The Use of Intellectual Property Right Bundles by Firms in Copyright Intensive Industries

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Abstract

This paper contributes to the complementarity theory of Intellectual Property rights (IPRs) and seeks to explain how companies active in copyright industries bundle different types of formal IP protection in order to effectively protect their original works and maximise economic returns from their creative activity. Based on a unique set of data covering IP activity of European companies operating in copyright based industries, a number of regression models have been developed to identify factors explaining the use of the various protection mechanisms.

Statistical analysis indicates that 10% of companies in copyright industries use other forms of IP protection. Regression analysis further demonstrates that copyright companies employ other forms of IP protection more frequently than non-copyright companies. However there is an observed strong size effect, with larger copyright companies having larger probability to use other forms of IP more frequently than small companies. The paper provides support for complementarity between copyright and other forms IP given company specific characteristics.

Keywords: Intellectual Property Right bundles, copyright, complementary protection mechanisms, intangible assets.

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1. Introduction

Academic research on intellectual property has shifted away from the analysis of individual forms of IP rights, which has been traditionally concentrating on patents, and only recently has started to focus on analysing the effects of Intellectual Property Right bundles. By recognising that various forms of IP protection can reinforce each other, this stream of research is looking at how companies can jointly employ IP rights in order to better protect their creative work, maximize returns and achieve more efficient appropriation of their investments. Yet again, the bulk of these studies have been mostly driven by patents and trademarks and to a lesser extent by industrial designs, with copyrights being kept usually at the margins of the academic interest. Certain restrictions, especially with regard to data availability, have contributed to this: unlike other forms of IP protection, copyrights are not registered and data cannot be easily extracted for a meaningful economic analysis.

However, like all other formal means of IP protection, copyrights perform a vital economic function in the market by encouraging creativity and the originality of works while contributing to the stock of knowledge. By offering protection to the creator of a masterpiece for a limited period of time the proprietor can exploit the work and profit from the fruits of his or her ingenuity. It is these higher profits that provide the incentives to engage in creative activity[iv].

At the same time copyright industries represent the exceptional and interesting case of creative innovation as they have been evolving dynamically over time along with market and technological developments. Certain technological breakthroughs such as the printing press, sound recording, broadcasting radio, television, VCRs and the DVDs have all changed the way we perceive the functions of copyright in the market and its role in generating profits.

Undeniably the importance of the copyright industries and of the firms active in them is increasingly growing[v], whilst recent developments in the digitalised information technology and the emergence of internet have expanded the significance of copyright and its role in the economy. Although it is be hard to predict how further development of digital markets and 3D printing will affect copyright industries, it may well appear that these will generate higher returns and facilitate an increase in market power for companies acting in some of them, while creating significant obstacles for small firms and individual creators to appropriate the returns.

[iv] Corrigan and Rogers (2005) clearly distinguish between the creator per se (e.g. the writer) and the agents, or companies (e.g. publishers) that embed the creative work in a product available to consumers, and recognise that creators may be less responsive to economic incentives than agents.

[v] A study conducted jointly by EPO and EUIPO in 2013 found that copyright intensive industries account for 3.2% of total employment and generate 4.2% of the total economic output (GDP) in the EU.

To gain a better insight into the issues surrounding the role of copyright in generating profits for the company it is useful to analyse the complementary protection mechanisms these companies employ. Using the rich and novel dataset that brings patent, trademark and design information of nearly quarter of a million EU companies together, and building on a logistic regression model the study focuses on companies that make an extensive use of copyright protection and explains choices of IP protection based on their size, turnover and geographical location.

The remainder of the paper proceeds as follows. Chapter II provides the theoretical background and findings of recent academic work and existing literature. Chapter III explains the economic rationale of IP Rights and their combination, as well as explains our motivation for this study. Chapter IV describes the data and the methodology that identifies copyright-intensive industries used in our analysis. Chapter V presents the descriptive statistics findings. Chapter VI explains the econometric strategy and the results of regression models. Finally, the paper concludes with Chapter VII where key findings are brought together and the directions for the future research are outlined.

2. Theoretical background

Scholars have always sought to understand how firms extract value from intangible assets. The use of Intellectual Property has been recognised by industry and academics alike as an important means of appropriating value. However the almost exclusive attention given to patents in the literature has been to the detriment of research on other IP types, such as copyright, trademarks and secrecy.

Earlier work has also largely ignored the *relationships* between different types of IP rights. As noted by Graham and Somaya (2006), the prevailing implicit assumption viewed the different types of intellectual property rights as substitutes rather than as complements, largely focusing on the trade-off between patents and trade secrets. The very influential Yale innovation survey (Levin et al., 1989), for instance, reduces legal appropriability mechanisms to two dimensions – patent and non-patents (including secrecy) – which appeared to be used as substitutes. Other surveys conducted in Europe (Harabi, 1995; Arundel, 2001) either assumes that a firm had to choose between patenting and secrecy and implicitly considers them to serve as substitutes.

The possibility that IP rights may act as complements, and if so under what circumstances, are questions that could fundamentally alter our conception of IP strategy, and therefore deserves greater attention. Early work by Teece (1986) on the role of complementary assets and how these could generate profits from innovation has given rise to more recent comprehensive analysis (Cohen, 2000; Amara et al., 2008; Graham and Somaya, 2006; Ramello and Silva, 2006) of how firms mix various protection mechanisms.

Similarly, recent contributions have emphasized the role of symbolic value – defined as the set of social and cultural aspects associated with a product, which enables consumers to use it to communicate about their identity and social status. Following this rationale, among intangible

resources, trademarks and industrial design can play a fundamental role in the process of accumulation, protection and exploitation of symbolic value, and by doing so build up brand equity.

It is not uncommon to see different types of Intellectual Property rights being jointly used by firms. Depending on the industry and size of a firm, IP rights are increasingly being used in bundles. Bringing new products to the markets can require strategic use of multiple Intellectual Property rights that are complementary to each other. The empirical evidence points to the synergistic role of combined use of IP rights across firms.

Somaya and Graham (2006) suggest that different types of IP rights may act as complements due to market-driven factors and economies of scope. Such complementarities will arise if increased enforcement of patents leads to more exclusivity of the product associated with the patent, which in turn leads to a higher value of the corresponding brand. Complementarities between IP rights in the form of economies of scope will occur if the existing know-how and experience with one type of IP right simplifies the introduction of another type. In other words, firms that already own one type of IP rights, and have relevant experience, are more likely to consider supplementing their intangible assets portfolio by additional IP rights protection and in more efficient than company which has no prior IP related experience.

Millot and Llenera (2013) developed a theoretical model in which patents create a temporary monopoly, and absent any trade mark protection, advertising by one firm benefits its competitors, too. Thus, trade mark protection is modelled to reduce positive externalities from advertisement. The model produces two effects: a substitution effect, which occurs because the patent is assumed to prevent competition and therefore renders the effect of the trade mark worthless while the patent is in force, and a complementary effect, which occurs once the patent expires by creating additional streams of revenue once the technological lead is lost.

The most recent study conducted by Helmers and Schautschick (2013) on behalf of the UK Intellectual Property Office presents analysis of the use of different types of IP rights for the same product by firms registered in the UK. Authors conclude that owning patents as well as trademarks correlated positively with firms' performance.

The way in which different IP rights are combined depends on the firm, the industry in which it operates and the type of product or service it provides. While a high-tech firm may rely on a combination of patents, registered designs, trademarks and trade secrets, a web designer may have the option of choosing from copyright, trademark, and database protection.

Since majority of the studies have been mostly driven by patents and trademarks and to a lesser extent by industrial designs, with copyrights being kept usually at the margins of the academic interest, we find it important to engage in the empirical research regarding copyright intensive industries.

3. Intellectual Property Right bundles by companies

It is not unusual for firms to employ a variety of mechanisms to protect their inventions. Bringing new products to the markets can require strategic use of multiple intellectual property rights that are complementary to each other. The empirical evidence points to synergistic role of combined use of IP rights across firms.

Copyright industries represent an exceptional and interesting case of creative innovation. Copyright in many aspects is a unique IP right due to its long term (author life plus 70 years) of protection and its function of providing incentives to engage in creative activities.

According to the findings of recently published study *"Intellectual Property Right Intensive Industries: contribution to economic performance and employment in the European Union" (2013)* copyright intensive industries accrue significantly to economic growth. These industries generate over 7 million jobs or 3.2% of total jobs in the EU. Copyright intensive sectors also account for 509 billion euros (4.2%) of total EU GDP. Copyright industries have a positive trade balance, equal to 15.3 billion euros in 2010.

It is well worth to analyse what complementary protection mechanisms of the intangible assets companies employ in different copyright industries and throughout different European countries based on robust data and econometric research.

Employment and combination of various intellectual property protection strategies are observed not only in large multinational companies but small and medium sized companies as well. Our findings confirm that the most common IP bundling strategy is to combine copyright with trademark.

Every intellectual property right plays its own significant role in companies marketing and finance portfolio:

- Patents protect industrial inventions, offering a solution to a specific technological problem.
- Trademarks serve as identification tools in the marketplace and allow consumers to distinguish between particular products or services.
- Design protects the visual appearance of objects.
- Copyright protection extends to any original expressive work fixed in a tangible medium of expression.

Intellectual Property Rights Economic Rationale

It is important to explain the types of intellectual assets in more detail.

Patent protection is available for inventions intended to serve as new solutions to technical problems. Inventions must meet the requirements of novelty, non-obviousness to the skilled professionals of the field and be industrially applicable. Once granted, the patent prevents any other entity from commercially exploiting the invention without authorization of the owner. European patents typically are granted for the maximum period of 20 years since the date of application.

Trademark is a distinctive sign that identifies certain goods and services provided by certain company or individual. The main economic function of the trademark is to reduce consumer search costs and to serve in market place as identification mark for of the nature and quality of those goods and services. In order to be eligible for legal protection, a trademark must satisfy the requirements of distinctiveness and non-descriptiveness. The term of protection of the Community Trademark protection typically lasts for ten years, but it can be renewed indefinitely subject to payment of fees, for successive periods of ten years.

