

Statistics in focus

SCIENCE AND TECHNOLOGY

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Author
Bernard FÉLIX

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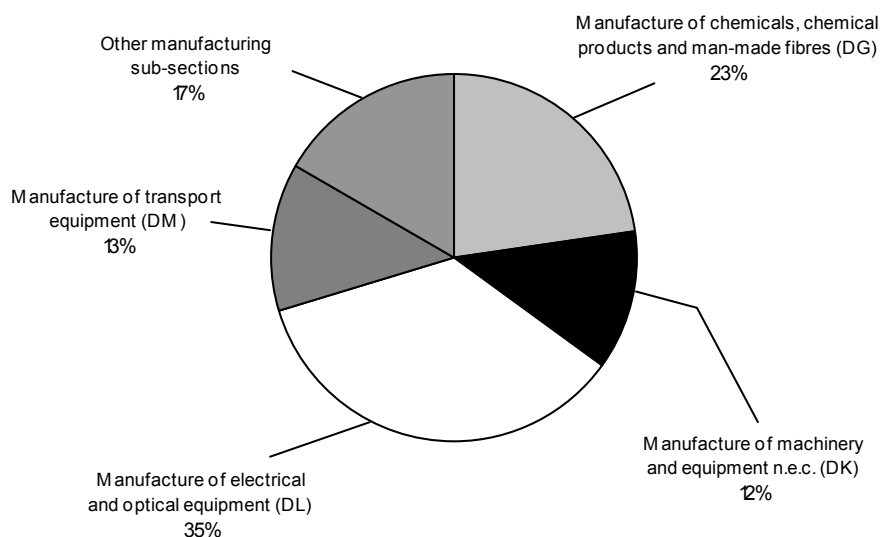


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Patent applications to the EPO at national level

Finland ranked first in high tech and ICT
patenting in 2002

Figure 1: Distribution of patent applications to the European Patent Office (EPO) in 2002 for EU-25 by manufacturing sub-sections (NACE sector codes)



Main findings

- In 2002, for the EU-25 83% of all patent applications to the EPO concerned the four main manufacturing sub-sections: "Manufacture of chemicals, chemical products and man-made fibre", "Manufacture of machinery and equipment not elsewhere classified", "Manufacture of electrical and optical equipment" and "Manufacture of transport equipment".
- Finland had by far the highest national share of patent applications to the EPO in high tech and in information and communication technology (ICT), with 44.1% and 51.6% respectively of the total.
- In most of the EU Member States, more than two thirds of the high tech patent applications were covered by two high tech groups: "Communication technology" and "Computer and automated business equipment".
- The EU-25 share of ICT patent applications (26.3%) was still lower than in Japan (37.5%) and in the United States (34.4%) in 2002, but the total number of ICT patent applications for the EU-25 quadrupled between 1985 and 2002.
- There is no real common pattern for foreign ownership of domestic inventions in patent applications to the EPO in the EU. But smaller economies often have a higher share of foreign ownership of domestic inventions compared to larger countries.

Four manufacturing sectors are mainly involved in EPO patents

Table 1: Patent applications to the EPO in 2002, by NACE manufacturing sub-sections and by countries, total number and a percentage of total number.

