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ECONOMIC EFFECTS OF COPYRIGHT
The Empirical Evidence So Far

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1. INTRODUCTION¹

This is a survey of the empirical, economic literature on copyright and unauthorized copying, conducted on behalf of the National Academies of the Sciences. The purpose is to identify areas for further research that could inform copyright policy.

Copyright defines the rough equivalent to property in many literary, scientific and artistic creations.² The copyright system is a central component of the creative industries, including suppliers of computer software, movies, books, newspapers and magazines or recorded music among others. Copyright is also a major influence on the formation of so-called ‘digital’ markets for information goods and services, affecting much of the IT sector.

Even though copyright has been part of US federal law for over 200 years – and similar arrangements existed even longer in major European countries – there is relatively little systematic, empirical evidence on the economic effects of copyright. If anything, that should make the studies reviewed here more valuable. The structure of this report derives from the following basic economic analysis.

1.1 THE COSTS AND BENEFITS OF COPYRIGHT

Economic theory suggests that the supply of reproducible creative works will fall below its socially desirable level in competitive markets. That is because important aspects of such works have characteristics similar to those of a public good. The typical cost structure of copyright industries – with substantial upfront development costs and very low costs of reproduction – aggravates this problem.

For many purposes, copyright can be studied as a costly measure to inhibit unauthorized copying and thus unauthorized use. Effective copyright endows creators with temporary exclusive rights to their original creations. This allows copyrights holders to raise prices and revenues in comparison to a situation in which they would have to compete with suppliers of identical copies (Plant, 1934). The economic literature on copyright disentangles the various consequences of copyright, and table 1 gives a rough overview of costs and benefits.

TABLE 1: Costs and benefits of a copyright system

	Benefits	Costs
Short run	Greater revenues to rights holders	1. Access costs to users 2. Administration costs 3. Transaction costs in trading rights
Long run	Greater incentives to supply copyright works for rights holders	User innovation is obstructed by the costs of compliance

¹ This report draws on the author’s work with Ruth Towse and Paul Stepan, as presented for example in Towse et al. (2008) and funded by the Fundación Autor, Spain, as well as on a report for the UK Intellectual Property Office (IPO) on copyright and digitization (Handke, 2010). I am grateful to Ruth Towse and Paul Stepan as well as the IPO for their permission to build on our common efforts. This report benefited greatly from comments by Joel Waldfoegel and Ruth Towse. All mistakes are undoubtedly mine.

² Among legal scholars, there is a debate whether intellectual property rights such as those granted by copyright law should be referred to as ‘property’ or as a mere ‘privilege’.

An essential distinction in order to make the economic case for copyright is that between the immediate, short-run effects of unauthorized copying and its long-run effects concerning the future supply of creative works (Johnson, 1985). In the short run, a rational copyright policy trades off rights holder interests (maximizing returns) against user interests (maximizing access to the existing stock of copyright works). The higher prices charged by rights holders generate access cost to users. There seems to be no copyright policy that improves the situation for rights holders and users simultaneously in the short run. What is more, any copyright system entails administration costs – some of which will typically involve public expenditure – and transaction costs in trading rights, which further inflate prices and access costs. Therefore, the short-run case for copyright is weak.

In the long run, the situation may be quite different. That is because unauthorized use can undermine incentives to invest in the creation and diffusion of copyright works. If rights holders find it hard to recoup the costs of creation, creative supply may dry up. The short-run benefits of unauthorized copying to users could thus be unsustainable. It would then be possible that a reasonably efficient copyright system increases both rights holder and user welfare in the long run. This long-run assessment is the standard, economic argument in favor of public investments into a copyright system.

One important clarification is that follow-up creators are also users of copyrighted works, who are affected by the access costs generated by a copyright system. Copyright can thus increase the revenues from supplying creative works and the costs of supplying them. Suppliers will have to clear rights held by others or work around them. Therefore, it is not a given that stronger copyright increases the supply of new creative works (Landes and Posner, 1989; 2003).

While there are various ways to conceptualize copyright, a dominant theme is the notion of a trade-off. What is more, many aspects of copyright policy are scalable, the duration of rights being a case in point. The question whether copyright can in principle increase social welfare is thus not of great practical importance (the answer being: ‘yes, but ...’). The question for rational policy is under what exact circumstances copyright will provide a net benefit and how copyright arrangements can be shaped to maximize this benefit. Finding a reasonable answer requires (1) a comprehensive, balanced analysis that takes all substantial costs and benefits into consideration equally, and (2) reasonably precise empirical estimates of the various costs and benefits.

1.2 THE CONTRIBUTION OF THIS REPORT

By now, there have been quite a few surveys of the economic literature on copyright, as well as the empirical findings in particular.³ Besides providing an update, this report makes two original contributions.

First, it advances a relatively elaborate structure in which to place the various items. This structure may be useful to provide a quick overview. What is more, it should help identify gaps in the empirical literature – issues that might require further attention in order to develop a comprehensive assessment of the costs and benefits of copyright throughout society.

Second, this report develops some links with closely related fields. On the one hand, it includes leading empirical studies from the much more extensive literature on patents, which might inspire further research on copyright. On the other hand, it includes the hybrid case of computer software, which falls in the realm of both copyright and patent law.

³ On theory, see for example Watt (2000), Peitz and Waelbroeck (2004), Liebowitz and Watt (2006), or Towse, Handke and Stepan (2008). An application to digitization is offered in Handke (2010b). Regarding the empirical literature, a relatively broad survey is Png (2006), and on the impact of file-sharing on rights holder revenues in the record industry see the specific sections in Liebowitz (2005a), Watt and Liebowitz (2006), and Oberholzer-Gee and Strumpf (2009).

1.3 A FIRST OVERVIEW

Some preliminaries – the literature on patents and the size of copyright industries

Chapters 2 and 3 cover some preliminaries. In section 2, the report reviews some empirical insights regarding patents. This literature has explored many different options to conduct research on IP, which can inform further research on copyright. However, it seems that research on copyright needs to develop quite different measures for key concepts such as IP strength and innovation. Chapter 3 briefly discusses reports on the size and economic importance of copyright industries (using one specific example for illustration), including their shortcomings for the purpose of informing copyright policy.

The core argument – various costs and benefits of copyright

Chapters 4 to 7 cover the main costs and benefits of the copyright system as presented in table 1. Table 2 provides an overview of contributions, classified according to a slightly more elaborate system. As discussed above, it is useful to distinguish between short-run and long-run effects, as well as between effects on rights holders and users (rows one and two). This report also distinguishes between empirical studies on three aspects of copyright strength: unauthorized copying, copyright law and copyright enforcement (columns one and two). This distinction is useful because enforcement of copyright laws is typically incomplete, and because unauthorized copying may change due to other reasons than law and its enforcement, for example changes in copying technology. Furthermore, the literature mostly examines whether the intended benefits of copyright transpire – say greater rights holder revenues or greater innovation. The costs and unintended consequences of copyright do also merit attention and these costs are covered in the lower rows in table 2.⁴ Public investments in the copyright system, for example, may not show up in assessments of rights holder and user welfare. The economic literature on copyright also contains some evidence that copyright may have unintended consequences regarding the contestability of markets for copyright works or technological innovation related to the sector.

⁴ This section of the table makes no distinction between short-run and long-run effects or between rights holder and user welfare.

TABLE 2: Empirical research concerning the effects of copyright protection

		Short-run		Long-run	
		Rights holder welfare ⁽¹⁾ (revenues)	User welfare (access)	Rights holder welfare ⁽¹⁾ (profits after indirect effects and adaptation)	User welfare (quantity or quality of works supplied; innovation)
Copyright strength	Unauthorized copying	Recorded music: - Hui and Png (2003) - Peitz and Waelbroeck (2004) - Blackburn (2004) - Boorstin (2004) - Hong (2004) - Michel (2004) - Peitz and Waelbroeck (2004) - Zentner (2005) - Rob and Waldfogel (2006) - Zentner (2006) - Gopal et al. (2006) - Oberholzer-Gee and Strumpf(2007) - Andersen and Frenz (2007)* - Liebowitz (2008) - Adermon and Liang (2010)* - Mortimer et al. (2010) Movies: - Bounie et al. (2006) - Rob and Waldfogel (2007) - Hennig-Thurau et al. (2007) - Smith and Telang (2010) - Adermon and Liang (2010)	Recorded music: - Rob and Waldfogel (2006) - Waldfogel (2010)	Indirect appropriability / academic journals: - Liebowitz (1984) Network and exposure effects / software: ⁽²⁾ - Givon et al. (1995)	Recorded music: - Handke (2010a)* - Waldfogel (2011)
	Copyright law	Various aspects of copyright law and several copyright industries: - Baker and Cunningham (2006)	--	--	Duration: ⁽³⁾ - Hui and Png (2002) - Landes and Posner (2003) - Khan (2004) - Png and Wang (2009)
	Copyright enforcement	-- ⁽⁴⁾	--	--	--

> *Continued on next page*

Costs of copyright ⁽⁵⁾	Administration costs		--
	Transaction costs		--
	Unintended consequences	Contestability	Recorded music: - Blackburn (2004) - Gopal et al. (2006) - Bhattacharjee et al. (2007) - Handke (2010a)* - Mortimer et al. (2010)
		Effects on technological innovation	Recorded music: - Handke (2010a)*

NOTES – This table excludes the hybrid case of computer software; studies can appear several times if aspects of them fall in various categories; two minus signs (--) indicate that no studies were found; an asterisk (*) indicates that studies do not address US data; to have some exclusion criterion, only papers calculating statistical significance levels for the relevant findings are included.

- (1) The distinction between short-run and long-run studies of rights holder welfare is difficult to make, because the time needed for complete adaptation is not known. In this table, only studies that deliberately address copyright industry adaptation to unauthorized copying are classified as covering long-term effects on rights holder welfare.
- (2) Other studies dealing with network effects included into this report do not explicitly address network effects from unauthorized copying and how they might affect sales and rights holder revenues.
- (3) Hui and Png (2002) deal with the supply of movies in the US; Landes and Posner (2003) deal with the number of several types of copyright works registered with the US Copyright Office; Khan (2004) addresses the number of book authors; Png and Wang (2009) address the supply of movies in a cross-country panel study.
- (4) Addressed indirectly through unauthorized copying in several studies, see chapter 8.
- (5) In these rows, no distinction is made between long-run and short-run effects, or between rights holder and user welfare.

Table 2 illustrates an important point: some issues have received more attention than others. By far the greatest number of studies addresses the impact of unauthorized copying on rights holder revenues. Results scatter somewhat and work remains to be done on this topic. Nevertheless, there is probably even greater need for studies addressing other consequences of copyright, for example: user welfare and the supply of copyright works; the more protracted effects on rights holder welfare, including adaptation to the presence of digital copying; the direct costs of administering the copyright system for the public sphere; and unintended consequences.

The table deliberately does not include information on the type of finding, for example whether unauthorized copying was found to have a significant effect on rights holder revenues or not. The main reason is that results are often quite nuanced.⁵

The various topics apparent in table 2 are dealt with in four different chapters. Chapter 4 addresses the economic effects of unauthorized copying. If copyright is mainly a measure to avoid adverse consequences of unauthorized copying, this is a most fundamental issue. The centrality of the issue is reflected in the relatively large number of empirical studies on this topic.

Chapter 5 deals with empirical studies on the effects of copyright law. Copyright law has several aspects. So far, economic literature contains mostly empirical studies regarding the consequences of copyright duration. There are no studies on the effects of copyright enforcement on the various costs and benefits of copyright. (Some studies on enforcement and unauthorized copying are addressed in chapter 8.)

