# SECTION A
# PATENTS, UTILITY MODELS AND MICROORGANISMS

Over the past two decades, the patent system has undergone important changes worldwide. As a result, patent legislation and patenting behavior have become prominent public policy themes. Similarly, use of the utility model (UM) system for protecting inventions has increased in certain countries.

This section provides an overview of patent and UM activity worldwide, aimed at enabling users to analyze and monitor the latest trends. It presents a wide range of indicators that offer insights into the functioning and use of the patent and UM systems.

Disclosure of an invention is a generally recognized requirement for the granting of a patent. Where an invention involves microorganisms, national laws in many countries require that the applicant deposit a sample at a designated International Depositary Authority (IDA). This section also provides data on microorganisms.

The first subsection on patents begins by describing the trends in patent filing and granting activity worldwide followed by analysis of filings and grants by office and origin, patent families, filings by field of technology, international applications filed through the Patent Cooperation Treaty (PCT), intensity of patent activity, patents in force, pending patents, pendency times and use of patent prosecution highways. The second subsection on UMs explores trends and activity, first worldwide and then at certain patent offices. The microorganisms subsection focuses on global deposits, and is followed by a breakdown of the number of such deposits at a selection of IDAs.

## The patent system

A patent is a set of exclusive rights granted to applicants for inventions that meet the standards of novelty, non-obviousness and industrial applicability. The term of protection is generally limited to a period of 20 years counted from the filing date, during which patent holders can exclude others from commercially exploiting their inventions. In return, applicants are obliged to disclose their inventions to the public, so that others, skilled in the art, may replicate them. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to appropriate the returns from their innovative activity.

The procedures for acquiring patent rights are governed by the rules and regulations of national and regional patent offices. These offices are responsible for issuing patents, and the rights are limited to the jurisdiction of the issuing authority. To obtain patent rights, applicants must file an application describing the invention with a national or regional office.

Applicants can also file an “international application” through the Patent Cooperation Treaty (PCT) system, an international treaty administered by WIPO that facilitates the pursuit of patent rights in multiple jurisdictions. The PCT system simplifies the process of multiple national patent filings by delaying the requirement to file a separate pursuit in each jurisdiction in which protection is sought. The decision on whether or not to grant patents remains the prerogative of national or regional patent offices, and patent rights are limited to the jurisdiction of the patent granting authority.

The PCT international application process begins with the international phase, during which an international search is performed and optional preliminary examination and supplementary international search may take place. It concludes with the national phase, during which national (or regional) patent offices decide on the patentability of an invention according to national law. Further details on the PCT system are available at: *www.wipo.int/pct/en/*

## The utility model system

Like a patent, a UM confers a set of rights for an invention for a limited period of time, during which UM holders can commercially exploit their inventions on an exclusive basis. The terms and conditions for granting UMs are different from those for granting "traditional" patents. For example, UMs are typically issued for a shorter duration (7 to 10 years) and, at most offices where UMs are available, applications are granted without substantive examination. Like patents, the procedures for granting UM rights are governed by the rules and regulations of national intellectual property (IP) offices, and rights are limited to the jurisdiction of the issuing authority.

Approximately 75 countries provide protection for UMs. In this report, the UM terminology refers to UMs and other types of protection similar to UMs. For example, "innovation patents" in Australia and "short-term patents" in Ireland are considered equivalent to UMs.

## Microorganisms under the Budapest Treaty

The Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure (also administrated by WIPO) plays an important role in the field of biotechnological inventions. Disclosure of an invention is an important requirement for the granting of a patent.

In order to eliminate the necessity to deposit a microorganism in each country in which patent protection is sought, the Budapest Treaty provides that the deposit of a microorganism with any IDA suffices for the purposes of patent procedures at national patent offices of all contracting states, and before any regional patent office that recognizes the effects of the treaty. An IDA is a scientific institution – typically a "culture collection" – capable of storing microorganisms. Currently, there are 42 such IDAs around the world. Further details about the Budapest Treaty are available at: *www.wipo.int/treaties/en/registration/budapest/*

# A.1

## Patent applications and grants worldwide

### A.1.1 Applications worldwide

Figure A.1.1.1 shows the total number of patent applications filed worldwide between 1995 and 2012.[1] The totals for each year are WIPO estimates using data covering 130 offices, and they include direct national and regional applications as well as PCT national phase entries.

The number of patent applications filed worldwide totaled 2.35 million in 2012. This represented growth of 9.2% on 2011 figures – the highest over the past 18 years. The long-term trend shows continuous growth in the numbers of applications filed, with the exception of a slight decrease in 2002 and a more pronounced decrease in 2009. Between 1995 and 2012, total patent applications more than doubled from their 1995 level of 1.05 million.

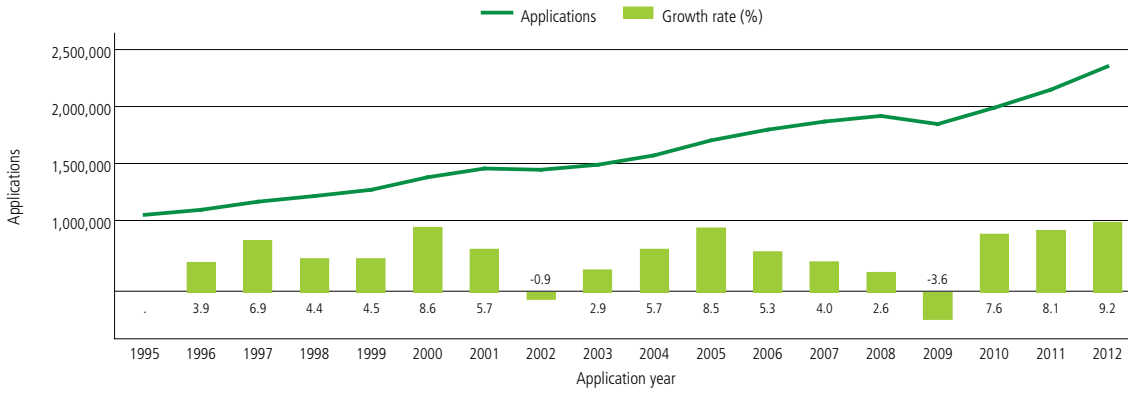
Following a drop in 2009 (-3.6%), patent applications filed worldwide rebounded strongly over the next three years, with accelerating growth rates – 7.6% growth in 2010, followed by 8.1% in 2011 and 9.2% in 2012. This was mostly due to a rapid growth in the number of applications filed in China in recent years. To illustrate this point, Figure A.1.1.2 breaks down application growth by offices for the 2005-07 and 2010-12 periods. It shows individual offices' contribution to the overall growth for each of these two periods.