	total number	Manufacture of chemicals, chemical products and man-made fibres (DG)	Manufacture of machinery and equipment n.e.c. (DK)	Manufacture of electrical and optical equipment (DL)	Manufacture of transport equipment (DM)	Other manufacturing sub-sections
EU25	59 756	22.7	12.3	35.3	13.2	16.6
EU15	59 074	22.6	12.3	35.4	13.2	16.6
BE	1 452	32.4	10.4	30.4	8.1	18.6
CZ	122	25.4	13.8	24.9	15.4	20.5
DK	1 167	31.9	10.6	30.5	8.6	18.4
DE	24 514	21.6	13.3	32.6	16.4	16.1
EE	10	39.0	3.4	40.5	5.4	11.7
EL	109	29.2	12.2	29.1	9.0	20.5
ES	1 246	24.4	14.2	26.4	13.3	21.7
FR	8 556	23.3	10.6	37.0	12.9	16.3
IE	311	18.9	9.8	50.7	7.1	13.6
IT	4 747	21.4	16.5	27.4	13.0	21.7
CY	5	37.9	8.7	35.8	2.5	15.1
LV	13	27.8	14.0	36.5	10.4	11.2
LT	10	15.3	13.7	30.8	15.6	24.5
LU	69	24.6	13.7	23.4	15.0	23.3
HU	193	31.7	11.2	28.6	9.2	19.3
MT	5	5.2	5.9	56.5	8.7	23.6
NL	3 934	19.6	10.1	50.0	7.2	13.1
AT	1 483	20.0	13.7	32.1	13.4	20.8
PL	179	30.8	8.7	28.2	10.7	21.6
PT	49	28.3	13.6	24.5	12.0	21.6
SI	103	30.5	12.2	32.7	9.5	15.0
SK	41	36.7	12.8	15.2	15.6	19.6
FI	1 593	14.0	11.2	53.9	7.9	12.9
SE	2 587	20.2	11.8	40.4	12.7	14.9
UK	7 258	27.1	9.8	37.6	9.5	16.1
IS	52	42.2	9.9	27.7	6.3	14.0
LI	28	26.5	13.1	25.2	14.8	20.5
NO	610	23.6	14.3	29.6	11.2	21.3
EEA	60 446	22.7	12.3	35.2	13.1	16.7
CH	2 987	24.4	12.9	35.1	9.5	18.1
BG	36	19.7	13.2	34.6	13.3	19.2
HR	87	32.0	14.5	18.2	13.5	21.8
RO	30	14.7	10.8	31.1	19.3	24.2
TR	118	23.5	18.9	28.8	10.4	18.3
CA	2 713	26.3	8.8	41.7	9.1	14.2
CN	1 480	25.4	8.4	42.2	7.7	16.3
JP	24 494	21.2	9.4	45.3	10.7	13.3
RU	591	25.9	12.5	32.1	11.1	18.5
US	46 819	27.9	8.0	43.1	7.6	13.5

Figure 1 shows for 2002 the four main industrial sectors involved in EPO patent applications for the EU-25. These four sections were “Manufacture of chemicals, chemical products and man-made fibre”, “Manufacture of machinery and equipment not elsewhere classified”, “Manufacture of electrical and optical equipment” and “Manufacture of transport equipment”.

Most of EU-25 Member States had a sub-section distribution comparable with the total EU-25, but there were some exceptions.

For the sub-section “Manufacture of chemicals, chemical products and man-made fibre” (DG), the EU-25 average was 22.7% but in Belgium, Denmark, Poland, Slovenia, Hungary and Slovakia it was higher than 30%.

“Manufacture of machinery and equipment not elsewhere classified” (DK) was the sub-section where Italy had the highest share (16.5%) of all EU Member States.

“Manufacture of electrical and optical equipment” (DL) was by far the most important sub-section for patent applications to the EPO for the EU-25. For some EU Member States this subsection accounted for 50% or more of their total applications. For Ireland, the Netherlands and Finland, patent applications in “Manufacture of electrical and optical equipment” were 50.7%, 50.0% and 53.9% respectively.

Concerning the sub-section “Manufacture of transport equipment” (DM) Germany was the EU Member State with the highest share (16.4%) and Ireland the lowest (7.1%).

Table 2: Patent applications to the EPO in 2002: Total (total number, AAGR 1997-2002, per million labour force and per million inhabitants), of which high tech (as a percentage), ICT (as a percentage) and biotechnology (as a percentage) at national level.