Chapter 6 discusses the limited empirical work on administration costs, transaction costs, and some unintended consequences of copyright.

Within specific chapters, results are further classified by: (1) the type of copyright industry; (2) the type of research design; and (3) the type of data used. The first of these classifications deserves particular attention. All copyright industries supply products that have some public good attributes.⁶ However, the various industries differ substantially, for example in terms of size and growth, cost structure, and relevant demand conditions such as the substitutability of unauthorized and authorized copies. Unfortunately, there have been few attempts to systematically compare the way in which copyright affects different industries within its realm.⁷

Software

Of all suppliers of copyrightable works, suppliers of computer software generate by far the greatest added value. Markets for business software and entertainment software (for example video games) are much younger than other copyright industries and as a rule, they have grown rapidly over recent years.

Software is also unique because in contrast to literary texts, movies or sound recordings, the market for software has been subject to unauthorized, digital copying for as long as it exists. Since

⁵ Furthermore, not all studies are of equal quality so that a decision by majority is not necessarily adequate. There may also be a bias in the selection criteria of journals, even though it is not clear in which direction this would work in the case of research on unauthorized copying. Typically, academic journals tend to favor studies that do find statistically significant results. On the other hand, results that find no effect of copying on rights holder revenues may be more likely to get published because they are counterintuitive and may be expected to get more attention.

⁶ Public goods are defined by two characteristics. First, they are non-excludable: exclusive (property-) rights to using them cannot be enforced. Second, public goods are non-rival: use by one individual does not inhibit use by others. Copyright works are rarely perfect public goods but they are regularly hard to exclude and important aspects of them are non-rival.

⁷ Hong (2007) is a notable exception. He uses data from the Consumer Expenditure Survey to compare entertainment spending of Internet users and non-Internet users between 1996 and 2002. Results are mixed. Only demand for recorded music is consistently found to fall with Internet use. In contrast to some other authors, Hong (2007) does not explicitly interpret Internet use as an indicator of unauthorized copying.

1980, software has enjoyed copyright protection in the USA, analogous to literary texts. In many other countries, software also falls in the realm of copyright law but enforcement varies, as will be discussed below. In contrast to other types of copyright works, machine-readable software can also be patented if it is accepted as non-obvious (or considered to constitute an 'inventive step' in many European countries). Suppliers of software thus have a choice. Copyright protection concerns the code itself, requires no registration fee, lasts longer and allows for the software itself to remain a trade secret. Patent protection prevents others from putting software with equivalent functions to use, requires complete disclosure, a test of non-obviousness and a registration fee.

Recorded music

By and large, markets for computer software have grown rapidly over recent decades in spite of extensive unauthorized, digital copying. By contrast, private copying of music seems to have increased quite suddenly and substantially with the rapid diffusion of digital copying technologies such as file-sharing networks as well as CD- and DVD-burners from the late 1990s. In the record industry, digital copying coincides quite precisely with a great falls in rights holder revenues, at least from the primary market in which authorized copies are sold to end consumers. This pattern is similar in all major markets, such as the US, Japan, the UK, France or Germany. The effect of digital copying on rights holder revenues in this market has received much attention, and many studies suggest that file-sharing contributed to falling revenues.

Movies

Movies are much more complex creative works than recorded music, which makes them more expensive to create and to copy. Studies on digital copying and file-sharing of movies suggest that the movie industry has been less vulnerable to file-sharing so far.

Other copyright industries

There are few empirical studies on other types of copyright industries, say suppliers of books, news publishing and periodicals or academic journals in particular.

Additions – mitigating mechanisms and the factors

The two final chapters fall outside of the structure presented in table 2. Theoretical work on the economics of copyright suggests that due to three mechanisms, adverse effects of unauthorized copying on rights holders could be mitigated (or even reversed): (1) indirect appropriability; (2) network effects; and (3) sampling or exposure effects. Chapter 7 addresses the empirical evidence. Furthermore, chapter 8 presents empirical findings on number of factors that influence the intensity of unauthorized copying.

Finally, some noteworthy topics are not dealt with in this report. On the one hand, alternatives to copyright in order to foster innovation and creativity are not addressed. On the other, much of the political economy of copyright policy – concerning lobbying, rent-seeking, and the finer points of interaction between stakeholders – falls beyond the scope of this report.

1.4 SELECTION CRITERIA

This report focuses on the quantitative-empirical literature that is based on economic theory. The net is cast widely in the sense that some papers from closely related academic disciplines such as a business and management are included. The same holds for research published in leading journals on computing and IT, as long as it is based on economic theory and applies essentially the same research methods. (In practice, some authors have published in publications specialized on several of

these different academic fields). Perfect coverage is hard to achieve, and the use of the literature from 'related fields' is less comprehensive than for the economic literature in a narrow sense.

Like any survey of academic literature, this report covers peer-reviewed and published articles. Markets for copyright works and copyright policy have been changing rapidly over recent years. Therefore, recent results are of particular interest and several articles are included that have not been peer-reviewed and published. The extent to which colleagues have already cited such working papers was considered as an indication of quality. In any case, some working papers may change considerably over time after corrections and additions so that they should be considered with particular caution. Furthermore, studies were more likely to be included if they make more original contributions – covering relatively empty cells in table 2, for example.

2. PATENTS, INNOVATION AND ECONOMIC DEVELOPMENT

There is relatively little systematic, empirical evidence on the economic effects of copyright. The patent system has been researched more extensively⁸, and the empirical literature on patents provides useful pointers for further research on copyright.

A central problem continues to be the measurement of the main phenomena of interest, of IP protection and innovation. The quantification of IP protection is tricky, in particular where social practice is not consistent with legal arrangements. Regarding innovation input, R&D expenditure is a limited measure of innovation, because it does not capture commercial innovation conducted outside of formally defined R&D departments and user innovation. Patent registrations are a limited measure of innovation output because the economic value of patented ideas may vary considerably.

2.1 THE EFFECT OF PATENTS ON GROWTH AND INNOVATION

As discussed above for copyright, IP can affect economic development in various ways. First, IP may affect investments in research and development, and thus innovation in the narrow sense of the creation of new useful ideas. The prospect of greater returns should promote incentives to develop and market new ideas. Second, IP may also affect the diffusion and application of new ideas. Effective IP will restrict imitation and follow-up innovation. An adequate IP system that gets the balance right may help to generate highly qualified jobs, promote productivity increases of existing industries or facilitate the emergence of new markets.

Patents and growth

Most studies on the effects of the patent system focus on innovation as a driver of long-term growth rather than on growth itself. An exception is a paper by Park and Ginarte (1997), who investigate the link between the strength of patent protection and economic growth in a panel study of over sixty countries between 1960 and 1990. Their findings are quite nuanced. Overall, Park and Ginarte (1997: 60) conclude that patent protection “has the potential to improve economic growth” by “making more investment activities possible”.

Patents and domestic innovation

An extensive empirical literature addresses the effect of patent protection on domestic innovation. Most studies that address the impact of increased patent strength in specific industries and countries found no significant effect (e.g. Scherer and Weisburst, 1995; Sakakibara and Branstetter, 2001).

For the US, leading studies based on surveys of innovative firms also suggest that by and large, the patent system has little effect on innovation output and the returns on innovation (e.g. Mansfield, 1986; Levin et al., 1987; Cohen et al., 2000). Respondents considered trade secrecy, lead-time advantages and other ways of appropriation to be more important. Nevertheless, most innovative firms make use of the patent system, often in a strategic manner by patent blocking, in order to secure advantageous negotiation positions or to prevent suits.

Results from panel studies including a great number of different countries are mixed. For 60 countries over a 150 year period, Lerner (2002) finds that substantial patent reforms have had little

⁸ It could be confusing that the literature on patents regularly refers to the broader concept of intellectual property, without actually addressing other types of intellectual property such as trademarks or copyright. An exception is Greenhalgh and Rogers (2007), who discuss various types of IP in one paper with useful pointers to the empirical literature.

effect on domestic innovation as measured by the number of patent applications from organizations residing within the country. In other panel studies, Kanwar and Evenson (2003) find a significant positive effect between an index of patent strength – as developed in Ginarte and Park (1997) and extended and updated in Park (2005) – and R&D investment relative to gross national product. Using the same index, Chen and Puttitanun (2005) find that the number of US patent applications by residents of developing countries increase with the patent strength in those countries.

Patents and technological transfer

There is only “limited evidence” that stronger IP protection would boost domestic innovation (Branstetter et al., 2000). If patents have no strong positive effect on domestic innovation, they may still increase ‘technological transfer’ – the influx of new ideas from other countries.⁹ A number of papers study whether IP is associated with the diffusion of new ideas through foreign direct investment. Lerner (2002) finds that after reforms strengthening the domestic patent system, patent applications by organizations from other countries do increase. Branstetter et al. (2006) address IP and technological transfer between countries. In particular, they study the effects of changes in IPR outside the US on US-based multinationals. Royalties paid from foreign affiliates increased with stronger IP protection abroad, and so did R&D expenditure by affiliates of US firms abroad, which should be indicative of greater technological transfer towards countries with stronger IP protection. Similar results are found in Lee and Mansfield (1996), Maskus (2000) and Javorcik (2004), for example.

2.2 PATENT PROTECTION AND ECONOMIC DEVELOPMENT – DIVERGENT INTERESTS BETWEEN COUNTRIES

The literature produced some interesting insights on the implications of IP for countries at different stages of economic development (Evenson, 1990; Rapp and Rozek, 1990). Ginarte and Park (1997) developed a widely used index of patent strength and find that between 1960 and 1990, “more developed economies tend to provide stronger (patent) protection.” An important factor determining the strength of patent protection seems to be whether domestic R&D is above a critical threshold. Of 110 countries, the USA had the strongest patent protection in 1990, and protection had increased substantially since 1960.¹⁰ All highly industrialized countries included had relatively strong patent systems. At the bottom of the table are some countries with no patent protection to speak of at the time, such as Angola, Burma, Ethiopia, Mozambique or Papua. In a related study mentioned above, Park and Ginarte (1997) find that intellectual property rights “matter for the R&D activities of the developed economies but not for those of the less developed economies.”

2.3 SUMMARY AND IMPLICATIONS FOR COPYRIGHT

Overall, the empirical literature provides no simple answer whether the patent system as it is spurs innovation and long-term growth. The mixed empirical results on the economic effects of patents might raise doubts whether other types of IP – like copyright – fulfill their intended function. There is some evidence for a net positive effect of IP in some economies. Results also suggest that

⁹ Helpman (1993) contains an influential theoretical analysis.

¹⁰ Index values and the rankings of countries vary slightly between Ginarte and Park (1997) and Park and Ginarte (1997).

countries have divergent interests regarding IP protection depending on their relative state of development and in particular on their domestic industries' ability to conduct innovation.

Regarding copyright policy, the latter point resonates with the historical accounts of US copyright (Goldstein, 2003:149ff.; Vaidhyanathan, 2003:50ff.). For the first hundred years of its existence, federal US copyright law applied only to domestic suppliers. This period coincided with extensive unauthorized use of copyrighted material from abroad, in particular from the UK (see also Plant, 1934). As US producers became more competitive, the US extended copyright protection to cover foreign rights holders in 1891 and gradually became a champion of international copyright protection. The most developed and innovative economies may favor stronger international copyright protection. Developing economies that seek to catch-up and grow through imitation (rather than through foreign direct investment and licensing) may not for the time being.

In order to research the economic effects of copyright, the empirical literature on patents offers an extensive catalogue of research designs and methods to study the economic consequences of IP. This section reviews some options with a view to informing US copyright policy.

