii)* The Japan Writers' Association, *iv)* The Japan Art, Photograph and Graphic Design Copyright Organisation (APG-Japan), *v)* Society for the Administration of Remuneration for Video Home Recording (SARVH), *vi)* Society for the Administration of Remuneration for Audio Home Recording, *vii)* Japan Council of Performers' Organisations (GEIDANKYO), and *viii)* Recording Industry Association of Japan (RIAJ).

These associations carry out a number of activities, including*: i)* collective rights management, *ii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities), *iii)* awareness raising campaigns in the area of copyrights, and *iv*) data collection.

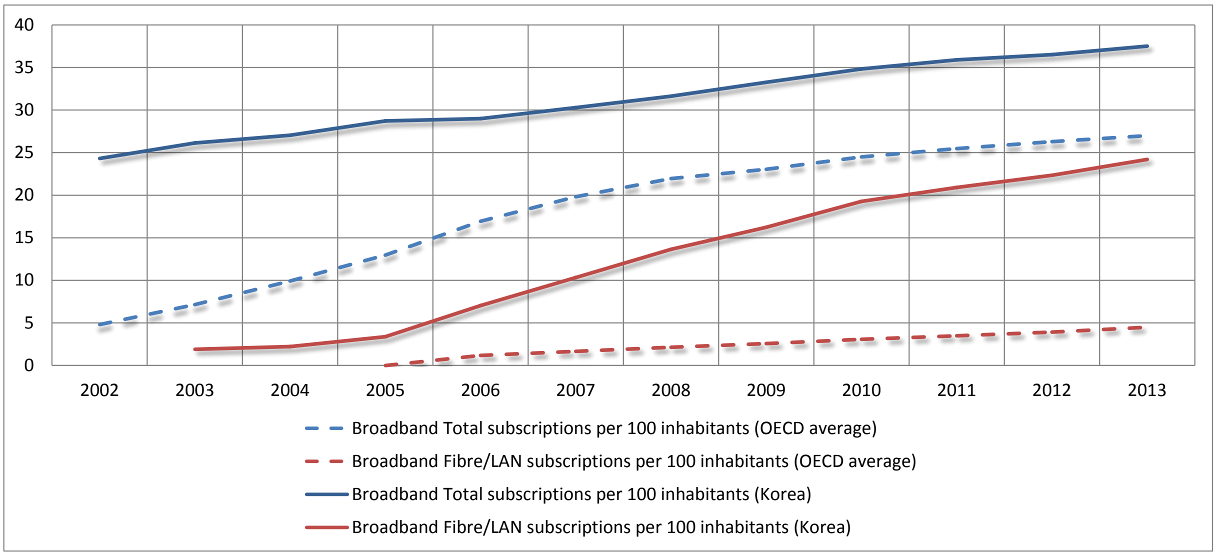
Korea

State of the Internet

In recent years access to broadband networks and the Internet has constantly increased in Korea. In terms of fixed broadband, penetration levels have been growing constantly and are well above the OECD average, reaching maturity. In addition, further deployments of fibre networks have taken place. Overall, deployment of fibre in Korea is at a very advanced stage and is well above the OECD average (see Figure 5.30).

Figure 5.30. Broadband penetration rates in Korea

2002-2013, per 100 inhabitants

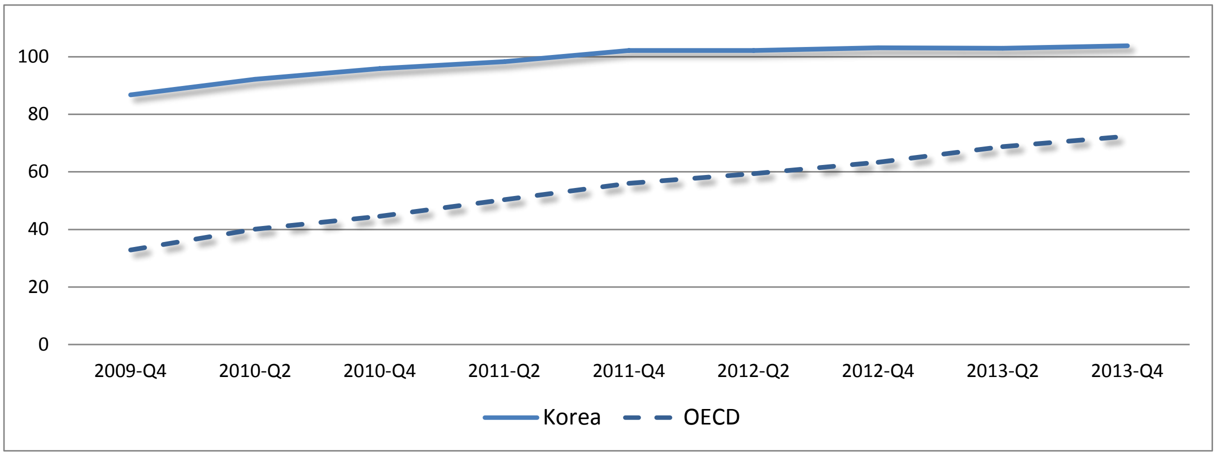


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in Korea, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has grown to more than 100 subscriptions per 100 inhabitants in Korea, meaning that some people have more than one subscription. This is way above the OECD average that has grown to 72% (Figure 5.31).

Figure 5.31. Mobile broadband subscriptions in Korea

2009-2013, per 100 inhabitants



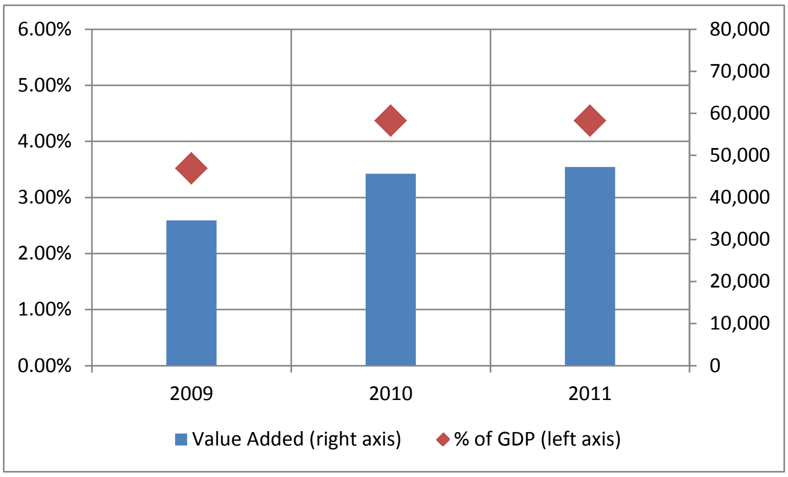
Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past years copyright-intensive industries in Korea have demonstrated overall better performance than the overall economy of Korea, reporting between 2009 and 2011 average annual growth rates of 13.0%[212].In addition, one should keep in mind that in 2010 there was an economic rebound, after the 2008-2009 global financial crisis downturn. In absolute terms Korean copyright-intensive industries contributed in 2011 KRW 47 246 billion to the Korean GDP (Figure 5.32) accounting for 4.37% of Korea's GDP.

Figure 5.32. Added value of copyright-Intensive industries in Korea

2002-2012, KRW billion (right axis) and % of GDP (left axis)

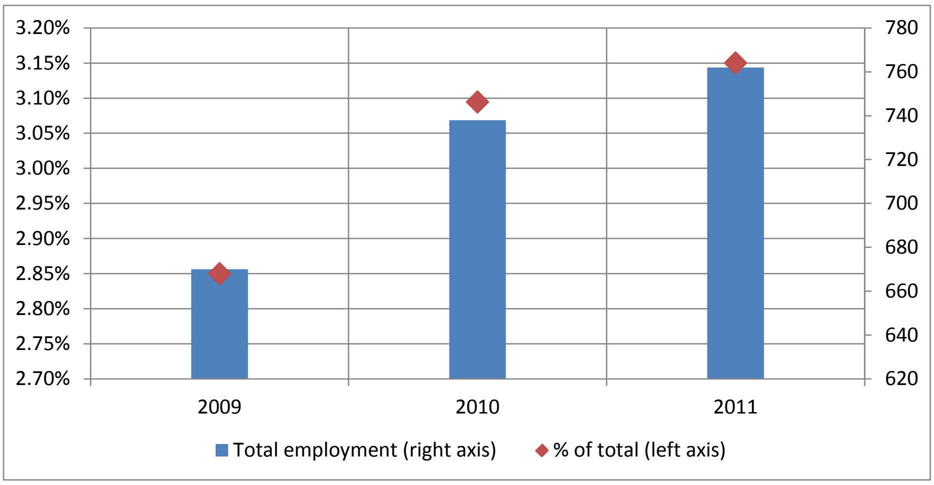


Source: Korea Copyright Commission (2013), The economic contribution of copyright industries in the Republic of Korea

Employment: Between 2009 and 2011, the overall share of people employed in copyright-intensive industries in total industry employees reported a moderate increase. In 2011 the total number of people employed in copyright-intensive industries represented 3.1% of all employed by Korean industry and amounted to 762 000 employees (Figure 5.33)[213].

Figure 5.33. Employment in copyright-intensive industries

volume of employment (thousands, right axis) and % of industry employment (left axis)



Source: Korea Copyright Commission (2013), The economic contribution of copyright industries in the Republic of Korea

Copyright-intensive industries and the Internet economy: Korean copyright-intensive industries successfully leverage the technical opportunities offered by the Internet. Among many start-ups in copyright-intensive industries in Korea, some have performed remarkably well in taking advantage of the Internet. Examples include Ocon Animation Studio and Iconix Entertainment (media), NCSOFT Corporation (entertainment software) and YG Entertainment (music) (See Box 5.7.).

Box 5.7. Korean creative businesses on the Internet: Iconix, Ocon, NCSOFT, YG.

"Pororo the Little Penguin" (simply known as "Pororo") is a cartoon series televised on EBS, Korean educational broadcasting company. The program has been aired in more than 130 countries and the revenue in 2009 including license fees was estimated over KRW 258 billion. The cartoon series and their characters were created jointly by ***Iconix Entertainment***, ***Ocon*** and some other companies. *Iconix* Entertainment (established in 2001) and *Ocon* (established in 1996) have produced animations and characters for children and tried to create new markets through character merchandising and other means of secondary uses.

Both *Iconix* and *Ocon* have been grown very rapidly over the past years. In 2011 *Iconix* recorded KRW 34.3 billion sales, an increase by 102.8% from 2009; nearly 70% of the sales were generated by Pororo. *Ocon*'s sales in 2009-2011 grew by 147.2% to KRW 8.9 billion, and Ocon has expanded its business area to theme parks. Despite the fact that the original characters were created decades ago, the recent huge success of these businesses is attributed by technological developments and diversification of distribution channels.

NCSOFT Corporation was founded in 1997 by its current CEO Taek-Jin Kim. Today *NCSOFT* is now one of the world leaders on development and publishing of massively multiplayer online games with paid-in capital of KRW 10 billion. *NCSOFT* gained and established its position with its flagship product "Lineage", the first successful internet-based online game in Korea. Thanks to high penetration rates of fast broadband in Korea, Lineage became popular very quickly, and the company soon launched following games: Lineage 2 and AION. Over the past years *NCSOFT* has established its position in the Asian, North American and European markets.

Since its launch in 1998 Lineage, the first Korean online game, has earned KRW 130 billion annually on average, and the accumulated sales in 2013 amounted to more than KRW 2 trillion. As Lineage has mainly contributed to *NCSOFT*'s growth in sales and size, Taek-Jin Kim appeared on the Forbes' list of "World's Billionaires 2011: Record Year For The Richest" (1140th out of 1211 richest people in the world).

YG Entertainment was established in 1996 as original name of Hyun Entertainment by its current representative Hyun-Suk Yang. Today it is one of the largest entertainment companies, home to well-known artists in Korea such as 1TYM, Big Bang and 2NE1. In 2012, it produced PSY's Digital Single "Gangnam Style" and has earned its world-wide recognition and big revenues. "Gangnam Style" was promoted mainly through YouTube, the world's most popular web site for uploading and sharing videos, and it has spread out with a number of video remakes and parodies throughout the world. After the launch of its official music video, uploaded on YouTube in July 2012, Gangnam Style won Guinness World Record for the most liked video in Youtube history in September 2012 and has been viewed over 2 billion times in May 2014.

YG Entertainment has been expanding its business models to various content markets such as concerts, broadcasts, games and advertisements while focusing on its main music business.

Legal landscape

Current copyright legislation: In Korea the legal issue of copyrights is regulated by the Copyright Act that was first passed in 1957 and amended several times.

Recent evolution: The Copyright Act has been amended several times since its enactment in order to reflect the changing environment in technology and copyright-intensive industries as follows:

- Jan. 28, 1957: Enactment of the Copyright Act of Korea.
- Dec. 31, 1986: Introduction of internationally recognised regimes in order to join international conventions such as Universal Copyright Convention.
- Dec. 30, 1989: Amendments following the amendment to the Government Organisation Act.
- Dec. 27, 1990: Amendments following the amendment to the Government Organisation Act

- Mar. 8, 1991: Change of names of relevant Acts following the enactment of the Library Promotion Act
- Mar. 6, 1993: Amendments following the amendment to the Government Organisation Act
- Jan. 7, 1994: Extension of protection term of copyright and neighbouring rights and imposition of more rigorous penalties, etc.
- Mar. 24, 1994: Change of names of relevant Acts following the amendment to the Libraries and Reading Promotion Act
- Dec. 6, 1995: Amendments following the WTO TRIPS, in preparation for the accession to Berne Convention
- Dec. 13, 1997: Introduction of a hearing system for such cases as revocation of copyright collective management services
- Jan. 12, 2000: Introduction of the right of interactive transmission, expansion of the scope of immunity for libraries, and imposition of more rigorous penalties, etc.
- July 10, 2003: Provision of sui generis protection of database producers and clarification of the scope of responsibilities of online service providers
- Oct. 16, 2004: Granting of the right of interactive transmission to performers and phonogram producers
- Oct. 4, 2006: Change of names of relevant Acts following the amendment to the Library Act
- Dec. 28, 2006: Introduction of the concepts of public transmission and digital sound transmission. Introduction of the Copyright Commission. Introduction of orders to collect, discard, delete and suspend illegal reproductions, etc.
- Feb. 29, 2008: Amendment following the amendment to the Government Organisation Act
- Mar. 25, 2009: Granting of immunity to the National Library of Korea (collection of online materials for preservation purposes). Clarification of the scope of specialised recording formats for the exclusive use by visually impaired persons, etc. Introduction of the right to claim remuneration for public performances for performers and phonogram producers.
- Apr. 22, 2009: Integration of the Copyright Act and the Computer Program Protection Act. Establishment of the Korea Copyright Commission. Strengthening of measures to prevent illegal online reproductions, etc.
- July 7, 2009: Change of names of relevant Acts following the amendment to the Act on the Advancement of Newspapers, etc.
- June 30, 2011: Recognition of the Korea-EU Free Trade Agreement
- Dec. 2, 2011: Recognition of the Korea-US Free Trade Agreement
- July 16, 2013: Amendment of Reproduction for Visually Impaired Persons
- Dec. 30, 2013: Amendment of free use of Public Works

Duration of copyright: In general copyright protection in Korea ends 70 years following the death of the last living author. Different rules exist for the term of protection of performances, phonograms and broadcasts: 70 years after the performance, 70 years after the publication, and 50 years after the broadcasting, respectively

Institutional setting: The Ministry of Culture, Sports and Tourism (MCST) is the main institution in charge of copyright-related issues in Korea. Within MCTS there are four dedicated divisions:

- *Copyright Policy Division* Its tasks include: Improving copyright-related laws and institutional systems; Supervising the Korea Copyright Commission; Promoting copyright education and public awareness campaigns; Enhancing copyright protection overseas.

- *Copyright Industry Division* Its tasks include: Laying the foundation for transaction of copyright (registration/authentication); Standardising copyright protection and management technologies; Guiding and supervising copyright management organisations and copyright brokerage organisations; Managing copyright statutory license and copyright donation systems, etc.

- *Copyright Protection Division* (including five regional offices) Its tasks include: Crackdown on distribution of illegal reproductions online/offline; Support for the operation of the Copyright Protection Center; Ordering suspension of online transmission of illegal reproductions or their deletion and imposing fines and taking other appropriate measures; Support for the development and operation of illegal reproduction tracking and management system, etc.

- *Culture and Trade Team* Its tasks include: Planning/coordination of trade policies in the cultural sector including FTAs/ Cooperation with copyright-related international organisations such as the World Intellectual Property Organisation (WIPO), foreign governments and agencies

Other relevant institutions include: the Korean Copyright Commission (KCC), the Presidential Council on Intellectual Property and the Copyright Protection Center.

The *Korean Copyright Commission* (KCC) is a government-funded public entity whose organisation is based on the Copyright Act. According to Article 113, the KCC has the following functions, among others: *i)* conciliation of disputes; *ii)* deliberation on matters concerning the rates and amounts of fees and royalties for the copyright management service providers; *iii)* promotion of fair use of works; *iv)* recommendation for corrective measures; *v)* statutory licensing and copyright registration entrusted by the MCST.

The *Presidential Council on Intellectual Property*, established on July 28, 2011, is in charge of the following policy areas: *i)* formulation, review, evaluation and modifications of national IPR strategies in Korea and the following action plans, *ii)* allocation of financial resources related to IPR policies.

The *Copyright Protection Center* focuses on offline copyright piracy. Although the MCST has the sole administrative power to crack down online and offline piracy, it delegates the offline enforcement power to the Center[214].

Database protection: The Copyright Act provides sui generis protection for non-original databases. The protection of database producers is defined in the Chapter 4 of the Copyright Act. A database producer shall hold the rights to reproduce, distribute, broadcast or interactively transmit of a whole or considerable part of his database.

Limitations and exceptions: In Korean copyright legislation limitations and exceptions are provided in Articles 23 to 36 and 101ter of the Copyright Act[215]. These include the following cases:

- Use in political speeches, judicial proceedings, for the purpose of school education, exam questions, news reporting, articles and editorials.
- Quotations.

- Public performance and broadcasting for non-profit purposes.
- Private use.
- Reproduction in libraries.
- Reproduction for Visually Impaired Person
- Ephemeral Sound or Visual Recordings by Broadcasting Organizations
- Exhibition or Reproduction of Work of Art
- Temporary Reproduction in the Course of Use of Work
- Fair use provisions.
- Use by means of translation.

It should be highlighted, that these limitations and exceptions clauses do not waive author's moral rights.

Orphan works: The Copyright Act has a statutory licensing scheme for orphan works entitled "Use of Works in Which the Owner of Author's Property Rights Is Unknown."

In particular, Article 50 stipulates that if any person, despite considerable efforts made in accordance with the criteria prescribed by the Presidential Decree, cannot identify the owner of author's property rights in a work made public (except foreigners' works) or his residence and therefore is unable to obtain the authorization of the author for its use, may use the work by obtaining approval from the MCST as prescribed by the Presidential Decree, and depositing remuneration according to the criteria as determined by the MCST. The authority of the MCST in respect of statutory licensing is delegated to the KCC.

The simplified statutory licensing scheme was introduced in April, 2012 and enforced in October 2012. Its main purpose was to facilitate the use of orphan works. The amendment to the Presidential Decree provides that the certain efforts by the MCST may replace the considerable efforts on the part of the intended user.

Copyright registration: Copyright registration is not mandatory in Korea, although it provides certain procedural benefits in case of a dispute or infringement. Copyright can be registered on-line at the Korea Copyright Commission and costs KRW 23.600 (USD 23) for most works except for software, where the on-line registration costs KRW 53.600 (USD 52). Off-line registration is possible and is on average KRW 10.000 (USD 10) more expensive.

Over the past five years the total number grew steadily at 6.75% average annual growth rate, from 24 225 registrations in 2009 to 31 462 registrations in 2013 (See Figure 5.34). Among all the registered works in 2013, computer programs have the highest share of 43.5% followed by artistic works (25%) and literary works (11%). For more detailed statistics on Korean copyright registrations see Table 5.5.

Figure 5.34. Copyright registrations in Korea (2009-2013)

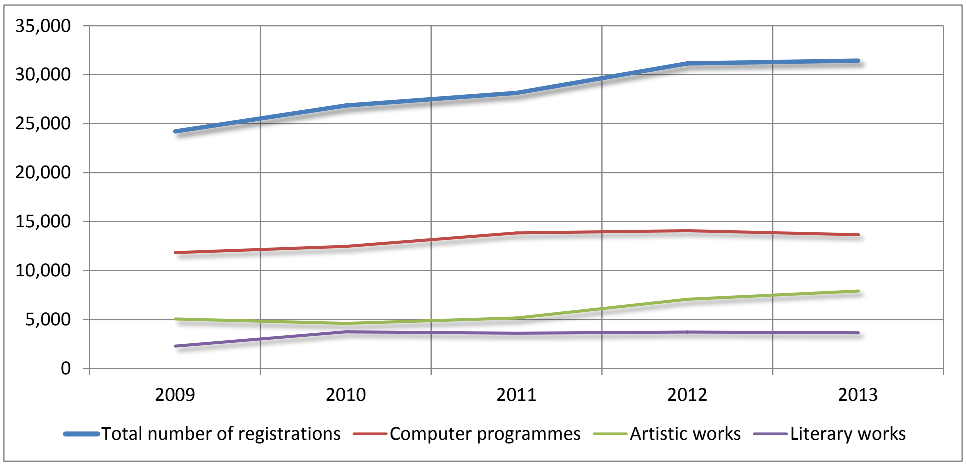


Table 5.5. Copyright registrations in Korea

2009-2013; by subject matters and by right-holders

Type of work		**2009**	**2010**	**2011**	**2012**	**2013**
Works	Literary	2,309	3,776	3,612	3,742	3,658
	Musical	987	1,387	1261	1,446	1,430
	Theatrical	27	25	20	24	58
	Artistic	5,075	4,632	5,179	7,092	7,938
	Architectural	117	84	246	57	131
	Photographic	378	447	281	507	447
	Cinematographic	238	676	374	505	626
	Diagrammatic	400	742	567	528	545
	Compilation	1,082	1,330	1,562	1,823	1,981
	Derivative	279	451	907	645	572
	Computer program	11,856	12,483	13,858	14,101	13,690
	Others	-	-	-	-	-
Performance		93	24	3	30	1
Photogram		1,366	705	230	565	323
Database		18	86	54	101	62
Type of right holder		**2009**	**2010**	**2011**	**2012**	**2013**
Individuals		6,759	9,904	10,516	11,622	12,220
Legal persons		17,187	16,201	16,678	16,334	15,843
Others		279	743	960	3,210	3,399
Total		***24,225***	***26,848***	***28,154***	***31,166***	***31,462***

Enforcement: The main agencies in charge of copyright enforcement in Korea are the Prosecutor's Office and the National Police. The law on special police power with the amendments in 2003 and 2008 gave a mandate to the MCST to counter online copyright piracy. Furthermore, customs authorities have a special role in combating pirated trade, according to Korean Customs Act[216].

Current debate

Summary of recent debates: The public debate on “copyrights in the age of the Internet” seems to be relatively advanced in Korea. It has been taking place for several years, and gathered numerous experts from the government, academia, think tanks, industry and civil society. Currently the following general themes are being debated:

- Implementation of the Free Trade Agreements between Korea and the USA and between Korea and the EU**.**
- Legal issues related to the so-called smart environment.
- Use of copyrighted works that originate from government agencies and public institutions.
- Criminal components of copyright violation.

Industry associations: There are 12 main industry associations in Korea. All of them are government-authorized organizations that manage copyrights in areas of music, literary, media (broadcasting and press), cinematographic and public works. These associations are:

- *Music industry*: Korea Music Copyright Association, Recording Industry Association of Korea, Federation of Korean Music Performers
- *Literary works*: Korea Reproduction and Transmission Rights Association, Korean Society of Authors, Korean TV and Radio Writers Association, Korea Scenario Writers' Association
- *Media*: Korea Broadcasting Performers' Association, Korea Press Foundation
- *Cinematographic industry*: Movie Distributors Association of Korea, Korean Film Producers Association
- *Public work*: Korea Culture Information Service Agency

For more details on these associations and their activities see the Appendix.

Industry best practices: Three relevant examples can be mentioned in the context of industry best practices in Korea: the graduate response scheme by Korean Internet service providers (ISPs), Korea Online Newspaper Association and its “Usage Rules for Online Content" and the "Guide on Cost Estimation for Software Project" by Korea Software Industry Association.

Korea enjoys one of the highest rates of high-speed Internet penetration in the world, which is clearly beneficial for Internet users and for many parts of the industry. Unfortunately, it is also an partial enabler for online piracy. This triggers counter-actions of Korean government (see enforcement) and pushes the industry to develop a set of best-practices. In 2009 a graduated response system was introduced targeting heavy uploaders who repeatedly make illegal copies available on the Internet. According to this system, the MCST issues orders to Korean ISPs to warn the on-line pirates and/or delete illegal copies. After the third warning, the MCST after deliberation by the KCC orders the ISPs to suspend their access for not more than 6 months.

The Korea Online Newspaper Association (KONA) is a non-profit organization with the members of the major online news companies in Korea that endeavours to protect its members' rights, in particular the rights related to the copyright law. In 2005 KONA published the "Usage Rules for Digital News" and in 2008 "Usage Rules for Online Content".

The "Usage Rules for Digital News" has been revised twice in order to reflect the amendments to the copyright law and to the developments of the online news market since the first publication in 2005. They provide information for readers on how to legally use digital news. They recall that digital news is protected by the copyright law and readers should use digital news according to the terms and conditions applied by the KONA. They address such issues as "copy and paste", hyperlinks, Rich Site Summary services, online communities, etc.

The "Usage Rules for Online Content" outlines rights and obligations for subscribers to the online news contracts. They deal with various issues ranging from the scope of use and modification of online content to the expiration of use and copyright protection measures.

The Korea Software Industry Association (KOSA), consists of 1,200 IT and software companies, and promotes a fair trading ecosystem. It proposes a proper cost estimation services for software projects summarized in its "Guide on Cost Estimation for Software Project". The Guide was made for software companies who are interested in participating in software development projects conducted by government agencies and public institutions in a effort to enhance competitiveness of domestic software industries. It proposes the cost estimation methods at the stages of project planning, software development and system maintenance and management. Explanations and comments are provided with illustrations and hypothetical examples.

Korea country study annex: Collective Management Organisations in Korea

Korea Music Copyright Association

The Korea Music Copyright Association (KOMCA) was established in 1964 to protect the rights and interests of music copyright holders. It was authorized to provide copyright collective management services on February 23, 1988 and manages the right of public performance, the right of broadcasting, the right of interactive transmission and the right of reproduction of musical works. The KOMCA collected copyright royalties worth KRW 108.7 billion in 2011 and KRW 111.5 billion in 2012, despite global economic downturn and extreme industrial slowdown in Korea. The numbers of its members and collective management agreement signatories broke through the 15,000 mark and the number of works under its collective management amounts to as many as 1 725 733, indicating its strong position as a music copyright collective management organisation.

The KOMCA is striving to develop various new means of royalty collection and to expand royalty rates on a continual basis. As indicated by the new establishment of films’ performance royalties, the organization continues to achieve not only quantitative growth, but also substantive qualitative growth. In the case of broadcasting royalties for terrestrial broadcasting stations, the royalty rate has been expanded to 1.2%, compared to the past, while it has been decided that revenues from endorsement would be included in the scope of revenues. It has also decided to settle VOD and webcasting service royalties under separate regulations, doing its utmost to protect the rights of its members. The KOMCA also prepares to begin collecting royalties for the use of music by UCCs, Blogs and Cafes on the Internet.

In addition, on December 4, 2012, during training sessions for representatives from countries in Asia and Latin America, as well as from Myanmar, Bhutan, Laos, Sri Lanka, Bangladesh, Mongolia, Nepal, India, Cambodia, Kenya, and Senegal, a project implemented in partnership with the World Intellectual Property Organization (WIPO).

Recording Industry Association of Korea

The Recording Industry Association of Korea (RIAK) was established in 2001 to protect the rights and interests of phonogram producers. It was authorized to provide copyright collective management services by the then Minister of Culture and Tourism on March 17, 2003 and has provided collective management of 260,000 songs owned by 2 217 members.

In addition to collective management of neighbouring rights for phonogram producers, the RIAK collects and distributes remuneration for 1.92 million songs of 3,000 phonogram producers, as it was designated as an organization to collect broadcasting remuneration for commercial phonogram in 2001, as an organisation to collect remuneration for digital audio transmission of phonogram in 2008 and as an organization to receive remuneration for performances for commercial phonogram in 2009 by the Minister of Culture, Sports and Tourism. Furthermore, the RIAK is proactively involved in copyright protection activities and crackdown on illegal audio sources.

Meanwhile, in May 2011, the RIAK was transferred with the Korea Music Data Center project from the Korea Creative Content Agency (KOCCA). The project is aimed at promoting citizens’ right to culture by collecting and classifying data on Korean music in a systematic manner and building online and offline data centre. Permanent and special exhibition halls and a data centre were opened on the first floor and the first basement floor in the Olympic Hall. In 2011, the “Korean Wave Soaring into the World” was staged and Nam In-su Special Exhibition was featured in 2012.

Federation of Korean Music Performers

The Federation of Korean Music Performers (FKMP) was established in June 1988 to protect and manage neighbouring rights of performers. It was authorised to provide copyright collective management services on November 14, 2000 by the then Minister of Culture and Tourism and has managed neighbouring rights of performers since then.

In addition to collective management services, the FKMP collects and distributes remuneration for music performers as it was designated as an organisation to collect remuneration for broadcasting of phonograms for sale in October 1988, an organisation to collect remuneration for digital sound transmission in 2008, and an organisation to collect remuneration for public performances of phonograms for sale in 2009.

As of December 31, 2012, the FKMP had 6,307 performers as its individual members and six special members, including the Korea Singers' Association, the Singers' Committee of the Korea Entertainers Association, the Korea Recording Musician Association, the Korean Traditional Music Association, the Music Association of Korea and the Korea Musicians Association. Its major activities include collection and distribution of copyright royalties and various remunerations, protection of rights and interests of music performers and improvement of their status, protection of rights of Korean music performers in foreign countries and publicity campaigns on neighbouring rights.

Korea Reproduction and Transmission Rights Association

The Korea Reproduction and Transmission Rights Association (KRTRA) was established on July 1, 2000 to protect the rights of copyright holders and publishers and promote the fair use of copyrighted works through collective management of rights on reprography and transmission of literary works on behalf of rights holders. The KRTRA was authorised as a copyright collective management organisation on November 14, 2000 and has copyright collective management organisations and related organisations as its members. The KRTRA has distributed full-amounts of collected fees to right holders since 2009, and the KRTRA carries out crackdown activities throughout the year to promote the legitimate use of works and eliminate illegal reproductions. For example, in collaboration with the MCST and the Copyright Protection Center, it performs joint crackdowns on photocopying businesses in university areas during new school semesters (March and September) to protect rights holders.

In addition to its main responsibility of providing copyright collective management services, the KRTRA has been designated as an organisation to collect remuneration from libraries (October 17, 2003) pursuant to Article 31 of the Copyright Act and remuneration for school education purposes (March 13, 2008) pursuant to Article 25 of the Copyright Act. Since then, it has collected and distributed remunerations from those organisations.

As standards on remuneration for reproduction, performance, etc. for school education purposes pursuant to Paragraph 2 of Article 25 of the Copyright Act was notified (the Minister of Culture, Sports and Tourism Notification No.2011-017, April 28, 2011), in 2011, the KRTRA organised workshops and produced guidebooks to provide information on the remuneration system aimed to collect and distribute remunerations on the use of copyrighted works for school education in schools such as universities, making concerted efforts to help the remuneration system for school education purposes to take root at an early date.

Besides, the Association also made multifaceted efforts to locate copyright holders to facilitate the distribution of collected remunerations. In the case of remunerations on textbooks, in particular, it has undertaken a variety of projects, including online and offline advertising campaigns, production of database and catalogue for images used in textbooks to found out the right holders.

Korean Society of Authors

The Korean Society of Authors (KOSA) was officially launched on July 28, 1988 after receiving approval by the Ministry of Culture and Public Information (currently, the MCST) for corporation establishment on July 13, 1988.

KOSA was authorised to provide copyright collective management services on March 16, 1989. Since then, it has managed copyrights of literary, dramatic, artistic and photographic works. In addition to copyright collective management, the main activities of KOSA include copyright infringement investigation and pursuit of legal remedies and public awareness activities by holding seminars and publishing publications. As of December 2012, KOSA had 3,462 members (including 82 groups).

In 2012, the KOSA signed an MOU with the Korea Writers' Association (KWA) on April 18 to promote the rights of wider circles of copyright holders, while pursuing mutual cooperation with various organisations, including the Korea Novelists Association and the Korea Children's Writers Association, to provide support for defending the rights and interests of writers.

As the free-of-charge e-Book publication project supported by KOSA starting from 2011 was well-received among its members, the KOSA published 200 works in e-book format by 2012. It is also preparing for a project to provide support for publication of paper books for its members.

Meanwhile, KOSA members visited Japan to sign a mutual management agreement to distribute Korean literary works overseas and distribute overseas works in Korea and held discussions on the mutual management agreement with the Japan Writers' Association.

Korean TV and Radio Writers Association

The Korean TV & Radio Writers Association (KTRWA) was established in 1962 to promote the rights and interests of TV broadcast writers who work in general fields of the broadcasting industry, including TV dramas, documentaries, entertainment, radio and translation, and contribute to the development of national culture through the growth of broadcasting literature and exchanges. It was authorised to provide copyright collective management services on September 20, 1988.

Korea Scenario Writers' Association

The Korean Scenario Writers' Association (KSWA) was established to protect the rights and interests of scenario writers, offer collective manage services such as licensing and management of scenario works on behalf of scenario writers, and contribute to the development of scenarios. It was authorised to provide copyright collective management services on September 12, 2001 when its name was the Cinematographic Scenario Writers Association. As it was renamed as the KSWA in November 2002, it launched copyright collective management and brokerage services in full swing.

The KSWA is engaged in various activities associated with its members and industry, including activities to protect the copyright of its members, research into scenarios, prize awards to meritorious members, and projects to promote the welfare of its members. In 2011, it hosted the Korea Scenario Contest with prize money worth KRW 100 million, contributing to invigoration of the film industry, including copyright projects.

The KSWA also has trained a number of scenario writers through its affiliated organisation, the "Scenario Writers Training Institute" established in 1992. In 2011, scenario writers of the institute's 37th and 38th class were trained in the training institute. A scenario contest and prize-awarding ceremony were also held at the training institute. And, KSWA recommended members for the Korean Film Council, and sectorial subcommittees of the Korea Media Rating Agency.

Korea Broadcasting Performers' Association

The Korea Broadcasting Performers' Association (KPBA) was established in August 2001 to protect neighbouring rights of broadcasting performers, including TV actors, voice actors, comedians and MCs. It was authorised by the then Ministry of Culture and Tourism to provide copyright collective management services on February 20, 2002.

The KBPA signed a special agreement on the use of neighbouring rights of its members with terrestrial and cable TV broadcasting companies pursuant to Paragraph 3 of Article 100 of the Copyright Act. Based on the agreement, it collects neighbouring right license fees that arise when broadcasting organisations reproduce, distribute, broadcast or interactive transmit broadcast programs where its members make an appearance from them and distributes royalties to its members.

As of 2012, the KBPA has signed MOUs with terrestrial broadcasting companies such as KBS, MBC, SBS, EBS, OBS and nine regional private broadcasting companies, as well as 47 programme providers (PP) for cable TV programs, to protect the rights of its members.

Furthermore, it understands that the level of protection of performers’ rights stipulated in Article 100 (3) of the Copyright Act lags behind compared with protection cases of developed countries, posing an obstacle to protection and promotion of the rights of performers. Hence, it has been vigorously engaged in policy activities to address this issue. Apart from such efforts, the KBPA is engaged in a variety of other activities to protect the rights of its members in practical terms, while expanding welfare programs for its members. It is also striving to sign a special agreement with newly launched general-programming cable TV channels.

Korea Press Foundation

In February 2010, the Korea Press Foundation (KPF, formerly the Korea Press Center in 1962 with two other organisations) was launched with the consolidation of the former Korea Press Foundation, the Newspaper Circulation Institute and the Newspaper Promotion Commission.

The KPF was authorised to provide copyright collective management services on June 7, 2006. As of the end of 2011, it manages the copyright of news works of 69 media of 59 media companies. Starting from 2011, 13 media from seven leading media companies such as Chosun, JoongAng, and DongA have joined the KPF's services in the form of agency or brokerage services, so the number of media companies under the management of the KPF amounts to 82 media from 66 media companies.

In 2012, the KPF organised a contest for a campaign against infringement of news copyright (UCC, newspaper advertising, slogan categories) to raise awareness of copyright protection. It also published research reports on the “digital news contents market and copyright” and “a study on news copyright-related systems and legal precedents in foreign countries.” It also identified practices of using news-related copyrighted works and established a permanent monitoring system to prevent copyright infringement, while launching public awareness campaigns to protect news copyright via various media such as newspapers, radio and the Internet. It posted news copyright protection advertising on more than 100 occasions in the newspapers of its member companies. The KPF has also developed educational video materials on protection of news copyright for the general public and youth, respectively, and plans to utilise them for public awareness campaigns on news copyright this year.

In order to facilitate paid use of news, the KPF has provided integrated new package products for central government agencies, doubling the scale of paid use of news by state organisations, compared to the previous year. It is endeavouring to expand the supply of the paid package products to local governments and public organisations.

As a result of such efforts, the KPF’s news copyright collective management project has been selected by the World Association of Newspapers and News Publishers (WAN-IFRA), which is the world’s largest press organisation in which the world’s newspaper publishers and editors participate, as an exemplary business model in recognition of its contribution to boosting market value of news and its success story was presented globally.

Movie Distributors Association of Korea

The Movie Distributors Association of Korea (MDAK) was established in 1999 to promote seamless and fair use of cinematographic works and establish their distribution order. It was authorised to provide copyright collective management services on November 9, 2005.

The MDAK manages the right of public performance of cinematographic works and mainly grants licenses to DVD theatres nationwide for performance of cinematographic works.

The MDAK's main activities include collective management of cinematographic works, collection and distribution of copyright royalties, crackdown on illegal cinematographic reproductions for copyright protection, protection of the rights and interests of its members, information management to facilitate the use of cinematographic works, suggestions for related bills and public awareness campaigns. In 2010, it established subcommittees to promote the development of the film distribution and home entertainment industries and pursued various solutions to address problems in respective industries.

In 2012, for an example of the activities, the MDAK carried out guidance and public awareness activities to eliminate the use of illegal cinematographic works and prohibit unauthorised use in libraries, accommodation establishments and bath houses. It also raised public awareness of copyright protection for cinematographic works. In the same year, the MDAK had 54 companies as its members, including regular members and special members. It also has six staff members, consisting of directors including the president and staffs at the secretariat that deals with management of copyright of cinematographic works, strategic planning and collection of royalties.

Korean Film Producers Association

The Korean Film Producers Association (KFPA) was established in February 1994 as a consultative body for currently active film producers in Korea. It joined the International Federation of Film Producers Associations (FIAPF) in 2001 and was authorised to provide copyright collective management services by Ministry of Culture and Tourism in 2005.

As an association of film producers, the KFPA is engaged in a wide range of projects involving Korea's film industry, including prevention of illegal reproduction and copyright protection, facilitation of the secondary market in the film industry, labour-management negotiations in the film industry and development of a standard contract form, and pursuit of rationalisation measures of the industrial structure, thereby contributing to both qualitative and quantitative growth of the film industry in Korea. As of the end of 2011, the KFPA had 65 companies as its members.

Korea Culture Information Service Agency

Korea Culture Information Service Agency (KCISA) was established in 2002 mainly to provide cultural information management services.

With the private sector’s rising demand for works owned by public institutions, the Korea Database Agency (KDB) has been authorised to provide copyright collective management services to accelerate their utilisation. The KCISA has been in charge of the services since the KDB transferred them to the KCISA in 2013.

Unlike private collective copyright management organisations that mainly engage in licenses of copyrighted works and collection of royalties on behalf of their members, the KCISA is a copyright collective management organisation in the public sector, so it focuses on distributing free copyrighted works based on the intentions of public institutions to promote the use of public copyrighted works by the private sector.

In addition to collective management of public copyright, the KCISA also strived to promote the use of public copyrighted works by the private sector. As part of this effort, in February 2012, it introduced the Korea Open Government License (KOGL) system, which is a system to permit the free use of public copyrighted works, and distribution is fully under way.

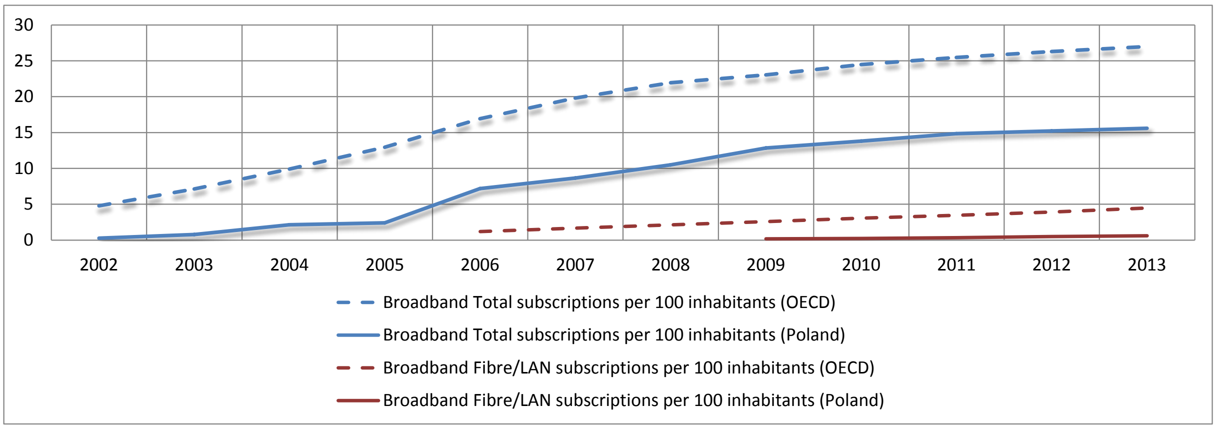
Poland

State of the Internet

In recent years access to broadband networks and the Internet has steadily increased in Poland. In addition, further deployments of fibre networks have taken place. Overall, however, broadband penetration rates and the deployment of fibre in Poland are still at an early stage in Poland and below the OECD averages (see Figure 5.35).

Figure 5.35. Broadband penetration rates in Poland

2002-2013, per 100 inhabitants

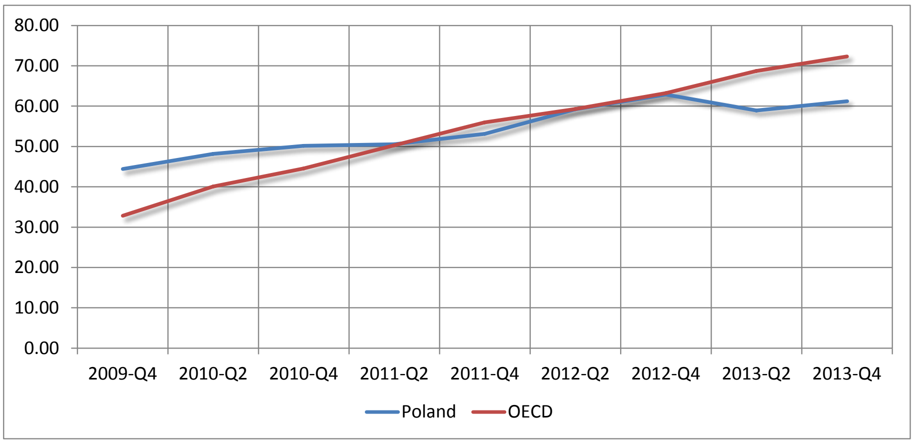


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in Poland, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has grown to over 60% in Poland, which is at a comparable level with the OECD average that has grown to more than 70% (Figure 5.36).

Figure 5.36. Mobile broadband subscriptions in Poland

2009-2013, per 100 inhabitants



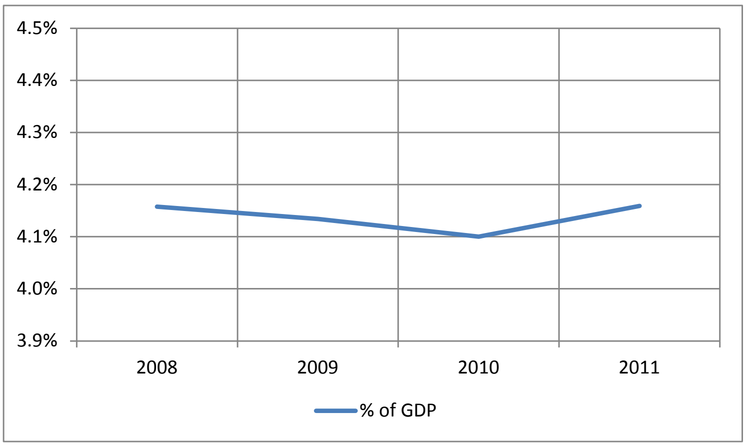
Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past years copyright-intensive industries in Poland have demonstrated overall stable performance[217]. Between 2008 and 2011 the total share of the copyright-based industries within the Polish economy remained virtually stable, accounting for 4.17% of Poland's GDP in 2011 (Figure 5.37).

Figure 5.37. Added value of copyright-Intensive industries in Poland

2002-2012, % of GDP (left axis)

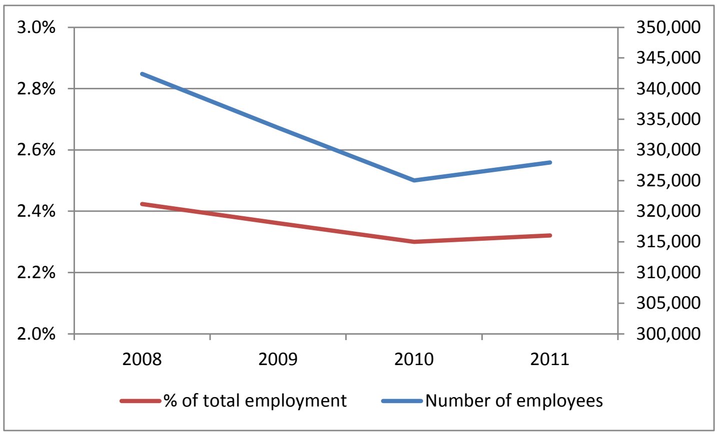


Source: Eurostat SBS database and EPO-OHIM (2013).

Employment: The total number of people employed in copyright-intensive industries represented 2.3% of all employed by Polish industry. Between 2008 and 2011, the overall share of people employed in copyright-intensive industries in total industry employees remained virtually stable. The total employment reported some fluctuations over that period. In 2011 it amounted to 315,000, which was slightly less than the volume of employment in these industries in 2008 (Figure 5.37).

Figure 5.38. Employment in copyright-intensive industries

volume of employment (right axis) and % of total employment (left axis)



Source: Eurostat SBS database and EPO-OHIM (2013).

Copyright-intensive industries and the Internet economy: In Poland, there are several services that offer legitimate access to copyrighted content in the Internet. Given that Polish language is mostly spoken in Poland only, hence content in Polish language is like to be demanded mostly in Poland, the activity of these services should be analysed in the context of the type of provided content: whether it is mostly foreign or domestic (Polish) content. Concerning foreign content, the main problem faced by most local, Polish services are the large costs of access to legitimate foreign content. Given the relatively moderate size of Polish market, this significantly increases the per-user costs, and it turn in favours global players such as iTunes of Spotify that are able to get access to content at a much more favourable per-user rate.

In the on-line music market in Poland main active services include: Muzo[218], Muzodajnia,[219] iplay[220] and Empik[221]. In addition, some companies offer single music files or ringtones online, or rely on music in another way (e.g. as suppliers of technological solutions relating to music, especially in the telecommunications sector). These services include Soho.pl[222], Polish Sound[223], NuPlays[224], Mobila[225], Papla[226], PlaytheMusic[227], Mood[228], Wind Mobile[229]. It should be mentioned that on the music market, some services, such as Sound Park[230] or MegaTotal.pl[231], specialise only in music that is not offered by "big labels". Sound Park addresses its offer to individual artists and independent labels. Megatotal.pl is the first Polish platform of music-related crowd funding and an online store[232] offering mostly music that was financed through the platform[233].

Most major music streaming service providers are now also present in the Polish market: iTunes, Deezer, WiMP, Spotify, YouTube and (since June 2014) Google Play Music. Proceeds from digital music sales rose by 45% in 2013, reaching 33,3 mln zlotys, which amounts to 15% of the total music market.[234]

Concerning Polish video-on-demand (VOD) market, there are several active legitimate services, that can be divided into four main categories:

- Services related to a TV station or a telecom company (Ipla.pl, TVP.pl, TVNplayer.pl, Orange.pl/vod).
- Services related to web portals (Vod.pl, Kinoplex.pl).
- Services related to movie distributors (Cineman.pl, Strefavod.pl).
- Independent services (Iplex.pl, Vodeon.pl).

Legal landscape

Current copyright legislation: In Poland the legal issue of copyrights is regulated by the Act of 4 February 1994 on copyright and related rights[235], by the Act of 27 July 2001 on databases protection[236] and by several specific regulations of the Ministry of Culture and National Heritage (MKiDN). In shaping its internal law Poland is obliged to take into account relevant Directives of the European Parliament and of the Council in its legislation, such as: the Directive on the term of protection of copyright and certain related rights (2006/116/EC), the directive on the harmonisation of certain aspects of copyright and related rights in the information society (Copyright Directive, 2001/29/EC) and the directive on the enforcement of intellectual property rights (Enforcement Directive, 2004/48/EC).

Additionally the important issue of Internet intermediary liability is regulated in the Act of 18 July 2002 on Providing Services by Electronic Means (articles 12-15), which transposes into the Polish legal system the directive on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (eCommerce Directive, 2000/31/EC)

Recent evolution: Over the past 20 years there have been several amendments of the Copyright Act, mostly implementing EU Directives. The main ones, introduced in 2011 focused on improvement of activities of collective rights management associations (transparency improvement) and functioning of the Copyright Commission – the arbitrary body whose main activity is to set tariffs used by collective management organisations.

Duration of copyright: In Poland copyright protection generally ends 70 years following the death of the last living author.

Institutional setting: Polish Ministry of Culture and National Heritage (MKiDN) is the main actor in the area of legislative works and awareness building campaigns in the area of copyright and related rights.

In addition, in 2000 the horizontal, Intergovernmental Team for Counteracting Infringements of Copyright and Related Rights was established, to coordinate efforts related to enforcement of various IPRs in Poland. The Team, on the basis of the analysis of state of the art in the domain of enforcement of copyright and related rights, is in course of preparing the new "Programme for the protection of copyright and related rights" which is to be adopted in the second part of 2014 and which will be in force for the tenure of 3 years.

The Ministry of Administration and Digitisation, set up in 2011, is responsible for the legal framework concerning information society services and hence is involved in developing copyright policy in the digital domain.

Furthermore, some other Ministries and government agencies are active in order to ensure effective functioning of the copyright protection, especially in the area of enforcement. These include:

- Ministry of Justice, The Office of the General Prosecutor, National School of the Judiciary and Public Prosecution: in the area of improvement of the efficiency of prosecutions and proceedings concerning copyright protection.

- Ministry of Internal Affairs and Ministry of Finance (Customs Service): in relation to limiting infringements of copyright and related rights, and other intellectual property rights in the markets.

- Patent Office, Minister of Science and Higher Education, Minister of National Education: in relation to conducting educational activities towards the development of social and legal awareness in the area of copyright and related rights and their role in the development of economy and knowledge based society

- Ministry of Internal Affairs, Ministry of Finance, The Office of the General Prosecutor, Minister of Justice, Minister of Foreign Affairs: in relation to enhancing international cooperation in the relevant areas of protection of copyright and related rights.

Database protection: If a database meets the originality criteria, it is treated as a literary work and is protected under the law of copyright. In addition, all databases in the Poland are protected by Act of 27 July 2001 on databases protection, which followed the directive 96/9/EC of the European Parliament and of the Council, of 11 March 1996 on the legal protection of databases.

Limitations and exceptions: Private personal use (*dozwolony użytek osobisty*) includes creation of backup or reserve copies, or creation of copies for sharing them with family and close friends.

Poland has implemented wide spectrum of limitations and exceptions that are in conformity with the international copyright law and European directives. These include: limitations and exceptions for libraries and archives, educational institutions, access to and processing of the information by press and media, citation, incidental reproduction of works, public exhibition, limitations and exceptions for the benefit of disabled persons.

Orphan works: This area in is not explicitly regulated yet. Projects of new legislation that will comply with the directive of the European Parliament and of the Council on certain permitted uses of orphan works (2012/28/EU) are currently debated.

Copyright registration: Copyright cannot be registered in Poland. There are works under way on introducing the registration procedure for orphan works in conformity with the EU Directive (2012/28/EU).

Enforcement: In Poland IPR enforcement is a both a civil and a criminal matter.

In civil proceedings an infringement should be pursued by the right holder in court. It should be mentioned that the enforcement of intellectual property rights through civil law in Poland is often criticised. In particular, the following problems are highlighted:

- Lengthy and excessive proceedings.
- Lack of specialised courts and judges with substantive preparation and inconsistent case law (decisions of a significant discrepancy based on the same legal grounds and factual evidence).
- Inefficient system of enforcement; problems concern both the execution of final judgments and provisions on the protection of claims and information obligations (Articles 80 and 105 of Act on Copyright and Related Rights).
- Lack of qualified experts.
- Other problems related to the IPR enforcement on the internet, such as lack of best practices governing the violations on the Internet and responsibilities of Internet service providers.

In criminal law there is a number of offences relating to copyright, most of them contained in the Act of 4 February 1994 on copyright and related rights (articles 115-119). Apart from the traditional offences such as false authorship claim or unauthorised reproduction and dissemination of protected works these also include offences of manufacture or possession of products or components intended for the circumvention of effective technical protection measure and failing to provide evidence. For the law enforcement authorities to take action the right holder must usually file an official petition, but some of the more serious ones allow for *ex officio* enforcement action.

Current debate

Summary of recent debates: The *Copyright Forum* (*Forum Prawa Autorskiego*) is the main platform for debates on the current copyright framework in Poland and its planned reforms. The Forum was established in 2013 by the Minister of Culture and National Heritage; it gathers around 80 institutions, associations and organisations of different origin including the representatives of creative, collective management organisations, chambers of commerce, cultural institutions and users and other related non-governmental organisations. Every meeting of the Forum is paralleled with written consultations, and all the outcomes are published online[237]. So far Forum has debated on: orphan works, out-of-commerce works, limitations and exceptions, public lending right, criminal sanctions; the Forum also joined copyright consultations organised by the European Commission. The results of these discussions will be incorporated into the legislative work on the new amendment of the Copyright Act that is going to start in 2014.

The copyright debate in Poland gained prominence after large scale protests broke out against the Anti-Counterfeiting Trade Agreement in early 2012, when thousands of protesters took to the streets around the country.

Industry associations: In Poland, there are several associations, industry chambers and collective management organisations of copyright-intensive industries in Poland. They carry out a number of activities, including: *i)* collective rights management *ii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, and training of public authorities) *iii)* awareness raising campaigns in the area of copyrights, and *iv)* data collection.

The most active industry-specific ones include: Izba Wydawców Prasy (Chamber of Press Editors), Polska Izba Książki (Polish Chamber of Books), and Krajowa Izba Producentów Audiowizualnych (National Chamber of Audiovisual Producers).

The main active collective management organisations include: ZAiKS (mostly literature and music), SAiW Copyright Polska (books, visual arts and photography), SFP (audio-visaul works), REPROPOL (press editors), STOART (music artists), SAWP (music authors), ZPAV (music producers), ZASP (actors), SARP (architects), ZPAV (photography), ZPAP (visual works).

Other relevant associations include: Stowarsyssenie Kreatywna Polska (Creative Poland), Swiąsek Kompozytorów Polskich (the Union of Polish Composers), and the Legalna Kultura foundation (copyright awareness-rising activities).

A number of non-profit non-gevernmental organisations are active in the debate. These include: Fundacja Nowoczesna Polska (Modern Poland Foundation), Centrum Cyfrowe: Projekt Polska (Digital Centre: Project Poland), Fundacja Panoptykon (Panoptykon Foundation), Fundacja Wolnego I Otwartego Oprogramowania (Free and Open Software Foundation).

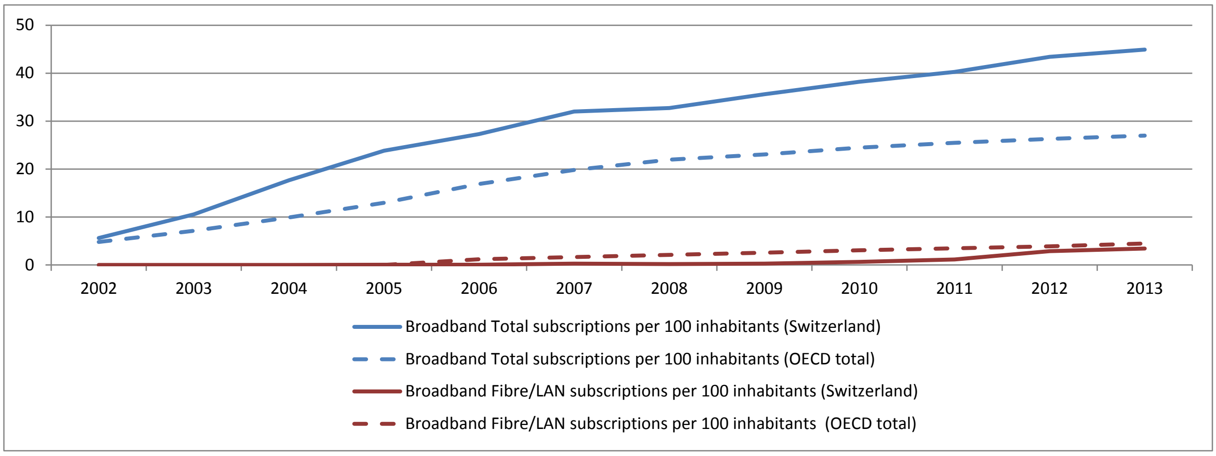
Switzerland

State of the Internet

In recent years access to broadband networks and the Internet has constantly increased in Switzerland. In terms of fixed broadband, penetration levels have been growing constantly and are well above the OECD average, reaching maturity. In addition, further deployments of fibre networks have taken place. Overall, however, deployment of fibre in Switzerland is still below the OECD average (see Figure 5.38).

Figure 5.39. Broadband penetration rates in Switzerland

2002-2013, per 100 inhabitants

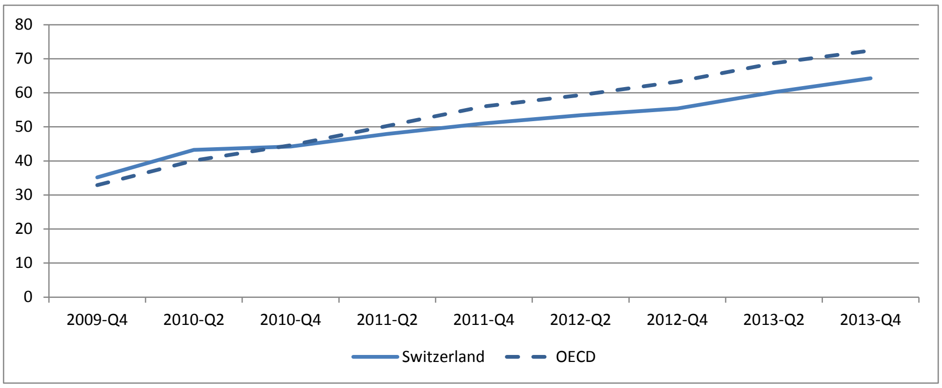


Source: OECD Broadband Portal

More recently there has been stable, substantial growth in mobile broadband access in Switzerland, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has grown to almost 65% in Switzerland, which is slightly below the OECD average (Figure 5.39).

Figure 5.40. Mobile broadband subscriptions in Switzerland

2009-2013, per 100 inhabitants



Source: OECD Broadband Portal

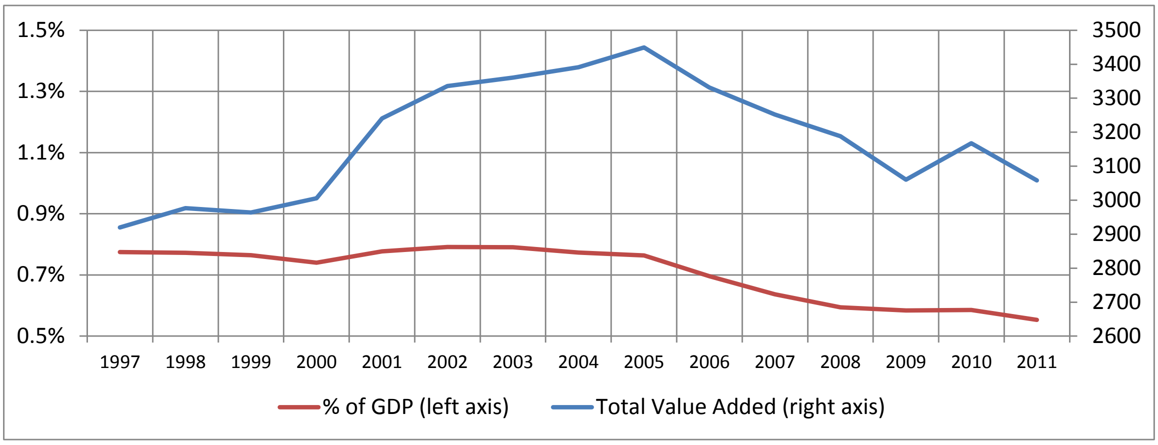
Copyright-intensive industries: Market overview

Unfortunately, to our knowledge the existing databases do not permit to draw an internationally-comparable picture of Swiss copyright-intensive industries. However, the Federal Statistical Office provides some information of the performance of the publishing, audio-visual and broadcasting industries (categories 58-60). These industries seem to be closely, although not fully representing, the core copyright-intensive industries as proposed by WIPO (2003).

Over the past fifteen years these industries in Switzerland have demonstrated somehow mixed performance, with a peak in 2005. Over that period the Swiss industry grew at average rate of 0.3%, although at a slower rate than the overall economy. In absolute terms Swiss industries that rely on copyrights contributed on average CHF 3.1 billion to the Swiss GDP over the past ten years (Figure 5.40). In 2011 the total contribution calculated for these industries was CHF 3 billion, accounting for 0.3% of Switzerland's GDP.

Figure 5.41. Added value of copyright-intensive industries* in Switzerland

1997-2011, CHF millions, at current prices (right axis) and % of GDP (left axis)



*) Publishing, audio-visual and broadcasting activities (categories 58-60)

Source: Swiss Federal Statistical Office, Industry and services production and turnover indicators;

Legal landscape

Current copyright legislation: "Swiss Federal Act on Copyright and Related Rights". Adopted in 1992 (CopA).

Recent evolution: The Swiss copyright Act (CopA) has been amended several times in order to support a functioning market in the digital environment. These amendments implemented some international treaties and standards (such as the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty), lead to creation of the Monitoring Office for Technological Measures (see below), and included new copyright exceptions and limitations (for example relating to temporary copies and to the use of works by people with disabilities).

Duration of copyright: For software, copyright protection generally ends 50 years following the death of the last living author. For other creative works copyright protection generally ends 70 years following the death of the last living author.

Institutional setting: The main institution in Switzerland in charge of the copyright-related issues is the Swiss Federal Institute of Intellectual Property. It acts as advisory to the Federal Council and other federal administrators in all area of intellectual property and represents Switzerland at the international level in these areas. It also supervises the collecting societies.

