

Use of IPR bundles by EU firms 2014-2015



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1. Introduction

Intellectual property (IP) protection is a key tool to protect the result of research and development (R&D) investments, but also a key mechanism to control and monetise the marketing of the resulting products and services. In a successful IP strategy, bundles of IPRs can help capture the different facets of intellectual assets and incentivise innovation by increasing the return on innovation.

In this study, a large sample of European Union (EU) firms that simultaneously used different types of IP right (IPRs) for the same product in the period 2014-2015 is examined. The reference period is the most recent one for which reliable and unbiased⁽¹⁾ data could be obtained from several databases that have been linked. However, since the patterns of use of IPRs examined in this study are of a structural nature, the use of data from 5-6 years ago does not affect the value of the findings.

An IPR bundle in this report will mean the use of at least two different types of the following IPRs: patents, registered trade marks, or registered designs (recognising that there are other ways to protect innovation, such as copyright, unregistered rights, trade secrets and various informal appropriability mechanisms)⁽²⁾. The study is based on EU-level IPRs only, as it was not practical to retrieve and analyse all relevant national filings made by the companies in the sample.

The use of IPR bundles is justified in that different forms of IPR are designed to address different market needs. Thus, patents are designed to address the problem of appropriation of innovation, that is, the fact that without legal means, firms cannot always prevent others from copying and marketing their inventions, which would often leave them with insufficient returns to recover innovation investments. Trade marks, on the other hand, serve to reduce the ‘information asymmetry’, which lowers the risk of consumer confusion and the costs that consumers must incur when searching for a particular good or service. The trade mark serves the purpose of distinguishing the goods and services to which it applies from those marketed by other firms. Registered designs are another way to support the marketing function by protecting the unique form attributes of a product. ‘Innovation is the market introduction of a technical or organisational novelty, not just its invention’⁽³⁾. It is therefore not surprising that IPR bundles are suitable for innovation, as it is a process where novelty and marketing are mixed, mapping the different IPR purposes and scope⁽⁴⁾.

The study uses data from European IPR registries (the European Union Intellectual Property Office (EUIPO) and the European Patent Office (EPO)) and also business data from the ORBIS

⁽¹⁾ The use of more recent data would have introduced a significant bias in the results due to the lack of coverage of newly created firms in the ORBIS database.

⁽²⁾ These types of IPR could not be included in a study of this type because in contrast with patents, trade marks and registered designs, information on copyright and unregistered rights cannot be obtained from publicly accessible databases. In the remainder of this report, the terms ‘trade mark’ and ‘design’ refer to registered trade marks and registered designs, respectively.

⁽³⁾ Joseph A. Schumpeter (1911), *Theorie der wirtschaftlichen Entwicklung*.

⁽⁴⁾ The definition of IP rights presented here is based on their economic function. The legal definition of the IPR examined in this study is shown in Section 3.

database, provided by Bureau van Dijk, a subsidiary of Moody's. The three databases were cross-matched using an algorithm used in previous Observatory studies, which has been able to accurately identify the applicants for more than half of the IPRs in the EUIPO's and the EPO's registers⁽⁵⁾. This comprehensive sample is the main basis of the study.

The use of a large sample of companies and the combination of several databases of different origin is one of the distinguishing features of the present study.

The report contains a comprehensive descriptive analysis to provide additional insight into the complex interlocking factors associated with the use of IPR bundles. Differences in the use of bundled IPRs between companies of various sizes, operating in different sectors and based in different Member States are also analysed.

The results are put into context of the existing literature on the determinants and consequences of adopting IPR bundles.

Finally, possibilities for further studies of the subject are discussed.

⁽⁵⁾ The algorithm is described in EPO-EUIPO, September 2019: Intellectual property rights intensive industries and economic performance in the European Union, Industry-Level Analysis Report, third edition. Not all applicants could be identified in ORBIS, either because these firms are not listed in ORBIS, because different names were used (often misspellings), or because ORBIS listed different firms with the same name.

2. Executive summary

This study looks at EU firms that simultaneously use different types of IPRs for the same products in the period 2014-2015. The sample is made up of 63 286 firms altogether holding 76 202 European patents, 98 257 EU trade marks (EUTMs) and 21 676 registered Community designs (RCDs). These IPRs represent 48.2% ⁽⁶⁾ of the total IPRs filed in the EUIPO and the EPO by European Union (EU) firms during the period.

Of the firms in this sample, 8.3% have applied for more than one type of IPR. The IPRs filed by these firms correspond to 35.7% of all IPRs in the sample. Out of these firms, 1 % applied for all three IPRs, (patents, trade marks, and registered designs) during the period. This corresponds to 16.8% of all IPRs registered in the EUIPO and the EPO by firms in the sample. These figures indicate a strong concentration of IPRs.

Out of the total designs and patents registered, half belong to firms from the sample. Furthermore 45% of design filings come from firms also filing trade marks. Trade mark filings show a different pattern though. Most trade marks (nearly 80%) are filed by firms that file only trade marks but neither designs nor patents.

Patents are the IPR that is most often used together with other rights. Firms filing both trade marks and patents filed nearly 4 patents for every trade mark; firms filing both designs and patents filed 6.5 patents for every design. When it comes to designs and trade marks filed by the same firm, there are 1.5 trade marks per design.

The multi-IPR firms have a strong economic weight, representing 31.9% of employment and 35.5% of turnover in the sample. Firms filing all three types of IPR represent 14.1% of employment and 16% of turnover.

The size of firms is of importance. The larger the firm, the more likely is it to be a multi-IPR business. More than 20% of large firms have filed more than one type of IPR, compared to only 7% of small and medium-sized enterprises (SMEs). More than 64% of the all IPRs filed by large firms are concurrent, compared to 20 % of IPRs filed by SMEs.

The study also shows significant differences among sectors. At one extreme, 15 % of firms in ‘manufacturing and mining’ are multi-IPR firms, while only 6% of firms active in ‘services, commerce and utilities’ use concurrent IPRs. This is not surprising given that those sectors file relatively few patents.

⁽⁶⁾ Specifically, they represent 55.9% of patents, 43.4% of trade marks, and 49.2% of designs.

3. Examples and definitions

IPR overview

This section provides a brief summary of the characteristics of patents, trade marks and registered designs.

Patents

Patent protection is available for inventions that aim to offer new solutions to technical problems. To be patentable in Europe, inventions must be new, non-obvious (i.e. include an inventive step) and industrially applicable. The novelty requirement means that, at the filing date, the technical solution must not be known to the public anywhere. To satisfy the inventive step requirement, the invention must not be obvious to a person who has ordinary skills in the applicable field. Finally, the invention must be susceptible to an industrial application. A patent needs to be examined and granted by a competent patent office.

In Europe, inventors can apply for patent protection in the individual European states via the national patent systems and/or seek regional protection through a centralised procedure at the EPO. A European patent granted by the EPO offers patent protection in up to 44 countries, subject to national validation.

Trade marks

A trade mark is a distinctive sign that identifies certain goods or services as those provided by a specific person or organisation and distinguishes them from those of other undertakings. Trade marks are intended to reduce information and transaction costs in the marketplace by allowing customers to identify the nature and quality of goods and services before purchase. Among the most common signs eligible for trade mark protection are words, pictures, stylised words, logos, a colour or colour combination, a shape, a sound or some combination of those signs.

Trade marks can be protected on the basis of either registration through a trade mark office (i.e. registered trade marks) or, in some countries, through their actual use in the market place (i.e. unregistered trade marks). The present study is based on registered trade marks.

Registered designs

Design protection covers the visual appearance of a product, part of a product and/or its ornamentation. A product can be any industrial or handicraft item, including packaging, graphic symbols and typefaces. In other words, a design covers the appearance of a product, but cannot protect its functions, which fall under the regime of patent protection. The requirements that must be satisfied to protect a design include that it must be new and have an individual

character. Industrial design protection is usually granted pursuant to a procedure for its registration (registered design).

In the EU, firms can protect trade marks and designs by applying for registration at national IP offices or alternatively, by filing an application for an EUTM or RCD at the EUIPO, the Intellectual Property Office of the European Union. Registration in the Member States IP⁽⁷⁾ offices will provide protection in those States, while EUTMs and RCDs provide protection in all Member States of the EU.

Timelines

RCDs are usually registered within 10 days if no deficiencies are found, whereas EUTMs are registered within 26 weeks in most cases. For patents, the process from filing to grant can last several years. Because of these very different timelines, a trade mark application is likely to occur at a later stage, when the product is closer to market introduction (although in some cases the trade mark may be filed at an early stage of the product development process, particularly in the EU where there is no use requirement for filing). In essence it means that the patent applications and TM registrations for the period may not always ‘match’.

The characteristics of the three IPRs are summarised below.

	Patents	Trade marks	Designs
Subject matter	Inventions (solutions to technical problems)	Distinctive signs that identify certain goods or services and distinguish them from those of other businesses	Appearance of an article or product or parts of it
Requirements for protection	Novelty; inventive step (non-obviousness); industrial applicability	Distinctiveness	Novelty; individual character
Acquisition of right	Examination by the patent office, followed by grant and validation	For registered trade marks, examination and registration by the IP office	For registered designs, examination by the IP office
Conferred rights	Exclusive right to make, use and sell the patented invention and to prevent any third party from using it without the rights holder's consent	Exclusive right to use the trade mark in trade and to prevent any third party from using it without the rights holder's consent	Exclusive right to use the design and to prevent any third party from using it without the rights holder's consent
Duration	Up to 20 years from priority filing, subject to payment of annual renewal fees	For registered trade marks, 10 years from filing, but can be renewed indefinitely, on payment of fees, for successive periods	In the case of RCDs, up to 25 years (in successive 5-year terms)

⁽⁷⁾ There is also a regional IP office in the EU, the Benelux Office of Intellectual Property (BOIP), that provides protection in Belgium, Luxembourg and the Netherlands.

Definitions

Table 1 below summarises the key definitions used in this study.

Table 1. Definitions

Terms	
IPR bundle	The use of at least two types of IPRs for the same product
IPR-active firm	Firm filing at least one IPR during the relevant period
Multi-IPR firm	Firm filing at least two types of IPR during the relevant period
Concurrent IPRs	IPRs filed by multi-IPR firms during the relevant period
Period	1 January 2014 to 31 December 2015
Scope	Trade marks and designs filed at the EUIPO and patents filed at the EPO ⁽⁸⁾

IPR-active firms⁽⁹⁾ are firms that have applied for at least one of the three types of IPRs: EUTMs, RCDs or European patents.