Research design

Regarding research designs, pure cross-sectional studies are likely to encounter a problem with the direction of causality. For example, if copyright protection correlates with innovation at a single point in time, this does not tell us whether countries with a strong innovation performance opt for greater IP protection, or whether they perform better in terms of innovation because of IP.

Longitudinal studies usually take the form of natural experiments, assessing the effect of changes in IP protection. This approach may be suitable to establish the direction of causality where it illustrates whether stronger IP protection is introduced after domestic industries develop a strong innovation performance or the other way around. Real events do not resemble ideal-type experiments, however, and deliberate experimentation by policy makers is often considered unacceptable. Furthermore, results for specific industries, countries and events may not be generalizable.

Finally, panel studies use data on a number of cases (countries in macroeconomic studies) over time. The leading studies on patents are of this type. The implementation of panel studies on the economic effects of copyright is restricted by data limitations. For either longitudinal or panel studies, the time period covered may not always be long enough to capture protracted effects. This can be a problem in particular for studies of recent events.

For the purpose of informing national copyright policy, it is not certain that macroeconomic panel studies would be the best way forward. That is because the literature suggests that the appropriate level of IP protection is context specific. For example, research on patents finds that highly developed economies have a greater interest in IP protection than less developed economies. If so, panel studies of many countries may not indicate the appropriate level of IP protection for an extreme case such as the USA. What is more, different sectors of the economy may be best served by different levels of IP protection. For example, if the market for computer software thrives in spite of extensive piracy this does not mean that the market for sound recordings or feature films would. Landes and Posner (1989; 2003) even make the point that in principle, the efficient level of IP protection could vary for each creation. To inform national policy, it thus seems desirable to combine panel studies with longitudinal studies of specific economic sectors.

Indicators of IP protection

There may be a particularly great rift between legal arrangements regarding copyright protection and protection in practice. For example, peer-to-peer file-sharing of copyright works is illegal in most major economies today, but it still occurs on a massive scale. Part of the problem is that in contrast to patents, benefitting from the ideas and works protected by copyrights does not require much

expertise or capital. Copyright infringements occur more frequently and often in the private domain, which inhibits effective enforcement of copyright law. This is one reason why most studies on unauthorized, digital copying use measures of copying rather than measures of the strength of copyright law to assess IP protection (see below).

Indicators of innovation in copyright industries

One problem in research on copyright is that most research on innovation has deliberately ignored the types of aesthetic and intellectual innovations covered by copyright law. To be sure, in the copyright industries technical innovations do occur as well. The adoption of new media technologies is a case in point. However, much innovation in the copyright industries concerns the creation of new media content. In order to measure innovation in copyright industries, it is useful to distinguish between more conventional 'humdrum innovation' and 'content creation'. Humdrum innovation concerns all facets of technological innovations and can be assessed with the familiar instruments of empirical research on innovation. Content creation concerns aesthetic and intellectual variations that distinguish different copyright works from each other. To measure content creation, it seems necessary to adapt traditional methods of innovation research.

Innovation input is traditionally measured by the size of R&D departments. Regarding content creation, there are two outstanding problems. First, much content creation occurs in relatively small firms and particularly volatile organizational set-ups. Second, content creation is not usually conducted in formally defined R&D departments. Other measures of innovation input are necessary to deal with innovation in small enterprises, with self-employed creators, or with user/amateur innovation that seems to play an important role in the cultural sector (e.g. regarding user-generated content).

Innovation output is traditionally measured by the number of patents, which has nothing to do with content creation. The sheer number of copyright entitlements generated is an even worse indicator of content creation than the number of patents is for technological innovation. One practical reason is that copyright applies automatically and there are no official, comprehensive directories of the number of works. Furthermore, the quality threshold for copyright to apply is lower than for patents. Many copyrighted works may be of very little value or originality. It may be possible to mitigate these problems where there is information available on whether rights holders invest in the marketing of works, which would be an indication of some expected commercial value.¹¹

¹¹ On measurement problems related to content creation/creativity and many creative works in the realm of copyright see, for example UNCTAD (2008:81ff.) and Towse (2010).

3. THE SIZE OF COPYRIGHT-BASED INDUSTRIES

In many major economies, stakeholders publish reports regarding the size of the copyright industries. The World Intellectual Property Organization (WIPO) promotes these accounting exercises and developed detailed guidelines for them (WIPO, 2003).¹² In the USA, the International Intellectual Property Alliance (IIPA) publishes such reports every couple of years. The IIPA represents some of the most important trade organizations of firms that own and commercialize copyrights.¹³ Its reports offer a convenient way to discuss data on the size of copyright industries, as it summarizes individual reports by its various member organizations. There are also some noteworthy difficulties in drawing adequate conclusions from such studies regarding copyright policy.

3.1 FUNDAMENTAL DEFINITIONS

There is general agreement that calculations should use value-added rather than turnover (WIPO, 2003). What is more controversial is which industries should be counted as copyright industries. The more recent IIPA reports define the “core copyright industries” as “those industries whose primary purpose is to create, produce, distribute or exhibit copyright materials” (Siwek, 2009:9). In practice, suppliers of books, newspapers and periodicals, motion pictures, recorded music, and computer software are counted as part of the core copyright industries. In these reports, broadcasters also count as part of the core and so do suppliers of works in the public domain, as long as there are included into IIPA member statistics. “Total copyright industries” further include suppliers of design intensive products (such as jewelry, furniture, or toys and games), a portion of support industries (such as transportation services, telecommunications, the wholesale and retail trade), suppliers of consumer electronics (such as CD players, tv sets and personal computers), as well as suppliers of recording media from blank DVDs to some types of paper.

3.2 THE SIZE OF US COPYRIGHT INDUSTRIES

According to the most recent IIPA report (Siwek, 2009), value added in the ‘core copyright industries’ was nearly US\$ 890 billion in 2007, amounting to 6.4% of GDP. For the broader concept of ‘total copyright industries’, value added was US\$ 1,525 billion or 11.1% of GDP. The IIPA report emphasizes that with 5.9 to 9.6% real annual growth rates during the years 2003 and 2007, growth in core copyright industries far exceeded total GDP growth of 2.0 to 3.6% over the same years. For total copyright industries, annual growth was even higher, ranging between 7.7 and 9.4% per annum.

Some caveats are in order, however. Roughly speaking, the real growth rates quoted above are calculated by what today’s products would have cost in previous years. This method leads to higher estimates of growth in innovation intensive industries, where costs fall or products improve relatively quickly over time. Many copyright industries have been a case in point over recent years.

¹² The Review of Economic Research on Copyright Issues (RERCI) devoted its first issue to these matters (RERCI, 2004).

¹³ As of March 2011, the seven member organizations of the IIPA are the Association of American Publishers (AAP), the Business Software Alliance (BSA), the Entertainment Software Association (ESA), the Independent Film & Television Alliance (IFTA), the Motion Picture Association of America (MPAA), the National Music Publishers’ Association (NMPA), and the Recording Industry Association of America (RIAA).

Regarding other types of indicators from the latest IIPA report, results are more sobering. In nominal terms, the share of value added in total GDP was stable for either the core copyright industries (at circa 6.4%) or the total copyright industries (at circa 11.1%) between 2003 and 2007. Over the same period, employment in the copyright industries expanded only modestly and its share in total employment was also stable (at circa 4.1% of total US employment for the core copyright industries, and at circa 8.5% for total copyright industries).

Some U.S. copyright industries are highly competitive internationally. Computer software accounts for a very large share of copyright-related U.S. exports. The IIPA report (Siwek, 2009) estimates revenues from software exports at US\$ 91.9 billion. That is almost exactly three times as much as estimates for combined US exports of recorded music, motion pictures, TV programs, videos, newspapers, books and periodicals.

In summary, copyright policy directly affects industries that make up a sizable share of the US economy. There are indications that copyright industries are particularly dynamic, even though some claims in this respect may be exaggerated.

3.3 PROBLEMS AND LIMITATIONS

In order to draw conclusions regarding copyright policy, there are considerable problems with studies on the size of copyright industries. First and foremost, such studies do not establish the economic significance of copyright. In the past, many valuable literary, scientific and artistic works have been created and traded without effective copyright protection (e.g. Scherer, 2008). A more current example regards open source software, which is produced without taking recourse to most aspect of copyright or other types of IP (Bessen, 2005; Krogh and Hippel, 2006). It seems improbable that advances in copying technology would completely do away with incentives to create further works. Therefore, it is one thing to establish the size of industries directly affected by copyright; it is quite another to establish what these industries would look like without copyright.

Furthermore, studies on the size of copyright industries tend to be commissioned by interested parties, so that it may be necessary to analyze them carefully. Towse (2004) notes that there is a tendency to exaggerate figures, since results are often used for advocacy purposes. A related problem is that the underlying methods are often not fully transparent.

Also, the demarcation of what is to count as copyright industries can be debated. There are many hybrid cases and to disentangle them perfectly is tricky. The elaborate definition developed by the WIPO (2003) includes a number of hybrid cases.

Suppliers of complementary goods and services are of particular interest. For these industries, there may even be conflicts of interest with copyrights holders. It seems probable that demand for telecommunications firms or suppliers of some consumer electronics could actually increase when copyright works are available at low costs, for example because of unauthorized copying. See section 6.3 on some preliminary evidence.

A recent report by UNCTAD (2008) discusses data limitations more extensively. This report also contains much more modest estimates of the size of the US 'creative industries' than the IIPA (Siwek, 2009) estimates for the closely related concept of the 'copyright industries'.

Finally, most goods and services supplied by copyright industries seem to be necessities and some are luxuries (cf. Vogel, 2010:20). Demand could thus be sensitive during economic recessions, and it remains to be seen how they perform in the current economic climate.

4. THE EFFECTS OF UNAUTHORIZED COPYING

4.1 INITIAL REMARKS ON STRUCTURE AND THE RELATIVE IMPORTANCE OF DIFFERENT ASPECTS OF THE LITERATURE

Studying the economic effects of unauthorized copying and use is different from studying the effects of copyright law. On the one hand, the enforcement of IP laws tends to be incomplete. On the other, the extent of unauthorized copying changes due to other reasons than changes in laws and enforcement measures, in particular advances in copying technology.

What the effects of unauthorized copying are is the most fundamental question regarding copyright policy.¹⁴ This topic has received relatively much attention by empirically minded economic researchers.

The introduction to this report argued that in order to inform copyright policy, it would be desirable to take account of the various and potentially divergent welfare effects of copyright/unauthorized copying for different stakeholders and over time (see table 1). It comes out well in table 2 that the academic literature is diverse and unevenly distributed. Therefore, strictly applying this classification system in the following text would result in some chapters being bulky, and others extremely short. Instead, this text covers some ancillary issues that have been well researched in separate chapters, whereas other, more principal issues are collided into single chapters. This is not supposed to signal that the issues well covered in the literature necessarily provide the most valuable information for copyright policy. Again, a reasonably comprehensive, balanced account would seem superior.

Much of this chapter deals with research on the impact of unauthorized copying on rights holder revenues (sections 4.3 to 4.6). The short-run effects on user welfare have received much less attention (section 4.7). There are also relatively few studies on the more distant effect of unauthorized copying on innovation and the supply of copyright works (section 4.8). Indirect effects of unauthorized copying and the potential for successful copyright industry adaptation are discussed later on in chapter 7.

The effects of unauthorized copying have nearly always been studied for specific copyright industries. Computer software and recorded music have received most attention. Lately, a handful of studies address movies. There is hardly any econometric research regarding other copyright industries.

For many copyright industries, a useful distinction is that between studies dealing with file-sharing of digital downloads and studies dealing with other types of unauthorized copying.¹⁵ With the exception of the literature on software, almost all studies covering the period after 1999 focus on file-sharing. (Napster started to operate in June 1999.) Copying hardware for CD-Rs and DVD-Rs started to diffuse widely among private households at roughly the same time and might have had an impact in particular in some European countries. At this point, digital copying and file-sharing is of greater interest than unauthorized copying through other means.