	Total				of which high tech in % of the total number	of which ICT in % of the total number	of which bio-technology in % of the total number
	Total number	1997-2002 AAGR	Per million labour force	Per million inhabitants			
EU25	59 756	5.3	284.4	:	18.5	26.3	4.6
EU15	59 074	5.2	335.3	:	18.6	26.4	4.6
BE	1 452	2.9	333.5	140.8	18.8	22.3	6.9
CZ	122	11.7	24.1	12.0	6.2	13.6	1.1
DK	1 167	8.8	407.8	217.5	18.0	21.3	11.9
DE	24 514	5.0	618.5	297.4	15.0	22.7	4.2
EE	10	6.4	15.0	7.1	25.9	40.4	23.4
EL	109	11.0	23.4	9.9	20.1	16.7	7.8
ES	1 246	10.0	66.7	30.5	12.8	16.2	5.2
FR	8 556	4.4	327.0	144.2	21.4	29.3	4.0
IE	311	11.7	168.7	79.7	29.7	39.5	4.3
IT	4 747	6.7	198.1	83.3	10.1	14.5	2.4
CY	5	8.3	16.4	7.6	12.4	21.8	0.0
LV	13	6.9	11.4	5.5	19.3	27.0	7.2
LT	10	15.6	5.9	2.8	0.0	18.9	0.0
LU	69	4.4	355.6	154.6	5.6	12.9	1.9
HU	193	9.4	47.1	19.0	14.0	18.0	3.0
MT	5	9.3	29.2	11.8	0.0	49.9	0.0
NL	3 934	8.2	468.9	244.3	28.0	44.2	4.6
AT	1 483	6.7	384.6	183.9	14.6	21.8	3.8
PL	179	26.8	10.4	4.7	12.5	18.2	5.6
PT	49	15.9	9.1	4.8	7.8	37.3	2.2
SI	103	25.0	105.2	51.7	9.0	5.6	5.8
SK	41	14.4	15.9	7.7	10.3	6.5	14.1
FI	1 593	4.6	592.9	306.6	44.1	51.6	1.8
SE	2 587	-0.5	565.5	290.4	21.8	29.8	5.5
UK	7 258	5.3	250.8	:	22.5	31.1	6.7
IS	52	22.1	322.0	180.9	23.7	17.8	20.8
LI	28	6.6	:	849.8	5.3	7.6	3.5
NO	610	4.9	255.2	134.8	14.7	24.2	5.6
EEA18	59 764	5.2	:	:	18.5	26.4	4.6
EEA28	60 446	5.3	:	:	18.5	26.3	4.6
CH	2 987	4.8	731.4	411.7	13.1	21.4	4.5
BG	36	7.6	10.6	4.6	16.0	27.6	0.0
HR	87	30.5	48.8	:	6.3	10.9	2.3
RO	30	7.9	2.8	1.4	7.8	15.2	0.4
TR	118	31.6	4.9	:	8.8	7.9	2.6
CA	2 713	9.3	:	:	30.1	34.7	9.3
CN	1 480	43.6	2.0	:	32.7	35.3	7.3
JP	24 494	8.7	366.2	:	25.5	37.5	4.4
RU	591	5.3	8.2	:	12.3	17.7	5.1
US	46 819	6.1	319.9	:	29.8	34.4	6.5

Table 2 shows the patent applications to the EPO at national level in 2002. For better comparability, the figures are also shown per million labour force and per million inhabitants. Taking the total numbers, Germany was in 2002 by far the EU Member State with the highest number of patent applications to the EPO (24 514). In second place was France (8 556) followed by the United Kingdom (7 258). Per million labour force, Germany still ranked first, but was then followed by Finland and Sweden with 619, 593 and

566 respectively. Per million inhabitants, Finland took first place, Germany was second and Sweden third.

Many Member States, had Average Annual Growth Rates (AAGR) between 1997 and 2002 that were higher than the EU-25 average, often over 10%. Poland and Slovenia had the highest rates with 26.8% and 25.0% respectively. Sweden was the only country to report a fall (-0.5%). The absolute number of patent applications in most of these countries was however still low.

Table 2 also shows three selected technology areas of particular importance: High technology, Information and communication technology (ICT) and Biotechnology. The selection of these areas is based on the aggregation of certain classes of the International Patent Classification (IPC), in which each patent has a classification code.

