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# Consolidating firm portfolios of patents across different offices. A comparison of sectoral distribution of patenting activities in Europe and Japan

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## Abstract

This paper describes a methodology for the construction of a novel patent dataset for computing consolidated patent portfolios across patent offices. In particular, relying on two previous contributions – the EPIP database for EPO/PCT patents and the IIP patent database for JPO patent documents – we discuss how to integrate the applicant names of these two databases with the mean of priority information from PATSTAT. This methodology yields significant improvements in the harmonization of applicants name for European firms in IIP patent database and Japanese firms in EPIP database. The paper concludes with a first look to the differences in patenting strategy by European and Japanese firms.

**Keywords:** patent database, Japan, Europe

## 1. Introduction

Patent information is extensively used by scholars in the field of innovation research. Patent information is publicly available from patent offices and its raw data is typically embedded in text formats such as SGML and XML. In addition, the names and addresses of patent applicants, assignees and inventors are not standardized, so database development projects to assemble user friendly datasets have been initiated as a service for the academic community.

Pioneering work has been conducted in the United States by the National Bureau of Economic Research (NBER) group. The data covers all granted patent information by the US Patent and Trademark Office (USPTO), as well as patent citation data. The names of assignees are standardized and those of listed companies are matched with the firm code in the Compustat Database for combining patent information with financial statements data. This NBER patent database is extensively used by researchers and more than 1,000 research papers using this dataset (needs to be confirmed) have been published.

A similar project was initiated by European researchers at the European Policy for Intellectual Property (EPIP Association) (www.epip.eu) for data originating from the European Patent Office (EPO) and Patent Cooperation Treaty and World International Patent Office) (PCT/WIPO). This dataset relies on open and freely accessible XML files distributed weekly by the EPO, which offers a level of scalability and updatability over time. This data source includes comprehensive bibliographic information from the patent front page and procedural data on the fate of the patent document. Particular effort has been dedicated to the cleaning and matching of applicant names (Thoma et al. 2010) and the outcomes have been made available via the EPIP's website.[1]

In Japan, the Institute of Intellectual Property (IIP) Patent Database has been constructed by Japanese scholars. This is based on Seiri-Hyojunka Data published by the Japan Patent Office (JPO) . From this, embedded text data files (approximately 200GB), commonly used variables, such as patent applications, applicants registered patents, rights holders, inventors and citation data, are extracted and made them available via the IIP web-site (Goto and Motohashi, 2007). Applicant names are cleaned and those of Japanese listed companies are assigned to each International Security

[1] Thoma et al. (2010) have made this dataset available at http://www.epip.eu/datacentre.php

Identification Number (ISIN), as is the case in the NBER patent database and Compustat matching table.

Recently, international coordination of these patent database projects in the triad started under the auspices of the Organisation for Economic Cooperation and Development (OECD). The OECD taskforce group of patent offices in the triad has discussed about the possible coordination of statistical activities based on patent information. The publication of PATSTAT by the EPO opens up an avenue for linking the patent database in each country/region via patent family information, and patent information such as the standardized name of applicants, which can be compared and supplemented against each other.

This paper presents our work on the linkage between the EPO/PCT patent data with the IIP patent database (for JPO patents) along the line of international coordination activities of the triads. As compared to the NBER patent database in the U.S., the European and Japanese patent databases are relatively new and not well documented. Therefore, we first provide a section describing each database. Then, the methodology for performing the data linkage is presented. Our strategy is using European (as well as US firms) information in EPO/PCT data for JPO application patents, while Japanese firms information in IIP Patent database for EPO/PCT patents. We have also provided some comparative statistics of patenting by European and Japanese listed companies, based on our linked patent dataset.

## 2. Patent database in Europe and Japan

### 2-1. EPIP database for EPO and PCT patents

The EPIP databases described by Thoma et al. (2010) offers a wide and updated coverage on EPO and WIPO/PCT patent documents. The main data source has been the weekly EPOLINE files up to December 2009 (available from http://ebd2.epoline.org/jsp/ebd1.jsp). This database includes all the patent document publications – applications and grants – since the inception of the EPO and WIPO/PCT systems up to December 31st, 2009 covering almost all the information included in a patent document, excluding claims and text description. In particular:

- Application and publication details such as authority, number, kind and relative procedural dates;
- Technical information and descriptions such as title, abstract, international and national classification;

- Applicant, grantee, inventor and attorney name, address, and country code;
- Identification of claimed priority, designating international application, parent application and technically related application;
- Identification of cited publication including patent and non-patent prior art, category and origin of the citation.
- Divisional and opposition information (this file regards only EPO documents).

In the EPIP dataset substantial effort has been dedicated to identify patentee firms as follows (Thoma et. al, 2010).

### 2.1.1. Institutional Categorization

The patentee names are parsed and classified according to the guidelines of the OECD Frascati Manual, that is:

a. Business Organizations, that are entities that are characterized by for profit goals;
b. Individuals, such as independent inventors that autonomously file patent applications;
c. Not for Business Organizations, such as universities, governmental agencies, hospitals, and private not for profit institutions.

### 2.1.2. Name Cleaning

The following box summarizes a sequence of operations for the business name cleaning and harmonization (adapted from Thoma et al. 2010):

1. Transformation into upper case to simplify matching. Addition of a blank space at the beginning and end of the string to facilitate word-based tests.
2. SGML and HTML codes substituted by the ASCII/ANSI equivalent, such as for example "&OACUTE;" replaced by "O" etc.
3. Proprietary character codes replaced by the ASCII/ANSI equivalent.
4. Each of the accented characters is replaced by its unaccented version.
5. Removal of frequent comma, double quotation mark irregularities and other period irregularities and non-alphanumeric characters.
6. The conjunction "and" and its translations into other languages are standardized as "&".
7. Umlaut harmonization by reducing variations such as "ue", "ae", and "oe" to respectively "u", "a", and "o".
8. Removal of common company words like INC and AB in descending order of their length.
9. Replacement of spelling variations with their harmonized equivalent for some frequent words (such as INTL for INTERNATIONAL and its variants).
10. Removal of the round parentheses and cleaning their content; typically this content consists of geographical information or former company names.
11. Removal of multiple blank spaces, replacing with a single space.
12. Generation of a unique list of patenters by removing duplicates after cleaning.

**Box 1. Operations for name cleaning and harmonization.**

Adapted from Thoma et. al (2010)

The final results of the software procedure for the creation of a patentee names dictionary for EPO and PCT/WIPO dataset are depicted in the accompanying tables:

- **Table 1** reports the country distribution of the business applicants and applications in the EPO/PCT dataset.
- **Table 2** reports the country distribution of the non-business organization (NBO) applicants and applications in the EPO/PCT dataset.
- **Table 3** reports the country distribution of the individual applicants and applications in EPO/PCT dataset.
- **Figure 1** reports the distribution across the top 18 countries of the reduction in the number of applicants after name harmonization using the software prototype

described in the previous section. The overall reduction of the size of the dictionary is about 28.8%.

### 2.1.3. Matching with Business Directories

For the merging of patentee names with business directories, Thoma et al. (2010) retrieved business and ownership information from Amadeus by Bureau Van Dijk, which collects information from approximately 10 million European firms and their subsidiaries at the worldwide level.[2]

Thoma et al. (2010) match patentee names only if they also came from the same country, that is, the same nationality of the patenting entity in the EPO/PCT dataset and company in Amadeus. The results of the matching to the Amadeus business directories are depicted in the following figures:

- **Figure 2** reports the share of business applicants in the EPO and PCT dataset that have been matched to Amadeus.
- **Figure 3** reports the share of business applicants in the EPO and PCT dataset that have been matched to Amadeus, weighted by their number of patent applications.

## 2-2. IIP-Patent database for JPO patents

The IIP Patent Database is based on the "Seiri Hyojunka Data" by the JPO, published 24 times a year by DVD-ROM, containing all the transactions associated with patent activities from the application to termination of patent rights. The IIP Patent Database is a subset of the information contained in this original data. The IIP Patent Database consisted of the six tables presented in Figure 1. The most recently updated version contains data published up to the 15th release of fiscal year 2009. This database consists of six tables concerning (1) patent applications, (2) patent applicants, (3) granted patents, (4) rights holder of granted patents, (5) inventors and (6) citations.

The patent application table contains the information on patent application number, application dates, International Patent Classification (IPC) codes, number of claims etc. The applicant information such as name and location is available in the applicant table, which can be linked with the application table by the application code. A similar structure is found in the tables on the granted patent and the rights holder. The

[2] Thoma et al. (2010) has made this dataset available at http://www.epip.eu/datacentre.php

inventor tables contain information on the name and address of inventors, and the citation contains the examiner citation information by the JPO, similar to the case with EPO patents[3].