However, for software piracy a distinction into a period before and after a massive diffusion of unauthorized copies through the Internet may make least sense. In any case, the literature does not make this distinction. Therefore, the peculiar case of software is addressed first.

¹⁴ To illustrate this point, let's imagine that unauthorized copying were found to entail no adverse consequences under specific market conditions. In such a case, there would be no point in discussing the adequate level and type of costly countermeasures such as copyright.

¹⁵ Another useful distinction would be between (1) commercial piracy with the intention to sell unauthorized copies, and (2) private copying that entails no direct pecuniary reward. Few empirical studies discuss the difference between these two types of unauthorized copying.

4.2 SOFTWARE

Empirical studies concerned with so-called ‘piracy’ of computer software often deal with copyright and patent infringements at the same time, and the authors rarely bother with this distinction. Many empirical studies on software piracy precede the current interest in copying of other types of copyright works. The bulk of this literature takes a business and management perspective. It is less concerned with social welfare and implications for public policy but with the interests of private business, in particular suppliers of software. For example, in contrast to research on patents proper, there seems to be less interest in the impact of IP protection/unauthorized copying on innovation or even macroeconomic growth (see chapter 2).

Furthermore, in contrast to research on unauthorized, digital copying of recorded music or movies, the extensive literature on software ‘piracy’ features few original assessments of the impact on sales and rights holder revenues (see sections 4.3 to 4.5). Estimates of lost sales due to piracy come from software suppliers and their representatives. The academic literature mostly discusses piracy rates (the ratio of users utilizing legitimate software and users of pirated software) but does not quantify the likely impact on rights holder revenues.

There may be several reasons why academic researchers hesitate to forward estimates of lost sales due to piracy. The rapid rate of product innovation in the industry makes it hard to isolate the effect of unauthorized use on sales. There may have been few sudden and substantial changes in the de facto level of copyright protection for software, which could have been analyzed as natural experiments. Furthermore, the rapid growth of the market for computer software could reduce the concern for sales displacement from piracy. The coincidence of rapid revenue growth, great innovation intensity and extensive piracy seems to have motivated many studies on how network effects may mitigate any adverse effects of piracy, see chapter 6.

One leading article by Givon et al. (1995) is an illustrative example. In their application of a diffusion model, Givon et al. (1995) estimate that in the UK in the early 1990s, around one in six business software users utilized a pirated version. This does not translate directly into a measure of lost sales, however, since the willingness to pay of illegitimate users may be lower than the retail price of the software. Furthermore, Givon et al. (1995) emphasize the positive effect of piracy for the diffusion of the product, which also positively affects sales.

4.3 THE EFFECTS OF FILE-SHARING ON RECORD INDUSTRY REVENUES

Unauthorized copying of recorded music has increased quite suddenly and substantially around the millennium. For users of widely available ICTs, the costs of generating, accessing and disseminating high-quality copies have fallen rapidly due to a combination of more and faster Internet connections, file-compression technologies and peer-to-peer file-sharing networks. So far, recorded music have been the most popular types of files disseminated online in this manner. The impact of file-sharing of mp3-files on record industry revenues has drawn a lot of attention, probably because in several major markets for sound recordings – including the USA – the explosive growth of file-sharing since 1999 has coincided with substantial reductions in sales of authorized copies.

Much of the research on unauthorized, digital copying is concentrated on how record industry revenues are affected. Other surveys of this specific literature are found in Michel (2004), Peitz and Waelbroeck (2004), Liebowitz (2005a), Watt and Liebowitz (2006), and Oberholzer-Gee and Strumpf (2009). This report will first introduce results from analyses of secondary data on accumulated sales figures and file-sharing. Second, two studies deal with effects on specific music albums. Third, many studies are based on consumer surveys. Unless otherwise stated, the studies refer to US data.

Studies based on accumulated, secondary data

Mainly based on descriptive data analysis, Liebowitz (2004) investigated alternative explanations for falling full-length CD sales in the US, including income and demographics, album prices and prices of related goods and services. He concluded that alternative factors cannot explain all of the reported falls in sales so that file-sharing appears to explain some sales reductions.

Peitz and Waelbroeck (2004) analyzed the International Federation of the Phonographic Industry (IFPI) data on CD sales and data on mp3-downloads from IPSOS-Reid. In their cross-section study of 16 major national markets they found a significant correlation between downloading and falling CD sales.

Zentner (2005) correlated IFPI data on music sales with various data-sets on the number of internet users and peer-to-peer usage in 65 countries between 1997-2002. He found that sales fell more in countries with wide internet usage.

Liebowitz (2008) worked with U.S. census data from the years 1998 to 2003 on Internet use, record sales and other demographic variables to compare the impact of file-sharing in 99 American cities. He concludes: "file-sharing appears to have caused the entire decline in record sales and appears to have vitiated what otherwise would have been growth in the industry".¹⁶

Based on data from Nielsen Soundscan and Pollstar, Mortimer et al. (2010) study the effect of file-sharing on two aspects of the record industry: recorded music and live performances. They find that an adverse effect on album sales. Revenues from live performance increase due to file-sharing, however.

In a recent working paper on the Swedish market, Adermon and Liang (2010) adopt an event study approach. Rather than correlating indicators of unauthorized copying with sales of authorized copies, they assess the impact of a substantial change in copyright strength in 2009 on Internet traffic and sales of authorized copies as estimated by the IFPI. They use data from the Norwegian and Finnish market in order to control for other factors that might have influenced sales of copyright works at the time. Regarding record music, they find that due to increased copyright protection, sales of recorded music on physical sound carriers increased by 27% and sales of digital music increased by 48%.

Studies based on sales figures for individual recordings

Blackburn (2004) used weekly data on album sales by Nielsen Soundscan and on file-sharing from Big Champagne to assess the effect of file-sharing on 197 specific albums between 2002 and 2003. He emphasizes differential effects for sales of more or less well-known recordings artists (see section 6.2). Regarding total sales, he finds that file-sharing has had a significant negative effect, and estimates that album sales could have been about 25% higher if file-sharing were to drop by half.

A study by Oberholzer-Gee and Strumpf (2007) also investigated the effect of downloading on sales of individual recordings. This study further stands out because it used primary data on file-sharing behavior, rather than estimates from other sources. Oberholzer-Gee and Strumpf (2007) worked with the weekly number of downloads via one server that hosted parts of a file-sharing network and correlated these with weekly album sales of albums from Nielsen Soundscan. They

¹⁶ In a similar study, Boorstin (2004) had come to the different conclusion that file-sharing was not the cause of declining sales. Liebowitz (2008) made technical improvements. In an earlier version of this paper and an 'e-companion' to Liebowitz (2008), Liebowitz (2005b) also presents an analysis of the different impact of file-sharing on various musical genres in the US. The results allow no firm conclusion regarding the impact of file-sharing, but sales for some genres that are popular with young listeners – who are more likely to download unauthorized copies – seem to have decreased relatively much with the diffusion of file-sharing. In a panel study of various countries, Zentner (2005) finds that sales of international repertoire falls more due to Internet usage, which would be consistent with an adverse impact of file-sharing on sales if audiences for domestic music are older and thus less likely to use file-sharing.

compared various recordings and studied the effects of changes in downloading on sales of authorized copies. The number of file-sharing downloads and album sales could have a common cause, the popularity of the recording artist. To isolate the effect of file-sharing on legitimate sales, the authors use variations in the number of active file-sharers over German school holidays, which affects the availability of uploads in the US. Oberholzer-Gee and Strumpf (2007:1) famously conclude that “downloads have an effect which is statistically indistinguishable from zero”.

This study has been criticized at length by Liebowitz (2007a; 2007b). One point of criticism is that the core data has not been made available for replication. Another problem is that exposure from file-sharing could boost the attention and sales for specific titles, while displacing demand for other titles. If so, overall sales of sound recordings could drop even if there is no significant effect between file-sharing and legitimate sales for individual titles (Liebowitz, 2008). Liebowitz (2007b) further scrutinizes a number of observations that Oberholzer-Gee and Strumpf (2007) claim would support their main analysis. For example, Liebowitz (2007b) argues that Oberholzer-Gee and Strumpf (2007) inadequately assess: variations of file-sharing and sales between different musical genres; the effect of greater availability of uploads from Europe at the US East coast; or the credibility of alternative explanations for falling US album sales over the period covered.

Studies based on consumer surveys

Moving on to studies based on consumer surveys, Hong (2004) made use of data from the U.S. Consumer Expenditure Survey. He treats Internet access as a proxy for downloading and appoints around a third of the total reduction of sales in 2000 (ca. 7.6%) to “Napster”. Hong (2004) further concludes that other factors must have played a significant role in causing falling record sales.

Michel (2004) used computer ownership as measured in the same survey as a proxy for downloading. He concluded that file-sharing may explain a reduction in sales by up to 13% between 1999 and 2003. Again, file-sharing seems to explain a substantial role in total sales reductions but it provides no complete explanation.

Peitz and Waelbroeck (2004) also attempted to gauge the substitution effect of mp3-downloads for CD purchases on the basis of U.S. survey data, concluding that mp3-downloads appear to explain falling record sales in 2001 rather well. Based on their elasticity calculations, however, file-sharing seems to explain only a fraction of sales decreases in 2002.

Rob and Waldfogel (2006) conducted their own survey on the downloading and purchasing behavior of 500 U.S. college students in 2004. They found that downloads substituted for purchases of authorized copies at a rate of 0.2 or more – that is five works downloaded illegally substituted for one legitimate purchase. Waldfogel (2010) ran two similar student surveys in 2009 and 2010, after electronic retailing of authorized music files had become popular (iTunes). He finds that between three and six unauthorized copies displace one authorized downloads, which is quite similar to the displacement effect calculated for CDs in Rob and Waldfogel (2010).¹⁷ These surveys produced a number of further insights regarding consumer welfare and willingness-to-pay that will be discussed below.

Zentner (2006) used music sales data by the IFPI and data from a European consumer mail survey by Forrester to establish the impact of downloading on purchasing behavior. He suggested that, for individual users, “peer-to-peer usage reduces the probability of buying music by an average of 30%”. Conversely, in a report for Industry Canada (based on data from Decima Research),

¹⁷ In a recent working paper, Bai and Waldfogel (2010) compare survey results on ‘movie piracy’ from China with those from the US. Unauthorized access seems to make up a much greater share of total consumption in China (“roughly three quarters rather than about 5 percent”). By contrast, the displacement effect in China appears to be much lower. This suggests that for now, Chinese consumers would not consume many more authorized goods and services if unauthorized access would be inhibited more effectively.

Andersen and Frenz (2007) found no significant correlation between file-sharing and purchases of either CDs or authorized downloads in Canada.

4.4 EFFECTS OF DIGITAL COPYING ON MOVIE INDUSTRY REVENUES

More recently, a couple of studies have appeared on the impact of digital copying on the market for feature films. Here, results are similarly diverse as for the market of sound recordings.

Fetscherin (2004) documented that in late 2002 and early 2003, it was improbable to find high quality copies of movies on file-sharing sites. He infers that file-sharing of movies would not explain much of the declines in movie industry revenues at the time.

Bounie, Bourreau and Waelbroeck (2006) ran a survey of 620 French university students and staff in 2005. A third of all respondents acquired pirated copies at least monthly and through various channels. Within the sample, unauthorized copying seems to have no significant effect on purchases of cinema tickets but video rentals and purchases are decreased significantly.