Design protection comprises the visual appearance of a product, some part of a product or its ornamentation. A design must be new and have an individual character, as differing from any previous designs. Owners of registered designs enjoy exclusive rights to use the design and can prevent any third parties from exploiting it. In the European Union, the Registered Community Design is granted for the maximum period of 25 years, and has initial period of 5 years from the date of filling.

Copyright gives right holders exclusive rights to control the use of their works, such as reproduction, adaptation, translation, performance or public display, and enables them to be adequately remunerated for their creative efforts. Unlike other forms of IP protection, such as patents, trademarks and designs, copyrights do not require registration.

In this paper we are primarily interested in the joint use of registered IP rights within the copyright intensive industries.

Motivation for the Research

First of all, it is important to highlight the need for an integrated analysis of intellectual property. There have been few attempts to estimate the use of IP right bundles (UK IPO – "The use of intellectual property right bundles by firms in the UK", 2013; "Towards an integrated theory of intellectual property", 2002). Nevertheless, these reports only take into account the bundles of patents and trademarks. The joint use of patents and trademarks could stand as good proxy for the intellectual property right bundles, as argued by the UK IP Office. However, the lack of the

empirical research in both areas: economic studies of copyright and the joint use of IP rights calls for more clarity and data precision.

The contribution of this paper stands in its holistic approach as it captures three main forms of registered intellectual property rights – trademarks, patents and designs. We seek to explore the use of these bundles particularly in copyright intensive sectors.

Combining copyright, patent or design protection can create important synergies for a company. First, the existence of a patent or copyright can reduce the cost of establishing a strong brand, as the costs of advertising may be lowered by the exclusivity of former rights and the period of the monopoly granted in the marketplace. Xerox, for example, succeeded in establishing a strong branding for its photocopy machines and its trademark has virtually become a synonymous and generic word for its product. Disney Company has registered trademarks for its characters originally protected by copyright in order to leverage its protection and establish their exclusivity in the market.

As noted by Parchamovsky and Siegelman (2002), the possibility to leverage patents through trademarks describes patentees' ability to charge supra-competitive prices even after the patent has lapsed and the invention is protected only by a trademark. These leverages might benefit consumers and innovators by providing greater incentives to innovate, and must not be overlooked by policymakers.

Both economic and legal scholars have ignored the research of the mentioned bundles and synergetic effects among the various types of IP protection.

Especially, the copyright based industries provide an interesting base for this kind of observations. First of all, copyright being a subject of recent and relevant policy changing subject (e.g. the term extension from 50 to 70 years for performers and sound recording producers in the EU in 2011) raises the questions of the effects and impact of the copyright length and scope. Second, economic aspects of copyright are complex, reflecting various trade-offs between the interests of creators, distributors, performers and consumers as well as short-term versus long-term effects. The general objective of copyright protection system is the trade-off between ensuring public interest and the access to the copyrighted works and providing sufficient degree of incentives for innovators to engage in the creative activities and be adequately compensated for their efforts.

The extensive research of whether and how companies employ complementary intellectual property assets to protect the creative content could contribute to providing some answers to these questions and add up significantly to the stock of empirical economic research in this field.

4. Data

The research object of this paper is the bundle of intellectual property rights employed by the companies operating in copyright intensive industries. We aim to assess interrelated effects of four main types of intellectual property rights: copyright, trademark, patent and design, considering them in their core function as legal protection devices.

The companies using bundles of IP rights are clustered into following categories, reflected in the table 1 below.

Table 1. Intellectual Property Right bundles

	Abbreviation	**Name of IP right bundle**
1.	**PAT**	Patent and Copyright
2.	**TM**	Trademark and Copyright
3.	**DES**	Registered Design and Copyright
4.	**PAT & TM**	Patent, Trademark and Copyright
5.	**PAT & DES**	Patent, Registered Design and Copyright
6.	**TM & DES**	Trademark, Registered Design and Copyright
7.	**PAT & TM & DES**	Patent in combination with Trademark, Registered Design and Copyright

Both, registries in the National Intellectual Property offices and European agencies are considered in the analysis. More specific, we were able to observe the number of trademarks, patents and designs registered in twelve national offices of Austria, Belgium, Germany, Denmark, Spain, France, Italy, United Kingdom, Hungary, Lithuania, Netherlands and Portugal.

In addition, the European Patents (EP) issued by the European Patent Office (EPO) and EU Trademarks (EU TM) and Registered Community Designs (RCD) granted by the European Union Intellectual Property Office (EUIPO) are also considered.

In our research we rely on national patent offices´, EUIPO, EPO and ORBIS databases. Subject to the study are the firms operating in above mentioned copyright intensive industries. We seek to observe firms' ownership of the registered national and European patents, trademarks and designs as well as the internal statistical information of those companies, i.e. number of employees and turnover.

The firm level data is extracted from the commercial database ORBIS containing industry classification and other information for more than 20 million European companies. As a next step, the data of companies operating in copyright intensive industries is joined with the original EUIPO-EPO database in order to identify different patterns and bundles of intellectual property rights (EU Trademarks, Registered Community Designs and European Patents).

We have composed the dataset consisting of the companies that are active in copyright intensive industries in accordance with the original WIPO methodology. In total we examine 33 copyright intensive industries as classified in the NACE industry classification (Statistical Classification of Economic Activities in the European Community).

ORBIS commercial database contains industry classification and other information for European firms. We encounter over quarter of a million companies operating in copyright intensive sectors (266.262 firms) in 12 European Union Member States: Austria, Belgium, Germany, Denmark, Spain, France, United Kingdom, Hungary, Italy, Lithuania, Netherlands and Portugal. Employment information was available for 172.985 companies and turnover information for 222.807 companies. Cases where several records appeared for the same company were eliminated and we have taken into consideration only those companies for which either employment or turnover data was available.

The year of the data included in the study is 2009, for both employment and turnover. Trademarks, patents and designs observed were those applied for during the period 2004-2008, and accordingly registered, granted or published by 2013. We included registered IP rights in 27 European Union Member States[vi].

4.1 Copyright Intensive Industries

Copyright gives right holders exclusive rights to control the use or economic exploitation of their works, e.g. reproduction, distribution, adaptation, translation, performance or public display. It is important to note that copyright is applicable only to the expression of ideas, not to the ideas themselves. No copyright registration is required (or possible) on EU level; the protection is granted automatically from the moment a work is created.

As acquiring copyright protection does not entail the registration, introducing a method for accurately counting them is not feasible. For this reason we adapt the original methodology developed by WIPO in the *"Guide on Surveying the Economic Contribution of the Copyright-Based Industries" (2003).* The methodology is based on the assumption that companies acting in copyright intensive industries rely on protection of this unregistered IP right. In total we distinguish 33 core copyright intensive industries as classified in the Statistical Classification of

[vi] European Union Member States as in 2013.

Economic Activities in the European Community, commonly referred to as NACE industry classification.

These industries are further grouped into four relevant broader clusters in order to ensure a sufficient level of information that would allow for a meaningful statistical analysis. The copyright intensive industries are clustered into the following groups:

- Publishing
- Media & Entertainment
- Information Technology (IT)
- Creative arts and Cultural activities

Table 2. Publishing group of copyright intensive industries:

NACE code	NACE industry description
5811	Book publishing
5812	Publishing of directories and mailing lists
5813	Publishing of newspapers
5814	Publishing of journals and periodicals
5819	Other publishing activities
5821	Publishing of computer games
5829	Other software publishing

Table 3. Media & Entertainment group of copyright intensive industries:

NACE code	NACE industry description
5911	Motion picture, video and television program production activities
5912	Motion picture, video and television program post-production activities
5913	Motion picture, video and television program distribution activities
5914	Motion picture projection activities
5920	Sound recording and music publishing activities
6010	Radio broadcasting
6020	Television programming and broadcasting activities
6312	Web portals
6391	News agency activities
6399	Other information service activities
7021	Public relations and communication activities

Table 4. IT group of copyright intensive industries:

NACE code	NACE industry description
6120	Wireless telecommunications activities
6201	Computer programming activities
6202	Computer consultancy activities
6203	Computer facilities management activities
6209	Other information technology and computer service activities

Table 5. Creative arts & Cultural activities' group of copyright intensive industries:

NACE code	NACE industry description
7311	Advertising agencies
7312	Media representation
7410	Specialized design activities
7420	Photographic activities
7430	Translation and interpretation activities
9001	Performing arts
9002	Support activities to performing arts
9003	Artistic creation
9101	Library and archives activities
9329	Other amusement and recreation activities

In total we observe 33 core copyright intensive industries. All these industries are involved in the creation and/or recording (in print, magnetically or digitally) of copyright-protected works, and are referred to be core copyright industries. Based on WIPO (2003) definition, the core copyright industries are the ones that are wholly engaged in creation, production, manufacturing, performance, broadcast, communication and exhibition, or distribution and sales of works and other protected subject matter.

We rely on an even more restrictive approach adapted from USPTO study (2012)[vii] in defining the set of industries that are identified as core copyright intensive, considering only the industries primarily responsible for the creation and production of creative copyrighted materials. Industries that are not involved in the creation of the content but only in the distribution of copyrighted work are thus not included. There are few exceptions however, as, for instance; the newspaper industry, which is involved in both production and distribution of copyrighted content.

[vii] See detailed description in Annex C

5. Statistical findings

In this section the joint use of European patents, trademarks and designs by firms active in copyright intensive industries is observed. The objective of the statistical analysis is to reveal broad patterns in companies' use of these different forms of intellectual property rights and their joint exploitation.

We observe 10.3% bundling rate of copyright in combination with national or European registered trademarks, patents and designs. This amounts to 27.456 companies out of 266.262 in our sample. The share of the companies complementing the copyright protection with one of the formal intellectual property rights is a subject for discussion and different interpretations. On the one hand, 10% of the companies might seem rather a small fraction. On the other hand, it is important to highlight that this fraction could be reduced subject to non-registered trademarks and designs employed by companies or data limitations in commercial database ORBIS.