For **high tech industries**, Finland (44.1%) was the country with the highest share of high tech patent applications to the EPO in 2002. Among the EU Member States it was followed by Ireland (29.7%) and the Netherlands (28.0%).

The **Information and communication technology (ICT)** sector can be split into four groups: "Telecommunications", "Consumer electronics", "Computer, office machinery" and "Other ICT".

For total ICT patent applications, Finland also ranked first with a share of 51.6%, nearly twice the EU-25 average of 26.3%. Looking at absolute numbers, most ICT patent applications were made by Germany

(5 566) followed by France (2 507) and the United Kingdom (2 256).

Biotechnology covers extremely specialised techniques, such as for example, "processes for modifying genotypes", "plant reproduction by tissue culture technique" or "medicinal preparations containing peptides".

8 044 patent applications made in 2002 to the EPO from the whole world concerned biotechnology. 3 040 patent applications were American, 2 739 came from the EU-25 and 1 069 from Japan.

Among the EU Member States, the highest shares of the total national applications for biotechnology were observed in Estonia, Slovakia and Denmark with 23.4%, 14.1% and 11.9% respectively. But as mentioned previously, Estonia and Slovakia have a very small absolute number of patent applications to the EPO. Germany in contrary had a share of 4.2% of the total number, which was close to the EU-25 level, but in absolute figures it amounted to 1 031 patent applications.

EU-25: Communication technology had the lion's share of high tech patent applications in 2002

Figure 2: Distribution of high tech patent applications to the EPO in 2002 by high tech groups and by countries.

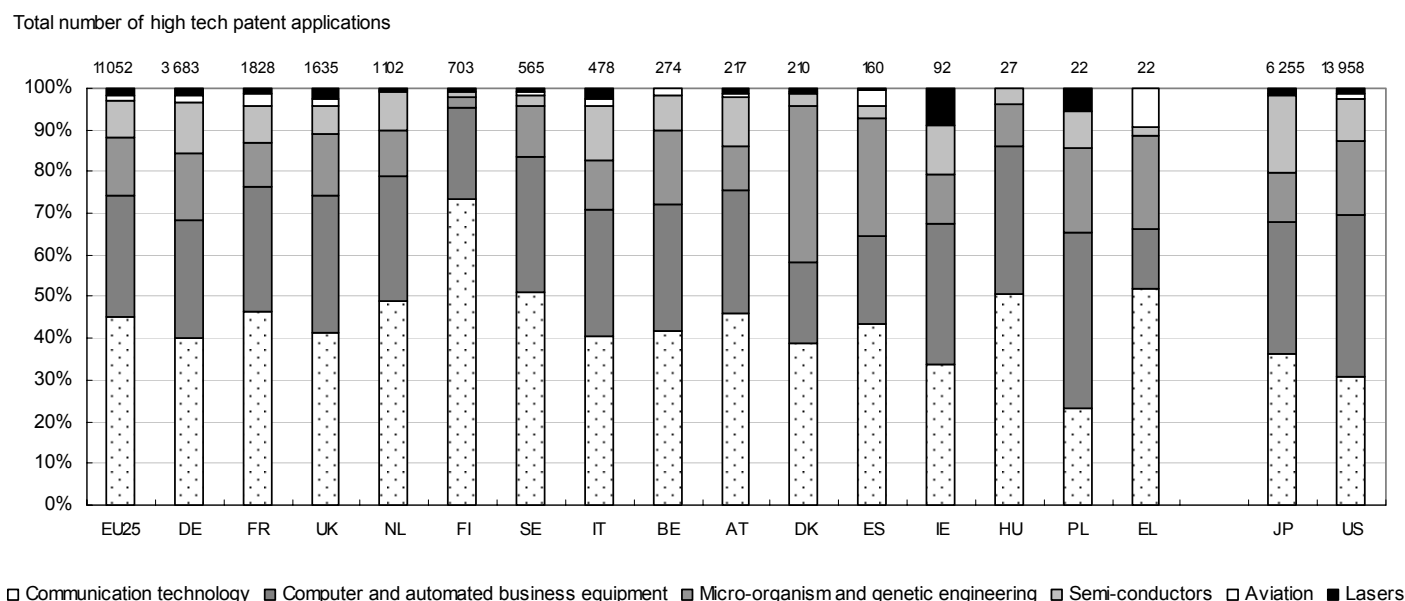


Figure 2 shows the distribution of high tech patent applications to the EPO for six different high tech groups in 2002.