A survey of US students by Rob and Waldfoegel (2007) found that “unpaid consumption of movies” reduced “paid consumption” by 3.5%. Smith and Telang (2010) report that between 2000 and 2003, increased broadband Internet penetration seems to have increased DVD sales considerably according to their analysis of secondary data from Nielsen Videoscan. Smith and Telang (2010) do not assume that unauthorized copying would increase DVD sales, however, but emphasize the role of more extensive information on movies online.

Hennig-Thurau et al. (2007) conducted a survey of 1,075 German individuals, with different responses being collected three times in 2006 and focusing on 25 specific films. Their results suggest that file-sharing significantly reduces cinema attendance, as well DVD purchases and rentals. However, this impact explains only part of reductions in movie industry revenues in Germany at the time.

De Vany and Walls (2007) study the effects of unauthorized downloading on a single movie. They try to avoid a problem in standard approaches – in which researchers essentially compare observations with predictions of what things would have been otherwise – arguing that this type of analysis is inadequate in extremely uncertain market such as those for many copyright works. According to their results, the movie lost US\$ 40 million in box office revenues due to downloading of unauthorized copies.

For Sweden, Adermon and Liang (2010) find that a substantial increase in copyright protection in 2009 has had no significant effect on either sales of cinema tickets or of DVDs featuring movies.

4.5 UNAUTHORIZED COPYING AND MUSIC / MOVIE INDUSTRY REVENUES PRIOR TO FILE-SHARING

The empirical literature on unauthorized copying has boomed with the diffusion of digital copying technology. A modest number of earlier studies cover sales displacement due to other types of piracy. If the current situation is fundamentally different from the past, for example because digital copying is much more potent, these studies are largely of historical value.

Recorded music

Png (2006) uncovered an early study by Widdows and McHugh (1984) on the effect of home taping on sales of prerecorded music in the US. They create a model on the basis of annual data from 1956 to 1981, and find that a slump in sales between 1978 and 1981 could largely be explained by income

and the number of young people who held a job (or even the end of the 'disco era'). Home taping seems to explain only a fraction of sales decreases.

On the basis of Euromonitor and IFPI statistics, Hui and Png (2003) conducted a panel study on 'piracy' and sales of authorized copies of recorded music in 28 countries, covering the years 1994 to 1998. They estimate that piracy decreased sales for authorized copies on CDs by about 6.6%, which is less than half of copyright industry estimates. Hui and Png (2003) emphasize that they do not completely cover potential increases in retail prices without piracy or indirect benefits of unauthorized copying for suppliers of copyright work (see chapter 7).

Movies

Cameron (1988) found "tentative" evidence that the diffusion of video recorders in the UK displaced demand for cinema tickets, but he does not address the extent to which this is due to home-taping/unauthorized copying. Marvasti's (2000) results suggest that the diffusion of video recorders diminished the demand for movies through other channels and reduced US exports of these copyright works.

4.6 SUMMARY AND DISCUSSION REGARDING RIGHTS HOLDER REVENUES

Results for various copyright industries

The software industry has existed (and thrived) in the presence of extensive unauthorized use of their products and services. There has been surprisingly little interest by academic researchers in calculating lost sales due to piracy in this market.

For the record industry, the situation is quite different. Revenues from the primary market of sound recordings (in which authorized copies are sold to end-consumers) have dropped very substantially over the last decade, in the US and other major markets. Over recent years, the bulk of the empirical research on copyright and unauthorized copying has revolved around the question to what extent this is a result of file-sharing. Results diverge considerably. One extreme result for the U.S. market is virtually no effect (Oberholzer-Gee and Strumpf, 2007). Another extreme result is that file-sharing has reversed what could have been a period of growth into a severe recession (Liebowitz, 2008). Most studies to date suggest that file-sharing displaced some demand, but that other, incompletely specified, factors must play an important role in explaining falling sales (see section 4.3).

Other copyright industries are likely to be affected by more extensive digital copying in the future. Findings for the movie industry are similarly diverse as those for the music industry. Some studies find a significant effects of digital copying on movie industry revenues, some don't. Video rentals and sales may be more vulnerable than cinema performances.

It remains to be seen whether studies of other copyright industries – for example newspapers, literature, or video games – produce a more consistent pattern and whether the situation varies between different copyright industries. For a case of successful adaptation to increased copying by publishers of academic journals, see Liebowitz (1985) as discussed in section 7.1.

Problems in gauging the effect of digital copying

Why would results scatter widely? In principle, the effects of digital copying on copyrights holder revenues could be very diverse over the various time periods and populations studied, which seems improbable however. Another explanation lies in the numerous technical difficulties encountered in doing detailed quantitative analysis of unauthorized digital copying, which may lead to distorted results. Data limitations seem to be particularly cumbersome.

Data limitations

First of all, most empirical studies use secondary data. Often, sales data is supplied by trade organizations such as the Recording Industries of America Association (RIAA) or the Motion Picture Association of America (MPAA). These sources are interested parties and campaigners for more intensive copyright protection. Some researchers have voiced objections as to the validity of their data (Liebowitz, 2004). Comprehensive documentation of the underlying methods is regularly not available.

Valid data on file-sharing appears to be particularly hard to come by. Liebowitz (2006) demonstrates how various measures of music file-sharing in the US diverge considerably. The use of proxies for file-sharing, such as internet access or computer ownership, may also create problems. Oberholzer-Gee and Strumpf (2007) used data on actual file-sharing activity but had to content themselves with a minuscule fraction of total interactions that went through a particular server. Measuring so-called 'piracy' in consumer surveys could introduce a downward bias as respondents might be reluctant to report illegal activities or may give strategic answers (Oberholzer-Gee and Strumpf, 2007).

Some surveys also ask hypothetical question, say on willingness to pay. Specialized academic surveys of file-sharing, valuation of authorized copies and purchasing behavior have to date been of relatively modest size and even some of the most reputable surveys on the matter are based on convenience samples (e.g. Rob and Waldfogel, 2006). These studies may not allow for generalization on consumers at large.

Market 'distortions' besides unauthorized copying

A further fundamental challenge to any of these studies is to isolate the effect of unauthorized copying in rather mutable markets. Uncertain demand conditions are characteristic for many copyright industries (e.g. Caves, 2000), for example. What is more, the diffusion of digital ICT is associated with broad and substantial changes in the copyright industries and related markets. Under such circumstances it seems particularly difficult to isolate the effect of file-sharing from other influences.

Empirical studies of the impact of file-sharing often conclude by pointing out factors that have not been covered fully in the quantitative analysis. These often include the growth of new information and entertainment services such as mobile telephony and video games. Many authors have also discussed the possibility that sales of authorized downloads may reinvigorate the record industry. It has further been argued that part of the sales decline could mark the end of replacement purchases of CDs for vinyl records. If that were the case, it would be misleading to use historical peak levels of sales preceding the emergence of file-sharing as a point of reference.

In any case, the effect of file-sharing on authorized sales remains contentious. Results and their interpretations vary considerably and none of the existing studies seems sufficiently conclusive as to settle the issue single-handedly.

4.7 SHORT-RUN USER WELFARE

Besides the apparent difficulties in gauging the effect of digital copying on rights holder revenues, it is important to recognize the limitations of such studies as a guideline for copyright policy. Effects on user welfare also deserve some attention. Obviously, end-consumers might benefit considerably from the availability of vast catalogues of works online at very low cost. So, indeed, might commercial users, including IT and telecommunication firms who sell the related technical infrastructure.

Rob and Waldfogel (2006) and Waldfogel (2010) are two rare examples of empirical studies

that adopt a consistent short-run approach. The authors estimate that music consumers' short-run welfare gains from file-sharing are several times higher than the related losses for rights holders. They emphasize, however, that their study does not account for the long-run costs to consumers due to weaker incentives for creativity. An extensive, descriptive study on behalf of several Dutch ministries also comes to the conclusion that consumers' welfare gains from file-sharing outweigh the costs to rights holders (TNO, 2009).

4.8 DIGITAL COPYING AND THE SUPPLY OF COPYRIGHT WORKS

The effects of unauthorized copying on innovation and the supply of copyright works – and thus long-term user welfare – have not received much systematic attention. Oberholzer-Gee and Strumpf (2009) observe that the variety of copyright works supplied in the USA has not diminished in the presence of file-sharing.

Handke (2010a; 2010c) applies a simplified time-series intervention analysis to study the impact of digital copying on the supply of sound-recordings in Germany. The starting point of the intervention is the emergence of Napster in June 1999, which coincided with the beginning of a severe recession in the primary market for sound-recordings. On the basis of IFPI data, he finds that the number of new titles released on physical sound-carriers in Germany and the overall number of different titles marketed expanded after 1998. There is no evidence for a significant change in the growth rate compared to the pre-Napster period.

A recent working paper by Waldfogel (2011) tries to assess quality rather than just quantity. It investigates the share of music albums released in the presence of digital copying in 'best of all times lists' as a measure of quality, at least of the top hits. He finds a downward trend over time but no acceleration of this trend in the presence of file-sharing technology and decreasing record industry revenues.

These findings are certainly preliminary. They are also counterintuitive, but consistent with previous studies on copyright strength and the supply of creative works (see section 5.2). In any case, these observations conflict with claims by the record industry that file-sharing would threaten innovation and the supply of new creative works. Arguably, the issue requires more attention.

5. THE EFFECTS OF COPYRIGHT LAW ON THE MARKET FOR COPYRIGHT WORKS

This report distinguishes between studies that assess the impact of copyright law or the impact of unauthorized copying. Due to incomplete enforcement and changes in copying technology, unauthorized copying may sometimes change irrespective of the law.

For policy makers, studies on how specific legal arrangements affect markets might still be of particular interest. Copyright law has many different aspects, for example: (1) the depth of copyright (what aspects of creative works are protected); (2) the type and intensity of enforcement measures; (3) the duration of rights; (4) the extent of fair use exemptions; (5) legal arrangements regarding digital rights management (DRM) techniques; (6) or even moral rights. In principle, each of these aspects could be studied in detail. In practice, empirical research on copyright has mainly used unauthorized copying as an indication of copyright strength, and there is little empirical evidence regarding the various dimensions of copyright law.

5.1 COPYRIGHT LAW AND RIGHTS HOLDER WELFARE

The value of copyright works over time

Several authors assess indications of the commercial value of old copyright works. This may be useful information for debates on the adequate duration of copyrights, since rational suppliers should take all expected future income into consideration when investing in innovation and creativity at present.

Rappaport (1998) estimated the value of old copyright works to inform the debate on copyright term extensions. He found that most copyright works are of very little commercial value at the end of their copyright term.¹⁸ Yet, a minority of old works still generates considerable revenues for rights holders, in particular books.

Similarly, Landes and Posner (2003) find that for the bulk of copyright works, US rights holders did not renew their registration with the US Copyright Office, which is associated with greater protection. This protection was apparently of little value for most copyright works at the end of the initial term.

The share of copyright renewed for all works is imperfect measure of the expected value of longer copyright protection. That is because the market share and commercial value of a small minority of hits is very high. Liebowitz and Margolis (2005) find that of 236 bestselling titles from the 1920s, 41% were still in print after fifty-eight years. Considering the costs of reproduction and distribution and the opportunity costs of shelf-space, these works must still have had considerable commercial value.

Setting a single, adequate duration of copyrights may be tricky. A short duration will make rights holders worse off and might diminish investments in the supply of copyright works. A long duration will diminish the number of works in the public domain. This could generate many orphan works, for which rights holder have insufficient incentives to make them available but that may still be worth something. Digital distribution lowers the costs of access to works in the public domain, which could aggravate the problem of orphan works.