In this study we were able to include 12 European countries representing various geographical regions, namely West Europe, as well as South and East European economies. These results could reveal very interesting insights into the level of international protection of the brands, inventions and product appearances in the European companies acting in copyright industries.

We could draw a conclusion that companies operating in copyright intensive industries do not have strong incentives to use complementary registered IP rights, as relying on copyright alone provides sufficient protection. Conversely, we could assume that companies not having trademarks, patents or designs to supplement protection of their intangible assets do not exploit their full potential in domestic and international markets.

Less surprising is the case of patents and designs. Nevertheless, the pattern of not having EU Trademark (EU TM) protection could be indicative of the domestic focus of the companies acting in copyright industries in Europe. From this we could induce broader assumptions and conclusions regarding the current legal system of copyright protection, licencing issues, activities of Copyright Collecting Societies (CCS), and cultural differences, including the language, of markets for creative works in Europe.

Combined use of IP Rights by Country

Before delving into graphical analysis of IP Rights bundling by country, it is well worth to observe more closely the use of IP rights by geographical area. We analyse 12 European countries[viii] that are heterogeneous and differ in various economic aspects. Based on the results of the further analysis and geographical location, we may distinguish three broad categories of these countries.

[viii] Austria, Belgium, Germany, Denmark, Spain, France, Italy, United Kingdom, Hungary, Lithuania, Netherlands and Portugal

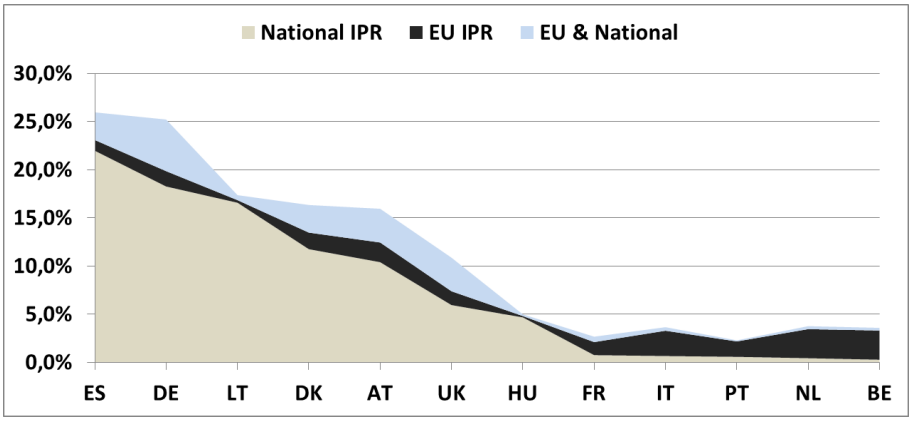
First category comprise of Spain, Germany, Denmark, Austria and United Kingdom. These countries tend to exploit intensively the registered IP rights, and have a high bundling rate. On average 19% of copyright companies in these countries jointly also use another form of Intellectual Property. Such an active combination of IP Rights in these five is mainly driven by National IP Rights registered by entities.

Second category comprises two EU Member States – Lithuania and Hungary. They became full members in 2004. We believe that data provided by these two countries offers an amazing opportunity to analyse behaviour of companies in Eastern and Central Europe. Lithuania is one of the leaders when it comes to joint use of several IP rights with the average bundling rate if 17,4%. Hungary, on the other hand, exposes more modest rate of 5%. One aspect, however, uniquely describes both these countries, as over 90% of bundling companies choose to register national patents, trademarks or designs, instead for opting for the EU-wide protection.

Third category is represented by another five countries: France, Italy, Portugal, Netherlands and Belgium. These states demonstrate very low bundling rates – on average only 3,2% of companies active in copyright industries rely on different registered IP rights.

Also, another trend emerges looking at these countries. Those companies which decide to combine copyright with patent, trademark or design – rely mostly on EU-wide protection. That is, 80% of bundling companies in these countries choose to register European IP rights, in comparison with only 30% of such companies in Spain, Germany, Denmark, Austria and UK.

Figure 1. *Share of companies using IP right bundles and GDP per capita in European countries.*



As illustrated in the figure 1 above, we observe significant differences between the European Member States regarding the rate of complementing the copyright protection with registered IP rights.

The highest bundling rates are observed in Spain and Germany, with nearly 25% of companies complementing the copyright protection with one of the formal IP rights on the national or European level. Nearly 15% of the companies tend to bundle in Lithuania, Denmark and Austria.

Interestingly, a much larger proportion of the companies in all the above mentioned countries rely on national trademarks, patents or registered designs, and only a small share – on average – 3.9 % of the companies – have chosen to register analogue European rights.

Italy, Netherlands, Belgium, France and Portugal represent an opposite case, as companies that are active in copyright industries tend to have larger share of European IP rights versus national equivalent rights. It is well worth noting that even though larger proportion of companies seeks international protection of their intangible assets, average bundling rate in these countries is only 3.2%.

Table 6. *IP rights bundling rate in the European Union-12*

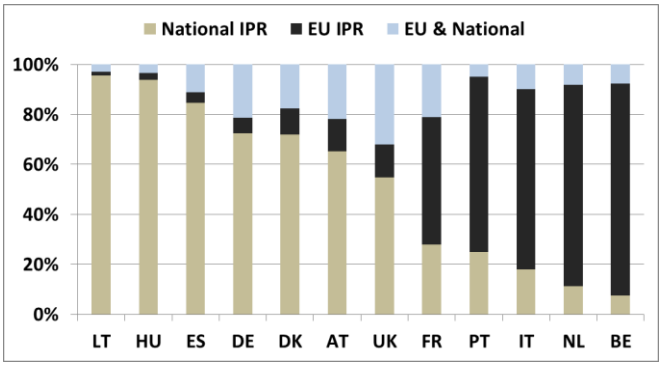
Type of IP rights	Bundling rate
National and European IP rights	1.7%
European IP rights	1.7%
National IP rights	6.9%
Total	10.3%

The total average bundling rate of both European and National intellectual property rights is 1.7% in 12 European countries observed. The bundling rate for European IP rights (EU TM, RCD and European Patent) is found to be the same 1.7% and much smaller than 6.9% of bundling with national trademarks, designs and patents.

Many aspects can come into play when influencing the joint use of intellectual property rights. Country related factors, size of the companies, the industries in which these companies are active in, the international angle of their business, as well as the knowledge and willingness to rely on formal IP registry system have a role to play in the IP strategies of the entities.

Further in our analysis we take into account the relevant company and industry variables that might have a significant impact on the patterns of joint use of different IP rights.

Figure 2. *The distribution of national and European IP rights in the bundling companies in different countries.*



As evident in figure 2, countries that have lower than average bundling rates – France, Portugal, Italy, Netherlands and Belgium – tend to have larger share of registered European as national IP rights.

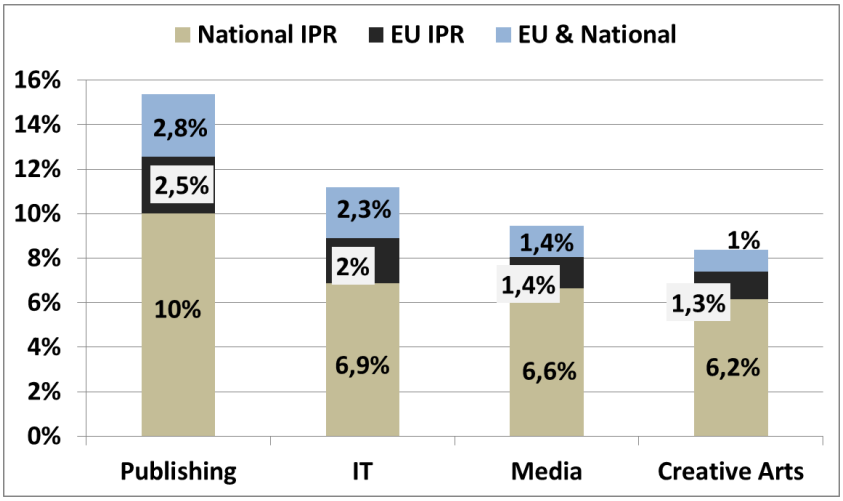
United Kingdom represents an exceptional case well balancing both – national and European IP rights.

Lithuania and Hungary, on the other hand, mostly complement the copyright protection on the national level. This in part might be explained by the size of the market in those countries.

Combined use of IP Rights by Industry

As displayed in figure 3 below, European companies that operate in different sectors exhibit quite different patterns of bundling copyright with at least one of the formal IP rights. However, National IP rights dominate all industries.

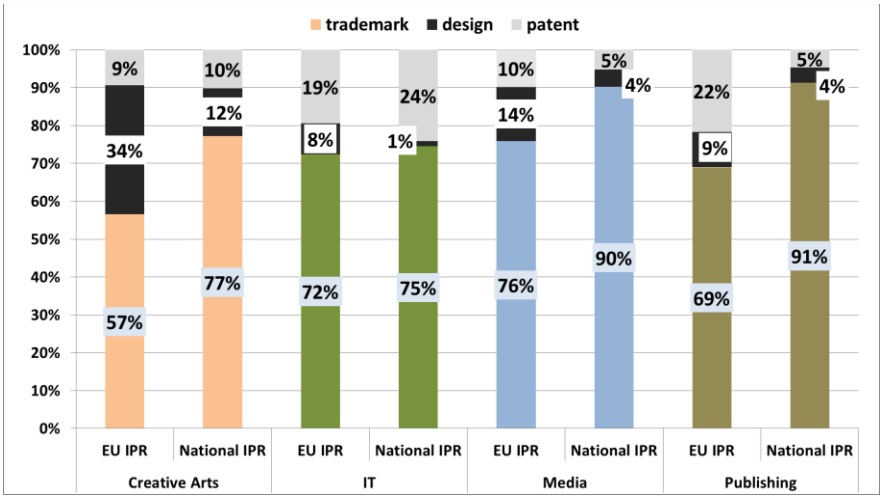
Figure 3. *Share of companies using IPR bundles in copyright intensive industries.*



Bundling rate of nearly 16% is observed in Publishing industries and 11% in IT industries. Smaller proportions of nearly 9.5% and 8.5% of bundling companies are noted in the industries of Media & Entertainment and Creative Arts & Cultural Activities.

