Statistics in focus

SCIENCE AND TECHNOLOGY

17/2008

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Contents

Manuscript completed on: 21.02.2008
Data extracted on: 11.09.2007
ISSN 1977-0316
Catalogue number: KS-SF-08-017-EN-N

Patent statistics

Applying PATSTAT – A new generation of methodological concepts

The first part of the publication shows the most recent figures for patent applications to the EPO and patents granted by the USPTO; furthermore, it explains the new methodological concept.

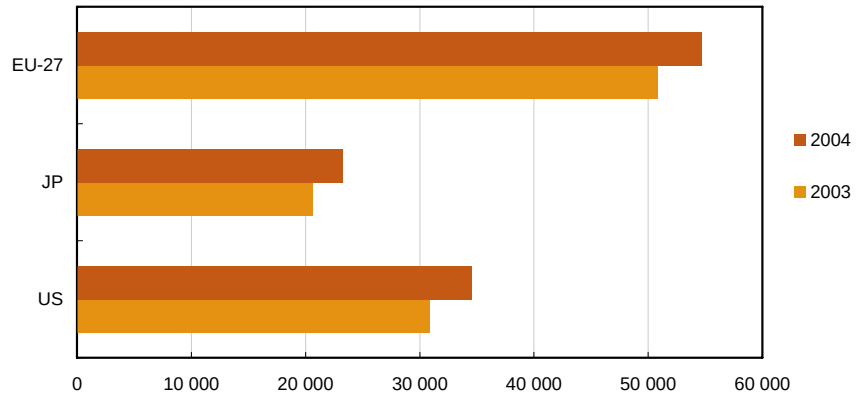
The second part takes a closer look at foreign ownership of patent applications and patents.

The last part deals with triadic patent family data, showing a breakdown by main economies for the years 1996 and 2001. Some additional information on the recent positive developments of the Reform of the European patent system is also provided.

Figure 1 shows for 2003 and 2004 the number of patent applications to the EPO from the three leading world economies. For all three economies the numbers of patent applications were on the increase. Thanks to "home advantage" the EU-27 is the best-performing economy, followed by the United States and Japan. Numerous European applicants regard the EPO, like their national office, to be their home patent office and will lodge their patent applications there rather than with any other patent office.

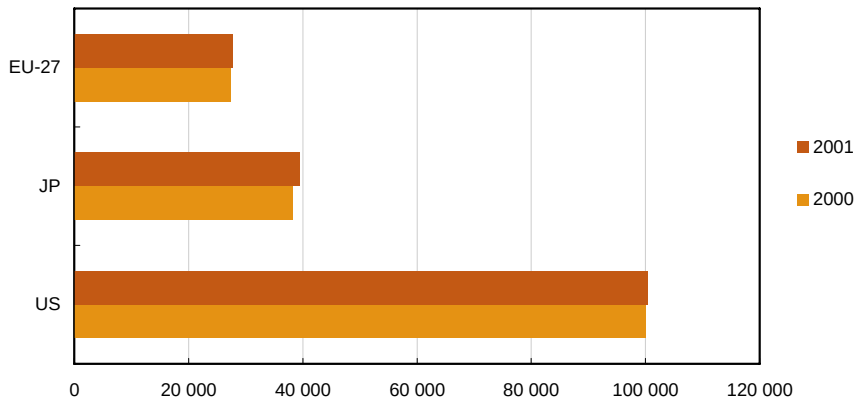
At the USPTO the United States led by a wide margin. Japan ranked second and the EU-27 third (see Figure 2).

Figure 1: Total number of patent applications to the European Patent Office (EPO) in 2003 and 2004 (estimates), EU-27, Japan and United States



Source: Patent statistics

Figure 2: Total number of patents granted by the US Patent and Trademark Office (USPTO) in 2000 and 2001 (estimates), EU-27, Japan and United States



Source: Patent statistics

"Home advantage" fosters the domination of the United States in the number of patents granted by the USPTO in 2000 and 2001 but other reasons may also explain its leadership. Whereas the USPTO is the home office of American inventors, in Europe the EPO coexists with the national patent offices in each Member State. Not all patent applications to national offices are also made to the EPO.