¹⁸ Rappaport (1998) precedes the discussion of the 'long-tail hypothesis' (Anderson, 2004; Brynjolfson et al., 2007). Rappaport (1998) includes a discussion of optional copyright renewal against a fee.

Copyright law and the stock value of suppliers

A paper by Baker and Cunningham (2006) is exceptional in three ways. First, it studies a whole set of copyright industries simultaneously.¹⁹ Second, it studies the effect of changes in US copyright law rather using direct measures of unauthorized copying. In this way, it is similar to a number of studies on patents using an index of patent strength (see chapter 2). Third, instead of direct indicators of rights holder revenues, the paper studies the impact on the stock-market valuation of firms that commercialize copyright works between 1986 and 1998. They find that greater copyright protection increases stock prices, either because existing copyright works become more valuable or because the expected returns from creating new works increases.

The authors see it as one advantage of their approach that it helps to identify lagged effects of copyright due to the “forward looking nature” of stock markets. The credibility of their results depends on the extent to which one accepts the hypothesis of rational (stock) markets. One problem with this study is that the measure of copyright strength through court decisions and legal initiatives is rough. Another problem relates to the finding that greater copyright protection seems to favor large incumbent suppliers relative to newcomers and fringe suppliers (see section 6.2). Larger firms are more likely to issue stocks, so that stock prices could overestimate the positive effect of increased copyright protection on the copyright industry as a whole.

5.2 COPYRIGHT LAW AND THE SUPPLY OF COPYRIGHT WORKS

Very few empirical studies have been published on the impact of (changes in) the copyright system on the supply of copyright works – or in other words the elasticity of supply to copyright protection. This may be surprising, since the promotion of innovation and thus the future supply of creative works is usually considered to be the ultimate aim of any type of IP.

Khan (2004) finds that the U.S. International Copyright Act of 1891 has had no substantial impact on the number of full-time authors. Scherer (2008) finds no substantial change in market entry by composers with music-related copyright extensions in Europe between 1709 and 1850. The markets regulated by copyright have evolved very substantially since the 19th century, and more current evidence is required to inform contemporary copyright policy.

Three studies address the impact of relatively recent copyright term extensions on the supply of copyright works. Hui and Png (2002) studied the impact of the Sonny Bono Act (resulting in an extension of US copyright duration from 50 to 70 years in 1998) on the supply of movies in the US. Studying data from the years 1990 to 2000, they find no significant effect, concluding that the Sonny Bono Act “appeared to have been a giveaway to owners of existing creative work, while having relatively little impact on new creative activity” (Hui and Png, 2002:219). These results are preliminary. On the one hand, they are based on 11 observations only. On the other, it may take more than 2 years before the full impact of more extensive copyright duration on the supply of copyright works transpire.²⁰

Landes and Posner (2003) investigated the number of optional U.S. copyright registrations to test for an effect of the term extensions in 1962 and 1998. They found no significant effect after either of these two events.

¹⁹ The industries included are newspapers, periodicals, books, book printing, computer programming services, pre-packaged music, and motion picture/video tape production.

²⁰ In the same paper, Hui and Png (2002) also address the responsiveness of movie production to economic incentives in a panel study of 38 countries between 1990 and 2000. They find that disposable income and the diffusion of ‘video tape players’ is positively related to movie production, whereas the diffusion of tv sets has a weaker, negative effect.

A working paper by Png and Wang (2009) used data from 26 major economies to test for an effect of copyright extensions during the 1990s on the quantity of movies supplied. Reverting on their results in previous versions of the paper, in the current version they found that term extensions from author's life plus 50 to author's life plus 70 years had no significant effect on the supply of movies. The latter paper provides a good primer on the complexities involved in isolating the effects of what is probably a relatively minor change in the copyright system and thus the regulated market.

Pollock (2009) deals with the duration of rights in a rather different way. He develops a dynamic model of the welfare effects of copyright that he uses to calculate the 'optimal' level of copyright protection. He includes empirical estimates of the discount factor for suppliers and the rate of cultural decay among other things. Pollock finds that the adequate level of copyright duration is in the area of 15 years.

6. THE COSTS OF THE COPYRIGHT SYSTEM

So far, the focus of the literature reviewed has been on the two questions whether unauthorized copying diminishes (1) rights holder revenues, and (2) the supply of copyright works. These are important issues in order to establish whether copyright as a costly countermeasure to unauthorized copying could be justified. This chapter addresses the costs of administering the copyright system, which also need to be considered in order to devise adequate copyright policy. This chapter further addresses the evidence for some unintended consequences of existing copyright arrangements.

6.1 THE COSTS OF ADMINISTERING AND TRADING COPYRIGHTS

The literature search did not bring up academic assessments of the costs of administration and enforcing copyright. For copyright policy, it would be useful to study the proportion of public expenditure on administering copyright to the net effect on social welfare of the copyright system.

The transaction costs of trading rights have not been studied directly, either. Information on this issue would be useful in order to discuss the case for collective administration of rights, for example.

6.2 UNINTENDED CONSEQUENCES OF COPYRIGHT

Unauthorized copying and contestability

Pivotal parts of many copyright industries are organized in narrow oligopolies. Extreme examples of concentration are Microsoft in the market for some office software, or iTunes/Apple in online retailing of authorized music downloads. Regarding more traditional parts of the copyright industries, in 2000 the distribution divisions of the major record companies in the U.S. settled allegations of price fixing out-of-court (Federal Trade Commission, 2000). Several objections to further merger activity between major record companies by competition authorities in the European Union also illustrate concerns with market power.

Extensive concentration is probably an efficient way to organize aspects of the copyright industries. The cost structure with high fixed costs and low variable costs entails economies of scale. On the demand side, network effects may also favor large suppliers. Nevertheless, this industry structure also comes with the usual concerns for dominant firms exploiting more fragmented, specialist suppliers and consumers (see section 6.2). For the UK, Sweden and Denmark, Towse (1999) documents that copyright hardly yields pecuniary earnings for artists other than for a small minority of superstars, and that the bulk of revenues generated by copyright ends up with intermediary firms such as publishers and record companies, for example. Kretschmer (2005) finds that the same holds in the UK and Germany.

In this context, it is of interest that digital, unauthorized copying seems to have asymmetric effects, hurting well-established incumbents more than fringe suppliers or newcomers. In other words, unauthorized copying may increase the contestability of the market.

Blackburn (2004) found that sales of publications by previously well-known artists are diminished as file-sharers substitute purchased copies for downloads. On the other hand, file-sharing appears to boost record sales for previously unknown artists, who seem to gain more from the additional exposure of their works than they lose due to a substitution effect.

Studying the billboard charts, Gopal et al. (2006) find that the prior reputation of recording artists has become significantly less important in determining chart placement when comparing the

period from 1995 to 1996 with 1998 to 2000. They conclude that Internet access and online sampling – including unauthorized copying – “threatens superstars and benefits lesser known artists” (Gopal et al., 2006:1530).

Bhattacharjee et al. (2007) observe that releases by smaller record companies exhibited longer survival times in the charts after the emergence of file-sharing networks. Their results are mixed however, in the sense that chart survival of albums ranking lower in the charts decreased with file-sharing, whereas the top hits were unaffected.

For the German record industry, Handke (2006) documented a large number of market entries by small, independent record companies in the presence of digital copying. He provides further evidence in a later study (Handke, 2010a) on a boom among ‘indies’ and a process of Schumpeterian creative destruction after 1998. It is not clear, however, whether industry fragmentation and greater contestability is causally linked to digital copying or whether it is due to other changes in the market.

Mortimer et al. (2010) find that file-sharing suppresses album sales for “large artists more than for small ones”. What is more, live performance revenues by small artists increase due to file-sharing, whereas there is hardly any positive effect for the most popular artists.

It seems desirable to further assess the impact of existing copyright arrangements on the contestability of markets for copyright works. The underlying, broader issue is the relationship between innovation and competition in the copyright industries.

Copyright, technological innovation and related industries

Most of the literature on copyright focuses on the creation of new copyright works. If content and technological innovations were traded efficiently, copyright should affect technological innovation in the same way as content creation. In practice, this is unlikely for example due to substantial transaction costs in markets for IP (Levin et al., 1987; Landes and Posner, 2003) and asymmetric information. A few authors have voiced concern that excessive copyright systems hold back technological innovation, associated with the dissemination and commercial use of ‘artistic and literary’ works.

Related questions have mainly been addressed on the basis of descriptive, historical studies. David (1993; 2004), for example, uses historical analysis to evaluate the economic impact of copyright in various industries and in changing technological conditions, arguing that the copyright (and patent) regime has created obstacles to technological innovation and change. Boldrin and Levine (2005) address the issue in their ambitious criticism of what they refer to as ‘intellectual monopolies’.

Handke (2010a) observes that in the German record industry, a period of extensive unauthorized copying and falling revenues coincides with extensive technical innovation. In a survey of German independent record companies, Handke (2010a) finds that these firms perceive problems with clearing copyrights to entail obstacles to technical innovation. On average, these innovation costs of copyright even appeared significantly greater than the innovation cost of unauthorized copying of the copyright works commercialized by these firms.

Some recent studies find that copyright affects the welfare of suppliers in a diverse set of related goods and services. According to Mortimer et al. (2010) total live performance revenues increase because of file-sharing. Roughly speaking, Zentner (2008) finds that broadband as a proxy of file-sharing reduced the number of music retailers.²¹

²¹ Zentner (2008) uses phonebook entries to measure the number of specialist, ‘bricks and mortar’ retailers of sound recordings between 1998 and 2002 (around the first mass diffusion of file-sharing), and correlates this with measures on Internet use, online sales of music and the proximity of a university. In the period covered, the number of music retailers

Especially in the IT sector, the availability of cheap copies should affect demand and thus investments in technological innovation. A working paper by Leung (2009) addresses an interesting topic on the basis of a conjoint survey of 884 students at the University of Minnesota. He finds that unauthorized copying is responsible for 22% of iPod sales. There could be similar effects on demand for other types of mp3-players. Adermon and Liang (2010) find that Internet traffic dropped by 18% with the extension of copyright protection in Sweden. This may be some indication that demand for Internet access is boosted by unauthorized copying. In other words, suppliers of mp3-players and Internet service providers seem to benefit from file-sharing.

also fell particularly around universities. Michel (2005) finds no evidence that consumers would have moved from purchasing recorded music to purchasing movies between 1998 and 2003, which could have been an alternative explanation for falling record industry instead of unauthorized copying.

7. MITIGATING MECHANISMS – INDIRECT APPROPRIABILITY, NETWORK EXTERNALITIES AND SAMPLING

The economics of copyright discusses potential mechanisms that could mitigate or even offset any adverse effect of unauthorized copying on demand for authorized copies. Under certain conditions, indirect appropriability, positive network externalities, or sampling and learning by consumers would even increase revenues of suppliers of copyright works. Such indirect effects could explain why the effect of unauthorized copying on rights holder revenues or on the supply of copyright works often appears to be low in empirical assessments. Few empirical studies have directly addressed these theoretical concepts in the copyright industries.

7.1 INDIRECT APPROPRIABILITY

Liebowitz (1985) studied the impact of photocopying on the market for academic journals and concluded that copying did not harm journal publishing because publishers were able to increase their revenues by using price discrimination. This was possible because publishers supply two distinct markets: that of individual subscribers and that of libraries. Copies in libraries are often photocopied, which should reduce demand for individual subscriptions. Libraries also tend to be willing to pay a much higher price than individual subscribers. Publishers reacted to photocopying by raising the price of library subscriptions. Liebowitz (1985) provided empirical evidence that, in the case of journal publishing, greater revenue from library subscriptions fully compensated for lost sales to individuals who would have purchased the journal issue without the possibility of photocopying. Publishers were therefore compensated indirectly for unauthorised copying.²²

7.2 POSITIVE NETWORK EXTERNALITIES

Positive network externalities (also known as network effects) occur where the benefit of a good increases with the number of consumers using the same kind of good. Direct network effects concern communication devices or services like telephones or social media that have a greater utility for individual users with a greater number of total users. Indirect network effects may occur where more complementary goods become available as the number of users increases. Network effects have received most attention in the literature on business software and computer games.