Between 2010 and 2012, the number of applications filed worldwide increased by 360,100. The State Intellectual Property Office of the People's Republic of China (SIPO) accounted for 72.6% of this total increase. The United States Patent and Trademark Office (USPTO) and the Korean Intellectual Property Office (KIPO) accounted for 14.6% and 5.2% each of this total increase.[2] SIPO (44.2%) also contributed the most to the overall growth (+162,400) over the 2005-07 period. However, when comparing both periods, the contribution of SIPO to overall growth increased, while those of other major offices decreased. This reflects the acceleration of the shift in the geography of where patent applications are filed - from the United States of America (US) and Europe towards China.

1 Throughout this publication, the term "patents" refers to patents for invention.

2 For simplicity, country names rather than office names are used to label graphs. For example, the patent office of China is referred to as "China" rather than the State Intellectual Property Office of the People's Republic of China. Similarly, "United States of America" is used in place of United States Patent and Trademark Office.

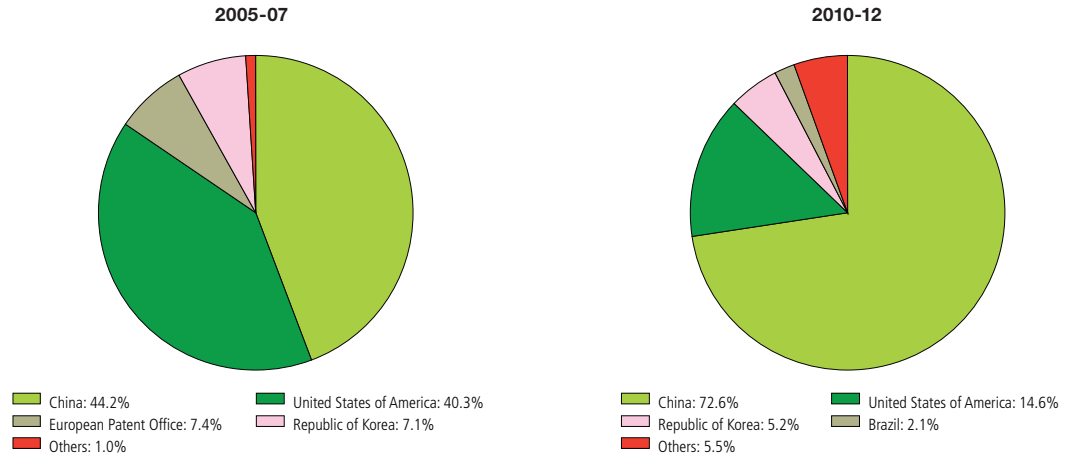
**Figure A.1.1.1 Trend in patent applications worldwide**




Note: World totals are WIPO estimates using data covering approximately 130 patent offices (see Data Description). These estimates include direct applications and PCT national phase entry data.

Source: WIPO Statistics Database, October 2013

**Figure A.1.1.2 Contribution of offices to growth in patent applications worldwide**




Source: WIPO Statistics Database, October 2013

Patent applications filed at an office are classified as resident or non-resident applications according to the residency of the first-named applicant. A resident application refers to an application filed with a patent office by an applicant residing in the country over which that office has jurisdiction. For example, an application filed with the Japan Patent Office (JPO) by an applicant residing in Japan is considered a resident application from the perspective of the JPO. Similarly, a non-resident application refers to an application filed with a patent office of a given country by an applicant residing in another country. For example, a patent application filed with the USPTO by an applicant residing in France is a non-resident application from the perspective of the USPTO. An application filed with a regional office is considered a resident application if the applicant is a resident of one of its member states, and is considered a non-resident application if the opposite applies. Resident applications are sometimes referred to as domestic applications. Likewise, non-resident applications are often called foreign applications.

**Figure A.1.1.3 Resident and non-resident patent applicants worldwide**


Note: World totals are WIPO estimates using data covering approximately 130 patent offices (see Data Description). These estimates include direct applications and PCT national phase entry data.

Source: WIPO Statistics Database, October 2013

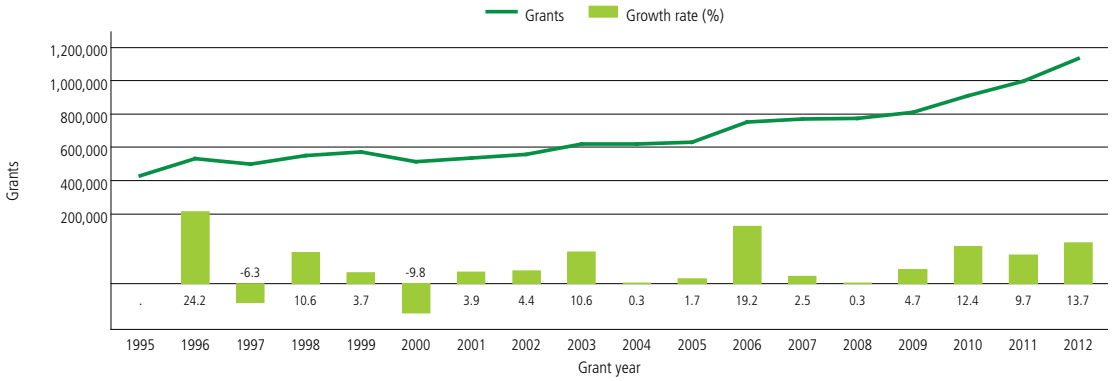
The 2.35 million applications filed in 2012 comprise approximately 1.51 million resident applications and 0.83 million non-resident applications (Figure A.1.1.3).[3] Resident applications grew by a double-digit rate of 10.5% in 2011 and 11.4% in 2012, while non-resident applications grew by 4.3% in 2011 and 5.5% in 2012. The growth in applications filed by residents worldwide was mostly due to substantial increases in resident filings at SIPO. In contrast, growth in applications filed by non-residents worldwide was mainly due to increases in non-resident filings received by SIPO and the USPTO. Between 2010 and 2012, the numbers of resident and non-resident applications filed worldwide increased by 284,300 and 76,100, respectively. SIPO accounted for 85% of the growth in total resident filing activity. In contrast, the USPTO accounted for 33.9% of the growth in total non-resident filing activity, followed by SIPO (25.4%).