The Federal Arbitration Commission for the Exploitation of Copyrights and Related Rights (Arbitration Commission)[238] is responsible for approving the tariffs of the collective rights management organisations.

The Monitoring Office for Technological Measures checks how technological measures are affecting the lawful use of works and whether public interests are being impacted. In addition, the office acts as an intermediary between those who apply technological measures and user and consumer groups and helps as needed in finding partnership solutions.

Database protection: There is no sui generis protection of databases in Switzerland. Original databases qualify for protection under copyright law.

Limitations and exceptions: In Switzerland the Copyright Act (CopA) defines precisely when a use of copyrighted contend can be done legally without rights holders' authorisations. This includes the following cases: private use (Art. 19, CopA); decoding of computer programs (art. 21, CopA); dissemination of broadcast works (Art. 22, CopA); use of broadcasting organisations' archived works (Art. 22*a*, CopA); use of orphan works (Art. 22*b*, CopA); making available broadcast musical works (Art. 22*c*, CopA); compulsory licence for the manufacture of phonograms (Art. 23, CopA); archive and backup copies (Art. 24, CopA); temporary copies (Art. 24*a*, CopA); copies for broadcasting purposes (Art. 24*b*, CopA); use of works by people with disabilities (Art. 24*c*, CopA); quotations (Art. 25, CopA); museum, exhibition and auction catalogues (Art. 26, CopA); works on premises open to the public (Art. 27, CopA); and reporting current events (Art. 28, CopA).

Orphan works: According to Article 22*b* of CopA use of orphan works is permitted in Switzerland and is subject to prior notification of collective societies. This Article only applies to phonograms or audiovisual fixations.

Copyright registration: Copyright cannot be registered in Switzerland.

Enforcement: In Switzerland, rights owners can file complaints in civil or criminal court against infringers. The cantonal courts are responsible for judging the infringement cases.

Current debate

Summary of current debate: In 2012, the Minister of Justice mandated a stakeholders' working group (AGUR12) to work on the modernisation of copyright law with regard to ongoing technical developments. The working group AGUR12 gathered representatives of: creative artists, producers, users, consumers, and representatives of the Swiss Federal Administration. In its final report that was published in December 2013, the AGUR12 recommends the adoption of a package of measures aimed at increasing the attractiveness of legal offers and simplifying the fight against piracy. These actions include improvement of consumer information, expanding and thus increasing the attractiveness of legal offers, simplifying the fight against piracy, enhancing the efficiency and transparency of collective societies, and adapting the limitations and exceptions to copyright to recent developments.[239]

Industry associations: There are many industry associations in Switzerland, including: AudioVision Schweiz (audio visual industry), Schweizerische Interpretengenossenschaft (performers), Schweizer Buchhändler- und Verleger-Verband (publishers and booksellers), Suisseculture (culture and media), Swiss Music Promoters Association (music industry), Verband Schweizer Medien (media), Simsa (the Swiss Internet Industry Association). In addition international associations, such as IFPI or BSA also have Swiss members and Swiss regional services.

These associations carry out a number of activities, including: (i) lobbying, stakeholder coordination and engaging in public debate about copyright, (ii) countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities), (iii) awareness raising campaigns in the area of copyrights, and (iv) data collection.

Industry best practices: The Hosting Code of Conduct (HCC) has been adopted by Simsa in early 2013 in order to counter the growth of traffic in illegal content, and in order to introduce industry standard that would strengthen legal security. The notice-and-take-down procedure introduced in the HCC contains principles of conduct that are already incorporated in self-regulatory instruments adopted by European and international associations of Internet Service Providers.

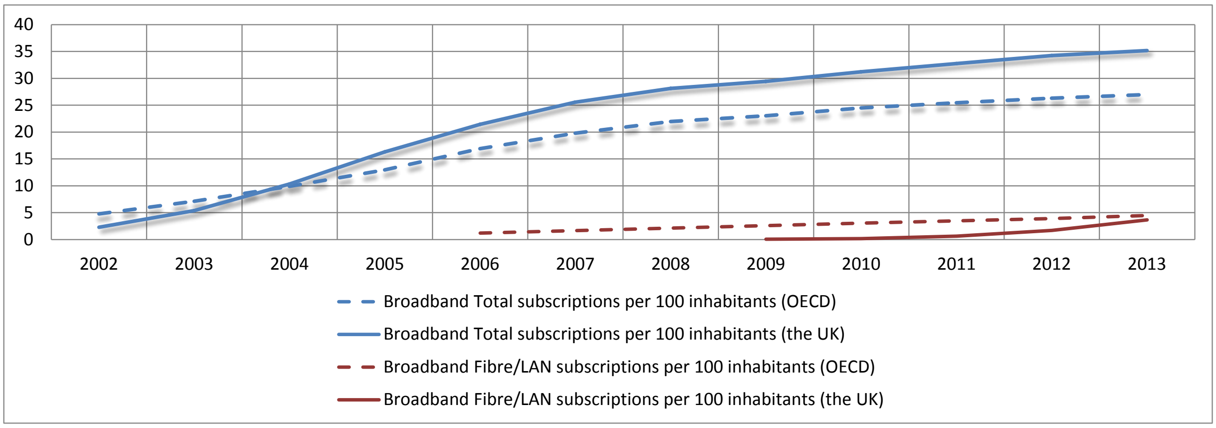
The United Kingdom

State of the Internet

In recent years access to broadband networks and the Internet has steadily increased in the UK. In addition, further deployments of fibre networks have taken place. Overall, broadband penetration rates are well above the OECD averages. However, the deployment of fibre in the UK is still at an early stage and below the OECD averages (see Figure 5.41).

Figure 5.42. Broadband penetration rates in the UK

2002-2013, per 100 inhabitants

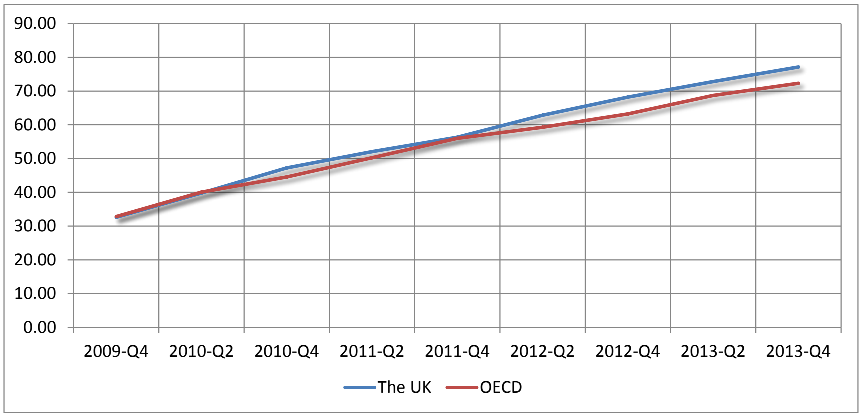


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in the UK, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has grown to almost 80%, which is way above the OECD average that has grown to 72% (Figure 5.42).

Figure 5.43. Mobile broadband subscriptions in the UK

2009-2013, per 100 inhabitants



Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past years copyright-intensive industries in the UK have demonstrated a better overall performance compared to the overall economy.[240] Between 2008 and 2012 the total volume of the copyright-based industries has increased by 15.6 %, compared with an increase of 5.4 % for the UK Economy as a whole. In 2012 the total contribution calculated for the core copyright-based industries in the UK was 5.2% of total GDP.

Employment: In 2012 the total number of people employed in copyright-intensive industries represented 5.6% of all employed by the UK industry. Between 2011 and 2012, the overall share of people employed in copyright-intensive industries in total industry employees grew by 8.6%.

Legal landscape

Current copyright legislation: In The UK the legal issue of copyrights is regulated by the Copyright, Designs and Patents Act 1988 (“CDPA”). In addition the UK is obliged to take into account relevant Directives of the European Parliament and of the Council in its legislation, such as: the Directive on the term of protection of copyright and certain related rights (2006/116/EC) or the directive on the harmonisation of certain aspects of copyright and related rights in the information society (Copyright Directive, 2001/29/EC)

Recent evolution: Within the past 20 years the main amendments originated from application of EU directives [see EU case study].

The most recent amendments took place on 29 October 2014, implementing the EU Orphan Works Directive (2012/28/EU) as well as a domestic orphan works licensing scheme.

Duration of copyright: For literary, dramatic, musical or artistic work copyright protection ends 70 years from the end of the year in which the author died. For sound recordings, it ends 50 years from the end of the year of making or, if it is published or made available during this time, 70 years from the end of the year in which it was published or made available. For film it ends 70 years from the end of the calendar year of the death of the last to die of the principal director, the author of the screenplay, the author of the dialogue, or the composer of music specially created for and used in the film, or if there are no such people, 50 years from the end of the year of making. For broadcasts, it ends 50 years from the end of the year the broadcast was made. For published editions: 25 years from the end of the year of publication.

Institutional setting: The UK Intellectual Property Office (IPO) has responsibility for copyright policy in the UK.

In addition, The Department for Culture, Media and Sport (DCMS) has an interest in supporting and promoting cultural copyright-intensive industries, and leads on some areas of broadcasting policy and on internet regulation, including measures against copyright infringement online.

The National Archives has responsibility for state-owned copyright.

Database protection: If a database meets the originality criteria, it is treated as a literary work and is protected under the law of copyright. In addition, all databases in the UK are protected by "Database Right" (implementation into UK law the provisions of the Database Directive), which gives the owner the right to prevent copying and unauthorised use of the database.

Limitations and exceptions: The UK provides for a number of exceptions to copyright, for purposes such as research and private study, education, and for the benefit of libraries and archives. Some are restricted to 'fair dealing' with a work, and some come into being only when there is no licensed alternative available.

Recent amendments to UK copyright legislation (on 1 June and 1 October 2014) introduced a new set of copyright exceptions, in order to give a number of sectors a legal framework fit for the digital age. These exceptions allow uses such as personal copying for private use, parody, caricature and pastiche, quotation making accessible format copies of protected material for disabled people, text and data mining for non-commercial research, and fair dealing with copyright content for educational purposes.

Orphan works: The Directive of the European Parliament and of the Council on certain permitted uses of orphan works (2012/28/EU) sets out common rules to provide for an exception to copyright law allowing the digitisation and online display of orphan works. The UK implemented the Directive in October 2014. .

Additionally, at the same time the UK introduced an orphan works licensing scheme which permits anyone to reproduce any type of orphan work in any media for commercial and non-commercial use. This means that providing the applicant has shown that they have undertaken a sufficiently diligent search, on payment of a market rate licence fee they will be granted a non-exclusive licence to reproduce an orphan work for up to 7 years (which can be renewed), for use within the UK only (as the UK Government cannot grant licences for use in other jurisdictions). Licence fees are held in case the right holder/s reappear[241]. To increase the chances of any right holder/s being found, a freely accessible and searchable orphan works register is available. The register lists details of orphan works licence applications, works that have been licensed as orphan and applications that have been refused.

Copyright registration: Copyright registration is not required in the UK; it is not offered by the IPO.

Enforcement: The UK's IP enforcement agencies are the following:

- The *IPO* is responsible for all IP policy, including IP enforcement policy (in its Copyright and Enforcement Directorate). The IPO also has an intelligence capability in the form of an Intelligence Hub, which collaborates closely with law enforcement agencies. The IPO is not an enforcement agency itself, and is not able to take legal action against any sort of IP infringement.

- The UK's *Trading Standards* (TS) are responsible for tackling both piracy and counterfeiting at a local level. The TS eCrime Centre focuses on internet scams, include the large scale distribution of pirated and counterfeit goods.

- The Police tackle IP crime at a local, regional, national and international level. The Police IP Crime Unit (PIPCU), which is based in the Economic Crime Directorate of the City of London Police, is dedicated to tackling serious, organised IP crime online, in the form of both piracy and counterfeiting. (It was established in September 2013, and the IPO is providing £2.56m in funding over the first two years (2013-15)).

- The UK's National Crime Agency (NCA) (established in October 2013), targets all IP crime through its Economic Crime Command.

- Under EU Directive 608/2013, concerning customs enforcement of intellectual property rights, HM Revenue and Customs (HMRC) and Border Force have the power to detain copyright and trademark infringing material.

Current debate

Summary of recent debates: The public debate on "copyrights in the age of the Internet" seems to be relatively advanced in The UK. It has been taking place for several years, and gathered numerous experts from the government, academia, think tanks, industry and civil society[242].

Currently, the prominent issues under discussion include:

- The debate on potential reform of copyright at the EU level, with the emphasis on completing the Digital Single Market[243].

- The UK's copyright reforms, within the EU copyright framework. Many of these changes were recommended by the Hargreaves Review of IP and Growth (2010-11)[244].

- Meeting the enforcement challenges of digital technologies (including the internet)

Industry associations: There are many industry associations in the UK, including in the music, film and television, books and periodicals, visual arts, videogames and broadcasting sectors.[245] These associations carry out a number of activities, including: *i)* collective rights management, *ii)* countering copyright infringement (intelligence collection, collaboration with relevant enforcement authorities, training of public authorities), *iii)* awareness raising campaigns in the area of copyright, and *iv)* data collection.

Industry best practices There are several relevant industry initiatives in the area of copyright, including:

- *Codes of Practice for Collecting Societies*: Following extensive consultation with Government, most UK collecting societies have established a system of self-regulation through industry codes of practice that broadly align with the UK Government's minimum standards.

- *Digital Copyright Exchange*: A Copyright Hub has been established by the industry to provide a gateway for finding information about UK copyright. The project received initial funding from the Government, but the sector is now working with the Connected Digital Economy Catapult (CDEC) to further develop the project.

Voluntary Copyright Alert Programme (VCAP), an industry initiative that seeks to find a voluntary solution to provide a mass warning scheme to ISP consumers whose accounts show evidence of alleged infringing activity. Industry is still involved in the commercial negotiations to create such a scheme; however the UK Government remains fully supportive of VCAP.

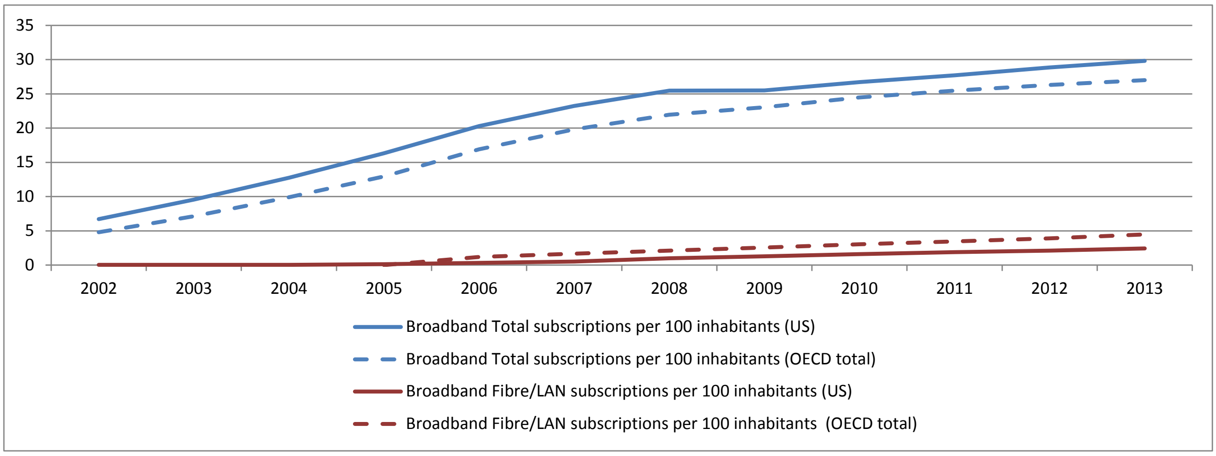
The United States

State of the Internet

Access to broadband networks and the Internet has constantly increased in the United States in recent years. In terms of fixed broadband, penetration levels have been growing constantly and are above the OECD average. In addition, further deployments of fibre networks have taken place. However, overall deployment of fibre in the United States is still at an early stage and is below the OECD average (see Figure 5.43).

Figure 5.44. Broadband penetration rates in the US

2002-2013, per 100 inhabitants

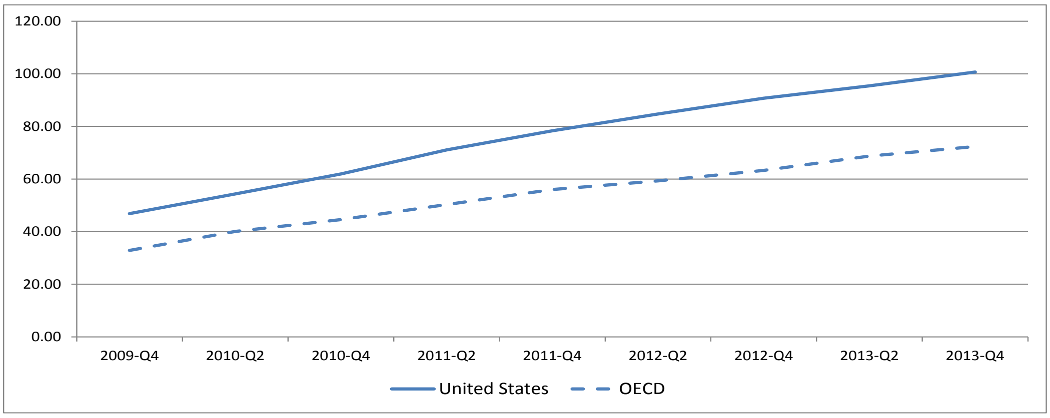


Source: OECD Broadband Portal

More recently there has been rapid and substantial growth in mobile broadband access in the United States, opening up new communication possibilities to people as they are away from a fixed-line connection. Mobile broadband penetration has grown to more than 100% in the United States, which is way above the OECD average that has grown to 72% (see Figure 5.44).

Figure 5.45. Mobile broadband subscriptions in the US

2009-2013, per 100 inhabitants



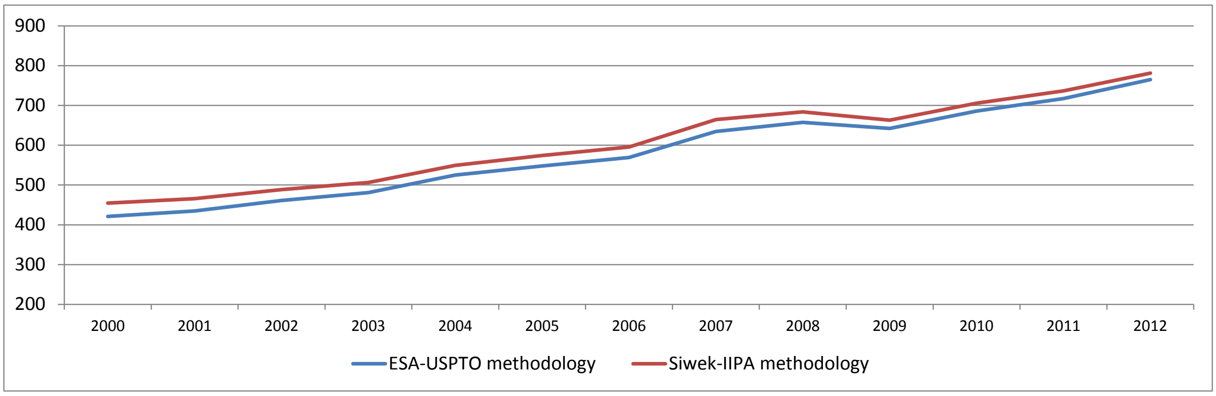
Source: OECD Broadband Portal

Copyright-intensive industries: Market overview

Value added: Over the past ten years the copyright-intensive industries in the United States have demonstrated generally good performance. Between 2000 and 2012 the total volume of the copyright-based industries grew either by 70% or 80%, depending on methodology chosen[246]. In absolute terms the US copyright-intensive industries reported moderate rates of growth, and contributed over the past ten years on average USD 590 billion to the American GDP (Figure 5.45).

Figure 5.46. Added value of copyright-Intensive industries in the United States

2000-2012, USD billion (according to Siwek-IIPA methodology and ESA-USPTO methodology)

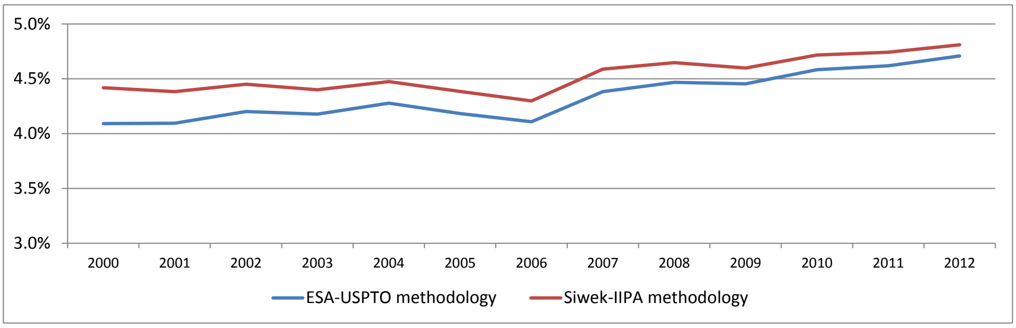


Source: Bureau of Economic Analysis' Industry Accounts database.

In 2012 the total contribution calculated for the core copyright-based industries was USD 764 billion according to the ESA-USPTO methodology, or USD 781 billion according to the Siwek-IIPA study which uses the statistical methodology as presented in WIPO (2003)[247]. The core copyright-based industries accounted for 4.7% (4.8%, respectively) of the US GDP (Figure 5.46).

Figure 5.47. Added value of copyright-Intensive industries in the United States

2000-2012, % of GDP (according to Siwek-IIPA methodology and ESA-USPTO methodology)

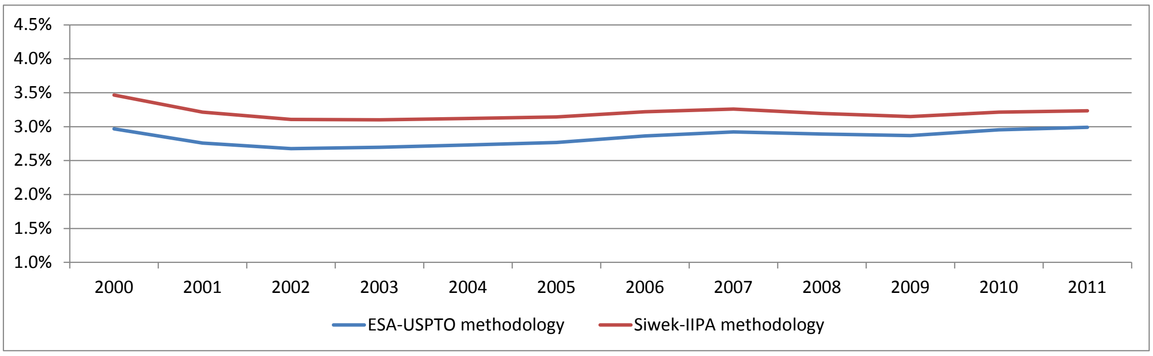


Source: Bureau of Economic Analysis' Industry Accounts database.

Employment: The total number of people employed in 2011 in copyright-intensive industries represented 3.0% of all employed by the US industry according to the ESA-USPTO methodology (3.2% according to Siwek-IIPA-methodology) (Figure 5.47), which seems almost unchanged compared to the shares reported in 2000. Between 2000 and 2011, the total employment in copyright-intensive industries reported some fluctuations and amounted to 4.17 million of employees in 2011 (4.5 million according to Siwek-IIPA methodology) (Figure 5.48).

Figure 5.48. Employment in copyright-intensive industries

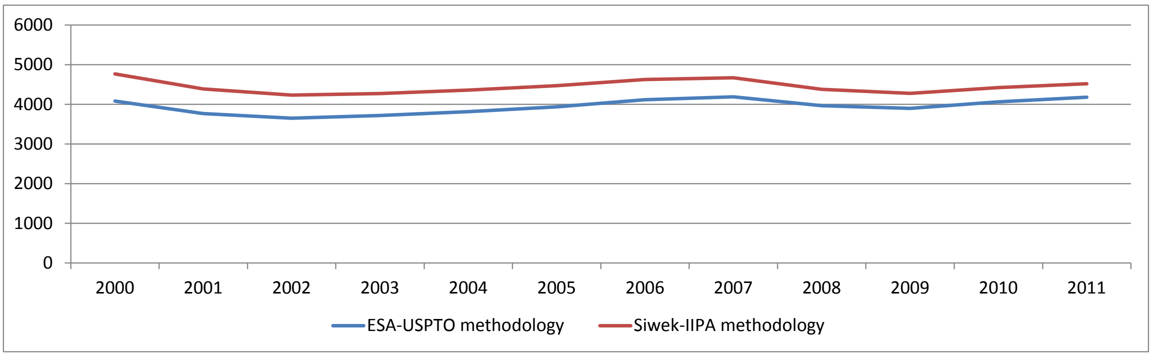
2000-2011; % of industry employment (according to Siwek-IIPA methodology and ESA-USPTO methodology)



Source: Bureau of Economic Analysis' Industry Accounts database.

Figure 5.49. Volume of employment in copyright-intensive industries

2000-2011; thousands of employees, (according to Siwek-IIPA methodology and ESA-USPTO methodology)



Source: Bureau of Economic Analysis' Industry Accounts database.

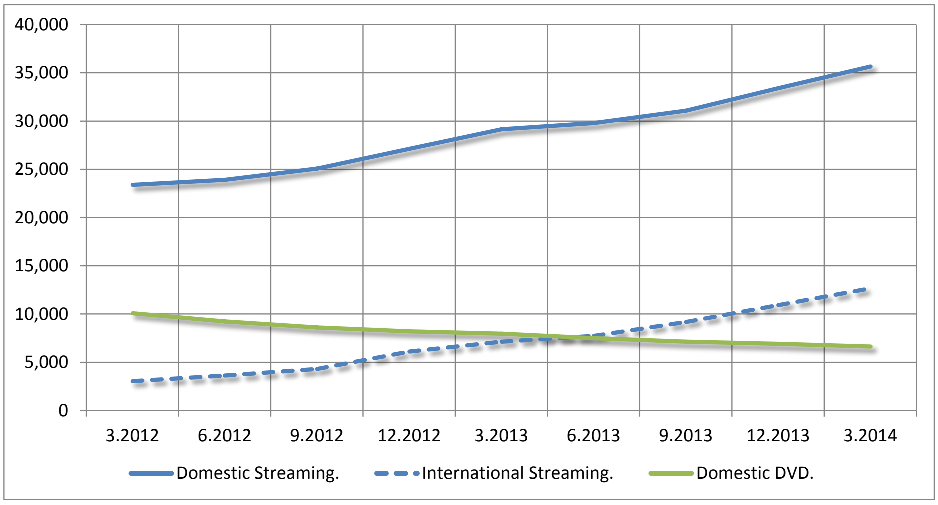
Business cases: The Internet significantly affects the American copyright-intensive industries by re-shaping existing business models and introducing brand new ways of business operation. In 2011, e-commerce reached 16% of the US business sector turnover (excluding some service activities), doubling with respect to the beginning of the decade (OECD, 2012). The efficiencies enabled by the Internet have also been welcomed by copyright-intensive industries, and there are numerous business initiatives that took the advantage of the Internet as the distribution channel. Two prominent anecdotal examples include Apple's *iTunes* and *Netflix*, whose current business models are based on the digitisation of content (see Box 5.8.).

Box 5.8. Creative businesses on the Internet in the United States: Apple's iTunes and Netflix

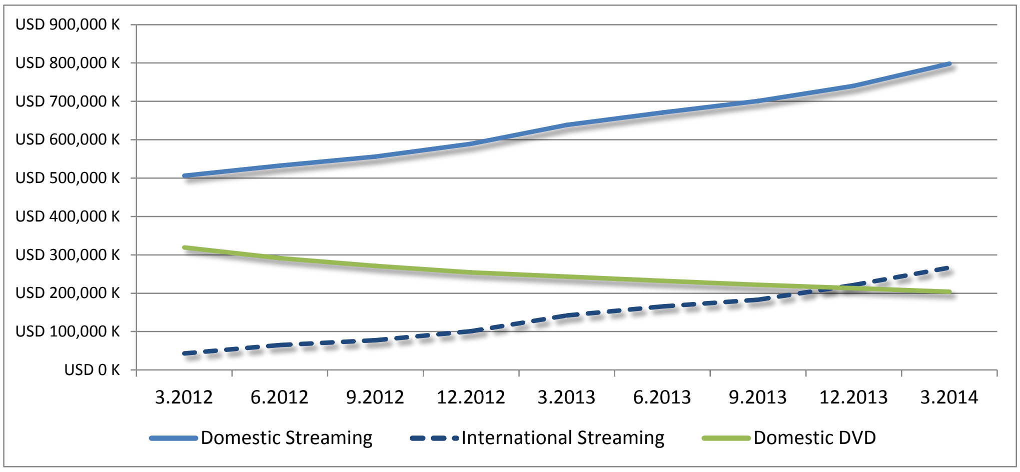
iTunes is an umbrella term that refers to an online digital media store operated by Apple and to compatible pieces of software (media player, media library, etc.) that were developed by Apple. The *iTunes* store opened in 2003, and offers music, apps, TV shows, audiobooks, podcasts, movies, etc. All the downloaded content becomes immediately available on Apple devices, such as iPhone, iPod or iPad. After some years of tremendous growth *iTunes* became in 2010 the biggest online music store in the world.

Netflix is a provider of two types of services: streaming of media on-demand and DVD-by-mail. *Netflix* started in 1997 as an online DVD rental, with flat fees and an extensive and successful personalised video-recommendation system. In 2007 *Netflix* began to expand its market by introducing video on demand via the Internet. While the number of on-line DVD rentals fell from 2006 onwards, the on-line streaming turned out to be successful. As of mid-2014, *Netflix* reports global streaming subscribers at 50 million (36 million in the United States) (See Box Figure 5.1). *Netflix* revenues from streaming yield at that period USD 1.04 billion (USD 800 million in the United States) (See Box Figure 5.2).

Box Figure 5.1: Netflix. Total members in various market segments (in thousands)**.**



Box Figure 5.2: Netflix. Revenues in various market segments (in thousands USD)**.**



Source OECD, based on data from Netflix 2011 annual report

Legal landscape

Current copyright legislation: Copyright protection in the United States is governed by the Copyright Act of 1976 and all subsequent statutory amendments and enactments thereto[248].

Recent evolution: A number of revisions to the US copyright legislation have sought to reflect contemporary uses of technology, to cope with changes in socio-economic landscape and to comply with evolving international obligations[249].

One of the most profound amendments over the past 20-year period was the Digital Millennium Copyright Act (DMCA) that was passed in 1998. The DMCA implemented the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty, including obligations pertaining to technological protection measures and rights management information. It also addressed a number of other significant issues, including, inter alia, the creation of qualified limitations on liability for online service providers when engaged in certain categories of activities, and exceptions pertaining to computer maintenance and repair, digital preservation by libraries/archives and ephemeral recordings[250].

In addition to legislation, the U.S. courts also have a role in interpreting U.S. copyright law to address legal, technological, and other changes.

Duration of copyright: In the United States the copyright law automatically protects a copyrightable work that is created and fixed in a tangible medium of expression on or after January 1, 1978, from the moment of its creation and gives it a term lasting for the author’s life plus an additional 70 years. This is only a general rule, however. Depending on when a work was created and whether a work was published, different rules may apply. Additionally, the terms of protection for anonymous, pseudonymous and works made for hire also constitute exceptions to the basic life plus seventy term[251].

Institutional setting: The Copyright Act vests all administrative functions and duties under the Act with the Register of Copyrights as well as important copyright policy functions (as director of the U.S. Copyright Office) [252]. The Register’s duties include advising Congress on national and international issues relating to copyright; providing information and assistance to federal agencies and the judiciary relating to copyright; participating in meetings of international intergovernmental organisations and meetings with foreign government officials relating to copyright issues; and conducting studies and programs regarding copyright[253]. In addition to the Copyright Office, copyright-related issues are within the scope of interest of other federal agencies. According to statute, the United States Patent and Trademark Office (USPTO, as part of the Department of Commerce, principally advises the President and the entire Executive Branch of the federal government on matters concerning intellectual property law and policy (including copyright). Other parts of the Department of Commerce dealing with copyright-related issues include: Economic and Statistics Administration (ESA), International Trade Administration (ITA), National Telecommunications and Information Administration (NTIA), and the National Institute of Standards and Technology (NIST). In addition, the USTR provides advice on the trade-related aspects of intellectual property, including copyright. The Office of International Intellectual Property Enforcement of the Department of State works closely with other federal departments and agencies on intellectual property issues along with providing advice to economic, commercial and public diplomacy officers at U.S. embassies around the world.” The Computer Crime and Intellectual Property Section (CCIPS) of the Criminal Division of the United States Department of Justice is the federal entity that prosecutes intellectual property crimes.

Database protection: In the United States there is no *sui generis* database right. This means that databases do not receive a separate protection, but copyright protection extends to the selection, coordination or arrangement of information when it is done so in a manner that is adjudged original enough to receive protection[254].

Limitations and exceptions: The U.S. Copyright Act includes six exclusive rights in Section 106, including rights to reproduce the works, to prepare derivative works, to distribute copies, etc.

Concerning exceptions and limitations, Sections 108-122 of the United States Copyright Act enunciate specific limitations and exceptions for a range of uses of copyrighted material that do not require authorisation from a right holder. The United States codified the judge-made fair use doctrine in its Copyright Act in 1976 in Section 107. This section includes a list of various purposes for which the use of a particular work may be considered fair, such as criticism, comment, news report, teaching, scholarship, and research. It also sets out four factors to be considered in determining whether a particular use is fair. These factors are: *i)* the purpose and character of the use, including whether such use is of a commercial nature or is for non-profit educational purposes; *ii)* the nature of the copyrighted work; *iii)* the amount and substantiality of the portion used in relation to the copyrighted work as a whole, and *iv)* the effect of the use upon the potential market for or value of the copyrighted work[255].

It should be mentioned that the fair use doctrine is buttressed by decades of case law jurisprudence and any given litigation takes place against this backdrop; in litigation, fair use must be raised as an affirmative defence to infringement. Section 107 does not comprise all of the copyright exceptions under the Copyright Act, however, as noted above.

Orphan works: Orphan works are not explicitly regulated in the United States.

At the request of Congress, the U.S. Copyright Office finalised a report on Orphan Works in January 2006. Legislation was introduced in Congress in 2006 and again in 2008, but was never ultimately enacted into law. The proposed legislation generally tracked the recommendations of the Copyright Office and would have limited remedies available under the Copyright Act when a user is unable to locate the copyright owner or other appropriate rights holder after conducting a good faith reasonably diligent search; been applicable on a case-by-case basis; and permitted the copyright owner or other rights holder later to collect reasonable compensation from the user, but not statutory damages or attorney’s fees.

Currently the United States Copyright Office is studying issues involving both orphan works and mass digitisation. Public comments have been received, and the Copyright Office recently held a public roundtable meeting on this topic on March 10-11, 2014[256]. The Office expects to release a report and recommendation on these issues to Congress sometime in 2015.

Copyright registration: In the United States an author can file an application for a copyright registration. Registration is voluntary and it is not a condition of copyright protection that copyright protection begins automatically at the moment of authorship (i.e., the moment an original work is fixed in a tangible medium of expression). Nonetheless, registration provides the copyright owner with certain benefits, including permitting a copyright owner to pursue statutory damages in civil lawsuits and providing prima facie evidence in court of the validity of the copyright claim.

For works of U.S. origin, an author must register before filing an infringement suit in court. Moreover, for all works, statutory damages and attorney’s fees are available if registration is made within three months after publication of a work or prior to infringement. Other benefits of registration can be found at the U.S. Copyright Office website[257].

Enforcement: In the United States, copyright infringement is generally a civil matter, which the copyright owner must pursue in federal court. Under certain circumstances, the infringement may also constitute a criminal misdemeanour or felony, which would be prosecuted by the U.S. Department of Justice. Indeed, the Justice Department recently issued the fourth edition of its Manual on Prosecuting IP Crimes[258].

Current debate

Summary of current debate: Over the last 20 years, there has been a robust discussion of a broad range of issues related to "copyright in the age of the Internet" involving the U.S. Government, industry, academia, and civil society. The Green Paper on Copyright, Creativity, and Innovation in the Digital Economy ("Green Paper") issued in July 2013 by the Department of Commerce Internet Policy Task Force (IPTF) provides an overview of the developments during that time period.

Most recently, following a call for congressional review of the copyright law from Register of Copyrights Maria Pallante in early 2012[259], the House Subcommittee on Courts, Intellectual Property and the Internet is currently undertaking a comprehensive review of U.S. copyright law. Several hearings following the Register's original testimony in March 2013 have been held (as of early June 2013), including the following: A Case Study for Consensus Building: The Copyright Principles Project (May 2013); Innovation in America: The Role of Copyrights (July 2013); Innovation in America: The Role of Technology (August 2013); The Role of Voluntary Agreements in the U.S. Intellectual Property System (September 2013); The Rise of Innovative Business Models: Content Delivery Methods in the Digital Age (November 2013); The Scope of Copyright Protection (January 2014); The Scope of Fair Use (January 2014); Section 512 of Title 17 (March 2014); Preservation and Reuse of Copyrighted Works (April 2014); Compulsory Video Licenses of Title 17 (May 2014); and First Sale under Title 17 (June 2014); Music Licensing Under Title 17 (June 2014); Moral Rights, Termination Rights, Resale Royalty, and Copyright Term (July 2014); Copyright Remedies; and Chapter 12 of Title 17 (September 2014) and Copyright Issues in Education and for the Visually Impaired (November 2014)[260]. More hearings will be scheduled at least through the first half of 2015.

In addition, the U.S. Copyright Office regularly undertakes studies at the request of Congress and also under its own initiative. Recent reports for Congress have included a report on *Small Copyright Claims* (September 2013)[261] and on *Resale Royalties* (December 2013)[262]. The Office also has open dockets, requesting public comment in advance of completing reports to Congress on issues such as orphan works and mass digitisation (mentioned above), the right of making available[263], and issues related to music licensing[264]. Preparation of such reports involves requests for public comment as well as public roundtable hearings. These policy efforts are in addition to the Office's ongoing work, which includes registration issues, a review of the copyright recordation system, an inquiry into technological updates, an updated fee study, and associated regulatory rulemakings[265].

The IPTF of the U.S. Department of Commerce also brought together the technical, policy, trade, economic, and legal expertise of several government agencies to produce the "Green Paper"[266]. The Green Paper "provides a lens through which to assess current policy related to copyright and the Internet, identifying important issues that are being addressed by the courts and those that are ripe for further discussion and development of solutions." The paper checks whether the "current balance of rights, exceptions and responsibilities – crafted, for the most part, before the rapid advances in computing and networking of the past two decades – is still working for creators, rights holders, service providers, and consumers"[267].

As a follow up to the Green Paper, the IPTF will be holding a series of roundtable discussions in 2014 on:

- the legal framework for the creation of remixes;
- the relevance and scope of the first sale doctrine in the digital environment; and

- the appropriate calibration of statutory damages in the contexts of: *i)* individual file sharers and *ii)* secondary liability for large-scale infringement.

The purpose of the roundtables was to seek additional input from the public in locations around the country in order for the Department to have a complete and thorough record upon which to make recommendations.

In the Green Paper, the Department also stated its intention to establish an open multi stakeholder forum aimed at improving the operation of the notice and takedown system for removing infringing content from the Internet under the Digital Millennium Copyright Act (DMCA). The goal is to provide a collaborative forum through which stakeholders will identify best practices and/or develop voluntary agreements for improving the technical operation of the DMCA notice and takedown system. A wide variety of the notice and takedown system's users are participating, including right holders and individual creators, service providers, consumer and public interest representatives, and technology companies.

Best practices: Much of the content industry's enforcement initiatives in the United States seem to concentrate in the area of online copyright enforcement; to be clear, however, the content industries do continue to engage in anti-piracy actions that involve their content that is not online in nature. Indeed, most online copyright enforcement actions in the United States are handled through civil litigation. Copyright owners have at their disposal a range of possible tools, including lawsuits against the primary infringer as well as actions based on theories of secondary liability. There are also procedures apart from litigation for removing infringing content from the Internet[268]. Also, as mentioned above, certain copyright infringement cases have resulted in federal criminal prosecutions.

Considerable progress in curbing online infringement has been made in recent years through stakeholder co-operation. One such example can be found in the voluntary agreement reached between rights holders and internet service providers to implement the Copyright Alert System. The first report marking the one year anniversary of the implementation of this system was recently released[269].

The Green Paper notes that most online copyright enforcement is handled through private action. Copyright owners have at their disposal a range of possible tools, including lawsuits against the primary infringer or based on theories of secondary liability, as well as procedures short of litigation for removing infringing content from the Internet[270].

ANNEX. COPYRIGHT-INTENSIVE INDUSTRIES

Australia

Table A 5.1.: Copyright-intensive Industries in Australia

Industry (ANZSIC, 2006, Revision 2.0)	code
Newspaper, Periodical, Book and Directory Publishing	Group 541
Software Publishing	Group 542
Motion Picture and Video Activities	Group 551
Sound Recording and Music Publishing	Group 552
Radio Broadcasting	Group 561
Television Broadcasting	Group 562
Internet Service Providers and Web Search Portals	Group 591
Data Processing, Web Hosting and Electronic Information Storage Services	Group 592
Libraries and Archives	Group 601
Other Information Services	Group 602
Advertising Services	Group 694
Other Professional, Scientific and Technical Services	Group 699
Creative and Performing Arts Activities	Group 900
Amusement and Other Recreation Activities	Group 913
Printing and Printing Support Services	Group 161
Reproduction of Recorded Media	Group 162
Newspaper and Book Retailing	Class 4244
Entertainment Media Retailing	Class 4242
Telecommunications Services	Group 580
Data Processing, Web Hosting and Electronic Information Storage Services	Group 592

Canada

Table A 5.2. Core Copyright-Based Industries in Canada

Industry (NAICS description)	NAICS code
Publishing Industries (except Internet)* * includes 5111 Newspaper, periodical, book, and directory publishers, and 5112 Software publishers	511
Motion picture and sound recording industries ** ** includes 5121 Motion picture and video industries and 5122 Sound recording industries	512
Radio and television broadcasting	5151
Cable and other subscription programming	5152
Computer systems design and related services (software and databases)	5415
Advertising, public relations, and related services	5418
Performing arts, spectator sports and heritage institutions	71A

The European Union, Italy and Poland

Table A 5.3. Copyright-intensive Industries in the European Union, Italy, and in Poland

Industry (NACE description)	NACE code
Book publishing	58.11
Publishing of newspapers	58.13
Publishing of journals and periodicals	58.14
Other publishing activities	58.19
Publishing of computer games	58.21
Other software publishing	58.29
Motion picture, video and television programme production activities	59.11
Motion picture, video and television programme post-production activities	59.12
Motion picture, video and television programme distribution activities	59.13
Motion picture projection activities	59.14
Sound recording and music publishing activities	59.20
Radio broadcasting	60.10
Television programming and broadcasting activities	60.20
Wireless telecommunications activities	61.20
Computer programming activities	62.01
Computer consultancy activities	62.02
Computer facilities management activities	62.03
Other information technology and computer service activities	62.09
Web portals	63.12
News agency activities	63.91
Other information service activities n.e.c.	63.99
Advertising agencies	73.11
Media representation	73.12
Specialised design activities	74.10
Photographic activities	74.20
Translation and interpretation activities	74.30
Performing arts	90.01
Support activities to performing arts	90.02
Artistic creation	90.03
Library and archives activities	91.01
Other amusement and recreation activities	93.29
Printing of newspapers	18.11
Other printing	18.12
Pre-press and pre-media services	18.13
Binding and related services	18.14
Reproduction of recorded media	18.20
Retail sale of books in specialised stores	47.61
Retail sale of newspapers and stationery in specialised stores	47.62
Retail sale of music and video recordings in specialised stores	47.63
Wired telecommunications activities	61.10
Satellite telecommunications activities	61.30
Other telecommunications activities	61.90
Data processing, hosting and related activities	63.11
Other reservation service and related activities	79.90

Industry (NACE description)	NACE code
Photocopying, document preparation and other specialised office support activities	82.19
Cultural education	85.52
Operation of arts facilities	90.04
Activities of amusement parks and theme parks	93.21
Activities of professional membership organisations	94.12

Source: EPO-OHIM (2013).

Japan

Table A 5.4. Copyright-intensive Industries in Japan

Industry (Japan Standard Industrial Classification; Rev. 12, November 2007)	code
Broadcasting	38
Information Services	39
Internet based services	40
Video Picture Sound Information, character Information Production and distribution (except. 4161 and 4169)	41
Advertising	73
Libraries	8212
Establishments engaged in administrative or ancillary economic activities (share corresponding to category 8212)	820
Design services	726
Authors and Artists	727
Establishments engaged in administrative or ancillary economic activities (share corresponding to category 726 and 727)	720
Photographic Studios	746
Establishments engaged in administrative or ancillary economic activities (share corresponding to category 746)	740
Performances (except otherwise classified), Theatrical Companies)	802
Establishments engaged in administrative or ancillary economic activities (share corresponding to category 802)	800
Printing and allied Industries	15
Semiconductor memory media	2831
Optical discs and magnetic tapes and discs	2832
Establishments engaged in administrative or ancillary economic activities (share corresponding to category 2831 and 2832)	280

Source: http://www.stat.go.jp/english/index/seido/sangyo/san07-3a.htm#g

Korea

Table A 5.5. Copyright-intensive Industries in Korea

Economic Activity (Class)	KSCIC Code	Description
Press and Literature		
Authors, writers, translators (including one person business)	1010101	Independent performing artists (Press, literature)
	1010102	Translation services (Press, literature)
Newspapers	1010200	Publishing of newspapers
News and feature agencies etc.	1010300	News agency activities
Magazines/periodicals	1010401	Publishing of magazines and periodicals
	1010402	Publishing of advertising periodicals
Book publishing	1010501	Publishing of textbooks and study books
	1010502	Publishing of cartoons
	1010599	Other publishing
Cards, maps, directories and other published materials	1010600	Other publishing of prints (Cards, maps, etc.)
Pre-press, printing, and post-press of books, magazines, newspapers, advertising materials	1010701	Commercial printing by stencil plates and similar plates or master printing (Books, magazines, newspapers, advertising materials)
	1010702	Screen printing (Books, magazines, newspapers, advertising materials)
	1010797	Other printing (Books, magazines, newspapers, advertising materials)
	1010703	Printing composition service and plate-making (Books, magazines, newspapers, advertising materials)
	1010704	Bookbinding service (Books, magazines, newspapers, advertising materials)
	1010798	Other service activities related to printing (Books, magazines, newspapers, advertising materials)
Wholesale and retail of press and literature	1010801	Wholesale of books, magazines and newspapers
	1010802	Retail sale of books and magazines
	1010803	Book renting
	1010804	Retail sale of stationery
Libraries	1010900	Library and archive activities (Literary books)
Music, Theatrical Productions & Operas		
Composers, lyricists, arrangers, choreographers, writers, directors, performers and other personnel (including one person business)	1020101	Performing arts event promotion and organization
	1020102	Public performance and production agencies
	1020103	Other creative and arts-related services n.e.c.
	1020104	Independent performing artists (Music, theatrical productions, operas)
	1020105	Independent non-performing artists (Music, theatrical productions, operas)
	1020106	Managers
	1020107	Ballroom operation
	1020108	Singing room operation
	1020109	Recreation education
	1020199	Other recreation services n.e.c.

Economic Activity (Class)	KSCIC Code	Description
Printing and publishing of music	1020200	Publishing of music and other audio
Production/manufacturing of recorded music	1020300	Reproduction of musical records and videotapes
Wholesale and retail of recorded music	1020401	Wholesale of musical records and videotapes
	1020402	Retail sale of musical records and videotapes
	1020403	Discs and video tapes renting
Creative Support Services (art, literature)	1020500	Creative and arts support services
Performances and allied agencies (bookings, ticket agencies, etc.)	1020601	Operation of public performance facilities (Music, theatrical productions, operas)
	1020602	Performing arts event promotion and organization (Music, theatrical productions, operas)
	1020603	Public performance and production agencies
	1020699	Other creative and arts-related services n.e.c.
Motion Picture and Video		
Writers, directors, actors (including one person business)	1030101	Independent performing artists (Motion picture, video)
	1030102	Independent non-performing artists (Motion picture, video)
Motion picture and video production and distribution	1030201	General motion picture and video production
	1030202	Animated cartoon and video production
	1030203	Commercials advertising motion picture and video production
	1030204	Motion picture, video production related services
	1030205	Motion picture, video distribution
	1030206	Sound-recording studios (Motion picture, video)
Motion picture exhibition	1030301	Motion picture exhibition
	1030302	Video exhibition rooms
Video rental and sales, video on demand	1030401	Wholesale of videotapes
	1030402	Retail sale of videos
	1030403	Video tape renting
Allied services	1030500	Reproduction of recorded media (Motion picture, video)
Radio and television		
Television programme production activities	1040101	Broadcasting programme production
	1040102	Broadcasting programmes' production-related services
	1040103	Broadcasting programme distribution
National radio and television broadcasting companies	1040201	Radio broadcasting
	1040202	Over-the-air broadcasting
	1040203	Other programme distribution
Independent producers	1040300	Broadcasting programme production (Independent producers)
Cable television	1040401	Wired telecommunications
	1040402	Cable networks
Satellite television	1040501	Satellite telecommunications
	1040502	Broadcasting via satellite and other broadcasting

Photography		
Studios and commercial photography	1050101	Portrait photography and videotaping of events services
	1050102	Commercial photography services
	1050103	Photograph processing
	1050104	Independent non-performing artists (Photography)
Photo agencies and libraries	1050201	Printing composition services and plate-making (Photography)
	1050202	Bookbinding services (Photography)
	1050203	Other service activities related to printing (Photography)
	1050204	Library and archive activities (Photography)
	1050299	All other business support services (Photography)
Software and databases		
Programming, development, and design manufacturing	1060101	Online and mobile game software development and supply
	1060102	Other game software development and supply
	1060103	System software development and supply
	1060104	Application software development and supply
	1060105	Computer programming services
	1060106	Computer system integration consultancy and establishment services
	1060107	Computer facilities management services
	1060199	Other information technology and computer operation related services
Wholesale and retail prepackaged software	1060201	Wholesale of software
	1060202	Retail sale of software
Database processing and Publishing	1060301	Data processing
	1060302	Hosting and related service activities (database processing)
	1060303	Portals and other internet information media service activities
	1060304	Database activities and online information provision services
Visual and Graphic arts		
Artists(fine arts, crafts, visual graphics)	1070100	Independent non-performing artists (Fine arts, crafts, visual graphics)
Art galleries and other wholesale and retail	1070201	Arts works and Antiques wholesale and retail
	1070202	Visual arts services (Galleries)
Picture framing and other allied services	1070300	Mounted arts-related services
Graphic design	1070401	Graphic design services
	1070402	Service activities related to printing(Graphic design)
	1070403	Editing and proofreading services (Graphic design)
	1070499	All other business support services (Graphic design)

Economic Activity (Class)	**KSCIC Code**	**Description**
Advertising Services		
Agencies, buying service	1080001	Media advertising agencies
	1080002	Outdoor and exhibition advertising
	1080003	Media representatives and media buying agencies
	1080004	Advertising preparation
	1080005	Market research and public opinion polling
	1080099	Other advertising n.e.c.
Copyright Collective Societies		
Copyright collective societies	1090001	Professional organizations (12 copyright collecting societies)
	1090002	Leasing of intangible property rights
	1090003	Agencies of business and intangible property rights

The United Kingdom

Table A 5.6. Copyright-intensive Industries in the UK (Eurostat)

Copyright-intensive industries Group	SIC	Description
Advertising and marketing	70.21	Public relations and communication activities
	73.11	Advertising agencies
	73.12	Media representation
Architecture	71.11	Architectural activities
Crafts	32.12	Manufacture of jewellery and related articles
Design: product, graphic and fashion design	74.10	Specialised design activities
Film, TV, video, radio and photography	59.11	Motion picture, video and television programme production activities
	59.12	Motion picture, video and television programme post-production
	59.13	Motion picture, video and television programme distribution
	59.14	Motion picture projection activities
	60.10	Radio broadcasting
	60.20	Television programming and broadcasting activities
	74.20	Photographic activities
IT, software and computer services	58.21	Publishing of computer games
	58.29	Other software publishing
	62.01	Computer programming activities
	62.02	Computer consultancy activities
Publishing	58.11	Book publishing
	58.12	Publishing of directories and mailing lists
	58.13	Publishing of newspapers
	58.14	Publishing of journals and periodicals
	58.19	Other publishing activities
	74.30	Translation and interpretation activities
Museums, galleries and libraries	91.01	Library and archive activities
	91.02	Museum activities
Music, performing and visual arts	59.20	Sound recording and music publishing activities
	85.52	Cultural education
	90.01	Performing arts
	90.02	Support activities to performing arts
	90.03	Artistic creation
	90.04	Operation of arts facilities

Source: The UK Department for Culture, Media and Sport (2014)

The United States

Table A 5.7. Copyright-intensive Industries in the United States

Type	Industry (NAICS description)	NAICS code
Core (ESA-USPTO and Siwek-IIPA)	Newspaper, periodical, book, and directory publishers	5111
Core (ESA-USPTO and Siwek-IIPA)	Software publishers	5112
Core (ESA-USPTO and Siwek-IIPA)	Motion picture and video industries	5121
Core (ESA-USPTO and Siwek-IIPA)	Sound recording industries	5122
Core (ESA-USPTO and Siwek-IIPA)	Radio and television broadcasting	5151
Core (ESA-USPTO and Siwek-IIPA)	Cable and other subscription programming	5152
Core (ESA-USPTO and Siwek-IIPA)	Specialized design services (visual and graphic arts)	5414
Core (ESA-USPTO and Siwek-IIPA)	Computer systems design and related services (software and databases)	5415
Core (ESA-USPTO and Siwek-IIPA)	Advertising, public relations, and related services	5418
Core (ESA-USPTO and Siwek-IIPA)	Other professional, scientific, and technical services (photography and translation)	5419
Core (ESA-USPTO and Siwek-IIPA)	Performing arts companies	7111
Core (ESA-USPTO)	Independent artists, writers, and performers	7115
Core (ESA-USPTO)	Other information services (news syndicates and internet sites)	5191
Core (Siwek-IIPA)	Printing and related support activities	3231
Core (Siwek-IIPA)	Manufacturing and reproducing magnetic and optical media	3346

NOTES

150 As noted, this study is based on an examination of 12 jurisdictions. The economic trends and legal debates that are developed therefore may not reflect those of every Member State of the OECD. In particular, the analyses and conclusions from this Chapter, and their summary in Chapter 1, may not be applicable in the OECD countries which did not participate in the study.

151 Directive on the harmonisation of certain aspects of copyright and related rights in the information society (2001/29/EC).

152 *Orphan works* have been referred to as copyrighted works whose rights holder cannot be identified and/or located.

153 WIPO Copyright Treaty, adopted in Geneva on December 20, 1996; and WIPO Performances and Phonograms Treaty, adopted in Geneva on December 20, 1996; available at http://www.wipo.int/treaties.

154 See BSA (2014), Danaher et al. (2012), Juniper Research (2104).

155 For example, according to a recent report by KPMG, 86% of most popular film and TV titles in the UK are available via legitimate services (KPMG, 2014). See also BSA (2014), Danaher et al. (2012), Juniper Research (2104).

156 Source: https://www.flickr.com/photos/franckmichel/6855169886/

157 Copyrights are be limited by certain limitations and exceptions. This issue is presented in Sections one and three of this chapter.

158 These include: Berne Convention for the Protection of Literary and Artistic Works (of September 9, 1886, completed at Paris on May 4, 1896, and revised and amended several time since then; last amendment in September 28. 1979); International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations (Rome Convention; done at Rome on October 26, 1961); Convention for the Protection of Producers of Phonograms against Unauthorized Duplication of their Phonograms (of October 29, 1971); Copyright Treaty (adopted in Geneva on December 20, 1996); Beijing Treaty on Audiovisual Performances (adopted by the Diplomatic Conference on the Protection of Audiovisual Performances in Beijing, on June 24, 2012); Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired or Otherwise Print Disabled (adopted by the Diplomatic Conference to Conclude a Treaty to Facilitate Access to Published Works by Visually Impaired Persons and Persons with Print Disabilities in Marrakesh, on June 27, 2013).

159 Article 5(2) of Berne conventions states that “[t]he enjoyment and the exercise of [copyrights] shall not be subject to any formality.”

160 While this chapter focuses primarily on the copyright intensive industries, it is also important to acknowledge the expanding body of user generated digital content. The Internet and hardware from cameras to smart phones empower individuals to create and disseminate digital content which is now another important source of information and entertainment.

[161] Source: https://www.flickr.com/photos/franckmichel/6855169886/

[162] Source: http://mashable.com/2013/09/16/facebook-photo-uploads/

[163] Source: http://instagram.com/press/

[164] Source : http://www.apple.com/pr/library/2013/02/06iTunes-Store-Sets-New-Record-with-25-Billion-Songs-Sold.html

[165] Source : http://press.spotify.com/fr/information/

[166] Source: https://www.youtube.com/yt/press/statistics.html

[167] Source: OECD based on Instantwatcher (http://instantwatcher.com/titles/all)

[168] The comprehensive database of services is searchable by country, language, genre and other factors and can be found at *http://mavise.obs.coe.int/welcome*

[169] The growth in new business models may not offset the initial drop in sales.

[170] See page endnote 5.

[171] For more information see the final report of High Level Expert Group on Digital Libraries advising the European Commission in the framework of the i2010 Digital Libraries Initiative. Available at: http://www.dlorg.eu/uploads/External%20Publications/HLG%20Final%20Report%202009%20clean.pdf

[172] For a detailed list of copyright-intensive industries in Australia, see table A 5.1 in the Annex.

[173] More detailed info can be found in the document "Short guide to copyright". Available at: http://www.ag.gov.au/RightsAndProtections/IntellectualProperty/Pages/Copyright-information.aspx

[174] See "Australian Copyright Council Information sheet G101v04". Available at: http://www.copyright.org.au/admin/cms-acc1/_images/1549612446523924db2ad24.pdf

[175] See: http://www.alrc.gov.au/publications/copyright-report-122

[176] See Figure 5.3.16 of the Communications Monitoring Report 2014: Telecommunications Sector by the Canadian Radio-television and Telecommunications Commission. Available at: http://www.crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2014/cmr5.htm#s5-3i

[177] For a detailed list of copyright-intensive industries in Canada, see table A 5.2 in the Annex.

[178] Statistics Canada (2013), Report titled: "Digital Technology and Internet Use, 2012", available at: http://www.statcan.gc.ca/daily-quotidien/130612/dq130612a-eng.pdf

[179] Statistics Canada (2011), Sound Recording and Music Publishing, available at: http://www.statcan.gc.ca/pub/87f0008x/87f0008x2013001-eng.pdf

[180] Entertainment Software Association of Canada (2013), Canada's Video Game Industry in 2013, Final Report, available at: http://theesa.ca/wp-content/uploads/2013/10/ESAC-Video-Games-Profile-2013-FINAL-2013-10-21-CIRC.pdf

181 Book Net Canada (2013), The State of Digital Publishing in Canada 2013, available at: http://www.booknetcanada.ca/storage/research-education/state-of-digital-publishing/BNC_Research_TheStateofDigitalPublishinginCanada_2013.pdf

182 See: http://www.ic.gc.ca/eic/site/crp-prda.nsf/eng/rp00863.html

183 The summary can be found at: http://copyright.econsultation.ca/

184 For a detailed list, see Annex 4 of the following document: http://www.wipo.int/export/sites/www/copyright/en/performance/pdf/econ_contribution_cr_ca.pdf

185 More detailed info can be found at: http://www.egov.ufsc.br/portal/sites/default/files/7_0.pdf

186 For more information see: http://www.propiedadintelectual.cl/Vistas_Publicas/publicContenido/contenidoPublicDetalle.aspx?folio=4183&idioma=0 (in Spanish). The relevant provisions are in articles 71A to 71S.

187 See: www.propiedadintelectual.cl/Vistas_Publicas/publicNoticias/noticiasPublicDetalle.aspx?idNoticia=43733

188 See: www.inapi.cl/protegetuidea/

189 Harabi, N. (2004), Creative Industries: Case Studies from Arab Countries, Munich Personal RePEc Archive Paper No. 15628, Available at: http://mpra.ub.uni-muenchen.de/15628/; WIPO (2003), Performance of Copyright Industries in Selected Arab Countries, Available at: http://www.wipo.int/export/sites/www/freepublications/en/copyright/916/wipo_pub_916.pdf

190 UNCTAD Secretariat Calculation based on United Nations Comtrade database data and IMF Balance of Payments Statistics and UNCTAD Calculation based on IMF Balance of Payments Statistics.

191 UNESCO's *Arabic Language Day* press release.Available at: http://www.unesco.org/new/en/media-services/single-view/news/world_arabic_language_day/

192 For detailed list of copyright-intensive industries in the EU see table A 5.3 in the Annex.

193 Article 5; Directive 2001/29/EC.

194 Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society

195 See: http://ec.europa.eu/internal_market/copyright/docs/copyright-infso/greenpaper_en.pdf

196 See: http://ec.europa.eu/internal_market/consultations/2013/copyright-rules/docs/contributions/consultation-report_en.pdf

197 For a detailed list of copyright-intensive industries in Italy, see table A 5.3 in the Annex.

198 For further information see AGCOM, https://www.ddaonline.it/

199 In particular, CRTV, IMAE, Motion Picture Licensing Corporation Italy, SCF, IPAA and FAPAV are not associated in “Confindustria Cultura Italia”.

200 This annex is based on Confindustria Radio Televisioni [CRTV], (2014).

201 Additional information on legal online offer in Italy (eBook, film, music, B2b, TV, videogames) is available on www.mappadeicontenuti.it.

202 For a detailed list of copyright-intensive industries in Japan, see table A 5.4 in the Annex.

203 See: eMarketer, Global B2C Ecommerce Sales to Hit $1.5 Trillion This Year Driven by Growth in Emerging Markets; available at: http://www.emarketer.com/Article/Global-B2C-Ecommerce-Sales-Hit-15-Trillion-This-Year-Driven-by-Growth-Emerging-Markets/1010575 and eMarketer, B2C Ecommerce Climbs Worldwide, as Emerging Markets Drive Sales Higher available at: http://www.emarketer.com/Article/B2C-Ecommerce-Climbs-Worldwide-Emerging-Markets-Drive-Sales-Higher/1010004

204 See ComScore, 2010 Mobile Year in Review; available at: http://www.comscore.com/Insights/Presentations_and_Whitepapers/2011/2010_Mobile_Year_in_Review .

205 See http://www.cric.or.jp/english/csj/csj2.html.

206 See http://www.cric.or.jp/english/qa/begin.html

207 See: http://www.cric.or.jp/english/qa/begin.html#9

208 Original name: 文化審議会著作権分科会

209 See: http://www.bunka.go.jp/chosakuken/singikai/index.html (Japanese only).

210 Japan Copyright Institute (2009), Copyright White Paper - A view from the perspective of copyright industries (vol.3), Japan Copyright Institute, Copyright Research and Information Center, August 2009; available at: http://www.cric.or.jp/english/doc/whitepaper_0908.pdf

211 For a more exhaustive list see: http://www.cric.or.jp/english/csj/csj7.html

212 For a detailed list of copyright-intensive industries in Korea, see table A 5.5 in the Annex.

213 See endnote 1.

214 See the part on enforcement.

215 Article 101ter deals with limitations and exceptions only with respect to computer programs.

216 This act has been revised several times in compliance with the TRIPS Agreement and the free trade agreements between Korea and the European Union (2011) and between Korea the United States (2012).