The estimates of EPO data for 2004 and of USPTO data for 2001 are nowcasts calculated by Eurostat (see methodological notes).

For the first time, the patent statistics published by Eurostat are almost exclusively based on the **EPO Worldwide Statistical Patent Database** PATSTAT. Along with the change of the data source goes the application of a slightly different methodology for the indicators on patent applications to the EPO. From now on, all direct patent applications to the EPO (EPO-direct) are taken into account, but among the PCT applications made to the EPO (applications following the procedure laid down by the *Patent Cooperation Treaty* – PCT) only those that have entered into the regional phase are selected. As PCT patent applications in the international phase designating the EPO will no longer be included in the calculation of indicators on patent applications to the EPO, the resulting data shown here are lower than those in former publications. This new methodological approach is in line with the methodology also applied by the OECD.

Growing number of patent applications to the EPO

Table 3: Patent applications to the EPO by priority year, as a ratio of GDP in EUR billion, per million inhabitants, per million labour force and total number, by country, EU-27 Member States and selected countries, 1999, 2003, 2004 (estimates) and AAGR

	2004e			1999	2003	2004e	AAGR 1999-2003	AAGR 1999-2004e
	As a ratio of GDP (EUR bn)	Per million inhabitants	Per million labour force	Total number				
EU-27	5.2	112.0	240.9	48 656	50 785	54 707	1.1	2.4
BE	4.9	135.1	311.0	1 317	1 273	1 405	-0.9	1.3
BG	0.7	1.7	4.0	8	21	13	27.7	10.9
CZ	1.0	9.0	17.9	60	112	92	17.0	8.8
DK	5.5	200.5	373.4	835	979	1 082	4.0	5.3
DE	10.5	281.8	584.9	20 956	21 469	23 261	0.6	2.1
EE	:	:	:	7	11	:	10.2	:
IE	1.6	58.7	121.0	211	214	236	0.4	2.3
EL	0.5	6.8	15.6	51	85	75	13.4	7.9
ES	1.4	28.6	60.1	729	920	1 209	6.0	10.7
FR	4.8	128.5	297.5	7 176	7 759	7 984	2.0	2.2
IT	3.3	79.1	188.0	3 719	4 269	4 581	3.5	4.3
CY	:	:	:	4	6	:	10.3	:
LV	:	:	:	2	8	:	48.2	:
LT	0.5	2.8	6.0	3	13	10	44.8	26.2
LU	3.9	235.8	536.5	63	87	106	8.5	11.1
HU	:	:	:	115	125	:	2.1	:
MT	0.9	9.7	24.3	5	4	4	-3.5	-5.0
NL	8.1	243.3	465.8	2 910	3 386	3 956	3.9	6.3
AT	5.7	165.6	342.8	1 068	1 302	1 348	5.1	4.8
PL	0.7	3.7	8.2	35	110	140	33.5	32.1
PT	0.4	5.8	11.1	36	61	61	14.0	11.0
RO	0.4	1.2	2.5	7	15	25	20.9	28.6
SI	4.1	53.8	106.7	31	76	107	24.8	27.9
SK	0.6	3.7	7.4	15	29	20	17.1	5.0
FI	7.6	221.1	444.9	1 398	1 245	1 154	-2.9	-3.8
SE	7.7	242.0	473.7	2 182	1 939	2 172	-2.9	-0.1
UK	3.4	98.3	199.7	5 712	5 264	5 869	-2.0	0.5
NO	1.4	62.7	120.9	371	336	287	-2.5	-5.0
EEA30	5.1	111.6	239.7	49 083	51 176	55 092	1.0	2.3
CH	10.6	419.1	:	2 463	2 675	3 087	2.1	4.6
CN	0.6	0.7	1.3	184	813	967	44.9	39.3
IL	15.5	224.5	570.7	791	963	1 529	5.0	14.1
JP	6.3	182.4	350.8	18 379	20 665	23 301	3.0	4.9
US	3.7	117.3	231.6	29 801	30 830	34 489	0.9	3.0

Source: Patent statistics

A look at the patent indicators shown for the EU Member States reveals that Germany was clearly in the lead in absolute numbers (see Table 3). As a ratio of GDP, Germany was in 2004 the only Member State with a rate higher than 10 patent applications per billion EUR GDP. Such a high rate can only be found, outside the

European Union, in Switzerland (11) and Israel (16). When taking the ratio of patent applications per million inhabitants at EU level, Germany is followed by the Netherlands and Sweden.
By contrast, Luxembourg replaces the Netherlands in the EU top three in the ratio per million labour force.