Multi-IPR firms are the firms that have applied for at least two different types of IPR during the period. This group of firms will be the proxy for firms engaged in bundling.

Concurrent IPRs are those filed by the multi-IPR firms, that is IPRs that have been filed by firms that filed more than one type of IPR in the period. Concurrent IPRs are used as a proxy for IPR bundles, recognising that in some cases they may refer to different products.

In most previous studies (if they have a macroeconomic approach) these variables have been used as proxies for IPR bundles and for the firms that use them. Often in these studies, ‘concurrent IPRs’ is assimilated to ‘IPR bundle’ for simplicity when presenting conclusions. To clarify, concurrent IPRs refers to the registration of more than two IPRs by a firm regardless of whether these rights are used for the same product. On the other hand, an IPR bundle refers to the registration and use of different IPRs for the same product.

The use of both proxies, that is, the number of firms bundling and the number of IPRs in bundles, will serve to better describe a situation found in previous studies, namely that the low number of firms engaged in bundling, hides its real economic importance: ‘firms that apply for both patents and trade marks account for a sizeable share of total assets, employment, and turnover in the manufacturing sector. Assuming that holding both patents and trade marks,

⁽⁸⁾ There are other registered IPRs, for example, plant variety rights, which could be bundled with patents or trade marks. However, such combinations occur infrequently.

⁽⁹⁾ This terminology is taken from Helmers, C., Schautschick, P., *The use of intellectual property right bundles by firms in the UK*, The Intellectual Property Office, Newport, 2013.

proxies for the use of IPR bundles, this would suggest that firms that use bundles account for an important share of economic activity within industries' (Helmets et al. 2013).

The number of multi-IPR firms and the number of IPRs registered by those firms, their total employment and their total turnover are used in this study in order to assess the use of bundles. Special relevance is given to the first two variables because they have been calculated with greater accuracy and are statistically more robust for group breakdowns⁽¹⁰⁾.

The above proxies have potential drawbacks that must be taken into account when interpreting the results. This is the case when considering **filings** in a period as a proxy for **use**. The duration of trade marks can be longer than that of designs and patents, for example in the fields of consumer electronics, where the product cycles can be short. It is common that new models, containing new innovations and protected by new patents and designs, are often marketed under the same trade mark, especially if the corresponding brand has gained prestige. Looking at filings during a limited period may not capture such bundling.

In addition, the choice of a two-year study period can cause one to fail to observe some bundles⁽¹¹⁾, as illustrated by the Miele example below (Example 2).

Example 1: trade mark and design

Beiersdorf AG is a German producer of cosmetics and personal care products. In 1996 the firm filed a word trade mark⁽¹²⁾ 'Labello' under Nice Class 3 for 'cosmetic products'. In 2014 the firm also registered a word mark⁽¹³⁾ under the Nice Class 3 'LABELLO CARE & COLOR'. In 2015 Beiersdorf filed three designs⁽¹⁴⁾ for packages under the Locarno Class 09.05 for 'Blister package, blister cards'.



⁽¹⁰⁾ IP rights are available for the whole sample, turnover is only available for half of the sample.

⁽¹¹⁾ An extreme case may be a trade mark filed in December 2013 and a patent filed for in January 2014.

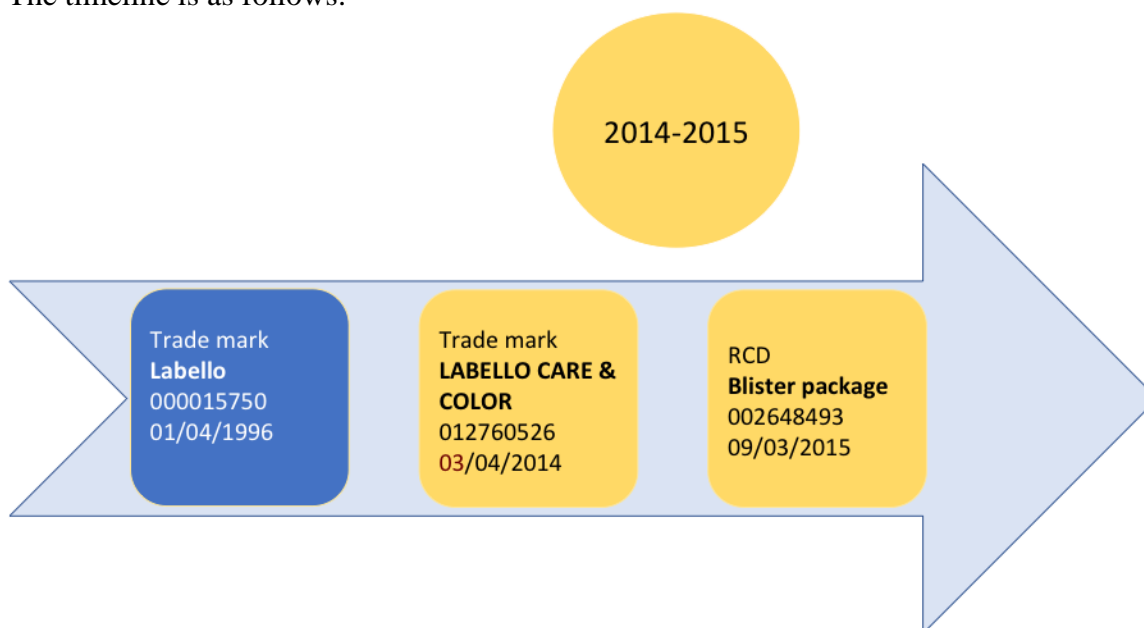
⁽¹²⁾ EUTM No 15 750.

⁽¹³⁾ EUTM No 12 760 526.

⁽¹⁴⁾ RCDs No 002648493-0007, No 002648493-0008, No 002648493-0009.

RCD No 002648493-0008

The timeline is as follows:



Example 2: patent, trade mark and design

In 2007, Miele filed the trade mark **Hyclean**⁽¹⁵⁾ under several Nice classes including Class 7 for household appliances, vacuum cleaners and related products.

Related to this product, various designs and patents were also filed. In 2015, Miele filed two patents in Germany for a dust filter bag for use in a vacuum cleaner, and a patent at the EPO in 2016. In 2017, a design for the 'packaging of vacuum cleaner bags' was registered⁽¹⁶⁾ (Locarno Class 09.03). Moreover, the firm also registered a design for 'vacuum cleaner bags'⁽¹⁷⁾ (Locarno Class 09.05) in 2017.

⁽¹⁵⁾ EUTM No 6 012 009.

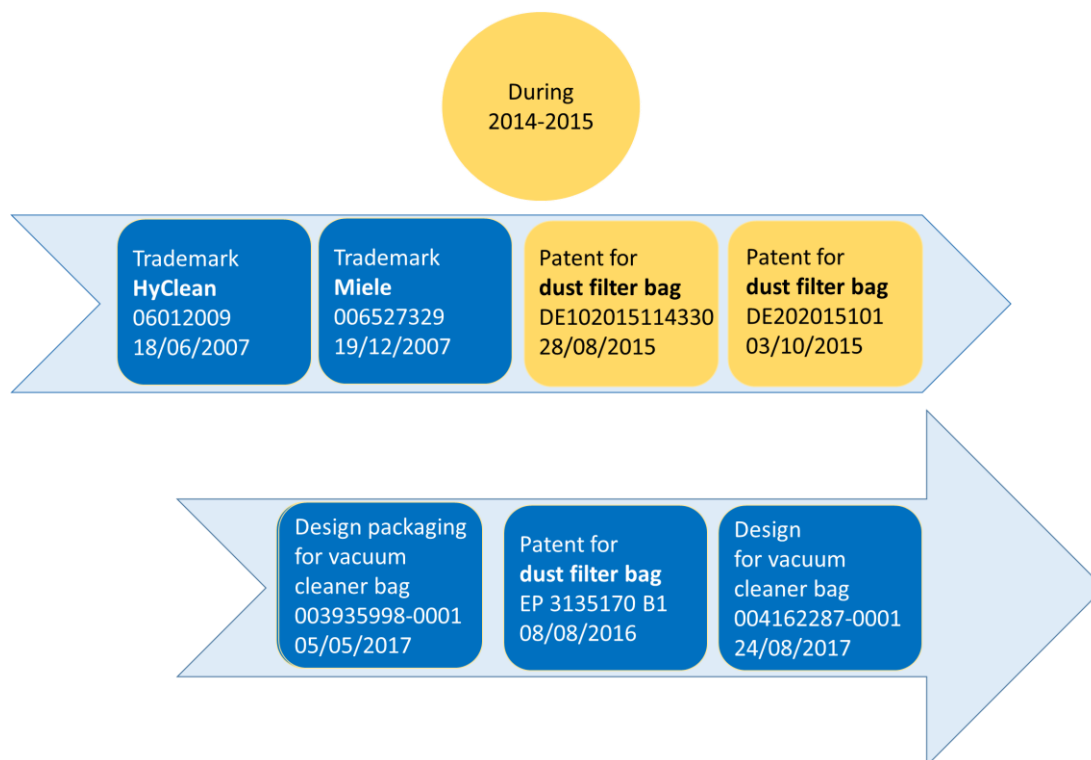
⁽¹⁶⁾ RCD No 003935998-0001.

⁽¹⁷⁾ RCD No 004162287-0001.

Packaging Design 003935998-0001**Bag design** 004162287-0001

In summary, Miele's innovation is protected by patents and registered designs (the bag) and marketing is supported by trade marks and designs (the packaging) over a period of several years. This example shows the complex nature of innovation, novelty and marketing, and the heterogeneity and complementarity of different types of IPRs.

The following figure summarises the timeline of filing of different IPRs related to vacuum cleaner bags produced by Miele. The only IPR related to this product/innovation filed during the years 2014 and 2015 was the patent but before and after this period several IPRs related to the product were registered.



Because the trade marks were filed before the study period, the data incorrectly indicates that Miele **was not** a multi-IPR firm during 2014-2015. It is therefore a ‘false negative’ in the study.