### 2.2.1 Institutional Categorization

IIP-Patent data also provides information on the institutional categorization of patent applicants into the following four categories:

a. Individual inventors

b. Business organizations

c. Universities and higher educational institutes

d. Others such as non-profit research organizations.

The JPO has their own information on the type of applicants for a part of the samples, so we use this information as the starting point. For those applicants which do not have an institution code, individual inventors are identified by using inventor names, in a sense the name of applicant is supposed to be the same as the inventor's one. Universities and non-profit organizations are identified by text matching of typically occurred character sequences, such as "大学" (meaning university)" and "○○県" (denominating prefecture). The remaining applicants are treated as a business organization.

### 2.2.2 Name Cleaning

We start with JPO's applicant codes, which are given by JPO examiners at the time of the patent application. However, we have found a significant number of false negative observations; that is, the assignation of different codes for an identical applicant. This will happen when an examiner puts a new code for some applicant, because they do not conduct enough searches for existing records of the applicant. In addition, the JPO has only applied such a code for all applicants after 1992, when the electronic patent examination system was introduced. Therefore, we use this information as the starting point, but some additional manipulations have been conducted.

The next step is parsing names and we assign a KZ_id-code for the applicants with the same name located in the same place (city, town and village level, covering about 1500 regional distinctions throughout Japan). This code is merged with the information from the JPO's code, using the assumption that the JPO's code has suffered from a type 2

[3] Please refer to Goto and Motohashi (2007) for more details.

error (false negatives), but not type 1 error (false positives). The final new id for patent applicants may have been type 1 error, when the same name but different firms exist in the same location. This point may be improved upon when we use additional firm list information (such as a business register). There may also be type 2 errors, since name parsing may not be enough. We have to consider an approximate matching procedure to control for this point.

### 2.2.3. Matching with Business Directories

For Japanese firms, we have chosen the International Securities Identification Numbering (ISIN) code for the identifier in business directories as it is widely used across many databases. The full ISIN code is a 12-character alpha-numerical code defined in ISO6166. The ISIN code for a Japanese listed company is assigned and published by the (Japanese) Securities Identification Code Committee and the code consists of 5 parts as follows:

Country code: JP
Listed company code: 3
Company identifier: XXXXX
Common stock code: 000
Check digit: "Modulus 10 Double Add Double" number

Therefore, the 5-digit XXXXX part is necessary and sufficient to identify a firm in Japan. We obtained all ISIN codes for Japanese listed firms in August 2009. This provided 2,376 applicants' names in Kanji and thesee have been linked to a KZ_id and with more than 100 total patent applications had been matched with the registered names of listed firms and their ISIN numbers (the above mentioned 5-digit XXXXX part). For example, Hitachi Ltd has the KZ_id as "132996" and that was linked to the ISIN number of "78860" via the exact matching of the Kanji name of "株式会社日立製作所". The results were checked manually and in some cases modifications were applied. For example, Matsushita Electric Industries Co. Ltd., the biggest patent applicant in Japan, had changed their name to Panasonic Corporation in October 2008. The ISIN code for Panasonic did not change but it needed to be linked to the Matsushita's KZ_id manually as it has not been observed as an applicant's name yet. Finally, the total amount of distinct 1066 KZ_ids were linked to distinct 1053 ISIN numbers.

## 3. Linkage of EPIP data and IIP-PD

In this section we discuss the methodology for linking patent holder names in the EPIP and IIP databases, relying on the so-called *patent family* of priority links across patent

offices (this methodology was first suggested by Thoma et al., 2010). Typically a patent family of priorities is defined as all patents that protect the same basic invention. Indeed, a priority link emerges when a patentee claims a priority date antecedent to the filing date of a given patent. Thus, if a patentee has filed a document in two or more offices claiming a common priority date, it is possible to trace a link from an entry in the patentee names file in one patent office to the corresponding entry in another patentee names file in the other patent offices, assuming that the ultimate owner of the patent will be the same at both offices.[4]

Based on this assumption, we can propagate the matching with business directories done with one dictionary to the other, reducing the cost of implementation of such matching across different files. First we start by describing the propagation of JPO ISIN names into the EPIP dataset. Then, following the converse symmetric approach we propagate the Amadeus matching into the IIP JPO dataset.

**Figure 4 (a)** shows how we link the JPO ISIN names with the EPO/PCT standard names. In TASK 1 we start from the ISIN applicants' name file made up of 1,069 distinct patentee names. The file has information on all patent-holders that have filed at least one patent application at the JPO over the period 1964-2008. The JPO ISIN file can be easily interfaced with the PATSTAT database through the patent publication number (TASK 2). Subsequently in TASK 3, using the PATSTAT database we can identify the priority links from and into the EPO patent database; in particular we rely on the INPADOC patent family definition. In TASK 4 we use the priorities compiled from PATSTAT by linking each EPO application to the JPO priority date patent via the application number. Finally, we deal with the identification of the proper link to the EPO patent-holder names in TASK 5, which takes account of the number of priority links and number of patentees per EPO patent. We used a string similarity algorithm and also manual checking to ensure the proper association across the JPO ISIN codes and EPO applicant codes.

[4] Thoma et al. (2010) note that this assumption will not always hold. For a major discussion see ibid.

| TASK 1: | TASK 2: | TASK 3: | TASK 4: | TASK 5: |
|---|---|---|---|---|
| Retrieval of ISIN JPO names<br><br>Source: IIP, ISIN file<br><br>*7,169,446 patents*<br>*1069 names* | Retrieving the JPO patent application numbers<br><br>Source: PATSTAT April 2009 Table tls201<br><br>*16,084,150 patent documents* | Merging using priority links across EPO/PCT & JPO patents<br><br>Source: PATSTAT April 2009 Table tls219<br><br>*1,537,489 priority links* | Retrieving the EPO/PCT patent publication numbers<br><br>Source: PATSTAT April 2009 table tls201<br><br>*3,848,012 patent application documents* | Merging to obtain EPO/PCT standard names<br><br>Source: EPOLINE source files April 2009<br><br>*3,848,012 patent documents*<br>*588,525 names* |

**Figure 4 (a). Harmonization tasks based on priority links: data and sources**

The final list of EPO applicant codes with an ISIN JPO name includes around 13 thousands patentee names corresponding to about 981 names in the ISIN JPO file. This file contains about 23.5% of the EPO patent applications and 77.7% of the JPO applications filed by business organizations.

Following the conversely symmetric approach we advanced the propagation of the Amadeus matching in the JPO dataset (**see Figure 4(b)**). In the PATSTAT, there are 12,086,205 JP application patents, but including 1,727,771 records which may consist of unspecified cited patents and patents with no JPO application number during the international phase of PCT application patents. In addition, there are some other patents which could not be linked with IIP-PD and deleting some duplications in PATSTAT records finally lead to 10,358,434 patents linked patents to IIP-PD (TASK 5). The resulting list of KZ_id codes with an Amadeus code is made up of around 7,898 patentee names linked to about 4,980 names on the Amadeus file. The list of applicants

accounts for about 29.6% of the EPO patent applications and 27.01 % of the JPO applications filed by business organizations.

| TASK 1: | TASK 2: | TASK 3: | TASK 4: | TASK 5: |
|---|---|---|---|---|
| Retrieval of Amadeus and EPO/PCT standard names<br><br>Source: EPOLINE, Amadeus<br><br>*2,164,630 patent applications 91,273 names* | Retrieving the EPO/PCT patent publication numbers<br><br>Source: PATSTAT April 2009 table tls201<br><br>*3,848,012 patent application documents* | Merging using priority links across EPO & JPO patents<br><br>Source: PATSTAT April 2009 Table tls219<br><br>*1,537,489 priority links* | Retrieving the JPO patent application numbers<br><br>Source: PATSTAT April 2009 Table tls201<br><br>*12,086,205 patent documents* | Merging to obtain JPO KZ_id names<br><br>Source: IIP<br><br>*10,358,434 patents 260,325 names* |

**Figure 4 (b). Harmonization tasks based on priority links: data and sources**

Notes: In the table tls201 of PATSTAT April 2009 we found 16,084,150 documents that have been classified with a Japanese publication authority (JPO). However, we dropped from this dataset 3,994,938 related to utility models inventions, 2,588 with a non standard application number and 419 without information on the application year.

## 4. Comparison of patenting activities of European and Japanese firms

In this section we compare the patenting activities of European and Japanese firms according to various dimensions. We start by looking at the core industrial activity code. In particular we use the 2,5 digits level aggregation as in the OECD STAN database. In this process, we converted SIC classification of Compustat database to ISIC rev. 3, used as a basis of the OECD STAN database (the concordance table is attached as an appendix).