In terms of annual average growth rates Germany was, for both periods, 1999-2003 and 1999-2004, below the EU-27 average. But it should be noted that the EU-27 average is raised by the high AAGR of smaller countries with low numbers of patent applications.

Increase in number of patents granted by the USPTO

Table 4: Patents granted by the USPTO by priority year, as a ratio of GDP in EUR billion, per million inhabitants, per million labour force and total number, by country, EU-27 Member States and selected countries, 1996, 2000, 2001 (estimates) and AAGR

	2001e			1996	2000	2001e	AAGR 1996-2000	AAGR 1996-2001e
	As a ratio of GDP (EUR bn)	Per million inhabitants	Per million labour force	Total number				
EU-27	2.9	57.6	124.6	26 146	27 398	27 837	1.2	1.3
BE	2.3	58.1	137.4	709	644	597	-2.4	-3.4
BG	0.4	0.7	1.6	2	4	5	14.7	18.1
CZ	:	:	:	30	35	:	3.6	:
DK	2.7	89.8	167.6	480	473	480	-0.4	0.0
DE	5.7	145.6	302.4	10 712	11 674	11 980	2.2	2.3
EE	0.6	3.0	6.2	3	3	4	5.5	10.4
IE	1.6	47.5	100.2	115	161	182	8.8	9.7
EL	0.1	1.0	2.5	30	17	11	-12.5	-17.4
ES	0.5	8.4	18.8	276	322	339	3.9	4.2
FR	2.5	61.6	144.4	4 010	3 761	3 752	-1.6	-1.3
IT	1.5	33.7	81.1	1 717	1 881	1 921	2.3	2.3
CY	0.5	8.5	18.4	0	5	6	94.3	78.1
LV	0.8	3.0	6.4	3	7	7	18.5	15.3
LT	0.5	1.8	3.9	1	5	6	50.1	44.8
LU	:	:	:	30	45	:	10.9	:
HU	1.1	6.4	15.9	45	63	65	9.1	8.0
MT	0.9	10.2	25.3	1	3	4	31.6	32.0
NL	3.4	95.6	185.3	1 321	1 529	1 529	3.7	3.0
AT	3.0	80.4	166.1	466	630	645	7.8	6.7
PL	:	:	:	28	29	:	0.9	:
PT	:	:	:	6	13	:	18.6	:
RO	:	:	:	6	5	:	-5.4	:
SI	1.4	15.1	30.8	14	28	30	19.8	17.4
SK	0.3	1.1	2.3	4	7	6	14.0	8.6
FI	6.0	162.6	323.5	762	792	843	1.0	2.0
SE	5.7	159.8	312.6	1 636	1 491	1 420	-2.3	-2.8
UK	2.4	65.7	134.4	3 738	3 773	3 878	0.2	0.7
NO	1.3	53.6	102.7	248	246	241	-0.2	-0.6
EEA30	2.9	57.7	:	26 435	27 682	28 124	1.2	1.2
CH	5.0	196.2	:	1 341	1 451	1 414	2.0	1.1
CN	0.4	0.4	0.7	111	447	520	41.7	36.2
IL	10.9	223.3	575.3	827	1 324	1 438	12.5	11.7
JP	8.6	310.4	584.6	32 666	38 356	39 470	4.1	3.9
US	8.9	352.1	692.2	85 745	100 146	100 493	4.0	3.2

Source: Patent statistics

Table 4 displays the same indicators as Table 3 but for patents granted by the USPTO in the years 1996, 2000 and 2001. At EU level the results are different. Germany led in absolute terms in 1996, 2000 and 2001 and recorded AAGRs for 1996-2000 and 1996-2001 higher than the EU average, but in relative terms other countries performed better. As a ratio of GDP, per million inhabitants and per million labour force Finland ranked first, followed by Sweden, and Germany was third. Only as a ratio of GDP was Germany placed in the same position as Sweden.