It should be noted that national intellectual property rights form the majority of bundling portfolios. They are followed by smaller fractions of European IP rights and the overlap of both European and national IP rights.

Figure 4. *Distribution of IP rights portfolio by the industry group.*



The above figure 4 shows the distribution of the number of registered IP rights in the portfolios of the companies acting in different copyright industry groups.

It is observed that the majority – over 70% – of the complementing European IP rights in IT, Media & Entertainment and Publishing industries are registered trademarks. This finding denies theoretical speculation by Parchamovsky and Siegelman (2002) that "trademark protection is virtually irrelevant to most types of copyrighted works, such as paintings, sculptures, and even movies".

Companies in Creative Arts & Cultural Activities rely mostly on the protection of registered community designs, as they comprise 34% of their registered IP rights portfolio.

Patents are mainly used by the companies in IT and Publishing industries. In the case of the latter, most of the patents are encountered in the field of software publishing. Companies operating in the field of Information Technologies, register most of the patents in computer programming activities as well as IT and computer service activities. The use of national patent rights is especially apparent in the industry of IT, where they form one quarter of the companies' registered IP rights portfolios.

It is interesting to observe that bundling patterns are quite similar across national and European IP rights. In particular, usage of copyright together with trademark, either national or European, is by far the most prevailing bundling pattern.

When it comes to choosing the type of registered design, companies in all industries prefer to have European design rights.

Patents: companies in Media and Publishing industries tend to have more EPO patents than National ones. Difference is especially sharp in Publishing industry where 22% of companies

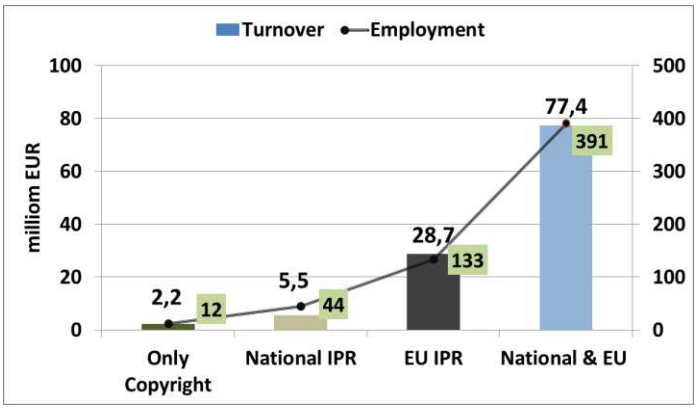
that own European IP rights have applied for a patent at the EPO. Only 5% of companies that have National IP Rights own a patent.

Entities in IT industry group, on the other hand have proportionally more National patents.

We also find it particularly interesting that Publishing industry is dominated by SMEs, contrary to our expectation that large entities would be the ones filing for European Patents in this industry. In fact, 63% of patent users in Publishing are small and medium sized firms. Conversely, IT industry has larger concentration of big firms – they account for 57% of patent owners.

Combined use of IP Rights by Companies

Figure 5. *Turnover and employment in bundling and non-bundling companies*



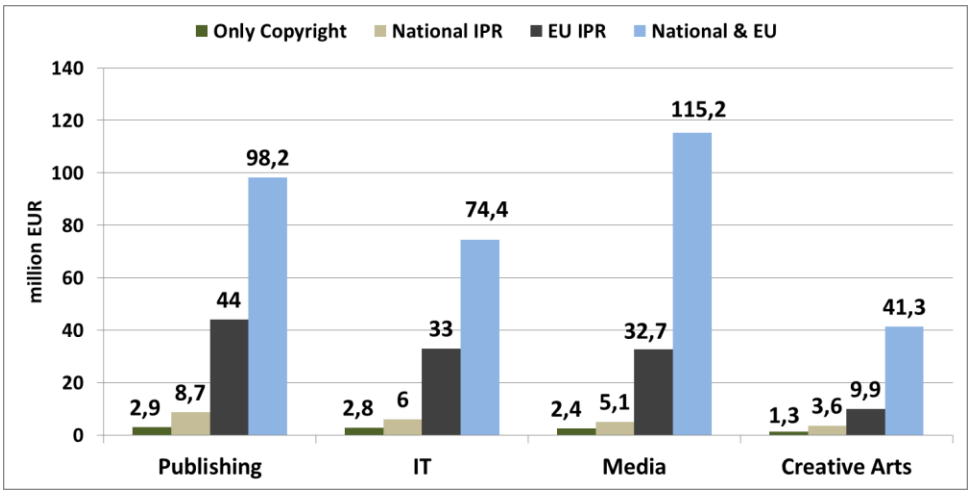
As indicated in Figure 5, significant differences between bundling and non-bundling companies are noticeable in terms of turnover and employment.

Companies that rely on at least one additional registered IP right – i.e. registered EU Trademark, Community Registered Design or European patent – generate 13 times higher turnover than those companies that rely solely on copyright protection. Observed average turnover in bundling companies that rely exceptionally on European registered IP rights is almost 29 million euros, while only 2.2 million in non-bundling firms. The turnover generated differs significantly in those companies that rely solely on national registered IP rights – those companies generate 5.5 million euros. Meanwhile companies that employ both national and European IP rights (e.g. EU TM and national patent) on average generate 77 million euros. There are several reasons for such significant differences. First of all, companies that register at the international level tend to be larger. Second, if a company registers on both national and European level, it has more intangible assets to protect and considerably it has more value for the company.

Same trend is apparent while comparing number of employees in IP rights' bundling and non-bundling companies. Those firms that rely on additional registered IP right protection solely on the national level on average hire 44 employees, while others, non-bundling firms hire 12

workers. Companies that choose to complement the copyright protection with the formal IP rights at the European level employ 133 workers. Companies owning both national and European IP rights on average create 391 job places.

Figure 6. *Turnover in bundling and non-bundling companies in different copyright industries*



Companies that operate in the copyright intensive sectors and rely on complementary intellectual property rights generate larger turnover than those that do not bundle.

The largest turnover is generated by the companies in Publishing and Media & Entertainment sectors where average turnover slightly exceeds 115 million euros. It is not the one with highest bundling rate however. The highest bundling rate is found in Publishing and IT group.

Companies operating in the same copyright industries but not having registered formal IP rights are observed to generate 1.2-3 million euro turnover.

Companies representing the Information Technology industry group and operating in activities such as computer programming and computer consultancy tend to use complementing formal IP rights, generate turnover of around 75 million euros. Bundling firms in Creative arts (such as performing arts, specialized design or artistic creation) and Cultural activities group generate average turnover of 41 million euros.

Nevertheless, it is important to emphasize that companies that have registered trademarks, designs and patents also tend to be larger companies, operating on the international level, therefore no causal relationship between IPR usage and firm performance could be established based on data at our disposal.

Table 7. *Mean turnover and employment in large companies and SMEs in bundling and non-bundling categories*

Company size	Bundling type	Number of companies	Turnover (thousand EUR)	Employment
LARGE FIRMS	**Only Copyright**	**1.452**	**185.239**	**636**
	Bundling with PAT, TM or DES	**1.238**	**348.125**	**1.490**
	EU & National	574	499.669	2.016
	European IPR	254	351.949	1.432
	National IPR	410	133.595	789
SMEs	**Only Copyright**	**237.354**	**715**	**4**
	Bundling with PAT, TM or DES	**26.218**	**2.508**	**15**
	EU & National	4.004	4.770	29
	European IPR	4.249	3.495	16
	National IPR	17.965	1.770	12

The above table summarizes main information of the copyright companies and their statistical information regarding turnover and company size reflected by employment.

It is important to observe the distribution bundling versus non-bundling firms in more detail, especially given the uneven distribution of the companies by size and bundling type, i.e. whether national or European rights are registered.

First of all, it might be possible to assume that significant differences in average turnover and number of employees in bundling and non-bundling companies is a direct consequence of the dominance of the large companies. Nevertheless, small and medium sized companies account for 96% of the whole bundling companies' sample (26.218 firms). The share of SMEs in non-bundling sample is even larger as they account for 99% of all non-bundling companies.

Comparing the turnover in the same class companies, we can observe that large companies owning bundles of IP rights generate 350 million euros turnover, nearly twice as much as the same size category non-bundling companies' produce. Small and medium sized companies that rely on more than one IP right on average generate 2.5 million euros turnover. This is nearly 3.5 times higher than turnover generated by SMEs that rely solely on copyright and do not supplement it by European or national level registered IP right. Large bundling companies on average employ 1.5 thousand workers in comparison to 630 employees in non-bundling large

firms. Small and medium size bundling firms tend to hire 15 workers in comparison to only 4 employees in non-bundling SMEs.

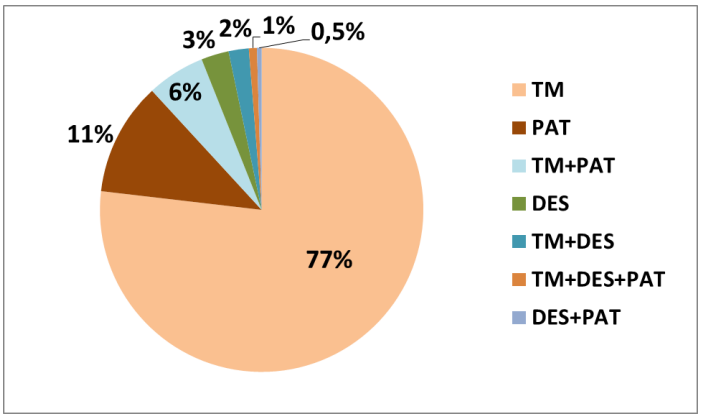
Considerable differences exist among the size and turnover generated between the companies that rely exceptionally on local or international IP protection systems. Large companies that combine European and national trademarks, patents or designs have 2000 employees and generate nearly half billion of turnover. SMEs that rely on the same broad pattern of joint use of IP rights are considered to be medium size companies with 29 employees and an average turnover of 5 million euros.