From its peak of 40.1% in 2006 and 2007, the non-resident share of total applications decreased to 35.5% in 2012 - a share similar to those witnessed in the mid-1990s. Despite growth in total non-resident applications, SIPO's share has decreased due to the substantial growth in resident applications it received. However, when SIPO data are excluded from world totals, a different trend is observed. For example, the non-resident share, excluding SIPO, has been increasing since the mid-1990s to reach 42.3% in 2012.

Compared to other types of IP rights, patent applications exhibit the highest non-resident share. The 2012 non-resident share for patents was 9.1 percentage points higher than that for trademarks (Figure B.1.1.3), and was 21.2 percentage points higher than the non-resident share for industrial designs (Figure C.1.1.2).

3 The figures do not correspond exactly due to rounding. The estimated number for 2012 is 2.347 million, which comprises 1.513 million resident applications and 0.834 million non-resident applications.

**Figure A.1.2.1 Trend in patents granted worldwide**




Note: World totals are WIPO estimates using data covering approximately 120 patent offices (see Data Description). These estimates include patent grants based on direct applications and on PCT national phase entry data.

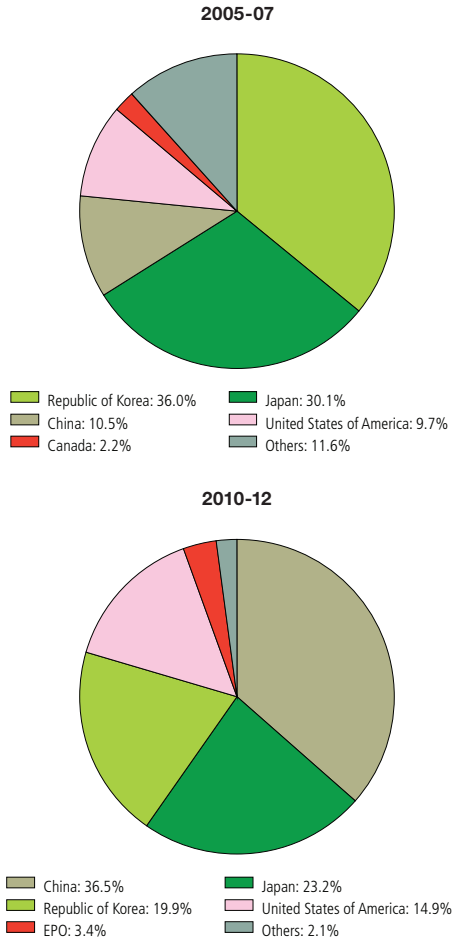
Source: WIPO Statistics Database, October 2013

### A.1.2 Grants worldwide

Since 2001, there has been uninterrupted growth in the total number of patents granted worldwide (Figure A.1.2.1). In 2012, for the first time, the total number of grants issued worldwide exceeded the one million mark, with 694,200 resident grants and 439,600 non-resident grants. As was the case for applications, total grants have also grown strongly since 2010. The 13.7% growth recorded in 2012 was the highest since 2006.

To identify the sources of growth in total grants issued worldwide, Figure A.1.2.2 breaks down growth by office for the 2005-07 and 2010-12 periods. It shows individual offices' contribution to the overall growth over these two periods. Between 2010 and 2012, the number of grants worldwide increased by 224,600. SIPO accounted for 36.5% of the total growth, followed by the JPO (23.2%), KIPO (19.9%) and the USPTO (14.9%). The contribution of SIPO to the overall growth of grants (36.5%) is considerably lower than its contribution to the overall growth of applications (see Figure A.1.1.2). The JPO and KIPO accounted for nearly two-thirds of the growth in total grants issued between 2005 and 2007. When both periods (2005-07 and 2010-12) are compared, the figures show that the contributions of SIPO and the USPTO to overall growth increased, while those of the JPO and KIPO decreased.