1 - Agriculture, hunting, forestry & fishing
2 - Mining & quarrying (energy)
3 - Mining & quarrying (non-energy)
4 - Food products, beverages & tobacco
5 - Textiles, textile products, leather & footwear
6 - Wood & products of wood & cork
7 - Pulp, paper, paper products, printing & publishing
8 - Coke, refined petroleum products & nuclear fuel
9 - Chemicals excluding pharmaceuticals
10 - Pharmaceuticals
11 - Rubber & plastics products
12 - Other non-metallic mineral products
13 - Iron & steel
14 - Non-ferrous metals
15 - Fabricated metal products, except machinery & equipment
16 - Machinery & equipment, Nec.
17 - Office, accounting & computing machinery
18 - Electrical machinery & apparatus, Nec.
19 - Radio, television & communication equipment
20 - Medical, precision & optical instruments
21 - Motor vehicles, trailers & semi-trailers
22 - Building & repairing of ships & boats
23 - Aircraft & spacecraft
24 - Railroad equipment & transport equip Nec.
25 - Manufacturing nec recycling (include Furniture)
26 - Production, collection & distribution of electricity
27 - Manufacture of gas distribution of gaseous fuels through mains
28 - Steam & hot water supply
29 - Collection, purification & distribution of water
30 - Construction
31 - Wholesale & retail trade repairs
32 - Hotels & restaurants
33 - Land transport and transport via pipelines
34 - Water transport
35 - Air transport

36 - Supporting & auxiliary transport activities; activities of travel agencies
37 - Post & telecommunications
38 - Finance & insurance
39 - Real estate activities
40 - Renting of machinery & equipment
41 - Computer & related activities
42 - Research & development
43 - Other Business Activities
44 - Public admin. & defense compulsory social security
45 - Education
46 - Health & social work
47 - Other community, social & personal services
48 - Extra-territorial organizations & bodies

**Box 2: Industrial classification of the OECD STAN database**

**Table 4** and **Table 5** report respectively on the distribution of patents for the matched Japanese and European patentees in the JPO, EPO and PCT system. We can observe some interesting differences of the patenting strategies across sectors.

In terms of JPO patent applications the top five most relevant sectors for Japanese firms regard: i) 17 - Office, accounting & computing machinery (24.2%); ii) 18 - Electrical machinery & apparatus (16.1%); iii) 19 - Radio, television & communication equipment (8.7%); iv) 20 - Medical, precision & optical instruments (8.8%); and v) 16 - Machinery & equipment (6.9%).

However, for European firms only one of these sectors is among the top five most relevant, that is, 16 - Machinery & equipment (15.5%), which is also the most important one for JPO applications filed by European patentees. The other four sectors are; 9 - Chemicals excluding pharmaceuticals (14.7%); 10 – Pharmaceuticals (8.7%); 31 - Wholesale & retail trade repairs (6.6%); and 43 - Other Business Activities (8.6%). It is noteworthy to mention that the sectoral concentration of JPO applications for European firms is smaller than for Japanese firms, that is 54.1% vis-à-vis 64.7%.

For JPO patent grants, the sectoral concentration mimics closely the sectoral concentration of JPO applications, although the grant rate of the top five most relevant sectors for Japanese firms is lower than for European firms. This finding could correspond on the one hand with the fact that patent applications in these sectors for

Japanese firms have been filed more recently, and hence they could suffer from a truncation lag. On the other hand the most relevant sectors for Japanese firms are sectors typically characterized by a very high patent propensity, which very often is a signal of strategic fillings (Bessen and Hunt 2007).

The evidences on the sectoral distribution hold with some caveats also in the case of EPO patent applications and grants. First of all, for the Japanese firms the above top five sectors account for 50.6% of all EPO applications and 51.5% of grants, and "9 – Chemicals" is the most important sector in terms of applications filed (12.8%). On the other hand, European firms with large EPO patent portfolio originate also from other sectors like ii) 18 - Electrical machinery & apparatus (9.1%); iii) 19 - Radio, television & communication equipment (12.3%); 21 - Motor vehicles, trailers & semi-trailers (9.0%).

The internationalization of patenting strategies is another dimension of analysis. The development of a full-fledged indicator of internationalization of IP strategies is beyond the goals of this paper. More simply we will use two broad proxies. The first regards the use of the PCT system. We can observe that European firms file more applications via the PCT system than their Japanese counterparts, who patent relatively more in the EPO. In particular the ratio of EPO / PCT fillings is about 1.7 for Japanese firms, whereas it is only 0.8 for their European counterparts.

The goal of the second indicator is associated with a sectoral comparison for firms from the same geographical context. In particular for Japanese firms it is given by:

(EPO fillings + PCT fillings) / JPO fillings

whereas for European firms it is equal

(PCT fillings + JPO fillings) / EPO fillings

Both these two indexes are reported respectively in column (8) of Table 4 and Table 5. We can note that the internationalization of the IP strategy (EPO vs PCT route) strongly fluctuates across industries. Both for Japanese and European firms IP internationalization is broadly negatively related to the intensity of patenting, i.e. sectors that hold the largest number of patent fillings are not necessarily characterized by a high level of IP internationalization. This evidence could correspond with a very high patent propensity of these sectors which is more pronounced in the home country. However, this speculation requires further investigation and it would benefit significantly by including R&D investments in the analysis. We plan to develop it in a

later stage of this project.

## 5. Conclusion

This paper describes the methodology for the construction of a patent database for EPO and PCT patents (EPIP database) and JPO patents (IIP patent database). In addition, applicant information of these two databases is liked by using priority information of PATSTAT. By linking two datasets, we can expect significant improvement of applicants name information for European firms in IIP patent database and Japanese firms in EPIP database.

In addition, we have provided some comparative tables of international patenting activities between European and Japanese firms by industry. There is a significant difference in patenting strategy between European and Japanese firms, and it has been found that the propensity for international patenting is generally higher for European firms.

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Figure 1
Reduction in the size of the name file after harmonization of the EPO/PCT dataset (business applicants only, top 18 countries)

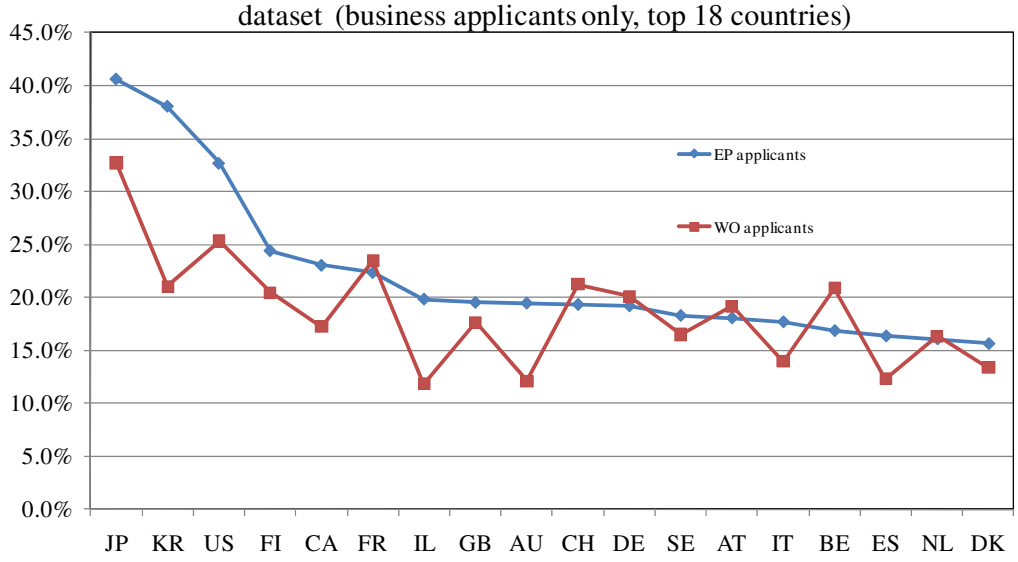


Figure 2: Share of business applicant names matched (top 18 EU countries)

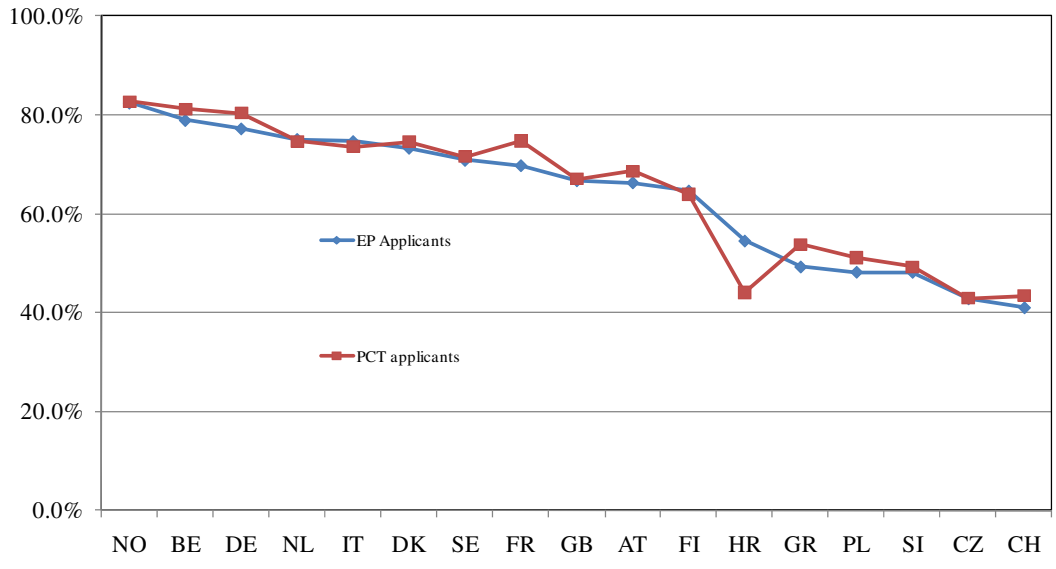

Figure 3: Share of business applicant names matched, weighted by number of applications (top 18 EU countries)