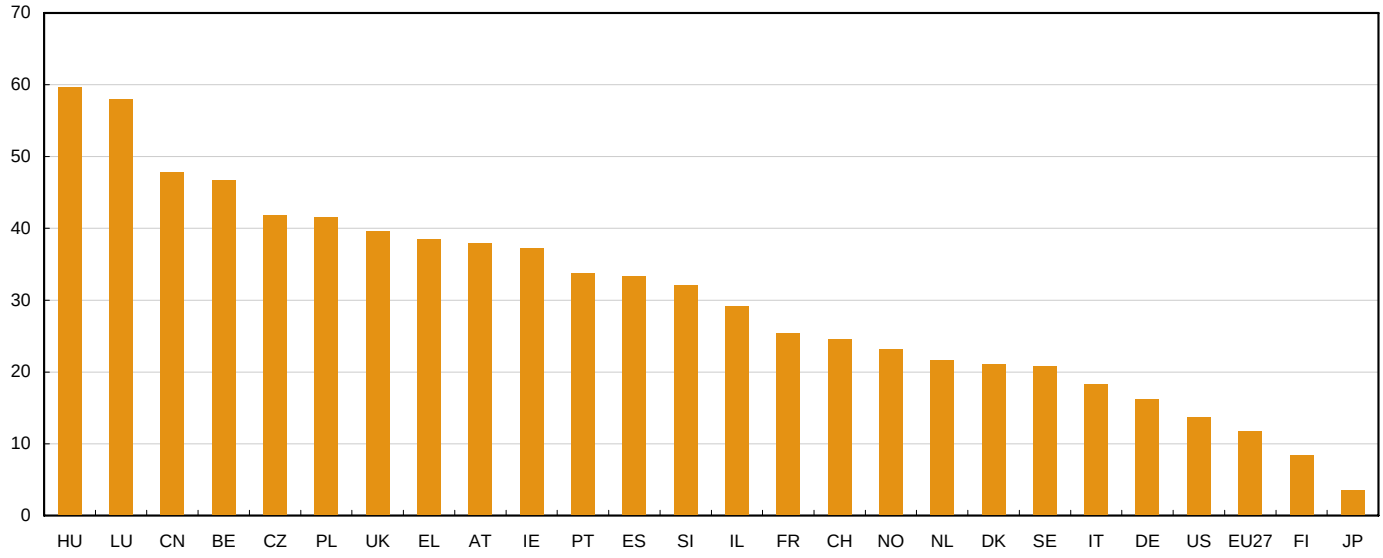
At international level the United States recorded by far the highest absolute numbers for all three years shown in Table 3. Referring to patents granted by the USPTO per million inhabitants and per million labour force, the United States also ranked first but as a ratio of GDP the first place was taken over by Israel.

Israel is the only country in the world that spent in 2001 5% of GDP on R&D expenditure. This is one of the main reasons why the country performs so well in patenting. The correlation between R&D expenditure and patents has already been analysed in several publications on patents (see in particular Statistics in Focus No 16/2006 “Patents and R&D expenditure”).

An increasing number of patents or patent applications taken as such is not a sufficient indicator for more innovation. R&D expenditure has also to follow the same trend.