**Figure A.1.2.2 Contribution of offices to growth in patents granted worldwide**



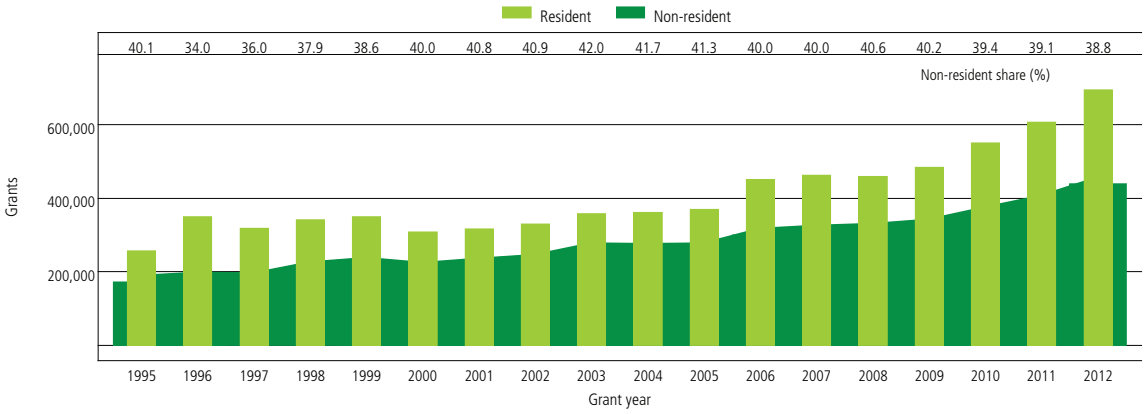

Source: WIPO Statistics Database, October 2013

Since 2010, there has been considerable growth in both resident grants and non-resident grants issued worldwide. Year-on-year growth shows that resident grants grew by 13.8% in 2010, 10.2% in 2011 and 14.4% in 2012. Likewise, non-resident grants grew by 10.4% (2010), 8.8% (2011) and 12.7% (2012). Between 2010 and 2012, grants issued to residents by SIPO contributed to 44% of the growth in total resident grants worldwide, followed by the JPO (26.3%) and KIPO (22.8%). The contribution of SIPO to the growth in total resident grants was considerably lower than its contribution to the growth in total resident applications worldwide.

As for the growth in non-resident grants issued worldwide, the USPTO accounted for approximately a quarter of overall growth, followed by SIPO (22.1%), the JPO (17.8%) and KIPO (14.8%).

Since 2010, the non-resident share of total grants has been approximately 39%, which is three percentage points lower than its peak of 42% in 2003 (Figure A.1.2.3). The non-resident share of total patent grants is slightly higher than the non-resident share of total applications (Figure A.1.1.3).

## Figure A.1.2.3 Resident and non-resident patent grants worldwide




Note: World totals are WIPO estimates using data covering approximately 120 patent offices (see Data Description). These estimates include patent grants based on direct applications and on PCT national phase entry data.

Source: WIPO Statistics Database, October 2013

# A.2

## Patent applications and grants by office

This subsection provides detailed data on patent applications and grants by office – national or regional.

### A.2.1 Applications by office

Patent offices in high-income countries received the majority of applications filed worldwide in 2012 (Table A.2.1.1). However, their combined share has decreased from 78.5% in 2007 to 64.5% in 2012. In contrast, the share held by the offices of upper middle-income countries has increased from 17.7% in 2007 to 32.1% in 2012. This was mainly due to the considerable growth in applications filed with SIPO. Offices located in lower middle-income countries accounted for 2.9% of total applications filed, and those of low-income countries accounted for 0.4% of the world total in 2012.

The distribution of resident and non-resident applications across income groups differs considerably. In 2012, resident applications accounted for approximately three-fifths of all applications filed at the offices of high-income countries, while the share of resident applications was approximately 22% at the offices of lower middle-income countries. The shares of resident applications are high for the upper middle-income and low-income countries; however, their shares are distorted by the high number of resident applications filed in China and in the Democratic People's Republic of Korea. The share of resident filings by the upper middle-income countries, excluding China, was approximately 26%, and the share held by low-income countries excluding the Democratic Republic of Korea was approximately 22%.

The table below also shows low growth in applications filed in high-income countries between 2007 and 2012, but higher growth among the other income groups.

Figure A.2.1.2 shows the long-term trend in the numbers of applications filed with the top five offices. These offices were selected according to their 2012 totals. Application numbers were stable until the early 1970s, after which the JPO began to see rapid growth in the number of applications received, a pattern that was also observed by the USPTO from the 1980s onwards. From 1883 to 1967, the USPTO was the leading office in the world in terms of filings. The JPO surpassed the USPTO in 1968 and maintained the top position until 2005. However, since 2005, the number of applications received by the JPO has followed a downward trend.

Both the European Patent Office (EPO) and KIPO have seen increases each year in the numbers of applications received since the early 1980s. The volumes received by these offices are of similar magnitude, but are far below those of the JPO and the USPTO. SIPO has seen rapid growth in applications since 2001, to such an extent that it surpassed both the EPO and KIPO in 2005, the JPO in 2010, and the USPTO in 2011 – thus becoming the largest patent office in the world in terms of filings. Since 2001, SIPO has recorded double-digit growth in applications each year, except in 2009 when the number of applications received by this office grew by 8.5%. The growth in applications received by SIPO was due to growth in resident applications – non-resident applications have remained more or less stable.

Since the early 2000s, the combined share of the top five offices in the world total has increased – from approximately 70% in 2000 to approximately 80% in 2012. There has also been a considerable shift in the shares held among the top five offices. SIPO's share increased from 3.8% in 2000 to 27.8% in 2012, while over the same period that of the JPO halved from 30.5% to 14.6%. The respective shares held by the EPO, KIPO and the USPTO have remained more or less constant.

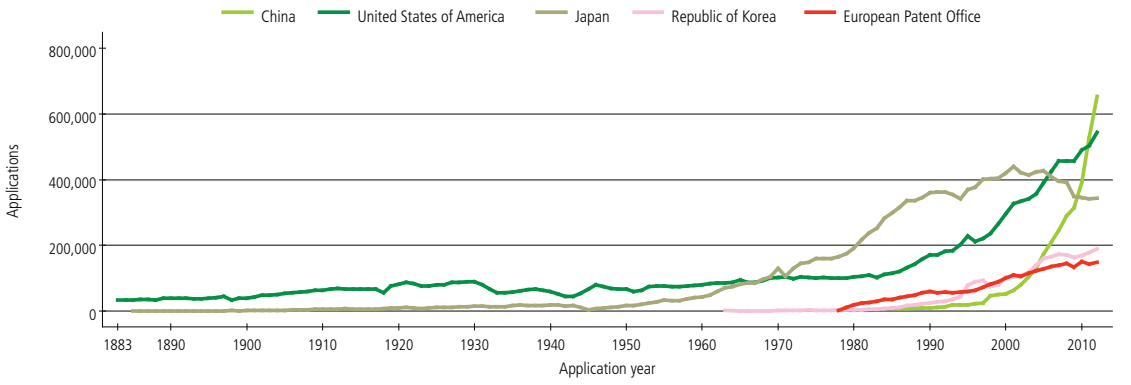
### Table A.2.1.1 Patent applications by income group