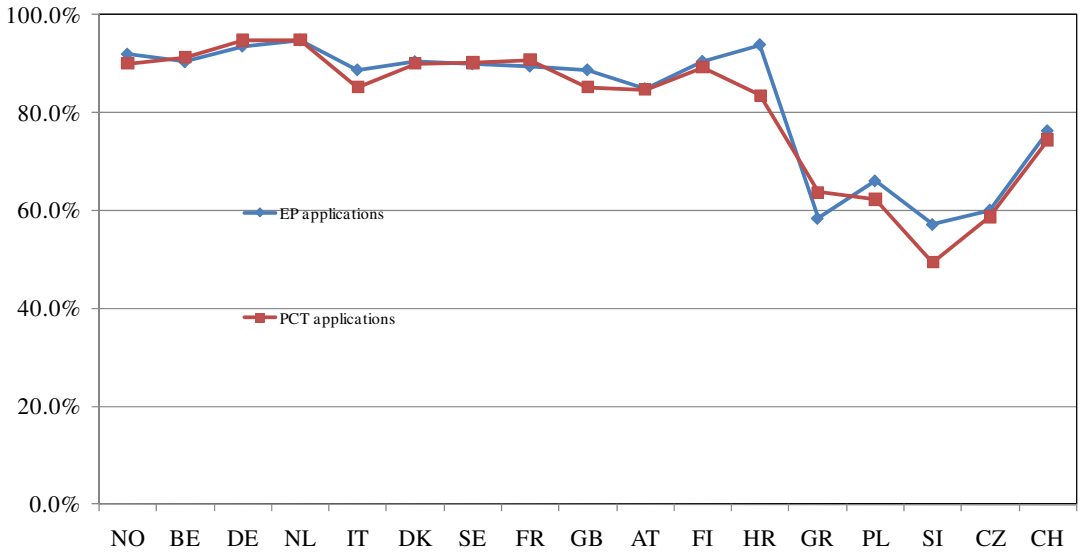

**Table 1 Business applicants and applications in EPO and PCT dataset**

(distinct original names, countries with more than 100 EP applicants)

| | EP applicants | | PCT applicants | | EP applications | | PCT applications | | Average | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | N | % | N | % | N | % | N | % | EP portfolio | PCT portfolio |
| AN | 286 | 0.1% | 66 | 0.0% | 1,096 | 0.1% | 245 | 0.0% | 3.83 | 3.71 |
| AT | 3,404 | 1.3% | 1,936 | 0.9% | 15,707 | 0.9% | 7,893 | 0.7% | 4.61 | 4.08 |
| AU | 4,787 | 1.8% | 8,134 | 3.7% | 9,236 | 0.5% | 14,888 | 1.4% | 1.93 | 1.83 |
| BB | 140 | 0.1% | 69 | 0.0% | 1,134 | 0.1% | 191 | 0.0% | 8.10 | 2.77 |
| BE | 2,892 | 1.1% | 1,513 | 0.7% | 15,421 | 0.9% | 6,992 | 0.6% | 5.33 | 4.62 |
| BG | 111 | 0.0% | 63 | 0.0% | 142 | 0.0% | 80 | 0.0% | 1.28 | 1.27 |
| BM | 107 | 0.0% | 61 | 0.0% | 298 | 0.0% | 168 | 0.0% | 2.79 | 2.75 |
| BR | 343 | 0.1% | 254 | 0.1% | 661 | 0.0% | 352 | 0.0% | 1.93 | 1.39 |
| CA | 5,574 | 2.1% | 6,610 | 3.0% | 18,404 | 1.0% | 17,808 | 1.6% | 3.30 | 2.69 |
| CH | 9,612 | 3.7% | 5,411 | 2.4% | 64,547 | 3.6% | 28,326 | 2.6% | 6.72 | 5.24 |
| CN | 1,337 | 0.5% | 2,200 | 1.0% | 3,501 | 0.2% | 8,292 | 0.8% | 2.62 | 3.77 |
| CY | 129 | 0.0% | 148 | 0.1% | 276 | 0.0% | 318 | 0.0% | 2.14 | 2.15 |
| CZ | 248 | 0.1% | 253 | 0.1% | 452 | 0.0% | 409 | 0.0% | 1.82 | 1.62 |
| DE | 37,564 | 14.4% | 18,733 | 8.4% | 345,386 | 19.3% | 147,941 | 13.5% | 9.19 | 7.90 |
| DK | 3,242 | 1.2% | 3,357 | 1.5% | 11,836 | 0.7% | 11,629 | 1.1% | 3.65 | 3.46 |
| ES | 3,286 | 1.3% | 2,273 | 1.0% | 7,000 | 0.4% | 4,271 | 0.4% | 2.13 | 1.88 |
| FI | 3,096 | 1.2% | 3,209 | 1.4% | 18,467 | 1.0% | 17,846 | 1.6% | 5.96 | 5.56 |
| FR | 21,361 | 8.2% | 10,918 | 4.9% | 125,162 | 7.0% | 46,988 | 4.3% | 5.86 | 4.30 |
| GB | 20,538 | 7.9% | 17,042 | 7.7% | 84,913 | 4.7% | 56,743 | 5.2% | 4.13 | 3.33 |
| GR | 180 | 0.1% | 132 | 0.1% | 274 | 0.0% | 207 | 0.0% | 1.52 | 1.57 |
| HK | 301 | 0.1% | 16 | 0.0% | 436 | 0.0% | 18 | 0.0% | 1.45 | 1.13 |
| HU | 633 | 0.2% | 599 | 0.3% | 1,596 | 0.1% | 1,226 | 0.1% | 2.52 | 2.05 |
| IE | 1,150 | 0.4% | 1,020 | 0.5% | 2,862 | 0.2% | 2,578 | 0.2% | 2.49 | 2.53 |
| IL | 2,500 | 1.0% | 1,704 | 0.8% | 4,845 | 0.3% | 2,703 | 0.2% | 1.94 | 1.59 |
| IN | 439 | 0.2% | 577 | 0.3% | 1,498 | 0.1% | 2,680 | 0.2% | 3.41 | 4.64 |
| IT | 17,024 | 6.5% | 6,542 | 2.9% | 54,688 | 3.1% | 16,345 | 1.5% | 3.21 | 2.50 |
| JP | 23,703 | 9.1% | 17,883 | 8.0% | 350,015 | 19.6% | 163,365 | 15.0% | 14.77 | 9.14 |
| KR | 2,977 | 1.1% | 5,655 | 2.5% | 22,550 | 1.3% | 17,237 | 1.6% | 7.57 | 3.05 |
| LI | 588 | 0.2% | 62 | 0.0% | 2,363 | 0.1% | 78 | 0.0% | 4.02 | 1.26 |
| LU | 659 | 0.3% | 414 | 0.2% | 2,483 | 0.1% | 1,442 | 0.1% | 3.77 | 3.48 |
| NL | 7,502 | 2.9% | 4,460 | 2.0% | 67,101 | 3.7% | 41,232 | 3.8% | 8.94 | 9.24 |
| NO | 2,028 | 0.8% | 2,628 | 1.2% | 4,785 | 0.3% | 5,885 | 0.5% | 2.36 | 2.24 |
| NZ | 598 | 0.2% | 553 | 0.2% | 1,046 | 0.1% | 835 | 0.1% | 1.75 | 1.51 |
| PL | 249 | 0.1% | 195 | 0.1% | 402 | 0.0% | 342 | 0.0% | 1.61 | 1.75 |
| PT | 204 | 0.1% | 142 | 0.1% | 380 | 0.0% | 204 | 0.0% | 1.86 | 1.44 |
| RU | 372 | 0.1% | 467 | 0.2% | 473 | 0.0% | 597 | 0.1% | 1.27 | 1.28 |
| SE | 7,487 | 2.9% | 7,632 | 3.4% | 35,584 | 2.0% | 35,735 | 3.3% | 4.75 | 4.68 |
| SG | 304 | 0.1% | 432 | 0.2% | 856 | 0.0% | 719 | 0.1% | 2.82 | 1.66 |
| SI | 151 | 0.1% | 135 | 0.1% | 428 | 0.0% | 351 | 0.0% | 2.83 | 2.60 |
| SU | 112 | 0.0% | 0 | 0.0% | 227 | 0.0% | 0 | 0.0% | 2.03 | n.d. |
| TR | 181 | 0.1% | 219 | 0.1% | 468 | 0.0% | 776 | 0.1% | 2.59 | 3.54 |
| TW | 924 | 0.4% | 101 | 0.0% | 1,826 | 0.1% | 220 | 0.0% | 1.98 | 2.18 |
| US | 70,194 | 26.9% | 87,431 | 39.3% | 503,399 | 28.1% | 423,571 | 38.8% | 7.17 | 4.84 |
| VG | 267 | 0.1% | 124 | 0.1% | 1,158 | 0.1% | 500 | 0.0% | 4.34 | 4.03 |
| ZA | 649 | 0.2% | 390 | 0.2% | 1,211 | 0.1% | 579 | 0.1% | 1.87 | 1.48 |
| Others | 1,565 | 0.6% | 868 | 0.4% | 3,129 | 0.2% | 1,366 | 0.1% | 2.00 | 1.57 |
| Overall | 260,997 | 100.0% | 222,628 | 100.0% | 1,789,721 | 100.0% | 1,092,169 | 100.0% | 6.86 | 4.91 |