A possible correction could be to base the analysis on the stock of valid IPRs at a certain point in time. For example, if one takes 1 January 2016 as the reference date, then both the patent for the filter bag, and the trade marks HyClean and Miele were registered and valid. Nevertheless, this approach would lead to considering as bundles many IPRs that are not really related. Indeed, Helmers et al. (2013) ‘assume that firms that have applied for both patents and trade marks, use them as bundles, i.e. to protect different features of the same product’ but after the analysis of a sample they conclude that ‘only a small fraction of firms that apply for both patents and trade marks, uses them as bundles’.

To try to mitigate the problem identified by Helmers, the period for considering concurrent filings will be reduced to 2 years thus increasing the likelihood that IPRs filed during a relatively short period truly constitute a bundle. The reason for that can be found in one of the conclusions of the Helmers study: ‘our analyses of the timing of the different IPRs that belong to a bundle suggest that firms tend to file the different IPRs closely together’⁽¹⁸⁾. In other words, by reducing the period to 2 years, an attempt is made to reduce the number of ‘false positives’ when identifying bundles, although this comes at a cost: the risk of getting more ‘false negatives’ such as the Miele example above.

In summary, identifying IPR bundles is difficult since different IPRs protect different types of IP and two types of IPRs (patents and trade marks) do not necessarily relate to one specific product. Patents protect technological knowledge (an invention), which can be used for many different products (particularly if the technology is process related or applies to a component that can be used in many different products). Trade marks can be used for all products of the entire firm or for an entire product line. Designs may also be used for several products, but may also refer to a part of a product that may not be used for any individual copy of a product.

The examples in this section illustrate the complex nature of using different IPRs at the same time to protect a firm’s entire business. From this complexity, it is fair to conclude that it is difficult to identify IPR bundles at the product level, but that it is more practical to identify firms that use different IPRs at the same time. The possibility of false negatives and false positives, is unavoidable.

⁽¹⁸⁾ Helmers, C., Schautschick, P., *The use of intellectual property right bundles by firms in the UK*, The Intellectual Property Office, Newport, 2013.

4. Literature on IPR bundles

The academic literature on IP bundles is scarce, focusing mainly on the interplay between patents and trade marks, sometimes in combination with informal protection methods such as trade secrets. Comino and Manenti (2015) conclude as follows:

‘The theoretical literature suggests that firms can jointly use two or more protection mechanisms (patents, copyright and trademarks) in order to exploit both cost-driven and market-driven complementarities. The joint use of IPRs is one of the most intriguing issues in ICTs [information and communication technologies] where short product life-cycles, fierce competition, high product complexity require firms to use effective protection mechanisms. The empirical literature on the use of IP bundles is extremely scant, and it is not specific to the ICT sectors. A better understanding of the interplay of the various property rights is also important for policy makers; a policy intervention affecting one IP instruments is likely to change how firms employ the other protection mechanisms.’

Helmers and Schautschick (2013) use data on UK firms that own IPRs. Their product-level analysis shows that only a small fraction of firms that apply for both patents and trade marks, uses them as bundles. They also find that there is considerable variation among different sectors in their use of bundles, that firms that bundle tend to file their IPRs at roughly the same time, and, surprisingly, they do not find a positive impact of bundling on the performance of the firms.

Dernis et al. (2015) is a descriptive study of patent and trade mark filings at the EUIPO, EPO, USPTO and JPO. Essentially descriptive in nature, the study presents statistics about the patent portfolio of companies and their trade mark strategies to launch new products, and looks at the extent to which companies bundle these two forms of IPR to protect and appropriate the returns of their knowledge-based assets. The authors stress the economic importance of bundling. Combining several IPRs is part of the firms’ strategy to ‘appropriate the returns of their knowledge-based assets’.

Furthermore, the study found that companies most likely to form bundles belong to the chemical, pharmaceutical, food product, computers and electronic industries. The computer, pharmaceutical and vehicle sectors tend to bundle trade marks with patents spanning a wide range of the technology sectors, implying a horizontal nature of R&D and product development in these industries.

Parchomovsky (2002) points out that IP bundling is not only important in the initial stages of product development and commercialisation but that it may have implications for the entire life cycle of a product. A patent can help develop and maintain brand loyalty and even when the patent protection has expired due to the use of a trade mark the firm can still earn profits from its innovation. In a similar vein, Jennewein (2005) concludes that a company’s investment in both branding activities as well as in the development of technological assets will increase the life cycle of an innovation. Aaker (2007) also stresses the additional returns to innovation if that innovation is properly branded (and hence protected by a trade mark).

In their joint study of high-growth firms, the EUIPO and the EPO (2019) found that small firms that use a combination of trade marks, patents and designs have a higher likelihood of achieving high growth in subsequent years than companies that only use one of the IPRs or none at all. However, the analysis in the study is not on the level of individual products but rather for the firm as a whole.

In the context of the existing literature, the added value of this study is to contribute a more precise terminology, with clear definitions and examples, and above all, with the analysis of the concurrence between products and technologies that is presented in Section 6.

5. Data and methodology

IPR registries and ORBIS

The main dataset consists of a sample of 63 286 firms based in the EU that filed for IPRs at the EUIPO or EPO in 2014-2015. In total, during those 2 years, the firms in the sample applied for 98 257 EUTMs, 21 676 RCDs and 76 202 patents at the EPO, which represents 48.2% ⁽¹⁹⁾ of the total IPRs filed at the EUIPO and EPO by EU firms during that period.

The sample was built by matching three databases.

- ORBIS, a commercial database containing economic sector classification, turnover, employment and other financial information for more than 20 million European firms. ORBIS is provided by Bureau van Dijk, which compiles data based on filings made by firms in company registries and similar government records in their respective countries. It includes data on all firms, whether listed on a stock exchange or not, the latter being typically the case for SMEs. The size of the firm (small, medium or large) was calculated based on the most recent available turnover and employment data in ORBIS, following the definitions of Eurostat).
- The EUIPO registry of EUTMs and RCDs.
- The EPO's PATSTAT database, containing information on patent applications that have been published and/or granted by the EPO.

The data matching between ORBIS and the IPR registries is carried out using the name of the IPR holders and the algorithm developed for the study on the contribution of IPR-intensive industries to the EU economy ⁽²⁰⁾. The algorithm was slightly adapted to identify which sets of owners' IDs corresponded to the same firm ⁽²¹⁾ and to increase the certainty ⁽²²⁾ when identifying concurrent IPRs. As a consequence, the percentage of IPRs identified in this study is lower than in the IP Contribution study. However, the sample is large and most of the relevant subgroups are well represented.

⁽¹⁹⁾ Specifically, the firms in the sample account for 43.38% of total trade marks, 49.19% of designs and 55.89% of patents during 2014-2015.

⁽²⁰⁾ IPR-intensive industries and economic performance in the European Union; September 2019. Further details about the matching algorithm can be found in Chapter 5, 'Methodology of the study'.

⁽²¹⁾ For different reasons, both in the EUIPO and the EPO, some firms apply for rights using different owner identifiers. Failure to identify these links can lead to 'false negatives'.

⁽²²⁾ Minimising the probability of 'false positives.'

Table 2. Sample description

IPR-active firms	63 286	Share of total IPR in the sample
<i>their trade marks</i>	98 257	43.4 %
<i>their designs</i>	21 676	49.2 %
<i>their patents</i>	76 202	55.9 %
Total IPRs	196 135	48.2 %
<i>Period</i>	01/01/2014 to 31/12/2015	
<i>Scope</i>	EU28 firms in the EUIPO and EPO	

During the period covered by the data, the United Kingdom (UK) was part of the EU and therefore UK firms have been included in the sample; where appropriate, aggregate results are presented with and without the UK, labelled EU28 and EU27, respectively.

6. Main results

Table 3 shows the behaviour of IPR-active firms in the sample. Among those firms, 8.3% applied for at least two types of IPR during the period 2014-2015; this group includes 1% of firms that have filed all three types of IPR.

The firms that have only filed one type of IPR have filed on average 2.2 IPRs versus 13.3 IPRs for the multi-IPR firms. In other words, multi-IPR firms are more than six times more active in filing IPRs than those that have only filed one type of IPR. This is why those 8.3% of firms account for 35.7% of the IPRs in the sample. The 1% that filed for all three IPRs account for 16.8% of all filings in the sample.

Table 3. Number of firms by filing combination, EU28

IPR combination	% of firms	% of IPRs	Employment (% of sample)	Turnover (% of sample)
Only TM	72.8 %	38.4 %		
Only DES	10.5 %	5.1 %		
Only PAT	8.4 %	20.8 %		
Concurrent filings	8.3 %	35.7 %	31.9 %	35.5 %
TM & DES	4.7 %	8.5 %		
TM & PAT	1.9 %	7.1 %		
PAT & DES	0.8 %	3.3 %		
TM, DES, PAT	1.0 %	16.8 %	14.1 %	16.0 %
N	63 286	196 135		

In terms of economic importance, the multi-IPR firms represent 31.9% of employment and 35.5% of turnover among the firms in the sample. Firms filing all three types of IPR represent 14.1% of employment and 16.0% of turnover in the sample.

Table 4 shows in more detail which IPRs are most often concurrent. Half of designs and nearly half of patents are filed concurrently with other IPRs. The case of trade marks is different: more than 80% are filed by firms that do not file designs or patents.

Table 4. Number of concurrent IPRs by type, EU28

% in concurrent IPRs	%	N
Trade marks	19.3	98 257
Designs	51.3	21 676
Patents	43.6	76 202

On average, firms filing both trade marks and patents filed 3.89 patents for every trade mark; firms filing both designs and patents filed 6.48 patents for every design. When trade marks and designs are filed concurrently, trade marks outnumber designs by a factor of 1.55.

The following two tables replicate Tables 3 and 4, respectively, but excluding the UK. It can be seen that the exclusion of the UK did not significantly change the results. Therefore, in the remainder of this report, only data for EU28 will be shown.