217 For a detailed list of copyright-intensive industries in Poland, see table A 5.3 in the Annex.

218 http://www.muzo.pl

219 http://muzodajnia.pl

220 http://iplay.pl

221 http://www.empik.com

222 http://www.soho.pl

223 http://www.polishsound.com

224 http://nuplays.pl

225 http://www.mobila.pl

226 http://www.papla.pl

227 http://www.playthemusic.pl

228 http://www.mood.pl

229 http://www.windmobile.pl

230 http://soundpark.pl

231 http://www.megatotal.pl

232 http://www.megatunes.pl

233 See “Report on the functioning of the digital music market in Poland 2013”; available at: . http://www.prawoautorskie.gov.pl/media/raporty/Report_on_the_functioning_of_the_digital_music_market_in_Poland_2013.pdf

234 Source - http://www.zpav.pl/aktualnosci.php?idaktualnosci=862

235 Ustawa z dnia 4 lutego 1994 r. o prawie autorskim i prawach pokrewnych.

236 Ustawa z dnia 27 lipca 2001 r. o ochronie baz danych.

237 www.prawoautorskie.gov.pl

238 See http://www.eschk.admin.ch/eschk/de/home.html

239 More information can be found at: https://www.ige.ch/urheberrecht/agur12.html

240 For a detailed list of copyright-intensive industries in the United Kingdom, see table A 5.6 in the Annex.

241 See: https://www.gov.uk/apply-for-a-licence-to-use-an-orphan-work

242 For points raised in public consultations around copyright see http://www.ipo.gov.uk/pro-policy/consult.htm

243 The UK’s position is set out at http://www.ipo.gov.uk/response-eucopyrightrules.pdf

244 More information on the implementation of the report’s recommendations in the area of copyright can be found here: http://www.ipo.gov.uk/types/hargreaves/hargreaves-copyright.htm

245 For a detailed list see: http://www.ipo.gov.uk/types/copy/c-manage/c-ownerorg.htm

246 For a detailed list of copyright-intensive industries in the United States, see table A 5.7 in the Annex.

247 See ESA-USPTO (2010); Siwek-IIPA (2004).

248 Copyright Act of 1976, Pub. L. No. 94-553, 90 Stat. 2541 (1976). For a listing of amendments made subsequent to the passage of the 1976 Act see Copyright Office Circular 92 at: http://www.copyright.gov/title17/circ92.pdf.

249 For more information on the history of copyright revision in the United States in the context of the Internet revolution, see the Preface to Title 17, available at: http://www.copyright.gov/title17/92preface.html. See also Section II.B of the Department of Commerce Green Paper. on Copyright Policy, Creativity, and Innovation in the Digital Economy (“Green Paper), available at: http://www.uspto.gov/news/publications/copyrightgreenpaper.pdf

250 Pub. L. No. 105-304, 112 Stat. 2860 (1998). For a summary of the law passed in 1998, see the US Copyright Office Summary of the legislation available at: http://www.copyright.gov/legislation/dmca.pdf

251 17 U.S.C. §§ 302-305. Some of the more common circumstances are described in Copyright Office Circular 15a. And works made for hire under the 1976 Act are described in Circular 9. All Copyright Office Circulars are available at http://www.copyright.gov/circs/

252 17 U.S.C. § 701 (a).

253 17 U.S.C. § 701 (b).

254 17 U.S.C. §§ 101 (definition of “compilation”) & 103. For more information see: http://www.copyright.gov/reports/dbase.html

255 17 U.S.C. §107. See also U.S. Copyright Fact Sheet FL-102, available at: http://www.copyright.gov/fls/fl102.html

256 More information on the Copyright Office’s docket on orphan works and mass digitization can be found at http://www.copyright.gov/orphan. Additional background from the perspective of the U.S. Department of Commerce can be found in the Green Paper (pp 30-33).

257 See Circular 1, available at http://www.copyright.gov/circs/circ01.pdf, at page 7.

258 U.S. Department of Justice, Fourth Edition of the Department of Justice’s Manual on Prosecuting IP Crimes, issued in 2013, available at http://www.justice.gov/criminal/cybercrime/docs/prosecuting_ip_crimes_manual_2013.pdf.

259 Maria A. Pallante, The Next Great Copyright Act, 2013 Manges Lecture at Columbia Law School, http://www.copyright.gov/docs/next_great_copyright_act.pdf.

260 To find more information on these and future hearings, see United States House of Representatives Judiciary Committee, Hearings, available at: http://judiciary.house.gov/index.cfm/hearings.

261 See USCO webpage on this study, including a link to the final report, available at: http://www.copyright.gov/docs/smallclaims/

262 See USCO webpage on this study, including a link to the final report, available at: http://www.copyright.gov/docs/resaleroyalty/

263 See USCO webpage on the right of making available study, available at: http://www.copyright.gov/docs/making_available/

264 See USCO webpage on the music licensing study, available at: http://www.copyright.gov/docs/musiclicensingstudy/

265 Links to all these ongoing efforts of the Copyright Office can be accessed on its homepage: www.copyright.gov.

[266] Available at: www.uspto.gov/news/publications/copyrightgreenpaper.pdf

[267] Green Paper at p. iii.

[268] A discussion of private action and available remedies in the area of enforcement of copyrights can be found in the Green Paper (section III B 2).

[269] http://www.copyrightinformation.org/wp-content/uploads/2014/05/Phase-One-And_Beyond.pdf

[270] A discussion of private action and available remedies in the area of enforcement of copyrights can be found in the Green Paper (section III B 2).

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CHAPTER 6. DESIGN AND DESIGN FRAMEWORKS: INVESTMENT IN KBC AND ECONOMIC PERFORMANCE

This chapter addresses the nature and the economic impact of design by looking at design-related intellectual property and how businesses protect their knowledge based capital.

The chapter reviews the nature and various definitions of design and how design-related IP, specifically registered designs, relates to other formal IP mechanisms such as patents, trademarks, and copyright. It looks at the primary areas of design activity in a subset of OECD countries and investigates the similarities and differences of the constituent design IP regimes as well as the various treaties governing international design IP regulation. The review continues with an examination of how design-related IP functions in comparison to and in conjunction with other formal and informal IP protection mechanisms and what factors motivate firms to choose and appropriate combinations of protection mechanisms.

By examining historical patterns of design registrations in a variety of ways, this chapter identifies trends, at the national level, of how firms perceive the importance of design-related IP. Analysis of national origins of registrations in both the European Community and the United States provides an indicator of the activity of those countries' businesses relative to their proximities to the markets. It explores the existence of possible alternative indicators for design activity and of industry-specific variations across the sample set.

The chapter concludes with a review of input and output measures as stated in the limited set of studies that have endeavoured to establish or quantify the value and/or benefit of design and design-related IP. The studies, while clearly suggesting that design does have economic benefits, both at the firm and overall economic levels, largely use qualitative or subjective indicators because the data necessary for large-scale econometric analysis are generally not available.

This chapter is intended to be exploratory rather than comprehensive or conclusive. It should be considered as an initial step towards the possibility of a broader and deeper analysis of design-related issues.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

Introduction

Design is the essence of all non-commoditised products—not only does it provide a means for differentiating products and services, but it also dictates the core user experience with those products and services. It goes beyond the pure aesthetics that we normally envision as the key to design, and encompasses features including the functionality and ergonomics behind every product. To that end, what is design? Where does technological development end and design begin? If there is no clear terminator, how do we quantify what is invention and what is design?

While these questions, among others, have occupied researchers and managers alike, few answers are apparent. As Afori so aptly put it, “A design is hard to define but is easily described.” (2008, p. 1107). This reflects how automatically we view all the aspects of design; to the extent that we do not cognitively process them, so much as we simply experience them. Likewise, managers often overlook some aspects of design, and it is difficult to identify—let alone measure—all the elements of design inputs in a product. Is developing a better user interface a matter of engineering or design? Are engineers designers and vice versa?

Through the advent of the patent system, we tend to identify inventions as discrete packets, and while there are also means of codifying design elements, it is rare that all elements of design are equally as well defined and protected. Thus, there is that much less substance by which to measure design (Black and Baker, 1987, Hertenstein et al., 2005). Nonetheless, there is general recognition about design being a major contributor to the economic fortunes of companies and to the regional and national economies to which they belong (Hertenstein et al., 2005, Kotler and Rath, 1984, Walsh et al., 1992, Yamamoto and Lambert, 1994).

In this document, we explore the nature of design, with a focus on industrial design, and examine how firms protect their design-related intellectual property and how, if at all, that has changed over the last ten years. We review what measures there are for design inputs and outputs, and suggest future directions for evaluating the benefits of design to firms and economies.

Defining design and industrial design

Design was once perceived as a mere decorative craft; however, it has since been recognised as the intersection between technology and the user. Firms previously left the product to be defined by its function and thus produced goods that functioned well in reference to their defined purpose but made fewer allowances for how the user would interact with it. Design has since become a study of ergonomics, consumer psychology, sociology, human dynamics, art, and software engineering as well as service and technology innovation (Buchanan and Margolin, 1995). A large part of the literature acknowledges design as an important competitive tool, as well as an intangible factor that contributes in most cases to the value-added and success of companies.

Box 6.1. What exactly is design?

The word *design* is widely used and can mean different things. Everything that surrounds us can claim to be the work of design: from buildings to cars, from furniture to product packaging. Walsh (1996) claims "the term 'design' covers a wide range of activities: architecture, fashion design, interior design, graphic design, industrial design, engineering design." Nevertheless, the difficulty remains that design has been defined in many ways but no single definition has been universally accepted (Gemser and Leenders, 2001).

While they are generally similar in nature, the definitions of design used for legislative and/or regulatory purposes differ somewhat:

- **EU Council**: "*Design* means the appearance of the whole or a part of a product resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation." (European Commission, 2002)
- **OHIM**: "*Design* is an art and a science, it forms our homes and our workplace, and it is all around us, wherever we are. Design is the surface of the man-made environment." (OHIM, 2013a)
- **WIPO**: "An *industrial design* constitutes the ornamental or aesthetic aspect of an article. A design may consist of three-dimensional features, such as the shape or surface of an article, or of two-dimensional features, such as patterns, lines or colour." (WIPO, 2014b)

Scholars also provide a set of definitions that give different facets to design according to the dimension and the context in which it is placed.

As suggested by D'Ippolito (2014), the nature of how we think about and study design has evolved over the years through several different philosophies:

- ***Design as creation of artefacts***— Consisting of "studying, researching, and investigating the artificial made by human beings and the way these activities have been explored in academia or employed in manufacturing." (D'Ippolito, 2014, p. 29, Simon, 1969)
- ***Design as a problem-solving activity***—A process involving problem definition, solution generation, evaluation, and selection.
- ***Design as a reflexive practice*** and ***design as making sense of things***— The designer not only creates but also reflects upon the creation so as to learn, improve, and re-create (D'Ippolito, 2014, p. 29, Johansson-Sköldberg et al., 2013).
- ***Design as a key input to strategy***— is conceived as the means to increase the competitiveness of firms: "Design relates directly to the strategy of the firm. It seeks to optimise consumer satisfaction and company profitability through the creation of form, durability and values along with products environments, information, and identities." (D'Ippolito, 2014, p. 29, Kotler and Rath, 1984)

Design protections

Industrial design refers to creative activity that results in the ornamental or formal appearance of a product (Sharma et al., 2011). This appearance may include the "look and feel" of a product, and can extend to the on-screen depiction of a website. For the purpose of this document, the nature of design is entirely separate from function or technical merits. That is to say, that any inherent aspect of a design that has functional significance may be excluded from design protections. However, what happens when the design is functional? Consider the case of a company that makes automobile tyres; if it uses the same materials, the same construction, and the same technology for a new tyre design as it does for its other tyres—and for that matter, as its competitors use, as well—what sets its products apart? The tread design is a pattern with a unique outward appearance that differentiates it from other designs and products; however, the new tread design, while not necessarily using novel elements, may contribute significantly to the tyre's ability to disperse water and adhere better to the road surface (Scalera et al., 2014). This may or may not bring design into "conflict" with patents, as patents must, as a basic requirement, have utility (i.e. function) unless the cognisant jurisdiction allows design patents. For example, In the United States, an article of manufacture (such as a tyre) may have both a utility patent (how it functions) and a design patent (how it looks). In the U.S., both design and utility patents may be obtained on an article if invention resides both in its utility and ornamental appearance. While utility and design patents afford legally separate protection, the utility and ornamentality of an article are not easily separable.

The aesthetic aspects that distinguish a product from others represent an opportunity for the producer, as product design gives an image and reputation to the company, and contributes to increase the firms' competitiveness and performance. For this reason, it becomes essential for enterprises to protect their design assets against copying by competitors and counterfeiters. However, some protections are similarly afforded under copyright and trademark protection (Brean, 2008). Copyright protects various artistic and software works, while trademark allows firms to indefinitely protect iconic elements that serve as representations that link firms with their brand and products (Jackson, 2014).

The protection of industrial design is a debated issue due to these conflicts regarding scope of protection and methods of enforcement (Lahore, 1971, Copinger and James, 1999). The reason is that "the industrial design is situated at the crossroads of art, technology, and the entire industry dedicated to attracting the consumer's attention. Legally speaking, design suffers from a hybrid nature since it has much in common with the three major intellectual property paradigms – copyright, patent and trademark laws—yet it does not exactly fit any one of them." (Afori, 2008, pp. 1107-1108) In the U.S., both design and utility patents may be obtained on an article if invention resides both in its utility and ornamental appearance.

The role of design: Product design and the design process

Design is a method whereby firms can add value to their products and services and differentiate themselves from their competitors (Rothwell and Gardiner, 1985). By bridging the gap between technological function and user experience, some argue that design spurs innovation (Kline and Rosenberg, 1986, Rothwell, 1992, Walsh, 1996). Since it is concerned with the outward—or "customer facing"—part of the product, design can be considered the most direct and impactful medium through which firms can communicate with customers (Verganti, 2003).

Given that it is difficult to assign a single clear definition of design since the term applies to a wide range of activities that can be at the one extreme "engineering" and at the other "art" (Lawson, 2006), it becomes even more difficult to categorise or measure design. As mentioned above, the role of design is often associated mainly with aesthetic aspects of the product, and sometimes, but not always, considered a key aspect of the product development process. Whereas some people consider design to be an activity, others think of it as a process and still others treat it as a philosophy (Krippendorff, 1989).

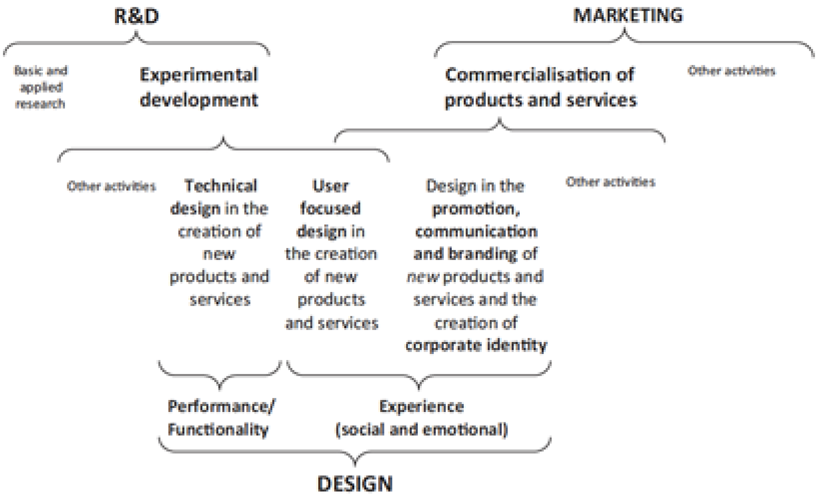
Design can be viewed as a communicator of the firm's quality image and product integrity (Yamamoto and Lambert, 1994), but design can have a variety of functions that vary from firm to firm or from process to process within the same firm. Perks *et al.* (2005) explores the role of design within the new product development (NPD) process and identifies three potential roles design can play:

1. Design as a functional specialism: in this category, designers concentrate mainly on design and with the aesthetic aspects of NPD;
2. Design as part of multifunctional team: here a team approach is used and the designers emerge as key players participating in NPD-related decision making along with other experts; and

3. Design as NPD process leader and a major force for innovation: the designer is the leader of the NPD process who drives and supports actions throughout it.

This is similar to Kotler and Rath (1984), who define design as "a strategic marketing tool" that seeks to optimise consumer satisfaction and company profitability. They propose three different "Design philosophies" to explain how companies incorporate design into the marketing planning process, from design-dominated companies, in which designers create without any marketing data to market-dominated companies, in which designers have to adhere closely to market research reports describing what customers want in the product.

Figure 6.1. Conceptualisation of design



Source: Moultrie and Livesey 2014

The design role is not even necessarily limited to new products and services: it could deal with other aspects of the business, such as communication and branding activities (Walsh, 1996). The British Standard guide to managing design (2005) draws a distinction between two aspects of design: the first concerns promotion and customer support that includes many elements such as advertising, packaging, promotional literature, etc. This is a design that communicates, promotes, and delivers products and services; the second concerns creation, communication and promotion of corporate identity and culture, therefore design reflects the "personality" of the organisation.

The Fourth Community Innovation Survey (CIS-4) considers design's role as a part of marketing innovation; Filippetti (2011), in fact, references the CIS-4 clarification on design, "a marketing innovation is the implementation of new and significantly improved design and sales methods to increase the appeal of your goods and services or to enter to new markets." (p. 9) In this case, design is considered as an output and not as a process or source of innovation, because, as mentioned by the OECD (2005), "marketing innovations include significant changes in product design that are a part of a new marketing concept. Product design changes here refer to changes in product form and appearance that do not alter the product's functional or user characteristics" (p. 49); but, in general, there seems to be a semantic confusion as to whether design is a process or an outcome (Bloch, 2011).

Design can play different roles within companies depending on the type of enterprise, and the importance that management chooses to assign to it. This will depend on the individual company's philosophy and the sector in which it operates, whether to limit design to the product or extend it to a whole process. By integrating design into the entire process at an earlier stage of new product development, firms have been able to attain efficiencies, in both time and cost (Gemser and Leenders, 2001). Therefore, it often becomes complex to recognise and measure the weight and role that design plays in different firms. We will explore these issues further in the next sections of this report. Section 2 presents design protection regimes in the sample countries we will emphasise, Section 3 discusses IP-related issues, Section 4 explores trends in registered designs, while Sections 5 and 6 talk about measures of inputs and outputs, respectively.

Protecting design

Many industries are making significant changes in how they invest in and protect their design-related intellectual property. This section of the report will deal with the regimes of design IP in a sample of countries: Canada, France, Germany, United Kingdom, Italy, Japan, United States, South Korea, and China.

Design IP v. patents, trademarks and copyrights: Subset or complement?

It is important to differentiate design as a form of intellectual property, possibly distinct from other forms of intellectual property such as patents, copyrights and trademarks.

Various nations and governing bodies use different terms for design intellectual property: Registered design, registered community design, design model, design patent, industrial design, etc. For the purposes of this document, we will use registered design for the intellectual property right and design or industrial design to refer to the larger concept of design as an activity, practice, or element of bringing aesthetic or visual change to an otherwise commoditised product.

The registration of inventions having functional or technological utility beyond or without regard to aesthetics also has a number of mechanisms. These mechanisms—which are referred to under a number of designations such as patent, utility patent, petty patent, innovation patent, small patent, and utility model—will be largely treated in this report as *patents* unless otherwise stipulated.

For the purpose of this report, we will use the term trademark (as opposed to trade mark or trade-mark) to represent the visual elements that link an enterprise with its products and services. This can be indicative of both registered and unregistered trademarks; however, the general discussion will be concerned with registered IPRs.

Registered designs

Registered designs are granted by different jurisdictions as a form of formal intellectual property protecting ornamental properties, shapes, configurations, appearance, or pattern of an article of manufacture, and such designs must be both new and distinctive or original. Registered designs have different names in different countries or regions, including “community designs” or “design patents.” In the interest of consistency, we will use the term *registered design* in this report[271].

Different jurisdictions have different defined periods of time that registered designs may be enforced. In the case of the EU, registered designs last five years and are renewable multiple times for a total protection of 25 years (OHIM, 2013b). To qualify, there should be no prior design that is identical (and different jurisdictions may not even allow prior disclosure by the designer himself or herself), the design should be non-obvious, and the ornamental features of the design should be visible when the product is in use. Usually, registered designs are intended for aesthetic features. Parties infringing registered designs can be prevented from using / commercialising the design or otherwise punished to recoup damages (UK Intellectual Property Office, 2014a).

Patents

The registration of a patent gives the owner the right to exclude others from making, using, or selling an invention. A patent provides the holder with a limited monopoly over a defined period in exchange for contributing the underlying knowledge of the invention to the public state of the art. Although patent protection is a right granted by government, the enforcement of patent infringement is deemed a civil matter and must, in the vast majority of cases, be pursued at the expense of the patent holder. Patents are also referred to as *utility, functional* or *mechanical patents* in some jurisdictions. Patents often protect solutions to technological innovations that take the form of processes or products; however, in some jurisdictions they may also be in the form of business methods, software, or even living organisms. The base requirements for patenting an invention is that it must be novel, have utility, have some inventive step, be non-obvious, and must be replicable by someone skilled in the art.(WIPO, 2008)

Given that functional aspects of a device cannot be protected by design IP, patents serve a vital role in protecting the novel elements of products that also may have design context. Registered designs and patents are often filed for the same product, the former covering the appearance and the latter the function (Cook, 2007).

Utility models

A utility model, sometimes defined as “petty patent” or “innovation patent”, provides the right holder the right to prevent others from using or selling the protected invention for a defined period of time. The requirements for filing a utility model are significantly less stringent than those for filing a patent, as the size of the “inventive step” required must attain only a much lower threshold and what examination is done of an application is brief and more cursory. Given that the protection period (7-10 years, non-renewable) and the examination period are much shorter than that of a patent, utility models cost significantly less than patents. Utility models, however, are only issued by some national patent offices, such as Germany, China and Japan, and have a much more limited geographic scope. They also have more limited scope in protection since they are not examined for novelty and can be invalidated more easily (Thomä and Bizer, 2013). Companies generally see them as a much more convenient means of establishing priority for incremental inventions, using them more as a method of strategic disclosure than as an exclusionary right.

In the role of providing priority, firms often use utility models, with the full knowledge that they carry limited protection from infringement, in order to protect their freedom to operate. A utility model is a certified document that commits the invention to the larger body of prior art, thereby preventing others from patenting the invention (Peters et al., 2013). Since utility models are less costly and easier to obtain, they can be a more agile tool to use when the design of a product will inevitably change in a term that it much shorter than the life of a patent or when designers intend product intervals to be naturally short (Byma and Leiponen, 2006).

Trademarks

A trademark is any sign, word, logo, etc., used to distinguish products and services from competitors of the applicant. Trademarks indicate (visually) the source of the product or service. The term of trademark protection continues indefinitely until such time that the trademark either is abandoned or loses its distinguishing feature by becoming a generic term. The violation of trademark rights (passing off a good or service as someone else’s by using their trademark) is subject to trademark infringement. It could also be considered infringement if a trademark is not exactly the same but similar enough to cause confusion among consumers (Durkin and Schirk, 2011).

Trademark and design are often closely and indelibly interlinked in the minds of consumers (Miaoulis and d'Amato, 1978). For this reason, trademarks often figure strongly in product strategy. Design protection allows firms the time to establish an identity in relation to a product without the worry of imitation. If the product design endures as a symbol of the firm, then the firm can maintain trademark protection almost indefinitely (Brean, 2008).

Copyrights

A copyright protects the form of artistic creation by protecting authors' literary work or the output of creative artists in the form of music, films, paintings, images, computer software, etc. The owner has the exclusive right to distribute the work and reproduce, adapt, display, or perform it, or authorise others to do so. Copyright does not protect the underlying ideas, only the form of the creation (WIPO, 2008). For industrial designs that qualify as eligible copyrightable subject matter such as graphics, copyright protection may function equally well, given that the protection of a copyright extends 70 after the death of the owner; significantly longer than the maximum of 25 years afforded to registered designs. Many have argued that fashion design should be similarly protected under copyright (Holton, 2014, Lahore, 1971, Miller, 2014, Roth and Jacoby, 2009, Saidman, 2007, Stevens, 2012, Tsai, 2005, Xia, 2010). In some countries, copyright protection is not available for functional articles (such as fashion or automotive parts) even though aesthetically pleasing where the artistic features cannot be separated either physically or conceptually.

Software and internet webpage designs are, however, covered by copyright in many countries. The Court of Justice of the European Union recently ruled that while the functionality of a program cannot be protected under copyright, the reproduction of a part of a manual, whether that be in a printed manual, and online document, or an onscreen representation of a program itself, may constitute copyright infringement. This finding, and its subsequent enforcement by the Court of Appeal for England and Wales, sought to limit the scope whereby software developers could claim infringement and stifle competition (Gervais and Derclaye, 2012). However, it has resulted in a realisation that copyright alone is insufficient to protect software and must be complemented with registered designs to protect notable features of appearance as well as patents for functional innovations (Silverman, 2014).

Countries considered in the study

Canada. The Canadian Intellectual Property Office (CIPO) is the agency responsible for IP regulation and registration of patents, trademarks, industrial designs and copyrights in Canada. In Canada, industrial designs are defined as "the visual features of shape, configuration, pattern or ornament, or any combination of these features, applied to a finished article." Such a design may be of a common object that, in and of itself, has no functional novelty but does have an original appearance. The appeal to the eye is the key to novelty. An idea, a method of construction, the materials used in the construction of an article or the function of an article cannot be registered. In Canada, there is no time limit for registering an industrial design if the design has never been published but if it has been published, the registration must be within 12 months of publication. The exclusivity is for a period of five years, which can be renewed for an additional five years (Canadian Intellectual Property Office, 2001).

France. France has recently experienced significant growth in design IP. Although the Institut National de la Propriété Industrielle (INPI) is the national agency responsible for administering IP, much of the increase in applications has been filed under the broader Office for Harmonisation in the Internal Market (OHIM) or World Intellectual Property Organisation (WIPO)[272] schemes. The Compagnie Nationale des Conseils en Propriété industrielle (CNCPI), which represents patent attorneys in France, recommends companies and research centres bundle the various forms of protection available to them (patents, trademarks, designs and models, domain names, etc.) and encourages the development of an "intellectual property culture" in France (Compagnie Nationale des Conseils en Propriété industrielle, 2014).

Regarding design IP in particular, French companies file approximately 7% of all community designs (see trends section below), which CNCPI feels is lower than what would be expected given the size of the French economy, "leaving foreign companies to monopolise protection in the design field." While French copyright law is strong, it is not able to protect designs in all circumstances. Thus French copyright for design protection may work for firms focusing exclusively on the French market, but "the informal nature of copyright protections and the difficulties in establishing priority dates for first use make it difficult for these firms to defend themselves in the face of infringement claims filed by firms empowered with the more formal rights of a registered design."(Compagnie Nationale des Conseils en Propriété industrielle, 2014)

Germany. Germany has the largest export economy in Europe. A high proportion of Germany's exports are manufactured products that rely heavily on design to differentiate them from cheaper, lower quality products. The latest relevant law on design regulation in Germany is the Regulation of 2 January 2014 for Further Modernisation of the Design Act and Introduction of the Invalidity Procedure in Design Matters. The German Patent and Trademark Office (DPMA) is national agency responsible for patents, utility models, registered designs, and trademarks. In the case of registered designs and utility models, the DPMA checks only if the application forms and definitions conform to the respective requirements; it does not examine the character of the invention or design itself nor does it test the novelty of the concept (DPMA, 2014).

United Kingdom. The system on intellectual property rights promoted by the United Kingdom seems to offer strong protection. In 2014, the UK Parliament amended the intellectual property laws with special attention to the protection of designs (HM Government, 2014).

A Registered Design in the United Kingdom can give rise to a valuable intellectual property right that can serve as a basis of an infringement action against other parties. The registration of a design requires that the design be new and have an individual character. The United Kingdom also excludes certain items from registration as a design if the design does not fall under the legal definition, if the design is offensive, if the design consists of certain protected flags and international emblems and if the design elements are solely dictated by the product's technical function (UK Intellectual Property Office, 2006).

Italy. Italy provides a designs protection in line with the harmonisation requirements of EU Directive 98/71/EC. The exclusive right takes effect from the date of filing of the application and has a validity of 5 years, renewable for other four terms of 5 years, up to a maximum of 25 years. The registration protects the appearance of a product, but there are no specific aesthetic requirements[273].

In accordance with the cumulus option provided by the EU Directive, the Italian IP code provides rules for the relationships to utility models and copyrights. While designs protect just the formal appearance, utility models protect the functional appearance. The same form can be protected both by utility model and by design at the same time, but the two IP rights cover different objects and scopes.

A registered design may also be eligible for protection under the law of copyright, but only for designs which meet two further requirements: creative character and artistic value. In this case, the validity of the protection is 70 years after the author's death, as per general copyright rules. The Italian IP code does not provide for unregistered design protection.

To enhance the use of design protection at the enterprises level, especially for SMEs, after the design registration fees, the renewal fees are due just from the second five-year period.

Japan. As the first country to ratify the Anti-Counterfeiting Trade Agreement (ACTA), Japan has generally had a proactive stance in intellectual property protection on the global stage (Office of the United States Trade Representative, 2012). Given Japan’s evolution over the past half century from a low-cost producer to a developer of high technology and high-concept design goods, Japanese firms have taken leading positions on both patent and design registry lists. This is largely due to the benefits of the Designs Act. The Designs Act dates back to April 13, 1959, and it was amended with the revisions of Act No. 63 of 2011 (WIPO, 2014c). In addition to many of the protections afforded by other national patent laws, the Japanese law allows design registrations to be held secret for up to three years at the request of the filing party. There are also provisions by which designs may not be granted by the Japanese government, such as any design that is liable to injure public order or morality. Japanese law also acts in a manner similar to trademark protections as it prohibits any design that is liable to create confusion with an article pertaining to another person's business (Japan Patent Office, 2014). This differentiation is a *de facto* form of trade dress protection[274].

United States. In the United States, industrial designs are protected to varying degrees under design patent law, copyright law, and trademark and unfair competition law. For the United States Patent and Trademark Office (USPTO), a design consists of “visual ornamental characteristics embodied in, or applied to, an article of manufacture.” As the design manifests itself in its visual characteristics, a “design patent” (US version of a registered design) application may concern itself with the “configuration or shape of an article, to the surface ornamentation applied to an article, or to the combination of configuration and surface ornamentation.”(USPTO, 2012) Whoever invents any new, original, and ornamental design for an article of manufacture may obtain a patent therefor. The term of protection has been 14 years from the granting date. However, this term has been increased to 15 years from the granting date for applications that are filed on or after May 13, 2015.[275] There is an area of overlap between Copyright and Design Patent Statutes where an author/inventor can secure both a Copyright and a Design Patent. Thus, an ornamental design may be copyrighted as a work of art and may also be the subject matter of a Design Patent. It is the policy of the Patent and Trademark Office to permit the inclusion of a copyright notice in a Design Patent application, and thereby any patent issuing therefrom[276].

A design patent and a trademark may be obtained on the same subject matter. The U.S. courts have held that the underlying purpose and essence of patent rights are separate and distinct from those pertaining to trademarks, and that no right accruing from the one is dependent upon or conditioned by any right concomitant to the other. Accordingly, the use of trademarks in design patent application specifications is permitted under limited circumstances[277].

South Korea. The Republic of Korea has the Industrial Design Protection Act or Act No. 951 of December 31, 1961, as amended up to Act No. 9764 of June 9, 2009 (WIPO, 2014a). Design includes the “shape, pattern, colour or a combination of these in an article that produces an aesthetic impression in the sense of sight.” The term of protection is 15 years from the granting date. Two categories of design applications are available in South Korea: normal examination designs (substantive) and non-examination designs (non-substantive). Non-examination designs are restricted to two-dimensional products such as wrapping paper and/or those with a short life cycle, for example fashion-dependent goods such as clothing (IP Australia, 2014).

China. China's rapid economic rise led to it joining the World Trade Organisation (WTO) in 2001, and this has contributed to major reforms in its intellectual property laws. Since then, China has introduced legislation covering every aspect of the protection of IP. Chinese authorities have traditionally relied heavily on the local registration characteristics and history of an item, whereby designs and trademarks commonly known in other parts of the world were registered in China by parties other than the recognised owners, because there was no evidence inside the Chinese domain. China has, however, put great effort into conforming to international norms and treaty standards.

As has been the case in other countries, the importance of reciprocal protection of IPRs grows as the country generates more of its own IP. China's emergence as a developer of design and technology intellectual properties has brought about stronger enforcement of rights for IPRs held by both foreign and domestic entities. Enforcement methods in China can vary from civil prosecution to governmental administrative action and customs seizure for cases of wilful infringement (UK Intellectual Property Office, 2014b).

The EU. The European Union established the Office of Harmonisation in the International Market (OHIM), a central agency for the administration of trademarks and designs, in 1994 (European Commission, 1994). The collective protection of design within the EU started in 1998 through the Design Directive followed by the Design Regulation of 2001 with the eventual purpose of a European design intellectual property regime. The Directive on the Legal Protection of Designs (European Commission, 1998) sets minimal standards for the eligibility and scope of protection for industrial design across Europe, but also provides leeway in allowing member states to independently regulate registration, renewal, and invalidation of design IP within their own borders so long as it meets those minimal standards. The necessity of a single form of design protection that would allow goods embodying designs to circulate inside the internal market led the EU to enact the Community Design Regulation (CDR) in 2002. The CDR introduced the concept of Registered and Unregistered Community Designs (RCD and UCD, respectively). While both enable the holder the ability to protect their design throughout the EU, the UCD is of a shorter duration (3 years) and offers only limited protection against duplication, whereas the RCD offers protection for a period of five years from the date of filing and can be renewed every five years for a maximum of 20 years of protection. The other main difference between RCD and UCD is that RCD aims to protect against both deliberate copying and the independent development of a similar design. UCD only prevents intentional copying; if a second designer can demonstrate that she or he had no prior awareness of the existence of the protected design and had created the design independently, there are no grounds for infringement. Nevertheless, both forms of design protection have to meet the same conditions to be valid (OHIM, 2013b).

It is interesting to note that Art. 8 (1) of the CDR states that "Community design shall not subsist in features of appearance of a product which are solely dictated by its technical function." This language is common in design legislation so as to preclude the use of registered designs as *de facto* patents (European Commission, 2002).

Major design areas

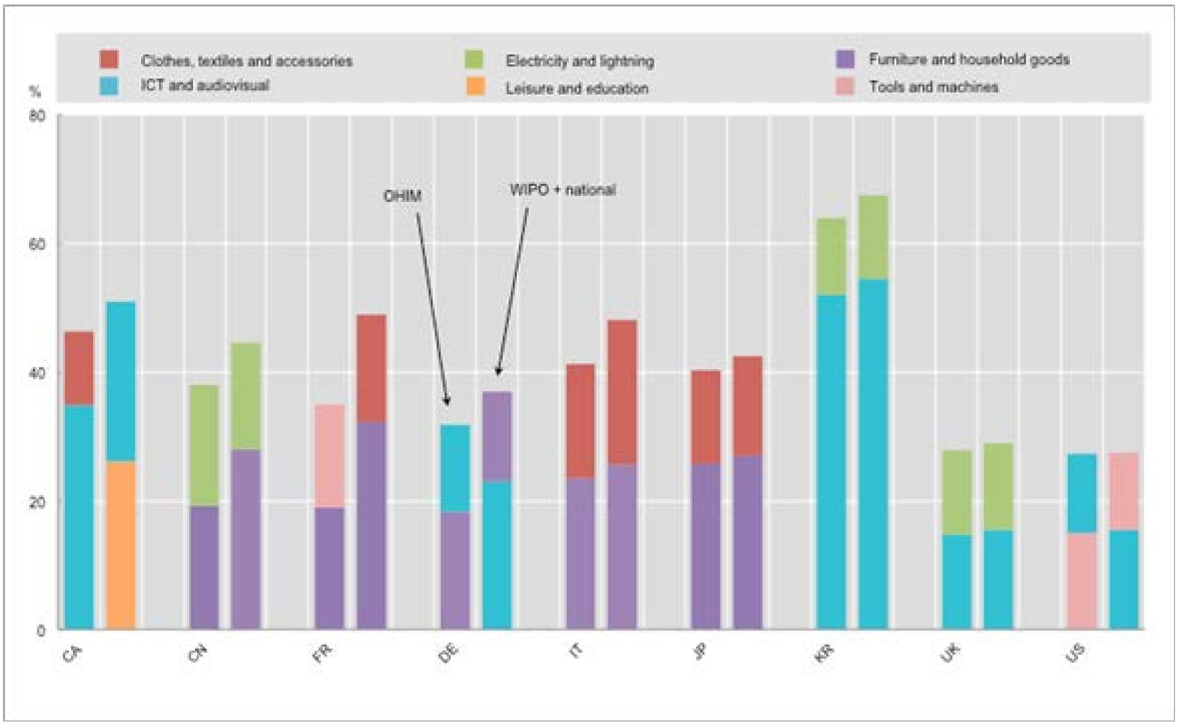
Registered designs are classified using the Locarno system, except in Canada. The Locarno Agreement of 1968 established a means for classifying registered designs. This allows all participating countries to use a common framework for indexing the nature of designs submitted. This benefits all by allowing for easier search for establishing novelty. The classification system reflects the function of the object being classified, and while this is similar in nature to the system of classifying patents, there is no concordance between the two. Thus, a product may have a Locarno number that is vastly different from patents describing the component parts therein. Likewise, the Locarno number speaks to the function of the design being registered, not the industry wherein the object will be marketed, so Locarno classifications may not be an accurate mapping of how designs are representative of certain industries. Although Canada and the US (for U.S. design patents issued after May 6, 1997) are not signatories of the Locarno Agreement, the US does assign Locarno classification numbers in addition to their own classification codes so as to facilitate international searches.

Figure 6.2. The top design categories for each country in our sample as ranked by the count of industrial designs filed at OHIM or through national and international routes, respectively, from 2009-2011 illustrates the top two Locarno classes of industrial designs by the representative countries in our sample.

In the first column for each country is the listing of RCDs applied for through OHIM for protection within the EU, whereas the second column is the combined listing of national and WIPO international filings. We can see that there are five major categories:

- Clothes, textiles and accessories
- Electricity and lighting
- Furniture and household goods
- ICT and audio-visual, and
- Tools and machines

Figure 6.2. The top design categories for each country in our sample as ranked by the count of industrial designs filed at OHIM or through national and international routes, respectively, from 2009-2011



Source: OECD Science, Technology and Industry Scoreboard 2013.

Although leisure and education was Canada's top category for non-EU registrations, the category did not rate as highly for any other country and did not amount to a significant portion of overall application filings. Therefore, we excluded it from the list.

This informs us that design is a strong element in the consumer goods arena, specifically for products we might assign to the categories of fashion and decor—industries that have long been associated with design. Information and communications technology, on the other hand, is not one that we consider immediately as a design domain; however, within that domain is the subclass of "Screen displays and icons", wherein any representation of an electronic control interface would be registered.

Commonalities of design IP regimes

Table 6.1 gives a summary of design IP regimes across the sample countries. All nine countries have laws and regulation that rule and protect industrial design. While there are differences across the various definitions and enactments of design protection, there are also a number of notable similarities. Specifically, the OHIM and various countries of the EU share many commonalities. This stems from the fact that EU Directive 98/71/EC obliged each of the EU Member States to harmonise the substantive rules on the protection of industrial design in an effort to establish uniform laws in a sector characterised in the past by a diversity of approaches.

The definition of design varies from system to system: there are countries where the definition is complete and exhaustive, such as Japan, UK, France and Italy, countries where the definition is, in the view of some, more ambiguous or simplistic (USA, Germany, Canada, Korea and China). Where the definition of design is not as clear as the protection rules, interpretative problems have led to difficulties of application.

Table 6.1. Representation of similarities and differences of design rights across sample countries

Comparison of Design IP Regimes

Country	Country designation code	Name	Definition of Design				Term of Protection		Substantive examination	Accession of Treaty		Online application	Multiple applications	Unregistered Option
			part	whole	method	Symbols / Graphics	F = from filing G = from grant	Years x number of terms		Locarno Agreement	Hague Agreement			
Canada	CA	Industrial Design		●		●	G	5 x 2	●			●		
China	CN	Design Patent		●			F	10	●	●		●		
France	FR	Designs and Models	●	●	●	●	F	5 x 5		●	●		●	
Germany	DE	Designs	●	●		●	F	5 x 5		●	●	●	●	
Italy	IT	Design and Model	●	●		●	F	5 x 5		●	●	●	●	
Japan	JP	Design	●	●		●	F	20	●	●		●		
Korea	KR	Design	●	●		●	F	15	●	●	●	●	●	
UK	UK	Registered Design	●	●	●	●	F	5 x 5	●	●			●	●
US	US	Design Patent	●	●		●	G	14/15	●		●	●		
EU	OHIM	Registered Community Design	●	●	●	●	F	5 x 5		●		●	●	●

Source: authors' compilation.

Note: The United States Senate gave advice and consent to ratification of the Hague Agreement on 7 December 2007. On 18 December 2012, title I of the Patent Law Treaties Implementation Act of 2012 was enacted to implement the provisions of the 1999 Geneva Act of the Hague Agreement Concerning the International Registration of Industrial Designs ("Hague Agreement"). (Public Law 112-211, Dec. 18, 2012). Specific implementing provisions are found, for example, in 35 USC 381-390. On 13 February 2015, the United States deposited its instrument of ratification for Geneva Act of the Hague Agreement. On 2 April 2015, the U.S. Patent and Trademark Office published its final rule to implement the Hague Agreement. 80 Fed.Reg. 17,918 (Apr.2, 2015). The treaty will go into effect on 13 May 2015 with respect to the United States. As previously noted, U.S. design patents resulting from applications filed on or after 13 May 2015 will have a 15 year term.

The terms of protection generally range around 20-25 years. Even though each county may have its own definition of industrial design and the term of protection, there is a debate about the appropriate model for design IP harmonisation, especially the line between copyright and design rights. One side of the debate proposes that since design focuses on the visual impact of a product, it is much closer to creative work than invention, so copyright law could be suitable for design protection as compared to other intellectual property forms (Rahman, 2014, Afori, 2008).

Encouraging protection of design

As design allows firms to differentiate themselves and their products, thereby allowing them to appropriate superior value compared with more "commoditised" product or service, protection of design rights may give incentives to innovate and invest in design in both manufacturing and service industries.

International treaties and industrial design

Different international treaties concern standardisation of intellectual property rights; however, there is not a clear definition of their legal protection with regard to design (Suthersanen, 2010) because different jurisdictions have differing classifications of industrial design and the debate over the nature of design is still open. Nevertheless, industrial design is mentioned in different international treaties.

The Berne Convention: The Berne Convention was the first major international copyright treaty, became effective in 1886 and defined industrial design as an artistic work (Schickl, 2013). Industrial design is not specifically regulated under the Berne Convention, but it is conceived as a "work of applied art" [Art. 2(1)] and leaves it to the discretion of member countries whether they want to protect industrial design as applied art [Art. 2(7)]. The convention provides reciprocal rights for protection of industrial designs, such that if an industrial design is protected under the laws of one signatory country, it shall receive the same protection under similar legislation in other signatory states. If a signatory state's law does not pronounce on the protection of industrial design, the Berne Convention offers protection under copyright law, as it considers industrial design to be artistic work (Schickl, 2013).

The Paris Convention: The first international treaty for the regulation of patents, the Paris Convention was signed in 1883 and the last revision was made in 1967 (Schickl, 2013). Under the Paris Convention, industrial design was dealt with as industrial property and was accorded a patent-like protection. It stipulated that nationals of contracting states must be afforded equal rights of protection as nationals of other contracting states in those jurisdictions. An applicant can file separate applications with each office directly to obtain protection in multiple jurisdictions, but gains protection from the time the first application was filed so long as the follow-on applications were filed within 12 months for patents and utility models, 6 months for industrial designs and trademarks. It also stipulated that industrial designs must be afforded protection in a contracting state even if products derived from those designs were not manufactured in that nation (WIPO, 2014d). This was an effort to lower barriers trade.

The TRIPS Agreement: The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) is administered by the World Trade Organisation (WTO) and became effective in 1994. The TRIPS does not provide a definition of industrial design but merely defines the requirements and scope of its protection. Language of the TRIPS Agreement is relatively sparse regarding industrial designs. Nonetheless, it does integrate design rights into the larger canon of law providing global protection of intellectual property. It also establishes a minimum of ten years of protection for an industrial design that meets novelty and other requirements.

The Hague Agreement: Concluded in 1925 and revised in 1999, the Hague Agreement provided for a single point of application for members of all signatory states. It establishes an initial five-year protection period for industrial designs at the international level, with the possibility of multiple renewal periods. The advantage is that design owners can obtain protection for their designs with a single registration, thereby minimising formalities and expense. An applicant can obtain protection for up to 100 industrial designs for products belonging to one and the same class and in multiple jurisdictions with a single application filed through WIPO.

The above agreements and treaties provide holders of design-related intellectual property with a coherent set of rules and regulations whereby they can expect to receive fair and unbiased treatment so long as they work within the established system of a member state.

Differences between IP regimes

Despite the implementation of various treaties and harmonisation efforts, there still remain many differences between the regimes of the various sample countries.

German and French courts seemingly tend to be quick and proactive in protecting design IP. This is largely due to the fact that the German and French laws assign greater weight to the authors' and inventors' rights. In Italy, in the field of industrial law the use of summary (or urgent) proceedings is statistically very frequent. It is characterised by the full freedom of forms, though with due discussion between the parties and greater speed of the decision. In most cases, the urgent decision is not followed by an ordinary trial process. German design owners tend to be more aware of the options available for design IPR and thus make higher use of the system whereas UK innovators tend to opt for other means of protecting their designs such as confidentiality agreements, lead-time and brand awareness (BOP Consulting, 2011).

One issue with the need to be first-to-market is that it tends to result in shorter product lifecycles. Short product cycles in conjunction with arduous application processes can also deter design owners from registering their IP. This has been identified as one reason for the low rate of design IP adoption in the United Kingdom (BOP Consulting, 2011). In an effort to combat a similar issue and to aid its prominent fashion industry, the French IP office introduced a simplified procedure for registering designs (BOP Consulting, 2011). The changes appear to have had significant influence, both on design owners' perception of the system and on filing rates. In Italy the IP code envisages special provisions to address issues related to the short life cycle of a product and the processing time for the design application: the the exclusive right takes effect from the date of filing of the application so the designs holder has the right to base a legal action from the filing application date.

In China, patents and trademarks registered in other countries are not afforded mutual protection as defined under international treaties, as mentioned above. This is because China's trademark and patent regimes rely on filing as a means of establishing priority; evidence of prior use or invention carries less weight than an application filing. For this reason, China has not always recognised the existence of a design outside the country as grounds for invalidity. This has led to a number of cases, most notably in the copyright and trademark realms but also in the design realm, in which companies with recognised designs, brands, or trademarks have seen IP disputes arise when attempting to enter the Chinese market. While there are valid appeals processes, those processes are costly, time consuming, and—as with any legal process—uncertain. (Canadian Trade Commissioner Service, 2014).

The differences between the intellectual property regimes among the sample countries can be attributed to several factors—from cultural, to political, to economic orientation of the sample states. An example could be the differences in the design IP regimes of France, Germany, and the UK. Up until recently, infringers faced more severe sanctions in Germany than in the UK. The received wisdom at the time was that France and Germany had laws and courts that placed a higher importance on the rights of authors or inventors. Furthermore, the cost of enforcement of those rights had been consistently lower in France and Germany than in the UK, which required a civil process (BOP Consulting, 2011). However, in 2014, prompted by the Hargreaves report (2011), the UK followed suit and declared that the intentional copying of a registered design would now be subject to criminal prosecution (HM Government, 2014). The

UK law, however, did not stipulate that the underlying design IP must be re-examined, nor did it make the criminal conviction subject to the ultimate validity of the infringed IP.

Participation in global value chains and trade can also be significantly shaped by differences in IP regimes. For example, if a design protected in a specific country is not necessarily protected in another country, there will be no rights to claim against design infringement in the country where a design is not protected. On the other hand, enterprises with significant design rights in a country of origin may opt to not expand to another country because of the lack in protection of design-related IP.

The differences in the term of protection also may influence intellectual property strategies of owners. The different terms structures may mean that the design IP is no longer protected in one jurisdiction while at the same time being valid in another. The enterprise that owns the design-related IP could therefore be subject to additional expenses to resolve the situation. Infringement of design will no longer be protected after the term has run out in one of the jurisdictions in which the owner operates.

Design IP complementarities

IP protection mechanisms allow the inventor/innovator to appropriate most of the returns from the initial innovation investment by excluding third parties from using the property. As such, the overriding role for protection mechanisms is to ensure exclusivity, thus, *appropriability* is the primary a concern for inventors. With regard to design, the output of inventive activity is often a non-excludable form of knowledge based capital (KBC). In the absence of an effective formal IP system, invention and innovation may be stifled if firms are unable to use IP protection mechanisms.

Across most legal jurisdictions, several IP protection mechanisms exist to exclude third parties from appropriating innovation (Rammer, 2002). These mechanisms can be grouped into two broad categories. The first is formal protection mechanisms, which rely on regulatory systems to protect IP. Formal IP protection mechanisms encompass a range of legal mechanisms such as patents, trademarks, industrial designs, utility models, and copyright (Rammer, 2002). These formal protection mechanisms act as incentives for innovators to invest in technology development, generate new knowledge, and foster diffusion (Rammer, 2002). As these have been discussed in the prior sections, we will not treat them further here.

The second category of protection mechanisms falls under the category of informal protection instruments. The mechanisms are primarily extra-legal measures not enforceable through formal regulatory mechanisms. Unlike formal mechanisms, enforcement is not guaranteed by the state (Rammer, 2002). Informal mechanisms can encompass a range of strategies, tacit knowledge, confidentiality agreements, lead-time (first mover advantage), or complexity (of design) that are defined as “alternative” or informal IP.

Informal protection mechanisms

Firms may choose from a range of “alternative” or informal appropriation mechanisms, such as lead-time, complexity, tacit knowledge, or confidentiality agreements to bundle with design IP. Informal protection is relatively weak compared to formal protection when it comes to enforcement through the legal system, but it can be highly effective, lower cost, and in some cases may carry less risk of “inventing around.” (Hall et al., 2012)

Lead-time

Lead-time—otherwise known as “product first to market” or “speed to market”—is the advantage provided by getting to market ahead of the competition. This practice allows firms to gain an early market-share and establish themselves as market leaders. Quite often, this results in a firm establishing its product as the de facto market standard. All of these advantages provide the leading firm superior opportunities to appropriate value. By establishing itself as the market leader or the exemplar after which all other products are measured, the leading firm will be able to appropriate superior rents even when the product market becomes commoditised by imitators (Boldrin and Levine, 2013). Given a hypothetical situation wherein there was a total absence of intellectual property protection such that unlimited duplication would carry penalty, the manufacture of duplicates would nonetheless require time. Before a competitive equilibrium would be reached, the leader would be able to charge a price premium. Despite both the theoretical and practical advantages provided by lead time, it is difficult to quantify—since build-quality, brand value and consumer perception all factor in to the price advantage—and also hard to qualify since interviews and surveys often suffer from ex ante or ex post biases.

By analysing the relevant importance of different appropriability mechanisms as reported by respondents from Germany, Belgium, Denmark, Luxembourg, Ireland, Norway and the Netherlands, Arundel (2001) finds that Lead-time is deemed to be the most effective mechanism by far for appropriating value from innovations. This is by far the most important factor, with secrecy, design complexity, patents and design registration following in order of decreasing relevance.

Complexity

Complexity of design is classified as an informal method of protection. Ichijo (2007) illustrates this for some consumer electronics products: Sharp put tremendous efforts into making imitation of its LCD TV sets time consuming and difficult. While the complexity factor may appear to be only relevant to the realm of technology products, it should be noted that complexity has been the hallmark of designers and craftsmen for centuries. The technique of engraving fine intersecting and overlapping lines on the plates of banknotes or stamps, also known as guilloche, is an example of complexity that was also used by manufacturers of jewellery, fine art craft works, timepieces, and weaponry in order to provide a superior appearance and set them apart from simple imitations (see Samuelson and Scotchmer, 2002 for further details and examples).

Tacit knowledge

Tacit knowledge is knowledge that is difficult to codify and transmit without high interaction between the transmitter and receiver of the knowledge. While many elements of a design may be evident from the appearance of it, this does not necessarily mean that competitors have the knowledge or abilities to recreate the product expressing that design. Studies have provided evidence that, in general, firms place a low value or importance on formal IPRs such as patents or registered designs (Cohen et al., 2000, Gemser and Leenders, 2001, Hall et al., 2012). While many employers may see this as a call for secrecy and restriction on employees, most firms view their knowledge workers as vital resources who are directly tied to firm success by virtue of, among other factors, their tacit knowledge. In order to protect their resources, these firms tend to rely more on rewards and incentives than on restrictive measures. By building a lasting relationship with their knowledge workers, whether employees or contractors, they contribute to the company’s ability to maintain its competitive advantage.

Confidentiality agreements

Both lead-time and complexity involve elements of secrecy or confidentiality, the failure of which would allow competitors to pre-empt or imitate the as-yet unreleased product. While the nature of design is that the design elements may be fully revealed in the product once it is released, the key to value appropriation is to maintain the advantage that informal factors allow. By using such things as non-disclosure agreements, non-compete agreements and intellectual property assignment agreements, firms can protect and control the information about impending products that the techniques that were used to produce them. This becomes more important as firms engage in larger sets of collaborators, suppliers, contractors, and distributors in order to address larger markets. Whereas at one time such matters would be taken care of with an oath and a handshake, in this era one must rely upon tangible documents in order to uphold and enforce such agreements. For this reason, even in pure design service industries and others that may not rely heavily on technological innovations, non-disclosure agreements are ubiquitous.

Factors explaining selection of IP protection mechanisms

Various factors go into the strategic decisions surrounding the choice of IP mechanisms a firm uses to protect its innovations and extract superior rents. Teece (1986) explains that a mixture of three factors drives profits: appropriability regimes, complementary assets, and how strong the dominant paradigm is in the market sector in which the firm operates. The appropriability regime is the integrated network of formal and informal protection mechanisms as discussed above. A tight appropriability regime will make it harder for competitors to imitate the product, providing obstacles or penalties that act as barriers and allow the firm to retain greater profits (Teece, 1986).

Complementary assets represent all of the elements throughout the value chain that a company needs to develop, manufacture, and successfully market a product. This can include access to components, manufacturing facility, upstream or downstream supply chain, distribution, marketing, sales and support networks. Complementary assets can also mean access to knowledge stocks, IP, or talent. In a good scenario, a firm has access to all, but exclusive access to some of them—thereby creating a bottleneck that a competitor must overcome. Teece (1986) cautions that even when a firm has the full advantage of a strong appropriability regime in its favour, if it cannot muster the full value chain of complementary assets, it would be at a market disadvantage.

There is also the issue of dominant paradigm. Consider Tesla Motors, the maker of the well-received electric cars. Tesla had a strong IP portfolio, with both patents and design rights, as well as informal protection mechanisms. The industry had, however, two dominant paradigms that the company had to overcome: the support (fuel) structure was for gasoline vehicles, and in most states in the US it is illegal for automobile manufacturers to sell directly to the consumer. Tesla has worked to establish networks of widely spaced charging stations to overcome the former and continues to work on challenging the laws that restrict their abilities in the latter case. This shows that there is not just one key condition for success and that firms must take a more strategic approach to integrating formal and informal mechanisms into its IP decision process.

There have been few studies examining the integration of design IP with different formal and informal mechanisms. Examining data from the French portion of the CIS-3 survey, Mairesse and Mohnen (2004) compared the level of use of various protection mechanisms by manufacturing and service firms. Patents, secrecy, and design registration all fell consistently behind trademarks, complexity, and lead-time in terms of frequency of use (Mairesse and Mohnen, 2004). Baldwin *et al.* (1999) also investigated firms' usage of IP mechanisms through a direct survey of businesses in the communications, financial services, and technical business services sectors. They found that less than half of the respondents made use of any IPRs. Of those that did make use of IPRs, copyrights and trademarks were the predominant tool used. Lead-time and complexity were considered far more useful than any of the formal mechanisms.

These studies used survey methodology to assess the importance or usage of various IP protection mechanisms. Survey methodology makes it difficult to accurately measure the level of integration or the effectiveness of any given part of an integrated strategy. However, it is clear from these reports that design IP does not play a pivotal role in the IP strategies of the respondents or their firms. Part of the issue may be the perception on the part of the manager that seeking design rights is too costly in terms of time or money, or that the ownership of IP brings with it liabilities and the potential for infringement actions. On the other hand, managers may also be attributing success to lead-time and complexity and downplaying the advantages provided by design IP. Moreover, none of the studies took into account that, in Europe at least, unregistered design is a passive right that either was not given as options or was not considered by respondents.

Trends in design outcomes, with a focus on registered designs

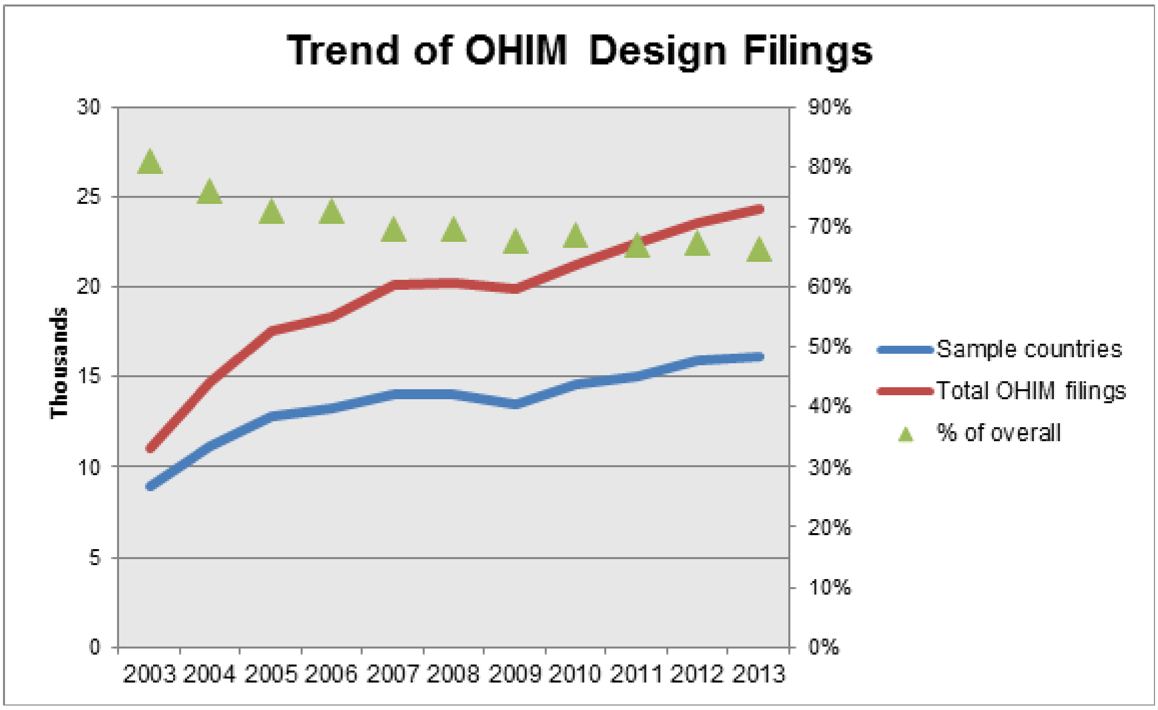
In this section, we will examine trends in registered designs. Below, we discuss the incidence of registered design activity at the national and sectorial levels and describe whether and how some of this activity has changed over time. We describe the activity of firms based in each country of our sample as well as overall activity within each country. We then examine the primary sectors within each country. Finally, we look at some of the top designers at the firm level and describe their IP bundling strategies.

To examine the overall trend of design registration without risk of overlapping registrations we are using data from OHIM and the USPTO. While WIPO is yet another registry of design IP, given that only a portion of our sample set are signatories of the Hague Agreement, there is a certain amount of irregularity in WIPO participation wherein design holders may register both with WIPO under the Hague Agreement and under other national protection mechanisms. It is for this reason that we focus on design IP filed solely within the EU and US.

Overall trend of OHIM filings

Given that design regulation started under OHIM in 2002, we have the opportunity to see the early stages of this regime. Given that the countries in our sample comprise the core of the European economy, it is to be expected that in the early stages of OHIM’s development, they formed the highest percentage of filings. However, as OHIM has become more established we see an increasing percentage of filings coming from other actors. Nonetheless, we also see that the countries in our sample dictate the trend and contribute the greatest proportion of filings.

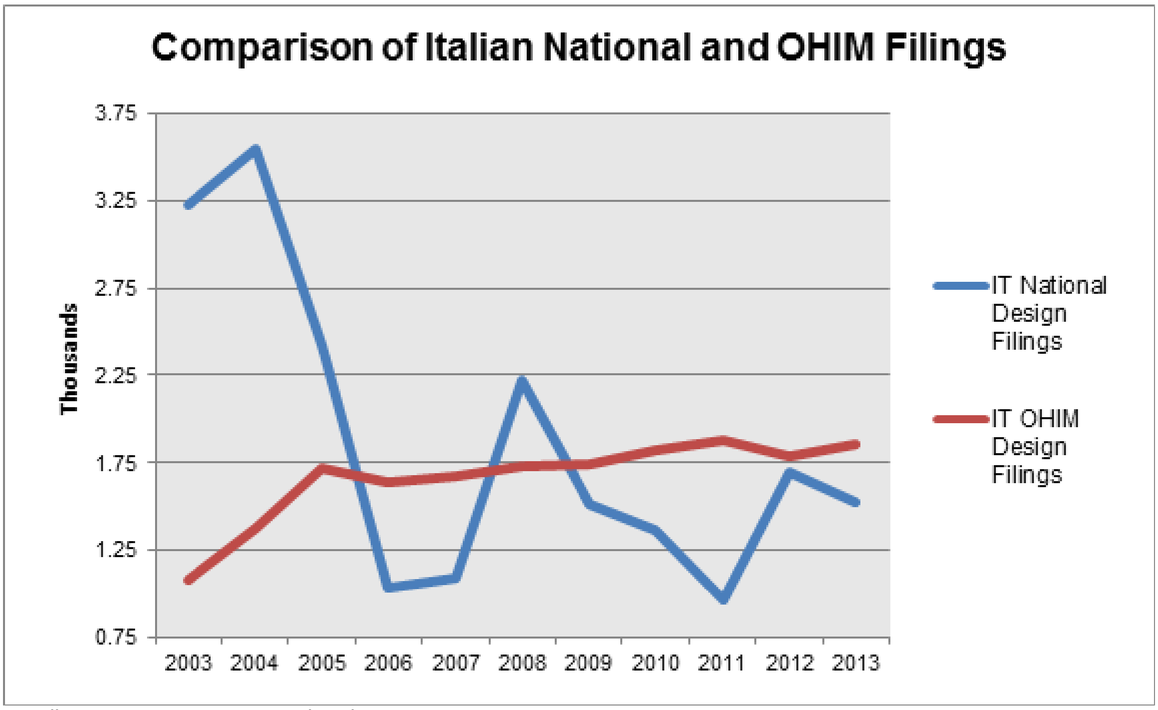
Figure 6.3. The trend of overall design filings through OHIM



Source: OECD StatExtracts, 2014.