Commercial business software

Givon et al. (1995) studied the diffusion of spreadsheets and word processing software in the UK between 1987 and 1992. At the time, about 85% of software users utilized unauthorized copies. According to Givon et al.'s (1995) estimations “pirates significantly influenced the potential users to adopt this software” and “they contributed to generating more than 80% of the unit sales”. The authors conclude that rights holders may often benefit from alternating periods in which they do not

²² Mortimer (2007) addresses copyright provisions that inhibit direct price discrimination in the US. She studies price discrimination for video sales in the US between 2000 and 2002, when both the VHS and the DVD accounted for a substantial market share. She finds that suppliers of movies use indirect price discrimination, varying prices strategically between VHS and DVD, but pricing depended even more on demand for the specific movie in question. Her welfare analysis suggests that legalizing direct price discrimination in the US would benefit rights holders and consumers, while harming retailers.

fight unauthorized copying, extending the user base, with periods in which they enforce copyrights to maximize revenues.

In the US market for commercial spreadsheet software between 1987 and 1991, Brynjolfsson and Kemerer (1996:1644) find that network externalities arising from the existing user base as well as compatibility with a “dominant interface standard” were approximately as important in determining the market value of software as intrinsic product characteristics.

Video Games

There are a number of studies on network effects in the market for video game consoles and games. These studies do not deal with unauthorized copying directly, since in contrast to video games run on personal computers (PC), copying is effectively obstructed where games are run on single-purpose consoles.

Shankar and Bayus (2002) find evidence for network effects in the market for video games. In this market, there are a handful of suppliers, each operating on the basis of a product bundle of hardware (consoles) and software (games) that is incompatible with the products of competitors. For the two leading suppliers of consoles Sega and Nintendo between 1993 and 1995, the size of the existing user base seems to have had a positive effect on hardware demand. Furthermore, Shankar and Bayus (2002) argue that stronger network effects per user may explain why Nintendo could surpass its competitor Sega in terms of profits, in spite of the advantages for market leaders that are typically associated with network effects.

Clements and Ohashi (2005) explore the implications of network effects in the US market for video game consoles between 1994 and 2002. They find that for a new console, demand is highly sensitive to price and depends less on the variety of software available. As the market for the console matures, its price becomes less important for demand whereas the variety of compatible games becomes more important. The authors argue that suppliers should thus introduce new consoles at low prices, expanding the user base even at the expense of short-term profitability. Over time, it would thus be more likely that more compatible software will become available, and suppliers of consoles could thus exploit indirect network effects and high profitability later on.

These studies are roughly consistent with results for business software discussed above. After all, unauthorized copying could be seen as an extreme case of low prices. Suppliers of information goods and services subject to network effects may often face a trade-off in their pricing decisions and the attitude towards unauthorized copying. They could sacrifice short-term profits and set promotional prices or permit unauthorized use in order to expand the user. Of course, this only makes business sense when at some point, suppliers can charge monopoly prices because network effects endow them with some market power.

Furthermore, the situation in many other copyright industries is quite different. For console-based video games, suppliers are basically suppliers of hardware and software (or of licenses to external software suppliers). In most copyright industries, many suppliers are specialized on software, which could make their business models more vulnerable to unauthorized copying.

7.3 CONSUMER LEARNING (SAMPLING)

Many copyright works have the attributes of experience goods: their value cannot be judged adequately before purchasing and experiencing the good through consumption. What is more, there are often literally thousands of product variants available (Caves, 2000). This implies that there are problems with incomplete information of consumers.

The ‘frictionless market’ hypothesis suggests that the Internet may host a more efficient market for information goods because it allows for more efficient product searches and lower costs

of reproducing and distributing such goods. For an early discussion of the (limited) empirical evidence for the ‘frictionless market’ for copyright works online see Brynjolfsson and Smith (2000). The literature on copyright discusses whether unauthorized copying may contribute to greater consumer information and thus greater efficiency through ‘sampling effects’ or ‘exposure effects’ of unauthorized copying (e.g. Blackburn, 2004; Peitz and Waelbroeck, 2006).

There seem to be three aspects to this. First, as long as cheap, unauthorized copies are not perfect substitutes for authorized copies, some consumers may use them to establish their utility before buying. There is little empirical evidence whether consumers actually buy works they have previously downloaded without authorization. In a student survey run by Gopal et al. (2006), some respondents reported that unauthorized copying of music coincides with a greater propensity to purchase authorized copies, if the music is found to be of high quality during sampling. In a survey conducted at French universities in 2005, Bounie et al. (2006:20-21) found, that almost half of ‘pirates’ used unauthorized copies of movies to “discover new actors/directors”, and nearly a third claimed that “watching pirated movies has led them to purchase movies that they would have most likely not purchased otherwise”. In any case, more complete pre-purchase information on product qualities and lower search costs should increase the probability of detecting a good match for individual preferences and willingness to pay (cf. Smith and Telang, 2010). This could counteract any sales displacement due to the substitution of authorized copies for illegitimate downloads. However, consumers could also buy less if they can avoid experimental purchases.

Second, over time greater exposure from access to cheap, unauthorized copies could also lead to rational addiction and boost demand for authorized goods and services. Taste formation is widely discussed in the specialized literature on the economics of arts and culture/cultural economics (Towse, 2003). To date, there is little empirical evidence concerning copyright industries, however. Cameron (1999) finds little evidence of previous exposure leading to greater demand for cinematic performances.

A third issue related to ‘sampling’ and ‘exposure’ does not concern total demand but the extent to which the market is concentrated on a few hits, superstars, and dominant intermediary firms. Several empirical findings suggest that file-sharing/digital copying has more adverse effects for large incumbent suppliers than for smaller firms and newcomers (e.g. Blackburn, 2004; Bhattacharjee et al, 2007). The explanation may be that smaller firms gain more from the additional exposure than they lose from sales displacement due to unauthorized copying. For empirical evidence related to file-sharing and the contestability of copyright industries, see section 6.2.

7.4 OTHER MITIGATING FACTORS REGARDING COPYING AND SUPPLY

The literature suggests a few further mitigating factors that concern the impact of unauthorized copying on the supply of copyright works. For example, creativity may be intrinsically motivated, or suppliers of copyright works supply multiple products, not all of which are equally affected by unauthorized copying.

Intrinsic motivation

For example, the empirical literature on artists’ labor markets/cultural economics suggests that these types of workers accept below average compensations. They seem to be intrinsically motivated. For a survey of empirical results, see Benhamou (2003). An application with a view to copyright is found in Towse (2006). Intrinsic motivation would decrease the sensitivity of supply to any adverse effects of unauthorized copying on rights holder revenues. See also the research on unpaid work and open source software (e.g. Lakhani and von Hippel, 2003).

Multi-product firms

Last but not least, many suppliers of recorded music do not solely operate in the primary market, where authorized copies are sold to end-consumers. They often incur revenues from the secondary market where copyrights are licensed to professional users – say advertisers or video-game producers who wish to make use of a song – and often also from live performances. Where exposure in one market boosts demand in others, rights holders who are not specialized in the primary market might be compensated in secondary markets for falling sales of authorized copies. Changes in additional sources of income to rights holders thus need to be included in the analysis. The idea is related to network effects.

A survey conducted by Handke (2010a) shows that most independent record companies in Germany have other sources of income than sales of sound recordings to end consumers. He finds little evidence that income from related markets would have increased in between 1998 and 2004, however.

8. DETERMINANTS OF UNAUTHORIZED COPYING

To determine the desirable scale and scope of copyright protection, it would be useful to know what specific factors influence the extent of unauthorized copying and its relationship with the market for authorized goods and services. Like previous chapters, this chapter first deals with the peculiar case of software (section 8.1). Studies on motives and determinants of file-sharing for other copyright industries are discussed jointly in section 8.2. So far, only markets for recorded music and movies seem to have been covered.

Two papers do not fit into this scheme. First, a paper by Kranenburg and Hogenbirk (2005) stands out because it simultaneously and separately deals with several copyright industries – business software, entertainment software, ‘recordings and musical compositions’, as well as motion pictures. This type of approach is interesting because it might help to uncover systematic differences.²³ Kranenburg and Hogenbirk (2005) examine whether country characteristics explain variations in estimated piracy rates and revenues lost for US copyright-related products. Results do vary by copyright industry and country. For example, the strength of the copyright protection system was associated with significantly lower piracy rates for business and entertainment software but not for recorded music or movies.

Second, Cox et al. (2010) make no distinction between the types of content downloaded in a survey of 6,103 Finnish Internet users run in August 2007. In this sample, financial incentives and the “observed behaviors/attitudes of family and friends” had the greatest effect on involvement in unauthorized copying (whether respondents participated at all, only downloaded, also allowed for downloads of files from their computer, or had been the first to upload new content). Respondents who believe that punishment is extremely improbable are more likely to participate, and the main restriction on file-sharing seems to be the perception that at least some aspects of participation are morally wrong. In spite of the last result, Cox et al. (2010:305) conclude that “file sharers behave and respond to incentives in the ways in which economists would typically expect from rational decision making agents”, which is consistent with many other micro-level results presented below (cf. Chen et al., 2008).

8.1 SOFTWARE

Software piracy and economic development

Most leading studies on software piracy are cross-sectional or panel studies with countries (or US states) as the unit of analysis. Marron and Steel (2000) deals with explanations for different piracy rates for business software on the basis of a cross-sectional study of 77 countries. Similar to results on patent strength and economic development, they find that highly developed countries exhibit lower piracy rates. In other cross-country studies of software piracy, Husted (2000), Depken and Simmons (2004), Yang et al. (2005) and Rodriguez (2006) find an inverse relationship between development and the extent of software piracy as well.

This pattern also seems to hold within the US, according to a study by Bezmen and Depken (2006). They assess variations in software piracy between different US states and find that “A 1% increase in per-capita income correlates with approximately a 0.25 percentage point decline in the average state’s software piracy rate” (Bezmen and Depken, 2005:359).

²³ See also Bhattacharjee et al. (2003), who compare the implications of unauthorized copying in markets for computer software and for recorded music.

Other factors determining software piracy

Cross-country studies

Next to income/economic development, the literature discusses a number of other factors determining software piracy. Marron and Steel's (2000) findings suggest that a culture that puts greater emphasis on individualism rather than collectivism correlates with less business software piracy, which is consistent with Husted (2000), Depken and Simmons (2004), and Yang et al. (2005). Various indicators of the strength of the legal and judicial system are associated with less piracy (e.g. Marron and Steel, 2000; Moores, 2003; Banerjee et al. 2005). Results regarding education from cross-country studies are inconsistent (Marron and Steel, 2000; Depken and Simmons, 2004).

Surveys

While dealing with official, secondary data is usually considered to be preferable among economists, existing data does not address many specific phenomena related to unauthorized copying. Survey-based studies on the determinants of software piracy confirm that increasing retail prices are associated with greater piracy rates (e.g. Cheng et al., 1997), consistent with what economic theory predicts for relative prices of close substitutes. Unauthorized copies seem to be inferior goods in the sense that demand for them decreases with wealth (e.g. Bezmen and Depken, 2006). Furthermore, Gopal and Sanders (1997) found that technical measures against piracy reduced demand for software, which seems to reflect the more recent experiences of the record industry.