Several countries (the Czech Republic, Estonia, Cyprus, Latvia, Luxembourg, Portugal, Slovenia and Slovakia) made fewer than 10 high tech patent applications. In these cases the distribution to high tech groups is hardly comparable with the other countries, so these countries are not shown in Figure 2.

"Communication technology" was in 2002 for the EU-25 by far the largest high tech group with 45.1% of all high tech patent applications, but there are significant differences at the national level. Whereas its share of Finnish high tech patent applications was 73.6%, it was only 38.8% in Denmark.

"Computer and automated business equipment" was for the EU-25 the second largest group of high tech patent applications, with 29.1%.

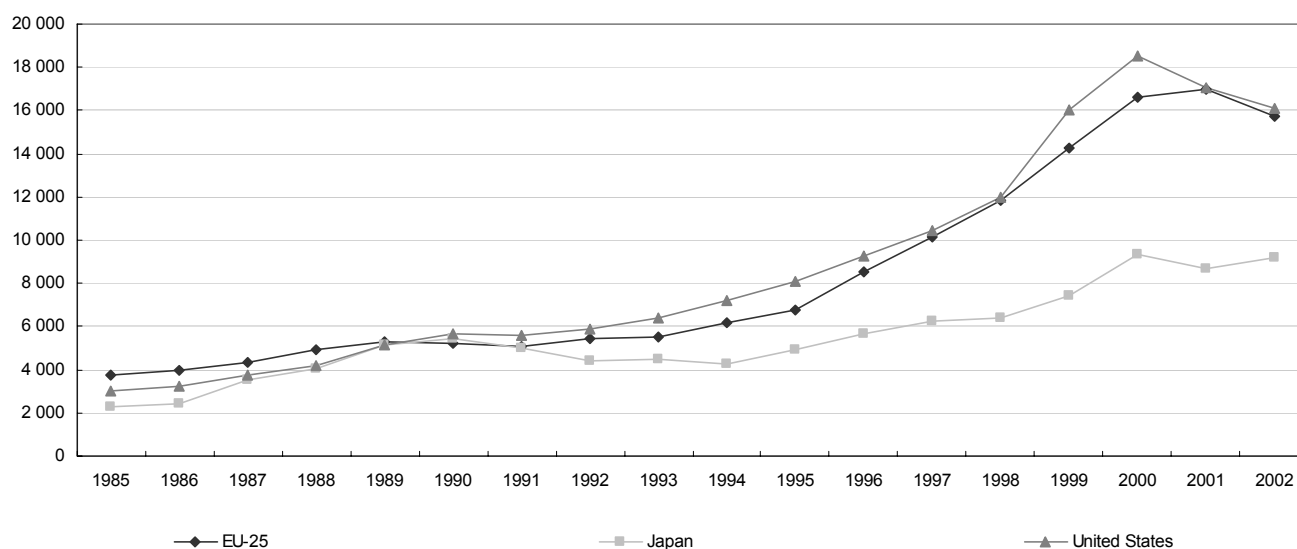
“Micro-organism and genetic engineering” and “Semi-conductors” account for 13.8% and 8.9% of EU-25 high tech patent applications respectively. In Denmark and Spain the share of “Micro-organism and genetic engineering” patent applications was significantly higher at 37.4% and 28.0% respectively. 13.0% of Italian high tech patent applications concerned the high tech group of semi-conductors.

The last two groups of high tech patent applications “Aviation” and “Lasers” were very small. For the EU-25 in 2002 only 1.6% and 1.5% of the high tech patent applications were classified in these two groups respectively.