Intellectual Property Right combination strategies

The companies using bundles of IP rights are clustered into following categories:

1. Copyright and patents
2. Copyrights and trademarks
3. Copyright and designs
4. Copyright, patents and trademarks
5. Copyright, patent and design
6. Copyright, trademark and design
7. Copyright, patent, trademark and design

Figure 7. *Share of companies in different bundling categories*



As it is possible to observe in the figure 7 above, most of the companies fall into the bundling category 'TM'. It means that 77% companies that are active in copyright intensive industries and tend to complement the copyright protection with registered IP rights, choose to register EU TM or national trademark. These results are hardly surprising, as trademarks constitute an important channel of communication between firms and consumers. Brand protection allows consumers to associate goods and services to the provider and allows for the companies to build brand loyalty and transmit the message promoting the virtues of their product or service.

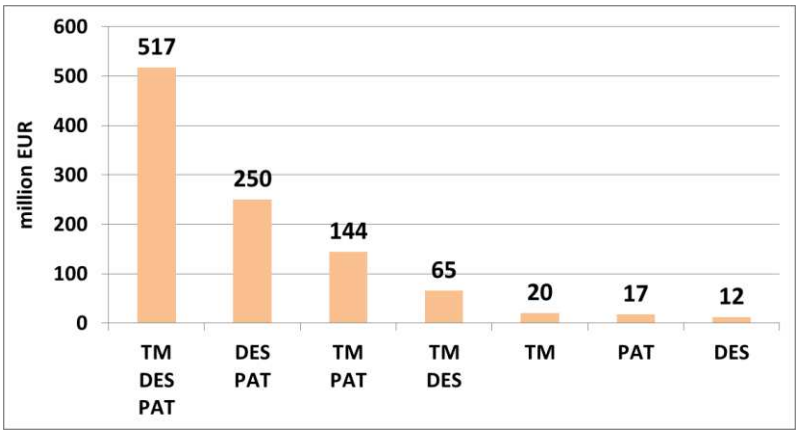
The remaining 23% of the companies tend to supplement copyright protection using different mechanisms. 3% of all companies that tend to rely on copyright protection jointly with formal IP rights, fall into category 'DES' – owning Registered Community Designs or national registered designs. Accordingly, 2% of the bundling companies rely on joint trademark & design protection.

Copyright is complemented by patent protection by 11% of the companies, representing mainly the industries of software publishing and computer programming and consultancy activities. Smaller share – 6% of the bundling firms – tend to jointly rely on both trademark and patent legal protection in addition to copyright.

The smallest share of the companies – only 0.5% fall into bundling category of joint use of registered designs together with patents. It is a rather rare case when company has an interest and innovative capacity to register both design and patent. Few examples are found in computer consultancy and advertising agencies activities.

Also, only 1% of the bundling companies have registered all three formal IP rights – patent, trademark and design. Most of such companies represent IT and computer service activities and computer programming activities.

Figure 8. *Average turnover generated by companies in different bundling categories*



Additionally, it is interesting to observe whether the companies that represent the bundle of certain registered intellectual property rights tend to generate larger turnover. Figure 8 above illustrates that companies owning all three registered IP rights, trademark, design and patent, generate the largest turnover of nearly a half billion euros on average. In comparison, companies that complement copyright protection with trademark solely, generate 20 million, or patent solely – 17.5 million turnover.

6. Empirical Model and Results

This section provides the specification of econometric strategy and results from estimation of the logistic regression models. It encompasses the decision to complement the copyright with the registered Intellectual Property Rights.

Empirical Strategy

With the purpose to explore which variables contribute to differences in the rate of usage of other than copyright formal IP rights we engage in econometric study. We build logistic regression models to investigate relative importance of various firm characteristics on the choice of the protection bundle for its products. Among the firm characteristics we are able to investigate factors such as NACE code (a proxy for the main copyright industry firm is active in), firm size, turnover and geographical location.

In all specifications we model utility of each alternative on the basis of firm's individual variables. We do not use attributes of the choices such as costs of each alternative bundle. This is the most important limitation of our models as it is very plausible that not only firm's attributes but also attributes of each choice have impact on the probability of selection of the specific form of additional intellectual property rights protection.

General model specification is then

$$Y^* = \beta_0 + \beta x' + \varepsilon, \qquad y = 1[y^* > 1]$$

Where Y* is a latent variable describing the utility of each alternative, $\beta x'$ is the vector of firm specific variables and ε is usual error term (Wooldridge 2012).

Logistic Regression Models

We have specified three stage logistic regression model. Stages differ by inclusion of controlling variables.

1. No controlling variables.
2. Controlling for the size of the company.
3. Controlling for the size of the company and its geographical location.

In the first logistic regression model specification none on the controlling variables is included. Second, we control for the size of the company – specification SME. Third, we control for the country (twelve European Union Member States observed).

Two sets of models are built using the same controlling variables.

1. Copyright
2. Copyright Industry groups

With the first set of models we want to check whether firms active in copyright intensive industries rely more on other formal intellectual property rights protection than companies from other industries.

Second, we check if the hypothesis regarding higher likelihood to complement copyright with at least one of the three registered IP rights holds for all the NACE divisions representing copyright intensive industries. In total there are 12 such NACE divisions[ix].

Variables

Dependent variables

1. The first dependent variable for the outcome – whether to rely on copyright protection only or to combine copyright with at least one of the Registered Intellectual Property Rights – is also a dummy variable. It takes the value one if company chooses to own additional legal protection in the form of trademark, patent or registered design. It takes value of zero if company relies on copyright protection solely.

2. Second group of dependent variables is a set of copyright industries. We seek to check whether the hypothesis regarding higher usage of complementary IP protection could be maintained for all the NACE divisions representing copyright intensive industries. Dummy variable assigned for comparison in this specification represents all NACE industries except for the copyright intensive.

Explanatory variables

SME. This variable allows controlling for the size of the companies. SME (small and medium entity) is defined using "employment" and "turnover" data extracted from ORBIS database. Company falls under SME category if it has less than 50 thousand euros turnover and hires less than 250 employees.

Geographical location. This variable allows controlling for the seat country of the company. Country is represented by the main activity address provided in commercial database ORBIS. In total we observe 12 European Member States: Austria, Belgium, Germany, Denmark, Spain, France, United Kingdom, Hungary, Lithuania, Netherland and Portugal and Italy.

Data

Before constructing our dataset we eliminated all observations where either number of employees or turnover for 2009 was not available. Then we drew random sample of 612.869 firms representing non-copyright industries and added to that all the observations representing copyright intensive industries with non-missing employment or turnover data. Thus our final dataset consists of 879.131companies representing above mentioned 12 Member States of

[ix] See table B-1 in annex B.

European Union: Austria, Belgium, Germany, Denmark, Spain, France, United Kingdom, Hungary, Lithuania, Netherland and Portugal and Italy. Our sample is unbalanced with overrepresentation of copyright intensive industries. It does not introduce any bias to our models but allows for more precise computation of respective coefficients for copyright intensive industries.

Results of Logistic Regression models

Results of all models are quite robust and indicate that firms representing copyright intensive industries are more likely than firms representing all other industry groupings to use formal IP protection (on national and European level). On the other hand, those companies have lower probability of using patents and designs than firms representing other industry groups.

As indicated in table A-1 (see annex A), being active in one of the copyright intensive industries is positively associated with the choice of other form of IP (trademark, design or patent), as a complementary protection instrument. The coefficient is positive and significant. Its magnitude remains constant and it stays statistically significant through other models where we control for size category (model 2) and seat country (model 3).

In the second specification, table A-2, we are interested to check whether the hypothesis regarding higher usage of complementary IP protection could be maintained for all the NACE divisions representing copyright intensive industries. Dummy variable assigned for comparison in this specification represents all NACE industries except for the copyright intensive.

Results of this specification suggest that for almost all copyright intensive industries, predicted propensity to use formal IP rights for intangible assets protection is higher than for non-copyright industries. The only industries where coefficient is not statistically significant are industries forming arts, entertainment and recreation group (91 and 93). Those results are pretty stable when we control for size class of the company and seat country. The only major change in this last setting is that coefficient for class 93 becomes negative on 95% confidence level. It means that if we control for size class and seat location of the company firms active in NACE division 93 have lower propensity to use formal IP rights than firms representing non-copyright industries.

As evidenced in tables A-3 and A-4, this general pattern of higher likelihood to use formal IP right protection by firms representing copyright industries is confirmed if we separately analyse propensities to use national and European IP rights.

The only major change is that NACE 70 division becomes not significant when we control for size class and seat country in the model of European IP usage, while it is still positive and significant in the model of national IP usage. Thus we cannot reject the hypothesis of the same propensity to use formal European IP rights for NACE division 70 and non-copyright industries.

Also, while the coefficient for NACE division 90 is negative in first two models for the national IP usage, it becomes positive while we control for both size class of the firm and the seat country. Coefficient is consistently negative for this division in all the models estimating European IP usage. Lastly, while coefficients are positive in first two models for the national IP usage for division 93 it becomes non-significant when we control both for size class of the firm and the seat country. In all models estimating usage of European IP rights all the coefficients for this division become negative.

We continue our analysis by investigating likelihood to use patents. Unsurprisingly, copyright firms are less likely than companies representing other NACE classes to use patents. Respective coefficient for copyright intensive industry dummy is negative and statistically significant in model 1. Generally we can observe the same result in other models when we control for size class of the company and its seat country (models 2 and 3).

More interesting pattern emerges from the analysis of propensity to use patents by firms representing individual copyright intensive NACE classes.

While for the majority of the NACE classes respective coefficients are negative, there is notable difference as regards divisions 61 – telecommunications and 62 – computer programming, consultancy and related activities. For division 61 the patent usage propensity is higher than for firms representing other, non-copyright intensive divisions and these results is pretty stable while controlling for size class and seat country. For division 62 respective coefficient is positive and highly statistically significant (on 99% confidence level) both in the basic specification (model 1) as well as controlling for the size class. However, when we control for seat country, coefficient becomes lower and is significant only on 90% level. Estimated result for division 62 is quite surprising because in contrast to US, European laws do not provide for the possibility of patent protection for software.