Table 5. IPR-active firms' distribution, EU27

Combination	firms	IPRs
Only TM	71.5 %	
Only DES	10.7 %	
Only PAT	9.2 %	
Concurrent filings	8.6 %	37.3 %
TM & DES	4.7 %	
TM & PAT	2.1 %	
PT & DES	0.9 %	
TM, DES, PAT	1.0 %	4.5 %
N	54 221	174 851

Table 6. Number of concurrent IPRs by type, EU27

IPR type	%	N
TMs in bundle	20.0	82 416
DESs in bundle	51.6	19 176
PATs in bundle	44.0	73 259

Firm size

The larger a firm, the more likely it is to be a multi-IPR firm. More than 20% of large firms have filed more than one type of IPR, compared to 7% of SMEs. More than 64% of all IPRs filed by large firms are concurrent, compared to 20% for IPRs filed by SMEs.

Table 7. Concurrent IPRs by firm size

Size⁽²³⁾	% firms	# firms	% IPRs	# IPRs
Large	21.7	1 983	64.4	49 714
SME	7.1	2 250	19.8	12 435
medium	10.6	1 046	24.7	5 902
small	6.4	676	15.5	3 006
micro	4.6	528	18.1	3 527
(Unidentified)	4.6	1 031	14.0	7 872
EU28	8.3	5 264	35.7	70 021

The following table shows the distribution of multi-IPR firms and concurrent IPRs by economic sector.

⁽²³⁾ Size is defined using the European Commission criteria. A micro firm has 1-10 employees, a small firm has 11-50 employees, and a medium firm has 51-250 employees. There are additional criteria related to the firm's turnover and balance sheet.

Table 8. Concurrent IPRs by economic sector

NACE ⁽²⁴⁾ Economic sector		firms		IPRs	
		%	number	%	number
B	Mining and quarrying	13.7	14	52.9	254
C10-C12	Manufacture of food products; beverages and tobacco products	8.3	257	29.6	2 589
C13-C15	Manufacture of textiles, wearing apparel, leather and related products	11.3	185	33.1	1 124
C16-C18	Manufacture of wood, paper, printing and reproduction	10.0	82	37.2	700
C19-20	Manufacture of petroleum and chemical products	12.4	167	47.8	3 941
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	17.8	95	65.5	2 948
C22	Manufacture of rubber and plastic products	16.9	209	46.7	1 676
C23	Manufacture of other non-metallic mineral products	14.0	82	46.8	886
C24	Manufacture of basic metals	14.5	35	38.0	344
C25	Manufacture of fabricated metal products, except machinery and equipment	16.8	283	45.9	2 239
C26	Manufacture of computer, electronic and optical products	17.4	238	46.9	3 566
C27	Manufacture of electrical equipment	22.1	240	68.9	4 665
C28	Manufacture of machinery and equipment n.e.c. ⁽²⁵⁾ .	16.8	419	72.1	13 328
C29	Manufacture of motor vehicles, trailers and semi-trailers	19.4	88	69.5	4 612
C30	Manufacture of other transport equipment	16.1	51	56.2	1 182
C31-C33	Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment	15.9	374	40.9	2 548
D	Electricity, gas, steam and air conditioning supply	7.4	14	42.3	258
E	Water supply; sewerage, waste management and remediation activities	3.6	5	8.6	22
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	7.1	1 037	25.9	8 362
H49-H51	Land transport and transport via pipelines; water transport; air transport	3.5	9	19.2	104
J58	Publishing activities	2.1	16	8.5	121
J61	Telecommunications	7.0	19	59.8	833
J62	Computer programming, consultancy and related activities	2.7	90	9.9	539
M71	Architectural and engineering activities; technical testing and analysis	6.5	76	19.5	594
M72	Scientific research and development	9.8	122	34.8	1 741
M73	Advertising and market research	3.3	24	9.3	107
	Other ⁽²⁶⁾	4.9	1 033	18.3	10 738
All sectors		8.3	5 264	35.7	70 021

⁽²⁴⁾ NACE (Nomenclature statistique des activités économiques dans la Communauté européenne) is the standard classification of economic activities used in the EU.

⁽²⁵⁾ 'not elsewhere classified'

Figures 1 and 2 summarise the information for multi-IPR firms in a graphical manner. Figure 1 shows the percentage of firms in each sector that engage in bundling, while Figure 2 shows the share of each sector's total IPRs held by the bundling firms.

There are two large clusters, one consisting of firms in manufacturing and mining, of which 15% are multi-IPR firms, and a cluster of services, commerce and utilities with 6% of firms using concurrent IPRs. This was to be expected as patents are especially appropriate to protect inventions with industrial applications, while organisational and service-related novelties are often not patentable; instead, trade secrets are preferred to protect these innovations⁽²⁷⁾.

The most active 'bundling sector' is *manufacture of electrical equipment* with 22% of firms engaged in bundling and accounting for 69% of concurrent IPRs in the sector. *Manufacture of motor vehicles*, *manufacture of pharmaceutical products* and *manufacture of computer, electronic and optical products* also have a high prevalence of multi-IPR firms. The only manufacturing sector that is below the EU average of 8.3% is *manufacturing of food products, beverages and tobacco*, with 8% of firms in the sector engaged in bundling.

Conversely, all service, commerce and utilities sectors are below the EU average in terms of share of bundling firms, with the exception of *scientific research and development*. In some of those sectors, the multi-IPR firms still account for a high share of IPRs in the sector. For example, 7% of firms in *telecommunications* (J61) are multi-IPR firms but they file 60% of all IPRs in the sector, a percentage superior to most manufacturing sectors.

⁽²⁶⁾ Agriculture, forestry, fishing, construction, accommodation, food services, finances, insurances, administrative service, public administration, defence, education, human health, social services, entertainment and 128 firms for which sector was not identified.

⁽²⁷⁾ 'Patents are more likely to be used (alone or in combination with trade secrets), when the innovative product is a physical good rather than a service', 'Trade secrets (often without patents) are more likely to be used for process innovation and for innovations in service'. *Protecting innovation through trade secrets and patents: Determinants for European Union firms. EUIPO (July 2017).*

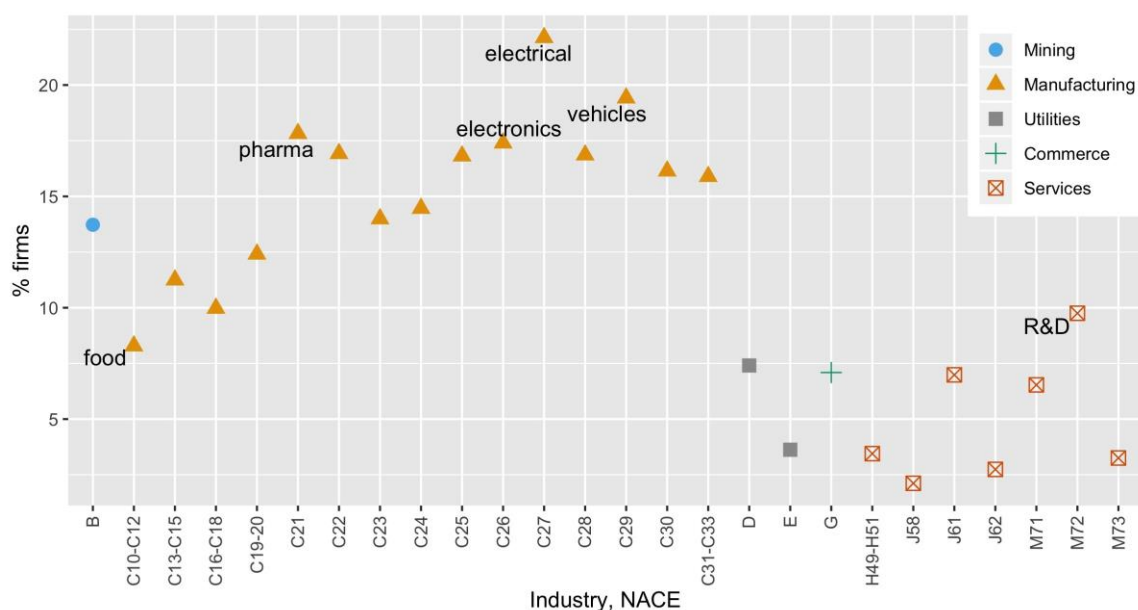
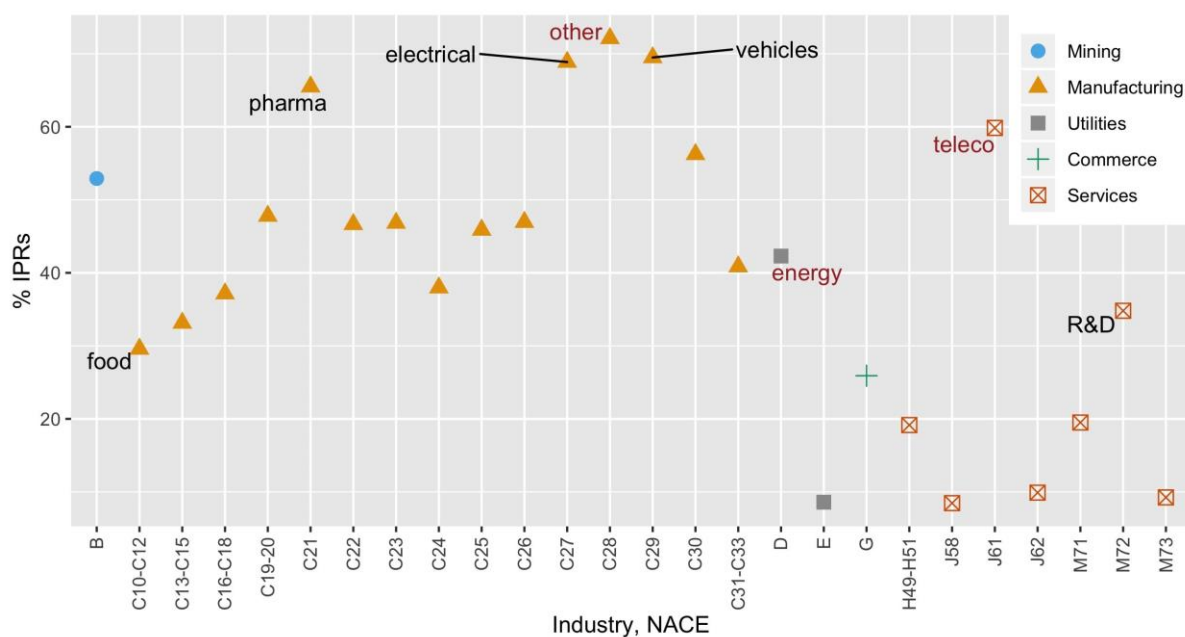
Figure 1. Multi-IPR firms, by sector**Figure 2. Concurrent IPRs by sector**

Table 9 shows bundling behaviour by firm size and by industry. Nearly 30% of large firms in manufacturing are multi-IPR firms, with 73% of concurrent IPRs in the sector. The corresponding figures for services are 10% of firms with 38% of concurrent IPRs. As the table shows, there are significant variations within each sector according to firm size. In manufacturing & mining, 7% of micro and small firms filed concurrent IPRs, representing 21%

of the IPRs in this group. In services, 5% of micro and small firms are multi-IPR, registering 21% of total IPRs in this grouping.