Compared with the EU-25, the distribution of high tech patent applications to the EPO was not the same for Japan and for the United States. 18.6% of Japanese high tech patent applications were classified in the high tech group of semi-conductors, which is more than twice the EU-25 average. For the United States, the largest group of high tech patent applications was “Computer and automated business equipment” with 39.0%. Looking at total numbers, this difference was even more significant because the share of high tech patent applications was 29.8% in the US compared with 18.5% in the EU-25 (see Table 2). The United States counted 5 447 patent applications for “Computer and automated business equipment” and the EU-25 only 3 214.

Since 2000: slow down in the trend of ICT patent applications in EU-25 and US

Figure 3: Trends of ICT patent applications to the EPO in total number, between 1985 and 2002, EU-25, United States and Japan.



As shown in Figure 3, the total number of Information communication technology (ICT) patent applications from the United States was always higher than the total number of ICT patent applications from the EU-25 over the 1990-2000 period.

In 2000, the US reached a peak with more than 18 000 ICT patent applications, then fell for the last two years of the reference period.

For the EU-25, the growing trend continued one year longer; numbers began to reduce only in 2001.

For Japanese ICT patent applications, the trend was less steadily growing than for the EU-25 and the United States, and the absolute level was always lower. The trend remained stable however in the last two years of the considered period.

Comparing 1985 figures with 2002 data, the EU-25 and Japan multiplied the number of ICT patent applications by a factor of more than 4. The multiplication

factor over the 17 years was more than 5 for the United States.

Taking a closer look at ICT patent applications to the EPO in 2002 for the EU-25, the United States and Japan differences in the distribution to ICT groups can be observed. The highest share of American ICT patent applications (39.7%) concerned “Computer and office machinery”. For the EU-25, 30.4% of the ICT patent applications were linked to the ICT group “Telecommunications”. Compared with the EU-25 and the United States, Japan had the highest share of ICT patent applications in the ICT group “Consumer electronics”.

Figure 4: Examples of four IPC classes (A61, B23, B60 and C07) of EU-25 patent applications from 1995 to 2002