In Figure 6.3 we see that the overall trend of design registrations is increasing, albeit at a decreasing rate compared to the early period. Much of the rapid increase was because of the initial adoption and diffusion of the OHIM system. In Figure 6.4, we see the example of Italy, wherein national filings in 2003-2005 were higher than OHIM filings of Italian origin, but as Italian OHIM filings increased there was a coincidental decrease in filings at the national patent office of Italy. This indicates a relatively rapid adoption of the OHIM system of protecting designs as design owners seek the broader geographical coverage provided by OHIM. However, we also note a relatively consistent amount of design registrations with the national office. This is, in part, due to the unique situation wherein Italy's laws provide the same national protection for designs along as for copyright. This provides incentives for firms to file in parallel so that they can enjoy this extended protection even after design protections under the OHIM regime have expired.

Figure 6.4. Italian filings nationally and through OHIM



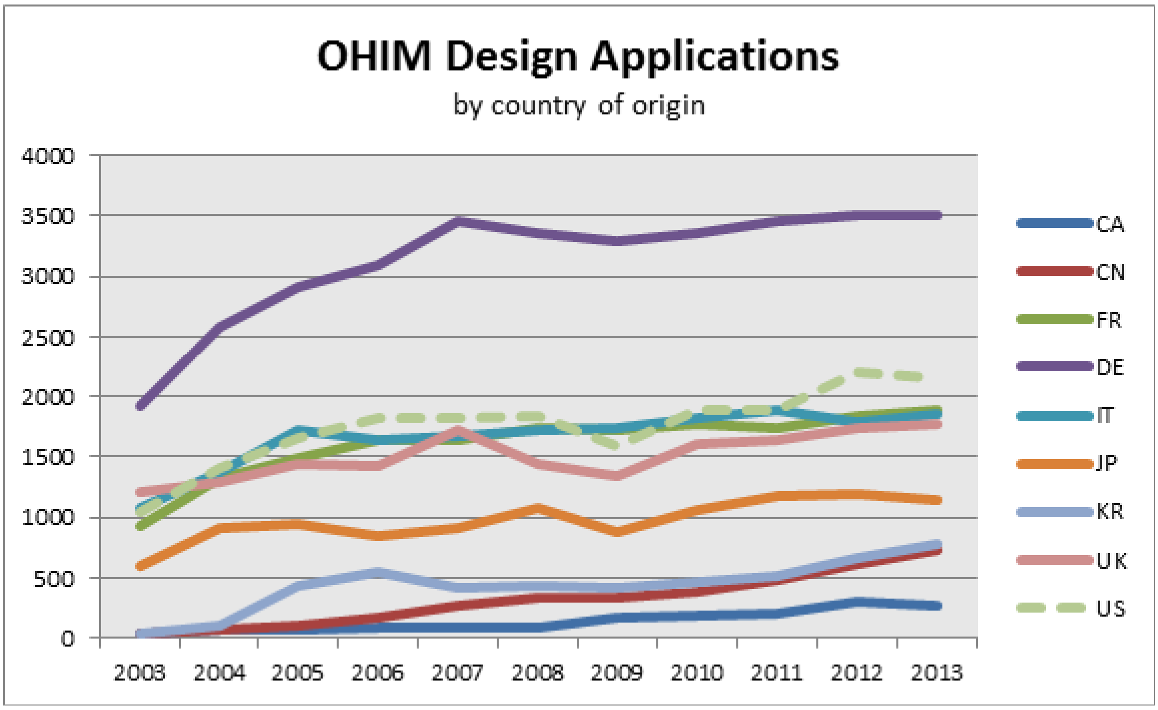
Source: Italian UIBM 2014; OHIM DesignView 2014.

Nonetheless, in Figure 6.4 we do observe that the overall rate of filings have decreased in Italy from an initial peak in the sampling period, decreasing drastically and then settling out at a relatively steady pace. This slow but steady rate of increase is what we have seen across the overall sample set. This may be an indication that the adoption of design IP has reached a stable state and the growth in design registrations is primarily a reflection of the overall growth of the economy.

Registered designs emanating from the sample countries—trends

As noted in the previous section, in Figure 6.5 we see a gradually increasing trend in applications for design registrations in many of the sample countries. This represents the supply of overall stock of design IP for the European community. Although this stock of IP is being constantly replenished, there is also the depletion of stock due to designs reaching their expiration or, since registered designs must be renewed every five years, the choice of owners not to renew.

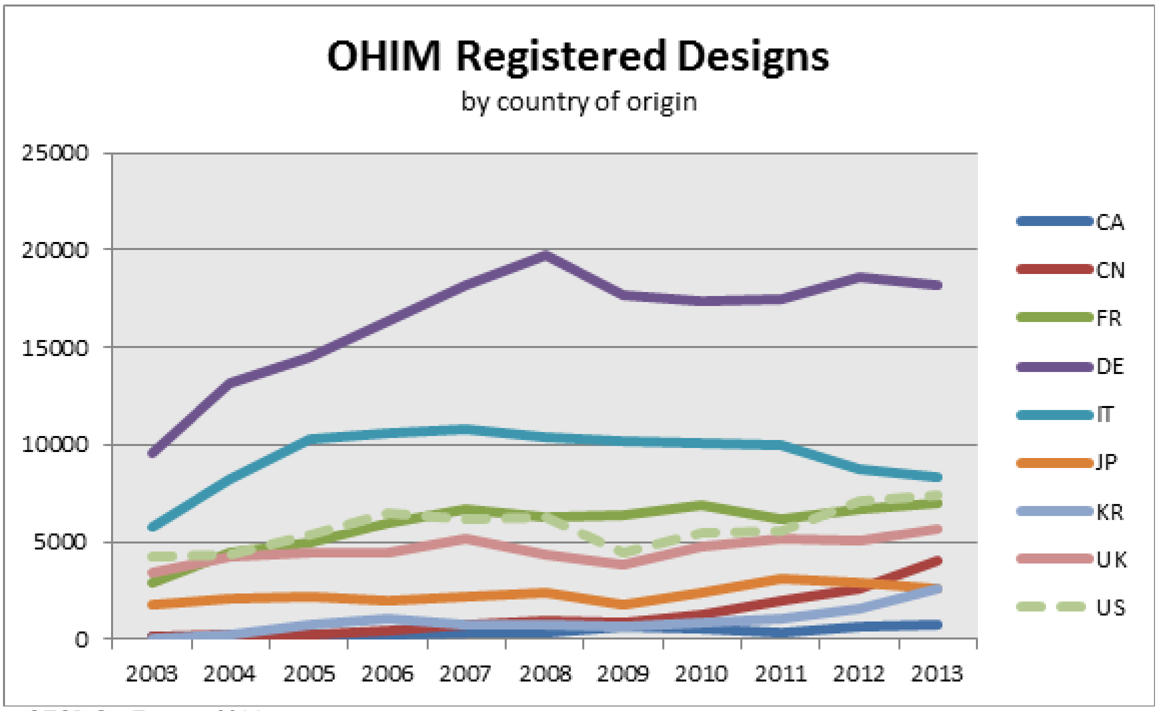
Figure 6.5. OHIM Design Applications by country of origin



Source: OECD StatExtracts 2014.

These trends are depicted in Figure 6.6. Although we see the rate of applications increasing, the stocks appear to be levelling out or decreasing, especially for the dominant countries Germany and Italy.

Figure 6.6. OHIM Registered Designs by country of origin

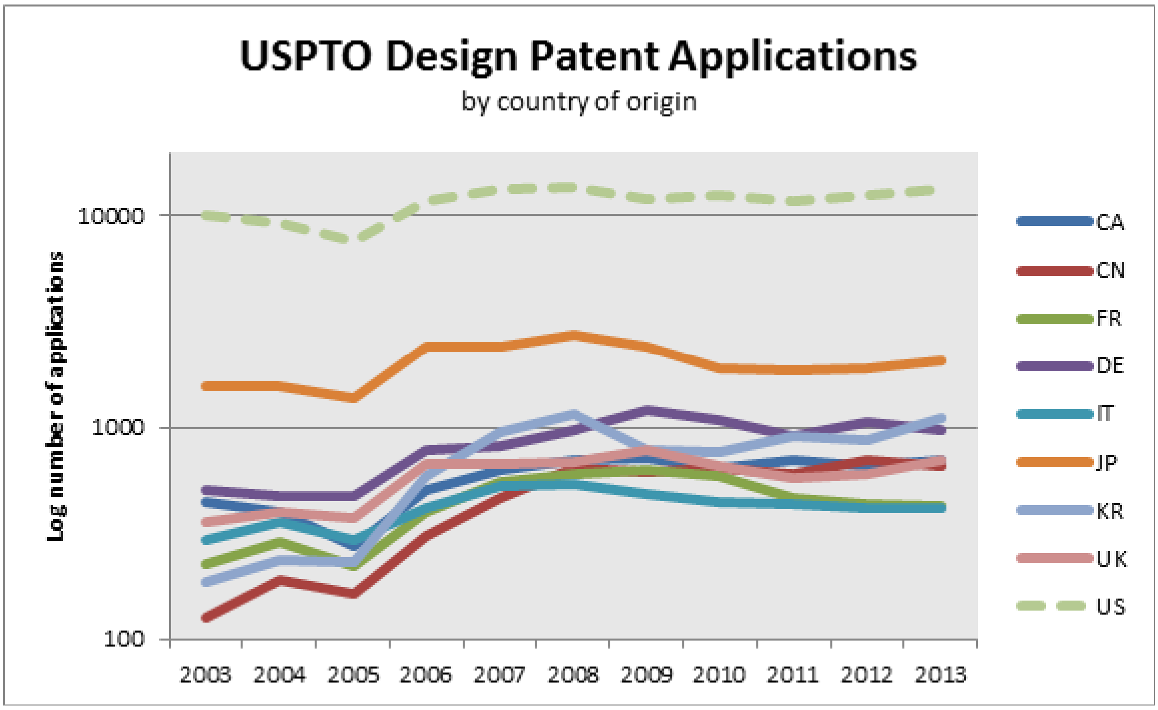


Source: OECD StatExtracts 2014.

In this figure, we note a slight growth trend over the ten-year period, but not very rapid growth, with two notable exceptions. For Korean registrations, if one examines the designs closely, the vast majority of them are in the area of consumer electronics in recent years and most of them emanate from one firm: Samsung. Samsung's rise to prominence in consumer electronic design (rather than pure outsourced manufacturing of the past) thus accounts for much of the growth in Korean registrations, whereas other sample countries tended to have a more stable registration patterns, probably due to the more stable importance of design in their economies. Likewise, China is seeing a robust growth in the number of registered designs as it shifts from a outsourced manufacturing economy to a design and production model in its own right.

The other major market for design protection is the United States by filing through the USPTO. Given the size of the US market, it is clear that the dominant contributor to US design patent registrations is the US. Figure 6.7 shows the importance of US firms in the design market.[278] What is also notable, although not surprising, is that Japan figures so prominently. Given that the US is one of Japan's primary export markets, it is only sensible that Japanese firms protect the designs of their products there.

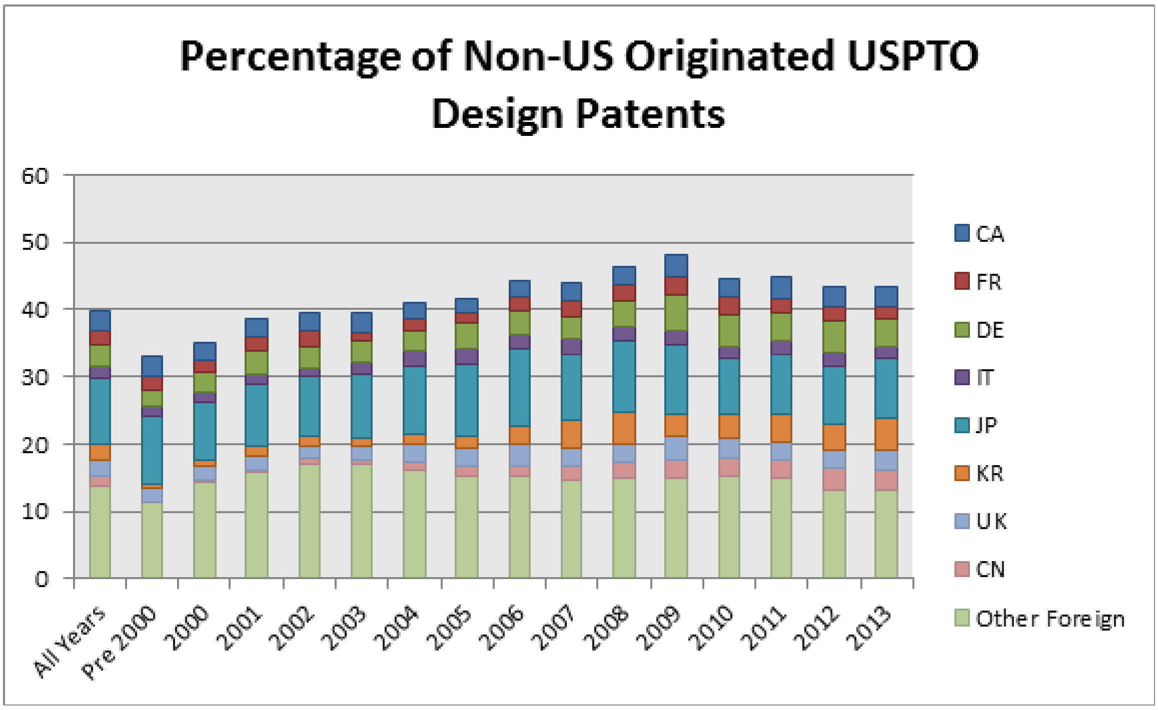
Figure 6.7. USPTO filings (log count, adjusted axis) for design patent applications from the sample set



Source: USPTO PTMT 2014.

There is, however, a greater subtlety to the dynamics of design registration in the US market if one excludes the dominant US input. Figure 6.8 shows the relative proportion of design registrations by non-US applicants. While Japan figures prominently, Germany and Korea—also major exporters to the US—are strongly involved in design registration; however, the combined input of all other nations not selected in this sample create a mass of design IP greater than that of any one of these major players. This indicates that the market for design IP is both diverse and active.

Figure 6.8. Non-US participation in USPTO design patent registrations

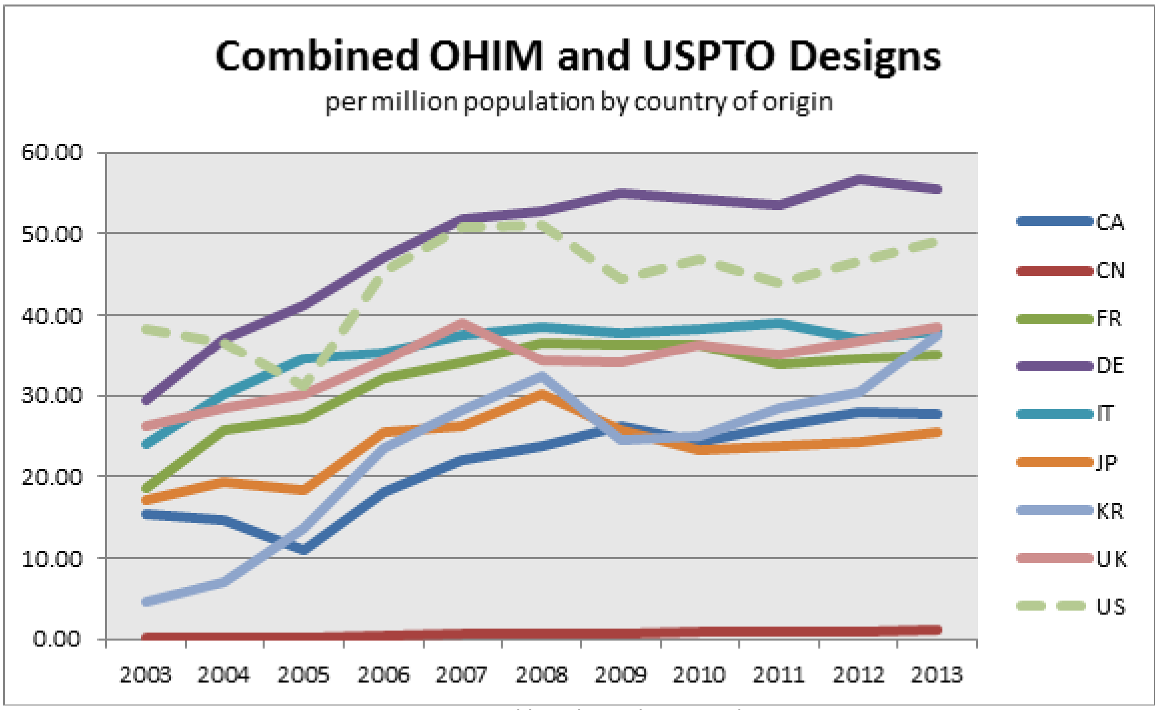


Source: USPTO PTMT 2014.

Resource-based estimates of design output

The indicators we are examining have, so far, been represented on a per nation basis; however, the relative positioning of the nations in terms of design-related registrations tells us as much about their relative Gross Domestic Product (GDP) as it does about the design capacity of the nation. We thus sought a means whereby we could normalise these data in order to bring them into context relative to the inherent resources of the nations. As mentioned earlier, the GDP indicators are not significantly different from the traces we have here, so we sought other means. Since designs are commonly registered by firms, we could examine the data in that manner; however, the data on number of total enterprises by nation is incomplete—both in terms of the nations we are examining and in terms of the years reported if the data are available—such that we could not generate representative indicators. In addition, the variance in firm sizes across nations, and thus the relative count of firms, might introduce additional error factors. Given that design is a human artefact (Krippendorff, 1989), the population of any nation may be a good measurable resource for design generation. For this reason, we feel it most appropriate to examine the relative outputs of each sample country relative to its population. This weighting method can thus express the innovative design output not on the basis of sheer brute force, but instead by the engagement of the population.

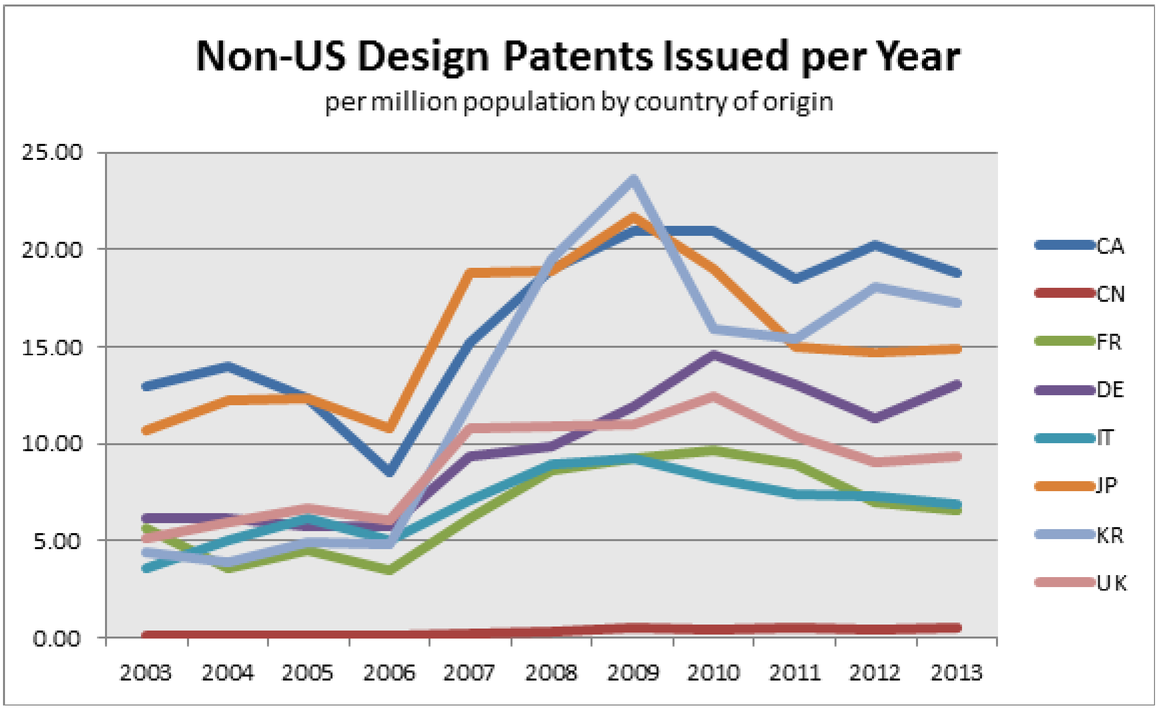
Figure 6.9. Combined OHIM and USPTO design stocks by country of origin per million population



Source: USPTO PTMT 2014, OECD StatExtracts 2014, World Bank Database 2014).

Although we saw in Figure 6.8 that the US is the dominant leader in design279, when the populations of those countries are factored in and registrations in both the US and the EU are taken into account, as seen in Figure 6.9., the picture changes dramatically. The US falls behind Germany in designs per capita, remaining just above Italy, France, and the UK. The latter group of countries have approximately the same activity as Korea when normalised by population. Given the massive population of China, it is not surprising that its design activity is less pronounced when normalised.

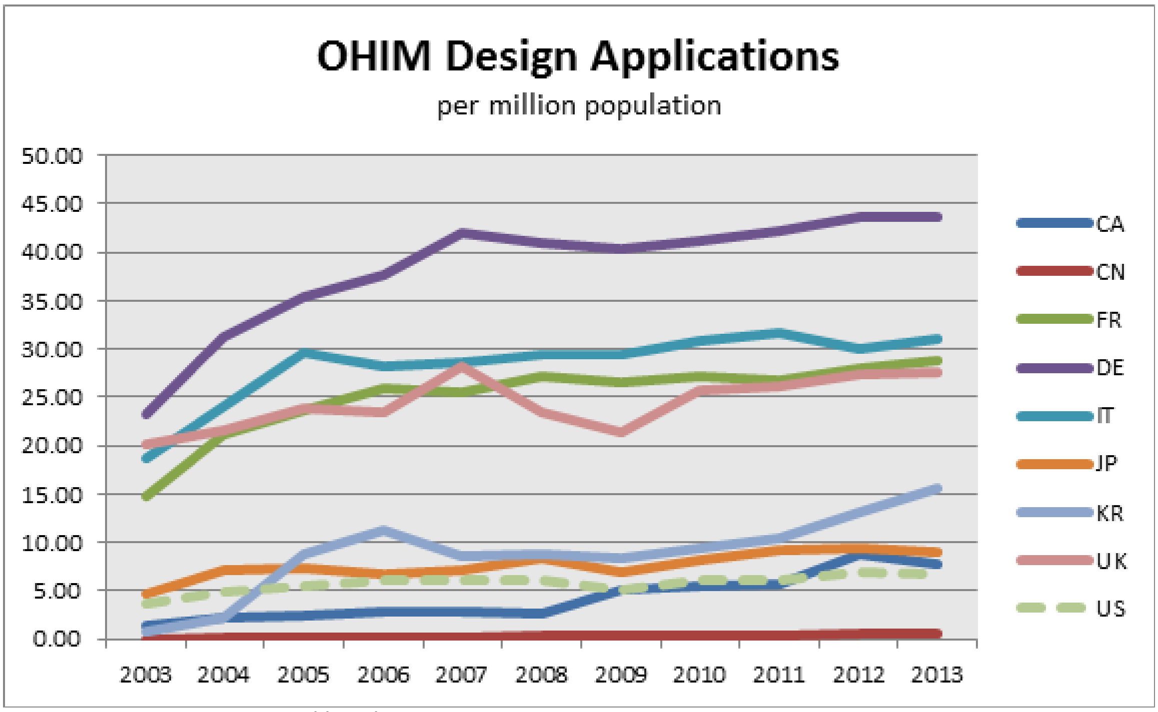
Figure 6.10. Per capita design output as measured by non-US originated design applications made to the USPTO



Source: USPTO PTMT 2014, World Bank Data 2014.

Korea's designs per capita become even more pronounced when one considers the US market alone and excluding the overwhelming inputs of the US. In Figure 6.10.we see that, although Japan does retain a leading position in terms of per capita output, Canada and Korea are strong in registering designs in the US market. Given Canada's proximity to the US, it is not surprising that this would be a natural market for the design output of its relatively small population. Korea, on the other hand, with its powerhouse firms in the audio-visual (televisions, computer displays, etc.) and telecommunications (mobile phones, tablet computers, etc.) fields, also has a strong stake in the US consumer market despite its geographic distance from them.

Figure 6.11. OHIM design applications by country of origin per capita



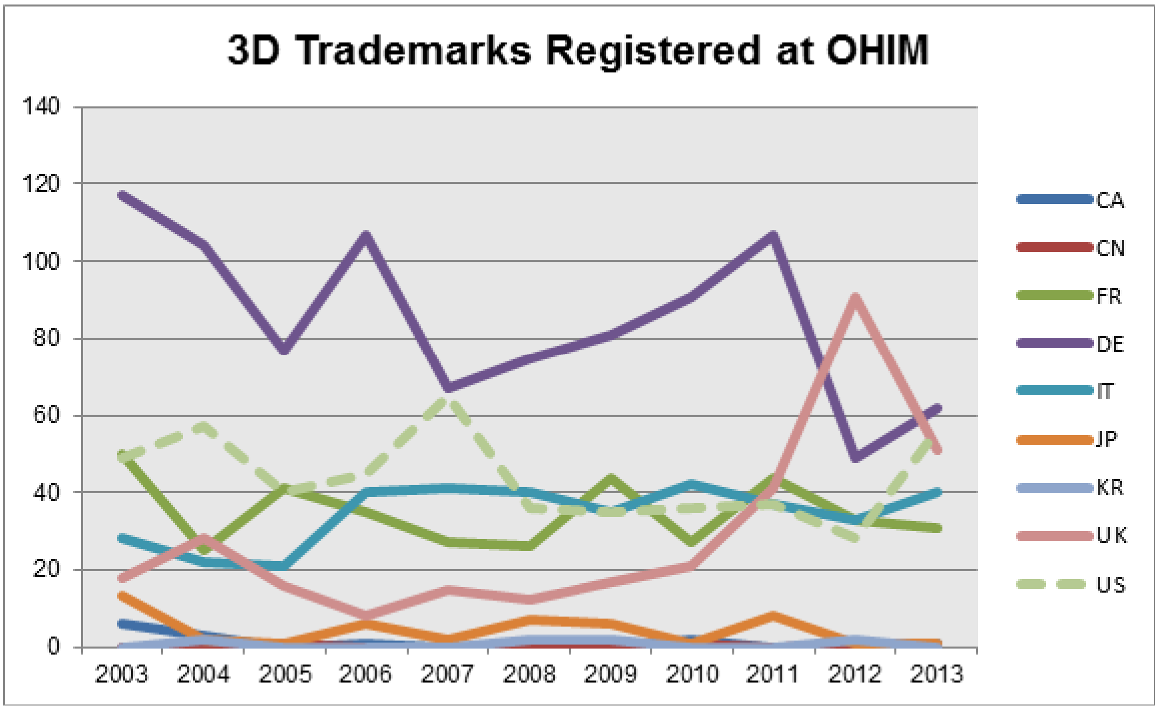
Source: OECD StatExtracts 2014, World Bank Data 2014.

Looking at the trend in relation to OHIM design applications when normalised by population, we observe that German designers continue to dominate the space, while the rest of the European countries (Italy, France, and Britain) remain clustered together, with a distinct lead over the non-European countries. Much like the US, which dominates the North American market, the European players tend to focus primarily on their home ground. Part of this is the simple fact that sales and exports are highly dependent upon proximity and familiarity. Nonetheless, even in the European marketplace we see Korea making definite gains and establishing itself as a rising power.

Alternative indicators of design activity

As previously stated herein, design is intrinsically linked to brand identity and the firms that own the brands. Since trademarks can be words, statements, images or other elements, there is significant debate as to whether they are a valid representation of design (Durkin and Schirk, 2011, Jackson, 2014, Miaoulis and d'Amato, 1978). Trademarks can, however, be used to protect three-dimensional designs, and given the longer protection of a trademark, the registration of three-dimensional trademarks could be an indicator of those designs that firms may consider to be more significant or longer lasting. Other than articles describing the legal frameworks under which three-dimensional trademarks can be implemented or how they may conflict with design or other laws (Khoury, 2008, Li, 2012), there is no evidence that the value proposition of these marks as perpetuating or representing design has been examined in literature. In light of the consideration that this may, at some point, be an avenue for future research, we include here an analysis of three dimensional trademark filings from 2003-2013.

Figure 6.12. Registration rates by country of origin of three-dimensional trademarks



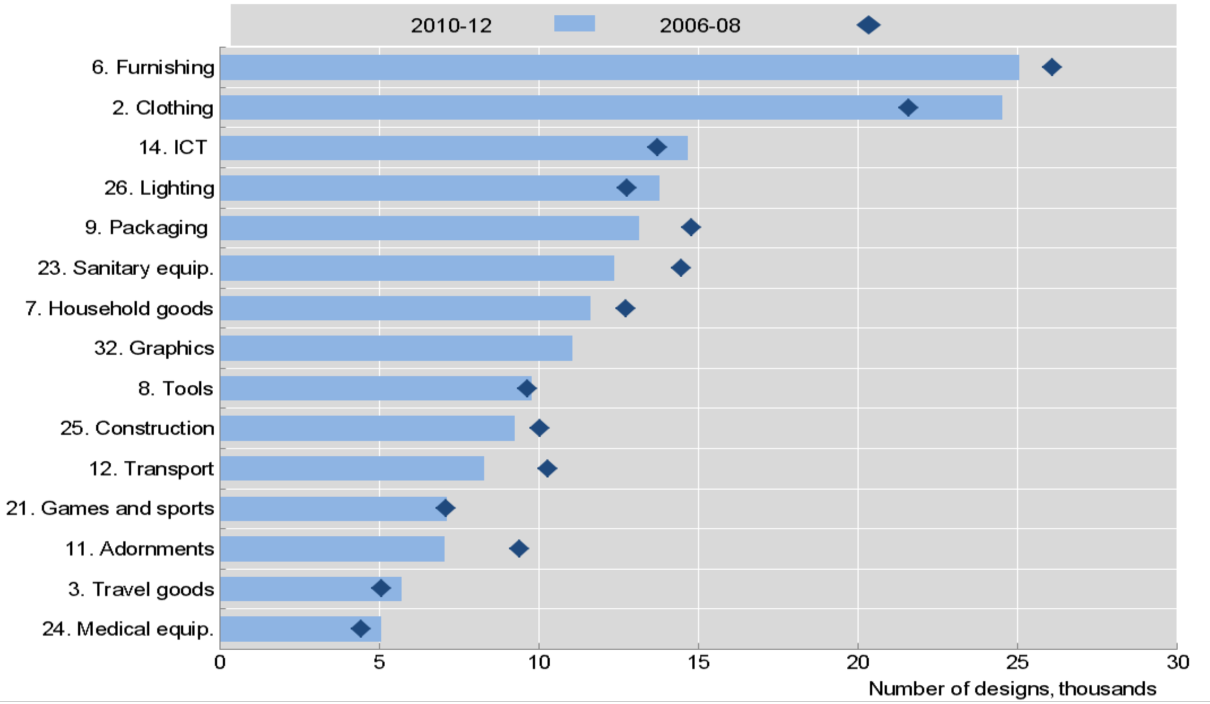
Source: OECD StatExtracts 2014.

Indications are that the quantity of three-dimensional trademarks filed annually is too low to establish any current trend, as seen in Figure 6.12. It does appear that Germany has previously been a frequent source of registrations.

The major sectors in which designs are registered

Figure 6.13. is reproduced from the OECD Science, Technology, and Industry Scoreboard (OECD, 2013, p. 192) and shows the number of registered designs for the periods 2006-2008 and 2010-2012. Sectors are identified on the basis of a taxonomy using information about the Locarno class in which designs are registered. Please note that as mentioned above, the figure does not represent the sectors in which the firms actually compete, but rather in which they register their designs. For example, if an airplane manufacturer registered a design on a new seat, this would be classified as "furnishing" and not "air frame manufacturing."

Figure 6.13. Number of OHIM registrations by Locarno Classification

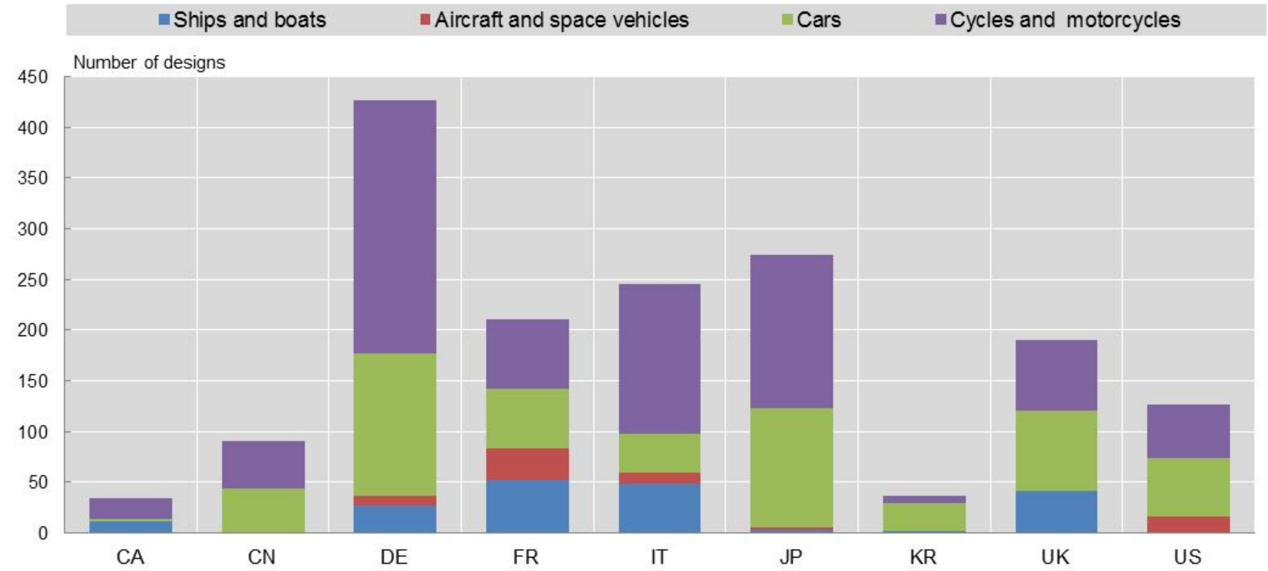


Source: OECD StatExtracts 2014.

Note that the figure represents total designs registered; therefore, it should be expected not to have too much movement between the two periods, as the only difference would be new registrations minus expired registrations. Still, we see net inflows (growth of registrations) in clothing, ICTs, lighting, travel goods, and medical equipment. We see net outflows in furnishing, packaging, sanitary equipment, household goods, construction, transport, and adornments.

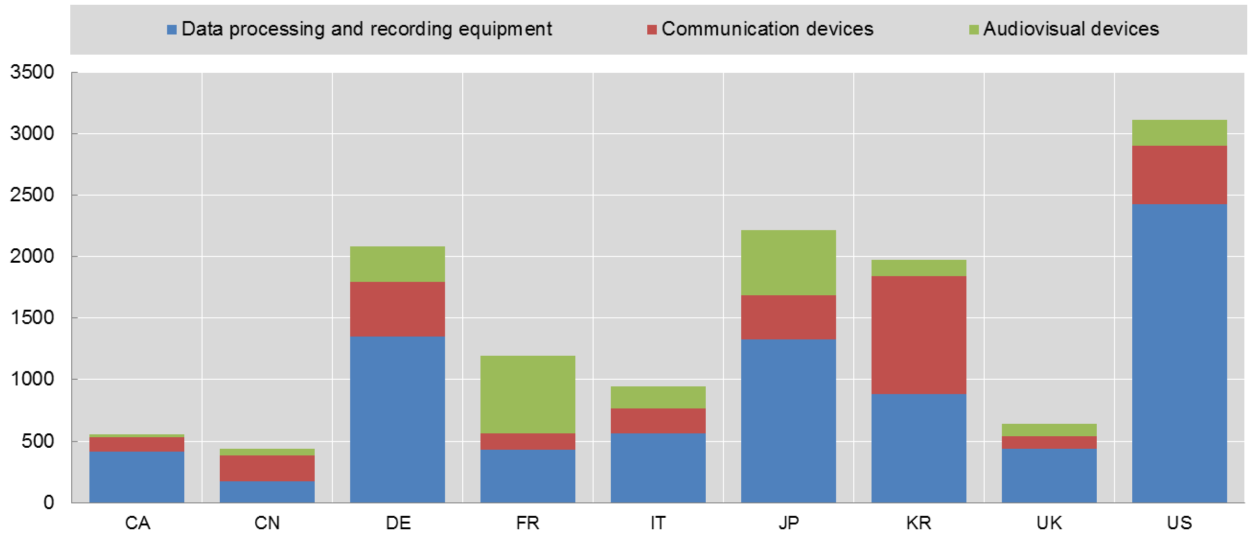
Regarding the participation from the sample countries in these sectors filed with OHIM,[280] the OECD examines two major sectors more closely: transport, and ICTs, as shown in Figure 6.14. and Figure 6.15. Transport is divided into ships/boats (top countries: France, Italy, UK), aircraft / space (France, USA, Italy), cars (Germany, Japan, UK), and cycles / motorcycles (Germany, Japan, Italy). The ICT sector is divided into data processing / recording equipment (top countries: USA, Germany, Japan), communication devices (Korea, USA, Germany), and audio-visual devices (France, Japan, Germany). Among the other countries, Canada is fairly active in ships, motorcycles, data processing equipment, and communication devices. China is fairly active in cars, motorcycles, and all the ICT sectors.

Figure 6.14. OHIM transport-related registered designs, 2010-2012



Source: OECD STI Scoreboard 2013.

Figure 6.15. OHIM ICT and audiovisualrelated registered designs, 2010-2012



Source: OECD STI Scoreboard 2013.

Firm-level activity

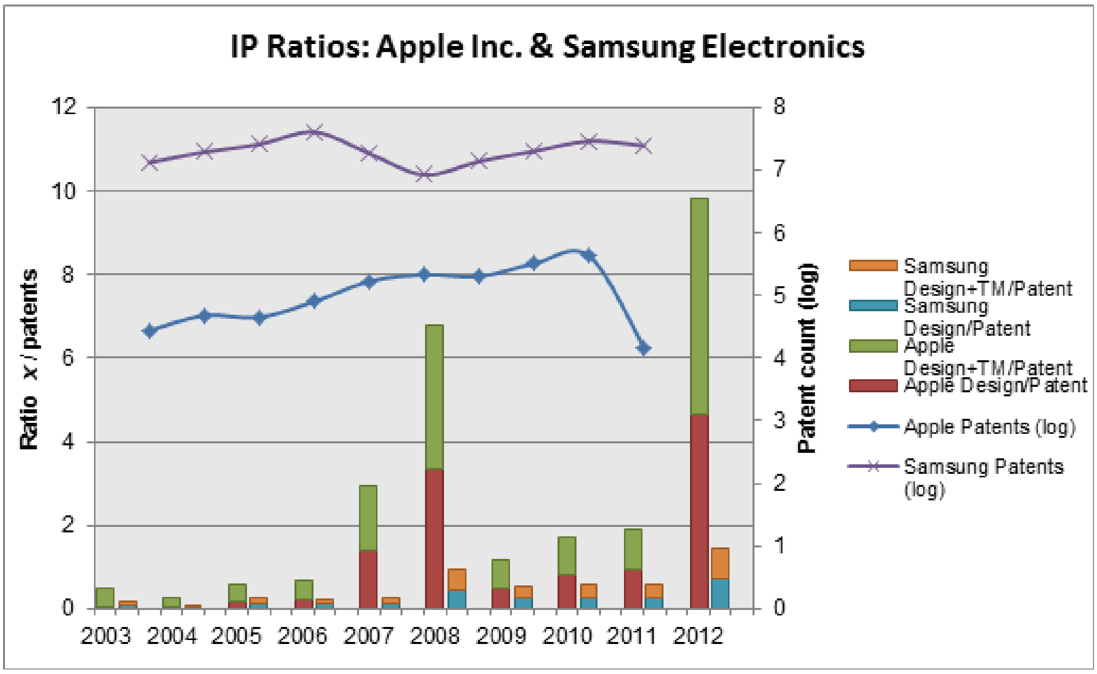
Of course, most of the activity for registered designs actually takes place at the firm level and most of the statistics we have discussed so far have been aggregated up to the country level or grouped by sector in which the design was registered. In this section, we look more closely at trends in firm-level registered design activity.

Bundling designs and patents (and possibly other forms of IP)

Whether for the fact that design can be expressed in a multitude of ways or that firms seek multiple avenues to protect their knowledge-based capital, it is recognised that covering a singular design or invention with multiple IPRs is prudent (Silverman, 2014). This practice, known as "bundling" IPRs, can provide a more solid or longer-lasting protection of designs. While it is difficult to identify bundles without painstaking, record-by-record analysis, it may be possible to identify bundling tendencies through the analysis of trends in firms' accumulation of various ratios of IP.

In an effort to illustrate and explore this activity, we undertook a comparative analysis of two firms that have competed strongly against each other. These are two of the largest firms by market capitalisation of two countries in our sample, Korea and the US. The two companies, which have carried on a well-publicised series of lawsuits over the various merits, or lack thereof, of registered designs as well as technology patents, are Apple Inc. and Samsung Electronics Co., Ltd. While the relationship between these two companies is complex and multidimensional, given that they have both a competitive as well as a supplier/customer relationship, matters came to a head shortly after Apple introduced the iPhone in 2007. Apple claimed that Samsung products were intentional imitations of the highly successful iPhone, and later iPad, designs (Cusumano, 2013).

Figure 6.16. Ratios of design, trademark and patent registrations for Samsung and Apple over a 10-year period



Source: OHIM DesignView 2014, OHIM TMview 2014, Questrel Intellectual Property Portal 2014.

In Figure 6.16. note that for the period 2003-2006 both companies had a relatively low ratio of designs to patents. Apple added a significant number of designs to its portfolio in 2007 just ahead of the iPhone release, and it also increased its collection of trademarks. Samsung, meanwhile, continued to maintain its previous pattern of design, trademark and patent filings[281]. Samsung did commit itself to capturing a significant portion of the smartphone market. By 2010, Samsung had released the first of its Galaxy smartphones and immediately drew the attention of Apple. We see some evidence that Samsung began bundling more in 2008, and that Apple, fresh off of registering numerous designs and trademarks after the release of the iPhone and iPhone 2, continues to show significantly increased tendencies to bundle. Included in this chart is a trend line of patenting activity for each firm, which tells us that the rate of patenting did not decrease; in fact, patenting activities of both companies tend to increase consistently[282]. Given that patents are in the denominator of each ratio, and given that patenting is generally increasing, this means that since 2007 Apple's rate of increase in design registration and trademarking—in most years, each of those activities individually—is in excess of the rate of increase in the patents filed by the firm. Furthermore, the rate of bundling has generally been accelerating since 2009.

While we acknowledge that, given the 18-month (or more) blackout period that utility patent applications[283] are subjected to, patents are a lagging indicator, we argue that the nature of patents requires that they be filed significantly sooner than design registrations or trademarks, which may be filed just prior to or even after the initial release to the public. This may result in much of the lag time between patent filing and publication being negated. In any case, the overall increasing rate of patenting, even if lagged, does not account for the greater increase in design and trademark registration activity. By all appearances, both Apple and Samsung have altered their behaviour and have adopted some bundling tendencies.

Measures of design inputs

The general protocol for R&D input measures is the "Frascati Manual" (OECD, 2002). However, the Frascati Manual takes a narrow view of design inputs (see paragraphs 22, 79, 84, and 110), according to some (e.g. Moultrie and Livesey, 2014). Under that protocol, some design-related activities might be excluded. Thus, there is a paucity of research connecting design investments or activity or inputs with performance outputs.

Classification of input measures

However, in this section, we would like to take the small number of articles that exist on design activity and classify them by their input measures (see Table 6.2.).

Design orientation by observation of organisation structure

These inputs are subjective measures that examine the internal organisation of the firms and where the design function fits into it, if at all. In an examination of design orientation of firms, Black and Baker (1987) measure greater design involvement within the NPD process in interviews with 61 executives in Scottish engineering and industrial textile companies. They use the presence of an "aesthetic design" or industrial design group at all as a proxy for "design orientation." Ones with aesthetic design groups (very few) are thought to be more design-oriented. In contrast, most of the small companies in their sample have an "engineering design" group. The authors also measure whether the Managing Director of the company had personal involvement in the design process or not. Similarly, Walsh *et al.* (1992), studying 100 firms in different sectors worldwide, uses the existence of formal design activity, and whether such activity is located inside marketing or engineering, as a measure of "design consciousness."

Perceptual measures

In several cases, researchers simply ask managers to rate their investment qualitatively as growing or shrinking, or other perceptions of the firms' investments. For example, Chiva and Alegre (2009) survey 182 ceramic tile manufacturers in Spain and Italy in which they asked managers to rate their perceptions about whether investment in design in the respondent's company had increased or decreased (Chiva and Alegre, 2009). Likewise, Dickson *et al.* (1995) surveys over 200 CEOs of rapidly growing companies listed in *Inc*. magazine's list of rapidly growing companies and asks them to rate their design activity in several different categories, such as product/service design or packaging design on a range from "greatly decreased" investment to "greatly increased" investment.

Table 6.2. Input measures of design as sampled in literature (Authors' compilation)

Reference	Measure	Category	Details
Black and Baker 1987	Design involvement within NPD	Design orientation	In interviews, existence of an "aesthetic design" group
Walsh *et al.* 1992	Design consciousness	Design orientation	The existence of formal design activity in 100 companies, and whether such formal activity is located inside marketing or engineering
Roy and Potter 1993	Costs of design work	Actual expenditures	Survey of 221 UK SMEs in manufacturing (cross-industry) that received a government grant to employ a professional design consultant answering questions about total expenditures
Dickson *et al.* 1995	Investment in design	Perceptual measures	Survey of 201 CEOs listed in the Inc 100 or Inc 500. Answer to several questions in a five-point Likert scale from "greatly decreased" to "greatly increased" (over the three-year period): A. Product/Service design. B. Packaging design. C. Advertising design. D. Store design. E. Factory design. F. Office Architecture/Design.
Sentance and Clark 1997	Design activity	Actual expenditures	Survey of 800 manufacturing firms (cross industry) reporting expenditures on seven categories of design (market research, product development and improvement, appearance design, technical design, process/systems design, engineering design and graphic/brand design) as a percentage of sales in five levels (<1%, 1–2.9%, 3–4.9%, 5–9.9%, >10%), aggregated up to national level estimates.
Gemser and Lenders 2001	Industrial design intensity	"Objective" measures	Survey of 27 Dutch manufacturing firms in home furniture or precision instruments factor-analysing answers to: A. What percentage of NPD products use design expertise. B. The number of design awards or prizes. C. The number of temporarily employed design interns or design-school students. D. The average expenditure on product appearance during NPD projects.
Hertenstein *et al.* 2001	Design effectiveness	Perceived effectiveness	Expert panel ranked 51 firms (cross-industry) by how "effective" they were in design within each industry sector
Design France 2002	Investment in design	Actual expenditure	Survey of 637 SMEs in the manufacturing sector asking questions "How much do you estimate you spent on design in 2000 in your company?" With different levels of expenditures (<150 KF [thousands of French Francs], between 150 KF and 300 KF, and > 300 KF) and across four different categories (product, packaging, graphic, and architectural).

Reference	Measure	Category	Details
Hertenstein *et al.* 2005	Industrial design effectiveness	Perceived effectiveness	Expert panel of 138 experts ranked 93 manufacturing firms (nine sectors) on how "effective" they were, considering factors such as: Quality of the firm's design program (e.g., number of design awards, peer recognition); Quality/excellence of design evidenced in the firm's products, collateral marketing materials, etc. (e.g., their opinion of the firm's design of products and materials); and importance placed on the firm's design program (e.g., large investment in design).
Galindo-Rueda *et al.* 2008	Design investment	Actual (estimated) expenditures	Expenditures estimated at a national (UK) level based on occupations involved in design and industries in which design is important, and then estimating how much was spent in-house vs. contracted out by extrapolating to the whole economy
Chiva and Alegre 2009	Design investment	Perceptual measures	Survey of 182 Italian and Spanish ceramic tile producers. Answer to question "How much has your company increased or decreased its investment in design over the past three years?" with a seven-point Likert scale ranging from "greatly decreased" to "greatly increased."
Moultrie and Livesey 2014	Design spending	Actual expenditures	428 firms answering questions about their total design expenditures, both in-house and outsourced, with a "precision estimate" at five levels (within GBP 1K, 10K, 50K, 100K, and "can't estimate"). The total design expenditures were divided into four categories: Technical design of products and services; Design of the user experience for products and services; Design of promotional materials for specific products and services; and Design to develop and promote corporate identity.

Actual expenditures

Several studies have attempted to ask for or estimate the actual amounts spent on, or invested in, design, and this is the largest category of work related to design inputs. Moultrie and Livesey (2014), for example, work to develop a framework for the measurement of design investment and to evaluate this framework in a pilot survey, with the purpose of refining a set of valid measures. They end up performing a survey in which they asked for both expenditures on design, plus a "precision" of the estimate (how comfortable the respondent was with his/her estimate of expenditures). Total design expenditures are divided into four categories: Technical design; User experience design; Graphic design of promotional materials; and corporate identity design. They carry out their study on a sample of 428 firms, finding that investment in design is around 4% of turnover (total sales) with 81% of all design investment being in "technical design," focused on functionality and performance of new products and services.

Galindo-Rueda *et al.* (2008) estimate the total expenditure on design in the UK by breaking the analysis into "outsourced" vs. "in-house" architectural and engineering design services. To do this, they analyse the industries in which new design might be one of the key objectives. Further, they examine occupations in which design is mentioned as part of the description of the occupation. When these are merged, the authors reveal that almost 300,000 employees in the UK are involved in the in-house design process. Supply-use (input-output) tables are used to estimate the amount of total expenditures on design, which is estimated at GBP 44 billion in 2004, of which GBP 27 billion could be considered in-house and 17 billion to be "purchased." Some of this could be considered "investment" in that it could lead to knowledge-based capital or other intangible assets; the authors estimate this investment to be 50% of total design spending, although this number is based on surveys of managers and actually is bounded by 9% on the lower end and 86% on the upper, a very wide range "too wide for comfort." (Galindo-Rueda et al., 2008, p. 17)

A few years before that, Sentance and Clark (1997) attempted a similar estimate of national (UK) design activity but based on a survey of design expenditures in seven different categories as a percentage of sales in manufacturing companies. The authors estimated that manufacturers spent more on design (GBP 10 billion) than on R&D (GBP 7 billion) in the prior year, although they acknowledge the lack of precision in their categorisation scheme. In France, Design France (2002) performed a survey of over 600 small and medium-sized French manufacturers. The respondents were asked to give actual expenditures in the prior year but rounded into three "bucket" levels: less than 150 000 French Francs (approximately EUR 23 000), between 150 KF and 300 KF, or greater than 300 000 French Francs (approximately EUR 46 000). These were further categorised by product, packaging, graphic, and architectural design so there would be one range for each of the four categories. In the UK, the UK Community Innovation Survey asked one question on design inputs: what is the firm's total expenditure on design? Roy and Potter (1993) surveyed a group of 221 firms in the UK that had taken advantage of a government scheme to subsidise the hiring of a designer to find out how much the companies had spent in total on the project and how much they had spent on design so they could estimate the return to design investment.

"Objective" non-pecuniary measures

Objective non-pecuniary measures refer to measures that are not based on actual expenditures, but are not entirely perceptual, either. We put "objective" into quotes the first time because we understand that almost all data obtained from people is actually subjective to one degree or another, but here we draw a distinction between firms reporting numbers and reporting perceptions / agreements with statements. For example, Gemser and Leenders (2001) measure design activity using a multi-item survey, which they refer to as "industrial design intensity"—not to be confused with the "intensity" of Moultrie and Livesey (2014), who refer to the more standard intensity as total expenditures divided by total sales. They ask respondents as to what percentage of R&D projects professional design expertise was employed; how many design prizes the firm had won [which is partly an output measure, not an input], the number of temporary design interns / design school students currently employed at the firm, and the average expenditure devoted to "product appearance." Factor analysis revealed that all of the above items loaded onto a single factor that the authors called "industrial design intensity."

Perceived effectiveness of design as rated by a third party

This last set of projects is somewhere between inputs and outputs in that design activity is not directly measured, but rather design performance itself is measured and then correlated with firm performance (see section 6 below). Hertenstein *et al.* (2001, 2005) had expert panels evaluate firms on the effectiveness of their design functions. Herenstein *et al.* (2001) employed experts to rate firms on their effectiveness and was able to divide companies into two groups: 26 firms that had more effective design functions and 25 that had less effective design functions. In a similar research design, Hertenstein *et al.* (2005) was able to mobilise 138 experts (design managers attending the Design Management Institute conference) to rate almost 100 firms and sort them into the same two groups as before: effective vs. ineffective design based on perceived visibility, quality, and investment.

Sector-specific indicators

There have been numerous studies done on business and innovation practices in some of the design-intensive sectors, but there have been relatively few that have been able to come up with sector-specific indicators that could be used on a large-scale. Even in industries that might be considered design-driven, such as architecture, clothing and furniture design, or industrial design, there are significant activities such as marketing, project management, or product implementation that tend to muddle the ability to look at revenues and outputs directly. In product-oriented and technology-oriented firms, this becomes even more obscure. Similarly, the advent of web development makes it difficult to see what costs are allocated to a specific product or service, and which of those costs should be considered development versus maintenance.

Design experts have indicated that a common notion is to protect IP by way of “thematic design,” whereby the appearance or form of a product is repeated across the full spectrum of user experience. Thus, one would expect design elements to be repeated across categories. Since applicants are commonly allowed to file multiple designs in the same application so long as the designs are all within the same Locarno class, the practice of thematic design would result in multiple applications by the same applicant at the same time. One could postulate that such applications would likely fall on the same date for the same applicant and include at least one application under Locarno class 14, subclass 4. Given that thematic design has not been widely studied, this may be a fertile area of research. This would allow us to segregate product-oriented design from pure web-based design.

Measurement of design outputs

Some firms contend that design is the key differentiator permitting them to appropriate value over and above that of a hypothetical commoditised version of their product. Some of the studies mentioned in the prior section also attempted to correlate design inputs with different types of outputs, mainly centred on firm performance. In this section, we review those output measures, grouping them into categories. In addition to the firm-level analysis, we also discuss the small number of papers that aggregate to a higher level of analysis.

Table 6.3. Output measures of design at the firm level (Authors’ compilation)

Reference	Measure	Category	Details
Black and Baker 1987	Sales growth rate	Self-reported objective financial information	Companies’ sales growth (four-year average from 1982–1985) was obtained via interviews and cross-checked against published figures
Walsh *et al.* 1992	Profit margin	Perceived performance; Self-reported objective financial information;	Return on assets, profit margin, sales growth.
Roy and Potter 1993	Commercial success	Perceived performance	Whether the company produced a new or redesigned product; whether the company produced new packaging or graphics, sales, profit margins on all projects; whether there were indirect benefits such as learning to manage designers better; as asked in a survey.
Dickson *et al.* 1995	Importance	Perceived performance	Perceptual questions on the importance of design knowledge for current employees, for future MBA students, and for the competitiveness of US firms, as answered in a survey.

Reference	Measure	Category	Details
Gemser and Leenders 2001	Company performance	Perceived performance	Perceived performance relative to competitors on a five-point scale from lowest 20% to top 20% in quintiles for profit, profit growth, and sales growth, as asked on a questionnaire.
Hertenstein *et al.* 2001	Financial performance	Self-reported objective financial information; Market-based financial performance measures	Financial data from COMPUSTAT and SEC filings for all 51 companies from 1995-1999, including cash flow relative to sales and assets; income relative to sales and assets; growth in sales, income, and cash flow; and total stock market value relative to the S&P 500.
Design France 2002	Return on investment	Perceived performance	How long it would take to recoup the investment in design (perceived), as asked in a survey.
Design Council 2005	Stock market performance	Market-based financial performance measures	Total stock market performance for the 61 firms in the “design index” firms in absolute terms and relative to the FTSE (UK broad index) from 1995–2004, inclusive.
Hertenstein *et al.* 2005	Corporate financial performance	Self-reported objective financial information; Market-based financial performance measures	Financial data from COMPUSTAT and SEC filings for all 51 companies from 1995-2001, including cash flow relative to sales and assets; income relative to sales and assets; growth in sales, income, and cash flow; and total stock market value relative to the S&P 500.
Chiva and Alegre 2009	Firm performance	Perceived performance	Respondents were asked to rate their company’s performance in a survey, on a seven-point scale in which 1 was the lowest relative competitiveness, and 7 was the most competitive.
Design Council 2009	Protecting IP; Success	Design intellectual property; Perceived performance	Use of different forms of IP to protect designs; Perceptions on achieving business objectives via design; perceptions on the link between design and profitability; perceptions on the importance for the country as a whole; as answered in a questionnaire in the UK.

Benefits to the firm

In this section, we review the literature on firm performance as it has been related to various forms of investment or activity in design. The articles are mainly the same ones discussed in the prior section on measuring design inputs in the cases (majority) in which the articles were concerned with the performance implications of design activity and not just measuring design investment in a vacuum. We categorise the benefits to firms in terms of “objective” vs. subjective data, and within objective, whether the data are provided directly by the managers, or whether filtered through external evaluations. (As mentioned above, we put “objective” into quotes the first time round.) Most of the research on design in this area involves classifying firms into high vs. low design groups and then comparing performance information between the two groups. Thus it is difficult to assess causality, as several of the authors admit.

Self-reported objective financial information

One of the most common measurements undertaken by researchers has been objective firm performance data, sometimes solicited directly from managers responding to surveys, and other times via archival studies (which are often based on surveys). Design orientation of firms was examined by Black and Baker (1987), who use the company sales growth rate as measure of success, stating that successful companies have greater design involvement within the NPD process and consider design as a source of competitive advantage. Firms were classified into three groups: high, medium, and low average sales growth over the prior four years. These three groups were compared and contrasted along several perceptual dimensions as discussed in Section 5 above. There are not many obvious differences between the three groups in terms of design orientation, except in the following cases: when marketing personnel are involved in the prototype evaluation stage; when engineering design personnel are involved in the design stage; and pretty much any time aesthetic design personnel were involved in any of the five stages. In fact, most companies did not have an aesthetic design function and the ones that did tended to be in the high growth category of firm. The authors conclude that aesthetic design's involvement in the NPD process can be highly advantageous for firms.

Hertenstein *et al.* (2001) find that the more effective design companies as defined above in Section 5.1.5 enjoy better financial performance, which includes standard financial ratios, higher returns on sales, returns on assets, sales growth, net income, and cash flow, along with stock market value (see below). The authors divide the 51 companies into two groups of firms: those perceived by a panel of experts to have highly effective design activity and those perceived to have less effective design activity. Based on the financial measures mentioned above, the authors propose that firms that have effective industrial design may earn positive returns on investment in industrial design.

Design intellectual property

Given the many forms that designs take, it is often difficult to unbundle design from innovation and invention. Registered designs and similar forms of design-related IP provide us with some ability to measure design. The Design Council (2009) found that 85% of UK businesses felt that design was a significant part of their business model, but 66% of respondents took no measures to protect their intellectual property, design or otherwise. Only four per cent of respondents used registered designs, while another four per cent used unregistered designs. Working under the presumption that those firms using design protections are a subset of the businesses that consider design important, we can conclude that just over 90% of them do not use formal design protection measures. In the above-mentioned study, the use of copyright and trademark protection utilisation far outstrips that of design protection (at 26% and 12%, respectively: see Section 4 above on bundling); however, those mechanisms may not be used exclusively by design-exposed firms and thus are more uncertain indicators of design. More firms, on the other hand, used formal design IP protection than used patents (3%) in the Design Council study. The ratio of usage provides an interesting clue to the assessment of participation in the design IP realm, given that the United Kingdom allows for unregistered designs. One could extrapolate that, in those countries where there is not an option of an unregistered design mechanism, the credible number of *bona fide* design IP holders may be at least twice the number reflected by actual holders of design IP. These data, however, do not identify the quantity of design IP held, only the participation rate within a sample population.

Market-based financial performance measures

Market-based financial performance measures are based on third party assessments of company performance. Stock market performance, or market value, or the related Tobin's *q*, are common measures used in business research. Tobin's *q* is a measure of the value of a firm expressed as the ratio of its knowledge based capital over the replacement cost of its tangible assets. Knowledge based capital (KBC) relates to the perceived value of the firm as judged by the price represented in the stock market while the replacement cost could also be seen as the cash value of all assets and liabilities held by the firm (Villalonga, 2004). From an empirical point of view, Tobin's *q* functions as a good proxy for the KBC of firms because of the accounting treatment of KBCs (Gu and Lev, 2001). Lindenberg and Ross (1981) find that the Tobin's *q* of firms in R&D- or advertising-intensive industries are abnormally high. This would indicate that some part of the market value is driven by the added element of intellectual property. It is, therefore, not uncommon in studies using Tobin's *q* as a performance indicator to "adjust" the denominator to account for the presence of "tangible" KBC (Hall, 1993, Villalonga, 2004).

Relating these measures to outcomes in the design literature, in a study by the UK Design Council (2005), companies that were "effective users of design" outperformed the UK stock market (FTSE 500 index) by more than 200% between 1994 and 2004. The study selected companies for inclusion in the "design index" primarily based on their being nominated for and winning design-related awards, such as Design Effectiveness Awards, D&AD Awards, Interbrand, Millennium Products, and Panel Nominations. The study concluded that companies that focused on product design not only substantially outperformed their competitors during good economic times, they also fared significantly better (in terms of stock market performance) during economic downturns and recovered market share more quickly.

Hertenstein *et al.* (2005) confirmed "good industrial design is related to corporate financial performance and stock market performance even after considering expenditures on industrial design." The methodology is similar to Hertenstein *et al.* (2001) with more experts and hence more firms rated on "good industrial design." The authors find that stock market returns relative to the S&P 500 index are higher for the firms rated as having good industrial design, and all other financial measures follow suit in terms of a positive association between good industrial design and financial performance when looking at the aggregate seven-year window. In other words, "design pays for itself" (Wong, 2009).

Perceived performance

Gemser and Leenders (2014) find that there is a positive association between industrial design intensity and firm performance. To measure business performance, they asked managers to rate their firm's performance over the prior three year period and score their firms' profit, profit growth, and sales growth in quintiles relative to competitors. Then to explore the perceived value of industrial design investments, the managers involved rated the impact of industrial design investments on specific product performance measures, and as a result, they found higher benefits of industrial design investments for companies that invest considerably in it than companies investing little in industrial design. The authors state that company performance is positively related to industrial design intensity, and the impact of design investments on company performance is more considerable in precision instrument firms where the strategy of investing in design is emerging, rather than in the furniture industry where this strategy is quite mature. However, they find positive associations in both sectors. Dickson *et al.* (1995) provide descriptive statistics of *Inc.* 100/500 CEOs' perceptions about the importance of design. 49% of the CEOs assert that it is important that all managers be knowledgeable about design, and 46% think that it would be important for MBA students to study design. Furthermore, 43% of the CEOs disagree with the statement that managers in general have enough design knowledge to make design decisions.

Walsh *et al.* (1992) find a positive relationship between design consciousness and perceived success in firms along several performance dimensions. The 100 firms were divided into two categories, those more vs. less "design conscious" as described above in Section 5. Across both industry sectors studied, return on assets was higher in the design conscious group. Sales growth and profit margin had more mixed results with design consciousness associated with higher performance in one of the two industry sectors. Chiva and Alegre (2009), in a survey of ceramic tile producers in Spain and Italy, demonstrate an association between design investment and firm performance, where firm performance is a perceptual measure based on the performance of the firm relative to competitors. The authors also discuss the mediating role of "design management" as defined by Dickson *et al.* (1995) and discussed in Section 5 above. The authors interpret the results as indicating that higher design investments lead to better design management skills, which then lead to higher firm performance. This interpretation could be the basis for a link between design and competitive advantage.