Foreign ownership

Figure 5: Foreign ownership of domestic inventions in patent applications to the EPO, as a percentage of total, by country, EU-27 Member States and selected countries, 2003



Source: Patent statistics

Table 6: Domestic ownership of foreign inventions in patent applications to the EPO, as a percentage of total, by country, EU-27 Member States and selected countries, 2003

	Percentage of total	Number of total
EU-27	8.8	4 386
BE	36.0	415
CZ	21.5	20
DK	20.4	199
DE	12.9	2 711
IE	48.2	135
ES	8.5	65
FR	20.8	1 633
IT	5.0	193
LU	81.6	146
HU	13.2	10
NL	42.4	2 122
AT	29.6	369
PL	10.3	9
PT	21.8	12
FI	25.3	377
SE	34.3	809
UK	19.0	831
NO	13.6	43
CH	51.6	2 138
CN	17.9	108
IL	10.0	78
JP	4.5	948
US	17.9	5 705

Source: Patent statistics

Foreign ownership of domestic inventions in patent applications is one of the three indicators of international cooperation in patenting (see Figure 5). The two others are domestic ownership of foreign inventions in patent applications, shown in Tables 6 and 8, and patent applications with foreign co-inventors, presented by Figure 7.

These indicators simply count each patent application from both the inventor country or countries and the applicant country or countries. The total number of patent applications from each country therefore consists of all applications in which the country is involved, whether as an applicant or as an inventor. Therefore, the total number of cases of international cooperation is not equal to the sum of the number of cases per partner country since several partner countries can be involved in any case of cooperation. Also, these patent indicators should not be compared with previous ones, where fractional counting rather than simple counting was applied. Furthermore, these indicators should not be added across countries, as this would mean counting the same patent more than once.

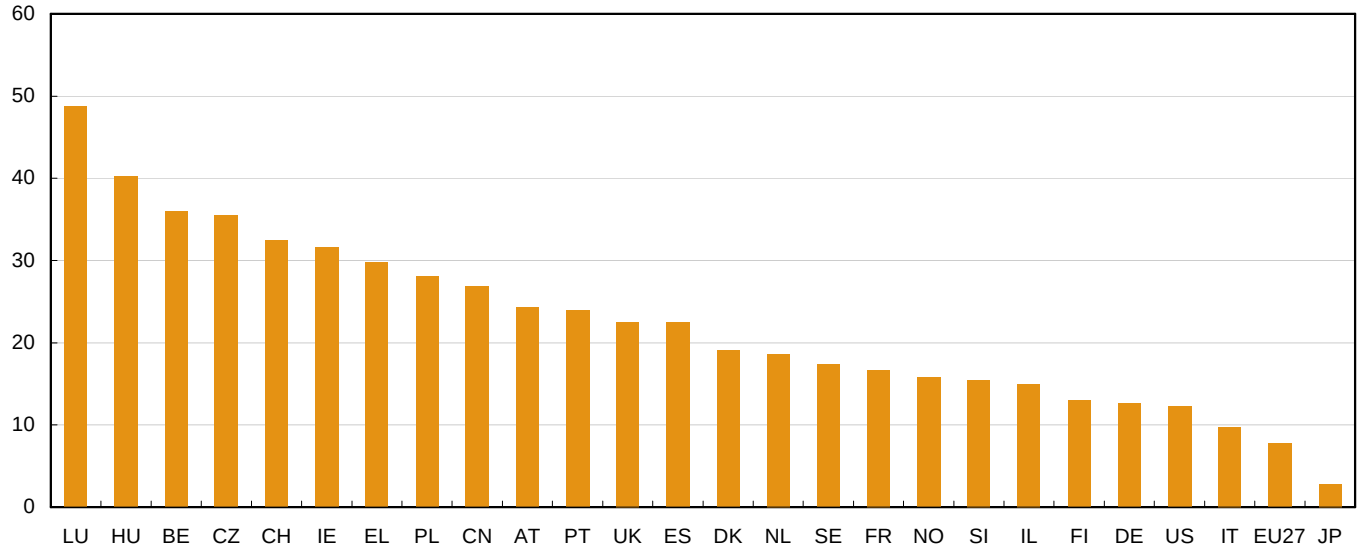
Data on foreign ownership measure the number of patents invented within (or applied for by) a given country that involve at least one foreign applicant (or a foreign inventor). Figure 5 shows foreign ownership of domestic inventions in patent applications to the EPO, as a percentage of all applications to the EPO from countries that submitted more than 50 patent

applications in 2003 (this cut-off rate is also used for the data shown in Table 6, Figure 7 and Table 8). Hungary had the highest rate of foreign ownership of domestic inventions with close to 60%, followed by Luxembourg with 58% and China with 48%. The lowest rate at EU level was recorded in Finland, with only 8%. The United States, the EU-27 and Japan were also situated at this end of the scale with 13%, 12% and 4% respectively.