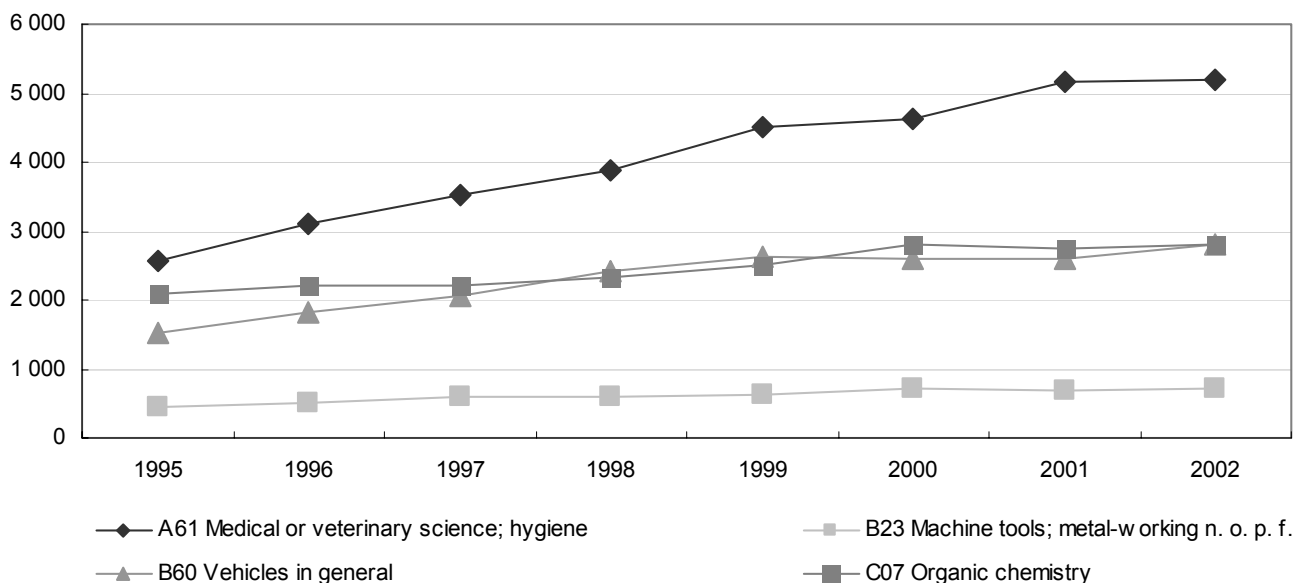
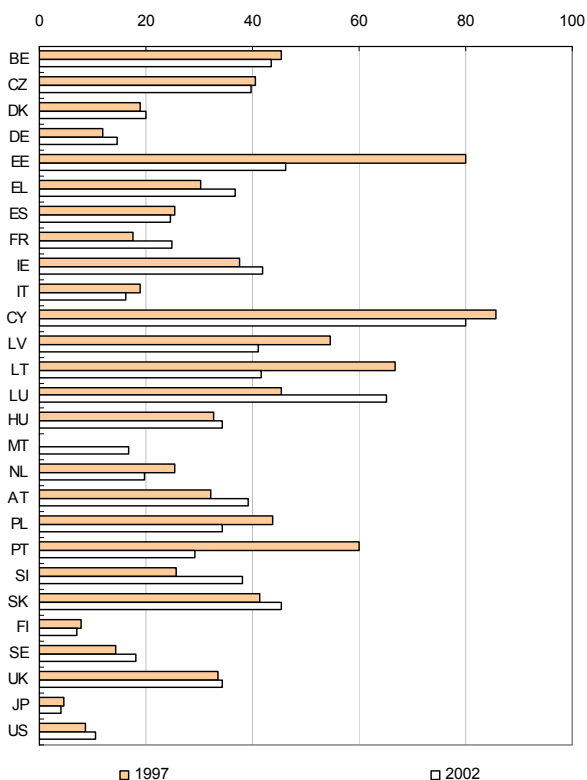


Figure 4 presents the trend of four IPC classes: A61 Medical or veterinary science; hygiene, B23 Machine tools; metal-working not otherwise provided for, B60

Vehicles in general and C07 Organic chemistry. These four IPC classes show a continuously growing trend from 1995 to 2002.

1997-2002: slight trend for less foreign ownership for patent applications

Figure 5: Foreign ownership of domestic inventions in patent applications to the EPO by priority year at the national level in 2002 and 1997, as a percentage of total.



Turning to Figure 5, it seems that there is no clear pattern of foreign ownership of domestic inventions in the EU. A closer look at the data reveals that most of the countries which had a high share of foreign ownership of domestic inventions in the EU 2002 and 1997 were small economies as, for example, Cyprus (80.0%) or Luxembourg (65.1%) in 2002.

But for several small countries, a trend for less foreign ownership can be observed. In the case of the three Baltic States, the foreign ownership fell from 1997 to 2002: for Estonia from 80.0% to 46.2%, for Latvia from 54.6% to 41.2% and for Lithuania from 66.7% to 41.7%.

The three countries with the lowest shares of foreign ownership in domestic inventions in 2002 were Finland, Germany and Italy with 6.9%, 14.5% and 16.2% respectively.

➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

Patent statistics produced by Eurostat

The production of patent statistics at Eurostat has been reorganised in 2005. This means that the data shown in this Statistics in Focus publication, and also on the Eurostat webpage, is no longer fully comparable to the data disseminated previously.

In 2005 only one single raw data base (mainly compiled on the basis of the input from the European Patent Office - EPO, the US patent & Trademark Office - USPTO and the Japanese Patent Office - JPO) was used for producing an extended set of tables and indicators on the Eurostat webpage. This will also be done in the years to come. Eurostat no longer disseminates data from the OECD.

The data and indicators disseminated on the webpage are structured as follows:

Patents at the national level

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

Patents at the regional level

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

Please find further explanation on EPO patent applications in the following paragraphs.