Roy and Potter (1993) collected costs, sales, and profit data, along with whether the firm produced anything new or redesigned products in a survey of 221 companies that were able to take advantage of a government scheme to receive some design help in their projects. They were able to reconstruct the profitability of each of the projects to examine the returns on design investment, and find that 50% of the projects could be considered a "complete success" given that they were profitable and that there were some indirect benefits, such as managers learning how to manage the design function better. 10% were commercially successful but had fewer indirect benefits. And 21% were break even or had small losses, but exhibited indirect benefits. The authors conclude that inexperienced SME manufacturers can benefit from professional design help.

The Design Council (2009) study mentioned above also asked respondents whether they believed that design helps achieve business objectives, and 23% of respondents felt that it contributed "a lot more" than in the past. Respondents were also asked whether they felt there was a link between design and profitability, and 59% of respondents agreed with that in contrast with 13% who disagreed. Design France (2002) asked respondents how long it would take to pay back their investments in design. Recall from Section 5 above that there were four categories of design: product, packaging, graphic, and architectural (interior). Respectively, respondents said that it would take less than one year 24%, 29%, 31%, and 27% of the time for the different categories. For 1-2 years, the percentages were: 38%, 39%, 33%, and 25% respectively. Thus the modal payback times were: for products, more than one year; for packaging, 1-2 years; for graphic, more than two years; and for architectural, more than two years.

Benefits to the country/region

In contrast with the input measures, which have seen work at multiple levels of analysis, including the national level, output measures in terms of benefits at the national level have been less studied, other than asserting that as it appears to be useful for firms to undertake design investment, it must aggregate up to higher levels of analysis. Some authors find design to be increasingly important for national competiveness in the global economy (Hargreaves, 2011, Hertenstein et al., 2005, Monseau, 2012, Moultrie and Livesey, 2014). Governments, particularly in Europe and Asia, as well as some corporations (Wong, 2009), are becoming considerably more aware of the effects of design on market performance. Although comparable data on national design industries are relatively hard to collect, making reliable comparisons between nations difficult, several studies have linked business success to the use of design (Hertenstein et al., 2005), as discussed above. Further, the Design Council (2009) study asked respondents (representing firms) in the UK whether they thought that design was "integral to the country's future economic performance," and 52% of respondents agreed with that statement (71% of manufacturers), whereas only 16% disagreed with it. Likewise, Dickson *et al.* (1995) asked similar questions with a US sample and 71% of *Inc*. 100/500 CEOs agreed that "design issues will be of increasing importance for U.S. firms' competitiveness in the coming decades."

De Rassenfosse (2013) investigated the information content of investment in brand equity and design. He finds that carrying out an analysis on an unbalanced panel of 32 countries (from 1980 to 2010), brand equity investment is a powerful predictor of trademark applications, but he found a weak relationship between investment in architectural and engineering design activities and the demand for design rights. Two different interpretations were proposed: the first is that the use of design rights is an inappropriate measure of design activity; the second is that the investment series fail to capture design activity, because no effect on the demand for design rights was observed. De Rassenfosse concludes, "While registered design rights may not be a perfect indicator of design activity, they capture one important dimension of design assets, namely assets with higher-than-average market value." (de Rassenfosse, 2013, p. 18).

Conclusion

Design is a complex activity that touches on many parts of a commercial endeavour. It has proven difficult to measure and assess precisely because it touches on so many areas of the organisation: aesthetics, engineering, product development, marketing, advertising, and so on. In this document, we explored the nature of design, with a focus on industrial design, and examined how firms in nine different countries protect their design intellectual property. We related designs to traditional forms of intellectual property and discussed the role and origin of the registered design as another tool in the toolbox of management. Certain sectors are more popular than others for registered designs, and we reviewed the most popular classification sectors and noted how they vary from country to country, from ICTs in Korea and Japan to furnishings / household goods in several European countries. We also brought forward several other commonalities and differences between the IP regimes for design in the sample countries. We also discussed bundling design with non-IP complements and why some firms would want to pursue such strategies.

In the next part of the report, we reviewed trends in design IP, mainly in registered designs, but also in 3D trademarks. Over the last ten years, there has been a steady upward trend in registered designs, but there are plenty of fluctuations from year to year as old design protections expire and new ones enter the system via new applications. One gets the impression that design protection is making a steady march toward wider adoption and diffusion.

In truth, the measurement of design remains an elusive goal, given the difficult-to-define nature of the elements of design, both as to what constitutes design input as well as what portion of a final product's value can and should be attributable to industrial design. Thus the last two sections of the report were devoted to how design inputs and outputs are manifested in the literature. We began with different studies' measurement of design investment or design activity. There has been no consensus in the literature, with researchers doing everything from requesting specific figures for the amount spent on design, to perceptual measures of design efforts within the firm, to expert ratings of firm efforts. We also examined the output side of the equation, mainly referring to firm-level benefits listed in the body of literature we reviewed, and here the dominance of perceptual firm performance measures is quite striking. We noted in the report that the most popular research design to assess the impact on design first categorises companies into high vs. low design activity, and then correlates these groups cross-sectionally with perceived performance benefits. While this work was necessary to lay the groundwork and stimulate interest in the subject, it is clear that the causality and identification issues need to be tackled in future research.

In addition to future work with new research methodologies, we may find, on the other hand, that this is a field prime for the application of fuzzy logic, where approximate ranges of values can be integrated into analyses of very large samples to derive estimates with large standard errors at the firm-level, but more robust estimates at the industry, regional, or national level. Certainly, aggregation to higher levels of analysis is another open challenge for design scholars. In any case, there is abundant work for academics, managers, and policy-makers to do in understanding this exciting topic.

NOTES

271 There are also unregistered designs which afford some protection but whose terms are shorter. In this report, we will focus on the registered designs.

272 Created in 1967, WIPO is one of the specialised agencies of the United Nations and its mission is to lead the development of a balanced and effective international intellectual property (IP) system that enables innovation and creativity for the benefit of all member countries.

273 Multiple designs are allowed in one application if they concern products in the same class, without upper limit for number of designs. There is no period of secrecy, except upon a request by the applicant in order to forbid the accessibility, for a maximum of 12 months from the date of filing or the date of priority.

274 Trade dress is an extension of most trademark laws that extends the protection of a trademark to simulacra or representations imitating a look that may nonetheless have different content.

275 This term change was part of the United States implementation of the Geneva Act of the Hague Agreement. See *Title I of the Patent Law Treaties Implementation Act of 2012* (Public Law 112-211, December 18, 2012).

276 See USPTO Manual for Patent Examining Procedure (MPEP) § 1512.

277 See MPEP § 608.

278 Given the dominant role of the US in registration activity with the USPTO, on a normal (linear) chart the other nations in the sample are agglomerated at the bottom of the plot; we therefore felt it better to represent it on a logarithmic scale. So as to better indicate relative activity levels, we also trimmed the vertical axis. It is important to note that the number of US filings is a full order of magnitude greater than all of the other sample countries except for Japan.

279 This is true because the sum of the shares of non-US-originated patents is below 50% throughout the period concerned. Simple arithmetic tells us that US companies must account for the remaining percentage, which is always above 50% and well above the individual share from any other country.

280 OECD Scoreboard, 2013, pp. 193-194, plus supporting data linked to the report.

281 It should be noted that Samsung has a far more diverse product line, including appliances, televisions, and computer monitors, as well as component-level products such as LCD screens, integrated circuits, and memory chips, for which Samsung also obtains various forms of IP protection. So the advent of a single competitive race, while possibly changing behaviour, will not have as dramatic effect as it would on a company with a much narrower product focus such as Apple.

282 The drop in patenting by Apple at the end of the series may be an artefact of Apple’s tendency towards secrecy that sees the firm taking unusual measures to delay publication or granting of patents. So we may be seeing delayed reporting of patent filings beyond the normal 18-month blackout period.

283 In the US, design patent applications are not subject to publication (see 35 U.S.C. 122(b)(2)).

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CHAPTER 7. LEGAL ASPECTS OF OPEN ACCESS TO PUBLICLY FUNDED RESEARCH

Internet growth, content digitisation, and expanding "big data" and data analytics capabilities have affected the ways in which publicly funded research results are accessed, disseminated and used. While these technological advances have made sharing and processing information easier, that does not change the fact that the information may be protected by IP laws. Open access efforts, which aim to make the outputs of publicly funded research more widely accessible in digital formats, therefore raise a number of IP policy questions. To explain the interplay between open access and IP laws, this chapter provides an overview of the IP regimes that protect research outputs in a sample of OECD jurisdictions. It then reviews the open access policies that are in place in some of those jurisdictions and examines two contexts in which IP questions can arise when open access principles are applied: public/private partnerships and text and data mining.

EXECUTIVE SUMMARY

This chapter gives an overview of the main legal issues and policy considerations involved in accessing, disseminating or using both publicly funded scientific publications and research data under open access (OA) conditions. The term open access is used to denote public availability of scientific output (publications and data) without payment and re-use restriction. This paper focuses on the legal aspects of OA to publicly funded research results and, in particular, it examines whether copyright law and database protection rights support, impede, enable or are neutral towards the implementation of open access principles for the dissemination of publicly funded scientific results.

After a general overview of intellectual property protection at the international level, Section 2 examines the laws of different jurisdictions (including countries from the European Union, the United States of America, Australia, Canada, Israel, Japan and South Korea) as they relate to the protection of scientific publications and research data. The brief overview of the copyright and, where applicable, the database legislation in force in the different jurisdictions shows that the scope of protection granted to research output varies significantly from one country to another. Although the implementation of OA principles is based on contractual arrangements between authors, publishers, universities, and funding organisations, the framework set by copyright and database protection regimes, where relevant, is an important factor in how those arrangements are formed.

The way copyright law defines the scope of rights and recognises limitations and exceptions on these rights serves as the backbone to the licensing agreements. If it is to support OA, whether granted through the 'Golden Road' (where articles published in OA journals are provided directly and for free) or the 'Green Road' (where articles are published through traditional channels and subsequently deposited in institutional repositories), the copyright regime should create a favourable environment for the dissemination and re-use of publicly funded scholarly publications.

Section 3 follows by highlighting the main characteristics of OA principles and policies in certain jurisdictions. Section 4 draws attention to two as yet unresolved issues, namely the problem of OA in the context of public-private partnerships and that of text and data mining (TDM). OA principles entail more than just granting access to research output free of charge. Where the funding of a research project is partly realised through external private sources, different rules of ownership may apply. What are the implications of applying OA principles to research results that are not funded entirely by public money? The uncertainty in current legal frameworks regarding the scope of protection of works and databases could create obstacles for TDM activities. A system resting solely on licensing agreements might be insufficient to allow TDM to take place in all instances where it would be socially desirable.

Although no generalisation can be made, countries that actively encourage compliance with OA principles for the publication of publicly funded research results seem to steer copyright reform in a more flexible and research-friendly direction. The United Kingdom is one good example of this: while the Research Council has adopted a 'Golden Road' policy, mandating researchers to publish results under a Creative Commons Attribution Licence 4.0, the legislator has also proceeded with the adoption of new exceptions on copyright, including a specific exception for text and data mining. The German research council may not have officially opted for an OA mandate on its grant recipients, but the legislator did modify the copyright act to make it easier for authors to comply with the contractual arrangements with publishers. The general framework of United States copyright law, which excludes Federal Government works from protection and admits a fair use defence, is also very conducive to the application of OA principles.

The complexity of the status of research data in particular as protected by intellectual property in Europe and other jurisdictions arguably has the potential to adversely affect re-use opportunities, given the difficulty – both for research institutions making the database available and for prospective re-users – in determining each time whether a certain database is covered by a *sui generis* right and in which measure re-utilisation and extraction can take place freely. Whether the use of compilations or databases for purposes of research and private study in general, and text and data mining in particular, is covered by any relevant exception on copyright or the database right is not always clear. The use of Creative Commons licences 4.0 may alleviate the uncertainty by clearly stating what can and cannot be done with the licensed material.

Finally, four more conclusions can be drawn:

- The exponential growth in data should have little effect on copyright protection, e.g. should not make it either more or less relevant than it currently is. As long as the criteria for copyright protection are applied strictly (either in the form of an 'originality' requirement or that of being an 'author's own intellectual creation'), there is no reason to think that the copyright regime will lose its relevance.

- On the other hand, in those countries that recognise a *sui generis* regime of protection for databases, the exponential growth in data may entail a greater tendency towards private appropriation of databases. In this case, the application of OA principles to publicly funded scientific output is particularly important.

- The increase of machine-generated data in science (e.g. scientific sensors) may pose particular challenges, especially in trying to determine whether the result qualifies as a subject matter susceptible of intellectual property protection and whether it meets the criteria for protection.

- A related challenge might be the use of machine-generated data to identify a rights owner. This analysis would need to take place on a case-by-case basis. In the best case scenario, the machine-generated data will not qualify as protectable subject matter and may also be devoid of any originality so that it would in principle be free for use by everyone.

Introduction

Innovative scientific research plays a crucial role in addressing global challenges, such as healthcare, environmental, and security issues, while research in social sciences and the humanities occupies a key function in understanding emerging social phenomena[284]. Evidence shows that access to research data not only increases the returns from public investment in this area, but it also reinforces open scientific inquiry, encourages diversity of opinions, promotes new areas of work and enables the exploration of topics not envisioned by the initial investigators[285]. Collaborative exchanges help avoid unnecessary duplication of research and give insight into the methodology followed. Timely and cost efficient access to publicly funded scientific research therefore contributes to increasing the general economic and social welfare[286]. Open access principles are gaining ground among policy makers, research funding agencies, high education institutions and researchers alike as the way forward. 'Openness' in science involves granting 'access on equal terms for the international research community at the lowest possible cost, preferably at no more than the marginal cost of dissemination. Open access to research data from public funding should be easy, timely, user-friendly and preferably Internet-based'[287].

Copyright and other intellectual property rights play a decisive role in the way scientific output is being disseminated and used by the scientific community because they underpin the relevant licensing practices. The expansion of open access policies to publicly funded research data raises a number of legal and policy issues that are often distinct from those concerning the publication of scientific articles and monographs. Since open access of research data – unlike publications – is a relatively new policy objective, less attention has been paid to the specific features of research data. This paper therefore gives an overview of the main legal issues and policy considerations involved in licensing both scientific publications and research data under open access conditions. It examines whether copyright law and database protection rights support, impede, enable or are neutral towards the implementation of open access principles for the dissemination of scientific results.

Generally speaking, intellectual property licenses are permissions to use protected subject matter, without which such use would constitute an act of infringement on the owner's rights[288]. Parties to a license tailor their contractual arrangements on the basis of the protection granted by the law. A license may therefore be more or less permissive for the licensee, depending on the circumstances and the goals pursued by the parties. Where the law is already permissive, a restrictive license will be deemed acceptable to an informed and equal licensee only if the reduction in permission is compensated in another way (reputation, income, etc.). Where the law is less permissive, a more liberal license will procure clear advantages to the licensee. The degree of permissiveness of an open access license is intrinsically connected to the scope of rights granted in each jurisdiction to scientific output, and the exceptions to those rights. While the implementation of OA principles may be based on contractual arrangements between authors, publishers, research institutions and funding organisations, the legal framework represents an important factor in how these arrangements are formed.

Other elements like the definition of protectable subject matter (e.g. the question of what is or is not protected by an IP right) and the duration of protection do not directly influence the permissiveness of an OA license, but are likely to affect the enforceability of a license. In principle, unprotected or no longer protected subject matter belongs to the public domain and should remain freely available for re-use by anyone and for any purpose. The failure to abide by the terms of a license attached to public domain material does not give rise to an infringement of rights. At most, it amounts to a breach of contract, which generally entails less far-reaching implications for licensees and more limited redress possibilities for the licensor. Because the qualification of the object licensed does not immediately affect the permissions granted under the OA license, this issue will essentially remain outside the scope of this chapter. References to the criteria for protection in the jurisdictions surveyed below are meant to give a rough indication of the likelihood that research data is protected independently from the scientific publications, and consequently whether it could be the object of a separate open access license.

This chapter is further divided in three parts after this introduction. Section 2 examines the intellectual property protection of scientific output, understood as including scientific and scholarly publications as well as collections of any type of data. After an introduction of the general legal framework, which gives an overview of the main existing intellectual property rights that may attach to scientific output, section 2 further gives a portrait of the laws of several jurisdictions applicable to research results, with a particular focus on copyright law and, where applicable, on the protection of databases. Section 3 follows by giving a brief overview of the open access policies in some of these jurisdictions, making a link with the state of the IP legislation in those countries. Section 4 draws attention to two as yet unresolved issues, namely the problem of open access in the context of public-private partnerships and that of text and data mining.

It is important to realise at the outset, that the promotion of OA in science is essentially a matter of policy on the part of the government or the parties involved in the licensing of research output. The basic rationale behind promoting OA in science is generally that the gains made by society as a whole in having free access to and re-using the output of publicly funded research outweigh the loss of control of the licensor over the material. To demonstrate the soundness of this rationale as a policy choice would have required economic evidence and sociological analysis far beyond the means available for this study.

Scientific output and Intellectual property protection

General legal framework

This section will give a general overview of the international intellectual property regimes that are or may be applicable to the protection of scientific output. Scientific output, understood as including scientific and scholarly publications as well as collections of any type of data, can be protected by a number of rights within the category called intellectual property, chiefly copyright and database protection. These two rights are granted to their owners without any formality, at the moment an original work or qualifying database is created. Many other rights exist in the area of industrial property, such as trademarks, patents, topographies of integrated circuits, design rights, or protection of plant varieties. However, because industrial property rights accrue to their owner only once an active step towards registration has been made, the fulfilment of an open access policy can easily be achieved by not applying for registration. These rights will therefore not be discussed. Before turning to a jurisdiction-specific analysis, let us first provide a general overview of the selected rights at the international level in order to determine their ambit and the scope of their protection.

Copyright

Copyright protects literary and scientific works such as articles, papers, and other types of publications in the scientific field. However, copyright protects the original expressions of ideas, and not ideas themselves. This means that the article, paper, or other type of scientific work has to be expressed in some original form. This basic principle is implicitly enshrined in the oldest and most influential international agreement in the field of copyright, the Berne Convention of 1886 which states that: “The expression “literary and artistic works” shall include every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as … ”[289].

A more explicit statement can be found in Art. 2 of the WIPO Copyright Treaty (WCT) of 1996, and in the specular Art. 9(2) of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) of 1994, which respectively establish that: “Copyright protection [shall] extend[s] to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such”[290]. According to this basic principle of copyright law, it is not sufficient that an idea takes shape in the mind of the researcher or scientist, but that idea needs to be expressed in a form that can be perceived (but does need to be perceived, as un-published works are protected as well) by others; this principle is also known as the idea-expression dichotomy[291].

The rights granted by copyright law at the international level are quite broad and traditionally encompass the right of reproduction of the work, the right of distribution of the work and of copies thereof, the right of communication of the work to the public including by public performance, the right of rental, and the right of translation, adaptation, arrangement and alteration of the work[292]. Only the rights relevant for the scope of this study will be dealt with in detail in the next paragraphs.

The right of reproduction is one of the most fundamental rights granted by copyright laws worldwide and gives rights holders the right to reproduce the work in any manner or form[293]. The right of reproduction generally covers verbatim copies of a protected work as well as partial or complete reproductions of the work in other formats. In other words, methods of reproduction such as design, engraving, lithography, printing processes, typewriting, photocopying, mechanical or magnetic recording, and all other processes known or yet to be discovered are acts covered by the reproduction right[294]. The extent to which these acts also include specific forms of adaptation is not entirely clear, and both the Convention and national implementations protect adaptations – or specific types thereof such as translations – either independently or as part of the reproduction right. This is usually due to the indeterminateness of the boundaries of the reproduction rights, especially in the case of borrowings that are far from literal copies of works[295].

The right to distribute copies is not present in the Berne convention[296]. In 1996, the WCT eventually filled the gap by establishing in art. 6 that "authors of literary and artistic works shall enjoy the exclusive right of authorising the making available to the public of the original and copies of their works through sale or other transfer of ownership"[297]. Accordingly, all WCT signatories that did not already provide for a general distribution right in their domestic legislations have implemented this provision. The InfoSoc directive of 2001 expressly prescribes this right at the EU level, something that was previously required only for specific subject matter such as computer programs, databases, and some neighbouring rights[298]. Accordingly, the distribution of copies of scientific articles, books, monographs, studies, or computer programs or databases, are all acts that need to be authorised by the right holder (e.g. scientist, department, university, research centre).

An important limitation to the distribution right is the principle of "exhaustion" or "first sale doctrine". This principle allows the resale of tangible copies of works (e.g. books) without authorisation from the right holder once the copies have been put on the market with his consent. In absence of this limitation, an author would be able to exercise his exclusive right every time a copy incorporating his work changed owners, thus enabling the author to control not only the first commercialisation of the work but also the derived, second-hand market with consequences on the international movements (imports and exports) of goods[299].

At the international level, a technology neutral formulation of the right of communication to the public constitutes a relatively recent addition, as it was introduced in 1996 in Art. 8 WCT. A right to communicate to the public was however already present in some jurisdictions, while others offered individually defined rights such as the right of public performance, broadcasting, and recitation, in accordance with Berne provisions (i.e. Arts. 11, 11bis, and 11ter)[300]. Art. 8 WCT, however, brings the new concept of making available works "in such a way that members of the public may access these works from a place and at a time individually chosen by them" within copyright control[301].The main field of application of the new addition is in online and interactive environments, such as the Internet. Accordingly, to upload a work such as a scientific article or a database and offer it for download to Internet users constitutes an act of making available to the public, which needs to be authorised by the right holder. The case law of some jurisdictions has recognised that posting hyperlinks to works already available on websites, however, is not an independent act of communication, unless the link is clickable and it provides access to the work to a new public[302].

Acts such as the publication of articles, the making of reproductions, both analogue and digital, as well as the creation of derivative works - for instance a computer program or a database developed from a pre-existing one – are all acts that, at least in general terms, require the authorisation of the right holder unless an exception applies. It must be stressed that the international agreements of reference usually establish a "minimum level of protection" which means that signatory countries are allowed to offer more protection than that which is contained in the international agreements.

Another key characteristic of copyright law is found in the balance it strikes between uses reserved for right-holders and uses that are free, or in other words uses for which no authorisation is required. Two typologies can be found: uses that are not covered by copyright law and uses that are covered but exempted from authorisation, although sometimes "fair compensation" is required.

The former category enlists cases such as the possible requirement of fixation[303]; official texts of a legislative, administrative and legal nature, and official translations of such texts[304]; applied art and industrial designs and models[305]; political speeches and speeches delivered in the course of legal proceedings[306]; and news of the day or miscellaneous facts having the character of mere items of press information[307]. Except in the latter case, for which an absolute exclusion from protection is mandated, in all the other cases Berne countries can decide whether or not to offer protection to such categories of works.

The second category,“exceptions and limitations to copyright”, generally permit the use of a copyrighted work without the permission of the author or copyright owner. Such exceptions and limitations may be provided by statute or case law, including uses covered by “fair use” or “fair dealing” provisions. The policy rationales for exceptions and limitations in national law vary, including the protection of constitutional and/or fundamental rights, the regulation of industry practice and competition, the dissemination of knowledge, or finally market failure considerations[308]. Examples of this second category can be seen in cases such as quotation[309]; illustration for teaching[310]; certain articles on current economic, political, or religious topics[311]; and the reproduction of works for the purpose of reporting current events[312].Once more, given the minimum level of protection approach of the conventions, signatories are free to enact other exceptions and limitations, as long as these apply only to certain special cases that do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the author[313].

Database protection

Databases represent a peculiar subject matter that is protected by copyright under certain circumstances, but in some countries – namely in the EU, Japan, South Korea – is also protected by a so called sui generis database right (SGDR) aimed at the protection of the investment.

The Berne Convention does not mention databases, but provides protection for collections of literary or artistic works such as encyclopedias and anthologies that, by reason of the selection and arrangement of their contents, constitute intellectual creations[314]. The plain meaning of the provision seems to exclude from protection collections that do not consist of works, that is to say, collections of data (databases) are not covered by Art. 2(5). It has been argued that collections of data are in fact covered by the general provision of art. 2(1) as “literary and artistic works”.

In any event, nowadays the protection afforded to databases (as collections of data or other elements) is established – or confirmed – by both Art. 10(2) TRIPS and in the almost identical Art. 5 WCT.

“Compilations of data or other material, whether in machine readable or other form, which by reason of the selection or arrangement of their contents constitute intellectual creation shall be protected as such..[315] ”

As anticipated, an additional layer of protection is found in some countries and is afforded to databases regardless of the intellectual creation (i.e. “selection or arrangement”) that may or may not be present. What is protected instead is the investment in making the database, i.e. in the obtaining, verification or presentation of the data. This type of right, also known as Sui Generis Database Right (SGDR), is typical of the EU Database Directive, and of the laws of a number of other countries and will be dealt with below. It should be borne in mind that while the protection afforded to original databases focuses on the arrangement or selection without extending to the content of the database, the SGDR offers protection against the copying of substantial parts of the database, that is to say it extends, at least to some extent, to the data themselves.

National legislative framework

This section examines the laws of different jurisdictions as they relate to the protection of scientific publications and research data. In fact, scientific publications, like articles, monographs and reports, are in the vast majority of cases covered by copyright law, as original works of authorship. The question becomes more problematic in the case of research data such as survey results, datasets etc. This type of information is most of the time excluded from copyright protection in so far as the compilations in which they are gathered do not meet the requirement of originality. However, the compilations or databases may be protected in those countries that recognise a sui generis database right. This explains why, in the pages below, greater attention is put on research data as objects of protection. The jurisdictions examined below are a sample of the Contracting parties of the OECD and include countries from the European Union, the United States of America, Australia, Canada, Israel, Japan and South Korea.

EU legal framework

Copyright protection

Whereas scientific publications, such as articles and monographs, virtually always attract copyright protection under the copyright laws of the Member States of the EU, the individual research data and the datasets containing them may not so easily fall under the copyright regime. Since copyright does not protect mere facts and ideas, but rather applies to the original expression of ideas, research data is not likely to qualify as protectable subject matter for lack of originality. The concept of originality in copyright law has been harmonised at the European level with respect to software[316], databases[317] and photographs[318], and more recently extended to all kinds of works through the interpretation of the Court of Justice of the European Union (CJEU), which established that a work is original if it is the 'author's own intellectual creation'[319] .

To be eligible for copyright protection, collections of data, tables and compilations must therefore show a sufficient degree of originality in their selection or arrangement, that is to say if through this selection or arrangement the author was able to express his free and creative choices[320]. Whether collections of scientific research data meet the criterion of originality is a question of fact to be determined on a case-by-case basis. However, if the selection or arrangement of the contents of a scientific database is dictated by technical factors or imperatives of accuracy and exhaustiveness, then the author can exercise little to no creativity or discretion in the choice, sequence and combination of the data in the collection. Scientific databases are therefore in most cases not likely to meet the threshold for copyright protection.

The Information Society Directive confers on rights owners the exclusive right to reproduce, communicate to the public and distribute their works. Member States must ensure that the reproduction right covers both the direct and indirect and the temporary and permanent making of reproductions by any means, in whole or in part, both to authors of works and to owners of neighbouring rights[321]. This broad definition is however limited by the mandatory exception for transient and incidental reproductions contained in art. 5(1)[322]. The Directive also contains a list of exceptions on these exclusive rights, the most relevant of which is article 5(3)(a) that allows Member States to provide for exceptions in the case of 'use for the sole purpose of illustration for teaching or scientific research, as long as the source, including the author's name, is indicated, unless this turns out to be impossible, and to the extent justified by the non-commercial purpose to be achieved'. Like the vast majority of other exceptions in the Directive, this exception is optional; Member States may decide whether to implement it or not [323]. As a result, Member States have different rules and regulations in this context, where some countries recognise no research exception at all (like The Netherlands and Spain). As a result the research exception is generally vague and unevenly implemented at national level, which may put some researchers at a disadvantage[324].

In its 2008 Green Paper on Copyright in the Knowledge Economy[325], the Commission initiated a round of consultations among stakeholders to discuss whether an approach based on a list of non-mandatory exceptions was still adequate in the light of evolving Internet technologies and the prevalent economic and social expectations[326]. This consultation resulted in the publication of a Communication to the European Parliament and the Council on Copyright in the Knowledge Economy[327]. As the Green Paper that preceded it, the Communication addressed several aspects of copyright in the knowledge economy, putting particular emphasis on the exceptions for the benefit of libraries and archives, including the issue of orphan works, teaching and research, persons with disabilities, and user-created content (UCC).

At the beginning of 2014, the Commission launched another round of consultations on the reform of the European copyright regime, asking again about the adequateness of the research exception. In its Report on the responses to the Public Consultation on the Review of the EU Copyright Rules[328]. the Commission reports on the respective position of the different stakeholders. While end users believe that open access is a suitable solution to increase access to research content that should be better supported, institutional users plead for a mandatory and technology-neutral research exception to be adopted at EU level. Publishers on the other hand argue in favour of licensing solutions. The future will tell whether the research exception will be modified as part of the copyright reform.

Database protection

Collections of scientific works, data, or other materials arranged in a systematic or methodical way and individually accessible electronically or by other means may be protected under the European *sui generis* database right (SGDR). Through article 7 of the Database Directive, as implemented in the legislation of the Member States, the maker of a database showing a substantial investment (assessed qualitatively and/or quantitatively) in either the obtaining, verification or presentation of its contents has the exclusive right to prevent the extraction and/or re-utilisation of the whole or of a substantial part, evaluated qualitatively and/or quantitatively, of the contents of that database. Like copyright protection, the *sui generis* database right arises automatically, without any formal requirement, at the time of completion or disclosure of the database to the public.

Where the ‘obtaining, verification or presentation’ of research datasets does involve the substantial investment necessary to qualify for protection, the *sui generis* protection confers two transferable rights on the maker of a database: the right of extraction and the right of re-utilisation of substantial parts of the database, which are respectively defined as follows: ‘(a) 'extraction’ shall mean the permanent or temporary transfer of all or a substantial part of the contents of a database to another medium by any means or in any form; (b) ‘re-utilisation’ shall mean any form of making available to the public all or a substantial part of the contents of a database by the distribution of copies, by renting, by on-line or other forms of transmission’.

These two concepts have received a broad interpretation from the ECJ[329]. In the Directmedia case, the Court found that an act of ‘extraction’ occurs when all or part of the contents of the database concerned are transferred to another medium, whether of the same or of a different nature. Such a transfer implies that all or part of the contents of a database can be found in a medium other than the original database[330]. In the view of the ECJ, it is immaterial whether the transfer is based on a technical process of copying the contents of a protected database or on a simple manual process; similarly, it is irrelevant that the transfer of the contents of the database may lead to an arrangement of the elements that is different from that in the original one. The Court adds that the transfer of material from a protected database to another database following an on-screen consultation of the first database and an individual assessment of the material contained in that first database is also capable of constituting an extraction.

In the British Horseracing Board decision, the Court ruled that the concept of ‘re-utilisation’ must ‘be understood broadly, as extending to any act, not authorised by the maker of the database protected by the sui generis right, of distribution to the public of the whole or a part of the contents of the database’. The Court observed that the nature and form of the process are of no relevance in this respect[331]. Recently, the Court of Justice reaffirmed its broad interpretation of the concept of ‘re-utilisation’ in a case involving the display of information generated as a result of a search in a dedicated meta search engine[332]. The technique employed by a dedicated meta search engine to crawl the targeted databases for specific information, although not identical, is probably comparable to some of the techniques used to text and data mine databases for research purposes: both types of searches make it possible to search the entire contents of that database even if only part of the database is actually consulted and displayed.

The Database Directive does not provide any definition of the terms 'substantial'/'insubstantial' or 'qualitative'/'quantitative'. Intuitively, the first method to assess the substantiality of the part extracted and/or re-utilised consists in comparing quantitatively the amount of data taken with the total amount of data contained in the database as a whole. Accordingly, the ECJ decides that a quantitatively substantial part corresponds to 'the volume of data extracted and/or reutilised and must be assessed in relation to the volume of the contents of the whole of that database'. Furthermore, the Court observes that 'if a user extracts and/or reutilises a quantitatively significant part of the contents of a database whose creation required the deployment of substantial resources, the investment in the extracted or re-utilised part is, proportionately, equally substantial'[333]. It has been argued that the substantiality of a part can also derive from its economic value, namely from the price that would be paid for such a part, which would rise proportionately with the rate of investments incurred in the obtaining, verification and/or presentation of the part's contents. But such a direct correlation cannot always be traced, and the Directive recognises a *sui generis* protection on the basis of the investment made in the database's production rather than in its economic value.

The protection under the *sui generis* right lasts for 15 years from the first of January of the year following the date on which the database was completed. The term of protection for a database may start anew under two conditions, both involving the term 'substantial'. The first one is a substantial modification of the contents of the database, evaluated either qualitatively or quantitatively, which can consist of additions, deletions or alterations (including rearrangement of the contents). The second is a substantial investment, evaluated qualitatively or quantitatively. This is one of the most controversial and criticised provisions of the Directive since it apparently offers grounds for a perpetual protection of the databases[334].

Finally, it is worth pointing out that, according to article 11 of the Database Directive, only natural persons who are nationals of a Member State or who have their habitual residence in the territory of the EU can benefit from the database right. Furthermore, companies and firms are also entitled to such protection if they are formed according to the law of a Member State and have their registered office, central administration or principal place of business within the EU. Article 11.2 clarifies that in case a company or a firm has a registered office only in the territory of the EU, its operations must be substantially and durably linked with the economy of a Member State. In other words, the protection of the *sui generis* database right is not only unique to Europe in that it is conferred only on EU nationals, whether natural or legal persons, but also because there is no real comparable regime of protection for non-original databases outside the European Union[335].

The Database Directive contains a separate set of exceptions for copyright and the database right. With respect to copyright, Article 6(1) contains a mandatory exception on copyright stating that the lawful user of a database may perform, without prior authorisation, any act covered by Article 5 necessary for the purposes of access to the content of the databases and normal use of the content. Article 6(2) allows Member States to provide for limitations on the copyright owner's exclusive rights, including the right to make reproduction of a non-electronic database for private purposes and to use it for the sole purpose of illustration for teaching or scientific research, as long as the source is indicated and to the extent justified by the non-commercial purpose to be achieved[336]. Since Article 6(2) is optional, Member States have either implemented it in various ways or not at all[337].

With respect to the *sui generis* database right, Article 8(1) states that 'the maker of a database which is made available to the public in whatever manner may not prevent a lawful user of the database from extracting and/or re-utilising insubstantial parts of its contents, evaluated qualitatively and/or quantitatively, for any purposes whatsoever'. Article 9 recognises the same optional exceptions on the *sui generis* as in Article 6, but limited to the right of extraction. This means that, where implemented, the substantial extraction of the content of a database is allowed for research purposes, but that no act of re-utilisation can be performed. This restriction actually removes any practical value of the research exception on the database right[338].

The application of Articles 6 and 9 rests on the concept of a lawful user: only a lawful user may benefit from the exceptions of Article 6(1), 8(1) and 9, while the exceptions listed in Article 6(2) extend to anyone. The concept of 'lawful user' is nowhere defined in the Directive. A literal interpretation suggests that once the right holder makes the database available to a user, s/he is deemed to be a lawful user[339]. Access may, however, be conditioned by the terms of use or other contractual agreements set by the rights holder. In such a case, "contractual agreement" would need to be interpreted in a broad manner. The use of freely available online databases (websites in many instances), even in the absence of any specific terms of use, on the basis of an implied authorisation, may also qualify as a lawful use, as long as the database is published by (or with the consent of) the rights holder[340].

France

In France, copyright is regulated in the *Code de la Propriété Intellectuelle* (Intellectual Property Code, IPC[341]), which deals with literary and artistic property as well as with industrial property. The object of protection is an original work of the mind (*oeuvre de l'esprit*), which enjoys rights of economic exploitation and moral rights[342]. In particular, original books, as well as other literary, artistic, and scientific writings, conferences and sermons, works of photography, computer programs, and databases are illustratively listed as protected works[343].

Article L122-1 establishes that authors' rights of exploitation include the right of representation (*représentation*) and the right of reproduction. The former covers acts of communication to the public by any means, including by public presentation, public transmission, and any other diffusion throughout a telematics network[344]. The right of reproduction consists in the material fixation of the work through any process, such as printing, drawing, photography, and any other mechanical or magnetic recording[345].

Exceptions and limitations to copyright are regulated under Article L122-5 IPC. Particularly relevant for the purpose of this study is the exemption of short quotations and analysis justified by the educational, informational or scientific character or for criticism, provided that the name of the author and the source are indicated[346]. Also allowed – under the same general obligation to cite the author and the source – are the representations or reproductions of excerpts of works for the scope of illustration for teaching and research, provided that the public for which such representations or reproductions are intended is mainly composed of pupils, students, teachers or researchers, that there is no commercial exploitation, and under the obligation of a fair compensation for authors. Works conceived for pedagogic purposes are also excluded from the exception.

Regarding the sui generis database protection (SGDR), Art. L341-1 requires a financial, material or human substantial investment in the constitution, verification or presentation of the database in order to grant the relative right to the maker. In a number of decisions, French courts have applied a low threshold concerning the requirement for substantial investment, although many of them pre-date the 2004 ECJ saga, which established that investments in the creation of the data do not qualify for SGDR protection[347].

Regarding the exceptions and limitation that apply to databases, a few observations can be formulated. Art. L122-5 paragraph 5 of the IPC states that the acts necessary for the purpose of access to the contents of an electronic database and within the limits of the use regulated by contract do not require the author's authorisation. Two elements of the French provision are not present in Art. 6 of the Directive: the limitation only to electronic databases, and the presence of a contract – the directive employs the term *lawful user*, which includes users who lawfully use the database also in absence of contractual provisions.

The French transposition does not explicitly implement Art. 15 of the Directive, which declares null and void any contractual provision in violation of Article 6(1). Regarding the exceptions for illustration for teaching and scientific research[348], the general provision of Article 122-5(e) is applicable to all copyright-protected subject matter and therefore also to databases. The only observation is that the French provision requires fair compensation for such uses, something that the Directive does not mention. As to whether other exceptions and limitations that are traditionally authorised under national law (Article 6(2)(d) of the Directive) are applicable under French law, no specific reference is made in the Code. It seems that an interpretation in line with the general principles of law would admit that pre-existing exceptions that apply to copyright should apply also to databases, as long as those are protected by copyright.

Regarding exceptions to the SGDR, the French legislator took the opportunity to introduce an exception for private purposes for cases of *extraction* of non-electronic databases (Article 342-3(2)), and for extraction and re-utilisation for teaching or scientific research purposes (Article 342-3(4)), although once again requiring fair compensation. The exception for public security or administrative or judicial procedures is to be found in a different part of the Code, which applies generally to all rights covered by that section (copyright, neighbouring rights and the SGDR). The wording of such exceptions is consequently slightly different from that contained in the Directive.

An important observation is the omission by the French legislator in Article L342-3 of provisions dealing with the exceptions and limitations to the SGDR of the lawful user and it should therefore be concluded that such exceptions are available to any user.

Finally, France has introduced a new exception to the SGDR on the basis of the implementation of the Information Society Directive. Such exception applies to legal persons and publicly accessible institutions such as libraries, which are allowed to make extractions and re-use substantial parts of a database for personal consultation by handicapped persons and for non-commercial purposes (Article L342-3(3)).

Germany

The German Copyright Act (UrhG) protects literary, scientific and artistic works, among which it illustratively lists writings, speeches, musical works, choreographies, works of fine art, works of photography, cinematographic works, and illustrations of a scientific or technical nature[349]. The list is non-exhaustive and is followed by a general purpose clause, defining copyright-protectable works as “personal intellectual creations” of their authors[350].

In order to establish that a work is a personal intellectual creation four cumulative criteria are generally considered essential. According to these criteria a work is a “personal creation” (the work has to originate from a person) with an “intellectual content” (an idea that is expressed) in a “perceptible form” (the work needs to be expressed in a form that can be perceived) which has a certain degree of “individuality” (the work has specific characteristics that make it original). This does not mean that works need to be novel or unique, but they need to be creative and individual to the author. Mere ideas are not protected[351].

Art. 4 of the German Copyright Act grants copyright protection to databases, i.e. to collections of works, data, or other independent elements which, by reason of their selection or arrangement, constitute the author’s own intellectual creation[352]. Protection of course does not extend to the constituent elements of the collections or databases, which can be both protected works or unprotected items. The decisive consideration is whether the collection itself constitutes an intellectual creation[353]. Accordingly, the selection or arrangement of the database elements must constitute an intellectual creation and the work must have reached a certain level of originality. This level of originality has to be found in the structure of the database i.e. in the selection or arrangement of its content[354].

According to Article 7 UrhG, the author is the creator of the work. Since a personal creation is required, the author of a work can only be a natural person[355]. It is worthwhile to note that, in German copyright law, transfers of copyright to others are not contemplated as article 29 I UrhG prohibits this type of alienation. However, it is possible to assign rights of use as stated by Article 31 I UrhG.

Authors' exclusive rights are listed in Arts. 15 et seq. and comprise the exclusive rights of reproduction (Art. 16 UrhG), distribution (Art. 17 UrhG), exhibition (Art. 18 UrhG), and the right of communication to the public (Arts. 19 - 22 UrhG). Extremely relevant in the context of this report is a recent addition to the Act, in Art. 38 UrhG, which deals directly with the issue of licensing scientific publications created as a result of public funding and reads as follows:

> *The author of a scientific contribution which is the result of a research activity publicly funded by at least fifty percent and which has appeared in a collection which is published periodically at least twice per year has the right, even if he has granted the publisher or editor an exclusive right of use, to make the contribution available to the public in the accepted manuscript version upon expiry of 12 months after first publication, unless this serves a commercial purpose. The source of the first publication shall be indicated. Any deviating agreement to the detriment of the author shall be ineffective*[356].

This provision is intended to allow the author of a scientific work that is generated in the context of publicly funded – at least 50% – research and published in a periodical collection (at least biannual), to make the accepted version of the manuscript publicly available for non-commercial purposes after an embargo period of twelve months. The right to republish cannot be limited by contractual agreements, which means that even if the author has licensed all her exclusive rights to a publisher, she will still be entitled to the right of republication[357].

Exceptions and limitations to copyright are present in Sec. VI (Arts. 44a to 63a). Of particular relevance for this study is the exception of quotation provided by Article 51 UrhG that allows the reproduction, distribution, and communication to the public of a published work for the purpose of quotation (e.g.: inclusion in an independent scientific, literary or musical work) to the extent justified by such a purpose.

The sui generis database right (SGDR) is implemented in Sec. VI of the Act, Arts. 87a-e. The implementation of the sui generis right follows closely the requirements already seen when analysing the EU framework. Of particular interest in the German implementation is the provision regarding the maker of the database, identified as the person who has made the investment, with no explicit reference to the "risk" factor[358]. However, it has been noted that the *Datenbankhersteller* is in fact the person (including legal person) who bears the risk, as the risk element is implied in the concept of investment[359].

Regarding the level of substantial investment, German courts have fully implemented the ECJ rulings that limit investments to acts connected with the obtaining, verification and presentation of the data, and not with the creation of the data themselves[360]. However, the investment so characterised does not need to be particularly high and even "routine" investments such as the maintenance of the database software, and verification of the entries submitted by third parties qualify[361].

The German Supreme Court (Bundesgerichtshof, BGH) ruled that the extraction of 75% of a database corresponds to a substantial extraction in quantitative terms and therefore violates the scope of the SGDR[362]. Similarly, the same Court found that an extraction of one-tenth of a database's content does not constitute a substantial reproduction in quantitative terms and therefore is permitted by the law[363]. While this type of numerical pointer can prove particularly helpful in determining the boundaries of the right and consequently what constitute a licit reproduction, it must also be borne in mind that investments that are qualitatively substantial can constitute an infringement. Therefore, an extraction of 10%, when this 10% is qualitatively substantial (because it corresponds to a quantitative or qualitative substantial investment) can be found to infringe the SGDR.

Art. 87c lists the limitations to the SGDR and states that acts of reproduction of substantial parts of the database are permissible in cases of private use (but only in the case of non-electronic databases), personal scientific use (but only to the extent justified by that use and for non-commercial purposes), and illustration for teaching (as long as there is no commercial purpose). A general exception to the rights of reproduction, distribution and communication to the public is also permitted for cases of public order such as court proceedings and other authority mandated uses.

The Netherlands

Article 10 of the Dutch Copyright Act (DCA) contains a non-exhaustive list of categories of works that are literary, scientific and artistic works, and are protected under the DCA provided they are sufficiently original. This includes original adaptations (Article 13 DCA). The criterion of originality is not specified in the Act but has been recognised as a requirement for protection by the courts in several cases[364]. "Originality" (or "oorsponkelijkheid") is in Dutch practice typically used as shorthand for a two-pronged test elaborated by the Supreme Court. The work must have an "own, individual character" and "bear the personal stamp of the author"[365].

Exclusive rights of the author are governed by either one of two broad concepts: the right to make a reproduction, or "verveelvoudiging", pursuant to Article 13 DCA and the right to communicate to the public, or "openbaarmaking", pursuant to Article 12 DCA. The right to make a reproduction encompasses two elements: the right to make copies of a work of authorship, and the right to make adaptations, arrangements, interpretations, translations, or any form of conversion of the work into another work. Actually Article 13 of the Act only refers to the second element of the right of reproduction. Because the issue was so obvious to the Dutch legislator, the first element of the right of reproduction is nowhere explicitly provided for in the Act.

Chapter 6 of the DCA contains numerous limitations and exceptions allowing unauthorised use of protected works for different purposes, by different types of users and under different conditions. The most relevant in the context of this study are the right of quotation (Article 15a), the right to use works communicated by or on behalf of a public authority (Article 15b), and the educational use exception (Article 16). Unique to the DCA and relevant in the context of scientific works produced or disseminated by or on behalf of public authorities is Article 15b, which reads as follows:

> *The further communication to the public or reproduction of a literary, scientific or artistic work communicated to the public by or on behalf of the public authorities shall not be deemed an infringement of the copyright in such a work, unless the copyright has been explicitly reserved, either in a general manner by law, decree or ordinance, or in a specific case by a notice on the work itself or at the communication to the public. Even if no such reservation has been made, the author shall retain the exclusive right to have works of his that have been communicated to the public, by or on behalf of the public authorities, appear in the form of a collection.*

This exception is barely invoked in practice and has led since its introduction in the Copyright Act in 1975 to only three judicial decisions[366].

Another exception relevant to the use and dissemination of scientific works is the educational use exception. Long before the implementation of the Directive, the DCA allowed the "taking over of parts of works" for teaching purposes, pursuant to Article 16. Article 16 § 1a gave examples of possible acts falling under the scope of the exception. These include publications, sounds or video recording. Whether these means of reproduction included digital reproduction or online communication was highly uncertain. As a result of the implementation of the Directive, Article 16 of the DCA has been made technology-neutral/independent, so that digital reproductions are also covered, as well as acts of making a work available to the public. Accordingly, all reproductions and communications that comply with the conditions set out in the article are in principle covered. Notably, Article 16 of the DCA contains three additional criteria that do not appear in Article 5(3)(a) of the Directive: 1) the work from which the part is taken must have been published lawfully; 2) the adoption must be in accordance with that which might reasonably be accepted under the rules of social custom; and 3) moral rights have to be observed. In addition, educational use requires that the source of the work used be indicated. Furthermore, and in contrast to the Directive, educational uses have always been and remain permissible under Dutch law provided that an equitable remuneration is paid to the rights owners. Note however, that the Dutch Copyright Act contains no specific research exception.

Pursuant to Article 1a of the Database Act, and in conformity with the Database Directive, a database is protected if it constitutes "a collection of independent works, data or other materials arranged in a systematic or methodical way and which elements are individually accessible by electronic or other means and for which the acquisition, control or presentation of the contents, evaluated qualitatively or quantitatively, bears witness to a substantial investment". Unconvinced of the need to grant protection for databases beyond that provided by the Dutch copyright regime, Dutch courts have tended, since the very adoption of the Database Act, to interpret the requirement of "substantial investment" rather restrictively. Since the ECJ's decision, Dutch courts have followed the ECJ's creation/collection dichotomy and are in general reluctant to conclude that there has been a substantial investment in the absence of clear evidence put forward by the alleged right holder that he incurred substantial costs in the collection, verification or presentation of the content of the database[367].

The beneficiary of the protection is not defined in the Dutch Database Act. There is therefore no reference in the Act to any kind of risk of investing. Dutch commentators seem to agree, however, that the *sui generis* right "should only be conferred as a reward for the risks taken by the innovating industry which actually produce the databases, not the commissioning parties[368]. Other commentators posit that employees, subcontractors or anyone else executing the work without bearing the financial responsibility for the end product cannot be considered as a database right holder[369].

The Database Directive is silent on the issue of the source of the funding or the role of public money in the acquisition of rights. The Netherlands is so far the only Member State to have explicitly regulated the exercise of the *sui generis* rights by public sector bodies. Article 8 of the Dutch Database Act denies a public authority the right to exercise its exclusive database rights unless the right is reserved explicitly by a general mention in an act, order or ordinance, or in a specific case by notification on the database itself or while the database is made available to the public. The specific question of the impact of public funding on the nature of the investment made to produce a database was the object of a ruling from the Raad van State (Dutch Council of State) in the *Landmark* case[370]. In the court of first instance, the District Court of Amsterdam found that the local authorities of Amsterdam could not be qualified as the producer of the database, of which the list of addresses was part, since the production of the database was initiated and financed by the local authorities of Amsterdam, a large part of which was financed by the Ministry of

Housing, Spatial Planning and the Environment. This ruling was confirmed on 29 April 2009 by the Raad van State. The Dutch position is so far unique within the EU.

The Dutch legislator transposed Article 9 of the Directive on permitted exceptions to the database right literally. In addition to these exceptions, the Dutch Database Act contains in Article 8(2) a unique provision, modelled after Article 15b of the Copyright Act. The provision reads:

The right, referred to in Article 2, paragraph 1 shall not apply to databases for which the public authority is the producer, unless the right is expressly reserved either in general by law, order or resolution or in a particular case as evidenced by a notification in the database itself or when the database is made available to the public.

The main rationale behind this provision is that when transposing the Database Directive into Dutch law, the Dutch legislator did not want to put the makers of a database in a better position than authors of copyright-protected works. In other words, since works that are made available by or on behalf of public authorities are covered by the exception of Article 15b of the Copyright Act, there is no reason not to apply a similar exception to databases produced by public authorities.

United Kingdom

In the United Kingdom copyright law is regulated pursuant to the Copyright, Design and Patents Act 1988 (CDPA 1988). The central element of copyright protection is the copyright work characterised as literary, dramatic, musical, and artistic works, films, sound recordings, broadcasts, and published editions (or typographical works). Differently from many other Copyright Acts the UK's lists exhaustively the categories of works that can qualify for copyright protection; that is to say, under UK law a work, in order to enjoy copyright protection, has to fall within one of the eight categories above listed[371].

Scientific works, although representing a heterogeneous class whose components could fall within more than one of the eight mandatory categories aforementioned, will most likely be included in the first one: literary works. Literary works, in fact, are defined as any work, other than a dramatic or musical work, which is written, spoken or sung, and accordingly includes a) a table or compilation other than a database; b) a computer program; c) preparatory design material for a computer program; and d) a database[372]. Literary works are not limited to works of literature, but include all works spoken or written, – with the obvious exclusion of dramatic or musical works – as well as symbols and numerals irrespectively of any quality or aesthetic value[373]. Literary works include explicitly works that are spoken such as lectures, conference talks and key-notes, yet, as indicated by Sec. 3(2), copyright does not subsist in a literary [...] work unless and until it is recorded, in writing or otherwise.

In accordance with the EU framework, the rights granted by the CDPA are the right of reproduction, distribution, communication to the public, adaptation, rental and lending rights, and the right to perform, show or play the work in public. These rights may be available only for some though not all of the protected subject matter, but for our main purpose – scientific works falling within the literary work category – it is safe to assume that all the aforementioned rights are available to right holders[374].

Databases are protected as a distinct class of literary works on the basis of a definition that closely resembles the one provided by the Database Directive. The definition is broad enough to cover most if not all of the material that previously was protected as table and compilations[375]. The sui generis database right was implemented in the Copyright and Rights in Databases Regulations 1997 amending the parts of the CDPA 1988 regarding the protection offered to databases by copyright (Part II) and regulating in detail the SGDR (Part III) following the framework set forth by the EU Database Directive. In particular the database maker is the person who takes the initiative in obtaining, verifying or presenting the contents of a database and assumes the risk of investing in that obtaining, verification or presentation[376]. Fair dealing with substantial parts of a database extracted by the lawful user for the purpose of illustration for teaching or research and not for any commercial purpose and provided that the source is indicated is not an infringement of the database right in a database[377].

The UK, as many common law systems, has a partially different approach to exceptions and limitations to copyright, if compared with the national examples – mostly from civil law tradition – thus far analysed. This difference lies in a general provision allowing a certain number of uses so long as they are "fair". According to Sec. 29 and 30, fair dealing with a [literary, dramatic, musical, or artistic[378]] work does not infringe any copyright in the work so long as the purpose of the fair dealing is: a) research or private study; b) criticisms or review; or c) news reporting. In order to benefit from this copyright infringement liability exemption it must be shown that the dealing (any use of a work) was fair, which is often a matter of "degree and impression"[379]. Factors to be considered in order to establish the fairness of someone's use include whether the work was published, how the work was obtained, the amount taken, the use thereof made, the motives and consequences of the dealing, and alternatives to the dealing, i.e. whether the purpose could have been reached by other means[380]. In addition to the fair dealing provisions, a number of other exceptions and limitations are present in the CDPA. Two that are relevant for our present purpose are contained in Sec. 32 and allow the preparation of copies of a work in the course of, or preparation for, instruction. Another relevant provision, Sec. 50D, implements the EU made rule that the legitimate user of a database does not infringe any copyright when doing any acts which are necessary for the purpose of access and use of the content of the database; this defence cannot be contracted out.

The UK has recently implemented[381] a number of amendments to the CDPA, which are expected to facilitate the conduct of scientific research and analysis. Of particular interest is the new section 29A, which reads as follows:

"29A Copies for text and data analysis for non-commercial research

(1) The making of a copy of a work by a person who has lawful access to the work does not infringe copyright in the work provided that —

(a) the copy is made in order that a person who has lawful access to the work may carry out a computational analysis of anything recorded in the work for the sole purpose of research for a non-commercial purpose, and

(b) the copy is accompanied by a sufficient acknowledgement (unless this would be impossible for reasons of practicality or otherwise).

(2) Where a copy of a work has been made under this section, copyright in the work is infringed if —

(a) the copy is transferred to any other person, except where the transfer is authorised by the copyright owner, or

(b) the copy is used for any purpose other than that mentioned in subsection (1)(a), except where the use is authorised by the copyright owner.

(3) If a copy made under this section is subsequently dealt with —

(a) it is to be treated as an infringing copy for the purposes of that dealing, and

(b) if that dealing infringes copyright, it is to be treated as an infringing copy for all subsequent purposes.

(4) In subsection (3) "dealt with" means sold or let for hire, or offered or exposed for sale or hire.

(5) To the extent that a term of a contract purports to prevent or restrict the making of a copy which, by virtue of this section, would not infringe copyright, that term is unenforceable."

The provision basically clarifies that making a copy of a work for the purpose of text and data mining (TDM) is not an infringement of the copyright in the work provided that this is made for the sole purpose of research for non-commercial purposes. The provision has also the upside to make clear that any contractual agreement that has the effect of limiting the possibility of making copies under this provision is unenforceable. The exception does not cover the SGDR, however. It is the opinion of the UK government that the SGDR's fair dealing exception for non-commercial scientific uses offers a parallel defence adequate to the present needs[382].

United States of America

The intellectual property clause of the U.S. Constitution authorises Congress to enact copyright legislation with the objective to promote science and useful arts by giving authors the exclusive rights to their writings for a limited time[383]. The present Copyright Act, which was last given a comprehensive update in 1976, rests on this constitutional basis[384]. Sec. 102 of the Copyright Act affords copyright protection to original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.

The section proceeds with non-exhaustive lists of examples of what can constitute a work of authorship: literary, musical, dramatic, choreographic, pictorial, audio-visual, architectural works, and sound recordings[385]. The concept of originality under U.S. copyright law has been defined as requiring a modicum of creativity, therefore excluding from protection the mere investment of time and effort in the creation of works (the so-called "sweat of the brow" doctrine)[386]. Significantly, the second part of Sec. 102 excludes from protection any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work. Another major area where copyright cannot apply is in United States government works: Sec. 105 establishes that copyright protection is not available for any work of the United States Government[387].

Any work created by an officer or employee of the US government as part of that person's official duties is not subject to copyright within the United States. Consequently, the majority of works, including original databases, produced by US government agencies are in the public domain and can be used and re-used for any purpose without fear of copyright infringement. Two main limitations to this rule need, however, to be noted: a) the rule applies only to works of the US federal government – the works of states and local authorities are protected by copyright; b) the rule operates only for US works and only within US borders – the US government reserves the right to enforce copyright in its own works outside the United States[388]. US copyright grants authors the exclusive rights to reproduce their work in copies and phonorecords; to prepare derivative works based on the copyrighted work; to distribute copies to the public by sale, rental, lease or lending; and to perform and display the work publicly[389].

Among the main innovations that the present Copyright Act introduced was the codification of the so-called "fair use" doctrine. The fair use doctrine was originally developed by US courts and only later codified in § 107 of the Copyright Act 1976. The doctrine is characterised by an open-ended list of purposes for which the use of a work may be regarded as fair, marked by the words 'such as', and by four factors to be considered in determining whether or not a particular use is fair.

A recent application of the fair use doctrine can be seen in two cases that involved the Google Books project. The "Google Books Program" actually consists of two components: the "Partner Program" involving the hosting and display of material provided by book publishers or other rights holders, and the "Library Program" involving the digital scanning of books in the collections of several public and university libraries. These programmes entail several activities, including making text available with rightsholder authorisation, and offering the tools for online searching of the content of the books and displaying snippets of the books. *Whether the display of "snippets" is fair use in Authors Guild v. Google is still to be determined, as the case is currently on appeal to the Second Circuit.*

After the rejection of a proposed settlement between The Authors Guild and Google, The Authors Guild continued its lawsuit against Google and at the same time sued HathiTrust, a partnership of major academic research libraries that relies on Google Books Search to create a digital archive of library materials (the HathiTrust Digital Library, or "HDL"). Works within the HDL are used for three purposes: (1) full-text searches; (2) preservation; and (3) facilitating access for print-disabled persons. In both cases, a District Court had to determine whether digitisation of books is a fair use of copyrighted material. The decisions were rendered by different judges (on October 10, 2012[390] and November 14, 2013[391] respectively), both of whom ruled against the Authors Guild and in favour of applying the fair use doctrine.

The Mass Digitisation Project is referred to in the Authors Guild, Inc. et al v. Hathitrust et al case[392] and is a project through which Google creates digital copies of works in the Universities' libraries in exchange for which Google provides digital copies to Hathitrust. Considering the different goals of the Mass Digitisation Project under the first fair-use factor[393], the Court stressed that these were to be considered as transformative uses, referring – amongst others – to the new areas and methods of research, such as text mining, that the digital copies enabled. Although one might have expected Google's fair use defence to be weaker than the libraries', Judge Chin in *Authors Guild v. Google* equally ruled that Google's use of the copyrighted works in the context of its book scanning and indexing project constitutes "fair use" under copyright law. The court reasoned that Google's digitisation of books is "highly transformative," adds value, serves several important educational purposes, and may enhance the sale of books to the benefit of copyright owners.

The fact that Google Books facilitates search, offering an important tool for readers, scholars, researchers, libraries and others to identify and find books, and opens up new fields of research, in particular through text mining, was put forward to demonstrate the transformative character of Google's use of the copyrighted works. In *Authors Guild v. HathiTrust*, the Court refers in a footnote to text mining, noting that "[m]ass digitisation allows new areas of non-expressive computational and statistical research". This may or may not apply to copying entire digital databases that are already "mass digitised" and created for purposes that include text mining. Admittedly, the Court did not address any intermediate copying activities by TDM researchers themselves. However, considering the outcome of both *Authors Guild v. HathiTrust* and the lower court decision in *Authors Guild v. Google* – concluding that HathiTrust and Google's use of the copyrighted works qualified as fair use – there is precedent indicating that copying acts by TDM researchers for the purpose of extracting non-expressive metadata, within certain parameters, could be considered fair use under US law. However, as is true of all fair use cases in the US, these decisions are highly dependent on the particular facts before the courts. Moreover, these cases are not binding on federal courts outside the Second Circuit.

Canada

The Canadian Copyright Act[394] regulates copyright at the federal level since its original enactment in 1921[395]. Protection is afforded to every original literary, dramatic, musical, and artistic work and grants the exclusive rights to produce or reproduce the work or any substantial part thereof in any material form whatever, to perform the work in public or, if the work is unpublished, to publish the work or any substantial part thereof[396]. The Supreme Court of Canada has ruled that an original work is the expression of an idea through an exercise of skill and judgment[397].

Contrary to the United States, where works produced by the federal government are not protected by US copyright law, Canada's Copyright Act provides that copyright in works prepared or published by or under the direction or control of Her Majesty and save an agreement to the contrary belongs to the crown, and is exercised in Canada by the government. It is worth noting, however, that the Canadian government has waived the enforcement of copyright in relation to laws and decisions of federal bodies and courts, and many provincial governments have followed this path[398]. Furthermore, many Departments who administer Crown copyright for material they create implement a policy whereby permission is not required for certain specified uses of Crown copyright material (e.g., for personal or non-commercial purposes), unless otherwise specified in the material.

The scope of protection under the Canadian Copyright Act includes the right to reproduce the work in a material form, to publish the work, to perform the work in public, to communicate the work to the public by telecommunication, and to make an adaptation of the work[399]. The Act has contained a fair dealing exception since its initial adoption in 1921. To be exempted under the fair dealing exception, the purpose of the dealing must qualify as one of the allowable purposes under the Copyright Act, and the dealing must be fair. The Copyright Act underwent changes in 2012, which included provisions to implement the WCT, as well as new or expanded exceptions (for example, education, parody, and satire were added to the previous allowable fair dealing purposes, namely research, private study, criticism, review or news reporting) and remedies[400].

A first element in the assessment of whether a dealing is "fair" is to consider whether it falls under one of the allowable purposes of the Copyright Act. In *CCH Canadian Ltd. v Law Society of Upper Canada*, a landmark case[401], the Court was asked to decide upon the application of the fair dealing defence for purposes of research and private study. The Court ruled that 'these allowable purposes should not be given a restrictive interpretation or this could result in the undue restriction of users' rights' (para. 54). The Court in *CCH* also stated that the allowable purposes must be given a "large and liberal interpretation", and that "research" is not limited to non-commercial or private contexts (para. 51)[402].

Secondly, the dealing must be fair. Whether a dealing is "fair" depends, in addition to the purpose of the use, on a series of criteria set out by the courts and to be assessed on a case-by-case basis, including the character and amount of the dealing, the nature of the work, the existence of any alternatives to the dealing, and the effect of the dealing on the work. A recent line of jurisprudence from the Supreme Court of Canada interpreting the criteria of the "fair dealing" defence has prompted some commentators to see in this development a subtle move towards an American-style "fair use" defence[403].