Table 6 displays two kinds of data on domestic ownership of inventions made abroad: the percentage of patent applications to the EPO invented abroad and the number of patent applications owned by national residents that have been invented by at least one foreign resident.

With more than 80%, Luxembourg led by a wide margin, followed by Switzerland (52%) and Ireland (48%). Conversely, percentages below the 10% mark were recorded in the EU-27, Italy and Japan.

Figure 7: Patent applications to the EPO with foreign co-inventors, as a percentage of total, by country, EU-27 Member States and selected countries, 2003



Source: Patent statistics

Table 8: Domestic ownership of foreign inventions in patents granted by the USPTO, as a percentage of total, by country, EU-27 Member States and selected countries, 2000

	Percentage of total	Number of total
EU-27	13.0	3 294
BE	35.1	151
DK	18.4	78
DE	14.8	1 656
IE	43.7	59
ES	7.3	15
FR	22.5	775
IT	7.8	127
LU	87.8	65
HU	20.7	6
NL	58.9	1 382
AT	19.5	78
FI	28.5	271
SE	27.3	453
UK	19.5	460
NO	20.5	44
CH	53.1	994
IL	11.8	111
JP	4.3	1 687
US	9.4	9 719

Source: Patent statistics

Figure 7 shows patent applications to the EPO with at least one foreign co-inventor. In the first three places were the EU Member States Luxembourg (49%), Hungary (40%) and Belgium (36%). At the other end of the scale we find Italy (10%), the EU-27 (8%) and Japan (3%).

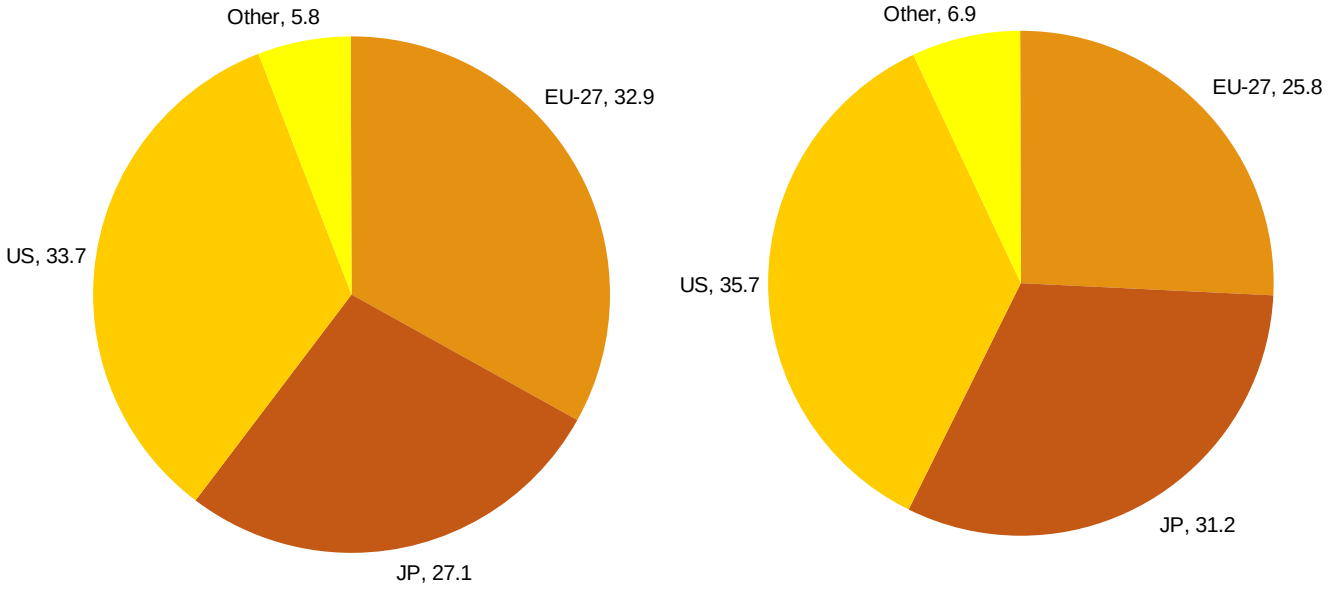
The low percentage for the EU-27 indicates that inventors resident in the EU-27 made only a few co-inventions with inventors resident outside the EU. In other words, in the calculation of the EU-27 value two inventors living in different EU Member States and working on the same invention are not treated as foreign co-inventors since they are both EU residents. On the other hand, the high rates for several EU Member States show that inside the EU, foreign co-inventions are frequent.