Next, we analyse propensity to use trademark. Models in table A-9 (see annex A) show that copyright intensive firms are more likely than firms representing other sectors, to use trademarks as a protection mechanism complementary to copyright. As shown in table 10, this general finding is maintained in the analysis of individual copyright intensive NACE classes. Trademark usage propensity is higher for almost all copyright intensive divisions than for non-copyright ones.

In the last set of models we analyse usage of designs. As can be seen in table A-11, firms representing copyright intensive industries have somewhat lower propensity to use formal design protection than firms representing other industries.

As for individual copyright intensive NACE divisions, the general pattern is mixed. There are some divisions for which the hypothesis of same propensity as for non-copyright industries

cannot be rejected. Namely, for the NACE divisions 60 – programming and broadcasting activities, 61 - telecommunications, 70 – public relations and communications activities, and 91 – libraries, archives, museums and other cultural activities.

There are industry divisions for which the likelihood to use registered design is lower than for non-copyright industries: 59 – motion picture, video and television programme production, sound recording and music publishing activities, 62 – computer programming, consultancy and related activities, 63 – information service activities, 90 – creative, arts and entertainment activities, and 93 – other amusement and recreation activities.

There is also group of copyright industries that have higher propensity to use registered design than firms representing non-copyright industries. In particular firms representing NACE divisions 73 and 74, respectively advertising and market research and other professional, scientific and technical services (including photographic activities and specialised design services), have higher propensity to use formal design protection than other firms representing non copyright intensive industries.

7. Conclusion

The objective of this paper is to explore the joint use of IP rights by the companies operating in copyright intensive industries. We assess the interrelated effects of the main types of intellectual property rights: copyright, trademark, patent and design.

Bundling of IP rights with the copyright has never been studied by economists before.

It is interesting for several reasons: (i) subject of joint use of different IP rights has been largely unaddressed by both economic and legal scholars; (ii) copyright industries, especially, provide an interesting case, being a subject of recent policy change[x] and discussion concerning the piracy; (iii) economic aspects of copyright are complex, reflecting various trade-offs between the interests of creators, distributors, performers and consumers as well as short-term versus long-term effects; (iv) copyright industries are significant, generating over 7 million jobs (3.2%) jobs in the EU and 509 billion euros (4.2%) of European GDP.

This paper is based on a very rich and novel dataset comprising all three forms of registered IP rights: trademarks, patents and designs. In our research we rely on the data from 12 national IP offices as well as EUIPO and EPO databases. Commercial data, such as employment and turnover, is extracted from ORBIS database for the year 2009.

[x] Extension of copyright protection from 50 to 70 years in music industry: for performers and sound recording producers in the EU in 2011.

Analysis of the data indicates that companies operating in copyright intensive industries have strong incentives to use complementary registered IP rights. Larger likelihood to employ additional legal IP protection is mainly driven by trademarks both on European and National level.

The highest bundling rate is observed in Publishing industries, such as book, newspaper or software publishing. The lower bundling rates are observed in the industry groups of Media & Entertainment and Creative arts & Cultural activities.

IT and Publishing companies patent intensively. They register most of their patents in the field of software publishing, computer programming activities as well as IT and computer service activities.

Empirical findings are derived from a three stage logistic regression model. They reveal interesting and significant insights of the bundling propensities by firms active in copyright industries:

- Size of the company matters. Larger entities are more likely to be using other formal IP right at both national and European level.
- Firms in copyright industries are more likely to use registered IP rights in comparison with firms in other industries.
- In general, these firms have larger propensity to register trademarks. They have lower propensity to use patents and designs.
- Companies in some countries are more likely to bundle.
- Austrian, German, Danish, Spanish, UK, Lithuanian and Hungarian entities are more likely to complement copyright with trademark, patent or design. Companies located in Belgium, France, Netherlands and Portugal, on the other hand, are less likely to employ additional IP rights.

For the first time we manage to observe empirically that European companies which extensively rely on legal copyright protection are also more likely to supplement this protection with the trademark. This finding supports the case for an argument that IP rights act as complements rather than substitutes. Companies in copyright industries find it important to invest in their brands and distinguish their creative and innovative activities. Also, it is important to take into account that trademarks may act as leveraging instruments, protecting certain figurative marks even after copyright protection will have expired.

The likelihood for copyright companies to rely on the protection of a patent or design is smaller than that for companies active in other fields. Nevertheless, we prove that IT (Information Technology) entities tend to patent intensively and are more likely to come up with the patentable inventions in comparison with companies across other industries (other than

copyright). The same trend holds for registered designs in publishing, advertising and photography companies.

We hope that our findings could contribute to a better understanding of how companies in different copyright industries operate, and have implications for existing policy and economic discussion in the field of copyright.

Our work raises questions for future research. The link between the relative likelihood to complement copyright with registered IP rights (trademarks, in particular) that emerges from the model is quite robust. Further research is needed to establish how the differences between countries and various copyright industries can be explained and generalized.

Directions for future research

Economics lacks empirically tested theories which explain how an optimal copyright system should work. It is well worth to engage in more extensive research, analyzing how the strategies of complementing IP rights assist companies to exploit their full potential.

We would like to outline possible directions for the future research and improvements to the data used and econometric model applied.

First, the models could be built comparing propensity of using specific IP right bundles among copyright industries and other companies instead of current model based on comparison of propensity of using any IP right. In addition, current models could be expanded by adding variables characterizing alternative choices, such as costs of protection for each bundle.

As an important step of improvement we view the possibility to complement our sample including more countries. This would allow us to observe bundling rates and differences among different income level, and control for other macroeconomic variables, such as trade of creative goods and services.

We have found that although European legal system does not offer the possibility to file for software patents, firms representing NACE code 62 – computer programming, consultancy and related activities have larger propensity to patent than non-copyright industries. It would be interesting to analyze in more detailed manner what drives this propensity to be higher, whether they are differences between firms seated in different countries and what IPC codes those firms are patenting in.

In the statistical analysis we have seen some evidence of correlation between usage of formal intellectual property rights and revenue and size of the firm. It would be important to explore this relationship in more detail and by employing proper econometric techniques in order to form causal conclusions about effectiveness of various protection strategies employed by firms active in copyright intensive industries.

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ANNEX A – Logistic Regression Models

Logistic Regression models for overall IP Rights usage

Table A-1. *Logit model for overall IPR usage*

	IP user		
	(1)	(2)	(3)
Copyright	0.623***	0.634***	0.651***
	(0.008)	(0.008)	(0.009)
SME		-2.345***	-2.291***
		(0.025)	(0.028)
Austria			1.207***
			(0.028)
Belgium			-0.293***
			(0.038)
Germany			1.644***
			(0.017)
Denmark			1.231***
			(0.028)
Spain			1.877***
			(0.016)
France			-0.448***
			(0.021)
Great Britain			0.948***
			(0.020)
Hungary			0.058**
			(0.028)
Lithuania			1.346***
			(0.028)
Netherlands			-0.107***
			(0.027)
Portugal			-0.792***
			(0.040)
Constant	-2.786***	-0.487***	-1.340***
	(0.005)	(0.025)	(0.030)
Observations	879,131	879,131	879,131
Note:			*p<0.1; **p<0.05; ***p<0.01

Table A-2. *Logit model for overall IPR usage with individual NACE codes*

	IP user		
NACE Industry	(1)	(2)	(3)
58-Publishing	1.081***	1.060***	1.188***
	(0.018)	(0.018)	(0.019)
59-Media&Ent.	0.335***	0.350***	0.501***
	(0.024)	(0.025)	(0.026)
60-Media&Ent.	1.253***	1.218***	1.096***
	(0.042)	(0.043)	(0.045)
61-IT	0.696***	0.581***	0.853***
	(0.078)	(0.081)	(0.083)
62-IT	0.713***	0.719***	0.722***
	(0.011)	(0.012)	(0.012)
63-Media&Ent.	0.690***	0.707***	0.581***
	(0.045)	(0.045)	(0.047)
70-Media&Ent.	0.484***	0.514***	0.535***
	(0.034)	(0.034)	(0.035)
73-Creative arts	0.718***	0.745***	0.695***
	(0.016)	(0.016)	(0.017)
74-Creative arts	0.178***	0.217***	0.223***
	(0.028)	(0.029)	(0.029)
90-Creative arts	-0.065*	-0.034	0.133***
	(0.035)	(0.035)	(0.036)
91-Creative arts	0.109	0.129	0.196
	(0.158)	(0.158)	(0.161)
93-Creative arts	0.001	0.021	-0.090**
	(0.035)	(0.035)	(0.036)
SME		-2.311***	-2.256***
		(0.026)	(0.028)
Austria			1.180***
			(0.028)
Belgium			-0.304***
			(0.038)
Germany			1.610***
			(0.017)

Denmark			1.210***
			(0.028)
Spain			1.886***
			(0.016)
France			-0.466***
			(0.021)
Great Britain			0.950***
			(0.020)
Hungary			0.038
			(0.028)
Lithuania			1.338***
			(0.029)
Netherlands			-0.118***
			(0.027)
Portugal			-0.798***
			(0.040)
Constant	-2.786***	-0.520***	-1.366***
	(0.005)	(0.025)	(0.030)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Logistic Regression models for National IP Rights usage

Table A-3. *Logit model for National IPR usage*

	national IP user		
	(1)	(2)	(3)
Copyright	0.597***	0.606***	0.622***
	(0.009)	(0.009)	(0.010)
SME		-2.219***	-2.180***
		(0.026)	(0.030)
Austria			1.915***
			(0.033)
Belgium			-0.749***
			(0.069)
Germany			2.412***
			(0.023)
Denmark			1.969***
			(0.032)
Spain			2.668***
			(0.022)
France			-0.066**
			(0.029)
Great Britain			1.655***
			(0.026)
Hungary			0.870***
			(0.033)
Lithuania			2.178***
			(0.032)
Netherlands			-0.333***
			(0.043)
Portugal			-0.924***
			(0.063)
Constant	-2.958***	-0.783***	-2.282***
	(0.006)	(0.026)	(0.035)
Observations	879,131	879,131	879,131
Note:			*p<0.1; **p<0.05; ***p<0.01