Whether TDM is fair dealing would depend on the specific facts of each individual case to which a court would apply the conditions mentioned above. TDM would need to fall under one of the enumerated purposes and be "fair'. Knowing that the Supreme Court has twice reiterated the importance of allowing fair dealing for purposes of research and private study, TDM activities could, under the appropriate factual circumstances, qualify as fair dealing under the new Canadian copyright regime.

Australia

According to the Australian Copyright Act, copyright subsists in an original literary, dramatic, musical, or artistic work published or unpublished[404]. Copyright gives the author of a literary, dramatic, and musical work the exclusive right to reproduce the work in a material form, to publish the work, to perform the work in public, to communicate the work to the public, and to make an adaptation of the work[405]. Reproduction arises when one such work is copied in any material form, where material is to be interpreted as including any visible or non-visible form of storage, irrespective of whether the work is stored in a form that itself could be reproduced (therefore including e.g. RAM copies)[406]. In particular, Sec. 21(1A) establishes that a work is reproduced if it is converted into or from a digital or other electronic machine-readable form. The right of publication consists in the right of distribution and a work is published only if reproductions of it have been supplied to the public by sale or otherwise[407]. The Copyright Amendment Act of 2000 has introduced in Australia a general right of communication to the public, defined as the right to make available online or electronically transmit a work or subject matter[408].

Fair dealing for the purpose of research or study does not constitute an infringement of the copyright in the work [409]. The meaning of research and study in relation to fair dealing defence has been analysed in detail by the Court of Appeal[410]. Interestingly, Sec. 40(1A) establishes that fair dealing with a literary work (other than lecture notes) does not constitute an infringement of copyright if it is for the purpose of, or associated with, an approved course of study or research by an enrolled external student of an educational institution. Lecture notes are defined as any literary work produced for the purpose of the course of study or research by a person lecturing or teaching in or in connection with the course of study or research[411].

In order to determine whether the dealing for the purpose of research or study was fair, Subsection 2 lists, for the purpose of illustration: the purpose and character of the dealing; the nature of the work; the possibility of obtaining the work within a reasonable time at an ordinary commercial price; the effect of the dealing on the potential market for the work; and the amount and substantiality of the part copied in relation to the whole work – in cases of only partial reproductions. A special case is introduced for reproductions, for the purpose of research or study, of all or part of a literary, dramatic or musical work contained in an article in a periodical publication. This case is considered to be fair dealing – i.e. regardless of an evaluation of the elements established by Subsection 2 – for the purpose of research or study unless another article in the publication is also reproduced for the purpose of different research or a different course of study[412].

Another special case where the finding of fairness in the dealing is irrespective of the elements listed in Subsection 2, is provided by Sec. 40(5). It establishes that a reproduction for the purpose of research or study of not more than a reasonable portion (usually a 10% or a chapter) of a published work such as a literary work of at least 10 pages is taken to be a fair dealing with the work for the purpose of research or study. The provision of Subsection 5 does not apply to computer programs or electronic compilations such as databases.

Other cases of fair dealing on top of research and study include criticism or review, parody or satire, and news reporting[413]. The Australian Copyright Act also provides for a number of specific exceptions to copyright (“Acts not constituting infringement of copyright”) in Divisions 3 to 5, which include a variety of cases ranging from copies for private use and copies made by educational establishments, to temporary reproductions made in the course of communications, which however are not particularly relevant for our present purpose.

Unlike the U.S. and Canada – where as seen, and for different reasons, fair use and fair dealing are considered flexible instruments – the Australian fair dealing exception has not received such a broad interpretation from the courts. The Australian Law Reform Commission received Terms of Reference for the Copyright Inquiry on 29 June 2012. The ALRC was asked to consider whether exceptions and statutory licences in the *Copyright Act 1968* are adequate and appropriate in the digital environment and whether further exceptions should be recommended. The Final Report was tabled in Parliament on 13 February 2014[414].The report discusses at length the comparative benefits and drawbacks of introducing a fair use defence or amending the fair dealing defence. The Report contains 30 recommendations for reform. The key recommendation is for the introduction of a fair use exception to Australian copyright law. Only the future will tell whether the Australian Parliament will go that far.

Israel

The Israel Copyright Act of 2007 grants protection to any original literary, dramatic, musical, or artistic work, if the work is fixed in any form[415]. Sec. 5 of the Act states that ideas, procedures and methods of operation, mathematical concepts, facts or data, or news of the day are not protected by copyright, which however can subsist in their expression[416]. The case law indicates, however, that in addition to originating in an author, a work must show some creativity to attract copyright[417]. In particular, the Supreme Court found that a scholar deciphering fragments of old and damaged scrolls and reconstructing missing parts performed a copyright protectable activity even though his intent was to restore the text to its prior state, because such reconstruction required creativity and discretion in choosing among alternatives[418].

According to Sec. 11, an author enjoys the right of reproduction, publication, public performance, broadcast, making available to the public, making a derivative work, and rental. In particular, reproduction is defined as the right to make a copy of the work and includes storage of a work through electronic or any other technological means, making a three-dimensional copy of a two-dimensional work and the other way around, and making a temporary copy of a work[419]. The right of publication, that is the right to publish a reasonable quantity of copies of the work, taking into consideration the character of the work, serves as the right of distribution[420].

The 2007 Act shifted Israeli copyright law from a British ‘fair dealing’ framework to an American ‘fair use’ framework, accompanied by an additional list of exceptions. Traditionally, the ‘fair dealing’ defence is in principle much narrower than the US inspired ‘fair use’ defence. The main difference lies in the fact that the purposes for which the defence is admissible are enumerated exhaustively in the act[421]. Fair dealing is therefore not an open norm and the interpretation of the purposes listed in article 2(1)(i) of the former Act by the Israeli courts gave rise to some tension in the years preceding the copyright reform. Since the amendment of 2007, the Israeli Copyright Act contains an open-ended fair use defence that can be invoked in a wide variety of cases and situations. Article 19 of the Copyright Act of 2007 is modelled after section 107 of the US Copyright Act of 1976 but contains an interesting feature in paragraph (c), according to which the Minister may make regulations prescribing conditions under which a use shall be deemed a fair use.

The purposes that a court should consider in order to determine whether a dealing was fair for the purpose of private study or research are listed in Sec. 19(b) and *include* the purpose and character of the use, the character of the work, the scope of the use, in both quantitative and qualitative terms, and the impact of the use on the potential market of the work. Importantly, the list is non exhaustive and courts have considered the attribution to the author or copyright owner as an important additional factor[422].

The amendments of 2007 were limited not only to the implementation of the fair use defence. An extensive number of additional exceptions were introduced in the Israeli Copyright Act covering a number of different uses of works, none of which are directly applicable to TDM activities. The new Israeli fair use provision has yet to be tested in a TDM case. At this time, it is impossible to predict how a judge would rule on the issue, but it is fair to say that in rendering judgment in new situations Israeli courts tend to look at American case law for inspiration.

Japan

The Japanese Copyright Act 1970[423] defines its overall purpose as that of securing protection of [copyright] paying due regard to fair exploitation of cultural products and in order to contribute to the development of culture[424].Works are defined as productions in which thoughts or sentiments/emotions are expressed in a creative way and which fall within the literary, scientific, artistic or musical domain, such as theses and lectures, figurative works of a scientific nature, and computer programs[425]. Collections of works and databases are explicitly protected under the conditions seen above in the Section dedicated to international protection[426].

Arts. 21 to 27 regulate the scope of protection of copyright, which include the rights of reproduction, distribution, adaptations and translation, rental and lending rights and public performance. The right of reproduction is defined by Art. 21 as the right to reproduce a work in a tangible form by means of printing, photography, copying, sound recording, visual recording or other methods. Temporary reproductions and reproductions for private use are exempted[427]. Art. 26-2 regulates the right of distribution, i.e. the right to control the exploitation of copies of works by making them available to the public by way of the assignment of the original copies.

Arts. 30 to 50 constitute Subsection 5, which is dedicated to exceptions and limitations to copyright. Of particular interest for our purpose is certainly Art. 30(4), introduced in 2012, which allows a publicly disclosed work to be used as needed for the development of technology and in experiments to test audio or visual recording devices[428].

Another amendment, of 2009[429], introduced, alongside other limitations an exception aimed at boosting Japan's internet economy,[430] an exception specifically designed to permit TDM. Article 47*septies* of the Copyright Act[431] contains an explicit provision to allow text mining, which reads:

> *For the purpose of information analysis ('information analysis' means to extract information, concerned with languages, sounds, images or other elements constituting such information, from many works or other much information, and to make a comparison, a classification or other statistical analysis of such information; the same shall apply hereinafter in this Article) by using a computer, it shall be permissible to make recording on a memory, or to make adaptation (including a recording of a derivative work created by such adaptation), of a work, to the extent deemed necessary. However, an exception is made of database works which are made for the use by a person who makes an information analysis.*

A report issued by the subdivision on Copyright of the Council for Cultural Affairs in January 2009 presents the following examples of information analysis: (1) website information analysis and language analysis in which the use of a specific language or character string is analysed and statistically processed and (2) sound analysis and video/image analysis in which the meaning of the sound wave, video, character string, etc., comprising a certain sound, video, image, etc., is analysed. Although the types of works subject to this provision are not limited, the reverse engineering of computer programming falls outside the scope of this exception: reverse engineering cannot be regarded as "information analysis" because no statistical analysis is conducted.

The wording of the last sentence of the provision may be due to difficulties in translation. According to the AIPPI report of the Japanese Group, when the results of information analysis are presented, it is prohibited to exploit the works subject to the information analysis. The results may be presented or provided only if the results are presented or provided in the form of statistical data, etc., in which the works subject to the analysis are not exploited.

Recently, Japan has seen the introduction of new services that enable users to search and analyse users' comments on the Internet including blogs, review sites and social media. The establishment of said Article is one of the factors that have promoted the emergence of those new services[432].

Database related provisions were introduced in Japanese Copyright Law for the first time in 1986. The Japanese legislator considered that separate protection from that afforded to compilations under copyright law should be afforded to (electronic) databases, and decided to introduce provisions specifically drafted for electronic databases into the Copyright Law. Based on this distinction between compilations and databases, it was thought that databases that should be protected under the new provisions were computer-searchable databases, and at the same time, because creativity of their data arrangement does not need to be protected, electronic databases are excluded from the definition of “compilations.” Art.2(1)(xter) of the Law defines the term “database” as “an aggregate of information such as articles, numerals or diagrams, which is systematically constructed so that such information can be searched for with the aid of a computer.”

The Japanese Copyright Law does not give any indication about whether the reproduction of a “portion of” a database constitutes an infringement of the database. However, it seems that because a database or compilation can enjoy copyright protection for the very reason of “the selection or arrangement of their contents” (compilations) or “the selection or systematic construction of information”(databases), whether a reproduction of a “portion” of a compilation or database is allowed or not should be judged by answering the question whether the selection or systematic construction of information was reproduced or not (for an electronic database) or whether the selection or arrangement of their contents was reproduced or not (for a non-electronic database)[433].

South Korea

The Copyright Act of the Republic of Korea protects the creations of human ideas or emotions, as long as the ideas or emotions are expressed that can be perceived and the creations are original[434].Copyright subsists in a variety of works of authorship ranging from literary works to computer program works[435].

The Copyright Act provides for authors, in addition to moral rights, exclusive rights of reproduction, public performance, public transmission, exhibition, rental and adaption[436]. Reproduction comprises not only the act of fixation but also the act of making copies, whether permanent or temporary. The broader concept of public transmission includes, in particular, broadcasting, interactive transmission and digital audio transmission. Distribution is defined as the act of transfer or rental of originals or copies in tangible format to the general public[437].

The Copyright Act also provides limitations and/or exceptions to authors' exclusive rights in Article 23 through 36. Relevant for this report are Article 25 (use for school education), Article 29 (quotation), Article 31 (use by libraries or archives) and Article 35-3. Article 25 permits to publish works made public in school textbooks for primary and secondary schools and to use a portion of works made public by designated educational institutions for teaching purposes under certain conditions. According to Article 28, anyone can quote works made public for news reporting, criticism, education and research, etc., provided that the quotation is within a reasonable limit and compatible with fair practices. Libraries and archives are exempted from liability for use of the books held by them under certain conditions and circumstances as referred to in Article 31. The Republic of Korea introduced a U.S. type fair use clause, i.e., Article 35-3 in 2011 when the Copyright Act was amended to comply with Korea-U.S. FTA obligations. According to the Article, it is permissible to use works for news reporting, criticism, education and research, etc., when such use does not conflict with the normal exploitation of works and does not unreasonably prejudice the legitimate interests of the author. Factors in determining the use as fair to be considered: the purpose and character of the use, including whether such use is for profit or non-profit purposes; the type and purpose of the work; the amount and substantiality of the portion used in relation to the work as a whole; and the effect of the use on the present or potential market for or value of the work.

Compilations are protected as original works of authorship, if they are creative in selection, arrangement or composition of their contents. Databases are defined as compilations of which their contents are arranged or composed in a way that anyone can individually access or search such contents.[438]

Thus original databases are protected by copyright, as they meet such conditions. Non-original databases fall under statutory subject matter of protection in accordance with the new Chapter IV introduced in 2003. The database producer who makes a considerable investment in human or material resources for the production of a database, or renewal, verification, or supplementation of their contents has the rights of reproduction, distribution, broadcasting or interactive transmission[439]. A foreign national can be a beneficiary of sui generis protection on the condition of reciprocity, if he or she is protected in accordance with a treaty to which the Republic of Korea has acceded[440]. The rights of the database producer are limited more broadly than copyrights, as the limitations and exceptions to copyright are applicable mutatis mutandis to the rights of the database producer on the one hand, and the use of the whole or substantial portion of the database is permissible for educational, academic or research purposes, or for reporting current events on the other hand[441]. The term of protection is renewable 5 years[442].

Conclusion

This brief overview of the copyright and, where applicable, database legislation in force in several jurisdictions shows that the scope of protection granted to research output varies significantly from one country to another. Although the implementation of OA principles is based on contractual arrangements between authors, publishers, and universities, the framework set by the copyright regime is a determinant factor in how those arrangements take form. The ways in which copyright law defines the scope of rights and limitations and exceptions to them serve as the ground rules for licensing agreements. If they are to support OA, whether access is granted through the 'Golden' or the 'Green Road' (see section below), copyright regimes should create a favourable environment for the dissemination and re-use of publicly funded scholarly publications.

Open Access Policies

In this section we pay closer attention to OA Principles and their implementation in practice. The first subsection discusses what Open Access means, with a succinct review of the main principles and implementation options. The second subsection takes a brief look at the OA policies in two regions in the world, Europe and the United States.

Defining Open Access

Publicly funded scientific research constitutes an essential building block for further progress and innovation, one that is often seen as a collective good. For this reason, a common assumption is that, for the greater good of science and the public interest, publicly funded research should be made accessible without restriction. This principle of unfettered access also entails the freedom to use and re-use publicly funded scientific research.

The term 'open access' was first formally defined at a meeting in Budapest in early December 2001. Out of that meeting came the so-called Budapest Open Access Initiative[443] and 'open access' was defined as the 'free availability of scientific literature on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.' The Budapest Open Access Initiative was followed up some 15 months later by the Bethesda Statement[444], which came out of a one-day meeting of scientists, funding agencies, librarians, scientific societies and publishers, held in April 2003. In October of the same year, the Max Planck Society in Germany convened a meeting on 'open access to Knowledge in the Sciences and Humanities.' This meeting widened the discussion to include the humanities and produced the 'Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (October 2003)'[445].

OA material can potentially include original scientific research results, like articles and monographs, as well as raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material. On the basis of the Berlin and Budapest statements and initiatives, the three following essential characteristics of OA emerge: free accessibility, further distribution, and proper archiving[446]. The Berlin Declaration gives a definition of a contribution that qualifies as open access:

> *1. The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, worldwide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship (community standards, will continue to provide the mechanism for enforcement of proper attribution and responsible use of the published work, as they do now), as well as the right to make small numbers of printed copies for their personal use.*
>
> *2. A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards (such as the Open Archive definitions) that is supported and maintained by an academic institution, scholarly society, government agency, or other well-established organisation that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving.*

Since the lack of access to complete literature can impede advances in knowledge, the main thrust of the Declaration lies in the creation of a new 'open access' business model for scientific publishing or, in the absence of this, of institutional repositories where all scientific and scholarly publications are to remain freely accessible. According to the Berlin Declaration, the only main constraint on reproduction and distribution of articles should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. The principles set out in the Berlin Declaration are primarily aimed at governments, universities, research institutions, funding agencies, foundations, libraries, museums, archives, learned societies and professional associations. Remarkably, neither publishers nor authors are listed in this enumeration[447].

These principles are transposed into reality following two main roads: the 'Golden road' and the 'Green road' of open access publishing. The two roads to open access should not be confused, for they are complementary to each other. Under the 'Golden road', journals directly provide free open access to their journals and articles. As the Berlin Recommendation of 2003 implies, the 'Golden road' is the preferred way for the full deployment of the open access principles. This Recommendation states that "in order to implement the Berlin Declaration institutions should: implement a policy to require their researchers to deposit a copy of all their published articles in an open access repository; and encourage their researchers to publish their research articles in open access journals where a suitable journal exists and provide the support to enable that to happen"[448].Open Access journals are usually licensed under one of the six core Creative Commons (CC) licences, preferably under the most liberal type, e.g. a CC- Attribution Licence 4.0[449]. Among the more successful open access journal and databases are the *Public Library of Science* (PLOS)[450], Biomed Central[451] and the open access alternative offered by Springer Open Choice Publishing[452].

The 'Green road', by contrast, centres on self-archiving of articles published through traditional channels, where authors provide access to their own published articles by making their own e-prints free for all. Open access self-archiving is *not* self-publishing; nor is it about online publishing without quality control (peer review); nor is it intended for writings for which the author wishes to be paid, such as books or magazine/newspaper articles. While the Green Road does meet the main OA requirements, namely free access, possibility to copy, use, distribute the work and permanent archiving, the fact that the publications are first published through traditional channels means that authors only retain limited rights on their publication/data. Self-archived articles are usually accompanied by the text of a licence telling users what they can and cannot do with the article. As a result, it is most often unclear whether self-archived articles can be distributed, re-used or modified. By contrast, releasing research results along the Golden Road ensures a better access, clearer re-use possibilities, visibility and 'fundability' of research output on the internet[453].

European Open Access Policy

On July 17, 2012, the European Commission published its Communication to the European Parliament and the Council entitled 'Towards better access to scientific information: Boosting the benefits of public investments in research'[454]. As the Commission observes, 'discussions of the scientific dissemination system have traditionally focused on access to scientific publications — journals and monographs. However, it is becoming increasingly important to improve access to research data (experimental results, observations and computer-generated information), which form the basis for the quantitative analysis underpinning many scientific publications'[455]. The Commission emphasises that through a more complete and wider access to scientific publications and data, innovation will accelerate and researchers will collaborate more so that duplication of effort will be avoided. Moreover, open research data will better enable subsequent researchers to build on previous research results.

The Communication marks an official new step on the road to open access to publicly funded research results in science and the humanities in Europe. Scientific publications are no longer the only elements of an open access policy: research results upon which publications are based must now also be made available to the public. To implement this policy, the European Commission set up a pilot initiative on Open Access (OA) to peer reviewed research articles in its Seventh Research Framework Programme (FP7), otherwise known as the OpenAire project, to ensure that the results of the research it funds are disseminated as widely and effectively as possible to guarantee maximum exploitation and impact in the world of researchers and beyond[456]. OpenAire pursues three objectives: to build support structures; to establish and operate an electronic infrastructure; and to manipulate research datasets. All of this under open access conditions.

Following on from this, the Commission agreed that open access to scientific publications should be a general principle of the current Horizon 2020 research framework programme. In the model grant agreement for Horizon 2020, the Commission states that, in addition to scientific publications, the beneficiaries must deposit the data and associated metadata that are needed to validate the results presented in scientific publications in a research data repository as soon as possible. The beneficiaries must also take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate the data, free of charge for any user. In all cases, the Commission also encourages authors to retain their copyright and grant adequate licences to publishers.

The European Open Access Policy is not binding on the Member States who are free to adopt the policy that best suits the needs of their own scientific community. This leads to a mosaic of open access policies across Europe, ranging from the mandatory 'Golden Road' for publications and data put in place by the Research Councils of the United Kingdom (RCUK), to the 'Green Road' for publications and data of the Netherlands, to the 'Green Road' for publications in Germany and to other more equivocal policies in a number of Member States. In the recent years, the national research councils of the UK and the Netherlands have issued policy statements according to which research grants will be awarded only provided that the applicants commit to publishing their results, both publications and data, under OA conditions.

Open Access in the United States

Since 2008, all publications that arise from National Institutes of Health (NIH) funds have to comply with the NIH Public Access Policy. The policy requires the final peer-reviewed paper to be deposited in PubMed Central, NIH's digital full-text archive, upon acceptance for publication, with an indication of when, within a period of 12 months (the so-called embargo period), the paper will become accessible to the general public[457]. More recently, thanks to a US government directive issued by the Office of Science and Technology Policy [Public Access Directive], all federal agencies with more than USD 100 million in research and development expenditure are required to develop plans to make the published results of federally funded research freely available to the public within one year of publication[458].

However, the NIH Public Access Policy does not specify under which conditions users may reuse the publications and data made available on the website. This means that PubMed Central users can only reuse the works in accordance with the copyright law of their own jurisdiction[459]. In fact, while it may be possible to reproduce the paper for private or research purposes (make copies), it may not be possible to redistribute the paper (post it on one’s own website) nor to modify the paper, outside what is allowed by fair use or other exceptions or limitations to copyright law. All these rights remain within the author's domain or, more often, within the publisher's. The Directive specifically calls for agencies to implement measures to prevent the unauthorised mass redistribution of scholarly publications[460]. Consequently, users enjoy public access, but not open access[461].

In some cases, data mining or bulk downloading is prohibited and enforced purely on the basis of contractual terms. For example, the NIH PubMed Central Public Access Policy prohibits the use of crawlers or systematically downloading articles that are individually available for public access on their repositories, referring to copyright restrictions[462]. However, in May of 2013, President Obama issued a Policy Memorandum, “Open Data Policy – Managing Information as an Asset”. The Policy Memorandum requires U.S. federal agencies to manage information created, collected, processed, disseminated, or disposed of, by or for the United States Federal Government as an asset throughout its life cycle to promote openness and interoperability, and properly safeguard systems and information. Under the Policy Memorandum, federal agencies are required to make data publicly available and fully reusable to the widest range of users for the widest range of purposes permitted by law – subject only to privacy, confidentiality, security, or other valid restrictions. Data is to be provided in convenient, modifiable, machine-readable, non-proprietary, publicly available, open formats that permit retrieval, downloading, indexing, searching and reuse. Data must be described fully so that consumers have sufficient information to understand and make effective use of federal data. Primary data is to be published in its complete form in a timely manner, and agencies must designate points of contact to assist with data use and to respond to complaints about adherence to federal open data requirements[463].

Unresolved Issues

OA principles entail more than just granting access to research data with limited or no restrictions. The core of OA principles aspire to make research data available for any type of re-use by any user. What are the implications of applying OA principles to research results that are not funded entirely by public money? How does the funding of research by public/private partnerships affect ownership of the data and the licensing conditions applied? To what extent is copyright law implicated by ‘Text and Data Mining’ (TDM) and what is the role of OA principles?

Public/Private Partnerships

Ownership issues may arise in cases of research outputs from public/private partnerships. The funding of a research project through external sources, whether public or private, usually leads to the application of different rules of ownership. For copyrightable research outputs, the parties may elect to contract around copyright law. A contract typically involves at least three parties: the author, the university or other research institutions and the sponsoring or commissioning party. Depending on the law, the internal policy of the institution or on the bargaining position of the respective parties, the copyright ownership may be transferred either to the university or to the external entity.

The issue of rights ownership is very important in the context of public/private partnerships because it can greatly influence the manner in which research output will be published: either through traditional channels with a full reservation of copyright, or through ‘Green’ or ‘Golden Road’ OA.

Although the possibility exists under the Creative Commons licensing system to restrict use for commercial purposes, the distinction between commercial and non-commercial use in the Creative Commons licences raises pressing questions not only in the scientific publishing sector, but also in several other sectors of the copyright industry, because it leaves much room for interpretation. For example, for the purposes of an OA contribution, would the ‘responsible purpose’ referred to in the Berlin Declaration include a commercial use? Would a pharmaceutical company’s distribution among thousands of physicians of an OA scientific article promoting its product fall under such a ‘responsible purpose’?

Text and data mining

TDM is an important technique used in science and other disciplines for analysing and extracting new insights and knowledge from the exponentially increasing store of digital data (‘Big Data’), which is certain to become more important as researchers acquire the skills and the technology to address and investigate datasets of increasing size, complexity and diversity in all media: text, numbers, images, audio files and in any other form.

The uncertainty in current legal frameworks regarding the scope of protection of works and databases is bound to create obstacles to TDM activities. A system resting solely on licensing agreements might be insufficient to allow TDM to take place in all instances where it would be socially desirable. Firstly, because only a portion of the databases that are interesting for TDM research may be offered as part of publishers’ subscription agreements and an even smaller portion could be available under OA conditions. If TDM were allowed to take place without restriction, transaction costs would be lower. Otherwise, some databases may remain out of reach of researchers. Moreover, transaction costs would rise if researchers had to reconcile the terms and conditions of non-standard or non-interoperable licenses.

Private actors are not subject to any obligation to open up or share their data with third parties. Even in situations where such data does not enjoy any special copyright or database protection, restrictions on the (re-)use may flow from contractual requirements (in terms and conditions) set by the holder of the data or from the application of technological protection measures.

It is against this background that the United Kingdom has recently introduced a specific exception in the Copyright, Designs and Patent Act to allow TDM activities for non-commercial research to take place without the rights holder’s prior authorisation under the conditions stated in the law. Together with the Japanese provision, the UK provision is a step towards facilitating scientific research that may in time be followed by other jurisdictions.

NOTES

284 This chapter is based on a background paper prepared by L. Guibault and T. Margoni, DSTI/STP(2014)37. The background paper, in turn, was based in part on L. Guibault and A. Wiebe (ed.), *Safe to be open : Study on the protection of research data and recommendations for access and usage*, Göttingen: Universitätsverlag Göttingen, 2013.

285 See for example the TIP interim report draft of the OECD Open Science project: DSTI-STP-TIP(2014)9-ENG, in particular the section "The impacts of Open Science: an Overview".

286 OECD Principles And Guidelines For Access To Research Data From Public Funding, Paris, OECD, 2007; Communication of the European Commission on scientific information in the digital age: access, dissemination and preservation, COM(2007)56, Brussels, 14.2.2007.

287 Id.

288 See L. Guibault, 'Owning the right to open up access to scientific publication', in L. Guibault, C. Angelopoulos, *Open Content Licensing: From Theory to Practice*, Amsterdam University Press, 2011, p. 137-167.

289 See Art. 2(1) of the Berne Convention for the Protection of Literary and Artistic Works, signed in Berne, Switzerland on 9 September 1886. As of 2014 the Berne Convention has been ratified by 167 countries, including all OECD members.

290 See Art. 2 "Scope of copyright protection" of the World Intellectual Property Organization (WIPO) Copyright Treaty, adopted in Geneva on December 20, 1996; and Art. 9(2) "Relation to the Berne Convention" of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), signed in Marrakesh on 15 April 1994, as Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization. The two provisions are virtually identical, with the only difference being the presence of the auxiliary "shall" in the TRIPS definition.

291 See e.g. the U.S Supreme Court decision in Harper & Row v. Nation Enterprises, 471 U.S. 539 (1985) "copyright's idea/ expression dichotomy strikes a definitional balance between the First Amendment and the Copyright Act by permitting free communication of facts while still protecting an author's expression". A similar statement is present in art. 1(2) of the European Software Directive "protection … shall apply to the expression … of a computer program. Ideas and principles … are not protected".

292 See Arts. 8 and seq. Berne, Arts. 6 and seq. WCT, and Arts. 11 and seq. TRIPS.

293 See Art. 9(1) Berne. See also P. Goldstein, B. Hugenholtz, International Copyright – Principles, law, and practice, 3rd ed., Oxford University Press, 2013, at 307.

294 See the WIPO Guide to the Berne Convention, 1978, at 54.

295 See S. Ricketson and J. Ginsburg, International copyright and neighbouring rights, Oxford University Press, 2006, at 11.26.

296 Although a right to distribute copies can be identified with regard to specific cases such as cinematographic adaptations and reproductions of literary works (Art. 14(1), *droit de suite* of original works of art and written manuscripts (Art. 14ter), and the seisure of infringing copies of works (Art. 16); See Ricketson, cit., at 11.45.

297 A similar provision is contained in Arts 8 and 12 of the WIPO Performance and Phonograms Treaty.

298 See Goldstein, cit., at 311.

299 See De Wolf Study, at 61.

300 Among the jurisdictions already offering a general right to communicate a work to the public are Germany and France, while recognising specific rights Canada, the U.K., and Japan can be listed; See Goldstein, cit., at 324.

301 See Goldstein, cit., at 325.

302 See German Supreme Court (BGH), 17 July 2003, Case I ZR 259/00 (Paperboy); ECJ Case C-466/12 of 13 February 2014, Svensson et al. v. Retriever Sverige [Svensson]; M. Senftleben, in Dreier & Hugenholtz, Concise European Copyright Law, 2006, WCT note 6(a); Goldstein, cit., 336.

303 Art. 2(2) Berne.

304 See Art. 2(4) Berne.

305 See Art. 2(7) Berne.

306 See Art. 3(1) Berne.

307 See Art. 2(8) Berne.

308 See Guibault L., Copyright limitations and contracts, London 2002, at 28.

309 See Art. 10(1) Berne.

310 See Art. 10(2) Berne.

311 See Art. 10bis(1) Berne.

312 See Art. 10bis(2) Berne.

313 See Art. 9(2) Berne Convention. This article is the first appearance in an international agreement of the so called Three-step Test. Art. 9(2) was introduced in the 1967 Stockholm revision of the Convention and in its Berne formulation only applies to the right of reproduction. Successively, it was introduced in all the other major international agreements. See in general Senftleben M., Copyright, limitations and the Three-step test, London, 2004; Gervais D., Towards a new core international copyright norm: the reverse Three-step test, Marquette Intellectual Property Law Review, Vol. 9, 2005, p.1; Ricketson S., WIPO study on limitations and exceptions of copyright and related rights in the digital environment, WIPO, 2003.

314 See Art. 2(5) Berne Convention.

315 See Art. 10(2) TRIPS Agreements.

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317 Directive 96/9 of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, *OJ L 77, 27.3.1996, p. 20–28,* art. 3(1).

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338 De Wolf Study, p. 365. See also: A. Beunen, Protection for Databases – The European Database Directive and its effects in the Netherlands, France and the United Kingdom, Nijmegen, Wolf Legal Publishers, 2007, p. 219.

339 See Recital 34 offers some guidance: ‘Whereas, nevertheless, once the rightholder has chosen to make available a copy of the database to a user, whether by an online service or by other means of distribution, that lawful user must be able to access and use the database for the purposes and in the way set out in the agreement with the rightholder, even if such access and use necessitate performance of otherwise restricted acts’.

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341 Code de la propriété intellectuelle created by Loi n° 92-597 du 1er Juillet 1992, as amended.

342 See Art. L111-1 IPC.

343 See Art. L112-2 and L1112-3 IPC.

344 See Article L122-2 IPC; A. Lucas, H. Lucas, et al, Traité de la propriété littéraire et artistique, 4th Ed., Paris, 2012, at 247.

345 See Art. L122-3; Lucas et al., op. cit., at 253.

346 See Article L122-5(3) IPC.

347 See Beunen, op. cit., p. 144. See also TGI Paris 25 April 2003; TGI Strasbourg 22 July 2003.

348 See article 10(2) of the Berne Convention : “It shall be a matter for legislation in the countries of the Union, and for special agreements existing or to be concluded between them, to permit the utilisation, to the extent justified by the purpose, of literary or artistic works by way of illustration in publications, broadcasts or sound or visual recordings for teaching, provided such utilisation is compatible with fair practice” and article 5(3)a) of the Directive 2001/29/EC “(a) use for the sole purpose of illustration for teaching or scientific research, as long as the source, including the author's name, is indicated, unless this turns out to be impossible and to the extent justified by the non-commercial purpose to be achieved”.

349 See Arts. 1 and 2 German Copyright Act (Act of 9 September 1965 “Gesetz über Urheberrecht und verwandte Schutzrechte, UrhG).

350 Cf. A. Nordemann, in Fromm/Nordemann (eds), *Urheberrecht*, 10th edition, Stuttgart, Kohlhammer, 2008, § 2, para. 11.

351 See G. Schulze, in Dreier/Schulze (eds), *UrhG*, 3rd edition, Munich, Beck, 2008, § 2, para. 37.

352 See Art. 4 German Copyright Act.

353 See Cf. G. Schulze, in Dreier/Schulze (eds), *UrhG*, 3rd edition, Munich, Beck, 2008, § 4, para. 4.

354 See BGH, MMR 2007, 589 – Gedichttitelliste I.

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357 See R. Hilty et al, Zum Referentenentwurf eines Gesetzes zur Einführung einer Regelung zur Nutzung verwaister Werke und weiterer Änderungen des Urheberrechtsgesetzes sowie des Urheberrechts-wahrnehmungsgesetz, Stellungnahme des Max-Planck-Instituts für Immaterialgüter- und Wettbewerbsrecht zur Anfrage des Bundesministeriums der Justiz vom 20. Februar 2013, available at http://www.ip.mpg.de/files/pdf2/Stellungnahme-BMJ-UrhG_2013-3-15-def1.pdf; V. Moscon, Open Access to Scientific Articles: Comparing Italian with German law, available at http://kluwercopyrightblog.com/2013/12/03/open-access-to-scientific-articles-comparing-italian-with-german-law.

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359 See G. Westkamp, Der Schutz von Datenbanken und Informationssammlungen im britischen und deutschen Recht, Munich 2003, p. 406.

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363 See BGH, MMR 2011, 676 – Zweite Zahnarztmeinung II, at 14.

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378 The expression "literary, dramatic, musical or artistic" has been deleted by the Copyright and Rights in Performances (Research, Education, Libraries and Archives) Regulations 2014, in force since 1st June 2014.

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381 These yet to be implemented provisions should refer to Personal copies for private use, Quotation and Parody, scheduled entry into force on October 1st 2014.

382 See the official opinion of the UK Government in the document titled "Technical Review of Draft Legislation on Copyright Exceptions: Government Response", at 13 ("The Government's view is that this existing exception will permit the extraction of whole works if required for text and data mining through the provision for "fair dealing with a substantial part").

383 See Art. I, Sec. 8, Clause 8 of the United States Constitution.

384 See Copyright Act 1976 Pub. L. 94-553 (Oct. 19, 1976), in force since 1978.

385 See Sec. 102 Copyright Act 1976.

386 See Feist Publications, Inc., v. Rural Telephone Service Co., 499 U.S. 340 (1991).

387 "... but the United States Government is not precluded from receiving and holding copyrights transferred to it by assignment, bequest, or otherwise".

388 See e.g. "Copyright and Other Rights Pertaining to U.S. Government Works", available at http://www.usa.gov/copyright.shtml

389 See Sec. 106 Copyright Act 1976. See M. Nimmer and D. Nimmer, Nimmer on Copyright, 2013 Rev. Ed., at ch. 8 Vol. 2.

390 Text of the decision available from: http://docs.justia.com/cases/federal/district-courts/new-york/nysdce/1:2011cv06351/384619/156. It should be noted that The Authors Guild is appealing the decision in Authors Guild v. HathiTrust to the Second Circuit and announced it would also appeal the ruling in Authors Guild v. Google.

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393 The first fair use factor considers the "purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes."

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457 "The Director of the National Institutes of Health shall require that all investigators funded by the NIH submit or have submitted for them to the National Library of Medicine's PubMed Central an electronic version of their final, peer-reviewed manuscripts upon acceptance for publication, to be made publicly available no later than 12 months after the official date of publication: *Provided*, That the NIH shall implement the public access policy in a manner consistent with copyright law", see Division G, Title II, Section 218 of PL 110-161 (Consolidated Appropriations Act, 2008), as confirmed by Division F, Section 217 of PL 111-8 (Omnibus Appropriations Act, 2009); for references see http://publicaccess.nih.gov/policy.htm (last accessed 06/2013).

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459 Interestingly the PubMed Central copyright notice prohibits bulk downloading of papers for copyright reasons: "Bulk downloading of articles from the main PMC web site, in any way, is prohibited because of copyright restrictions", available at http://www.ncbi.nlm.nih.gov/pmc/about/copyright

460 See Public Access Directive, sec. 3.

461 Indeed, PubMed Central offers a specific Open Access subset: http://www.ncbi.nlm.nih.gov/pmc/tools/openftlist

462 "Crawlers and other automated processes may NOT be used to systematically retrieve batches of articles from the PMC web site. Bulk downloading of articles from the main PMC web site, in any way, is prohibited because of copyright restrictions. PMC has two auxiliary services that may be used for automated retrieval and downloading of a special subset of articles from the PMC archive. These two services, the PMC OAI service and the PMC FTP service, are the only services that may be used for automated downloading of articles in PMC. See the PMC Open Access Subset for information about which articles are included in this special subset, and for links to the PMC OAI and FTP services. Do not use any other automated processes for bulk downloading, even if you are only retrieving articles from the PMC Open Access Subset. Articles that are available through the PMC OAI and FTP services are still protected by copyright but are distributed under a Creative Commons or similar licence that generally allows more liberal use than a traditional copyrighted work. Please refer to the licence statement in each article for specific terms of use. The licence terms are not identical for all the articles", http://www.ncbi.nlm.nih.gov/pmc/about/copyright.

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CHAPTER 8. SUMMARY OF THE EXPERT WORKSHOP, “SOCIETY’S GAIN FROM THE INTELLECTUAL PROPERTY EXCHANGE”

As part of the KBC2/IP project, the OECD hosted an expert workshop on the topic “Society’s Gain from the Intellectual Property Exchange” on 26-27 May 2014. The workshop addressed a number of topics that are complementary to those addressed in other chapters of this Report. This chapter begins with an overview of the cross-cutting themes from the workshop, followed by its key messages concerning patents, trade secrets, and copyright. It then presents a more detailed summary of the discussion. The workshop was designed around the observation that IP rights effectively operate as an exchange between society and inventors/creators, rewarding innovative and creative work while giving society the benefits of greater technological and artistic creation and diffusion[464].Discussions in the workshop examined whether and how the exchange may be affected by broad changes that have been taking place, such as the growth of the Internet, the proliferation of mobile devices, globalisation, the digitisation of content, and the growing importance of IP. This summary reflects the information exchanged among the parties at the workshop. The views presented at the workshop and reflected in this chapter are the experts’ own and do not necessarily represent the views of the OECD or any of its Member countries. As such, this summary of the workshop is provided for information purposes on issues that were not addressed elsewhere in the project.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries

EXECUTIVE SUMMARY

General Themes

(i) *Intangible assets, particularly intellectual property (IP) rights, are an increasingly important and prominent element of the knowledge-based economy, with links to innovation, improved firm performance and increased consumer choice. Changes wrought by technological developments in recent decades, however—including the emergence of the Internet, digitisation, the changing business environment including practices like outsourcing and open innovation, and the growing importance of relatively new industries such as biotechnology and cloud computing—raise questions as to whether existing IP systems are dealing adequately with the challenges posed by such new technologies. There is a need, furthermore, to ensure that the importance of intangible assets is given sufficient recognition to secure the levels of investment required for their continued growth and economic contribution.*

As OECD economies have become more knowledge-based, IP rights have gained increased prominence and importance as both a means of facilitating innovation and of reaping the rewards of investment in technological and creative development. There is evidence that patent and trademark ownership, for example, results in faster firm growth, greater innovation and job creation. The workshop highlighted the financial value of investment in intangible assets in modern economies, which now considerably outranks more conventional investment in tangible assets in some OECD countries. Moreover, as the nature of the firm and of business relationships change in modern economies, IP rights are likely to play an even more valuable role.

However, few categories of intangible investment are reflected in company accounts, which may lead intangibles to be undervalued within both the firm context and within society overall. Workshop participants thus argued that greater efforts should be made to reflect intangible investment within accounting practices, particularly in order to ensure the necessary investment for growth and development in these areas. There is, in this regard, some evidence that firms backed by venture capital tend to place emphasis on IP rights, particularly patents.

Nonetheless, many of the same technological changes that have driven the growth of IP rights in certain sectors may raise more general challenges for the IP system as a whole, such as the growth of the digital economy. Accordingly, the purpose of the expert workshop was to examine various aspects of IP systems in light of those changes and the goals of innovation and economic growth.

(ii) *IP rights operate, in effect, as an exchange between society and inventors or creators. Although rights-based approaches to authorship and innovation challenge the notion that IP is solely a question of economic efficiency, a degree of 'give and take' and a balancing of competing interests are inherent in every IP system. Given the technological and economic changes that have been occurring, it is sensible to examine how the 'grand bargain' struck by the IP system has been affected.*

The IP system operates as an exchange between society, on the one hand, and inventors and creators, on the other. This exchange, or 'grand bargain', involves, essentially, sacrificing short-term efficiency gains (through granting exclusive rights) in pursuit of longer-term dynamic efficiency in the form of greater innovation and creativity. A sensible policy discussion regarding the optimal parameters and operation of the IP laws must, however, acknowledge the 'give and take' inherent in striking a balance between exclusive rights and the stimulation of creativity and innovation. This is particularly so insofar as a State grants such (time-limited) exclusive rights in order to encourage greater innovation and a competition of ideas in the longer term.

(iii) *The need for robust, independent empirical evidence to inform and underlie IP policy making was the overarching theme emerging from the workshop. Experts representing a diverse range of stakeholders, including rights holders, users, academics and government officials, acknowledged the utility of such evidence across all areas of IP considered in the workshop—patents, copyright and trade secrets. The panellists identified a lack of available data and uncertain funding as potential barriers to further research, although they also discussed a variety of potential data sources over the course of the workshop.*

The experts repeatedly emphasised the pivotal importance of robust, hard evidence on the use of IP rights and on the economic and social impacts of the IP system. There is actually relatively little concrete evidence available to support the assumption that IP rights encourage greater innovation and creativity. Most if not all participants, representing the views of a broad range of stakeholders, thus agreed that economic evidence is of vital relevance to IP policy makers: that is, IP policies should be based on facts not opinions. Although obtaining consistent and sufficiently detailed data has proven to be a barrier to such empirical research in the past, new data sources are emerging (including through innovative digital research techniques). There was, furthermore, some suggestion from panellists that government agencies might play a greater role, both in funding research but also in terms of collecting and making available relevant data.

(iv) *The rise of the Internet, in particular, is something of a double-edged sword for IP systems. In the context of copyright, greatly decreased distribution costs and ease of copying has created significant problems of piracy. Although many creative industries have responded with innovative distribution systems, there may nonetheless be a problem of falling returns, alongside the growth of intermediaries for content distribution. In the context of patents, however, digitisation and online availability have assisted in greater disclosure and dissemination of patent information, as well as information sharing between patent agencies in different jurisdictions.*

The rise of the Internet and the advent of digitisation have posed many challenges, but also created new opportunities, in the context of the IP system. Content producers that rely upon copyright have faced increasing problems of piracy, alongside new distribution and storage mechanisms that have, on the one hand, threatened traditional remuneration models, whilst on the other, created a significant disjunction between consumer expectations and the formal application of the copyright rules. Conversely, digitisation and the Internet have greatly facilitated the dissemination of information disclosed in patent applications, thus leading to greater knowledge diffusion. The availability of large quantities of data in online databases has also led to the emergence of text and data mining as a potentially powerful research technique. Its nexus with copyright law, however, may depend on the content and the end user's licence. For this reason, at least one jurisdiction has introduced a separate copyright exception to facilitate third party use of certain types of compiled data for such purposes.

In sum, the digital revolution has had an immense effect on certain areas of the IP system, although the system itself has not always kept pace with the changes. In addressing these changes within the IP system, however, it is important to focus on developing the law to meet future challenges and not merely to address current problems.

(v) *Further work may need to be done on the notion of the 'IP bundle,' that is, where a single firm utilises a variety of IP instruments to protect its business processes and products. Although in certain situations some forms of protection—such as patents and trade secrets—may operate as substitutes, they are mostly complementary; yet these instruments may overlap and interact, so one should perhaps be wary of considering such overlapping rights in isolation.*

Larger firms, in particular, often employ a wide variety of legal instruments and methods to protect businesses processes and products—both formal, such as IP rights, and informal, such as trade secrets. Although the workshop considered only certain discrete issues in IP, in practice there can be significant overlap and interaction between ostensibly distinct protection mechanisms. (The principle exception here is the relationship between patents and trade secrets, insofar as the disclosure requirement of the former is inherently at odds with the secrecy requirements of the latter.) To the extent that interactions within the IP bundle may have knock-on effects in terms of the operation of these mechanisms, this may be an area that merits further study.

Patents

(vi) *The 'disclosure' requirement is an integral element of the 'grand bargain' of the patent system: exclusivity is granted to inventors in the medium term in order to facilitate knowledge diffusion and further innovation in the longer term. The effectiveness of disclosure as a means of knowledge diffusion in practice, however, has been called into question. Empirical evidence presented at the workshop suggests that patent disclosures can have a positive impact on innovation, but the effects may vary between industries, and there is evidence that the quality of disclosure may be inadequate in some instances. Greater emphasis should thus be placed on the sufficiency of disclosure at the patent examination stage.*

Disclosure of patented technology is the *quid pro quo* for granting exclusive (but time-limited) rights under the patent system. The information disclosed ought to be sufficient to enable a person skilled in the art to replicate the relevant technology: one workshop participant went so far as to argue that the patent data disclosed ought to be seriously useful for follow-on innovation to justify the exclusive rights granted. The workshop devoted significant time to considering empirical evidence on the effectiveness of the disclosure requirement for patenting in practice. The evidence presented suggests that the extent to which patent information is consulted prior to follow-on innovation tends to vary between industries. It is also affected by factors such as whether the innovating firm itself holds patents or is venture-backed, both of which tend to increase the likelihood of consulting the patent literature.

Although the empirical evidence thus counters the prevailing academic view that patent disclosures have no positive effect on knowledge diffusion, the extent to which merely reading patents actually facilitates follow-on innovation remains uncertain. There is a danger, for instance, that patent information is used primarily for strategic rather than innovative purposes. From the evidence available, it is clear that many researchers question the value of information disclosed in patent applications on the basis that it does not actually enable the technology to be replicated. Although there are, ostensibly, fairly rigorous technical requirements regarding disclosure, some participants suggested that these disclosure obligations are not always applied rigorously at the patent examination stage. Further training of patent examiners might be required in this regard, alongside more innovative solutions such as peer review.

The workshop also gave some consideration to the 18 month secrecy period allowed from the filing of a patent to first publication. Some participants questioned the across-the-board nature of this 18 month period, querying why this duration is viewed as an appropriate time-period for secrecy in all industries and jurisdictions. Within certain rapidly moving sectors, the technology itself may become obsolete within 18 months. One participant thus suggested that the secrecy duration might be reduced, for instance, for university patent applications, where there is lesser public interest in protecting secrecy.

(vii) *Disclosure, in the context of the patent system, involves not merely the provision of information in a patent application but also its wider dissemination. In this regard, the growth of the Internet has been especially beneficial in terms of making patent information available more cheaply and easily. Although developing countries may, unfortunately, lag behind in this regard due to a slower pace of digitisation, considerable work has been undertaken by WIPO to assist in greater knowledge diffusion at a local level in developing jurisdictions.*

Although the quality of information disclosed in patent applications might be questioned, dissemination of this information has improved greatly in recent years due to digitisation and online availability. Easily accessible research tools such as Google Scholar provide patent information, while many patent offices have now digitised their application processes and databases. Although developing countries may lag behind in this regard, WIPO provides considerable support to developing jurisdictions through its Technology and Innovation Support Center Program. To support the greatest diffusion of knowledge possible, several workshop participants suggested that patent information should be made available at marginal or minimal cost.

Furthermore, ease of access to digitised patent information is also of use to patent offices, particularly in terms of the sharing of information (for example, in relation to prior art) between different jurisdictions.

Trade Secrets

(viii) *Not formally a category of IP rights, trade secrecy as a means of protecting sensitive business information is nonetheless valued highly by firms, even at the expense of patenting where the latter would be available.*

In some situations, trade secrecy can be a substitute for patenting as a means of protecting business information. *Trade secrecy can also be used as a compliment to patent protection within a given IP portfolio.* To obtain the time-limited exclusive rights provided by patents, the applicant must disclose how to make and use the invention, while secrecy relies on non-disclosure to protect knowledge-based capital without any specific time limitation. The existing theoretical literature on the relationship between trade secrecy and patents is fairly inconclusive, while the empirical literature has tended to focus on firms rather than innovation. Nonetheless, there is some evidence that trade secrecy is valued more highly by firms than patents, although patenting propensity increases with a range of factors such as firm size, the possibility of reverse engineering, sales of the innovative product and in high-tech industries. While weak patent protection tends to push firms towards secrecy, it is not clear that trade secret enforcement enhances innovation or development in the aggregate.

Copyright

(ix) *The advent of the Internet and digitisation has had perhaps the greatest effect in the realm of copyright law. Piracy, radically altered distribution mechanisms, the rise of new intermediaries and the emergence of cloud computing, amongst other significant changes, all pose challenges to the conventional copyright model. Some workshop participants emphasised the need to take greater account of consumer expectations and fairness to end-users in this regard. The supply of creative works should not be taken for granted, either, with a need to retain sufficient incentives within the IP system to provide fair remuneration for content creators.*

Several panellists spoke about the need to realign the ambit of the copyright rules with legitimate expectations of users and consumers. Nowadays, many mainstream computing practices, such as cloud storage and transferal of digital content between devices, may involve incidental infringements of the copyright rules. Although no one supported obviously infringing practices such as Internet piracy, some workshop participants contended that copyright law should not catch minor infringements that consumers do not understand to be violations of the law. In this regard, one participant spoke about the need for reform in order to avoid bringing the copyright laws further into disrepute in the eyes of the general public.

In recent years, much of the policy discussion surrounding copyright has focused on term extensions. There was broad agreement at the workshop, however, that a) this issue is of lesser importance as we look towards the future of copyright law, and b) term extensions are difficult to justify in economic terms. On the other hand, participants acknowledged the need to maintain the viability of the copyright system more generally to reward and incentivise content creation.

(x) *To address the challenges faced by the copyright system, the workshop considered two dichotomous solutions: either improving remuneration for use of copyrighted material, or expanding the exceptions and limitations to copyright. Discussions in relation to the latter focused on the various personal use exceptions, and potential expansion to a more generalised fair use exception. Participants were divided on the extent to which further exceptions to the copyright rules would be desirable, with arguments focusing on legal certainty and fairness to consumers, on the one hand, and fairness to rights holders, on the other.*

Copyright exceptions and limitations enable consumers to make use of copyrighted material without violating the copyright rules. These may arise due to exceptions within the law itself, exceptions mandated by other areas of law (such as competition or consumer law), or tolerance of technically infringing but *de minimis* conduct. Participants debated the acceptable scope of personal use exceptions, specifically whether they might extend to non-private uses. The workshop also considered whether the existing personal use exceptions ought to be expanded into a broader and more general fair use exception. Again, there was some debate regarding the extent to which the fair use concept, particularly as it has been interpreted in the US, is broadly coterminous with personal use exceptions. Nonetheless, many participants and delegates took the view, linked to consumer expectations, that a reasonable space should be created for personal use exceptions, although a number of participants, reflecting the interests of rights holders, argued that such use should be remunerated in some circumstances.

(xi) *In providing remuneration for use of copyrighted content within the digital context, there remains some debate as to whether levies or licences provide a more effective approach. Levies are favoured in certain jurisdictions, although these were criticised by some participants as operating irrationally. Innovative licences may provide a simpler and more acceptable solution in the future, but they face criticisms for being too fragmented at present. Collective rights management was, generally, seen as retaining a valuable role within the digital context, although some panellists emphasised the need for greater transparency.*

No clear consensus emerged as to whether levies or licences provide a better model for copyright remuneration in the digital environment. With respect to levies, some participants suggested that these might work most effectively when targeted at the most obviously problematic forms of primary copyright infringement. Such differentiation could be further facilitated, moreover, by technological innovation. As currently deployed, however, levies faced criticism as being akin to an arbitrary 'tax' on certain goods or services, without evidence of any resulting benefits in terms of innovation. Moreover, in jurisdictions that impose copyright levies, firms might become 'addicted' to such payments, so that any attempts to reform the copyright system may be met by further claims for compensation.

As for licences, these are viewed more favourably by content creators as a means by which to provide a sustainable income stream for digital and online activities. Yet, the current licencing systems face considerable criticisms, on the basis of geographic fragmentation, undue complexity, and high transactions costs and delays. Establishing copyright exchanges may help to alleviate some of these problems, although experience with the UK’s Copyright Hub suggests that such projects can be difficult to realise. While there is probably a role for collective rights management within this structure, participants acknowledged, generally, the need for greater transparency and accountability on the part of collecting societies.

(xii) Particularly in the context of copyright, there is scope for greater consumer education, to explain both the value of copyright to users and how it operates and limits the uses that can be made of copyrighted content. Conversely, some participants argued that greater emphasis should be placed upon the responsibility of those that sell copyrighted content to control its further uses, and less emphasis placed upon the ostensible liability of consumers and users.

Many participants remarked that one of the difficulties of the existing system is that consumers fail to appreciate its value, both in terms of ensuring a supply of creative works and a means to provide fair remuneration for artists, most of whom are not famous and wealthy. Education may, therefore, have a valuable role to play in communicating the benefits and necessity of the copyright system. Many consumers, especially young consumers, may also fail to appreciate the extent to which the copyright system constrains the use of copyrighted content even where the consumer has purchased a copy of the material. Education may have a further role to play in delimiting more clearly the acceptable uses of copyrighted content.

By contrast, other participants suggested that undue responsibility for upholding the copyright rules might be placed at present on relatively uninformed and powerless end-users. To counter this unfairness, those participant argued, greater responsibility should lie with those who sell copyrighted material to ensure that the rules are ultimately respected.

(xiii) Text and data mining (TDM) raises particular issues relating to copyright. Viewed as a promising means by which to both advance scientific and other research and to generate significant value for the wider economy, TDM may conflict with copyright insofar as it depends upon access to and extraction of data from large quantities of (often, proprietary) material. There is some evidence that researchers in certain jurisdictions (the EU and Brazil, for example) are inhibited from engaging in TDM due to fears of infringing copyright in the process. There are arguments both for and against crafting specific exemptions within the copyright rules to protect TDM, or relying on more general exemptions for fair use, while the scientific publishing industry argues that enhanced licensing arrangements facilitate TDM without any alteration of the existing copyright rules.

TDM can be defined as the deployment of a set of continuously evolving research techniques which have become available as a result of widely distributed access to massive networked computing power and exponentially increasing digital data sets, enabling almost anyone who has the right skills and access to assemble vast quantities of data, whether as text, numbers, images or in any other form, and to explore that data in search of new insights and knowledge.

The workshop highlighted the potential future importance of data analytics as a means by which to generate both scientific knowledge and economic benefit, and also the consequent need to ensure that the existing IP laws, particularly, copyright, do not prevent or inhibit innovation in this regard. There was evidence that some non-European jurisdictions, particularly the US and the People’s Republic of China, are considerably more advanced in this field than in Europe, although these claims were disputed. Despite its potential benefits, TDM involves a balancing of interests between researchers and the broader interests of society, on the one hand, and copyright holders, on the other. TDM may also raise certain data privacy issues, although the workshop did not consider these aspects in detail in the discussion.

Summary of Discussion

Experts

Olivier Bomsel, *MINES ParisTech*
Ahmed Bounfour, *Université Paris Sud*
David Carson, *IFPI*
Tony Clayton, *Intellectual Property Office (UK)*
Sergey Filippov, *The Lisbon Council*
Stuart Graham, *Georgia Institute of Technology*
Bronwyn Hall, *University of Maastricht & University of California at Berkeley*
Ian Hargreaves, *University of Cardiff*
Lisa Larrimore Ouellette, *Yale Law School*
Frances Lowe, *PRS for Music*
Jeremy Malcolm, *Electronic Frontier Foundation*
Cédric Manara, *Google*
Tomoko Miyamoto, *World Intellectual Property Organisation (WIPO)*
Pedro Mizukami, *Fundação Getulio Vargas Law School*
Carlo Scollo Lavizzari, *Lenz Caemmerer Attorneys*
Sampsung Xiaoxiang Shi, *East China University of Political Science and Law*
Sacha Wunsch-Vincent, *WIPO*

Moderators

Dominique Guellec, *OECD*
Douglas Lippoldt, *OECD*
Christian Reimsbach-Kounatze, *OECD*
Piotr Stryszowski, *OECD*
Jeremy West, *OECD*

The expert workshop on intellectual property (IP) opened with introductory remarks by Dirk Pilat (OECD), who explained that it formed part of a broader OECD project exploring knowledge-based capital (KBC), also known as intangible assets. The workshop was intended to provide a forum for the exchange of expert views on a range of issues regarding the future of IP, particularly aspects that may relate to KBC. The objectives were thus to gather evidence and facilitate dialogue and knowledge exchange, rather than to arrive at prescriptive conclusions as such. Any views expressed at the workshop, moreover, were those of the expert panellists rather than the OECD or its member countries.

Jeremy West (OECD) provided further background on the KBC project as it related to IP. Now in its second phase (KBC2), the project was looking in detail at five IP-related topics, namely: copyright in the digital era; open science and open data; design rights; the economic and technical value of patents; and trade secrets. This workshop was designed to explore other IP issues that complement those five topics. The overarching theme of the KBC2 work on IP was pervasive change—resulting, for example, from globalisation, digitisation, the growth of the Internet and open science—and the potential implications for IP use and frameworks.

Session One: Introduction to the IP Exchange

The session Moderator, Dominique Guellec (OECD), introduced the first session exploring the theory and practice of the 'IP exchange,' that is, the balance of rights and duties between IP rights holders and society more generally. This question can, first of all, be considered from a moral standpoint. Thus, one might argue, echoing the work of John Locke, that creators should be entitled to ownership of their creative works. The symmetrical but converse viewpoint would argue that all contemporary creators stand on the shoulders of past giants, and thus should not be entitled to claim exclusive ownership of work that depends heavily on the prior creativity of others. Alternatively, the question can be considered from an economic standpoint, asking, more pragmatically, whether IP is useful or not. On the one hand, IP regimes may provide incentives for beneficial risk-taking, so that restrictions on competition are necessary to compensate inventors. On the other hand, where competition is limited society loses out in other ways. Accordingly, the optimal solution is not immediately obvious from either a moral or an economic standpoint, and indeed different issues may require a different balance to be struck.

Tony Clayton, UK Intellectual Property Office, focused on the underlying incentives within the IP system, what they are intended to achieve, and the extent to which they work in practice. Citing the intellectual property clause of the US Constitution (Art. 1, section 8), which mirrors earlier UK law, he argued that IP law has both economic and social objectives. At its core, IP is about both creation and application of new ideas. The temporary right to exclude is granted as a means to incentivise innovation, so that, to the extent that IP policies fail to result in the creation and use of new ideas, they cannot be justified. Moreover, the emphasis is upon competition between ideas, not within ideas. The economic incentives provided by the IP system relate to the entire value chain: from inventors and authors, to 'second movers' that help to diffuse innovations, to distributors and intermediate users of innovative products and processes. The incentives particularly extend to open innovation partners, who need to be aware of which rights can be used in an increasingly important economy of knowledge exchange.

Recent years have seen a significant increase in levels of investment in intangible assets. IP rights are available to protect investment in certain categories of intangibles, including software (in the US and Japan), creative works, research and development (R&D), reputation and branding and designs, whereas other categories fall outside the ambit of IP, including business organisation and processes, and workplace skills. Few if any of these investments tend to be reflected within a company's balance sheet, but some appear as investment in national accounts. Evidence from the UK indicates that, in the past two decades, there has been a notable shift from tangible to intangible investment, a trend that is also found in other countries.

Considerable effort has been expended marshalling data to determine the impact of IP rights on economic performance. There is evidence that patent and trademark ownership results in faster firm growth, greater innovation and the creation of better jobs (Hall et al., 2012); that patent owners lead ‘new to market’ innovation and that licensees make significant contributions to R&D (Arora & Athreye, 2012); and that patent disclosure and licensing helps knowledge diffusion (Graham et al., 2010). The evidence is weaker with respect to design rights (Bascavusoglu-Moreau & Tether, 2011), although the design sector in the UK remains successful despite the apparent lack of performance impact from registered IP protection. Similarly, certain aspects of the copyright system appear to work poorly at present. Copyright levies, imposed in certain European countries, are very varied and even irrational in their application. Copyright term extensions have no incentive impact, and raise distributional concerns. Licensing rules and procedures have struggled to keep pace with evolving technologies. Moreover, there is evidence that a significant number of consumers, newly exposed to the IP system, are unconvinced by it and that their behaviour is uninfluenced by knowledge of the law. Perhaps counter-intuitively, significant groups of consumers who choose to infringe copyright tend to spend more on copyrighted materials than those who do not break the law.

In an evolving world, the current IP framework faces a variety of challenges. There are, for example, difficulties of existing patent complexity and quality. These include problems of patent thickets and patent trolls, the strategic drafting of ‘thesaurus patents’ that use opaque or evasive language to claim unjustified rights, and the continuing high costs of patent litigation. Digital transformation has radically altered the economics of copyright, insofar as reproduction and distribution costs have almost vanished, access to copyrighted material is instantaneous, and barriers to entry are significantly reduced. The Hargreaves Review of IP in the UK concluded that where IP laws do not adapt to new technologies and marketplaces they could obstruct innovation and economic growth. While the principles underpinning the IP system remain sound, its practice needs to evolve with the changing landscape. In response to the Hargreaves Review, the UK is making numerous changes to its copyright system, including an orphan works licensing system, and enabling text and data mining, private copying, archiving and parody through exceptions. It has also promoted the ‘UK Copyright Hub,’ a business-led project to create a digital exchange that provides information about copyright ownership, access and licensing to facilitate efficient transactions.

In concluding, Mr Clayton stressed the need for data on the impact and effectiveness of IP protections, in order to inform and shape IP policy making, as well as efficient use of IP. The big question will be how investment in intangibles is to be financed. Although intangible assets now eclipse fixed assets in spending and in enterprise value, these are often not reflected in company accounts, and are usually valued by banks at zero in loan assessment. There must be a greater connection between intangible investments and the financial markets to enable necessary investment. At present, a large amount of ignorance exists regarding the value of IP.

Ahmed Bounfour, University Paris-Sud, spoke about his research on the topic of ‘hard intangibles,’ including IP rights. Intangible assets are an important source of innovation and growth. The conventional view of economic activity focuses on organisational settings that are relatively stable in space and time, typically the firm. Yet, in reality, economic activity is undergoing deep transformation at present, with new production systems and arrangements emerging outside the traditional boundaries of the firm. It is necessary to understand the role of IP rights specifically in this context.

Professor Bounfour provided economic data from a variety of European countries that indicates that certain IP rights contribute substantially to economic growth with, furthermore, a clear correlation between the growth of intangibles and GDP. Hard intangibles are an important ingredient for innovation, too. More specifically, patents are directly related to process and product innovation, including a correlation to the percentage of income derived from innovation. In terms of the relationship to turnover, there is greater correlation between trademarks and revenues.

The most important issue for the future is the relationship between different types of intangible assets held by a firm. Examining bundles of intangibles, Professor Bounfour’s research identified a degree of complementarity between patents and R&D, and between trademarks and marketing. By contrast, there is a much weaker relationship between skilled labour and design rights.