| Income group | Number of applications | | Resident share (%) | | Share of world total (%) | | Average growth (%) |
|---|---|---|---|---|---|---|---|
| | 2007 | 2012 | 2007 | 2012 | 2007 | 2012 | 2007-12 |
| High-income | 1,465,300 | 1,513,500 | 63.1 | 61.3 | 78.5 | 64.5 | 0.6 |
| Upper middle-income | 331,100 | 754,700 | 52.1 | 74.4 | 17.7 | 32.1 | 17.9 |
| *...Upper middle-income excluding China* | *85,900* | *101,900* | *22.6* | *25.8* | *4.6* | *4.3* | *3.5* |
| Lower middle-income | 60,900 | 69,000 | 20.8 | 22.1 | 3.3 | 2.9 | 2.5 |
| Low-income | 8,700 | 10,500 | 83.2 | 84.1 | 0.5 | 0.4 | 3.8 |
| **World** | **1,866,000** | **2,347,700** | **59.9** | **64.5** | **100** | **100** | **4.7** |

Note: Totals by income group are WIPO estimates using data covering 130 offices. Each category includes the following number of countries: high-income countries (50), upper middle-income (39), lower middle-income (23) and low-income (18). European Patent Office (EPO) data are allocated to the high-income group, as the majority of its member states are high-income countries. For the same reason, data for the African Regional Intellectual Property Organization and for the African Intellectual Property Organization data are allocated to the low-income group, while those for the Eurasian Patent Organization are allocated to the lower middle-income group.

Source: WIPO Statistics Database, October 2013

### Figure A.2.1.2 Trend in patent applications for the top five offices




Note: The top five offices were selected based on their 2012 totals.

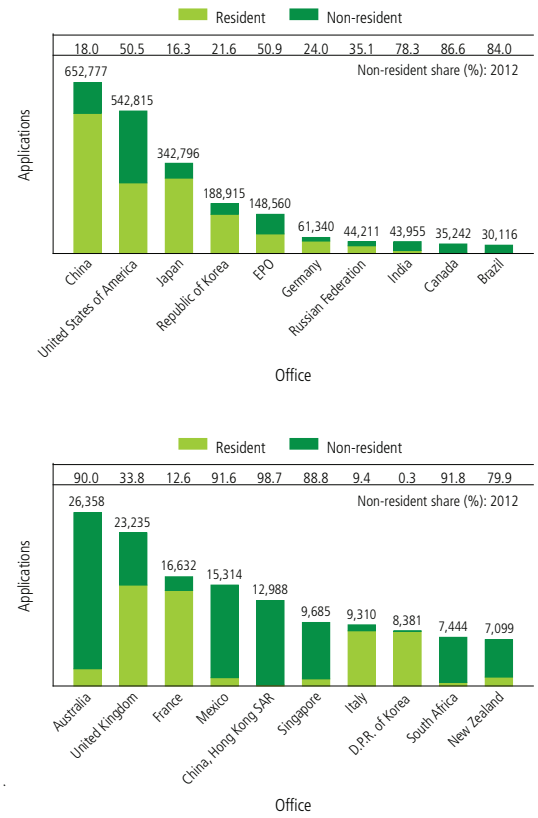
Source: WIPO Statistics Database, October 2013

Figure A.2.1.3 shows the numbers of patent applications received and their resident and non-resident shares for the top 20 offices worldwide. In 2012, SIPO received the largest number of applications, which was due to substantial growth in resident applications. The USPTO (542,815) is the only other office that received more than half a million applications in 2012. The JPO (342,796), KIPO (188,915) and the EPO (148,560) also received high numbers of applications. The gap between SIPO and the other offices has increased considerably since 2010.

While the top 20 list includes patent offices from 15 high-income countries, large middle-income countries such as Brazil, India, Mexico and South Africa also appear in this list. The rankings of the top 20 offices in 2012 are identical to that in 2011, except for those of Brazil, the Russian Federation and New Zealand. These three offices each moved up one place in their respective rankings.

Globally, approximately 35.5% of applications are considered to be non-resident applications. However, the resident and non-resident distribution differs significantly among offices. In 2012, the non-resident share ranged from 98.7% (China, Hong Kong SAR) to 0.3% (Democratic People's Republic of Korea). Non-resident applications accounted for more than three-quarters of total applications at 9 of the top 20 offices. In contrast, the non-resident share was below 33% for seven offices. The EPO and the USPTO have equal distributions of resident and non-resident applications. For the majority of the top 20 offices, the 2012 non-resident share is similar to that for 2011, except for New Zealand (+4 percentage points), Germany (+3 percentage points) and China (-3 percentage points).