Table 9. Bundles by economic sector and size

Sector	Size	% firms	# firms	% IPRs	# IPRs
Manufacturing & Mining	micro & small	7.4	443	21.2	2 245
Manufacturing & Mining	medium	13.2	677	29.1	3 538
Manufacturing & Mining	large	29.6	1 392	72.7	39 051
Services, Commerce & Utilities	micro & small	5.0	472	13.2	2 132
Services, Commerce & Utilities	medium	8.5	262	19.4	1 462
Services, Commerce & Utilities	large	15.3	361	51.0	6 838
Manufacturing & Mining	ALL FIRMS	14.6	2 819	54.0	46 602
Services, Commerce & Utilities	ALL FIRMS	6.2	1 412	24.8	12 681

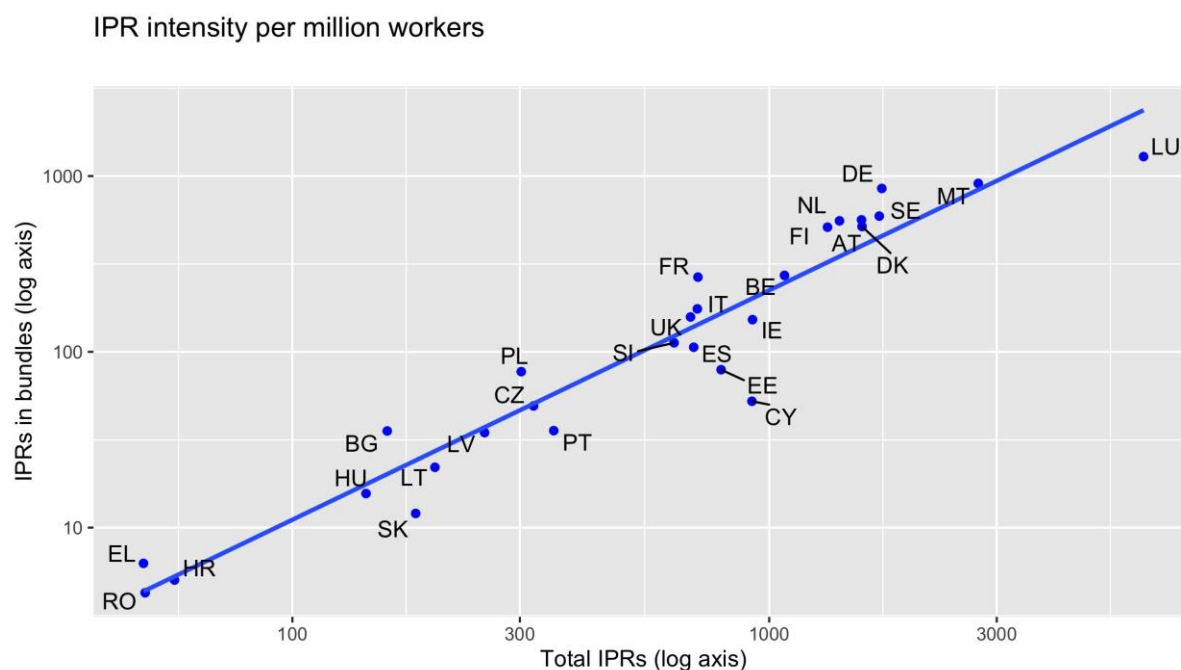
In addition to the differences in bundling behaviour across sectors and different firm size categories, the data also shows significant variations among the EU Member States. These differences are shown in Table 10.

Table 10. Concurrent IPRs by Member State

	Country	% firms	# firms	% IPRs	# IPRs
BE	Belgium	7.1	134	25.3	1 248
BG	Bulgaria	7.4	19	22.4	107
CZ	Czech Republic	5.6	56	15.4	253
DK	Denmark	9.0	127	33.0	1 425
DE	Germany	11.7	1 561	49.4	35 081
EE	Estonia	4.4	15	10.0	51
IE	Ireland	5.9	45	16.5	325
EL	Greece	3.5	3	12.9	23
ES	Spain	4.9	340	15.3	1 948
FR	France	11.1	493	37.5	7 085
HR	Croatia	4.3	3	8.9	8
IT	Italy	8.6	681	24.8	3 995
CY	Cyprus	2.3	4	5.7	19
LV	Latvia	5.6	9	13.7	31
LT	Lithuania	4.2	8	11.1	30
LU	Luxembourg	5.7	34	21.2	336
HU	Hungary	3.8	16	11.0	68
MT	Malta	3.8	8	33.1	189
NL	Netherlands	6.6	248	39.6	4 686
AT	Austria	9.6	216	36.1	2 378
PL	Poland	9.8	203	25.5	1 249
PT	Portugal	3.9	39	10.1	164
RO	Romania	3.3	9	8.7	36
SI	Slovenia	7.9	26	17.8	103
SK	Slovakia	3.3	10	6.6	30
FI	Finland	11.2	139	38.6	1 253
SE	Sweden	8.9	235	34.8	2 904
EU27		8.6	4 681	37.3	65 025
UK	United Kingdom	6.4	583	23.1	4 996
EU28		8.3	5 264	35.7	70 021

Denmark, Germany, France, Italy, Austria, Poland, Finland and Sweden have an above-average proportion of multi-IPR firms. Those firms account for almost half of the IPRs in Germany, and close to 40% in France, the Netherlands and Finland (even though in the Netherlands only 6.6% of firms fall into the multi-IPR category).

In order to make a comparison between the bundling propensity among Member States of widely varying sizes, Figure 3 plots the IPRs in bundles against total IPRs, in both cases calculated per million workers in each country.

Figure 3. Intensity of concurrent IPRs by Member State

In general, Member States with a high IPR intensity (as measured by the total number of IPRs on the horizontal axis) also have a high number of IPRs in bundles (vertical axis). However, some countries, for example Estonia, Cyprus, Luxembourg, Portugal and Slovakia have a lower propensity for bundling than countries of similar intensity in filing IPRs. Conversely, companies in Bulgaria, Germany, Greece, France, the Netherlands, Poland and Finland have a higher propensity to bundle than companies in countries with similar levels of overall IPR intensity.

This is partly explained by the nature of the filed IPRs rights; for example Spain and France have a similar intensity of IPRs when all rights are counted, but French firms are more likely to combine trade marks with patents. In France there were 120 patents applications per 100 trade marks, while in Spain the corresponding ratio was 5.4 patents per 100 trade marks. This reflects the relatively greater importance of trade marks in Spain (which in turn could be a reflection of differences in economic structure between the two countries) and the fact that of the three IPRs studied in this report, trade marks are most likely to be used alone.

Table 11 shows the number of filings of patents and designs per 100 trade mark filings. This count considers all IPRs filed by companies from each Member State, whether or not they are part of a bundle.

Table 11. Composition of IPR filings by Member State

	Country	Patents	Designs
Patents and designs per 100 trade marks			
BE	Belgium	70.5	24.3
BG	Bulgaria	0.3	29.0
CZ	Czech Republic	6.6	32.2
DK	Denmark	77.9	32.9
DE	Germany	203.0	23.6
EE	Estonia	3.0	13.4
IE	Ireland	24.8	6.8
EL	Greece	32.5	9.5
ES	Spain	5.4	11.6
FR	France	120.0	30.0
HR	Croatia	0.0	30.4
IT	Italy	25.6	26.9
CY	Cyprus	0.9	3.8
LV	Latvia	2.4	33.7
LT	Lithuania	8.8	23.4
LU	Luxembourg	21.4	10.7
HU	Hungary	3.7	17.4
MT	Malta	0.4	8.4
NL	Netherlands	88.4	22.9
AT	Austria	81.2	21.5
PL	Poland	5.7	46.7
PT	Portugal	2.4	16.7
RO	Romania	0.0	11.9
SI	Slovenia	19.5	30.7
SK	Slovakia	1.9	18.0
FI	Finland	52.1	27.4
SE	Sweden	82.0	21.7
EU27		88.5	23.3
UK	United Kingdom	20.8	15.8
EU28		77.3	22.1

These ratios do not fully explain the differences in bundling propensity; other factors to consider include the distribution of firm sizes in different Member States and even regional differences within each country. These complex relationships between the geographical distribution of IPRs and the impact in bundling could be subjects for a further study on IPR regional behaviour. An additional factor is the role of national IPRs, briefly explored in Section 8 below.

Relationship between patents and trade marks

In this sub-section, the concurrent filings of trade marks and patents are analysed with a view to group the common occurrences using the Nice Classification for trade marks and the International Patent Classification (IPC) for patents. The Nice Classification, with its 45 classes of goods and services, was used directly. It is reproduced in Table 13 in the annex.

The IPC provides for a hierarchical system for the classification of patents according to the different areas of technology to which they pertain. The classification consists of 8 sections, 131 classes and more than 600 subclasses. In order to simplify the analysis, the IPC classes have been grouped into the 22 groups presented in Table 14 in the annex.

In total there are 990 possible combinations of the 45 Nice classes and the 22 IPC groups, and in the sample 916 of those combinations appeared, with 3 680 447 couples (see Table 15 in the annex).

In order to provide an overview that covers most of the combinations and their variability, seven clusters have been defined covering 72 % of the 3.7 million couples.

Technologies

Looking from the point of view of the technologies, there are three groups of patents that can be called “ubiquitous”, because they appear in practically all concurrent IPR for all products. Those groups are **Transporting** (B60-B68), **Physics** (G) and **Electricity** (H).