Society now embraces many different sources of innovation, making it necessary to consider how business models must change as we move towards a model based on the accelerated production of links. Recent work on digital innovation suggests that the emerging business model is a generative digital platform, which leads to new forms of innovation (Zhang et al., 2012). This model, which is dynamic in nature and occurs outside the conventional firm structure, contrasts with the traditional fixed enterprise model. Outside the lean production space, which incorporates the conventional trio of suppliers, clients and the enterprise itself, large companies now must manage all the resource factors that exist between society—such as mobility, social networks, and the private time of collaborators—and competitors, complementors and platforms. This is, understandably, an increasingly complex and challenging task for company managers. A new production model is emerging: the accelection[465] model.

Professor Bounfour then discussed the implications for public policy that follow from this shifting landscape. Mapping is important in order to generate a typology of intangibles and related IP rights. Within the conventional transaction regime, there are proprietary intangibles for traditional firms and public organisations, individuals, and entrepreneurs, and joint intangibles in platformic firms and organisations. Within the community regime, there are joint community intangibles and individual proprietary intangibles for constrained communities. In terms of IP rights, the transaction regime includes exclusive IP rights for public organisations, firms, individuals, entrepreneur and platformic rights, whereas the community regime encompasses both joint and community IP rights. There is a need to integrate the emerging temporal, platformic, community and ‘big data’ dimensions into IP regimes, to define policy instruments for building and leveraging individual assets, and to provide support for funding mechanisms for innovative intangibles.

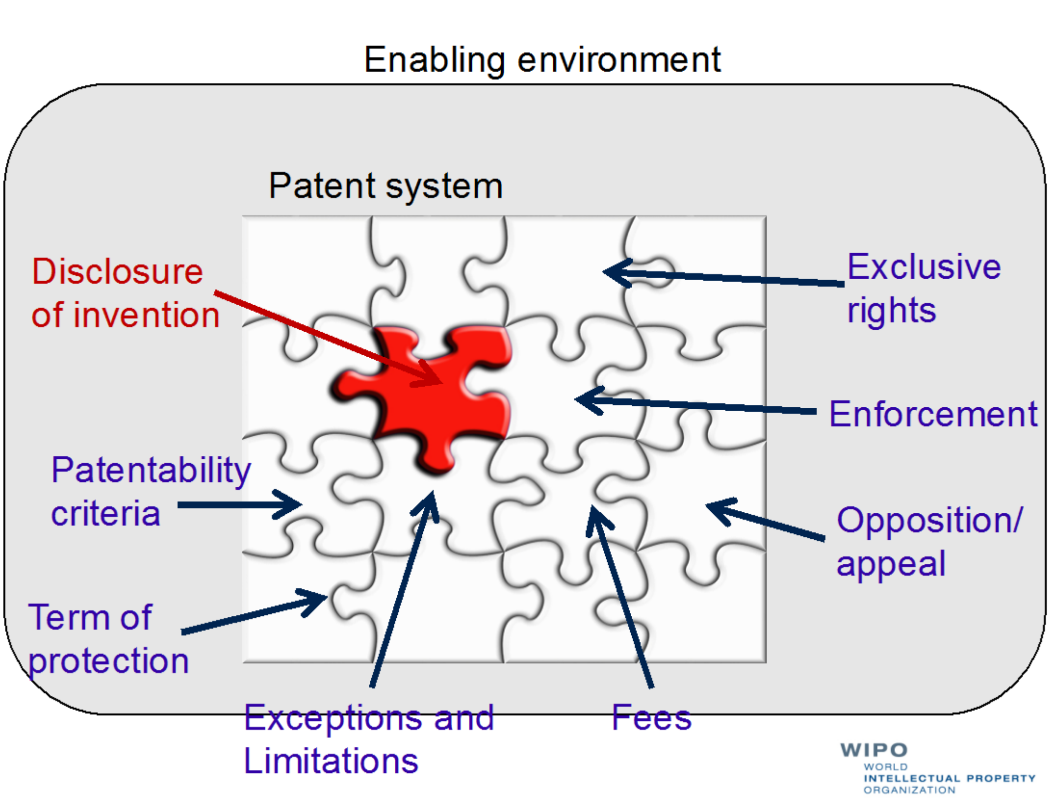
The panellists then addressed questions from the floor. In response to questions from Israel, Switzerland and BIAC regarding the quality and measurement of investment in intangibles, Mr Clayton explained that measuring even the quantity of intangible investment is difficult, let alone the quality of such investment. While there are proxies available for intangible investment—such as counting the number of knowledge works created, or the number of researchers involved in R&D—there remains an observation bias to the extent that many intangible assets are unreported in company accounts. The best way to counter this is by recognising that intangible assets are essentially capitalised labour, although this is difficult to achieve in practice. Professor Bounfour agreed that there is little information available on the quality of intangible investment. Moreover, the quality of the data available more generally is problematic, providing a patchwork of information rather than a systematic account. There is scope for a research project that aims to reformulate how company accounts are devised so that they give greater weight to intangible assets. Non-IP intangible assets are also important in this regard.

Dr Guellec mentioned that the increasing quantity of intangible assets within modern economies has the potential to destabilise the existing balance of the IP framework. There is also an evident degree of complementarity between different types of IP. It may, accordingly, be inadvisable to deal with different types of IP rights in isolation, insofar as there may be knock-on effects in other areas.

Session Two: How Is the IP Exchange Working Out in Practice?

Do the Disclosures in Patent Filings Lead to Knowledge Diffusion?

Tomoko Miyamoto, WIPO, began by explaining the orthodox view of patents as a two-way system: exclusive patent rights are granted, but with a quid pro quo of knowledge diffusion. This model is clear, concise and convenient. Yet the knowledge diffused through the patent system comprises more than what is in the filing, and such diffusion is only one piece of the 'jigsaw' of elements that frame the overall system. Other components include the patentability criteria, exceptions and limitations, the appeals process, enforcement, the term of protection, and fees. A wide breadth of information can be contained in patent applications, covering technical, legal, business and policy information. The average application is thus of different use to different audiences, for example, to researchers, potential licensees, competitors, policy makers, or patent examiners. All potential recipients of patent information are important in contributing to innovation and society's gain as a result.



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Two aspects of the knowledge diffusion process are of particular importance: *disclosure* (the information that is revealed) and *dissemination* (the accessibility of that information). Disclosure should enable third parties to use patented inventions once the patent has expired. It should thus allow a 'person skilled in the art' to understand how the invention works, be inspired and, potentially, make improvements. To achieve this, patent systems incorporate the requirement of enablement. Second, inventors are rewarded for what they invent but no more; what is known as commensuration. Accordingly, there are support and fair basis requirements, alongside the need for a written description. Overly broad or speculative claims are rejected, although the inherently ambiguous nature of many biotech products has led to specific challenges in this area. Third, the best mode requirement mandates that patentees should not conceal their preferred embodiment of the patented invention. Finally, the scope of protection must be clearly demarcated, such that claims must be clear and concise. Various iterations of these principles can be found within national patents systems, and within TRIPS.

In terms of accessibility of patent information, there is an increasing degree of standardisation across different systems. This is achieved by use of standardised forms and alignment of the format of patent information, plus the impact of digitisation including the development of IT tools. Patent information is usually held by public institutions (patent offices), which should promote accessibility and use of such information within the public domain. Ideally, access should be provided at marginal cost; where patent information is digitised the costs of access are likely to be low, although limited digitisation and publication of information made it more difficult to access patent information in developing countries. Where no patent exists (for example, the application is rejected) or it has expired, the recipient may freely use that information for commercial purposes. If a patent remains in force, commercial utilisation would require the patentee's consent and the patentee may require royalties. Even in the latter situation, nevertheless, knowledge has been transferred through disclosure. Certain challenges to greater accessibility of patent information exist, however. These include strategic behaviour by patentees, such as patent thickets or drafting techniques to blur the contents of a patent application. Particular difficulties arise in developing countries, including an absence of infrastructure for access to patent information, and a lack of professional intermediaries that assist in patent literacy.

The WIPO Technology and Innovation Support Center Program assists developing countries in establishing local centres that provide databases of patent information. Two examples of its work were discussed, relating to printing ink and pesticides derived from organic materials. In both instances, diffusion of patent information led to follow-on innovation by local companies, thus demonstrating the practical effectiveness of diffusion. WIPO has also created an information platform called WIPO Re:Search, which enables universities and firms to share technologies, patents and know-how for research and development for neglected tropical diseases, tuberculosis, and malaria, thus facilitating knowledge sharing between the public and private sectors.

Ms Miyamoto concluded by noting that, although patents provide access to considerable amounts of innovative knowledge, other relevant information often lies outside the patent disclosure, such as design data or know-how. A delegate from the United States asked whether it is possible to enable digital sharing of prior art between patent offices. Ms Miyamoto confirmed that this is now occurring as greater numbers of patent applications are digitised and made available online, including patent information from developing countries. As greater information exchanges between patent offices takes place, the quality of patents should improve.

Stuart Graham, Georgia Institute of Technology, then provided empirical data on the value and use of patented information from his forthcoming paper "The Disclosure Function of Patents: Empirical Evidence from Firms." The disclosure of technical information is part of the 'grand bargain' of the patent system, that is, that inventors are offered periods of limited monopoly over the use of their inventions in exchange for disclosure. In addition, society benefits since – while it suffers losses associated with static inefficiency in the short term – it gains dynamic efficiency in the form of a supply of invention in the longer term. It is thus necessary to consider both the incentive effects and the disclosure effects of the patent system, with the latter allowing for cumulative innovation and a reduction in wasteful duplicative investment.

The general view among legal scholars is that patents provide poor information content to innovators. In the US, there is concern that providing additional damages for 'wilful infringement' deters patent reading (Bessen & Maurer, 2008). Criticism of the information content of patents has been particularly strong in the software area, where it is claimed that patents contain little useful information and are not consulted by inventors (Mann, 2005; Klemens, 2008; Devlin, 2010). There is, however, prior empirical evidence to the contrary. This includes an EPO report from 1995, which found that, although patent awareness was greater among larger firms, about 21% of all firms relied upon patent information, regardless of size, rising to 54% among firms that have applied for patents. Similar results have been produced in other work conducted in Europe (Arundel & Steinmueller, 1998; Hall et al., 1999), and there is some prior evidence from the US that patent disclosure information is consulted and relevant for some innovation (Cockburn & Henderson, 2003; Cohen et al., 2002).

Professor Graham has, with collaborators, generated recent empirical data on this topic, the Berkeley Patent Survey, and is in the process of analysing it. The Survey was administered to young US technology firms in the biotech, medical devices, IT hardware and IT software/internet sectors. About 1,300 firms responded, typically at a high-level, e.g. CEOs and CTOs. Participants were asked whether they checked patent literature when innovating, and if so, at what point. The responses show that patent information is consulted, although the degree differs significantly between groups of respondents. Venture-backed firms consult such information more regularly and certain sectors—biotech and medical devices—make greater use of patent information than others, particularly compared with software and Internet start-ups, which tend to use it less often.

If firms consult patent literature, they tend to do so relatively early in the innovation process, either at the design stage or beforehand. While firms that are, themselves, patent holders are more likely to check the literature, some firms that own no patents also do so, and, again, this varies between sectors. Taking a closer look at venture-backed firms, a similar pattern emerges.

Accordingly, the Berkeley Patent Survey does not support the view that innovators do not use patent disclosures. Professor Graham noted that, in future research, it would be useful to investigate the performance implications of reading, and to consider whether reading patents can be separated from reading patent information.

In response to a question from a Canadian delegate regarding the impact of copyright on a firm’s likelihood of consulting the patent literature, Professor Graham noted that among the firms he surveyed, copyright is most significant in software where it may function as a substitute for other IP protections. Software firms may therefore be less likely to consult the patent literature because they are less likely to be involved in the patenting process. The delegate then asked whether the patent literature is read for strategic as opposed to purely innovative reasons. Professor Graham replied that it was impossible to answer that question from the Survey, although it may be possible to use as a proxy the firm’s reasons for patenting. Responding to a question regarding the high correlation between venture capital and patents, he noted that venture-backed firms hold more patents than other firms, and suggested that this might be attributable to enthusiasm for patents among the investors, which may of course also be in their economic interest.

Lisa Larrimore Ouellette, Yale Law School, provided a complementary presentation of her empirical research into the use of patent information in the field of nanotechnology. She noted the dichotomous viewpoints of US jurists and legal scholars on the question of whether disclosure leads to innovation. While the Supreme Court insists that disclosure facilitating technological progress is the underlying rationale for the patent system, prominent legal scholars insist that disclosure is ineffective and irrelevant for the purpose of innovation. Prior empirical research has suggested that the answer to the question whether scientists learn anything from disclosure is, in essence, “sometimes” (Cohen et al., 2002; Hall et al., 1999; Cockburn & Henderson, 2003; Walsh & Nagoaka, 2009; Graham et al., 2010).

Professor Ouellette surveyed authors of nanotech publications and nanotech researchers listed on corporate websites. There were about 200 respondents. Nanotechnology is an academic field, so the majority of respondents were working within academia, and 59% of respondents had submitted a patent application within the preceding two years. The good news is that 64% of respondents had read a patent, that 60% of those reading patents for scientific (i.e. non-legal) reasons said that they had found useful technical information, and that almost no respondents were concerned about claims of wilful infringement as a deterrent to reading patents. Accordingly, the survey indicates that patent disclosures are not useless, insofar as some scientists get some value from the information disclosed.

The less positive news, however, is that 36% of respondents had never read a patent, that 40% of those who read patents for technical reasons did not find useful information, and that 62% of readers thought that the patents they read did not provide sufficient disclosure for a nanotech researcher to recreate the invention. Accordingly, the survey indicates that the quality of disclosure could be improved significantly, and raises a question as to whether many patents actually meet the existing 'enablement' requirements.

The survey also provided qualitative evidence about the use and value of disclosure. Some respondents indicated that patents could be useful to show how a device works, to put ideas and research in context, to avoid duplication of work, to provide access to protocols not found in other published literature, or to provide access to a more reliable or reproducible description of new technology than found in scientific papers. Conversely, others noted that the language of patents could be obscure, that patent descriptions do not go through the same level of critical review as scientific articles, that patents may merely duplicate information already available in the scientific literature, that the long time delay to publication means that patents are less useful in rapidly moving fields like nanotech, and that many scientists find patent literature to be unduly legalistic rather than scientifically-oriented.

The nanotech survey suggests that patent disclosure can and does provide valuable information to scientists. The emphasis should thus be on how to improve the value of such disclosures without detracting from other aspects of the patent system. Professor Ouellette spoke about her own experience as a PhD researcher, during which time she did not consult the patent literature but subsequently discovered that information relevant to her research was available. As the law stands currently, there are no incentives for inventors to disclose more than the minimum required. Anecdotally, patents examiners are reluctant to focus on the enablement requirement, often preferring to invalidate or refuse a patent on another, less technical ground.

In response to a question regarding the utility of patent applications versus issued patents, Professor Ouellette questioned whether there is a difference in terms of value for scientists. Many survey respondents might not even be aware of the difference in legal terms. Google Scholar, for example, includes both issued patents and patent applications. In response to a question from a Swiss delegate regarding the disinclination of patent examiners to probe the enablement requirement, she explained that there are problems with both the current legal standards, and with the fact that those standards are not met. In patent litigation, issues like novelty are much easier to assess than disclosure. Mr Clayton remarked that a semantic analysis of US patents might be useful, insofar as one problem in this field is that existing patents are simply reformulated in order to obtain additional protections. Professor Graham added that, in a fast-moving field like nanotech where inventors work at the frontiers of knowledge, it would be particularly useful to have an effective means of disclosing technical information.

Professor Bronwyn Hall, University of Maastricht and University of California at Berkeley, noted the degree of heterogeneity in studies about the utility of patent disclosures, across both technologies and time. As access to patent literature becomes easier, greater numbers of researchers consult such information. Another factor that can influence the survey results is the identity of respondents, whether they are researchers or executives. Professor Ouellette agreed that the earlier literature cited a lack of access to patent information as a significant barrier to disclosure, and thus the prospect of online access to patent literature is greeted with considerable enthusiasm.

Dr Guellec then asked whether a patent applicant might choose to maximise disclosure, particularly if it anticipated subsequent litigation. Professor Graham noted that a popular strategy is to argue initially, before the patent examiner, that the language sought is narrowly defined, but then to argue subsequently, during litigation, that it has a broad ambit. Evidence from other work by Professor Graham on US patentees (Graham and Hegde, 2012) indicates that applicants that opt-out of disclosure at 18 months tend to have the lowest quality patents, while disclosure also appears to increase licensing opportunities for the patented technology (Hegde and Luo, 2012). So there is ambiguity, but there is also evidence that disclosure leads to economic benefit, both for patent holders and the innovation system more generally. In response to a comment from a US delegate that raised the possibility that all US patent applications not seeking foreign rights would opt to maintain secrecy after the 18-month stage, Professor Graham pointed to his work with Hegde, which showed that about 85% of such US applications are being allowed to publish at 18 months. Graham noted again that the US patents issuing after secrecy show indicators of consistently lower value, raising the question of what society is getting from this extra secrecy. Professor Graham also suggested that his research raises the question of why 18 months is the international standard period of pre-publication secrecy for patent applications, and whether it is really the optimal duration of secrecy across all jurisdictions, applicants, and sectors.

In response to a question regarding cross-country differences, Ms Miyamoto noted that many of the legal provisions at issue are similar across different jurisdictions. Nonetheless, anecdotally, when patent applications relating to the same technology are filed in different jurisdictions, the patents granted may differ significantly, suggesting that some patent examiners require more of applicants than others. Professor Ouellette added that differences can also arise with respect to the type of applicant; a good deal of patenting is now done by universities, which have different incentives, and arguably have less need for secrecy.

Trade Secrets versus Patents

Moderator Douglas Lippoldt (OECD) introduced the panel on trade secrets, a type of protection that has ancient origins relating to notions of fairness. TRIPS provides a starting point as the primary multilateral accord, but, although it defines what can be protected and when, it does not define *how* such protection is to be achieved. Given the lack of definition, countries use a broad range of approaches to effect protection for trade secrets. Recent work by the OECD has considered the variety of ways in which trade secrets are protected, developing a taxonomy of 37 dimensions of protection in 21 countries, while on-going work broadens the scope of this investigation.

Professor Hall then spoke on the topic of trade secrets in comparison with patents. She noted that trade secret protections are not a body of administrative law as such, but rather comprise a multitude of different approaches across different jurisdictions. Her presentation aimed to provide an overview of research on this topic to date, and to talk more closely about work that she has conducted in the context of the UK.

Firms that invest in innovation face a problem of securing returns to their investment in the face of imitation by competitors: the appropriability problem. To counter this, a range of protections are available, both formal (registered and unregistered IP) and informal (alternatives such as trade secrets). Such protections usually function as complements and can be used together. In the case of patents and trade secrets, however, the disclosure requirement of the former means that these protections are substitutes. Academic views differ as to whether patents or trade secrets are more attractive to inventors. There is also considerable anecdotal evidence that trade secrets can be worth substantial amounts, insofar as violation can lead to large damages actions or settlements. The IP system aims to provide *ex ante* incentives for innovation in exchange for disclosure; thus, questions arise as to how important the knowledge spill-overs generated by the system are for future innovation, and why firms choose secrecy when patent protection is available.

Professor Hall discussed the differences between patents and secrecy. Patenting requires disclosure of codifiable but not tacit knowledge, whereas secrecy requires disclosure of neither. A patented invention can be delimited more easily, but cannot lawfully be reverse-engineered, unlike inventions protected by trade secrets. The subject matter of a patent is defined by statute, whereas trade secrecy is broader. Patents are obtained after innovation, whereas secrecy may protect work-in-progress. Patents are available for both product and process inventions, whereas secrecy is more readily available for process innovations. Patents last for 20 years, whereas secrecy can potentially last longer. Finally, patents are more expensive to obtain, although the cost of secrecy is not zero, and enforcement is expensive in both cases.

An on-going study that involves research partners in the EU, US and Japan is considering the cost-savings that arise from reading patents: the results obtained thus far are heterogeneous across and even within sectors (Harhoff et al., 2011). Patents are important to innovation in the organic chemistry, pharmaceutical, polymers and materials chemistry sectors, but less important in sectors like telecommunications, IT and electro-technical. The importance of access to patent literature also varies between sectors along similar lines. Data from the UK and the US, moreover, indicates that within both jurisdictions secrecy is considered more valuable than patenting to protect inventions.

In theory, the costs of patenting include direct and indirect financial expenses; the obligation of disclosure; and uncertainty about whether it will be granted and whether it can be enforced. The potential benefits of patenting include exclusion of competitors from proprietary technology; licensing income; the ability to block competitors; quality signalling, which may help to secure potential collaborators or funding/financing; deterrence of infringement suits; and increased bargaining power in cross-licensing negotiations.

The costs of secrecy include direct and indirect financial expenditure; the need to maintain internal secrecy policy and confidentiality agreements; and uncertain and difficult enforcement. Conversely, the benefits of secrecy include potentially indefinite protection; applicability across all technologies; a broader scope of protection to include e.g. customer lists; and applicability to work-in-progress.

The theoretical literature on the relationship between patents and secrecy is in its infancy, and points to the complexity of the underlying issues (Horstmann et al., 1985; Anton & Yao, 1994; Kultti et al., 2006; Scotchmer & Green, 1990; Ponce, 2007; Schneider, 2008; Zaby, 2010). Results to date are mixed and depend upon the nature of competition and whether the lead innovator is far ahead. The accuracy of such models is challenging to evaluate; they sometimes struggle to account for the real world experience of innovation and generally depend upon an (unrealistic) 'one product one patent' model, so that matching the results to empirical data is difficult.

The existing empirical literature – comprising mainly survey evidence on patent/secrecy use, cross-country comparisons between different systems, measuring impact on performance and diffusion, and natural historical experiments – has problems, too (Levin et al., 1987; Cohen et al., 2000). There is a problem of observability: while patenting is obvious, it is difficult to assess secrecy otherwise than by asking firms, and often the responses obtained provide little information. In general, the available evidence suggests that firms prefer trade secrecy or lead time ('first to market') strategies over patenting, although, again, this differs by industry. The chemicals industry, for example, prefers patents, which relate to products rather than processes.

Professor Hall then discussed the Community Innovation Survey (CIS) and associated literature, which highlights factors that affect propensity to patent or use secrecy (Brouwer & Kleinknecht, 1999;

Arundel, 2001; Pajak, 2009; Heger & Zaby, 2010; Hussinger, 2006; Hall et al., 2014). Patenting propensity increases with firm size, sales of innovative products, R&D collaboration agreements, in high-tech industries, in situations where inventions are characterised by a smaller inventive step, and where reverse engineering is more straightforward. The propensity to rely upon secrecy, by contrast, tends to diminish with firm size for product innovations, in high-tech sectors and where firms are part of multi-national corporations. An historical study by Petra Moser compared a selection of inventions, presented at two world fairs in the nineteenth century, which originated in countries that did and did not have patent systems at the time (Moser, 2005). Her findings demonstrate that the existence of a patent system did not affect the rate of innovation, but where a system did not allow patenting, firms tended to use secrecy. The absence of patents affected the industrial distribution of innovative activity, however, as countries without patent systems concentrated on industries where secrecy was more effective, such as textiles and food processing.

The existing empirical evidence on firm performance is fairly weak (Hanel, 2002; Hussinger, 2006; Hall et al., 2014). Little work has been done on this topic due to the data challenges, namely the fact that use of secrecy cannot be observed. The existing litigation data is highly selective, making it difficult to drawn strong conclusions. The damages available in secrecy cases tend to be lower than in patent infringement cases, which may be explained by the fact that trade secrecy cases are usually against former employees (Lerner, 2010; Almeling et al., 2010).

Professor Hall concluded by noting the existing theoretical literature is inconclusive, while the empirical literature suffers from a focus at firm level rather than at invention level. From the available evidence, it is clear that sectors where patents are considered important are also those where reading patents tends to save time, which suggests that knowledge spill-overs are enhanced. Trade secret enforcement is largely directed at former employees and, while strengthening such protection is generally positive for incumbent firms, it may not enhance innovation or development in the aggregate. Conversely, weakening patent protection tends to push firms towards secrecy.

Copyright and Exceptions for Personal Use: Consumers and Digital Context

Introducing the next session, Moderator Piotr Stryszowski (OECD) explained that copyright has been impacted profoundly by digital innovation. A critical question is whether and when private use that involves copying is permissible. Jeremy Malcolm, Electronic Frontier Foundation (EFF), began by noting that copyright has never covered *all* uses of creative works, although the range of uses covered has expanded over time, from reproduction to adaptation, public performance, broadcasting and making available copyrighted works. Nevertheless, certain uses of copyrighted material remain permissible as personal use rights. Some personal use rights come from copyright law itself, as limitations or exceptions, or where licences are granted gratuitously, implicitly or compulsorily. Other such rights are supported by other sources of law (such as competition law, consumer law or international human rights law), or due to tolerance of technically infringing uses (such as forwarding emails, or where the breach is *de minimis*). The concept of ‘personal use’ is not limited to individual use, nor to private use, nor non-commercial use. Moreover, personal use is not always transformative, so, for example, backing up a computer is not transformative as such. The range of potential personal uses is undergoing rapid evolution at present.

The concept of ‘fair use’ is a more flexible standard that may provide an alternative to the rapidly evolving concept of ‘personal use’. Fair use is broader than personal use, and may add much needed flexibility to existing rules. Fair use-style copyright exceptions have been adopted or considered in an increasing number of jurisdictions (e.g. Israel, Singapore, Korea, Australia), although opposition is also mounting. The inherent uncertainty of the fair use exception, however, means that it must be paired with more specific or concrete rights to assist application. Considering the differences between personal use and fair use, Dr Malcolm noted that the latter exists as an exception to copyright whereas the former has a broader range of sources extending beyond the copyright rules. Some personal uses exist in every country, whereas the fair use exception is not found in every system. Some personal uses are not fair uses, and some fair uses are not personal uses (e.g. big data). Finally, some personal uses may be remunerated, whereas fair use is not remunerated. EFF takes the view that there is no justification for compensation of personal uses when there is a broader public interest in allowing those uses freely.

The differences in opinion that exist regarding the optimal scope of copyright have their origins, essentially, in philosophical differences about creative work and rights. Under the *rights-holder model*, creation is viewed as authorship. Strong rights of authorship are the default position, while personal use and public domain rights are minimised. Private copying is a loss for authors, while uncompensated sharing is akin to theft. Conversely, under the *consumer model*, both consumers and creators are seen to benefit from unremunerated use. Access and personal use are the default, while copyright should be limited and tightly circumscribed. Furthermore, there is no assumption that copying results in damage to authors.

Nowadays, personal use exceptions are under threat, due to the shift to distribution of digital content based on access rather than physical control, and given that acts of technical copying are involved to view, enjoy or modify that content. Decisions regarding how much usage is fair or personal—for example, questions about where digital products and services can be accessed, from how many devices, from whom such products and services can be acquired, and to what uses these can be put—are being taken away from consumers. Increasingly, instead, such decisions involve the rights-holder through legal and technical means, and through intermediaries.

Technical limits on personal use exceptions include digital locks to prevent copying or sharing, access controls such as geo-location, and remote device updating. Legal limits include efforts to extend the definition and criminalisation of commercial use (such as the US's No Electronic Theft Act), and small print in licence agreements that negates personal uses that the law otherwise allows. Intermediary activity includes the seizure of Internet domain names, spurious content removal and censorship, and misuse of power by payment intermediaries against alleged infringers. Finally, as an example of lawful personal uses that are constrained by technology, Dr Malcolm mentioned DVD region coding, which limits the use that can be made of lawfully acquired copyrighted material.

David Carson, International Federation of the Phonographic Industry, began his presentation by observing that the underlying assumption that copyright encompasses a balanced exchange between rights holders and society is not universally accepted. This characterisation may be accurate in common law systems where a balancing of economic and social arguments is accepted. In other countries, however, copyright is a fundamental right of authors. Society is better off when it protects creative works, so that to weaken copyright actually harms society. Copyright is thus not an option as such, but rather a necessity within any society that values culture. Nevertheless, and regardless of the underpinnings of any particular copyright regime, it is relevant to ask whether society is better off when it protects creative works. Since society benefits from the existence of authors and creators who make their livings from creative works, and from the existence of distributors who pay those creators and who promote and disseminate their works in the expectation of profit, copyright is not an option – it is a necessity.

Mr Carson noted that fair use exceptions have been adopted within only a very small number of jurisdictions, and only the United States has a long history of recognising the doctrine (now 17 U.S.C. §107). Fair use has little to do with personal use in the US context, however, and is a much-misunderstood area of copyright law. The enumerated purposes in §107 (criticism, comment, news reporting, teaching, scholarship and research) are the purposes that are favoured in the application of the exception, although it is possible to apply the exception to other uses.

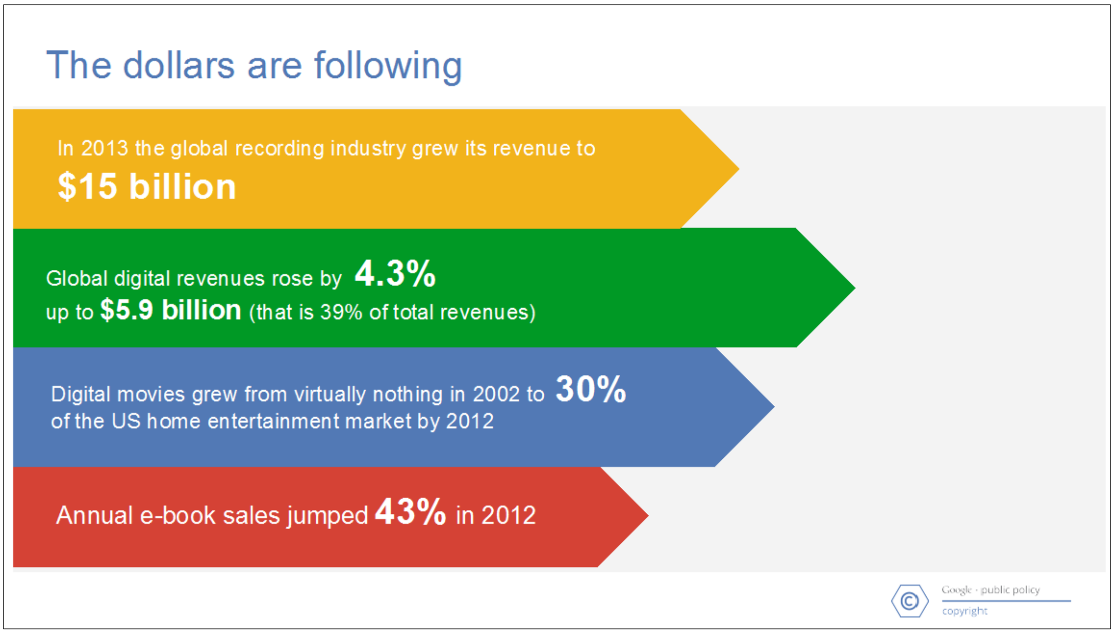
Mr Carson said that he took a narrower view of personal use than Dr Malcolm, viewing it as a concept that does not allow non-private use. He noted that in the United States, which has the richest body of fair use case law, there have been only two fair use cases involving personal uses and that both involved the copying, for purposes of "time-shifting," of a television programme that had been made available to the public for free over-the-air. The fair use doctrine does not provide for any general exception for the making of personal copies. In the European Union, Directive 2001/29/EC, which allows for exceptions or limitations to reproduction rights—permits the making of private copies provided that compensation is paid to rights holders. Some rights holders see private copying regimes as a means of obtaining fair compensation for use of their work. Others, the film industry especially, are strongly against private copying exceptions and prefer licensing. The recording industry lies in the middle of these views. As it can be difficult to determine how to licence such activities (for example, transferring music to a flash drive), levying works more effectively here, although licensing of cloud services might work equally well.

Eventually, as technology and business models change, private copying exceptions may become obsolete. Consumers nowadays are less interested in obtaining copies of copyrighted material, and instead prefer streaming of content. Sooner or later, the notion of having or making copies may be out-dated. Mr Carson referred to the terms and conditions of the iTunes store, which permit users to make ten copies of copyrighted material provided that five are made to iTunes-linked devices. Similarly, e-books can often be stored on several devices. Although the film industry is more reticent about moving towards this model, it has developed the UltraViolet platform to access digital content. Given this evolution to match the digital revolution, it is difficult to argue that amendment of the existing copyright regime is necessary: rather, the existing system is doing a good job at keeping pace with developments.

In response to a question from Professor Hall regarding regional limitations within digital content, Mr Carson argued that the source of the problem often lies with the vagaries of different licensing regimes, rather than any obstructions imposed by content producers. A particular seller may only have the rights to provide access within certain regions. Moreover, providers of streaming services often prefer to roll out their services on a targeted, country-by-country basis, irrespective of the willingness of content producers to licence rights on a multinational basis.

A delegate from the UK noted that when the UK government was seeking to reform its copyright laws, it commissioned various IP scholars to produce a study on the type of rights granted by copyright holders when licensing their content. Ultimately, even these experts found it almost impossible to decipher the relevant terms and conditions. That being the case, the delegate asked, how could consumers be expected to understand such opaque rights and limitations? A delegate from the Netherlands referred to lawsuits against young consumers who download unauthorised copies and emphasised that content producers must do more to make sure that consumers (particularly young consumers) understand that what they obtain when they purchase a CD or an e-book, and, importantly, what they can and cannot do with this content. Mr Carson replied that the recording industry has moved away from bringing infringement actions against very young consumers. When consumers buy creative works, they may own the physical CD or book, but they do not gain ownership of the content itself.

Cédric Manara, Google, opened with a reference to PSY's "Gangnam Style" video, which has been viewed about 2 billion times thus far. This illustrates the success and utility of the personal use exception and does not even reflect other personal uses (transformative, parody, etc.) that add to the success of the video. Mr Manara provided some statistics on the recent success of the recording, film and publishing industries (see below), where revenues have grown despite the apparent threats posed by the digital revolution. However, he acknowledged that the uses that consumers make of creative content, and the means by which they access it, are changing rapidly: via smart phones, tablets, cloud computing, and emerging technologies such as smart watches.



Slide included with permission of Google; figures are from IFPI, Recording Industry in Numbers (2013), available at www.ifpi.org/resources-and-reports.php#/recording-industry-in-numbers.php.

In such an environment, it is important that personal use exceptions retain their value in order to stay in line with consumers’ expectations. Consumers expect to be permitted to copy content that they have purchased, and to store such material in the cloud. Research shows that consumers consider total benefit when they purchase content, which includes format shifting or moving content onto any device (Rogers et al., 2009). Thus they believe that they have already paid for the uses that should fall within the personal use exceptions. In the future, consumers are expected to experience further economic benefits arising from a greater choice of technologies that rely in part on private copying. A clear exception to the copyright rules in such instances is likely to have a positive impact on growth in the technology sector, providing benefits both to providers of cloud-based storage and to users of such storage.

Mr Manara argued that to encourage new forms of personal use of copyrighted content is to encourage innovation. Providers of private cloud storage would benefit from reduced costs as a result of no longer having to pay for storage of copyrighted material in a private cloud, reduced administrative costs as a result of no longer having to negotiate licences, and reduced legal risks and uncertainty. An exception that removes barriers to launching new online services—because licences either are too expensive or are unavailable—is therefore likely to support innovation and economic growth in the technology sector. Start-ups, in particular, would benefit from any reduction in administrative costs, as these firms are least familiar with the licensing process. He gave as an example the Feedly personal reader service, which has only 12 employees but can handle significant traffic because of its reliance upon cloud-based services. A robust private copying exception would be of particular use for a small company like Feedly.

For personal use to have value, however, the legal framework must provide sufficient support and encouragement. Accordingly, the law should reduce unnecessary restrictions on the use of copyrighted content for private purposes, so that the law aligns with the reasonable expectations of consumers. Mr Manara quoted the Hargreaves Report to the effect that there is no strong evidence of harm to rights holders done by private copying in the normal course of using digital equipment to play works, and that the benefits of being able to do so are already being factored into the prices charged by rights holders. That being the case, he recommended that countries should adopt concrete personal use exceptions that allow the market, new technologies and new creativity to evolve.

Frances Lowe (PRS for Music) queried whether arguments for a personal use exception extend to the cloud, at least in the UK context. Although rights holders in the UK favour a (compensated) private use exception generally, cloud storage is already licenced and this allows for considerable innovation. Mr Manara agreed that levies coupled with licences do not work, and argued against jeopardising the future of cloud services in order to apply levies. The business model used is important in this regard. A delegate from Israel asked whether it might be possible to target levies strategically at more problematic types of copying, as opposed to, say, transferring content from one device to another. Mr Manara replied that the vast majority of content stored in the cloud is not copyrighted, but is, rather, wholly personal content. It is important, moreover, to focus on developing the law optimally for the future, and not merely the present.

Professor Olivier Bomsel, MINES Paris Tech, then made two points. First, from the perspective of an economist, copyright is an institution intended not merely to incentivise creation but also to facilitate transactions based on that creation. If copyright generates transaction costs, it is because it allows transactions to occur. Should copyright be suppressed, there would be no transaction costs just because there would be no transaction at all. Moreover, while bare creation has little economic value as such, transactions based on such creation can generate considerable value. Accordingly, copyright is equivalent to a land right upon which it is possible to build much complementary investment, but it is not particularly valuable in itself. Once a creation enters the media system, it gets value through a mediatisation process. Such mediatisation can be achieved through paid advertisement but also through the free consumption of degraded versions of the works. Professor Bomsel noted that considerable reuse of copyrighted content (e.g. parody) can occur within the mediatisation processes. Copyright enables the right holder to monitor and capture the benefits of the mediatisation of his or her works.

Second, the relationship between producers and consumers is more immediate in the digital world where information about consumers' choices is systematically collected. Accordingly, there is less scope for exceptions and more scope for direct application of rights. This can be problematic in countries like France where private copying levies have expanded hugely, and where, arguably, the major players are now 'addicted' to such levies. There is a risk that, if more private use exceptions are granted, the collecting societies will demand greater levies as compensation. In the digital environment everything can be internalised through exclusive rights, so there may be a need to negotiate with (and potentially provide compensation to) the collecting societies for the loss of their rights.

Dr Stryszowski asked whether we might expect more and more tailored offers for consumers, on the one hand, and more and more levies, on the other. Mr Carson noted that, for most of what the music industry sells, there are no restrictions, a legacy of its status as the first creative industry to go digital. Nonetheless, rights holders often make their work available at a number of different price points that provide different options; for example, the option to purchase a film or rent it for 24 hours. If a consumer opts for the latter, why should the consumer also have the right to make a copy of the protected work? Dr Malcolm noted, however, that overly strong copyright rules could prevent personal or fair use even where there was no question of ownership involved. For example, a consumer who rents a film may wish to produce an online review and include a clip.

On the question of tailored offers, Mr Manara said that Google would like to make more tailored offers to consumers, but it is very difficult due to fragmented licensing regimes. It is thus unduly complex to build unique offers. At the same time, this leads to bad experiences for consumers, who find that their access to content differs depending upon their geographic location. A delegate from Spain suggested that the move towards greater digitisation might herald a greater movement from levies to licences, as it becomes more technologically possible to control and track the use of copyrighted content. On the other hand, the multitude of models to be found across the different systems means that this would require significant changes, and thus necessitate a transitional period.

A delegate from BIAC stated that the emphasis placed by Mr Carson at the beginning of his presentation on rights rather than economics was somewhat misplaced, insofar as the recording industry itself is primarily focused on financial concerns. At present, the delegate argued, the entire copyright system is inefficient. Transactional friction is the primary problem, which enables those who benefit from such friction to monetise it. The focus should thus be placed upon getting the money paid into the system to creative parties. (It was noted by a representative of BIAC that the BIAC delegation was comprised of various independent experts in this area, who might not reach consensus on all issues.)

Professor Bomsel said that a basic function of any property right is to allow transactions: although there may be a battle to share the resulting value, this is an inherent feature of transactions, and happens in every field. The difficulty here is piracy: copyright is not inefficient, but it is increasingly ineffective. Professor Graham said that economists know a lot about IP rights, and that the breadth and scope of the rights pertinent to the underlying creativity make a significant difference in terms of the outcomes achieved. Professor Hall argued, however, that IP rights are not the same as property rights from a welfare perspective. Unlike conventional property rights—such as land—my use of an IP right does not prevent your use of the same IP right, so that it is less clear, from the perspective of society, that a State-sponsored restriction is desirable in this context.

The panellists were asked to provide final thoughts on the discussion. In response to a suggestion by Mr Carson that buying a region-appropriate DVD player solves the coding problem, Dr Malcolm argued that this does not address the underlying issues, as rules on circumvention are restrictive and the law should not privilege digital lock technology where it aims to destroy legitimate personal uses. Mr Carson agreed with the Spanish delegate that levies are likely to decrease in importance over time. He was less convinced, however, that the discussion had identified any legitimate personal uses going beyond purely private copying. He gave as an example of a positive development the licensing arrangements between YouTube and the recording industry, which generate benefit for all parties. Mr Manara noted that YouTube is a well-established service, though, and argued that we should focus on making sure that the legal framework changes with future developments and societal and technological changes.

IP Protections and Text and Data Mining

Ian Hargreaves, University of Cardiff, explained that his recent research on text and data mining (TDM) aimed to determine the extent to which the EU’s legal framework supports or obstructs this activity. The background to this study included a perception of weak European productivity and innovation; a lack of success in key digital sectors, notably Internet platforms; the darkening political atmosphere within the digital debate; and a (more positive) perception that it is not too late for Europe to pursue a different course if necessary.

Professor Hargreaves defined TDM as involving ‘the deployment of a set of continuously evolving research techniques which have become available as a result of widely distributed access to massive networked computing power and exponentially increasing digital data sets, enabling almost anyone who has the right skills and access to assemble vast quantities of data, whether as text, numbers, images or in any other form, and to explore that data in search of new insights and knowledge.’ The key aspect is that TDM involves the automated exploration of data, which can be contained in any format, whether text, numbers or images. TDM is potentially useful to researchers in all fields, from arts and humanities to medicine and the hard sciences. Cost is not a barrier to entry, while data analytics lie at its core. The predicted economic value of TDM is high, but also fairly speculative. While the OECD has highlighted the increasing importance of TDM as a means of supporting innovation and growth (OECD, 2012), a clear and predictable legal framework is needed to underlie such development. EU law currently deploys an approach based on ‘fair dealing’ with named exceptions, whereas US law uses the more generic ‘fair use’ exception. EU law also incorporates the Database Directive, which has no US counterpart, while data privacy and protection are also relevant.

The European Commission's 2014 TDM review was conducted within a short timeframe, without an opportunity for independent stakeholder consultation. Nonetheless, the existing literature demonstrates the wide variety of views in this area. European publishers argue against reform of the copyright laws to facilitate TDM, and instead propose changes to their licensing procedures to meet the needs of data miners. Researchers, by contrast, argue that the right to read should include the right to mine, and point to high costs in time and other resources in dealing with publishers' access systems for TDM. In addition to arguments regarding copyright, there have been arguments about open data, open access to other sources of knowledge and the role of the State. A difficulty for policy makers is the absence of concrete evidence regarding the optimal degree of copyright protection to minimise transaction costs and facilitate TDM, yet still protect rights holders. Empirical evidence points to an increasing number of references to TDM in academic publications, plus increasing numbers of patents that have been granted referencing TDM. From this evidence, it is possible to determine that the greatest volume of TDM occurring worldwide takes place in the US, followed by other Anglophone countries, and that levels are increasing.

Given existing levels of research expenditure in Europe, and the fact that TDM tends to increase researcher productivity, it can be assumed that a strong TDM industry in Europe would offer much economic value. Whilst it is impossible to be precise about potential benefits, a GDP gain with an order of magnitude of tens of billions of euros is feasible. Two further economic unknowns in this area, however, are what effects upon supply might arise from compensation of rights holders for loss of their rights to restrict or prevent TDM, and what economic benefits might flow from increased quality of research based upon access to more comprehensive data.

At present, the market for TDM in Europe does not work well. There are problems of high transaction costs, strategic behaviour by rights holders, and externalities. Any exception to rights protection for TDM could range in coverage from small (e.g. restricted to scientific publisher databases alone) to vast (e.g. all databases behind a firewall). While public debate has focused on science, the potential scope here is much broader, including, for example, web-scraping.

One unresolved issue is whether rules governing TDM should apply to all research or only to non-commercial activity. The 2014 TDM review considered whether legal barriers inhibit the use of TDM in Europe for research purposes, and if so, how the legal framework might be improved. The review considered three potential options for legal reform. First, it is possible to opt against reforming the copyright rules themselves, but instead improve licencing arrangements. Second, there is the option of redrawing the copyright rules, to provide, for example, a more normative approach to reproduction rights, exceptions to copyright and/or database rights, or open norms. Third, it would be possible to proceed by way of straightforward exceptions to existing copyright law to protect TDM. Across all of these options, however, data privacy issues might arise.

In conclusion, Professor Hargreaves emphasised that TDM is an important research technique with strong growth potential. It presents significant economic opportunity for Europe, and merits the attention and support of policy makers. Europe lags behind the US in this area, so legal reform to facilitate greater use of TDM appears necessary. Without reform, moreover, there is a risk to European competitiveness. At present, copyright law in Europe exceeds its useful boundaries in relation to TDM, inhibiting beneficial research activity. Licensing, the preferred approach of scientific publishers, provides a short-term solution but is an insufficient response. Developing specific exceptions to copyright, as advocated by the research community, is a positive step, but may generate certain problems and complexities, particularly concerning the division between commercial and non-commercial research. As a medium term solution, an EU-wide exception for TDM for scientific research should be brought forward. Nonetheless, the 2014 review concluded that a more strategic reform of copyright and database law in the EU is the best option in the longer term. A durable distinction should be made between copyright's protection of 'expressive' works—the core purpose of copyright—and its more questionable role in restricting or controlling basic automation of research. At the same time, it is necessary to avoid wrong moves on database protection and privacy.

Following a query from the delegate from the EU regarding calculation of potential economic impact, Professor Hargreaves explained that these figures are broadly drawn, and that it is difficult to be precise in terms of analysis. Essentially, one is either convinced or not by the argument that there is substantial value to be realised here. Responding to a question from a Swiss delegate about whether the apparent advantage of the US might be attributable to greater homogeneity in that market, he agreed that this was an advantage for the US, alongside the greater skills base available. Whilst it is difficult to disentangle these from the legal issues, the latter are clear: the fair use defence facilitates use of TDM in the US, whereas in Europe there is a combination of inhibition due to legal uncertainty coupled with a lack of skills.

Professor Hargreaves added that, interestingly, the Internet presents those who consider themselves to be economic and social liberals with a need to balance potentially conflicting interests between access to scientific information and protection of data privacy. The protection of personal data may lean against changing the legal framework for TDM. There is no 'right answer' here, but there is a significant danger of unintended consequences unless Europe considers these issues more deeply.

Pedro Mizukami, Centre for Technology and Law, FGV Law School, spoke about TDM in the context of Brazil. The IP system in Brazil is generally unfriendly towards TDM, creating strong incentives against such activity due to potential copyright issues. Anecdotally, FGV Law School has opted against data mining of legal literature due to fears about copyright ramifications. While there is a strong media presence for big data as a topic in Brazil, there have been no high profile cases involving copyright and TDM, and this issue is largely absent from media discourse. Similarly, debates on TDM and copyright are not common within policy fora in Brazil. The background issues, however, have been subject to intense discussion in the on-going copyright reform process since 2007.

The existing copyright rules, contained in Law 9.610/98, are very restrictive, to the extent that almost any use of copyrighted content is prohibited (and, indeed, criminalised). The rules were drafted for a pre-Internet, pre-mass digitised world, and were almost immediately inappropriate upon enactment, while the closed list of limitations to protection has been narrowed continually since the first law was enacted in 1898. The existing limitations are insufficient to permit TDM, insofar as any act of copying or digitisation is potentially an infringement, which renders TDM a very risky activity. Brazilian copyright law lacks an explicit rationale for copyright protection, and similarly lacks a rationale for its various exceptions and limitations. In such circumstances, a defendant may be forced to base his or her defence directly upon the constitution, an uncertain argument to maintain. There is an absence of scholarship on copyright in Brazil, other than that produced by scholars with ties to content producers, while few law schools offer copyright courses. There is also an absence of case law on these issues, apart from cases taken by the Brazilian collecting society, ECAD. Nonetheless, in two recent decisions, from 2011 and 2013, the highest courts of appeal made direct use of the Berne three-step test to expand the list of limitations beyond those found in the existing law, holding that it would be unfair to find an infringement in the circumstances of the non-commercial use at issue, which involved religious music.

Copyright reform has been on the agenda since 2007 and a draft text was placed under public consideration in 2010. Although the revised text does not contain an express exception for TDM, the public consultation resulted in considerable expansion of the list of specific limitations, with, an open-ended limitation inspired by the Berne three-step test that might cover TDM. The latest version of the bill includes a requirement to take account of fundamental rights in the application of copyright law. Opposition was channelled initially through ECAD, which was mainly concerned about stronger transparency rules for collecting societies but attacked the entire bill in the process. In response, the provisions that relate specifically to collecting societies were removed from the general bill and have already been passed separately, which has changed the political landscape significantly. A different configuration of political forces and pressures will thus take shape in Congress when the bill arrives there in 2015, potentially creating greater scope for an explicit TDM exception.

Carlo Scollo Lavizzari, Lenz Caemmerer Attorneys, spoke about the existing opportunities and current challenges raised by TDM. Big data has become a reality, and the challenge is to enable this further. TDM is applicable to, and of distinct value for, a range of activities such as biomedical research, security, sentiment analysis and searching. Yet, challenges exist: at present there is insufficient (albeit fast evolving) demand for published content; there are difficulties in defining TDM; and there is a fundamental question of whether it is fair and sensible to create and transfer economic value to third parties for a very low rate of return. In relation to the latter issue, academic publishers claim that the apparent rush to transfer value from one set of parties to another is misguided. There are multiple relevant stakeholders: publishers, researchers, those involved in corporate R&D (e.g. pharma), and commercial 'toolmakers' such as software companies that develop new products based on cross-publisher mining and entity extraction.

The contention that the EU is falling behind the US in terms of TDM activities can be disputed. The publishing industry examined the relevant data and is of the view that the EU is actually ahead of the US. Going forward, it is important to enable successful TDM by allowing a viable ecosystem to evolve. This requires the development of a collaborative system that allows fair returns on investment in necessary TDM infrastructure. Publishers are aware that they are not the only stakeholders in this regard and that there is substantial potential for economic, scientific and humanitarian value to arise.

Mr Scollo Lavizzari then discussed various initiatives taken by the publishing industry to facilitate TDM and to build value with other stakeholders. These include involvement in working groups on licences and technical standards; development of the 'click-through' Licence 4 Europe; involvement in the Copyright Clearance Center (CCC) TDM platform, which aims to enable search and delivery of content; and CrossRef Prospect, an intermediary that allows access to full text content for institutional subscriptions.

A significant fear of the publishing industry is the potential misuse of content, so the industry wants to retain some measure of control over access and use. On the other hand, the existing mechanisms and processes need to operate more quickly and easily, so the industry has a number of innovations in the pipeline that are intended to remove any obstacles that remain. This includes simplification of the process, provision of new technology standards and solutions, commonality in normalised formats and for content and data to sync, consistent licencing terms, and collaboration between all those involved in the information chain to provide combined solutions.

One should be wary, however, of transferring existing value to intermediaries immediately; it makes more sense to maintain caution and focus on improving the avenues available. Successful TDM requires the consent of rights holders: exceptions to copyright law are unnecessary and probably harmful. The possibility of massive downloads entails a risk of piracy and of illicit transformation and use of content. For commercial TDM, policy makers would interfere in existing markets; while, for non-commercial activities, it is premature to legislate. Mr Scollo Lavizzari concluded by emphasising that unfairly transferring economic value to third parties involved in TDM would undermine investment in the 'minable haystack', i.e. quality content.

A delegate from the UK acknowledged the need to provide incentives to make content available for mining, and also for producing software, but queried why licences for software are tied to ownership of content when these aspects are largely unrelated. He noted the complexity of licence terms and conditions, particularly for institutional access, and asked why content providers are so bad at explaining things to their customers. Mr Scollo Lavizzari accepted that licensing is often complex in practice, at least insofar as the objective is to encourage high-quality TDM using verified data. Although the publishing industry has collaborated in an effort to provide clearer template licences, there are limits to what can be achieved in this regard. Content that was produced originally to be read needs to be “normalised” before it can be mined, which requires the necessary infrastructure to be put in place. Some parties seeking access may seek too much, however, and criticisms of complexity in this regard may go too far. In response to a question from Mr Manara, he clarified that the main discussion within the publishing industry concerns access to texts, although other data sources are increasingly relevant.

Sergei Filippov, The Lisbon Council, presented evidence on levels of TDM in Europe. The world of data is growing exponentially: annually, the global research community generates over 1.5 million new articles, with an estimated 50 million articles in circulation as of 2010. TDM is an emerging research technique that has the potential to make sense of this avalanche of data, but is itself subject to copyright law. As part of the 2014 TDM review discussed by Professor Hargreaves, the Lisbon Council undertook a study to assess the scale of use of TDM processes and techniques in academic and research communities in Europe. To do so, it examined scientific publications about TDM and patents granted relating to TDM, and conducted interviews with experts and representatives of the research community.

First, the study looked in Elsevier’s ScienceDirect database at scientific publications that treat TDM as their primary subject-matter. Between 1995 and 2013, there were 1,374 publications about data mining, and 158 about text mining. About half of the work on data mining was done by US researchers and about a quarter done by EU scholars, the latter having lesser impact judged by number of citations. Publishers are typically reluctant to grant access to their databases and prefer to maintain the status quo, either due to fear of misuse or fear of undermining their own competing products or services. According to the British Library, it takes 16 months on average to negotiate copyright permissions with each publisher.

Turning to patent analysis, conducted using the EspaceNet Worldwide Database of the EPO, 2279 patents were granted between 2000 and 2013 which include the phrase ‘data mining’ in the title or abstract. The greatest number of patents granted was in the US, with China second (and progressing quickly). In the EU, by contrast, software is not patentable, which makes it more difficult to gain patents over TDM techniques. In terms of nationality of the inventor, again the greatest number of patents was granted to US nationals or persons based in the US, followed by Chinese nationals. Relatively modest numbers were granted to EU-based inventors. The EPO has granted relatively few patents relating to TDM, with the majority of these owned by large US corporations.

Finally, to gain practical evidence on the use of TDM, semi-structured interviews were held with 20 researchers (based in Belgium, Germany, the Netherlands, Slovenia, Spain, Sweden, the UK and the US), most of which are active in the social sciences. Virtually all respondents had at least a minimal knowledge of TDM/data analytics: some respondents employed it already, whereas others might like to do so but lacked the relevant skills. Within the social sciences, TDM was seen as having considerable future potential, but not yet as a mainstream research method. Many respondents were concerned about its copyright implications, and so would restrict any data mining activity to text published in the public domain (e.g. working papers, non-peer-reviewed articles). This creates the risk, however, that such research would be of lower quality. There was also a suggestion that data analytics should be given greater prominence in university curricula. When asked about the IP implications of TDM, some scholars argued that there should be a personal use (‘sharing for research’) exception, whereas others were more critical about the use of IP to protect, and arguably restrict access to, academic research at all.

Dr Filippov concluded by noting the strong increase in the number of publications and patents referring to TDM, growth that appears to be driven primarily by the US and Asia. Europe lags, raising questions as to whether the strong IP protections granted in the EU are a hindrance. There is a degree of uncertainty amongst scholars about the extent to which copyright applies to, and might inhibit, TDM, and the European research community is strongly in favour of an approach based on 'open access' to scientific publications. Thus, the traditional business model of the academic publishers is under pressure.

The UK delegate noted an interesting 'natural experiment' about to commence in the UK, as TDM of academic texts would be legal from 1 June 2014. This change was motivated by pressure from universities as well as various government ministries. Mr Scollo Lavizzari disagreed with the view that the US is a better environment for TDM, pointing to what he characterised as judicial activism in cases like the Google Books settlement. While publishers might disagree with the need for the UK exception, at least it is legislatively created. The Moderator, Christian Reimsbach-Kounatze (OECD), noted that a potential benefit of TDM is it allows researchers to mine and combine information from a number of databases produced by different publishers, and he asked to what extent the existing regimes permit and/or facilitate such work. Mr Scollo Lavizzari explained that CrossRef, a system aimed at the non-commercial market, enables text search and retrieval across several sources. In this sense, any copyright exception for TDM would be at most a shield and not a sword, as it is necessary to have an access mechanism in the first instance. The CCC approach is different, insofar as it assembles copyrighted material in a single location. One problem, however, is that content producers often have confidential information that they do not want to share generally.

How Have Changes in the Legal Protections for Copyright Owners Affected Creative Content Generation, Distribution and Consumption?

Sacha Wunsch-Vincent, WIPO, noted that the discussion around this topic can take two turns: a narrow one, that is debating the length of the copyright term protection and its effects and a broader one, debating which legal and economic fundamentals are necessary to generate a sustainable and vibrant digital content ecosystem. He urged the panel participants to focus on the latter to generate a more productive outcome.

Isolating the effect of copyright duration on content creation while taking into account the new digital environment, and the changed underlying economics of the content industries has proven hard, if not impossible (Wunsch-Vincent, 2013). This also has to do with the different effects copyright has on the creative supply, access to copyrighted works and associated institutional parameters in terms of positive impacts (e.g. incentives for creators, enabling transactions) and negative impacts (e.g. potential reduction in follow-on creativity, increased access costs for users, transactions costs). Economists have to disentangle the effects on all stakeholders, including creators, performers, rights holders and consumers. In considering the scope of the law, it is necessary to consider the protectable subject matter, the scope of exclusive rights, exceptions and limitations, the duration of protection, and the level of enforcement.

This framework for analysis, moreover, has to adapt to take account of changes brought about by digitisation and the increased role of the Internet, leading in turn to changes on how content is created, how it is distributed and how copyrights are administered. On the side of content creation, there is a blurring of the line between consumers and producers in terms of production, alongside a decrease in distribution (but not necessarily production) costs (OECD, 2007). New distribution channels and revenue models have emerged, alongside new forms of compensation and revenue sharing (OECD, 2005, 2008). The predicted growth in disintermediation (i.e. direct delivery of content) has not occurred, while re-intermediation has actually grown in some areas, with the prominence of e.g. YouTube and Netflix. Bargaining power might have shifted away from content owners and producers in recent years. We know relatively little about how these changes impact artists' and content industry revenues (OECD, 2005, 2008). Online piracy is a pressing problem: while not to blame for all difficulties it must be taken into account. In terms of rights' administration, the management of copyright globally remains complex and the potential for simpler management processes has not been exhausted.

Dr. Wunsch-Vincent suggested that the basic tenets of copyright economics regarding the incentives for new creative works are largely untested in existing economic literature. The majority of the empirical economic evidence since the advent of the Internet has focused on the effects of unauthorised downloading on the creative industries, with a particular focus on music and more recently films. Beyond this there is little empirical evidence regarding the effects of stronger rights on the supply or the price of creative works. There is a need for greater empirical (and independent) data (Wunsch-Vincent, 2013). First, statistics are missing on the quantity, quality and prices of creative works supplied. Secondly, data is missing on the revenues generated on the basis of copyright and the respective distribution of these revenues between creators, the creative industries, and other intermediaries. Third, and related to the point on costs, little convincing data is available on the administrative and transactions costs related to copyright

From a policy perspective, while term extension was important in preceding years there is now more policy discussion around the topics of preserving the level of protection online, improving the relevance and workings of limitations and exceptions (e.g. the WIPO Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled, or work in the area of user-created content), improved rights management (orphan works), and copyright relinquishment and other topics to creating a balanced and vibrant copyright system. The view of WIPO is that it is most important to focus on ‘copyright infrastructure’: thus, it is necessary to have a framework for easier licensing of content worldwide and for improvement of digital markets. Greater work needs to be done on the impact upon creative supply within this new environment.

A delegate from the UK noted recent work by the BBC, which revealed that, even as distribution mechanisms changed and costs dropped significantly, contracts between artists and their labels did not change. Thus, most artists continue to receive a very small proportion of overall revenues, creating a disequilibrium that must be corrected. In response to a question from BIAC regarding the revenue shares received by artists in the online world, Dr Wunsch-Vincent emphasised that the main issue is the lack of evidence, with a need for further research to provide a more accurate assessment. A delegate from OHIM suggested that one way of measuring the effectiveness of the current system would be to measure whether supply is declining; at present, supply appears to be increasing, despite the apparently difficult environment.

Frances Lowe, PRS for Music, explained that she represented a collective management organisation, which viewed the sustainability of artist revenues—broadly construed to include composers, performers, publishers etc.—as a critical component of content creation. Copyright is an area of law that must be underpinned by data and economic evidence, of which there is now an increasing amount available (OHIM & EPO, 2013; Department for Culture, Media & Sport, 2014; UK Music, 2013). Common methodologies for assessment of the value added by copyright creation to the economy are also emerging, although there is a need to improve the evidence base further. The evidence to date supports the view that the creative industries have a significant contribution to the economy, including job creation. UK interests are working on improvement to the evidence base: one example is a recent collaborative exercise involving the UK’s Office for National Statistics, the Department for Culture, Media & Sport, and the music industry to examine the statistical classification of music in the economy; it identified substantial gaps in how the music sectors are categorised in existing Standard Industrial Classification codes, in part because of the evolution of these industries in the digital economy. There is an opportunity to revise these classifications and codes at the global level in 2016, which would enable more accurate measurement of industries and the impact of policy changes on those industries in future. Furthermore, to undertake effective rights management PRS for Music registers all new creative works of its members, a dataset that might provide a fertile ground for further research on changing levels of creativity, and the impact of policies on creativity.

Distribution modes within the music industry have evolved significantly over time, from physical analogue, to physical digital, online downloading, and now online streaming mechanisms. While these changes were welcomed by the industry, the emergence of online downloading marked a decline in overall revenues, which has continued with the move to online streaming models. Although subscription revenues are growing, the download model is already in decline, and there is anxiety within the industry that individuals receive insufficient returns for their creative work. For example, within the UK in 2013, only about 7% of consumers who buy music paid for streaming services. While another 7% intended to do so in the following six months, these figures are comparatively low.

Turning to the legal framework, Ms Lowe noted that the European Commission had recently issued a chart showing authors and artists as the 'roots' of the tree of the creative and Internet economy. It is important to make sure that authors receive sufficient returns within the overall ecosystem, alongside others who make significant investment such as publishers and broadcasters. In this regard, Internet distributors do not invest in content creation to the same extent that traditional distributors do. On the issue of term extension, Ms Lowe noted that the reforms in the EU were the result of internal market harmonisation rather than an issue of IP as such, and that it was necessary to harmonise upwards to protect the rights of those in countries that granted longer protection.

Within the overall copyright ecosystem, there is a distinction between primary liability (attaching to an individual or service that uses copyrighted material, typically communicating to the public or copying a work without authorisation) and secondary liability (attaching to intermediary services, which may attract contributory or vicarious liability). Some business models, however, allow for the avoidance or illegitimate exploitation of copyright to the detriment of rights holders. In 2012, PRS for Music worked with Google and Detica to produce a data-driven survey of websites that infringe copyright, identifying six distinct business models for pirate sites and how these illegal businesses were financed by advertising, subscription or payment cards. Ms Lowe emphasised the need for more data-driven work to understand how business models work. There is also a need for greater consumer education, so that consumers understand the link between copyright revenues and, for example, the remuneration of creators.