**Table 2 Non-business organization applicants and applications in EPO and PCT dataset**

(distinct original names, countries with more than 100 EP applicants)*

| | EP Applicants | | PCT applicants | | EP applications | | PCT applications | | Average | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | N | % | N | % | N | % | N | % | EP portfolio | PCT portfolio |
| AT | 130 | 0.7% | 97 | 0.5% | 419 | 0.4% | 257 | 0.2% | 3.22 | 2.65 |
| AU | 506 | 2.7% | 671 | 3.5% | 2,535 | 2.6% | 3,708 | 3.2% | 5.01 | 5.53 |
| BE | 332 | 1.8% | 244 | 1.3% | 2,198 | 2.3% | 1,184 | 1.0% | 6.62 | 4.85 |
| CA | 711 | 3.8% | 850 | 4.4% | 2,478 | 2.6% | 3,498 | 3.0% | 3.49 | 4.12 |
| CH | 419 | 2.3% | 355 | 1.9% | 1,767 | 1.8% | 1,227 | 1.0% | 4.22 | 3.46 |
| CN | 345 | 1.9% | 578 | 3.0% | 684 | 0.7% | 1,778 | 1.5% | 1.98 | 3.08 |
| DE | 2,014 | 10.9% | 1,377 | 7.2% | 11,494 | 11.9% | 8,718 | 7.5% | 5.71 | 6.33 |
| DK | 129 | 0.7% | 152 | 0.8% | 420 | 0.4% | 530 | 0.5% | 3.26 | 3.49 |
| ES | 311 | 1.7% | 393 | 2.1% | 909 | 0.9% | 1,653 | 1.4% | 2.92 | 4.21 |
| FR | 1,558 | 8.4% | 1,182 | 6.2% | 14,389 | 14.8% | 9,122 | 7.8% | 9.24 | 7.72 |
| GB | 1,323 | 7.1% | 1,370 | 7.1% | 6,624 | 6.8% | 7,254 | 6.2% | 5.01 | 5.29 |
| IL | 204 | 1.1% | 127 | 0.7% | 956 | 1.0% | 444 | 0.4% | 4.69 | 3.50 |
| IN | 126 | 0.7% | 188 | 1.0% | 727 | 0.8% | 1,093 | 0.9% | 5.77 | 5.81 |
| IT | 491 | 2.6% | 354 | 1.8% | 1,885 | 1.9% | 1,385 | 1.2% | 3.84 | 3.91 |
| JP | 1,683 | 9.1% | 1,485 | 7.7% | 7,320 | 7.6% | 9,541 | 8.2% | 4.35 | 6.42 |
| KR | 409 | 2.2% | 557 | 2.9% | 1,481 | 1.5% | 2,586 | 2.2% | 3.62 | 4.64 |
| NL | 436 | 2.4% | 393 | 2.1% | 2,327 | 2.4% | 1,892 | 1.6% | 5.34 | 4.81 |
| PL | 119 | 0.6% | 87 | 0.5% | 242 | 0.2% | 170 | 0.1% | 2.03 | 1.95 |
| RU | 125 | 0.7% | 87 | 0.5% | 226 | 0.2% | 145 | 0.1% | 1.81 | 1.67 |
| SE | 143 | 0.8% | 151 | 0.8% | 274 | 0.3% | 285 | 0.2% | 1.92 | 1.89 |
| SU | 159 | 0.9% | 2 | 0.0% | 350 | 0.4% | 9 | 0.0% | 2.20 | 4.50 |
| US | 5,892 | 31.8% | 7,618 | 39.8% | 34,777 | 35.9% | 58,106 | 49.7% | 5.90 | 7.63 |
| Others | 980 | 5.3% | 845 | 4.4% | 2,429 | 2.5% | 2,371 | 2.0% | 2.48 | 2.81 |
| Overall | 18,544 | 100.0% | 19,162 | 100.0% | 96,910 | 100.0% | 116,956 | 100.0% | 5.23 | 6.10 |

Notes: *It includes also those individual applicants having the suffix "Prof." in their name.

**Table 3 Individual applicants and applications in EPO and PCT dataset**

(distinct original names, countries with more than 100 EP applicants)