In the case of transporting, its prevalence may be related to the complexity of the corresponding goods and services, while physics and electricity can be said to be “fundamental” technologies, part of the technological base for many products. Patents in ICP **transporting** are concurrent with the filing of trade mark for most Nice classes, but those IP rights are registered mainly by firms in four economic sectors: NACE C28 **Manufacture of machinery and equipment**, C22 **Manufacture of rubber and plastic products**, C29 **Manufacture of motor vehicles, trailers and semi-trailers**, and C30 **Manufacture of other transport equipment** ⁽²⁸⁾.

The groups Physics and Electricity are the most frequent combination for 34 Nice classes, with Electricity often being the second most frequent. No other IPC group has such a ubiquitous presence.

Two other patent technologies are important in a number of specific Nice classes. Those two technologies are: **Health; Life saving; Amusement** (A61-A99) and **Chemistry** (C01-C14).

⁽²⁸⁾ The sectors correspond roughly to Nice Classes 12, 7 and 17, respectively.

Health; Life-saving; Amusement (A61-A99) occurs mainly with the following eight Nice classes:

- 3 Cosmetics, with 106,247 combinations, corresponding to 39% of the patent group
- 5 Pharma goods,
- 10 Medical goods,
- 29 Food of animal origin,
- 30 Processed animal food,
- 32 Non alcoholic beverages and beers,
- 42 Scientific and technological services,
- 44 Catering and accommodation

Chemistry (C01-C14) is important for 10 Nice classes:

- 1 Chemicals,
- 2 Paints,
- 3 Cosmetics, with 40,199 combinations, corresponding to 18% of the patent group
- 4 Industrial oils,
- 5 Pharma goods,
- 29 Food of animal origin,
- 30 Processed animal food,
- 31 Raw plants and raw food,
- 32 Non alcoholic beverages and beers,
- 42 Scientific and technological services.

Products

Two Nice classes can be termed ‘ubiquitous’ or ‘versatile’ because they appear in bundles with many types of patents. These are Class 9 and 42 (**technological goods** and **technological services**, respectively). To a lesser extent Class 37 (**construction services and mining**) is also a versatile ‘auxiliary’ class.

The reasons why Classes 9 and 42 are so ubiquitous (27 % of all the combinations) is because they correspond to a large number of different products. Class 9 is always the most frequent class and Class 42 is often the second most frequent for 17 of the 22 patent groups.

Two other product classes are of significant importance in the concurrent filings: Cosmetics (3) and Machines other than vehicles (7).

Class 3, **Cosmetics**, is the most frequent combination for four groups of patents:

- Personal or Domestic articles (A41-A47),
- Health; life-saving; amusement (A61-A99),
- Printing (B41-B49),
- Chemistry (C01-C14).

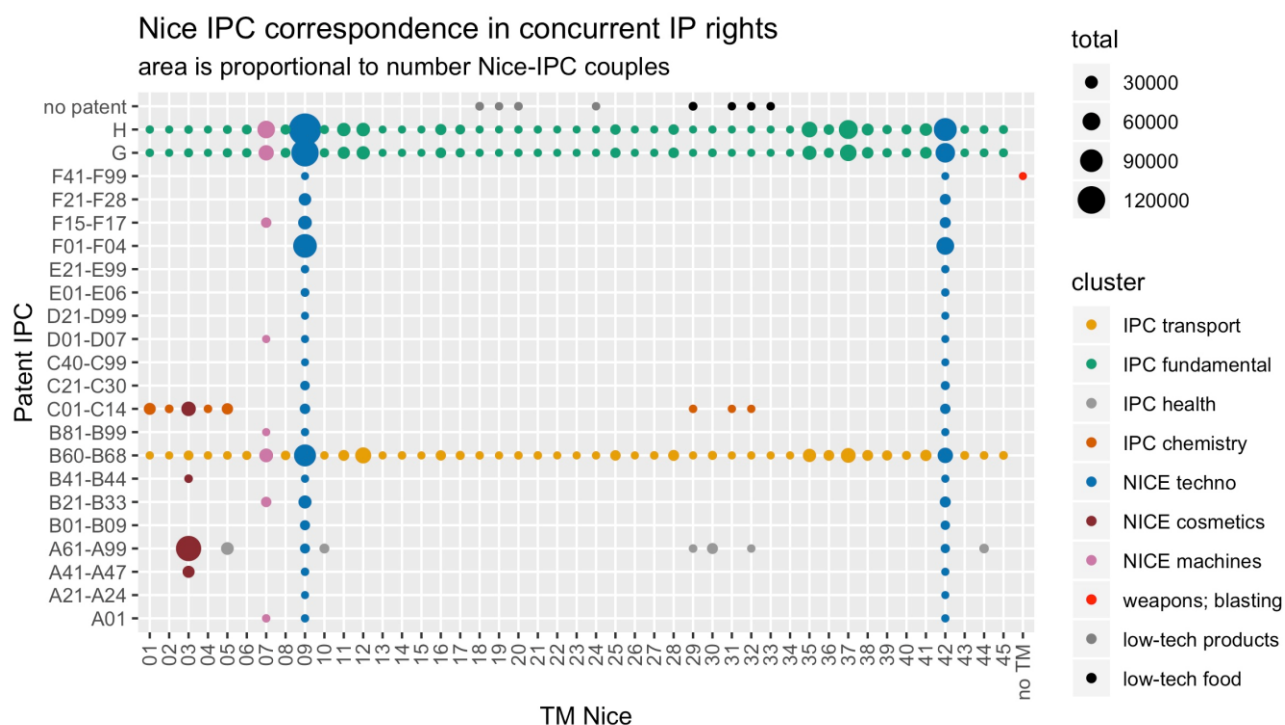
Class 7, **Machines other than vehicles**, is the relevant combination for seven groups of patents:

- Agriculture (A01);
- Textiles (D01-D07));
- Nanotechnology (B81-B99);
- Physics and Electricity (G and H);
- Shaping (B21-B33);
- Transporting (B60-B68), the ‘versatile’ technology;
- Engineering in general (F15-F17).

For Class 7, the most frequent technologies are **Physics** (G) and **Electricity** (H); **Shaping** (B21-B33) and **Engineering** (F15-F17). The first two are in the basis of machine building and shaping is also an important sector for machines.

The relationship between the Nice classes and IPC classes is summarised in Figure 4.

Figure 4. Nice-IPC correspondence clustering



The most frequent pairs are Nice Class 9 and IPC H and G, Nice Class 3 and IPC A61-A99, Nice Class 42 and IPC H, and Nice Class 9 and IPC B60-B68.

The figure also includes IPC classes that are usually not combined with trade marks, and Nice classes that do not appear in combination with patents, labelled ‘no TM’ and ‘no patent’, respectively. These trade mark and patent classes are discussed further below.

Non-concurrent filings

Some firms only apply for trade marks or only patents; Table 16 in the annex shows the number of Nice and IPC classes included in trade mark and patent filings, respectively, by these firms.

It can be seen that the number of such ‘lonely’ applications in **Weapons; Blasting** (F41-F99) is superior to any concurrent filing with a particular Nice product, except Class 9, **Technological goods**.

In no other technology are ‘lonely’ patent filings so dominant. For other IPC classes, there will typically be a more frequent association with a particular Nice class.

Regarding products, the applications for ‘lonely’ trade marks in classes **Leather** (18), **Construction materials** (19), **Furniture** (20) and **Textiles** (24) are more numerous than for trade marks in association with patents. The same is true for the Nice food classes, in particular 29, 31, 32 and 33.

The ‘lonely’ trade marks product groups are thus mainly relatively low-tech industrial products and some food products. However, as stated previously, there is also a large number of trade marks in the food classes concurrent with **Health** and with **Chemistry** patents, which can indicate different niches of food products.

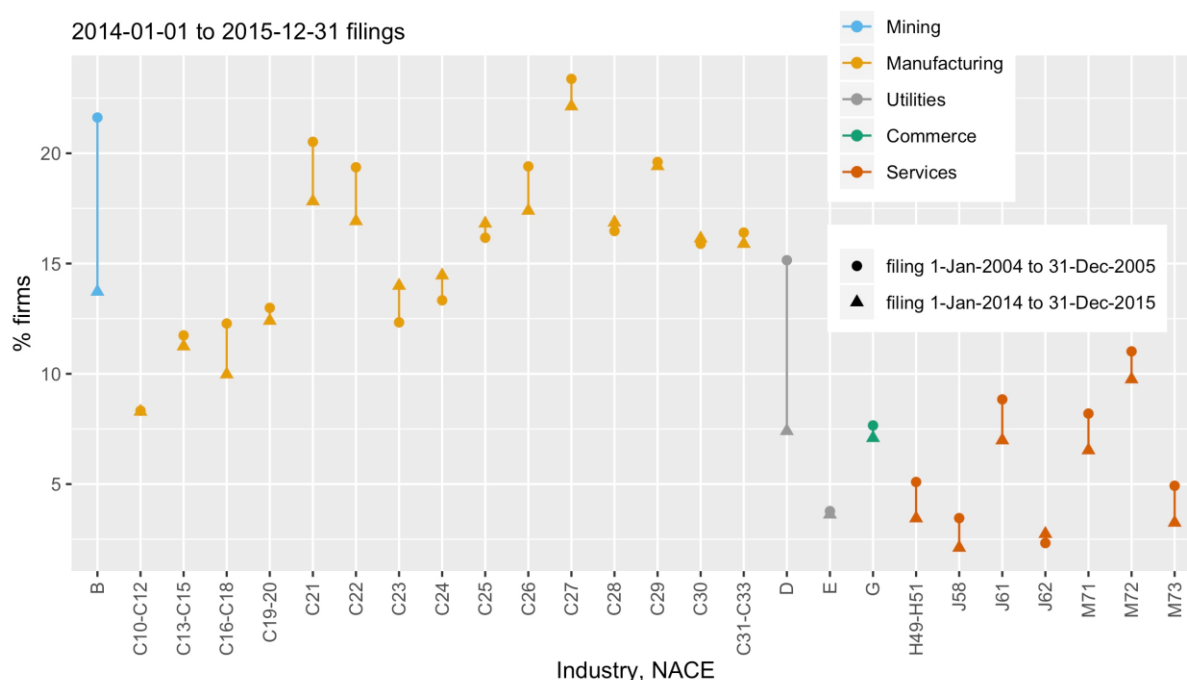
Finally, it can be considered if a disaggregation of the B60, G and H IPC classes but also Nice Classes 9 and 42 (that concentrate high numbers of filings) could add to or qualify some of the results in this section. While disaggregating IPC classes is relatively straightforward, disaggregation of Nice classes may be more cumbersome and need semantic analysis of the product description.