**Figure A.2.1.3 Patent applications for the top 20 offices, 2012**



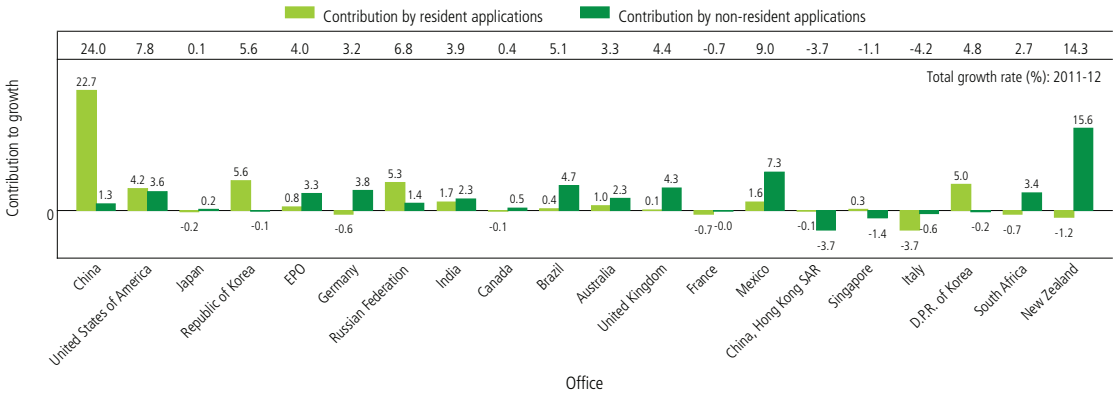

Note: D.P.R. of Korea = Democratic People's Republic of Korea

Source: WIPO Statistics Database, October 2013

Figure A.2.1.4 shows the contribution of resident and non-resident applications to total growth for the top 20 offices. All offices, except those of China Hong Kong (SAR), France, Italy and Singapore, received more applications in 2012 than in 2011. China (+24%) and New Zealand (+14.3%) were the only two offices that recorded double-digit growth in applications between 2011 and 2012. However, the source of growth in applications for these two offices differs. Growth in resident applications accounted for 22.7 percentage points of the total growth (+24%) in China, while growth in non-resident applications (+15.6 percentage points) accounted for all growth in applications in New Zealand (+14.3%) by offsetting the fall in resident applications filed at its office. Mexico (+9%), the US (+7.8%) and the Russian Federation (+6.8%) also saw considerable growth in applications in 2012. The source of this growth differed among offices. For a number of them (e.g., Brazil, Germany, Mexico and the UK), growth in non-resident applications was the main contributor to overall growth.

The list of the top 20 offices comprises 15 high-income countries (Figure A.2.1.3). However, a considerable amount of IP activity also takes place in the offices of middle- and low-income countries. Figure A.2.1.5 shows patent application data for selected middle- and low-income countries (selected offices are from different world regions and income groups). The patent offices of Malaysia (6,940) and Thailand (6,746) each received close to 7,000 applications in 2012, which is similar to the number of applications received by New Zealand. Ukraine, Argentina and Turkey also received large numbers of applications. Non-resident applications accounted for the bulk of total applications received by the majority of offices listed in Figure A.2.1.5. For example, non-resident applications accounted for almost all applications received by the offices of Guatemala and Honduras.

**Figure A.2.1.4 Contribution of resident and non-resident applications to total growth for the top 20 offices, 2011-12**

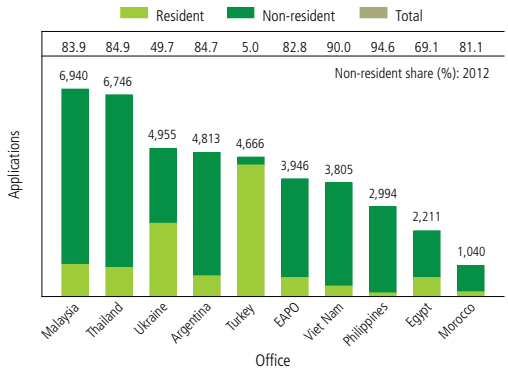


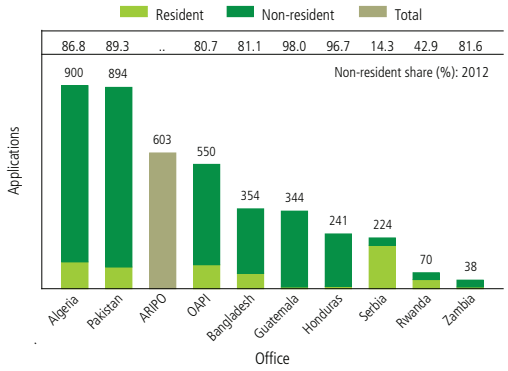

Note: D.P.R. of Korea = Democratic People's Republic of Korea

Source: WIPO Statistics Database, October 2013

More than half of these offices of middle- and low-income countries saw growth in the number of applications received in 2012, of which six saw double-digit growth (Figure A.2.1.6). Growth in non-resident applications was the main contributor to overall growth at the majority of these offices. However, for a number of them, the contribution of resident applications to overall growth outweighed the non-resident component. For example, growth in resident applications was responsible for nearly all growth at the office of Turkey. The Thai office had the highest growth in the number of applications between 2011 and 2012. This could be due in part to the accession of Thailand to the PCT system in December 2009.

**Figure A.2.1.5 Patent applications for offices of selected middle- and low-income countries, 2012**

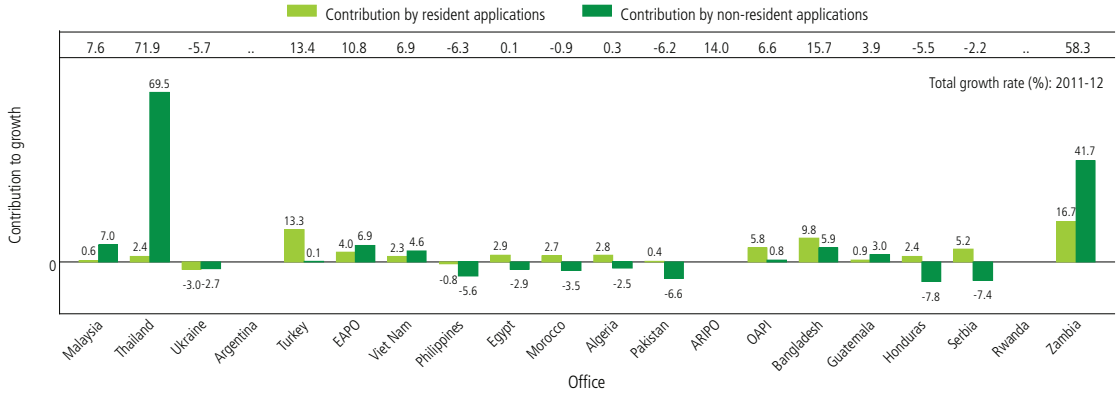



Note: The selected offices are from different world regions and income groups (upper middle-income, lower-middle income and low- income). Data for all available offices are presented in the statistical annex. ARIPO = African Regional Intellectual Property Organization; OAPI = African Intellectual Property Organization and EAPO = Eurasian Patent Organization.