Table A-4. *Logit model for National IPR usage with individual NACE codes*

	national IP user		
	(1)	(2)	(3)
58-Publishing	1.042***	1.018***	1.152***
	(0.019)	(0.019)	(0.021)
59-Media&Ent.	0.312***	0.326***	0.484***
	(0.027)	(0.027)	(0.028)
60-Media&Ent.	1.280***	1.243***	1.120***
	(0.044)	(0.045)	(0.049)
61-IT	0.487***	0.362***	0.732***
	(0.091)	(0.093)	(0.099)
62-IT	0.666***	0.670***	0.672***
	(0.013)	(0.013)	(0.013)
63-Media&Ent.	0.648***	0.663***	0.479***
	(0.049)	(0.049)	(0.051)
70-Media&Ent.	0.512***	0.540***	0.589***
	(0.036)	(0.036)	(0.038)
73-Creative arts	0.738***	0.764***	0.701***
	(0.017)	(0.017)	(0.018)
74-Creative arts	0.061*	0.098***	0.092***
	(0.032)	(0.032)	(0.034)
90-Creative arts	-0.107***	-0.078**	0.112***
	(0.038)	(0.038)	(0.039)
91-Creative arts	0.150	0.168	0.272
	(0.167)	(0.168)	(0.172)
93-Creative arts	0.062*	0.082**	-0.039
	(0.036)	(0.037)	(0.038)
SME		-2.183***	-2.142***
		(0.026)	(0.030)
Austria			1.891***
			(0.033)
Belgium			-0.758***
			(0.069)
Germany			2.379***
			(0.023)

Denmark			1.954***
			(0.032)
Spain			2.679***
			(0.022)
France			-0.081***
			(0.029)
Great Britain			1.663***
			(0.026)
Hungary			0.856***
			(0.033)
Lithuania			2.171***
			(0.033)
Netherlands			-0.340***
			(0.043)
Portugal			-0.928***
			(0.063)
Constant	-2.958***	-0.818***	-2.313***
	(0.006)	(0.026)	(0.036)
Observations	879,131	879,131	879,131

Note: *p<0.1; **p<0.05; ***p<0.01

Logistic Regression models for European IP Rights usage

Table A-5. Logit model for European IPR usage

	European IP user		
	(1)	(2)	(3)
Copyright	0.492***	0.506***	0.462***
	(0.014)	(0.014)	(0.014)
SME		-2.834***	-2.597***
		(0.028)	(0.029)
Austria			0.404***
			(0.042)
Belgium			-0.141***
			(0.040)
Germany			0.627***
			(0.022)
Denmark			0.214***
			(0.044)
Spain			0.136***
			(0.023)
France			-0.618***
			(0.025)
Great Britain			0.337***
			(0.026)
Hungary			-2.247***
			(0.088)
Lithuania			-1.623***
			(0.111)
Netherlands			-0.070**
			(0.030)
Portugal			-0.845***
			(0.046)
Constant	-3.836***	-1.091***	-1.247***
	(0.009)	(0.028)	(0.033)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table A-6. Logit model for European IPR usage with individual NACE codes

	IP user		
NACE Industry	(1)	(2)	(3)
58-Publishing	0.964***	0.907***	0.928***
	(0.029)	(0.029)	(0.030)
59-Media&Ent.	0.175***	0.199***	0.235***
	(0.042)	(0.042)	(0.043)
60-Media&Ent.	0.824***	0.712***	0.674***
	(0.076)	(0.079)	(0.079)
61-IT	1.117***	0.931***	0.990***
	(0.102)	(0.107)	(0.107)
62-IT	0.722***	0.729***	0.625***
	(0.018)	(0.018)	(0.019)
63-Media&Ent.	0.533***	0.559***	0.579***
	(0.076)	(0.077)	(0.077)
70-Media&Ent.	0.158**	0.212***	0.092
	(0.062)	(0.063)	(0.063)
73-Creative arts	0.237***	0.281***	0.242***
	(0.032)	(0.032)	(0.032)
74-Creative arts	0.173***	0.247***	0.297***
	(0.046)	(0.046)	(0.046)
90-Creative arts	-0.237***	-0.180***	-0.125**
	(0.061)	(0.061)	(0.062)
91-Creative arts	-0.577	-0.547	-0.546
	(0.355)	(0.357)	(0.357)
93-Creative arts	-0.509***	-0.475***	-0.529***
	(0.072)	(0.072)	(0.072)
SME		-2.785***	-2.556***
		(0.029)	(0.029)
Austria			0.372***
			(0.042)
Belgium			-0.160***
			(0.040)
Germany			0.591***
			(0.023)

Denmark			0.174***
			(0.044)
Spain			0.140***
			(0.023)
France			-0.633***
			(0.025)
Great Britain			0.318***
			(0.027)
Hungary			-2.277***
			(0.088)
Lithuania			-1.628***
			(0.111)
Netherlands			-0.089***
			(0.030)
Portugal			-0.853***
			(0.046)
Constant	-3.836***	-1.137***	-1.271***
	(0.009)	(0.028)	(0.033)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Logistic Regression models for Patent usage

Table A-7. *Logit model for Patent usage*

	Patent user		
	(1)	(2)	(3)
Copyright	-0.236***	-0.236***	-0.333***
	(0.021)	(0.022)	(0.022)
SME		-2.670***	-2.361***
		(0.036)	(0.037)
Austria			0.104*
			(0.058)
Belgium			-0.664***
			(0.062)
Germany			0.529***
			(0.028)
Denmark			-0.033
			(0.062)
Spain			-0.900***
			(0.039)
France			-0.409***
			(0.030)
Great Britain			0.324***
			(0.034)
Hungary			-2.180***
			(0.109)
Lithuania			-2.564***
			(0.219)
Netherlands			-0.337***
			(0.040)
Portugal			-2.511***
			(0.120)
Constant	-4.251***	-1.665***	-1.682***
	(0.011)	(0.035)	(0.041)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table A-8. *Logit model for Patent usage with individual NACE codes*

	Patent user		
NACE Industry	(1)	(2)	(3)
58-Publishing	-0.110**	-0.208***	-0.275***
	(0.056)	(0.056)	(0.057)
59-Media&Ent.	-1.120***	-1.106***	-1.175***
	(0.095)	(0.096)	(0.096)
60-Media&Ent.	-0.460***	-0.617***	-0.596***
	(0.170)	(0.172)	(0.172)
61-IT	0.724***	0.498***	0.560***
	(0.147)	(0.151)	(0.151)
62-IT	0.229***	0.222***	0.048*
	(0.027)	(0.027)	(0.027)
63-Media&Ent.	-0.925***	-0.916***	-0.882***
	(0.187)	(0.187)	(0.187)
70-Media&Ent.	-0.950***	-0.905***	-1.124***
	(0.130)	(0.130)	(0.130)
73-Creative arts	-0.781***	-0.746***	-0.797***
	(0.062)	(0.062)	(0.062)
74-Creative arts	-0.398***	-0.328***	-0.267***
	(0.074)	(0.074)	(0.074)
90-Creative arts	-1.084***	-1.031***	-1.048***
	(0.113)	(0.113)	(0.113)
91-Creative arts	-0.297	-0.266	-0.374
	(0.380)	(0.381)	(0.382)
93-Creative arts	-1.359***	-1.328***	-1.366***
	(0.133)	(0.133)	(0.134)
SME		-2.636***	-2.347***
		(0.036)	(0.037)
Austria			0.071
			(0.058)
Belgium			-0.688***
			(0.062)
Germany			0.501***
			(0.029)

Denmark			-0.071
			(0.062)
Spain			-0.892***
			(0.039)
France			-0.404***
			(0.030)
Great Britain			0.301***
			(0.034)
Hungary			-2.191***
			(0.109)
Lithuania			-2.557***
			(0.219)
Netherlands			-0.359***
			(0.040)
Portugal			-2.513***
			(0.120)
Constant	-4.251***	-1.696***	-1.683***
	(0.011)	(0.035)	(0.041)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Logistic Regression models for Trademark usage

Table A-9. *Logit model for Trademark usage*

	TM user		
	(1)	(2)	(3)
Copyright	0.728***	0.740***	0.781***
	(0.009)	(0.009)	(0.009)
SME		-2.337***	-2.317***
		(0.026)	(0.029)
Austria			1.623***
			(0.031)
Belgium			-0.094**
			(0.045)
Germany			2.082***
			(0.020)
Denmark			1.664***
			(0.031)
Spain			2.400***
			(0.020)
France			-0.715***
			(0.029)
Great Britain			1.330***
			(0.024)
Hungary			0.535***
			(0.031)
Lithuania			1.876***
			(0.031)
Netherlands			-0.049
			(0.034)
Portugal			-0.639***
			(0.048)
Constant	-2.984***	-0.696***	-1.909***
	(0.006)	(0.026)	(0.033)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table A-10. *Logit model for Trademark usage with individual NACE codes*

	TM user		
NACE Industry	(1)	(2)	(3)
58-Publishing	1.209***	1.189***	1.372***
	(0.018)	(0.019)	(0.020)
59-Media&Ent.	0.468***	0.485***	0.693***
	(0.025)	(0.025)	(0.027)
60-Media&Ent.	1.423***	1.390***	1.275***
	(0.043)	(0.043)	(0.047)
61-IT	0.745***	0.625***	0.954***
	(0.083)	(0.085)	(0.090)
62-IT	0.809***	0.816***	0.849***
	(0.012)	(0.012)	(0.013)
63-Media&Ent.	0.839***	0.858***	0.713***
	(0.046)	(0.046)	(0.048)
70-Media&Ent.	0.631***	0.663***	0.733***
	(0.034)	(0.035)	(0.036)
73-Creative arts	0.812***	0.841***	0.797***
	(0.017)	(0.017)	(0.018)
74-Creative arts	0.174***	0.215***	0.216***
	(0.031)	(0.031)	(0.032)
90-Creative arts	0.035	0.067*	0.272***
	(0.036)	(0.036)	(0.038)
91-Creative arts	0.118	0.139	0.228
	(0.171)	(0.172)	(0.176)
93-Creative arts	0.132***	0.155***	0.033
	(0.036)	(0.036)	(0.037)
SME		-2.299***	-2.280***
		(0.026)	(0.029)
Austria			1.598***
			(0.032)
Belgium			-0.104**
			(0.045)
Germany			2.047***
			(0.021)