| | EP Applicants | | PCT applicants | | EP applications | | PCT applications | | Average | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | N | % | N | % | N | % | N | % | EP portfolio | PCT portfolio |
| AR | 243 | 0.2% | 69 | 0.0% | 291 | 0.2% | 73 | 0.0% | 1.20 | 1.06 |
| AT | 3,165 | 2.4% | 2,029 | 1.2% | 5,002 | 2.9% | 2,943 | 1.4% | 1.58 | 1.45 |
| AU | 2,991 | 2.3% | 6,713 | 4.1% | 3,530 | 2.0% | 7,878 | 3.9% | 1.18 | 1.17 |
| BE | 1,702 | 1.3% | 1,017 | 0.6% | 2,191 | 1.3% | 1,206 | 0.6% | 1.29 | 1.19 |
| BG | 120 | 0.1% | 283 | 0.2% | 134 | 0.1% | 328 | 0.2% | 1.12 | 1.16 |
| BR | 302 | 0.2% | 506 | 0.3% | 329 | 0.2% | 557 | 0.3% | 1.09 | 1.10 |
| CA | 2,895 | 2.2% | 5,072 | 3.1% | 3,645 | 2.1% | 6,101 | 3.0% | 1.26 | 1.20 |
| CH | 4,687 | 3.6% | 3,121 | 1.9% | 6,937 | 4.0% | 4,166 | 2.1% | 1.48 | 1.33 |
| CN | 1,232 | 0.9% | 4,727 | 2.9% | 1,401 | 0.8% | 5,966 | 2.9% | 1.14 | 1.26 |
| CZ | 267 | 0.2% | 530 | 0.3% | 316 | 0.2% | 626 | 0.3% | 1.18 | 1.18 |
| DE | 25,515 | 19.3% | 15,279 | 9.3% | 39,302 | 22.5% | 21,297 | 10.5% | 1.54 | 1.39 |
| DK | 1,434 | 1.1% | 1,832 | 1.1% | 1,810 | 1.0% | 2,272 | 1.1% | 1.26 | 1.24 |
| ES | 2,791 | 2.1% | 2,791 | 1.7% | 3,384 | 1.9% | 3,219 | 1.6% | 1.21 | 1.15 |
| FI | 1,270 | 1.0% | 1,967 | 1.2% | 1,588 | 0.9% | 2,512 | 1.2% | 1.25 | 1.28 |
| FR | 12,552 | 9.5% | 8,814 | 5.4% | 16,519 | 9.5% | 11,121 | 5.5% | 1.32 | 1.26 |
| GB | 8,481 | 6.4% | 9,863 | 6.0% | 10,392 | 5.9% | 11,955 | 5.9% | 1.23 | 1.21 |
| GR | 619 | 0.5% | 597 | 0.4% | 732 | 0.4% | 736 | 0.4% | 1.18 | 1.23 |
| HK | 134 | 0.1% | 13 | 0.0% | 182 | 0.1% | 13 | 0.0% | 1.36 | 1.00 |
| HR | 109 | 0.1% | 353 | 0.2% | 125 | 0.1% | 422 | 0.2% | 1.15 | 1.20 |
| HU | 837 | 0.6% | 1,472 | 0.9% | 986 | 0.6% | 1,833 | 0.9% | 1.18 | 1.25 |
| IE | 602 | 0.5% | 602 | 0.4% | 740 | 0.4% | 734 | 0.4% | 1.23 | 1.22 |
| IL | 1,265 | 1.0% | 1,141 | 0.7% | 1,523 | 0.9% | 1,283 | 0.6% | 1.20 | 1.12 |
| IN | 384 | 0.3% | 1,099 | 0.7% | 449 | 0.3% | 1,578 | 0.8% | 1.17 | 1.44 |
| IT | 8,263 | 6.3% | 4,780 | 2.9% | 10,637 | 6.1% | 5,853 | 2.9% | 1.29 | 1.22 |
| JP | 6,023 | 4.6% | 7,436 | 4.5% | 9,367 | 5.4% | 10,748 | 5.3% | 1.56 | 1.45 |
| KR | 2,135 | 1.6% | 7,842 | 4.8% | 2,540 | 1.5% | 9,768 | 4.8% | 1.19 | 1.25 |
| MX | 132 | 0.1% | 441 | 0.3% | 142 | 0.1% | 506 | 0.2% | 1.08 | 1.15 |
| NL | 2,495 | 1.9% | 1,784 | 1.1% | 3,216 | 1.8% | 2169 | 1.1% | 1.29 | 1.22 |
| NO | 1,077 | 0.8% | 1,671 | 1.0% | 1,302 | 0.7% | 2068 | 1.0% | 1.21 | 1.24 |
| NZ | 350 | 0.3% | 414 | 0.3% | 401 | 0.2% | 433 | 0.2% | 1.15 | 1.05 |
| PL | 298 | 0.2% | 680 | 0.4% | 351 | 0.2% | 821 | 0.4% | 1.18 | 1.21 |
| PT | 181 | 0.1% | 160 | 0.1% | 202 | 0.1% | 189 | 0.1% | 1.12 | 1.18 |
| RU | 923 | 0.7% | 2,683 | 1.6% | 1,101 | 0.6% | 3472 | 1.7% | 1.19 | 1.29 |
| SE | 4,758 | 3.6% | 5,937 | 3.6% | 6,149 | 3.5% | 7577 | 3.7% | 1.29 | 1.28 |
| SI | 157 | 0.1% | 231 | 0.1% | 195 | 0.1% | 276 | 0.1% | 1.24 | 1.19 |
| SU | 288 | 0.2% | 5 | 0.0% | 348 | 0.2% | 5 | 0.0% | 1.21 | 1.00 |
| TR | 132 | 0.1% | 281 | 0.2% | 156 | 0.1% | 328 | 0.2% | 1.18 | 1.17 |
| TW | 1,431 | 1.1% | 144 | 0.1% | 2,056 | 1.2% | 180 | 0.1% | 1.44 | 1.25 |
| US | 27,442 | 20.8% | 56,118 | 34.1% | 34,846 | 19.9% | 69714 | 34.3% | 1.27 | 1.24 |
| YU | 159 | 0.1% | 119 | 0.1% | 218 | 0.1% | 130 | 0.1% | 1.37 | 1.09 |
| ZA | 602 | 0.5% | 1,439 | 0.9% | 681 | 0.4% | 1628 | 0.8% | 1.13 | 1.13 |
| Others | 1484 | 1.1% | 2453 | 1.5% | 1823 | 1.0% | 2954 | 1.5% | 1.23 | 1.20 |
| Overall | 131,923 | 100.0% | 164,503 | 100.0% | 174,732 | 101.4% | 203,054 | 102.3% | 1.32 | 1.23 |

**Table 4 Sectoral distributions of patents for the largest Japanese patenters**

(1,026 listed firms; patenting activity over period 1978-2009)

| | (1) | | (2) | | (3) | (4) | | (5) | | (6) | (7) | | (8) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| stan_code | JPO applications | | JPO grants | | (2)/(1) | EPO applications | | EPO grants | | (5)/(4) | PCT applications | | ((7)+(4))/(1) |
| | N | % | N | % | % | N | % | N | % | | N | % | % |
| 2 | 412 | 0.0% | 173 | 0.0% | 42.0% | 42 | 0.0% | 27 | 0.0% | 63.1% | 6 | 0.0% | 27.8% |
| 3 | 739 | 0.0% | 357 | 0.0% | 48.3% | 248 | 0.0% | 170 | 0.0% | 68.5% | 212 | 0.1% | 62.3% |
| 4 | 33,104 | 0.6% | 15,470 | 0.9% | 46.7% | 7,300 | 1.4% | 4,987 | 1.4% | 68.3% | 4,633 | 2.4% | 36.0% |
| 5 | 71,177 | 1.2% | 22,812 | 1.3% | 32.0% | 16,736 | 3.3% | 10,722 | 3.1% | 64.1% | 7,431 | 3.8% | 34.0% |
| 6 | 5,081 | 0.1% | 2,094 | 0.1% | 41.2% | 277 | 0.1% | 166 | 0.0% | 59.9% | 58 | 0.0% | 6.6% |
| 7 | 86,939 | 1.5% | 24,282 | 1.4% | 27.9% | 6,494 | 1.3% | 4,104 | 1.2% | 63.2% | 1,677 | 0.9% | 9.4% |
| 8 | 14,244 | 0.2% | 5,159 | 0.3% | 36.2% | 9,620 | 1.9% | 6,747 | 1.9% | 70.1% | 5,916 | 3.0% | 109.1% |
| 9 | 343,864 | 5.8% | 128,573 | 7.4% | 37.4% | 64,311 | 12.8% | 42,283 | 12.2% | 65.7% | 28,903 | 14.7% | 27.1% |
| 10 | 30,521 | 0.5% | 11,558 | 0.7% | 37.9% | 14,040 | 2.8% | 9,874 | 2.8% | 70.3% | 9,474 | 4.8% | 77.0% |
| 11 | 77,797 | 1.3% | 25,973 | 1.5% | 33.4% | 11,002 | 2.2% | 7,199 | 2.1% | 65.4% | 4,267 | 2.2% | 19.6% |
| 12 | 69,975 | 1.2% | 24,393 | 1.4% | 34.9% | 9,291 | 1.8% | 6,341 | 1.8% | 68.2% | 4,024 | 2.0% | 19.0% |
| 13 | 204,918 | 3.5% | 67,076 | 3.8% | 32.7% | 8,101 | 1.6% | 5,351 | 1.5% | 66.0% | 3,323 | 1.7% | 5.6% |
| 14 | 153,132 | 2.6% | 42,126 | 2.4% | 27.5% | 20,282 | 4.0% | 13,891 | 4.0% | 68.5% | 7,151 | 3.6% | 17.9% |
| 15 | 33,085 | 0.6% | 14,605 | 0.8% | 44.1% | 1,627 | 0.3% | 1,066 | 0.3% | 65.5% | 895 | 0.5% | 7.6% |
| 16 | 408,318 | 6.9% | 133,714 | 7.7% | 32.7% | 38,816 | 7.7% | 25,394 | 7.3% | 65.4% | 14,195 | 7.2% | 13.0% |
| 17 | 1,440,026 | 24.2% | 350,937 | 20.1% | 24.4% | 53,897 | 10.7% | 37,999 | 10.9% | 70.5% | 16,097 | 8.2% | 4.9% |
| 18 | 953,917 | 16.1% | 261,713 | 15.0% | 27.4% | 45,375 | 9.0% | 33,454 | 9.6% | 73.7% | 25,113 | 12.8% | 7.4% |
| 19 | 518,640 | 8.7% | 144,414 | 8.3% | 27.8% | 63,492 | 12.6% | 45,102 | 13.0% | 71.0% | 23,842 | 12.1% | 16.8% |
| 20 | 521,469 | 8.8% | 132,928 | 7.6% | 25.5% | 53,326 | 10.6% | 37,150 | 10.7% | 69.7% | 12,349 | 6.3% | 12.6% |
| 21 | 396,341 | 6.7% | 149,481 | 8.6% | 37.7% | 39,802 | 7.9% | 26,826 | 7.7% | 67.4% | 12,481 | 6.3% | 13.2% |
| 23 | 1,595 | 0.0% | 423 | 0.0% | 26.5% | 269 | 0.1% | 203 | 0.1% | 75.6% | 181 | 0.1% | 28.1% |
| 24 | 24,413 | 0.4% | 9,735 | 0.6% | 39.9% | 4,722 | 0.9% | 3,415 | 1.0% | 72.3% | 376 | 0.2% | 20.9% |
| 25 | 61,899 | 1.0% | 23,050 | 1.3% | 37.2% | 4,363 | 0.9% | 3,299 | 0.9% | 75.6% | 1,212 | 0.6% | 9.0% |
| 26 | 11,292 | 0.2% | 4,743 | 0.3% | 42.0% | 562 | 0.1% | 363 | 0.1% | 64.6% | 291 | 0.1% | 7.6% |
| 27 | 19,701 | 0.3% | 6,799 | 0.4% | 34.5% | 598 | 0.1% | 364 | 0.1% | 60.9% | 236 | 0.1% | 4.2% |
| 30 | 112,584 | 1.9% | 39,137 | 2.2% | 34.8% | 3,457 | 0.7% | 2,181 | 0.6% | 63.1% | 1,275 | 0.6% | 4.2% |
| 31 | 10,022 | 0.2% | 3,692 | 0.2% | 36.8% | 3,123 | 0.6% | 2,214 | 0.6% | 70.9% | 911 | 0.5% | 40.2% |
| 33 | 8,539 | 0.1% | 3,278 | 0.2% | 38.4% | 277 | 0.1% | 182 | 0.1% | 65.8% | 212 | 0.1% | 5.7% |
| 37 | 81,304 | 1.4% | 29,292 | 1.7% | 36.0% | 6,173 | 1.2% | 4,531 | 1.3% | 73.4% | 2,270 | 1.2% | 10.4% |
| 40 | 174 | 0.0% | 90 | 0.0% | 51.7% | 31 | 0.0% | 19 | 0.0% | 59.7% | 3 | 0.0% | 19.3% |
| 41 | 205,419 | 3.5% | 53,880 | 3.1% | 26.2% | 13,510 | 2.7% | 9,691 | 2.8% | 71.7% | 5,355 | 2.7% | 9.2% |
| 43 | 2,736 | 0.0% | 1,675 | 0.1% | 61.2% | 151 | 0.0% | 90 | 0.0% | 59.5% | 58 | 0.0% | 7.6% |
| 44 | 31,273 | 0.5% | 9,837 | 0.6% | 31.5% | 2,883 | 0.6% | 1,923 | 0.6% | 66.7% | 2,102 | 1.1% | 15.9% |
| 46 | 213 | 0.0% | 77 | 0.0% | 35.9% | 27 | 0.0% | 21 | 0.0% | 77.8% | 16 | 0.0% | 20.2% |
| 47 | 4,004 | 0.1% | 1,481 | 0.1% | 37.0% | 136 | 0.0% | 87 | 0.0% | 63.8% | 39 | 0.0% | 4.4% |
| Sub-total | 5,938,866 | 100.0% | 1,745,023 | 100.0% | 29.4% | 504,357 | 100.0% | 347,431 | 100.0% | 68.9% | 196,578 | 100.0% | 11.8% |
| Not Availat | 480,913 | | 42,869 | | | 16,259 | | 34,994 | | | 25,308 | | |
| Overall | 6,419,780 | | 1,787,892 | | | 520,616 | | 382,425 | | | 221,886 | | |