The new data production is as follows:

- Eurostat continues the production of the patent statistics (source: Eurostat/EPO) which began some years ago. This data is however now produced using the priority year of the application, and not the year of filing as previously. The data values are however similar.
- The data on EPO applications with data source OECD is no longer disseminated by Eurostat. This data is in general lower than the data released by Eurostat. This is due to the fact that all PCT applications designated to the EPO (= applications done in accordance to the procedure under the Patent Cooperation Treaty) are taken into consideration by Eurostat and only partially by the OECD.

Eurostat has implemented the changes described above as only one single data source is used and as the data produced reflects better the innovation and R & D performance of an economy.

For all further details please see also the Eurostat metadata on patent statistics disseminated on the webpage.

Counting patents with multiple inventors

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 $\frac{1}{4}$ th of a patent for France, $\frac{1}{4}$ th for the USA and $\frac{1}{2}$ a patent for Germany.

EPO patent applications by priority year

This collection provides users with data concerning patent applications to the *European Patent Office* — EPO. Data are given at the national level and cover the period from 1980 to 2002. EPO data refers to all patent applications by priority year.

Triadic patent families by earliest priority year

The patent families available in NewCronos refer to triadic families: i.e. a patent is a member of the patent families if and only if it has been applied for and filed at the *European Patent Office* (EPO), at the *Japanese Patent Office* (JPO) and if it has been granted by the *US Patent & Trademark Office* (USPTO). Patent families, as opposed to patents, are provided with the intention of improving inter-

national comparability (the home advantage is suppressed; the values of the patents are more homogeneous).

Statistical abbreviations and symbols

- : Not available
- Not applicable or real zero or zero by default
- AAGR Annual average growth rate

NACE sector codes

The breakdown in NACE sector codes is based on the concordance tables IPC-NACE created by the Fraunhofer Institute for Systems and Innovation Research in Karlsruhe (Germany).

DA	Manufacture of food products, beverages and tobacco
DB	Manufacture of textiles and textile products
DC	Manufacture of leather and leather products
DD	Manufacture of wood and wood products
DE	Manufacture of pulp, paper and paper products; publishing and printing
DF	Manufacture of coke, refined petroleum products and nuclear fuel
DG	Manufacture of chemicals, chemical products and man-made fibres
DH	Manufacture of rubber and plastic products
DI	Manufacture of other non-metallic mineral products
DJ	Manufacture of basic metals and fabricated metal products
DK	Manufacture of machinery and equipment not elsewhere classified
DL	Manufacture of electrical and optical equipment
DM	Manufacture of transport equipment
DN	Manufacturing not elsewhere classified

High technology groups in accordance to the International Patent Classification (IPC)

AVI	Aviation
CAB	Computer and automated business equipment
CTE	Communication technology
LSR	Lasers
MGE	Micro-organism and genetic engineering
SMC	Semi-conductors.

ICT sector groups in accordance to the International Patent Classification (IPC)

Telecommunications
Consumer electronics
Computer, office machinery
Other ICT

Biotechnology sector

The OECD defines biotechnology as: “*The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.*” The choice of the IPC subclasses used for this sector is based on the OECD definition.

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). Therefore, for counting co-inventions, the above example will be counted as 1 for France/Germany co-operation, 1 for France/USA co-operation. But it will be summarized as 1 for the co-operation of France (resp. Germany & USA) with the rest of the world. Therefore, these indicators should not be added across countries, as it would entail multiple counts of the same patent. This means also that these figures are not comparable with all the others.

Data presented in this Statistics in Focus shows the data availability in Eurostat's reference database as of November 2005.

Further information:

Databases: [EUROSTAT Website/Home Page/Data](#)

Science and technology

-  Research and development
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-  High tech industry and knowledge based services
-  **Patent statistics**
 -  **Patent applications to EPO by priority year**
 -  **EPO patents at the national level**

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Eurostat set up with the members of the 'European statistical system' a network of support centres, which will exist in nearly all Member States as well as in some EFTA countries.

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