The reader should note that the indicators on foreign ownership are based on the country of residence of applicants and inventors; nationality is not taken into account.

Table 8 shows the same indicator as Figure 5 but for patents granted by the USPTO in 2000. The highest percentage is also recorded by Luxembourg (88%), with the Netherlands in second place ahead of Switzerland, with 59% and 53% respectively.

Triadic patent families data

Figure 9: Triadic patent families for EU-27, US, JP and other, as a percentage of world total, 1996 and 2001



Source: Patent statistics

A patent is a member of the triadic patent family if, and only if, it has been applied for and filed at the European Patent Office (EPO) and at the Japanese Patent Office (JPO), and if it has been granted by the US Patent and Trademark Office (USPTO).

Data on patent triadic families are generally less biased as the "home advantage" disappears to a certain extent. These data also emphasise the value of such triadic patents, which is supposedly higher than the value of other patent applications or patents granted.

When the geographic distribution of triadic families (see Figure 9) for 1996 and 2001 is compared, the EU-27 appears to be losing ground.

The shares of the EU and Japan in 1996 were 33% and 27% respectively of all triadic patent families counted. The biggest share was held by the United States, with 34%, and the smallest (only 6%) by the rest of the world. Triadic patent family applications and grants are therefore concentrated in the three main economies.

In 2001 the EU-27 share decreased to 26% while all the other shares increased. The United States held a share of 36%, Japan 31% and the rest of the world 7%.

Reform of the European patent system

Since many years patent experts have declared that the European patent system needs to be reformed to become more competitive and more user-friendly. The high costs mainly related to translations make the grant procedure for patents at the EPO much more expensive compared to those at the JPO and the USPTO.

The process of reforming which was blocked since several years took in the last months of 2007 some steps forward in the right direction (see box below).

The entry into force of the London Agreement expected for the first half of 2008 will introduce a cost-attractive post-grant translation regime for all European patents.

French parliament approves London Agreement

On Tuesday, 9 October 2007, the French Senate followed the National Assembly in approving:

- draft law No 473 authorising ratification of the European Patent Convention as revised in November 2000 (EPC 2000);

- draft law No 474 authorising ratification of the October 2000 London Agreement.

Once the instruments of ratification have been deposited, both the EPC 2000 and the London Agreement will enter into force for France over the next few months: the EPC 2000 on 13 December 2007, the London Agreement on the first day of the fourth month following deposit of the instrument of ratification.

The aim of both texts is to improve the European patent system established in the 1970s. The EPC 2000 modernises the European patent grant procedure for which the European Patent Office is responsible, whilst the London Agreement makes it easier to obtain a European patent - especially for small and medium-sized firms - by reducing post-grant translation costs.

The entry into force of the two texts will mark a significant milestone in the process of reforming the European patent system, launched in 2000 at an intergovernmental conference hosted by France. Work meanwhile continues on creating a common judicial framework for European patents and on establishing a Community patent system.

Source: http://www.EPO.org

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

Patents statistics

Following changes in the production of patent statistics at Eurostat in 2007, data shown on the Eurostat webpage are no longer fully comparable with data previously disseminated.

From 2007 onwards Eurostat's production of EPO and USPTO data has been based almost exclusively on the EPO Worldwide Statistical Patent Database. The worldwide statistical patent database, also known as "PATSTAT", was developed by the EPO in 2005, using their collection and knowledge of patent data.