Ms Lowe added that although there are more intermediaries in the ecosystem taking responsibility, concerns still exist regarding monetisation that does not return to the investment cycle and thus harms sustainability for creators. There is considerable concern amongst content creators about expanding copyright exceptions for new business models, which may see a transfer of value from creative to technological industries. Further evidence is also required to assess the potential impact of an exemption for cloud computing models.

In response to a question comparing streaming services funded by paid subscriptions versus free services funded by advertisements, Ms Lowe explained that digital service providers prefer subscriptions, as they offer a more sustainable business model. A UK delegate described the results of empirical research commissioned by the UK government, which found that the majority of consumers consumed legally and paid for their consumption; whereas, perhaps counter-intuitively, those who use illegal services also spend a lot on consuming services. As a fairly small group of users consume the bulk of illegal services, it might be easier to target enforcement. Responding to a question from a Spanish delegate regarding the role of collecting societies online, Ms Lowe noted that collecting societies are owned by their members and work in their interests and would have a role if their members wanted them to. There are significant benefits in terms of having a number of hubs for licensing for data collection, and thus there is almost certainly a role for collecting societies within the online world, but transparency will be key in this regard. Dr Wunsch-Vincent added that this is also the view of WIPO, which continues to see an important role for collective rights management, but, again, transparency is vitally important.

Sampsung Xiaoxiang Shi, East China University of Political Science and Law, spoke about copyright in China. While it is now accepted that copyright provides incentives for creation, controversy exists regarding the optimal role for copyright in Chinese society. China might thus provide a prototype for empirical research on the correlation between the generation of creative content and the strength and rigidity of copyright protection.

At present, the market for content creation in China is isolated and highly regulated. Copyright is fairly young there, which, Professor Shi suggested, is because the concept of authorship in China is different—and less romantic—than it in Western literary traditions. Traditionally, Chinese authors were less concerned about reproduction and instead were happy to have their works read. During the Cultural Revolution, moreover, authors were viewed as equivalent to any other workers, and not deemed worthy of special protections.

The Copyright Law of the People's Republic of China was first promulgated in 1990; it has been revised twice and further amendments are proposed. From its initial enactment to the most recent revisions, foreign trade (and consequent international pressure) was an important consideration within Chinese copyright law. Notably, however, the proposed third amendment to the copyright rules has not been prompted by the exigencies of trade but, rather, by an emerging desire to promote and protect Chinese culture.

Historically, enforcement of copyright in China was hindered by the segmented nature of government, with little inter-agency collaboration. Since 2010, however, China's central government has had a greater commitment to copyright, which has resulted in much more effective enforcement. Professor Shi contrasted earlier approaches to digital piracy, which involved physical copies made on DVD, with contemporary piracy through infringing websites. Because earlier forms of piracy were relatively low level and involved numerous individuals, they were relatively difficult to police. By contrast, online piracy can be countered simply by shutting down infringing websites, often without any need for (elusive) collaboration between different government agencies. Several particularly notable cases in 2013 were the decisions against Baidu and QVOD, both prominent web services companies in China, for facilitating access to websites containing pirated material. In response, both companies received the highest statutory penalty that could be levied for such conduct.

There is an increasing realisation of the importance of IP to the economy in China, particularly in terms of growth. An interesting topic in this regard is the online literature industry. Literature websites, which publish works typically written by non-professional authors, are hugely popular in China. Authors publish their writing exclusively online, often in instalments, and are paid very small amounts by each reader. Although most authors make nothing from online publishing, the most popular have earned very large amounts and the online literature industry is hugely profitable. For some writers, simply receiving recognition for their work is sufficient compensation; for others, however, and particularly from the perspective of online literary websites, copyright is critically important to the digital value chain. Copyright is not the only area of concern here, though, as quality control and market saturation are increasing problems. Nonetheless, there is a strong argument for legal protection of the authors' moral rights, regardless of the financial consequences.

Professor Shi added that, although non-commercial usage or sharing is desirable to both authors and users of creative content, commercial exploitation of creative works is likely to be the focus of further regulation in China. He noted that his conclusions differed significantly from those made in the preceding presentation, and acknowledged that the music industry appears to view China as something of a lost cause.

In response to a query from an Israeli delegate regarding cultural approaches to authorship in China, Professor Shi explained that culture is partly the explanation for the historical ambivalence towards copyright law, but also the absence of a market economy meant that notional rights would be worthless. Now that rights can be traded, authors certainly do not shun remuneration. Responding to a question from a Swiss delegate regarding the impact of the introduction of TRIPS in China, Professor Shi explained that it is difficult to persuade Chinese scholars to conduct empirical research in copyright law.

Session Three: Conclusions for Policy makers

The final session of the workshop provided the panellists with an opportunity to respond to other presentations and draw out important themes from the workshop.

Patents

Professor Ouellette outlined a series of conclusions for policy makers that follow from her presentation on patent disclosure. She emphasised the need to improve the quality of disclosure: often, it is not so much the case that the existing law is defective but, rather, that is it not applied properly. Greater time and resources should be devoted to scrutiny at the initial (i.e. patent examination) stage, to ensure that, for instance, the patented technology is reproducible by a person skilled in the art. Although patent examiners have scientific backgrounds, it is difficult to be skilled in all areas, so peer review of applications might be beneficial. Parallels can be found here to current practise in the US where crowdsourcing has been used to determine prior art. It is necessary to ensure that scientists have access to the patent literature; Google’s patent listings are useful in this regard. In the US context, the recently reformed ‘wilful infringement’ doctrine needs to be clarified. Professor Ouellette also noted that 18 months is a long time lag between filing and disclosure in fast-moving fields, and suggested that university patents might be disclosed earlier. She also encouraged greater citation of relevant patents within scientific literature. Finally, there is scope for further empirical work, and she herself plans to extend her survey to other fields and possibly to other jurisdictions.

Mr Pilat noted that the OECD is engaged in work on data mining of patents, with some valuable information emerging. He noted, nonetheless, the scope for further empirical work on this issue, which might involve granting third party access to the large OECD database. A similar project is underway using trademark and design data, with the collaboration of OHIM.

Mr Clayton endorsed the points made by Professor Ouellette, and suggested that it might be desirable to go even beyond her recommendations. It is crucial that patent data is seriously useful in order to make markets work. If intangible capital is the foundation of the economy for the next century, then it is necessary to have a well-functioning information system in place: hiding such vitally important data will not help progress. A study conducted by the UK on patterns of patent litigation found it almost impossible to find relevant data, although the US is somewhat better in this regard. Such issues should be rudimentary with respect to any property right, particularly one that plays such an important economic role.

A delegate from the US acknowledged that, when she worked as a patent examiner, she rarely rejected a patent on the basis of insufficient disclosure. While further training might help patent examiners, most would feel that this is an extreme thing to do. Most applicants are wary of being too specific in their applications, as this might lead to a narrow patent being issued and have unintended consequences in future patent litigation. The delegate suggested that, in some systems, patent disclosures do not work well because the relevant information is not readily available or can be accessed only for a fee. We should promote free and convenient (i.e. online) access to patent data within all jurisdictions, as access to information is critical for technology transfers. The delegate also said that whether 18 months to disclosure is the appropriate period is likely to depend upon the area of technology and also upon how long it takes to have the patent itself examined.

Professor Ouellette noted that discussions regarding IP often start from the assumption that such rights are necessary to provide incentives for innovation and creation. IP is not essential to encourage inventors and creators, however, as it is possible to do so using taxes or grants or prizes or broader industrial policies. So bear in mind that reliance upon IP is not inevitable or unavoidable here.

A delegate from Switzerland remarked upon the apparent need to improve the quality of patent disclosure and suggested that a failure to do so may undermine the TRIPS bargaining structure insofar as an absence of disclosure denies developing countries the means and opportunity to catch up technologically. A delegate from the EU noted that there is a practical limit to the work that can be done by patent offices when examining and issuing patents, particularly as the number of applications continues to increase. Nonetheless, efforts should be made to increase and improve the information that is available regarding the patent system, for example by publishing details of court judgments, ownership of patents, etc., alongside continuing expert work by bodies such as the OECD and EPO. Furthermore, it is vitally important to obtain empirical evidence on the innovation and knowledge diffusion effects of the patent system. In terms of future research, it would be useful to consider the extent to which patents actually make a difference to innovation.

Dr Wunsch-Vincent remarked that considerable work has been done in terms of collating and presenting patent information for economists, but, increasingly, researchers want access to the entire patent, so WIPO is currently engaged in a project that will make patent information available in its entirety. Considerable information sharing also takes place through WIPO-sponsored technology and innovation support centres.

A US delegate acknowledged that TRIPS requires a certain minimum level of disclosure, but only to benefit those who are already skilled in the art, meaning that the disclosure requirement is not too onerous. Although access to the whole patent may be useful for researchers, access to the file history is likely to be of even greater use, so that greater access to files should perhaps be encouraged across jurisdictions.

Professor Bounfour added that it is necessary to focus on the importance of patents for entrepreneurs in raising funds, and to consider the timespan of technology as such issues can be quite different for different (fast-moving) technologies. Professor Ouellette concluded the discussion on patents by acknowledging that jurisdictions have limited resources to expend on patent examination. Yet peer review is relatively inexpensive, and it already works well in relation to scientific publications. Furthermore, there is scope for better-resourced survey evidence in this area.

Copyright

Dr Malcolm noted that a globalised ‘fair use’ exception is an ambitious idea and, potentially, a valuable one. Many commercially valuable IP rights begin as non-commercial fair use; for example, *Fifty Shades of Grey* was first conceived as *Twilight* fan-fiction. More generally, it is important to ensure that the existing copyright rules are not so inflexible that they cannot adapt to innovative practice. Thus, personal use rights should not be framed narrowly or prescriptively, e.g. limited to a particular number of copies. Rather, it is important to reiterate that some personal uses lie outside the purview of copyright entirely. In this regard, an overarching globalised fair use rule would seem to have particular utility.

Mr Manara remarked upon a growing trend to use copyright as a protectionist tool, with recent laws that appear to be targeted exclusively at a very limited number of prominent Internet actors (such as Google). For instance, a number of jurisdictions have created a concept of ancillary copyright that creates

IP protections for certain types of *information*—and not merely *creativity*—which includes press material. The result is that the indexing of such material triggers the copyright law; in effect, this ancillary form of copyright is a disguised tax to protect local media. Such laws have been enacted in Germany, are pending in Spain and Israel, and have been proposed in France. Laws of this nature are not copyright in the conventional sense, and, arguably, are contrary to international trade agreements. Nonetheless, it is a worrying global trend with a protectionist objective.

Professor Hargreaves summed up the conclusion of the Hargreaves Review on IP for the UK government as: start moving in the right direction, not the wrong direction, on IP reform. Establishing the appropriate direction of travel in this regard is significant. The role of copyright from the perspective of consumers and end-users is a much-discussed issue, but we should be wary about applying these rules to areas of human activity where it was never intended to apply, such as automated copying. One of the primary reasons why the UK chose to review and reform its copyright rules was a fear that, otherwise, the copyright system would fall further into disrepute, insofar as it alienated and appeared illogical to users yet was ineffective to protect the legitimate rights of creators. Further work to improve licensing systems needs to be undertaken, especially to reflect the shift to a digital environment. Had more incremental reforms of the copyright system been undertaken earlier, then some of the more fundamental criticisms faced by the system might have been avoided. It nonetheless remains a case of 'better late than never' in terms of reforming copyright for the future, although, as the Brazilian example demonstrates, the creative industries continue to be resistant to change.

Although enforcement of copyright in China has proven easier in the digital environment than in the pre-digital world, this has not been the case in most other jurisdictions where the copyright rules were well established beforehand. Echoing the comments of Mr Manara, Professor Hargreaves agreed that the future of copyright in the digital context is aligned, to a large extent, to the future governance of the Internet. The apparent desire to constrain the Internet is at odds with the desire to realise its innovative potential. It is important to ensure that future policy making for either Internet governance or digital copyright issues is not informed solely by vested interests, but, rather, is aimed to connect IP policy to an innovation-friendly agenda. If the existing energy and enthusiasm for innovation in the digital sector dissipates, it may become easier to regulate IP issues via the Internet, but society as a whole is likely to pay an unacceptably high price for this convenience. This danger is, perhaps, the biggest issue facing the knowledge-based economy at present.

Professor Mizukami added his support to the notion that the IP system represents an exchange between society as a whole and inventors/creators. It is unhelpful to distinguish between copyright as an economic concept or as a rights-based one, insofar as this tends to stifle debates regarding the optimal shape and operation of copyright. In view of the relatively limited existing understanding of incentives in knowledge-based industries, we should encourage and facilitate further empirical research, including providing access to data as necessary. Important issues for future research include monetisation, advertising and the role of intermediaries.

Dr Wunsch-Vincent re-emphasised the need for empirical research and data on copyright, particularly its impact on price and quality. Many of the presentations focused upon the need and possible means to improve the existing copyright infrastructure, including greater access to relevant data. In this regard, clarifying the rights of users is important for securing greater compliance with existing law. Finally, compelling arguments can be mustered both in favour of and against the copyright system. At present, the pendulum of popular opinion appears to swinging against copyright, so that there is increasing emphasis on exceptions, limitations and improving access to copyrighted material. It is essential, nonetheless, to retain a balance between these competing interests. Policy makers should not take the supply of creative works for granted in reforming the copyright system.

Ms Lowe spoke about the link between protection of the rights of authors in the online environment and the movement from levies to licences online. There has been an increasing emphasis on access to licences, perhaps through automated means. In the UK it may be possible to use the Copyright Hub for this purpose. There are possible technology responses, as market actors are increasingly aware of where the money lies in the distribution chain. There are also potential regulatory responses, which might include greater transparency requirements for collecting societies, a move that is welcomed by PRS for Music. In addition to educating consumers about the need for and operation of copyright, there is a further need to show that licencing works and to make it work in practice.

Professor Shi emphasised that copyright needs to work for the benefit of users and consumers as well as rights holders, and in this regard the existing copyright system ought to reflect the needs and expectations of users. The Internet is changing the face of many industries, and has developed so quickly that the law lags behind. Policy makers should allow some markets to develop organically, but make plans with an eye to future developments. We should perhaps be wary of opting for licencing as the dominant model in the digital world, given that it has the potential to result in even greater centralisation of content distribution. Excessive centralisation and concentration can lead to problems of monopoly. Voluntary licensing is promising in theory, and commercial users are likely to be willing to pay where licences are available. Self-regulation may not work well in practice in all situations, however, given the significant self-interests at stake. In this regard, he noted that China has no real effective copyright collecting societies. There is also a need to think further about international cooperation: while the Chinese market is relatively isolated at present, it is undergoing considerable development.

A member of the audience remarked that, given the aim of the session to provide guidance for policy makers, perhaps the overarching theme that had emerged was the relative absence of concrete evidence with respect to the operation of the copyright system, especially outside the context of the music industry. Greater emphasis should be placed upon the role of policy makers in generating such evidence and not merely consuming it. One means of doing so is to provide funding, as, for example, the UK government has done. By contrast, much of the private funding in this area has been withdrawn in recent years, so there is an increased need for alternative public finding. Additionally, much useful data can be generated through national surveys and national economic accounting of creative industries, something the US’s Bureau of Economic Analysis has become involved in recently. Policy makers might also consider the reintroduction of some formalities for copyright, such as registration.

A delegate from Spain noted that three essential pillars for copyright reform emerge from the discussion: exploitation, enforcement and education. Governments have a role to play in all three areas. In terms of exploitation there is a need to balance the rights of copyright owners and consumers, to facilitate a reduction in transaction costs, and to review the existing limitations and exceptions to ensure that these keep tracking with the emerging technology and societal requirements. There is also a need to ensure proper remuneration of creators. In terms of enforcement, secondary liability appears to be increasingly important. Finally, education is crucial as a means by which to inform users of the underlying value of copyright.

Mr Clayton echoed earlier pleas for future research. Disentangling personal use from fair use is important, the former being concerned (despite the nomenclature) primarily with fairness to consumers. Term extensions do not appear to be a particularly pressing issue. Enabling licencing markets to function is critical, but the UK had found it more difficult than anticipated to get the Copyright Hub to work well. Some successful examples exist, however, albeit on a smaller scale, such as the Stanford Exchange. The enforcement framework should reinforce the creative incentive of the copyright system. The Chinese example is promising, where enforcers pursue infringing websites rather than consumers. In summing up the conclusions of this discussion, it is important to ask, “what would consumers think?”

A delegate from the Netherlands remarked that the discussions had underlined the importance of trade secrets and copyright in general terms, but there was a relative absence of consideration of the specific added value that these mechanisms can create. He suggested that conventional mechanisms might not work so well in terms of generating added value in the digital environment. The suggestion that copyright is used as a protectionist tool is worrying, and may merit further attention. In relation to consumer education, it is inadvisable to place too heavy a responsibility on individual consumers to understand the limitations of their rights when they purchase copyrighted content; greater responsibility should perhaps lie with those who sell such material.

A delegate from Canada noted that a key consideration underlying Canada’s copyright reforms in 2012 was the need to rebalance the interests of rights holders and users. In reality, the delegate noted, businesses often deploy a wide variety of IP instruments, and so it would also be useful to give further consideration at some point in the future to the ‘IP bundle’, that is, the extent to which various forms of IP overlap and interact, and whether the existing IP framework can account for these interactions.

The workshop then came to a conclusion.

NOTES

464 Here "society" is intended to mean society in an economy-wide sense, not consumers alone, so the societal benefits we focus on are factors like innovation, productivity, and GDP growth. Also, the exchange concept is weaker with respect to copyright than patents, but there is still a give and take in the sense that copyright protection eventually expires and certain exceptions apply to it, while the copyright provides a stronger incentive to create and disseminate content.

465 Acceluction is a portmanteau term that fuses the concepts of acceleration and production of links. Acceluction has been proposed by Ahmed Bounfour as a means of characterising the new production mode of firms in relation to the digital transformation. It originated within the work of the international research programme ISD: see Ahmed Bounfour, *Acceluction in action*, 2011, Paris, Cigref Foundation, www.fondation-cigref.org.

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CHAPTER 9. IP-BASED FINANCING OF INNOVATIVE FIRMS

This short chapter explains why IP-based financing for innovating firms is an important topic in need of further research. It summarises recent developments and efforts to improve IP-based financing in several countries, including policy options for making IP-based financing markets function better, building trust and awareness, and reducing the risk associated with IP-based financing instruments. The chapter also briefly surveys some of the relevant literature.

Introduction

Intellectual property rights serve to codify and protect the knowledge assets that result from research and development (R&D), branding, and creative or artistic work (OECD, 2013b). Like other intangible assets (e.g. databases, software, know-how and organisational competencies), these assets do not have a physical embodiment in plants, machinery or inventories. In the last decades, knowledge assets have become key resources through which firms raise productive efficiency, differentiate from competitors or develop new products and services (OECD, 2013b).

Empirical research has shown that investments in knowledge-based capital (KBC), i.e. intangible assets, have become key drivers of economic growth across OECD economies. Crucial actors in this process are the small and medium-sized enterprises (SMEs), especially the young ones, who develop new knowledge assets and exploit their increasing returns to scale, thus disproportionately contributing to growth. Nonetheless, young SMEs may face a number of difficulties in raising the capital necessary to grow, essentially because they are subject to high risks of failure and sometimes lack tangible capital. More generally, imperfections in the capital markets can lead to less-than-optimal investments in KBC, thus slowing the pace of economic growth.

In this context, intellectual property (IP) assets have two attractive features that may help firms to unlock new investment or obtain more favourable financing conditions. First, IPRs help to reveal to investors the quality of the firm's management and of its technological capabilities. Second, as legally protected economic resources, IPRs can raise the projected profitability of a firm, and can be separated from the business and sold in case of financial distress. Notwithstanding these properties, IP-based finance appears to be under-exploited across OECD economies, especially with respect to those young SMEs who need to open new financing channels. To stimulate a more efficient use of IP-based finance, the governments of many countries are making increasing efforts to understand why IP-based finance is not well developed and are experimenting with new policy actions and initiatives.

This chapter discusses the role of IP-based finance and the logic behind the main policy options that have been proposed or tried so far. It is structured as follows: section 2 reviews the logic and evidence supporting IP-based finance's potential role for growth; section 3 provides an overview of the main financing models connected to IP and presents the obstacles that seem to be impeding their use, with a focus on the IP markets, which are examined in Box 1; section 4 examines the policy options. Some final remarks conclude the chapter.

Innovation financing and intellectual property

This section sets out the economics background of IP-based finance. Section 2.1 focuses on the potential role of IP-based finance for SMEs and economic growth, while Section 2.2 and 2.3 introduce the concept of financing constraint on innovative firms and explains the function of IP in relaxing these constraints.

Knowledge-based growth, SMEs and IP-backed finance

Investments in KBC are crucial drivers of aggregate productivity and living standards across OECD economies (OECD, 2013b). According to recent estimates, between 1997 and 2005 KBC may have contributed to around 23 percent of labour productivity growth in the European Union and 32 percent in the United States (Corrado et al., 2013). This growth potential stems from the capability of knowledge to be combined with other inputs without re-incurring the initial development costs, thus giving rise to strong returns to scale in the production of goods and services (OECD, 2013b).

Recent research has also emphasised that reaping the potential of knowledge for growth depends on how capital and labour markets reallocate resources towards the firms that want to implement and commercialise new ideas (OECD, 2013b). As further explained in Section 2.2, the capital markets are subject to imperfections that may lead to sub-optimal investments in knowledge-intensive start-ups and young SMEs, thus slowing the pace of knowledge-driven growth (OECD, 2013b). Crucially, extensive empirical evidence has suggested that these firms disproportionately contribute to growth. For example, recent OECD work drawing on firm-level data suggests that between 2000 and 2011 young firms (3-5 years) – normally with fewer than 250 employees – have contributed 42 percent of job creation across 18 OECD and non-OECD countries on average, while accounting for only 17 percent of employment (Criscuolo et al., 2014).

As a consequence, relaxing financing constraints on young SMEs has the potential to boost knowledge-driven growth. In this context, IP assets can be leveraged by some cash-constrained SMEs to open new funding channels, either by attracting investors or through licensing. Indeed, the prospect of accessing new funding does induce some SMEs to apply for or register their IP. For example, in a study based on a 2005 survey of the applicants at the European Patenting Office (EPO), de Rassenfosse (2011) shows that 40% of the surveyed SMEs had strong 'monetary motivations' to apply, i.e. attracting investors or licensing. By contrast, this proportion is as low as 15% for large applicant firms. Interestingly, the findings of his econometric analysis suggest that among the firms that apply in view of attracting investors, the larger ones have higher rates of patent exploitation, meaning that some SMEs may find it relatively hard to acquire the resources necessary to exploit their inventions.

Another issue is that SMEs may not apply for or register their IP in the first place, making it more difficult to use for financing purposes. Rather, as found in recent observational studies, young and innovative firms may prefer to protect their intangible outputs through confidentiality agreements or secrecy (OECD, 2011b; Brassell and King, 2013)[466].

Market imperfections in innovation financing

Investment in innovation depends on the relationship between managers/entrepreneurs and financiers, which is affected by two well-known market imperfections: asymmetric information and moral hazard (see Hall, 2010 and Harhoff, 2009 for extensive reviews on the topic).

Information can be asymmetric because the manager/entrepreneur is better informed on the quality and expected returns of her projects than the investor or the lender.[467] As a result, the market has the characteristics of a 'lemons market', where the prospective investor or lender cannot distinguish between good and bad projects and thus requires a premium to compensate for the possibility that he/she picks a bad project. Another possible consequence is a situation in which lenders limit the loans supplied at a certain interest rate, even if other innovative firms would borrow at a higher rate.[468]

The relationship is further aggravated by moral hazard, which occurs because firms' managers and owners/financiers tend to carry conflicting interests (when the two are actually separated). In particular, managers in established companies tend to be more risk-averse than shareholders with respect to innovative projects, for instance where the manager expects to receive lower compensation in case of failure. The reverse problem takes place where the manager/entrepreneur of a start-up firm wishes to continue a project that financiers would like to terminate, because for the manager/entrepreneur the ultimate benefits in case of success would outstrip the costs. The result is the likely delay of investment decisions and the rise of costly practices aimed at aligning the two parties' interests, e.g. monitoring or incentive schemes.

Such market imperfections are deemed to be particularly severe for the financing of innovation, for at least three reasons.

First, the output of innovation investment mostly takes the form of KBC that needs to be sustained with continuous efforts and that is difficult for the financier to appropriate in case of distress. A significant fraction of the expenditures for innovation – like research and development (R&D), design and marketing of new products and workers' training – goes to the salaries of scientists, engineers, consultants and other highly skilled labour. The output is an intangible asset, which, unless codified, is only embedded in the human capital of the firm's employees.

On top of that, the output of innovation investment is often an idiosyncratic technology or knowledge that the innovating firm is uniquely capable of exploiting. The same applies to the intermediate results of innovation. As a consequence, KBC is hard to trade, so that financiers may find it hard to recover the investment in case of distress. The problem is more acute for the young firms, as they also lack a track record of successful investments.

Finally, innovative projects tend to be very risky at their inception. Very few projects result in high returns; most turn out to have little or no value. Also, the riskiness of the project is subject to change over time. Outcomes with such a high variance not only require bigger premiums on the investment but also mean that the financier may need to re-assess the investment decision during the project lifetime.

In summary, asymmetric information and moral hazard coupled with the specific features of innovation lead to higher interest rates, inefficiently low (external) funding and limited options to use KBC as collateral. Empirical research has shown that innovative firms are subject to these financing constraints (see Hall, 2010, for a recent review).[469] Knowledge-intensive start-ups and young SMEs are probably the most financially constrained, essentially because they lack tangible capital and track records (Harhoff, 2009). At the macro level, SMEs suffered disproportionately when interest rates rose and banks demanded more collateral as a result of the financial crisis in 2008 and subsequent years (OECD, 2014).

The literature has also emphasised that equity financing may be more suitable for innovation than debt financing. The reason is that banks and other credit suppliers prefer investments where the assets are more redeployable in case of distress. Moreover, in the early stage of financing, an innovative project is generally expected to bring revenues only in the long term, while debt arrangements often require predictable cash flows to repay the loan. One implication, which has been confirmed by empirical research, is that innovative firms tend to have lower debt to equity ratios (Hall, 2010). Nonetheless, as it will be further explained below, debt financing is important for the innovative firms that want to expand their operations. This is where IP can play a crucial role.

The role of IP in innovation financing

Using IP to attract finance for innovation is a recent trend in a number of OECD economies, especially the United States and the United Kingdom. According to Harhoff (2009), IP can serve two roles in financing innovative firms.[470] First, to an external investor, IP can be a signal of a company's quality and potential, thus reducing information asymmetries. Second, as codified and tradable KBC, IPRs provide the investor the prospect of a salvage value if the company fails, while protecting firms' revenues or increasing it through licensing in case of success.

IPRs as signals. According to information theory, to be highly informative as indicators of a company's high quality and potential, signals need to be observable by external stakeholders and overly expensive for low quality companies to obtain (Hoenen et al., 2014). Patents appear to meet both conditions. First, they are described in a codified language and are relatively easy for investors to observe.

Second developing and applying for patents can require too much effort and too many resources from companies with low technological capabilities. Thus, the companies with strong innovative potential can signal their superior capabilities by developing and applying for a patent. Crucially, the patent does not need to be financially evaluated to carry a signal. In fact, even just the application for a patent can reveal the potential of the company. Other kinds of IPRs like copyrights and trademarks appear to be less informative since their registration is cheaper and easier to obtain.

IPRs as economic resources. IPRs provide a temporary exclusive right to use an intellectual creation, thus partially protecting the company from competition and enhancing the possibility that it might earn a profit. The company can also extract value from IPRs by licensing them. Thus, the possession of an IPR can raise profitability during the protection period. In addition, if a company fails, its IPR can be separated from the other assets and legally sold.

These two functions can improve financing conditions for innovative firms in both equity and debt markets. In equity financing, IP's typical role is in attracting venture capital (VC), a form of private equity for privately held companies (Harhoff, 2009). In the face of very uncertain investment opportunities, VC firms assess quality signals, including IP, of the start-ups seeking capital.[471]

In debt financing, IP is most valuable as collateral because innovative firms typically lack other eligible assets like plants and equipment. Collateralising IP can improve the lending conditions, like loan size or interest rate, or even unlock credit that would otherwise be denied. In the literature, the potential of patent-backed lending for innovation and growth has been analysed by Amable et al. (2011). They introduce lenders limiting credit on the available collaterals in an endogenous growth model with innovators that may or may not invest in R&D depending on whether they face financing constraints. In this model, increasing the value that creditors can recover from patents relaxes the financing constraint on innovators and facilitates their entry, thus raising innovation and the growth rate of the economy.

IP-based finance: developments and barriers

While firms have been investing in intellectual capital and applying for or registering IP rights for a long time, IP-based finance has developed only in recent years. Several financial instruments involving IP appear to be increasingly used in OECD countries, especially the United States and the United Kingdom, although the extent and the features of these developments are not always easy to understand given the lack of comprehensive statistics. Evidence on IP-based finance is mostly drawn from surveys and expert reports or from empirical studies gathering data in innovative ways. Interestingly, this literature shows an increasing interest on the topic, while emphasising that the exploitation of IP-based deals appears to be impeded by a number of factors. In order to provide a background to the policy analysis, this section presents an overview of the main IP-based financing models and the barriers impeding their exploitation, with a special focus on SMEs.

IP and equity finance

Young and innovative firms typically seek to attract external funding through equity financing, but doing so might be difficult. The presence of IP – or of an IP strategy – can signal the quality of the company to the investors, particularly business angels and venture capitalists. The crucial difference with respect to debt finance is that these equity investors take a stake on the whole company and do not focus exclusively on IP. For this reason, they usually assess the expected profitability of the company without attaching a particular financial valuation to IP.

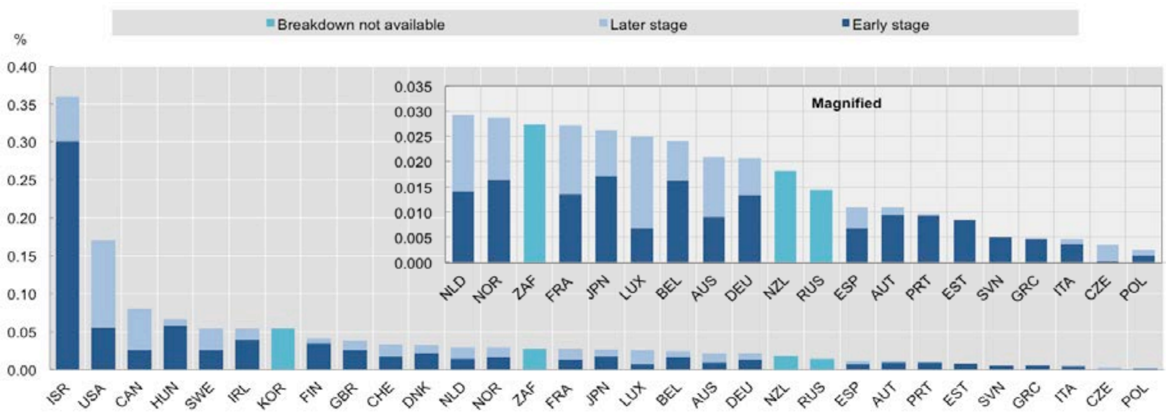
Angel investment

Angel investors, usually organised in networks, fund the early development of firms in the start-up or seed life phase, providing amounts that are usually smaller than what would be invested by a VC firm (OECD, 2011a). One major challenge faced by angel investors is the screening and selection of potential targets. The presence of an IPR can be a strong signal of the firm's potential: angel investors are typically interested in the protection of the technology and the barriers to entry granted by patents or copyrights. Also, the firms that angel investors look for are normally very small, and IP could well be the only asset such firms have that can be evaluated objectively (Brassell and King, 2013). Angel investment is particularly important in the United Kingdom and the United States.

Venture capital

As described above, venture capitalists take equity participations in young and high-growth firms to finance their expansion and possibly lead them towards listing on the stock exchanges, where the VC's investment is monetized. The segment is characterised by high risks of failure and asymmetric information. IP assets can signal to the VC firm the superior technological capabilities of the management as well as raise the prospect of future profits stemming from barriers to entry and first-mover advantage (Harhoff, 2009; Brassell and King, 2013). The VC market is most developed in Israel and the United States (see Figure 9.1).

Figure 9.1. Venture Capital Investment, 2012, as a Percentage of GDP



Source: OECD (2013a).

Several empirical studies have investigated the IP-VC nexus in the US market and found that patents can prompt VCs to invest faster and increase the funded amounts, providing evidence that patents act as a signal to investors (see Hsu and Zieonidis, 2008 as an example). One recent article by Honen et al. (2014) investigates the expected decline of the signalling power of patents over different rounds of VC financing: based on longitudinal data from more than 580 US biotechnology firms, the study suggests that the signalling effect might be strong in the first round while it tends to vanish in the second round. According to the authors, this result stems from the fact that between financing rounds the venture capitalists get to know the start-up better, thus reducing the information asymmetries. An interesting finding of this study is that pending patent applications can increase the funded amount by USD 630,000, largely offsetting the costs sustained by small biotech firms in the patent application process.

IP and debt finance

While young and innovative SMEs tend to finance themselves mostly through equity or internal funding, debt financing becomes an attractive source of capital when a firm matures enough to exploit its intangible assets' returns to scale or needs to finance steady operations. The main reason is that debt financing does not dilute existing shareholders (Harhoff, 2009). However, as we have seen above, debt financing may be very expensive or even inaccessible for young SMEs. Large firms, in contrast, can leverage portfolios of already commercialised IPRs to unlock debt financing. Firms in patent-dependent industries, e.g. pharmaceuticals, seem to be the most active in using IP-based debt financing. The significance of IP is most evident in four categories of debt finance: mainstream and IP-backed lending, IP-backed securitisation, IP sale and lease back, and venture debt.

Mainstream and IP-backed lending

IP-backed lending allows firms to exploit the economic value of their IP to obtain loans from banks or other financial institutions. IP can directly be pledged as collateral in a loan agreement so that the lender can seize it if the firm becomes insolvent. Alternatively, the rights to future IP-generated income can be transferred against an upfront loan. A simple and frequently used instrument from this category is a loan secured by the stream of revenues deriving from licensing or royalty agreements, which typically involve portfolios of copyrights or patents (Brassell and King, 2013; European Commission, 2014). This royalty financing is estimated to have totalled USD 3.3 bn in 2007-2008 in the United States (OECD, 2013b).[472]

Recent evidence suggests that the market for IP-backed loans is increasingly important in the United States and the United Kingdom, and that specialised non-bank institutions dominate the segment (Brassell and King, 2013, Munari et al, 2011; Loumioti, 2011). These financial intermediaries have an advantage with respect to (commercial) banks, as they do not need to value intangible asset collateral for the purpose of complying with capital adequacy requirements.

The size of the overall market for IP-backed loans cannot easily be gauged through statistical data because non-bank institutions are not subject to disclosure requirements. However, Loumioti (2011) infers that the share of loans backed by intangible assets (most notably IP) in a sample of 1,415 US-originated syndicated loans grew from 11% in 1996 to 24% in 2005. Moreover, her econometric evidence suggests that increasing intangible collateralisation was not the result of lax credit standards but of thorough economic considerations: lenders accurately selected borrowers with a good reputation and more liquid and redeployable intangibles, and required higher interest rates. While positive in the sense that they show intangibles-based financing is growing, these results nevertheless suggest that the credit standards applied to the collateralisation of IP are strict. That supports the view that IP-backed loans are mostly a viable option for large and established firms. In fact, the SMEs involved in IP-based debt transactions might be a very small fraction of the total. For example, based on a survey of 4,300 German SMEs, a study by KfW (2007) shows that only 2.2% of the firms reported having used intangibles as collateral.

The growth in IP collateralisation in the US market is further backed up by a recent analysis of USPTO trademark assignment data (Graham, Marco and Myers, 2014). This dataset contains the security interests on US-registered trademarks recorded by creditors who wish to defend their interests against third parties in case of default by the debtors. According to the study, in the last 30 years new registrations of security interests have increased in absolute terms as well as in relation to the number of live trademarks (from 2 percent in 1996 to slightly below 3 percent in 2008). Interestingly, the top creditors among the recorded transactions are primarily domestic commercial banks.

Notwithstanding these limits, IP can still represent a value for SMEs – and large firms alike – in mainstream lending: according to Brassell and King (2013), IP can play a risk-mitigating role even if it is not used as stand-alone collateral, thus positively contributing to the lending decision.[473] Overall, the US market for (private) bank and non-bank loans to start-ups is estimated to be worth USD 5 bn annually (Ibrahim, 2010). As a benchmark, VC investment in the United States averaged USD 27 bn annually over the 2007-2012 period (OECD, 2014).

IP-backed securitisation

The securitisation of IP-backed assets consists in placing an IP asset or the rights to its projected revenues (e.g. royalties) in a special purpose vehicle (SPV), which in turn issues securities in the capital markets. This way, lending institutions can eliminate the risk of holding IP assets while the originating firm can obtain more favourable funding conditions. This is because the securities issued by the SPV are in theory separated from the firm's risk and therefore can receive more favourable credit ratings (Munari et al, 2011). At present, securitisation might be an option only for large corporations.

The David Bowie bonds provide a famous example of IP-backed securitisation: the bonds, issued in 1997 for USD 55 million, were backed by the rights to the revenues from future sales of the artist's old musical albums (OECD, 2013b).

IP sale and lease back

In the "IP sale and lease back" a firm sells its IP to a specialised investor in exchange for immediate funding, while purchasing the license for its IP-protected operations and products. At the end of a specified term, the firm normally retains the option to buy back the IP asset at a predefined price. The advantage of this model is that the firm can increase its liquidity for short-term operations while maintaining the use of its IP (Munari et al, 2011). As with securitisation, large corporations are the most frequent users of the sale and lease back.

Venture debt

Venture debt is a finance model that features both debt and equity characteristics. Formally, in this model the firm seeking funding accesses capital in the form of a loan on which it agrees to pay interest. Simultaneously, the firm issues warrants for equity in the company, which are acquired by the lender. When efficiently deployed, such a structure blends the 'patient capital' role of equity financing with the risk assessment and valuation capabilities of a lending institution (Brassell and King, 2013; European Commission, 2014). IP represents a key asset to facilitate these deals, but it should be noted that the loan is typically backed by a blanket lien, i.e. a claim on all the assets of the firm in case of default.

Barriers to IP finance

Despite its potential for innovation financing, IP-based finance is widely believed to be under-exploited, especially by those young SMEs that would need it most (see for instance Brassell and King, 2013). Based on several recent surveys and expert reports, this section identifies the market-related barriers that are impeding IP-based financing. The identified obstacles affect both debt and equity finance, but it is probably the former that is at present most constrained.

It is important to notice in advance that some of these barriers arise naturally with IP and innovation financing, meaning that, while they can certainly be mitigated, they cannot be entirely removed through new business practices or policy action.[474]

IP may be hard to redeploy

Highly innovative firms sometimes create a business environment in which IP is combined with other complementary tangible and intangible assets, especially know-how, dedicated employees, other IP etc. The value of the IP may be contingent on the presence of those other assets. As a consequence, in case of financial distress, disposing IP in isolation from the business could imply the loss of most of its value, or it might simply be impossible.[475]

IP exit markets are immature

The secondary markets for IP are allegedly too underdeveloped to guarantee a quick and low-cost resale of the asset for the creditor that needs to realise a value from it (Brassell and King, 2013; European Commission, 2014). For banks, this represents a major barrier because they do not usually have the knowledge to assess IP risks or sell it in illiquid and non-formalised markets. As this topic tends to show up as a major obstacle here, a brief description of the state of play in IP markets and their significance for finance is separately provided in Box 1.

Transactions costs for IP as collateral are high

Lending to SMEs is subject to high transactions costs for a number reasons. First of all, severe asymmetric information drives up the costs necessary to gather compelling evidence on the firm's creditworthiness. In addition, operating at small-scale increases the weight of the fixed risk-assessment costs. In the context of IP-intensive SMEs, the presence of IP can represent a value but can also be perceived as a further source of uncertainty about the expected returns of the firm's projects and about the value of IP, which is subject to frequent changes (European Commission, 2014).

SMEs do not register enough IP nor manage it well

The low participation of SMEs in IP-based finance may partly be due to SMEs' management of their intellectual assets. As reported in an OECD review of SMEs' management practices, most innovative SMEs do not use IPRs to protect their intellectual assets, and, when they do, they rely more on forms of protection that are less practical to attract investors, e.g. trade secrets (OECD, 2011b). The Australian case is illustrative: 45% of the innovative SMEs surveyed in the country possess formal IP rights, while within this group 28% rely on secrecy or confidentiality agreements, 23% on copyrights and trademarks, and 8.2% on patents. This pattern is observed in other countries surveyed in OECD (2011b) (see also Brassell and King (2013) for the United Kingdom). Moreover, the OECD review highlights that innovative SMEs acquire IPRs in response to short term needs rather than as a deliberate strategic action (OECD, 2011b). While applying for or registering IP carries costs and may not be optimal for all firms, it is possible that many innovative SMEs still fail to understand the potential of IP for financing purposes.

Corporate reporting of IP assets is insufficient

One reason that prevents financial institutions to evaluate IP as collateral is that the IP may not be reported as an asset on the balance sheet. Generally, in-house IP investments are expensed as they occur, while purchased IP assets are valued in the transaction and can feature on the balance sheet (Brassell and King, 2013). Inadequate corporate reporting of IP and other intangible assets results both from strict accounting rules – which largely leave out intangible assets from the balance sheet – and insufficient efforts to produce information on all assets outside financial statements (Brassell and King, 2013; OECD, 2006a, 2006b, 2013b).

Banks do not sufficiently understand IP assets

To collateralise an IP asset, financial institutions need to understand its function, its relationship with cash flows and its potential value if disposed in isolation from the company. Clearly, the factors described above make this understanding hard to gain. Most financial institutions – especially banks – have not developed the necessary methods to streamline the assessment of IP assets. For example, while IP assets qualify as securities and potentially contribute to raise capital adequacy in order to meet regulatory standards, banks usually lack the experience to provide regulators the necessary assessment of the risks (Brassell and King, 2013; European Commission, 2014). Notably, though, according to the expert group on IP valuation for the European Commission, the available valuation methods for IP assets are valid, consistent, and accepted within different professional categories. The problem rests on the limited knowledge of their existence and the reciprocal lack of confidence in the results from the professional categories (European Commission, 2014).

Policies for IP-based finance

In the past few years, increasing awareness of the potential role of IP-based finance for innovative SMEs and of the bottlenecks to its development have underpinned the emergence of national policies, and proposed policies, in many countries. This section describes the key policy options proposed or implemented in recent times, grouped according to three goals: supporting the market for IP, sharing the risk of IP-based financial instruments, and building awareness and trust in IP financing. The policy options described below are to some extent complementary to each other and can be considered elements of a common strategy. The implementation of most measures is too recent to allow for fact-based evaluations.

Supporting the market for IP

Recent expert reports and empirical studies have emphasised that immature markets for IP can act as a major barrier to IP-based finance, especially bank lending (see section 3.3 and Box 1). Policy actions aimed at improving how IP markets function have recently been implemented in several countries. They follow three approaches: enhancing transparency and reliability in the market mechanism, creating new market infrastructures, or creating sovereign patent funds.

Enhancing transparency and reliability of IP markets

Transparency and reliability in IP markets are currently undermined by insufficient information regarding the ownership of IP and its transfers and by uncertainty over the legal protection and technological breadth of IP rights (Harhoff, 2009; Brassell and King, 2013; Terroir, 2014). To promote transparency in ownership and transfers information, new disclosure requirements could be introduced, for example through reporting regimes managed by IP offices.

Uncertainty is a multifaceted issue that affects the patents market in particular. In brief, the uncertainty surrounding each patent has mainly to do with the technological boundaries described in the patent claims[476]. Technological boundaries that are are too broad or not detailed enough can increase the likelihood of overlapping with other patents and can create doubts regarding the real applications of the invention. In other words, patents may cover inventions that are not truly original or may not be sufficiently detailed. Measures aimed at raising the ‘quality’ of patents can reduce these uncertainties and, as a consequence, enhance the reliability of the patents market (Harhoff, 2009 is particularly supportive of this approach).

Promoting transparency and reliability is the route taken in recent times by the US government.[477] Under a proposal for new rules and a new reporting regime, patent owners and patent applicants will be required to report and update ownership information. However, progress on this proposal may await further legislative action[478]. Moreover, as examiners may find it difficult to determine whether an invention is truly novel and non-obvious, the USPTO is seeking to introduce the crowdsourcing of prior art, i.e. a way to source up-to-date knowledge on each technical field directly from the relevant experts[479].

Other relevant initiatives have been undertaken since 2013 by the government of Singapore as part of a wide-ranging program to make the country a 'Global Hub for IP'[480]. In particular, the government is working to encourage IP rights holders to disclose ownership, transfer and licensing information. On top of that, the government is also working to strengthen its IP regime, for example by building a world-class 'search and examination' team in its patent system.

Creating new IP market infrastructures

The apparent underuse of IP markets has led to the idea that governments should build new open market infrastructures. Terroir (2014) proposes a patent market with the following characteristics:

1. The market should allow and facilitate transparent and secure trading and licensing of patents to all economic entities.
2. The market should be composed of a segment for standardised contracts and of a segment for transactions over the counter, both subject to the same transparency and security.
3. The segment for standardised contracts should include a large volume of licensable patents from the onset and offer the possibility to bundle different IP into tradable packages.
4. A market operator should provide thorough information on the listed patents as well as evaluate their legal validity, verify their actual ownership and report on any restriction to use.

The market should then include a number of dedicated tools, like patent rating systems and know-how libraries, and be sustained by strong IP brokers and lawyers. An infrastructure characterised by openness and security would provide SMEs the opportunity to monetise their IP or purchase licences to attain freedom of operation.

Private marketplaces with similar characteristics exist (see Box 1), but may not have gained enough attention because they did not offer a sufficient volume and variety of IPRs listed. For this reason, Terroir (2014) suggests that public marketplaces should operate with a large base of IP assets available for trade from the outset. In response to this situation, some governments are working to back existing platforms or create new ones. Some noteworthy initiatives follow:

- In the United Kingdom, the government-sponsored online platform Copyright Hub (www.copyrighthub.co.uk) enables users to access simple licensing via web and offers copyright education tailored to a wide audience.

- The government of Singapore wants to support a number of diverse initiatives as part of the 2013 'Global IP Hub' plan, i.e., auctions of IP assets, an IP trading platform and a digital copyright licensing exchange, which is similar in spirit to the United Kingdom one.[481]

- In Denmark, the Danish Patent and Trademark Office created the "IP Marketplace" (www.ip-marketplace.org) in 2007 as an 'online display window' where IPR holders can freely list their asset for sale or out-licensing.

- The government of India is currently experimenting with its own online IP market (Brassell and King, 2013).

- In Chile, the National IP Institute created a platform that enables SMEs, researchers and universities to trade their IP, while learning of ways to protect their inventions and creations [482].

Creating sovereign patent funds

In response to the IP marketplace challenge, governments can create sovereign patent funds with a view toward providing aggregation and defensive services – which are especially needed by universities and SMEs. However, sovereign patent funds also encounter some objections. First, IP assertion strategies can be hard to define and implement when they are pursued by publicly funded entities. Second, the effect on inventive activities is not necessarily positive, especially where the intervention is perceived as transitory. Third, if a fund pools many patents from the same technology domain, which might be positive from the point of view of providing services, it could end up over-protecting inventions that constitute – or make up the biggest part of – a stand-alone technology and unintentionally provoke a lock-in. Fourth, there is the risk that the patent fund is used to protect national champions' innovations from global competition, with the ensuing possibility of triggering a response from other sovereign patent funds and starting a "patent war" at the sovereign level. Recent examples of sovereign patent funds can be found in Korea, Japan, and France (OECD, 2013b).

Sharing risk of IP-based financial instruments

The high risks associated with the collateralisation of IP are seen as a major contributor to the costs incurred by companies that use IP to acquire financing. To bring down the costs of IP-based lending, government agencies and development banks can share the risk with the lender or investor by adopting IP-friendly risk-sharing mechanisms or providing support for IP risk insurance.

Creating IP-friendly risk-sharing mechanisms

Risk sharing schemes are in place in many countries to provide an interest rate subsidy or a guarantee to eligible firms seeking bank lending. To favour the collateralisation of IP, when exploiting these schemes banks should account for IP as a credit-scoring enhancement for attractive IP-intensive firms lacking tangible collateral. Efforts to foster dedicated risk sharing tools or improve the existing ones are currently on-going in Italy, Malaysia, Singapore, South Korea, and the United Kingdom (Brassell and King, 2013; UKIPO, 2014)[483].

Another way to improve financing conditions for IP-rich firms is for development banks to formally accept IP as collateral for loans. This practice has been introduced in many development banks, like the Brazilian Development Bank, the Beijing branch of the Chinese Bank of Communications, the Development Bank of Japan, and the Thais SME Bank (Munari et al, 2011; Brassell and King, 2013; Mateos-Garcia, 2014).

In both cases, the public agency delivering the scheme should not accept IP as collateral without a substantial assessment, because otherwise the firms would register or apply for low-quality IP with the sole purpose of attracting funding.

Supporting IP risk insurance

IP insurance is appealing to lenders to IP-rich firms. It traditionally covers the potential costs of infringement litigations. However, the market for IP insurance is very limited and its costs can be very high. To reduce the litigation risks for SMEs and lenders, the South Korean government has a scheme through which it shares up to 70% of the insurance premium with SMEs. In the European Union, how to support patent litigation insurance has been discussed since the 1997 "Green Paper on the Community patent and the patent system in Europe" of the European Commission[484]. In the 2000's, two expert reports found evidence that patentees – especially SMEs – would be willing to insure themselves against litigation risk at reasonable premiums, but that insurers had a small appetite to enter this market (CJA Consultants, 2003, 2006). The reports also highlighted that government-backed voluntary insurance would not be capable of dealing with adverse selection, i.e. a situation in which patentees demand insurance only for the most risky patents. In response to this challenge, mandatory insurance for all patents granted by the European Patent Office – with the exemption of patents held by "global oriented companies" – was primarily considered. However, the proposal was opposed by all stakeholders mainly on the grounds that it would push the balance towards litigating rather than settling an infringement dispute, and was not implemented[485].

Besides this role, IP insurance could become increasingly important for traditional banks that seek to insure themselves against the risk deriving from IP-backed lending. Currently, traditional banks lack the experience and the knowledge to count IP assets (and other intangibles) for their capital adequacy requirement. United States banks are seeking IP insurance for this purpose (Masters, 2012). Despite the past debate on litigation insurance, the potential role of governments in the development of the IP insurance market is unclear at present and deserves further analysis.

Building awareness and trust in IP financing

A key challenge consistently identified in recent expert reports is the lack of understanding of IP as an asset with potential cash flow and risks, both among innovative firms and financiers (European Commission, 2014; Brassell and King, 2013). Part of the problem stems from the fact that the prevailing asset valuation methods, corporate financial reporting, and bank and securities regulation are purposely designed for an era in which tangible assets were the most valuable capital in all companies. This has fundamentally changed: today investment in intangible assets is a primary source of firms' competitiveness and makes a relevant share of total private investments in many countries, possibly exceeding investments in tangibles in a few advanced economies, like the United Kingdom and the United States (OECD, 2013b). It is therefore natural that business practices and regulations ought to be upgraded to allow the rise of a full-fledged IP asset class. Indeed, the recognition of IP as an asset needs to grow within the community of innovative firms' and the financial sector alike. This process should largely be driven by market needs, but in some areas there is scope for policy intervention[486].

Disseminating information and providing assistance with innovative firms and financial institutions

To promote better management of IP by innovative firms (especially SMEs), governments can provide training tools, educational resources or seminars for IP management. In practice, awareness campaigns are delivered through IP right offices (e.g., in the United Kingdom, the United States, Chile and at the European Patent Office), industry and business ministries (e.g., in Australia) or partnerships between the government and private stakeholders (e.g., in Germany) (OECD, 2011a; Brassell and King, 2013; Mateos-Garcia, 2014)[487,488]. In Germany and the United Kingdom, these tools have purposely been augmented to facilitate the SMEs' practical evaluation of IP (Brassell and King, 2013).

The goal of awareness campaigns in the financial sector is to encourage financial institutions to incorporate IP in their credit assessment process through public-private collaboration on dedicated guidelines and employees training. Such campaigns need to bring together ministries or IP offices and financial services associations, as currently done in Germany and the United Kingdom (Munari et al., 2011; Brassell and King, 2013).

Increasing confidence in IP valuation methods

An important factor undermining trust in IP financing is the lack of confidence in IP valuation methods. Notably, different professional categories offering valuation services (accountants, lawyers, technology transfer experts) each have their own accepted methods, giving rise to mistrust between the professions (European Commission, 2014). To solve these issues, the European Commission's expert group on IP valuation proposes to set up a register of experts tested by a set of universities in the EU or by a centralised organisation dependent on the EU institutions. In a similar fashion, the government of Singapore has recently decided to set up a Centre of Excellence for IP valuation with an accreditation system for valuers[489]. Another option is to create an official guideline to standardised IP valuation models, as recently experimented in Germany, Italy and Malaysia (Brassell and King, 2013; Mateos-Garcia, 2014)[490].

Improving corporate reporting of IP assets

Under the prevailing accounting frameworks, the conditions for reporting assets in corporate financial statements appear disconnected from the characteristics of KBC, so that firms can find it hard to do so (OECD, 2013b). Although no obligation to report on KBC exists (except in certain cases), the firm's management can voluntarily disclose the existence, features, and in some cases, valuation of their intangible assets to produce a more complete image of the company for external stakeholders, especially lenders. This is usually done through so-called narrative reporting, which goes with the financial statements. Despite an intense debate on the issue and the rise of a variety of disclosure approaches in the last few years, the reporting of intangible assets – including IP – remains problematic (see OECD, 2013b for a discussion).

The role of the government can also be a thorny issue, considering the complexity of regulating accounting standards and the great information advantage of industries and companies on the specific nature of KBC. Keeping this in mind, some sensible options can be considered (OECD, 2013b): first, the reliability of voluntary reporting could be strengthened with the creation of official guidelines; second, young firms could be coached on how to introduce intangibles reporting; third, governments could engage in stronger international co-operation, possibly through organisations like the World Intellectual Capital Initiative (WICI) or the International Integrated Reporting Committee (IIRC); fourth, governments could push for the introduction of specific expenditure classes for intangibles within the Generally Accepted Accounting Principles (GAAP), which would facilitate comparability and data collections.

Conclusions

This chapter has discussed the role of IP assets in financing innovative firms, the barriers that might impede that function, and policy options for mitigating those barriers. A growing body of empirical evidence suggests that IP-based finance is underused by young SMEs across OECD economies. However, understanding of that phenomenon is constrained by the lack of data and information affecting many key elements, like the ownership of IP assets or the size of IP-backed loans disbursed and their recipients. As a consequence, it is hard to assess the relevance of the barriers and evaluate the policy options with solid statistical methods.

That being said, the analysis has identified the following key points:

- KBC is an increasingly important source of economic growth across OECD economies. However, capital market imperfections may slow the pace of knowledge-driven growth, especially because the young and innovative firms, who disproportionately contribute to growth, tend to be the most financially constrained.

- Asymmetric information and moral hazard coupled with the specific features of innovation cause interest rates for financing innovation to be higher than for other types of financing, lead to inefficiently low (external) funding, and limit options for using KBC as collateral. Knowledge-intensive start-ups and young small and medium-sized enterprises (SMEs) are probably the most financially constrained, essentially because they lack tangible capital and track records.

- The literature has emphasised that equity financing may be more suitable for innovation than debt financing. The main reason is that banks and other financial institutions prefer investments where the assets are more redeployable in case of distress. One implication is that innovative firms tend to operate with lower debt-to-equity ratios (Hall, 2010). Nonetheless, debt financing is important for the innovative firms that want to expand their operations.

- IP assets can serve two functions that facilitate financing, especially for SMEs. First, IP assets contribute to reveal the quality of a firm, thus reducing information asymmetries. Second, the exclusive right to use of an invention or creation that is conferred by IPRs can raise a firm's profitability, while giving the owner the possibility to separate it from the firm and sell it in case of distress. The latter function allows firms to use IP assets as collateral in debt financing.

- The main debt financing models connected to the exploitation of IP are: mainstream and IP-backed lending, IP-backed securitisation, IP sale and lease back, and venture debt. Expert reports and empirical studies agree on the fact that IP is increasingly used in debt financing, but the lack of comprehensive statistics makes it hard to understand its actual size and features. Due to the complexity of the transactions, large firms in IP-intensive sectors likely use more of these instruments than smaller firms.

- In equity finance, the value of IP assets is recognised in the angel investment and venture capital spaces. The latter has attracted a substantial body of empirical work investigating its effects and finding that young and high-growth firms with IP assets receive more funding.

- Overall, expert reports and empirical research have identified a significant gap in the use of IP-based finance, especially by SMEs. This outcome is due to a number of obstacles. One major barrier is presented by the lack of opportunities to sell the IP in the market for technology, which is both due to uncertain redeployability and to an immature market for IP.

- Supporting IP markets is an objective of policy makers in several countries. Three routes can be taken: first, the government can support transparency and reliability in the market mechanism, through the introduction of disclosure requirements or measures to foster clarity in patent claims; second, the government can create new IP market infrastructures; third, the government can support or participate in sovereign patent funds.

- The high risks associated with the collateralisation of IP can be managed by government agencies and development banks through risk-sharing mechanisms. Crucially, the schemes must allow IP to count as a credit-scoring enhancement after a substantial assessment of the collateral. Alternatively, the government can support the rise of IP insurance companies, although how to do so is still unclear.

- Building awareness and trust within both SMEs and financial sectors is crucial to facilitate the rise of IP assets as a full-fledged asset class. This process should be largely driven by the market, but policy makers can design and deliver awareness campaigns and contribute to increase reliability in valuation standards and corporate reporting of IP assets.

To conclude, the analysis has identified a growing interest in IP-based finance, its limits and the possible solutions, but more data and more research seem necessary to understand the developments in this sector and to better design the policy initiatives. Also, policy makers need to realise that IP-based finance interacts with IP systems, increasing their relevance and complexity (Harhoff, 2009; Hall, 2010; Terroir, 2014). Therefore, taking a broad perspective on the IP ecosystem is necessary to account for policy interactions (Mateos-Garcia, 2014). In this respect, markets for the transfer of IP assets probably deserve even more attention.

Finally, bringing about more functional IP-based finance is relevant for growth because it can foster a better relationship between credit institutions and the young SMEs who need to open new funding channels. This nexus is often considered less important than the nexus between equity investors and young and high-growth firms. Yet, financing constraints evolve over time, both because of changes in framework conditions and because of positive developments in the markets[491].

NOTES

466 The use of IPRs by SMEs may vary across IP categories and across countries.

467 This subsection presents the main arguments from Hall (2010) and Harhoff (2009).

468 This situation is known as credit rationing.

469 A way to test for the financing-constraint hypothesis is to estimate the reaction of investments to positive liquidity shocks (Hall, 2010). The majority of the studies agree that, while all investments can be sensitive to cash flows, innovation investments respond disproportionately. This result suggests that internal funding for innovation is less expensive than external funding and that an untapped potential for innovative investments tends to persist in OECD economies. Nonetheless, it remains hard to determine the size of the funding gap in any given situation, that is, how much additional financing would be needed to reach efficient investments levels.

470 Harhoff (2009) makes the case for patents only, but the same arguments can apply to other forms of IP.

471 Arguably, venture capitalists recognize the role of IP as a signal of both the quality of the management and of the technology, in addition to viewing it as a means of protecting revenues.

472 This figure includes royalty financing deriving from securitization (see below).

473 IP and other intangibles written on the balance sheet have always been included in the all-comprehensive blanket lien securing loans (European Commission, 2014).

474 This chapter does not focus on institutional and framework conditions affecting IP exploitation or innovation financing, like for instance the enforcement of IPRs and bankruptcy laws (see OECD, 2013b for a discussion).

475 By contrast, sometimes the potential applications of an IPR go beyond what was originally conceived by the originating firm. In these cases, the value of the IP may even grow if it needs to be transferred.

476 Other aspects of uncertainty related to patents include the novelty of the innovation, the inventive step and the adequacy of the disclosure.

477 See the White House press release from 20th February 2014 (accessed in October 2014) http://www.whitehouse.gov/the-press-office/2014/02/20/fact-sheet-executive-actions-answering-president-s-call-strengthen-our-p and the USPTO initiatives page (accessed in October 2014) http://www.uspto.gov/patents/init_events/executive_actions.jsp.

478 The head of the USPTO has said that the agency is giving up plans to establish rules requiring greater transparency about patent ownership and is instead leaving the issue to Congress. See Davis, 2014.

479 See the USPTO initiatives page (accessed in October 2014) http://www.uspto.gov/patents/init_events/executive_actions.jsp

480 See the “Intellectual Property Hub Master Plan” for Singapore, released on April 2013 by the IP Steering Committee (accessed in October 2014) http://www.ipos.gov.sg/Portals/0/Press%20Release/IP%20HUB%20MASTER%20PLAN%20REPORT%202%20APR%202013.pdf.

481 See the “Intellectual Property Hub Master Plan” for Singapore, released on April 2013 by the IP Steering Committee (accessed in October 2014) http://www.ipos.gov.sg/Portals/0/Press%20Release/IP%20HUB%20MASTER%20PLAN%20REPORT%202%20APR%202013.pdf

482 See the project website http://www.inapiproyecta.cl/605/w3-channel.html (accessed in October 2014).

483 For Italy, see the project presentation (accessed on October 2014) http://www.uibm.gov.it/attachments/article/2005713/presentazione_fondo.pdf

484 The Green paper can be found at http://ec.europa.eu/internal_market/indprop/docs/patent/docs/pat_en.pdf (accessed in October 2014).

485 See the Summary report of replies to the public consultation on the follow-up study on patent litigation insurance, carried out by CJA Consultants, at http://ec.europa.eu/internal_market/indprop/docs/patent/studies/consultation/summary_report_en.pdf (accessed in October 2014).

486 Possible changes to bank and security regulations are not discussed here. As we have seen above, unregulated financial institutions are the most active actors in IP-backed lending, probably because they are not subject to capital adequacy requirements. However, the main issue with bank lending is the understanding of IP as an asset and the assessment of IP risks, and not the regulation itself. Nonetheless, it is possible that bank and security regulations could be redesigned to incentivise IP-backed lending (Mateos-Garcia, 2014). To this end, a preliminary review of bank and security regulations would be warranted.

487 For the United States, see the White House press release from 20th February 2014 (accessed in October 2014) http://www.whitehouse.gov/the-press-office/2014/02/20/fact-sheet-executive-actions-answering-president-s-call-strengthen-our-p
and the USPTO initiatives page (accessed in October 2014) http://www.uspto.gov/patents/init_events/executive_actions.jsp.

488 For Chile, see the project website (accessed in October 2014) http://www.inapiproyecta.cl/605/w3-channel.html

489 See the “Intellectual Property Hub Master Plan” for Singapore, released on April 2013 by the IP Steering Committee (accessed in October 2014) http://www.ipos.gov.sg/Portals/0/Press%20Release/IP%20HUB%20MASTER%20PLAN%20REPORT%202%20APR%202013.pdf

490 For Italy, see the evaluation grid website (accessed in October 2014) http://www.uibm.gov.it/index.php/brevetti/utilita-brevetti/griglia-di-valutazione-economica

491 See the Bruegel blog “Are capital markets the only friend of innovation?” from March 2014, by Carlo Altomonte and Marco Antonielli on this topic http://www.bruegel.org/nc/blog/detail/article/1273-are-capital-markets-the-only-friend-of-innovation (accessed in October 2014).

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