Source: WIPO Statistics Database, October 2013

**A.2.1.6 Contribution of resident and non-resident applications to total growth for offices of selected middle- and low-income countries, 2011-12**




Note: ".." = not available. The selected offices are from different world regions and income groups (upper middle-income, lower-middle income and low income). All available office data are presented in the statistical annex. ARIPO = African Regional Intellectual Property Organization; OAPI = African Intellectual Property Organization and EAPO = Eurasian Patent Organization.

Source: WIPO Statistics Database, October 2013

## A.2.2 Grants by office

This subsection focuses on patent grants by office. The procedure for issuing patents varies across offices, and differences in the numbers of patent grants among offices depend on several factors, such as the examination capacity of offices.

Figure A.2.2.1 shows the numbers of resident and non-resident grants for the top 20 offices. Since 2007, the JPO has issued the largest numbers of patent grants. In 2012, the JPO was followed by the USPTO and SIPO (A.2.2.1) – all of which granting more than 200,000 patents. The number of grants issued by offices ranked from 12th to 20th ranged from approximately 3,400 to 6,900. The lists of the top 20 offices for applications (A.2.1.3) and grants (A.2.2.1) are almost identical, except for Brazil and Ukraine. The office of Brazil is ranked among the top 20 offices for applications but not for grants, while Ukraine appears in the top 20 list for grants, but not for applications.

The combined shares of the top five offices for applications and grants worldwide were of similar magnitude – approximately 80%. However, there are considerable differences between the JPO and SIPO shares. SIPO accounted for a higher share of applications filed worldwide (27.8%) than for grants issued worldwide (19.1%), whereas the opposite was the case for the JPO – a higher grant share (24.2%) than that for applications (14.6%). The majority of the top 20 offices held similar shares of world totals for both applications and grants.

At the global level, non-resident grants accounted for 38.8% of total grants issued in 2012. However, there is considerable variation in non-resident shares across offices. Non-resident grants accounted for almost all grants issued by the offices of China Hong Kong (SAR) and Mexico. Other offices with high non-resident grants were Australia, Canada, New Zealand, Singapore and South Africa. In contrast, resident grants accounted for almost all patents issued by the Democratic People's Republic of Korea.

Between 2011 and 2012, the office of New Zealand (+30.6%) witnessed the highest growth in patent grants, followed by France (+26.4%) and China (+26.1%). However, in absolute numbers, China (+44,992) and Japan (+36,468) saw the largest increases in grants. The offices of India (-16.3%), Ukraine (-16.2%) and Italy (-11.8%) saw considerable decreases in the number of grants issued.

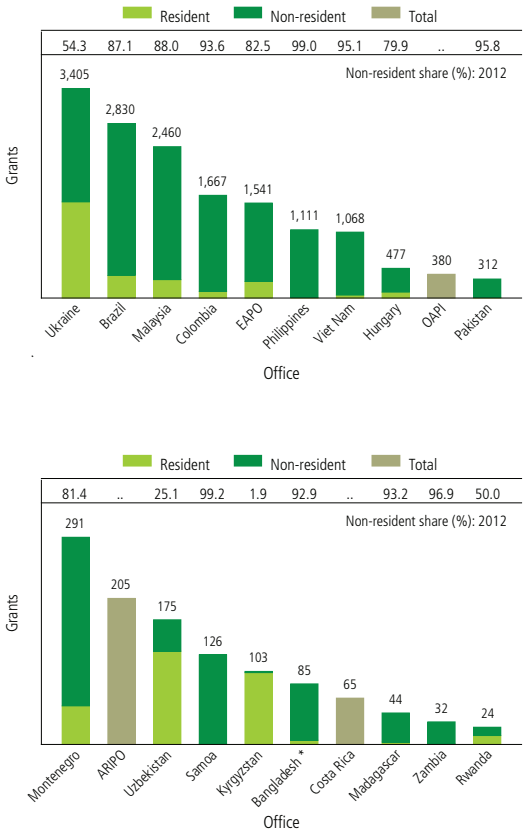
**Figure A.2.2.1 Patent grants for the top 20 offices, 2012**


Note: D.P.R. of Korea = Democratic People's Republic of Korea

Source: WIPO Statistics Database, October 2013

Figure A.2.2.2 focuses on patents granted by offices of selected middle- and low-income countries (selected offices are from different world regions and income groups). Among these countries, Ukraine (3,405) issued the largest number of patents, followed by Brazil (2,830) and Malaysia (2,460). Bangladesh, Costa Rica, Madagascar, Rwanda and Zambia each granted fewer than 100 patents. Non-resident grants accounted for the largest share of total grants for all offices with the exception of the offices of Uzbekistan and Kyrgyzstan. The office of Colombia showed the largest increase in patent grants in 2012 (+1,050 compared to 2011), while those of Viet Nam (-776), Ukraine (-656) and Brazil (-609) saw the largest decreases.

**Figure A.2.2.2 Patent grants for offices of selected middle- and low-income countries, 2012**




Note: *2011 data, ".." = not available. The selected offices are from different world regions and income groups (upper middle-income, lower-middle income and low-income). Data for all available offices are presented in the statistical annex. ARIPO = African Regional Intellectual Property Organization; OAPI = African Intellectual Property Organization and EAPO = Eurasian Patent Organization.

Source: WIPO Statistics Database, October 2013

# A.3

## Patent applications and grants by origin

Patent application counts based on the applicant's origin complement the picture of patent activity worldwide. Patent activity by origin includes resident applications and applications filed abroad. The origin of a patent application is determined by the residence of the first-named applicant. As some offices do not provide data broken down by the applicant's origin, the numbers of applications and grants by origin reported here are likely to be lower than their actual numbers. In 2012, the origins of approximately 65,000 applications (2.8% of applications worldwide) were unknown.