EPO data

The new methodology for EPO data used for the calculation of indicators is very similar to the methodology of the OECD. For patent applications to the EPO all direct applications (EPO-direct) are taken into account, but among the PCT applications (applications following the procedure laid down by the *Patent Cooperation Treaty* – PCT) made to the EPO only those that have entered into the regional phase are counted. As PCT patent applications in the international phase designating the EPO will no longer be included in the calculation of patent applications to the EPO, the data shown are lower. Nevertheless, patent data produced by Eurostat and the OECD can still not be exactly the same. Differences may be explained by the fact that the data sources used and the date of extraction of the data could differ.

USPTO data

Eurostat uses also the same methodology as the OECD for patents granted by the USPTO. Differences may be explained by the fact that the data sources are not exactly the same and by the date of data extraction.

Reference year (or date)

All patent statistics from Eurostat are shown by priority date, i.e. the first date of filing of the patent application anywhere in the world. This date is the earliest and it is chosen in order to be the closest to the date of the invention as patent procedures always take several years. The drawback of this choice is that the data on USPTO patents granted have declined in recent years, due to administrative delays between the priority date and the grant date. To a lesser extent this is also the case for the EPO data.

Counting patents with multiple inventors from different countries

Eurostat has chosen fractional counting as the counting method. This means that when a patent was invented by several inventors from different countries, the respective contributions of each country are taken into account. This is done in order to eliminate multiple counting of such patents. For example, a patent co-invented by 1 French, 1 American and 2 German residents will be counted as ¼ of a patent for France, ¼ for the US and ½ a patent for Germany.

Nowcasts for EPO data

For the calculation of the EPO data for 2004 a linear regression has been performed using the ratio of direct patent applications to the EPO to all patent applications to the EPO for the years 2000 to 2003. As explained in the methodology for the EPO patent indicators, direct applications and PCT applications in the regional phase are taken into account. The "nowcasting" methodology is built on the assumption that the relationship between direct applications and PCT applications in the regional phase can be estimated for 2004 by a linear regression of this relationship for the period 2000 to 2003. The estimate has been applied to the number of direct applications for 2004.

Nowcasts for USPTO data

For the estimation of USPTO data for 2001 a linear regression based on the values for 1997 to 2000 has been used. The estimate has been applied to the total number of patents granted by the USPTO in 2001.

Foreign ownership

Data on foreign ownership measure the number of patents invented within (or applied for by) a given country that involve at least one foreign applicant (or a foreign inventor).

To make this definition clearer, let us take as an example a patent with three inventors (one French, one German and one American) and two applicants (one German and one American). Combining the resident countries of inventors and applicants there are six partnerships, of which four are foreign, because they involve two different countries, and two are national.

Triadic patent families by priority year

A patent family is defined as a set of patents taken in various countries for protecting the same invention, i.e. related patents are grouped into a single record to derive a unique patent family. A patent is a member of a triadic patent family if and only if it has been applied for and filed at the European Patent Office (EPO) and the Japanese Patent Office (JPO) and if it has been granted by the US Patent and Trademark Office (USPTO). Patent families, as opposed to patents, are intended to improve international comparability (the home advantage is eliminated; the values of the patents are more homogeneous).

Data on triadic patent families are presented by priority year, i.e. the year of the first international filing of a patent. This exacerbates the disadvantage of traditional patent counts with respect to timeliness, and therefore the latest available data refer to 2001 only.

For all further details, please see the Eurostat metadata on patent statistics posted on the webpage.

Symbols/abbreviations

:	not available
e	estimate (here: nowcast)
AAGR	Average annual growth rate

Country codes for non-EU countries:

NO	Norway	IL	Israel
CH	Switzerland	JP	Japan
CN	China	US	United States

Data presented in this Statistics in Focus reflect availability in Eurostat's reference database as at 11 September 2007.

Further information:

Data:

Science and technology

- Patent statistics
  - Patent applications to the EPO by priority year
  - Patents granted by the USPTO by priority year
  - Triadic patent families by earliest priority year at the national level

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This publication was prepared in cooperation with Gesina Dierickx.