7. Evolution over time

As can be seen in Figure 5, 10 years before the period of study, in 2004-2005, the percentage of multi-IPR firms and concurrent IPRs was higher, specifically 10.0% (compared to 8.3% in 2014-2015) of firms and 41.3% of concurrent IPRs (compared to 35.7% in 2014-2015)⁽²⁹⁾.

In the manufacturing sector, bundling activity has been maintained or even increased in NACE Classes C23 (manufacture of mineral products), C24 (basic metals) and C25 (fabricated metal products). In all other NACE classes bundling has either declined or remained at the same level.

Figure 5. Evolution in bundling by economic sector, 2004/5 – 2014/15



Another angle at which one can look at the evolution of concurrent filings is to examine which combinations of patent classes and trade mark classes grow over time. Table 12 shows the Nice class / ICP combinations that have grown the most during the decade until 2015.

⁽²⁹⁾ A possible caveat is that the matching algorithm used in this study works better for older, more established firms.

Table 12. Increasing concurrent filing combinations, 2004/5-2014/15

Nice	IPC	Total 2015	Total 2005	Difference
09	F01-F04	96 626	25 276	71 350
09	B60-B68	85 944	27 764	58 180
37	H	67 521	19 114	48 407
42	F01-F04	60 090	13 275	46 815
42	H	91 845	51 748	40 097
09	G	119 094	81 312	37 782
07	H	58 808	23 350	35 458
37	G	53 194	18 331	34 863
09	H	148 878	114 153	34 725
42	B60-B68	45 588	13 350	32 238
37	F01-F04	47 257	15 033	32 224
42	G	71 066	39 181	31 885
07	G	45 028	20 102	24 926
07	F01-F04	37 976	13 184	24 792
09	B21-B33	31 554	8 116	23 438

The increasing couples are concentrated in Nice Classes 9 and 42 (**Technological goods** and **Technological services**, respectively), 37 (**Construction services and mining**) and 7 (**Machines**), in combination with the patent types **Transporting** (B60-B68), **Engines or pumps** (F01-04), **Physics** (G) and **Electricity** (H).

8. Conclusions and areas for further research

This study has examined the bundling of EU-level patents, trade marks and designs by European firms. The concurrent use of IPRs is a relevant topic because such bundling can signal the firm's exploitation of innovations in the marketplace. Other studies, in particular the EUIPO-EPO (2019) study of high-growth firms, indicate that SMEs that bundle different IPRs have a higher likelihood of achieving high growth in subsequent years.

The present study is based on EU-level rights. A fuller picture of firms' bundling activities would emerge with the inclusion of national rights as well, something that might be particularly important in the case of SMEs. Some firms that do not have concurrent applications at the EU level may have it at the national level, or they may have a bundle between a national right and a European one. This could be the case for smaller firms.

Therefore, the omission of national rights most probably understates rather than overstates the importance of bundling. Furthermore, it is likely that the relationships between technologies and products uncovered in this study, as well as the patterns of bundling by Member States, would not be materially changed by inclusion of national rights.

The present study provides a first look at bundling using EUIPO and EPO data. A number of interesting extensions could be considered in future studies, such as the regional dimension of bundling (and indeed IPR use in general). In many Member States there are significant differences between regions, both as regards overall IPR intensity and the prevalence of bundling.

Although more ambitious from a technical point of view, the use of 'semantic matching' could be employed to evaluate the possible joint use of trade marks and patents for the same product by searching automatically for 'compatibility' of the trade mark and patent descriptions for filings that occur within a pre-determined time period.

Annex

Table 13. Trade mark classes: Nice Classification (11th edition)

Class headings	
	Chemicals for use in industry, science and photography, as well as in agriculture, horticulture and forestry; unprocessed artificial resins, unprocessed plastics; fire extinguishing and fire
1	prevention compositions; tempering and soldering preparations; substances for tanning animal skins and hides; adhesives for use in industry; putties and other paste fillers; compost, manures, fertilizers; biological preparations for use in industry and science. Paints, varnishes, lacquers; preservatives against rust and against deterioration of wood;
2	colorants, dyes; inks for printing, marking and engraving; raw natural resins; metals in foil and powder form for use in painting, decorating, printing and art.
	Non-medicated cosmetics and toiletry preparations; non-medicated dentifrices; perfumery,
3	essential oils; bleaching preparations and other substances for laundry use; cleaning, polishing, scouring and abrasive preparations.
4	Industrial oils and greases, wax; lubricants; dust absorbing, wetting and binding compositions; fuels and illuminants; candles and wicks for lighting.
	Pharmaceuticals, medical and veterinary preparations; sanitary preparations for medical purposes; dietetic food and substances adapted for medical or veterinary use, food for
5	babies; dietary supplements for human beings and animals; plasters, materials for dressings; material for stopping teeth, dental wax; disinfectants; preparations for destroying vermin; fungicides, herbicides.
	Common metals and their alloys, ores; metal materials for building and construction;
6	transportable buildings of metal; non-electric cables and wires of common metal; small items of metal hardware; metal containers for storage or transport; safes.
	Machines, machine tools, power-operated tools; motors and engines, except for land
7	vehicles; machine coupling and transmission components, except for land vehicles; agricultural implements, other than hand-operated hand tools; incubators for eggs; automatic vending machines.
8	Hand tools and implements, hand-operated; cutlery; side arms, except firearms; razors. scientific, research, navigation, surveying, photographic, cinematographic, audiovisual, optical, weighing, measuring, signalling, detecting, testing, inspecting, life-saving and teaching apparatus and instruments; apparatus and instruments for conducting, switching, transforming, accumulating, regulating or controlling the distribution or use of electricity;
9	apparatus and instruments for recording, transmitting, reproducing or processing sound, images or data; recorded and downloadable media, computer software, blank digital or analogue recording and storage media; mechanisms for coin-operated apparatus; cash registers, calculating devices; computers and computer peripheral devices; diving suits, divers' masks, ear plugs for divers, nose clips for divers and swimmers, gloves for divers, breathing apparatus for underwater swimming; fire-extinguishing apparatus.
10	Surgical, medical, dental and veterinary apparatus and instruments; artificial limbs, eyes and teeth; orthopaedic articles; suture materials; therapeutic and assistive devices adapted for persons with disabilities; massage apparatus; apparatus, devices and articles for nursing infants; sexual activity apparatus, devices and articles.
11	Apparatus and installations for lighting, heating, cooling, steam generating, cooking, drying, ventilating, water supply and sanitary purposes.
12	Vehicles; apparatus for locomotion by land, air or water.
13	Firearms; ammunition and projectiles; explosives; fireworks.
14	Precious metals and their alloys; jewellery, precious and semi-precious stones; horological and chronometric instruments.
15	Musical instruments; music stands and stands for musical instruments; conductors' batons. paper and cardboard; printed matter; bookbinding material; photographs; stationery and office requisites, except furniture; adhesives for stationery or household purposes; drawing materials and materials for artists; paintbrushes; instructional and teaching materials; plastic sheets, films and bags for wrapping and packaging; printers' type, printing blocks.
16	Unprocessed and semi-processed rubber, gutta-percha, gum, asbestos, mica and substitutes for all these materials; plastics and resins in extruded form for use in
17	manufacture; packing, stopping and insulating materials; flexible pipes, tubes and hoses, not of metal.

Class headings

- Leather and imitations of leather; animal skins and hides; luggage and carrying bags;
- 18 umbrellas and parasols; walking sticks; whips, harness and saddlery; collars, leashes and clothing for animals.
- Materials, not of metal, for building and construction; rigid pipes, not of metal, for building;
- 19 asphalt, pitch, tar and bitumen; transportable buildings, not of metal; monuments, not of metal.
- Furniture, mirrors, picture frames; containers, not of metal, for storage or transport; unworked
- 20 or semi-worked bone, horn, whalebone or mother-of-pearl; shells; meerschaum; yellow amber.
- Household or kitchen utensils and containers; cookware and tableware, except forks, knives and spoons; combs and sponges; brushes, except paintbrushes; brush-making materials; articles for cleaning purposes; unworked or semi-worked glass, except building glass; glassware, porcelain and earthenware.
- 21
- Ropes and string; nets; tents and tarpaulins; awnings of textile or synthetic materials; sails; sacks for the transport and storage of materials in bulk; padding, cushioning and stuffing materials, except of paper, cardboard, rubber or plastics; raw fibrous textile materials and substitutes therefor.
- 22
- Yarns and threads, for textile use.
- 23
- Textiles and substitutes for textiles; household linen; curtains of textile or plastic.
- 24
- Clothing, footwear, headwear.
- 25
- Lace, braid and embroidery, and haberdashery ribbons and bows; buttons, hooks and eyes, pins and needles; artificial flowers; hair decorations; false hair.
- 26
- Carpets, rugs, mats and matting, linoleum and other materials for covering existing floors; wall hangings, not of textile.
- 27
- Games, toys and playthings; video game apparatus; gymnastic and sporting articles; decorations for Christmas trees.
- 28
- Meat, fish, poultry and game; meat extracts; preserved, frozen, dried and cooked fruits and vegetables; jellies, jams, compotes; eggs; milk, cheese, butter, yogurt and other milk products; oils and fats for food.
- 29
- Coffee, tea, cocoa and artificial coffee; rice, pasta and noodles; tapioca and sago; flour and preparations made from cereals; bread, pastries and confectionery; chocolate; ice cream, sorbets and other edible ices; sugar, honey, treacle; yeast, baking-powder; salt, seasonings, spices, preserved herbs; vinegar, sauces and other condiments; ice [frozen water].
- 30
- Raw and unprocessed agricultural, aquacultural, horticultural and forestry products; raw and unprocessed grains and seeds; fresh fruits and vegetables, fresh herbs; natural plants and flowers; bulbs, seedlings and seeds for planting; live animals; foodstuffs and beverages for animals; malt.
- 31
- Beers; non-alcoholic beverages; mineral and aerated waters; fruit beverages and fruit juices; syrups and other non-alcoholic preparations for making beverages.
- 32
- Alcoholic beverages; alcoholic preparations for making beverages.
- 33
- Tobacco and tobacco substitutes; cigarettes and cigars; electronic cigarettes and oral vaporizers for smokers; smokers' articles; matches.
- 34
- Advertising; business management; business administration; office functions.
- 35
- Insurance; financial affairs; monetary affairs; real estate affairs.
- 36
- Construction services; installation and repair services; mining extraction, oil and gas drilling.
- 37
- Telecommunications services.
- 38
- Transport; packaging and storage of goods; travel arrangement.
- 39
- Treatment of materials; recycling of waste and trash; air purification and treatment of water; printing services; food and drink preservation.
- 40
- Education; providing of training; entertainment; sporting and cultural activities.
- 41
- Scientific and technological services and research and design relating thereto; Industrial analysis, industrial research and industrial design services; quality control and authentication services; design and development of computer hardware and software.
- 42
- Services for providing food and drink; temporary accommodation.
- 43
- Medical services; veterinary services; hygienic and beauty care for human beings or animals; agriculture, aquaculture, horticulture and forestry services.
- 44
- Legal services; security services for the physical protection of tangible property and individuals; personal and social services rendered by others to meet the needs of individuals.
- 45