An interesting result comes up in a modestly sized survey of 148 US students (Chiang and Assane, 2002). In this sample, the type of education mattered. Computer majors were most likely to conduct piracy, which could be due to related technical skills. Science students also perceived the risks of 'being found out' to be lower than students of business or economics.

8.2 DETERMINANTS OF UNAUTHORIZED COPYING IN OTHER COPYRIGHT INDUSTRIES

Over recent years, the economic literature has addressed a substantial number of factors that might determine unauthorized, digital copying and its impact on the market for authorized copies. The main tools to explore the issue have been consumer surveys run by the researchers themselves. (One cross-country study on the topic was published by Walls (2008).) These surveys come with the usual concerns, for example with sampling error, biased responses in particular to hypothetical questions regarding willingness to pay, and measurement of concepts in ordinal variables. They still entail useful insights that would be almost impossible to uncover on the basis of higher quality data sets such as official statistics.

Key issues are (1) the utility of unauthorized copies and distribution networks for them relative to their authorized alternatives; (2) one particularly interesting aspect of this is the risk of penalties associated with copying; (3) cultural factors such as the prevailing behavior in a community and ethical considerations; and (4) demographic factors such as age, disposable income, educational achievement, etc.

A paper by Hennig-Thurau et al. (2007:4) contains a well-documented and quite sophisticated (if not overly complex) overview of specific issues and instruments to measure them in consumer surveys. That paper draws on a more straightforward effort by Rochelandet and Guel (2005).

The utility of unauthorized copying

Value and substitutability of authorized and unauthorized copies

First of all, it seems clear enough that unauthorized copying occurs in part because of financial incentives (Cox et al., 2010). With access to some widely diffused ICT, the pecuniary costs of acquiring an unauthorized copy are usually much lower than retail prices.

Unauthorized copies are no perfect substitutes for authorized copies, however. On the basis of a survey of college students, Rob and Waldfogel (2006) observe that within their sample of US students, unauthorized downloads of music were valued less than purchased copies. Like pirated software, unauthorized copies are inferior goods that are consumed because they are cheaper, not better. On consumer valuation of music downloads, see also surveys by Holm (2001) for Sweden, Rochelandet and Guel (2005) for France, Jeong and Lee (2010) for South Korea, as well as an experimental studies by Mafioletti and Ramello (2004) for Italy. The latter study is unique because it focuses on unauthorized copies on CDs rather than downloads. All studies concur that unauthorized copies are not valued as highly as authorized copies.

One implication is that there is some scope for rights holders to sell at prices above marginal costs, assuming that the costs of copying for rights holders are not higher than for unauthorized copiers. However, average willingness to pay for authorized copies is consistently much lower than actual retail prices. Another implication is that the harm to the industry cannot be calculated by multiplying the number of unauthorized downloads with retail prices of either CDs or authorized downloads.

Interestingly, in Hennig-Thurau et al. (2007) the gross utility of a specific movie is inversely related to unauthorized downloading of it. This could mean that for great movies consumers are more likely to prefer authorized copies or cinematic performances, similar to Gopal et al.'s (2006) finding that the probability of purchasing high-quality recorded music increases with unauthorized copying of it. Instead, Hennig-Thurau et al. (2007) argue that knowing how to file-share boosts downloading and diminishes the utility of the authorized ways of consuming movies. In the same study, the greatest effect of any instrument on downloading of movies is the utility derived from collecting movies, which does not necessarily imply watching them.²⁴

Costs and benefits of authorized and unauthorized distribution systems

Unauthorized copying is not entirely costless, even in the case of private copying where there is almost no pecuniary cost. The time and hassle of access matters as well. Jeong and Lee (2008), for example, find that music file-sharing behavior depends significantly on the transaction (search) costs of finding a desired file. Transaction costs should fall with the acquisition of relevant skills, and it is reasonably consistently found that familiarity with the Internet or file-sharing sites proper increases file-sharing (Rochelandet and Guel, 2005; Hennig-Thurau et al., 2007; cf. Chiang and Assane, 2002). According to Fetscherin (2004), for file-sharing of movies the quality and quantity of copies available were important limiting factors. The greater complexity of movies might have inhibited unauthorized copying of these types of works at least initially. More recent findings by Adermon and Liang (2010) suggest that sales of movies are still much less affected by copyright protection than recorded music. Problems with catching malware were tested for in several studies but had no significant effect.

For much of the period covered, authorized digital distribution and retailing was only taking shape. Transaction costs of authorized access to movies were associated with greater file-sharing in Hennig-Thurau et al. (2007). In spite of the problems mentioned above, it might sometimes be more convenient to acquire unauthorized copies, and some copyright works may not be easily available

²⁴ In their survey, Hennig-Thurau et al. (2007) measure 'obtainment' (downloading) and consumption separately. Many downloaded movies are never watched.

through legitimate channels. This is consistent with Rochelandet and Guel (2005), who document that the variety of supply motivates file-sharing of recorded music.

Legitimate electronic retailing may make a greater variety of works more easily available than traditional retailing for many consumers, and it could be more convenient. At the same time, unauthorized downloading could be a closer substitute for authorized downloading. Overall, Waldfogel (2010) finds that the displacement rate for unauthorized copies and authorized downloads is similar to that identified earlier for CDs.²⁵

Copyright protection/enforcement

The utility of unauthorized copying depends on the risk of litigation. Several empirical results coincide that the perceived probability and prospective severity of penalties have a strong effect on file-sharing. Mafioletti and Ramello's (2004) findings from experimental research imply that lawsuits against copyright infringers reduce unauthorized copying but do not "necessarily" have an effect on sales of authorized copies, because the willingness-to-pay often falls below the retail price.

In an event study, Blackburn (2004) assesses the impact of two public statements by the RIAA. The first stated the intention to sue individual file-sharers, and was associated with a significant decrease in measures of file-sharing; the second stated that only heavy users would be prosecuted, which was followed by an increase in file-sharing.

Bhattacharjee et al. (2006) extended on this type of event study. Their measure of file-sharing is based on an automated, covert system to monitor the file-sharing behavior of 2,056 very active Kazaa user IDs between March 2003 and March 2004. Bhattacharjee et al. (2006) test for an effect of four public signals regarding changes in enforcement measures by the RIAA on: (1) the number of works available for unauthorized downloading; and (2) the time spent logged on to file-sharing networks. By and large, a strong inverse relation was found between file-sharing and (publicized) enforcement.

Survey results by Jeong and Lee (2008) also suggest that file-sharers would be very concerned about penalties. By contrast, Rochelandet and Guel (2005) find no significant effect of the legal risk on file-sharing. Their explanation of this result is that in France, penalties were practically unheard of at the time.

Cultural factors

In a cross-country analysis of 26 countries, Walls (2008) finds a positive relationship between movie piracy and social coordination (collectivism) as well as the costs of enforcing property rights.²⁶ This is consistent with results of similar studies on software piracy.

Rochelandet and Guel's (2005; see also Cox et al., 2010) survey results indicate that the attitude and behavior of friends and family influence file-sharing of music. Hennig-Thurau et al. (2007) find no such effect for movie file-sharing in Germany.

Moral considerations influence file-sharing, mostly in the sense that concern for rights holders/artists diminishes the propensity to download (e.g. Rochelandet and Guel, 2005; Hennig-Thurau et al., 2007). In a survey of 785 students from the US and Switzerland conducted by Fetscherin (2009), US students are more sensitive to penalties and less sensitive to moral reasoning

²⁵ Two working papers compare results of the same survey run in different countries. Fetscherin (2009) finds that US students seem somewhat more prone to unauthorized copying of music than Swiss students. Bai and Waldfogel (2010) compare student survey results on 'movie piracy' from China with those from the US. Unauthorized access makes up the bulk of consumption in China. Yet, under current market conditions, unauthorized access does not seem to displace consumption of authorized goods and services as much as in the US.

²⁶ Walls (2008) also finds that movie piracy decreases(!) with internet usage, perhaps because piracy offline is rampant in some of the countries studied.

than the Swiss. However, according to Hennig-Thurau et al. (2007), some file-sharing in Germany seems motivated by an anti-corporate attitude, and Cox et al. (2010) reckon that many file-sharers see themselves as philanthropists.

Demographics

Most studies find that students/young adults and males are more likely to conduct unauthorized copying. In micro-surveys, measures of disposable income or social status of individuals are rarely significant predictors of piracy (e.g. Rochelandet and Guel, 2005).

An interesting finding in Boorstin (2004) is that Internet access correlates with higher purchases of CDs for consumers aged 25 and over and with lower CD purchases for consumers aged between 15 and 24. This could suggest that the numerous surveys of students may not allow for generalizations about the impact of file-sharing on the market for authorized copies. The underlying reason could be that students tend to have more spare time and less spending power than the population average. A related question is whether the habit of unauthorized copying is stable after graduation and changes in life style as generations used to the Internet grow up.

8. CONCLUSIONS

Economic theory suggests that copyright policy relates to a trade-off between a number of costs and benefits to various stakeholders. To inform copyright policy, it is desirable to develop: (1) a reasonably comprehensive and balanced analysis; and (2) reasonably precise empirical estimates of the various costs and benefits.

Over the last decade, a substantial number of empirical studies on the economic consequences of unauthorized copying and copyright have been published and many more seem to be forthcoming. Such studies may be of use to inform copyright policy, in particular with a view to adapting the copyright system to advances in digital copying technology and to digitization more broadly. The literature offers a catalogue of research designs and measurements of key variables that future research can extend upon. Furthermore, many empirical studies produced conflicting or counter-intuitive results, illustrating the need for careful empirical investigations rather than the heedless application of economic theory. Overall, the picture that emerges is still ambiguous and patchy.

Similar to the literature on patents, research on copyright has not produced conclusive empirical evidence whether unauthorized use of copyright works decreases social welfare, or what type of copyright policy would solve such a problem without excessive unintended consequences. Four problems in the literature are particularly pronounced. First, the literature is not balanced. Most empirical research deals with rights holder revenues. User interests and copyright industry adaptation have received much less attention. Second, data limitations have made it hard to produce definite empirical assessments regarding the economic effects of unauthorized copying and copyright. Third, even results on closely related questions stray widely. For example, it is still debated whether file-sharing substantially diminished demand for authorized copies of musical sound recordings in the US or elsewhere (even though the majority of studies on this specific topic find a significant effect). Fourth, the limited empirical evidence suggests that the economic effects of copyright vary between different industries, but these differences are not yet well understood.

Altogether, there is need for further empirical research, and the following criteria could be used to set priorities. On the one hand, research should prioritize the most fundamental issues. For example, it is preferable to understand the effects of unauthorized copying under current market conditions reasonably well, before discussing the fine-tuning of specific copyright arrangements. On the other hand, research should prioritize issues where information is particularly sparse. For example, relatively little is known about the effects of copyright protection on innovation and creativity, rather than on rights holder revenues. Furthermore, quantitative-empirical research on copyright is most promising where there is good data available, and where reasonable natural experiments occur due to sudden and substantial changes to the copyright system. Where these conditions are not met, it may be exceedingly hard to isolate the effect of copyright due the lack of counter-factual information. Indicators of key concepts such as innovation and copyright protection may require research in their own right. Finally, pragmatic considerations could play a role in setting priorities. For political and legal reasons, some aspects of copyright policy are more easily manipulated by policy-makers than others, and may thus be of greater interest.

The empirical literature reviewed here already offers useful insights. This overview also highlights noteworthy gaps and contradictions in the literature. What is more, rapid technological change in some copyright industries and related markets could render even relatively recent findings obsolete. Further empirical research seems highly desirable to inform the debate on copyright.

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