**Table 5 Sectoral distributions of patents for the European patenters**

(3,652 firms; patenting activity over period 1978-2009)

| | (1) | | (2) | | (3) | (4) | | (5) | | (6) | (7) | | (8) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| stan_code | JPO applications | | JPO grants | | (2)/(1) | EPO applications | | EPO grants | | (5)/(4) | PCT applications | | ((7)+(1))/(4) |
| | N | % | N | % | % | N | % | N | % | % | N | % | % |
| 2 | 233 | 0.3% | 72 | 0.3% | 30.9% | 1,151 | 0.2% | 659 | 0.3% | 57.3% | 634 | 0.2% | 61.3% |
| 3 | 235 | 0.3% | 86 | 0.3% | 36.6% | 1,533 | 0.3% | 884 | 0.4% | 57.7% | 949 | 0.3% | 67.5% |
| 4 | 2235 | 2.6% | 809 | 3.1% | 36.2% | 8,034 | 1.5% | 4,563 | 1.9% | 56.8% | 5,043 | 1.7% | 72.8% |
| 5 | 365 | 0.4% | 97 | 0.4% | 26.6% | 1,097 | 0.2% | 664 | 0.3% | 60.5% | 406 | 0.1% | 45.9% |
| 6 | 24 | 0.0% | 6 | 0.0% | 25.0% | 161 | 0.0% | 102 | 0.0% | 63.4% | 24 | 0.0% | 18.6% |
| 7 | 849 | 1.0% | 196 | 0.8% | 23.0% | 6,526 | 1.2% | 2,515 | 1.1% | 38.5% | 3,290 | 1.1% | 53.4% |
| 8 | 152 | 0.2% | 56 | 0.2% | 37.1% | 231 | 0.0% | 141 | 0.1% | 61.0% | 93 | 0.0% | 64.6% |
| 9 | 12446 | 14.7% | 3824 | 14.9% | 30.7% | 96,331 | 18.3% | 45,045 | 18.9% | 46.8% | 51,393 | 17.8% | 57.3% |
| 10 | 7372 | 8.7% | 2109 | 8.2% | 28.6% | 30,878 | 5.9% | 12,402 | 5.2% | 40.2% | 22,371 | 7.8% | 79.3% |
| 11 | 1180 | 1.4% | 453 | 1.8% | 38.4% | 5,600 | 1.1% | 3,077 | 1.3% | 54.9% | 3,153 | 1.1% | 64.4% |
| 12 | 812 | 1.0% | 236 | 0.9% | 29.1% | 4,092 | 0.8% | 2,037 | 0.9% | 49.8% | 1,960 | 0.7% | 53.7% |
| 13 | 437 | 0.5% | 168 | 0.7% | 38.4% | 1,884 | 0.4% | 1,159 | 0.5% | 61.5% | 908 | 0.3% | 57.1% |
| 14 | 615 | 0.7% | 184 | 0.7% | 29.8% | 3,159 | 0.6% | 1,498 | 0.6% | 47.4% | 1,330 | 0.5% | 47.9% |
| 15 | 1612 | 1.9% | 523 | 2.0% | 32.4% | 10,192 | 1.9% | 5,866 | 2.5% | 57.6% | 3,233 | 1.1% | 36.9% |
| 16 | 13103 | 15.5% | 4289 | 16.7% | 32.7% | 49,935 | 9.5% | 26,196 | 11.0% | 52.5% | 20,579 | 7.1% | 49.8% |
| 17 | 360 | 0.4% | 177 | 0.7% | 49.2% | 2,392 | 0.5% | 943 | 0.4% | 39.4% | 1,060 | 0.4% | 51.7% |
| 18 | 2839 | 3.4% | 939 | 3.7% | 33.1% | 47,954 | 9.1% | 18,618 | 7.8% | 38.8% | 33,047 | 11.4% | 70.9% |
| 19 | 4145 | 4.9% | 1062 | 4.1% | 25.6% | 64,648 | 12.3% | 25,434 | 10.7% | 39.3% | 38,338 | 13.3% | 60.9% |
| 20 | 5253 | 6.2% | 1775 | 6.9% | 33.8% | 26,369 | 5.0% | 12,129 | 5.1% | 46.0% | 12,447 | 4.3% | 53.9% |
| 21 | 3491 | 4.1% | 902 | 3.5% | 25.8% | 47,346 | 9.0% | 23,550 | 9.9% | 49.7% | 24,097 | 8.3% | 52.8% |
| 22 | 41 | 0.0% | 10 | 0.0% | 24.7% | 51 | 0.0% | 41 | 0.0% | 80.4% | 13 | 0.0% | 45.1% |
| 23 | 632 | 0.7% | 126 | 0.5% | 19.9% | 4,912 | 0.9% | 2,140 | 0.9% | 43.6% | 2,602 | 0.9% | 55.5% |
| 24 | 690 | 0.8% | 243 | 0.9% | 35.2% | 1,092 | 0.2% | 451 | 0.2% | 41.3% | 215 | 0.1% | 41.9% |
| 25 | 450 | 0.5% | 141 | 0.5% | 31.3% | 1,830 | 0.3% | 1,108 | 0.5% | 60.5% | 497 | 0.2% | 34.8% |
| 26 | 37 | 0.0% | 6 | 0.0% | 16.2% | 1,240 | 0.2% | 848 | 0.4% | 68.4% | 230 | 0.1% | 19.0% |
| 29 | 1 | 0.0% | 0 | 0.0% | 0.0% | 36 | 0.0% | 19 | 0.0% | 52.8% | 35 | 0.0% | 97.2% |
| 30 | 261 | 0.3% | 105 | 0.4% | 40.2% | 1,444 | 0.3% | 813 | 0.3% | 56.3% | 448 | 0.2% | 38.3% |
| 31 | 5619 | 6.6% | 1621 | 6.3% | 28.9% | 18,823 | 3.6% | 9,137 | 3.8% | 48.5% | 6,400 | 2.2% | 42.6% |
| 32 | 79 | 0.1% | 17 | 0.1% | 21.0% | 221 | 0.0% | 120 | 0.1% | 54.3% | 31 | 0.0% | 21.5% |
| 33 | 97 | 0.1% | 45 | 0.2% | 46.4% | 177 | 0.0% | 103 | 0.0% | 58.2% | 40 | 0.0% | 48.0% |
| 34 | 1 | 0.0% | 1 | 0.0% | 100.0% | 4 | 0.0% | 4 | 0.0% | 100.0% | 2 | 0.0% | 75.0% |
| 35 | 66 | 0.1% | 6 | 0.0% | 8.3% | 102 | 0.0% | 21 | 0.0% | 20.6% | 151 | 0.1% | 153.4% |
| 36 | 297 | 0.4% | 138 | 0.5% | 46.3% | 325 | 0.1% | 223 | 0.1% | 68.6% | 82 | 0.0% | 67.5% |
| 37 | 1036 | 1.2% | 248 | 1.0% | 23.9% | 8,130 | 1.5% | 3,239 | 1.4% | 39.8% | 5,121 | 1.8% | 66.0% |
| 38 | 4260 | 5.0% | 1266 | 4.9% | 29.7% | 15,323 | 2.9% | 8,541 | 3.6% | 55.7% | 6,425 | 2.2% | 50.2% |
| 39 | 1080 | 1.3% | 370 | 1.4% | 34.2% | 2893 | 0.5% | 1564 | 0.7% | 54.1% | 670 | 0.2% | 35.9% |
| 40 | 19 | 0.0% | 4 | 0.0% | 18.4% | 72 | 0.0% | 32 | 0.0% | 44.4% | 41 | 0.0% | 61.8% |
| 41 | 623 | 0.7% | 124 | 0.5% | 20.0% | 3919 | 0.7% | 826 | 0.3% | 21.1% | 2483 | 0.9% | 66.5% |
| 42 | 3962 | 4.7% | 1089 | 4.2% | 27.5% | 27209 | 5.2% | 12144 | 5.1% | 44.6% | 19237 | 6.7% | 74.7% |
| 43 | 7285 | 8.6% | 2069 | 8.1% | 28.4% | 27359 | 5.2% | 9282 | 3.9% | 33.9% | 18504 | 6.4% | 75.2% |
| 45 | 81 | 0.1% | 28 | 0.1% | 34.6% | 414 | 0.1% | 134 | 0.1% | 32.4% | 326 | 0.1% | 85.5% |
| 46 | 137 | 0.2% | 37 | 0.1% | 26.7% | 395 | 0.1% | 151 | 0.1% | 38.2% | 280 | 0.1% | 80.1% |
| 47 | 229 | 0.3% | 37 | 0.1% | 16.2% | 667 | 0.1% | 334 | 0.1% | 50.1% | 440 | 0.2% | 71.5% |
| Sub-total | 84,733 | 100.0% | 25,690 | 100.0% | 30.3% | 526,151 | 100.0% | 238,757 | 100.0% | 45.4% | 288,628 | 100.0% | 59.7% |
| Not Availat | 9,095 | | 2,714 | | | 24,412 | | 10,543 | | | 15,331 | | |
| Overall | 93,828 | | 28,404 | | | 550,563 | | 249,300 | | | 303,959 | | |