Table 14. Patent grouping based on IPC classes

IPC class	Description
A01	Agriculture
A21-A24	Foodstuffs; tobacco
A41-A47	Personal or domestic articles
A61-A99	Health; life-saving; amusement
B01-B09	Separating; mixing
B21-B33	Shaping
B41-B44	Printing
B60-B68	Transporting
B81-B99	Microstructural technology; nanotechnology
C01-C14	Chemistry
C21-C30	Metallurgy
C40-C99	Combinatorial technology [2006.01]
D01-D07	Textiles or flexible materials not otherwise provided for
D21-D99	Paper
E01-E06	Building
E21-E99	Earth or rock drilling; mining
F01-F04	Engines or pumps
F15-F17	Engineering in general
F21-F28	Lighting; heating
F41-F99	Weapons; blasting
G	Physics
H	Electricity

(Own grouping based on WIPO classes)

Table 15. Nice-IPC class count, 2014-2015

Nice	A01	A21-A24	A41-A47	A61-A99	B01-B09	B21-B33	B41-B44	B60-B68	B81-B99	C01-C14	C21-C30	C40-C99	D01-D07	D21-D99	E01-E06	E21-E99	F01-F04	F15-F17	F21-F28	F41-F99	G	H
01	1 382	978	710	5 442	3 171	1 890	394	2 203	83	24 618	803	1	491	376	376	229	517	775	831	2	3 534	2 359
02	204	40	38	254	489	680	544	1 722	9	4 856	188		92	80	171	54	427	546	161		1 407	1 071
03	999	7 402	25 143	106 247	5 443	4 817	4 004	11 357	104	40 199	1 409		1 349	102	838	57	830	963	885		7 035	4 172
04	164	57	70	469	691	1 039	39	3 205	3	3 995	253		69	48	159	158	722	1 073	297		1 625	1 348
05	1 040	2 829	1 359	28 989	2 550	1 923	121	4 230	44	20 907	610	1	418	141	358	176	2 912	1 352	1 353	3	8 451	5 916
06	157	43	576	786	1 303	3 248	95	7 108	38	1 774	1 399		80	74	3 266	396	8 199	3 828	2 711	6	8 833	11 705
07	2 737	151	3 140	3 622	5 725	14 905	971	35 438	1 060	4 539	3 703		1 415	204	2 898	1 062	37 976	14 955	9 924	139	45 028	58 808
08	204	76	1 085	2 388	1 115	3 552	28	9 743	445	662	356		394	3	283	18	7 539	3 196	1 765	24	12 201	13 974
09	2 231	663	2 943	12 552	13 025	31 554	1 749	85 944	1 920	15 417	9 982	1	1 120	610	5 200	2 965	96 626	35 139	27 763	527	119 094	148 878
10	140	159	888	11 747	1 250	1 638	40	3 237	24	3 277	420		203	28	184	117	2 862	1 199	1 574	3	8 472	7 325
11	325	433	3 462	6 538	3 744	7 656	154	18 019	609	3 436	1 804		1 083	84	2 172	401	18 503	7 247	10 260	44	26 408	33 645
12	453	30	423	876	2 715	12 858	41	49 679	605	2 926	2 186		987	66	1 787	382	25 374	12 785	5 023	217	32 937	34 556
13		5	57	7	35	324	2	1 567		42	41		15		44	5	331	314	72	193	745	480
14	12	109	127	823	137	824	32	3 502	5	1 073	156		58	3	147	10	1 017	769	208		2 009	1 171
15		3	22	7	33	324	2	1 244		38	41		15	1	38	5	331	300	68		663	420
16	269	760	624	4 970	2 219	5 147	572	14 562	267	5 522	1 357		163	363	1 196	421	12 828	4 976	3 223	69	16 455	19 855
17	200	28	181	576	1 276	3 501	230	7 366	68	3 741	1 134		243	92	1 326	377	7 786	2 803	2 392	7	8 527	11 918
18	25	124	418	1 068	161	937	36	3 516	4	1 173	150		73	3	153	10	853	779	223		2 064	1 194
19	123	10	238	107	167	900	99	1 567		1 232	131		44	45	1 968	33	356	654	254	4	1 103	791
20	88	23	681	374	340	1 315	31	3 312	71	1 154	157		65	7	1 008	15	1 314	1 227	401	6	2 532	2 417
21	123	549	1 296	5 838	506	1 217	265	3 466	21	5 133	355		196	28	415	5	573	751	449	21	2 591	1 893
22	5	7	47	127	42	387	16	1 323	1	262	54		35	12	118	5	332	312	84		669	439
23	1	4	23	7	33	332	2	1 244		62	41		33	10	38	5	331	300	69		662	419
24	24	218	199	820	137	656	157	2 388		532	59		73	22	109	10	520	504	147	2	1 341	711
25	302	134	1 014	2 499	1 445	4 511	151	15 478	104	3 097	1 376		316	75	660	340	11 097	4 246	2 978	26	14 508	15 320
26		9	108	314	56	404	12	1 634		68	58		37		58	5	469	371	99		912	535
27	35	8	49	166	59	734	59	3 950		101	73		43	22	169	5	618	872	213		1 924	980
28	38	107	696	1 630	1 356	5 147	95	18 602	44	1 869	1 397		186	63	747	329	11 324	4 893	2 999	6	16 016	15 586
29	180	2 057	540	3 644	470	404	2	1 748		3 109	43		111	17	104	5	331	316	147		922	419
30	914	8 512	2 303	18 439	2 252	1 255	2	7 111		15 928	152		524	84	517	7	1 677	1 054	543		4 429	1 618
31	159	473	137	786	353	431	2	1 342		2 303	105		44	14	74	15	338	315	112		732	536
32	132	1 307	376	2 697	356	401	2	2 136		2 431	42		87	13	95	5	361	389	133		1 008	459
33	33	315	140	679	111	336	2	1 405		620	41		33	3	52	5	338	316	107		728	420
34	1	365	36	68	35	339	7	1 611		46	42		15	1	62	5	354	345	86		786	459
35	503	1 989	2 205	11 397	4 719	11 461	525	32 626	146	9 790	4 059	1	624	278	1 736	1 326	32 403	10 475	9 046	22	37 537	47 572
36	47	201	197	1 247	1 229	6 277	425	17 220	38	1 842	1 442		303	66	555	364	9 653	5 228	2 507	6	12 978	15 968
37	345	152	600	3 029	6 043	15 404	562	41 938	627	6 558	5 331		365	276	2 656	1 665	47 257	14 595	12 529	256	53 194	67 521
38	137	222	539	2 299	1 895	5 388	842	17 822	181	2 288	1 657		184	134	889	446	16 879	6 887	4 203	43	21 861	24 399
39	84	307	202	1 224	844	3 898	246	13 606	75	1 845	758		264	47	436	145	6 788	4 364	1 530	13	9 027	8 925
40	58	54	129	921	1 484	3 128	323	6 408	39	3 524	1 413		109	88	406	363	7 894	2 497	2 397	8	8 979	12 000
41	509	927	1 076	7 478	2 661	7 366	486	20 796	348	6 655	2 014		309	135	906	553	17 759	7 110	4 604	124	23 220	28 452
42	1 787	486	1 240	8 155	8 931	18 673	1 469	45 588	911	14 721	6 827	2	437	490	2 580	2 182	60 090	18 981	18 268	233	71 066	91 845
43	70	416	298	1 001	422	1 614	118	5 645	110	998	179		90	6	140	37	2 489	1 527	531	6	4 165	4 012
44	137	554	1 621	9 838	923	1 479	222	3 995	67	4 069	348		111	33	157	60	2 508	1 258	799	4	5 201	4 733
45	81	12	136	333	442	1 604	722	5 015	166	718	170		72	50	216	17	3 045	1 415	573	10	6 297	6 181

Table 16. Nice and IPC class count for non-concurrent IPRsNumber of filed classes for firms
not filing trade marks

IPC	total
A01	1 151
A21-A24	904
A41-A47	1 052
A61-A99	5 326
B01-B09	2 541
B21-B33	4 819
B41-B44	505
B60-B68	7 368
B81-B99	146
C01-C14	9 838
C21-C30	1 230
C40-C99	3
D01-D07	786
D21-D99	296
E01-E06	1 875
E21-E99	720
F01-F04	3 013
F15-F17	3 223
F21-F28	1 949
F41-F99	272
G	10 182
H	10 490

Number of filed classes for firms
not filing patents

Nice	total
01	3 279
02	1 156
03	5 693
04	1 330
05	6 402
06	3 233
07	4 501
08	1 820
09	14 467
10	2 834
11	4 653
12	2 715
13	174
14	2 463
15	184
16	5 265
17	2 030
18	4 651
19	2 481
20	4 140
21	3 667
22	709
23	219
24	2 644
25	7 258
26	690
27	940
28	3 592
29	5 298
30	6 049
31	2 725
32	3 779
33	3 376
34	567
35	17 076
36	1 664
37	4 686
38	4 300
39	3 348
40	2 602
41	5 969
42	10 826
43	1 980
44	2 166
45	1 332

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Use of IPR bundles by EU firms 2014-2015

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