Denmark			1.645***
			(0.031)
Spain			2.415***
			(0.020)
France			-0.737***
			(0.029)
Great Britain			1.331***
			(0.024)
Hungary			0.514***
			(0.031)
Lithuania			1.873***
			(0.031)
Netherlands			-0.059*
			(0.034)
Portugal			-0.642***
			(0.048)
Constant	-2.984***	-0.732***	-1.941***
	(0.006)	(0.026)	(0.034)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Logistic Regression models for Registered Design usage

Table A-11. *Logit model for Design usage*

	Design user		
	(1)	(2)	(3)
Copyright	-0.051*	-0.048*	-0.052*
	(0.029)	(0.029)	(0.029)
SME		-2.628***	-2.582***
		(0.048)	(0.050)
Austria			0.510***
			(0.102)
Belgium			-0.215**
			(0.109)
Germany			1.155***
			(0.052)
Denmark			1.221***
			(0.078)
Spain			1.055***
			(0.050)
France			0.628***
			(0.050)
Great Britain			0.089
			(0.073)
Hungary			-0.606***
			(0.112)
Lithuania			0.081
			(0.132)
Netherlands			-0.066
			(0.077)
Portugal			0.356***
			(0.074)
Constant	-5.010***	-2.470***	-3.068***
	(0.016)	(0.047)	(0.063)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table A-12. *Logit model for Design usage with individual NACE codes*

	Design user		
NACE Industry	(1)	(2)	(3)
58-Publishing	0.309***	0.209***	0.202***
	(0.066)	(0.067)	(0.067)
59-Media&Ent.	-0.242***	-0.221**	-0.232**
	(0.091)	(0.091)	(0.091)
60-Media&Ent.	0.177	0.021	-0.006
	(0.181)	(0.183)	(0.183)
61-IT	0.300	0.031	0.289
	(0.260)	(0.263)	(0.265)
62-IT	-0.737***	-0.752***	-0.773***
	(0.059)	(0.059)	(0.059)
63-Media&Ent.	-0.539**	-0.524**	-0.540**
	(0.225)	(0.225)	(0.225)
70-Media&Ent.	-0.158	-0.104	-0.170
	(0.128)	(0.129)	(0.129)
73-Creative arts	0.663***	0.709***	0.642***
	(0.046)	(0.046)	(0.047)
74-Creative arts	0.577***	0.655***	0.664***
	(0.067)	(0.068)	(0.068)
90-Creative arts	-0.796***	-0.736***	-0.572***
	(0.143)	(0.143)	(0.143)
91-Creative arts	-1.492	-1.459	-1.090
	(0.999)	(0.999)	(0.999)
93-Creative arts	-0.859***	-0.821***	-0.770***
	(0.152)	(0.152)	(0.152)
SME		-2.661***	-2.597***
		(0.048)	(0.050)
Austria			0.516***
			(0.102)
Belgium			-0.219**
			(0.109)
Germany			1.165***
			(0.052)

Denmark			1.230***
			(0.078)
Spain			1.032***
			(0.050)
France			0.620***
			(0.050)
Great Britain			0.179**
			(0.074)
Hungary			-0.605***
			(0.112)
Lithuania			0.032
			(0.132)
Netherlands			-0.051
			(0.077)
Portugal			0.333***
			(0.075)
Constant	-5.010***	-2.439***	-3.052***
	(0.016)	(0.047)	(0.064)
Observations	879,131	879,131	879,131
Note:		*p<0.1; **p<0.05; ***p<0.01	

ANNEX B – Data description

There are 12 NACE divisions that represent copyright intensive industries: 58, 59, 60, 61, 62, 63, 70, 73, 74, 90, 91 and 93.

They are listed in the table B-1 below.

Table B-1. Dependent variables representing 12 Copyright intensive NACE divisions.

NACE Rev.2 Division code	Name of division	Core Copyright NACE industries falling under division category	Group of Copyright Industry
58	Publishing activities	5811, 5812, 5813, 5814, 5819, 5821, 5829	Publishing
59	Motion picture, video and television program production, sound recording and music publishing activities	5911, 5912, 5913, 5914, 5920	Media & Entertainment
60	Programming and broadcasting activities	6010, 020	Media & Entertainment
61	Telecommunications	6120	IT
62	Computer programming, consultancy and related activities	6201, 6202, 6203, 6209	IT
63	Information service activities	6312, 6391, 6399	Media & Entertainment
70	Activities of head offices; management consultancy activities	7021	Media & Entertainment
73	Advertising and market research	7311, 7312	Creative arts & Cultural activities
74	Other professional, scientific and technical activities	7410, 7420, 7430	Creative arts & Cultural activities
90	Creative, arts and entertainment activities	9001, 9002, 9003	Creative arts & Cultural activities
91	Libraries, archives, museums and other cultural activities	9101	Creative arts & Cultural activities
93	Sports activities and amusement and recreation activities	9329	Creative arts & Cultural activities

ANNEX C – Copyright-intensive industries according to the WIPO methodology

As explained in Chapter 3, the copyright intensive industries were selected on the basis of a USPTO adaptation of a WIPO methodology. This adaptation takes a stricter approach than WIPO towards inclusion of industries as copyright-intensive. In this Appendix, the standard WIPO methodology, as outlined in WIPO (2003), and the stricter USPTO (2012) interpretation are explained.

WIPO divides the copyright-intensive industries into four main categories:

- Core
- Interdependent
- Partial
- Non-dedicated support

Core copyright industries

The core copyright-intensive industries, as defined by WIPO (World Intellectual Property Organization), are industries that are wholly engaged in creation, production and manufacturing, performance, broadcast, communication and exhibition, or distribution and sales of works and other protected subject matter.

WIPO definition is broader than that used in the USPTO (United States Patent and Trademark Office) study in that it does not exclude activities related to distribution. According to WIPO, core copyright industries "as a category would not exist or would be significantly different without copyright in works or other subject matter." Therefore, all of the value added and employment generated in these industries should be considered to be copyright's contribution to the economy.

The list below shows all the core copyright-intensive industries identified by WIPO and/or the USPTO. Of the 33 industries used in the USPTO study, 31 are defined as core by both the USPTO and WIPO and are marked Core-US-WIPO in the list. Two industries (publishing of directories of mailing lists and public relations and communication activities) are considered copyright-intensive by the USPTO but not by WIPO. They are marked as Core-US. Finally, 18 industries are considered core by WIPO but not by the USPTO. Those industries are labeled Core-WIPO.

Table C-1. The list of core copyright-intensive industries according to WIPO and USPTO

NACE code	NACE description	Type
58.12	Book publishing	Core-US-WIPO
58.13	Publishing of newspapers	Core-US-WIPO
58.14	Publishing of journals and periodicals	Core-US-WIPO
58.19	Other publishing activities	Core-US-WIPO
58.21	Publishing of computer games	Core-US-WIPO
58.29	Other software publishing	Core-US-WIPO
59.11	Motion picture, video and television program production activities	Core-US-WIPO
59.12	Motion picture, video and television program post-production activities	Core-US-WIPO
59.13	Motion picture, video and television program distribution activities	Core-US-WIPO
59.14	Motion picture projection activities	Core-US-WIPO
59.20	Sound recording and music publishing activities	Core-US-WIPO
60,10	Radio broadcasting	Core-US-WIPO
60.20	Television programming and broadcasting activities	Core-US-WIPO
61.20	Wireless telecommunications activities	Core-US-WIPO
62.01	Computer programming activities	Core-US-WIPO
62.02	Computer consultancy activities	Core-US-WIPO
62,03	Computer facilities management activities	Core-US-WIPO
62.09	Other information technology and computer service activities	Core-US-WIPO
63.12	Web portals	Core-US-WIPO
63.91	News agency activities	Core-US-WIPO
63.99	Other information service activities n.e.c.	Core-US-WIPO
73.11	Advertising agencies	Core-US-WIPO
73.12	Media representation	Core-US-WIPO
74.10	Specialized design activities	Core-US-WIPO
74.20	Photographic activities	Core-US-WIPO
74.30	Translation and interpretation activities	Core-US-WIPO
90.01	Performing arts	Core-US-WIPO
90.02	Support activities to performing arts	Core-US-WIPO
90.03	Artistic creation	Core-US-WIPO
91.01	Library and archives activities	Core-US-WIPO
93.29	Other amusement and recreation activities	Core-US-WIPO
58.12	Publishing of directories and mailing lists	Core-US
70.21	Public relations and communication activities	Core-US
18.11	Printing of newspapers	Core-WIPO
18.12	Other printing	Core-WIPO
18.13	Pre-press and pre-media services	Core-WIPO
18.14	Binding and related services	Core-WIPO
18.20	Reproduction of recorded media	Core-WIPO

47.61	Retail sale of books in specialized stores	Core-WIPO
47.62	Retail sale of newspapers and stationery in specialized stores	Core-WIPO
47.63	Retail sale of music and video recordings in specialized stores	Core-WIPO
18.12	Wired telecommunications activities	Core-WIPO
61.30	Satellite telecommunications activities	Core-WIPO
61.90	Other telecommunications activities	Core-WIPO
18.12	Data processing, hosting and related activities	Core-WIPO
79.90	Other reservation service and related activities	Core-WIPO
82.19	Photocopying, document preparation and other specialized office support activities	Core-WIPO
85.52	Cultural education	Core-WIPO
18.12	Operation of arts facilities	Core-WIPO
93.21	Activities of amusement parks and theme parks	Core-WIPO
94.12	Activities of professional membership organizations	Core-WIPO