**Appendix: Concordance between OECD STAN sector classification and SIC 3 digits codes.**

| STAN code | STAN sector description | ISICrev.3 | SIC 3 digits |
|---|---|---|---|
| 1 | Agriculture, hunting, forestry and fishing | 1+2+5 | 01X - 09X (but not 08X) |
| 2 | Mining and quarrying (energy) | 10+11+12 | 10X, 11X, 12X, 13X, 16X, 17X, 18X, 019X, 20X, 21X, 24X, 25X, 27X, 29X |
| 3 | Mining and quarrying (non-energy) | 13+14 | 100, 101, 102, 103, 104, 106, 109, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 497 |
| 4 | Food products, beverages and tobacco | 15+16 | 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214 |
| 5 | Textiles, textile products, leather and footwear | 17+18+19 | 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319 |
| 6 | Wood and products of wood and cork | 20 | 080, 081, 085, 240, 241, 242, 243, 244, 245, 249 |
| 7 | Pulp, paper, paper products, printing and publishing | 21+22 | 260, 261, 262, 263, 264, 265, 266, 267, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279 |
| 8 | Coke, refined petroleum products and nuclear fuel | 23 | 290, 291, 295, 299 |
| 9 | Chemicals excluding pharmaceuticals | 24ex2423 | 280, 280, 281, 282, 284, 285, 286, 287, 289 |
| 10 | Pharmaceuticals | 2423 | 283 |
| 11 | Rubber & plastics products | 25 | 300, 301, 302, 305, 306, 307, 308, 309 |
| 12 | Other non-metallic mineral products | 26 | 320, 321, 322, 323, 324, 325, 326, 327, 328, 329 |
| 13 | Iron & steel | 271+2731 | 330, 331, 332 |
| 14 | Non-ferrous metals | 272+2732 | 333, 334, 335, 336, 339 |
| 15 | Fabricated metal products, except mach. & equip. | 28 | 340, 341, 342, 343, 344, 345, 346, 347, 348, 349 |
| 16 | Machinery & equipment, nec | 29 | 350, 351, 352, 352, 353, 354, 355, 356, 358, 359, 363 |
| 17 | Office, accounting & computing machinery | 30 | 357 |
| 18 | Electrical machinery & apparatus, nec | 31 | 360, 361, 362, 364, 369 |
| 19 | Radio, television & communication equipment | 32 | 365, 366, 367 |
| 20 | Medical, precision & optical instruments | 33 | 380, 381, 382, 384, 385, 386, 387 |
| 21 | Motor vehicles, trailers & semi-trailers | 34 | 370, 371 |
| 22 | Building & repairing of ships & boats | 351 | 373 |
| 23 | Aircraft & spacecraft | 353 | 372, 376 |
| 24 | Railroad equipment & transport equip nec. | 352+359 | 374, 375, 379 |
| 25 | Manufacturing nec recycling (include Furniture) | 36-37 | 250, 251, 252, 253, 254, 256, 259, 391, 393, 394, 395, 396, 399 |
| 26 | Production, collection and distribution of electricity | 401 | 490, 491, 493 |
| 27 | Manufacture of gas distribution | 402 | 492 |
| 28 | Steam and hot water supply | 403 | 496 |
| 29 | Collection, purification and distribution of water | 41 | 494 |
| 30 | Construction | 45 | 108, 150, 151, 152, 153, 154, 160, 161, 162, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179 |
| 31 | Wholesale & retail trade repairs | 50-52 | 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 523, 525, 526, 527, 530, 531, 533, 539, 540, 541, 542, 543, 544, 545, 546, 549, 550, 551, 552, 553, 554, 555, 556, 557, 559, 560, 561, 562, 563, 564, 565, 566, |

| | | | |
|---|---|---|---|
| | | | 569, 570, 571, 572, 573, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 753, 754, 760, 762, 763, 764, 769 |
| 32 | Hotels & restaurants | 55 | 581, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709 |
| 33 | Land transport transport via pipelines | 60 | 400, 401, 410, 411, 412, 413, 414, 415, 420, 421, 422, 461 |
| 34 | Water transport | 61 | 440, 441, 442, 443, 444, 448 |
| 35 | Air transport | 62 | 450, 451, 452, 458 |
| 36 | Supporting and auxiliary transport activities activities of travel agencies | 63 | 417, 423, 449, 470, 472, 473, 474, 478, 752 |
| 37 | Post & telecommunications | 64 | 431, 480, 481, 482, 484, 489 |
| 38 | Finance & insurance | 65-67 | 600, 601, 602, 603, 606, 608, 609, 610, 611, 614, 615, 616, 617, 619, 620, 621, 622, 623, 628, 630, 631, 632, 633, 635, 636, 637, 639, 641, 670, 671, 672, 673, 679 |
| 39 | Real estate activities | 70 | 650, 651, 653, 655 |
| 40 | Renting of machinery & equipment | 71 | 735, 750, 751, 784 |
| 41 | Computer & related activities | 72 | 737 |
| 42 | Research & development | 73 | 873 |
| 43 | Other Business Activities | 74 | 654, 722, 729, 730, 731, 732, 733, 734, 736, 738, 811, 870, 871, 872, 874, 890, 899 |
| 44 | Public admin. & defence compulsory social security | 75 | 911, 912, 913, 919, 921, 922, 931, 941, 943, 944, 945, 951, 953, 961, 962, 963, 964, 965, 966, 971, 972, 999 |
| 45 | Education | 80 | 820, 821, 822, 823, 824, 829 |
| 46 | Health & social work | 85 | 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 830, 832, 833, 835, 836, 839 |
| 47 | Other community, social & personal services | 90-93 | 483, 495, 720, 721, 723, 724, 725, 726, 780, 781, 782, 783, 790, 791, 792, 793, 794, 799, 83X, 840, 841, 842, 860, 861, 862, 863, 864, 865, 866, 869 |
| 48 | Private households with employed persons & extra-territorial organizations & bodies | 95-99 | 881 |