Applications filed at regional offices are considered equivalent to multiple applications in the respective states member to these offices. This subsection reports figures based on an equivalent applications or grants concept. For instance, in order to calculate the number of equivalent applications or grants for the Eurasian Patent Organization (EAPO) or the African Intellectual Property Organization (OAPI), each application is multiplied by the corresponding number of member states. By contrast, the EPO and ARIPO do not issue patents with automatic region-wide applicability. Thus, for these two offices, each application is counted as one application abroad if the applicant does not reside in a member state; alternatively, the application is counted as one resident application and one application abroad if the applicant resides in a member state. The use of this method might result in underestimating the number of applications and grants at the EPO or ARIPO, as the granting of patents on the basis of applications received by these offices may lead to patent protection in more than one jurisdiction. Uncertainty and lack of data on designations or validations in member states are the main reasons for limiting the number of applications abroad to just a single application in the case of the EPO and ARIPO.

### A.3.1 Applications and grants by origin

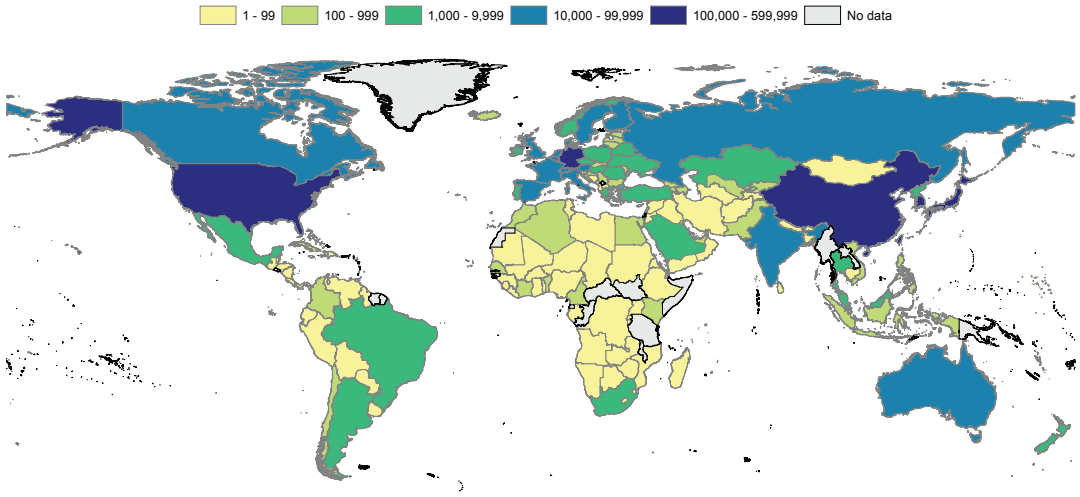
Figure A.3.1.1 shows the equivalent patent application data for all available origins for 2012. As depicted in the map, patent applications are concentrated among just a few origins, namely China, Germany, Japan, the Republic of Korea and the US. Most countries located in Africa, the Middle East and portions of Latin America exhibit low patent filing volumes. However, this could be partly due to missing data, as some offices do not provide statistics broken down by origin.

Figure A.3.1.2 presents equivalent patent application data for the top 20 origins. In 2012, China overtook both Japan and the US to become the origin of the largest number of patent applications. In 2012, China for the first time held the top positions both for the number of applications filed in China (A.2.1.3) as well as for the number of applications filed by Chinese applicants worldwide (A.3.1.2.). This was mainly due to the substantial growth in resident applications.

In general, European countries, such as Germany and France, are ranked higher in terms of origin data than they are for office data. In contrast, a number of middle-income countries, such as Brazil and India, are ranked higher in terms of office data than they are for origin data. This is due to differences between the numbers of applications filed abroad by residents of European countries compared to those filed by residents of middle-income countries. This is illustrated by the fact that Brazil, Mexico and South Africa are in the list of top 20 offices, but not in the list for the top 20 origins. In fact, China and India are the only other middle-income countries in the list of top 20 origins.

Applications abroad constitute the largest share of total applications for 14 of the top 20 origins, with Israel (89.2%) and Canada (82.2%) having the highest abroad share of total applications. Only a small portion of total applications originating in China, the Republic of Korea and the Russian Federation are filed abroad.

## Figure A.3.1.1 Equivalent patent applications by origin, 2012



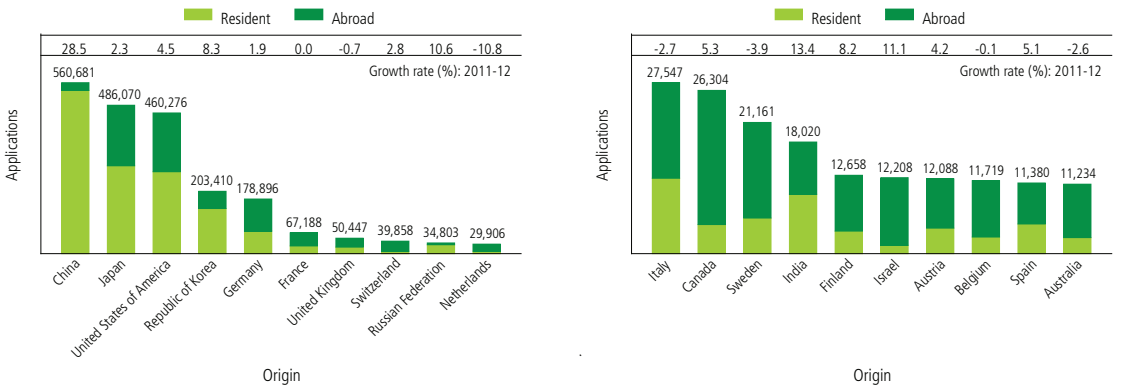

Note: As some offices do not provide data broken down by origin, the numbers of applications by origin reported here are likely to be lower than their actual numbers.

Source: WIPO Statistics Database, October 2013

When compared with figures for 2011, the majority of the top 20 origins saw growth in applications in 2012. China, India, Israel and the Russian Federation showed strong growth in total applications. Growth in resident applications was the main contributor to the overall growth reported for China and the Russian Federation.

In the case of India and Israel, growth in applications filed abroad was the key factor driving total growth. The Netherlands saw a 10.8% decrease in total applications, which was due to a drop in both resident applications and those filed abroad.

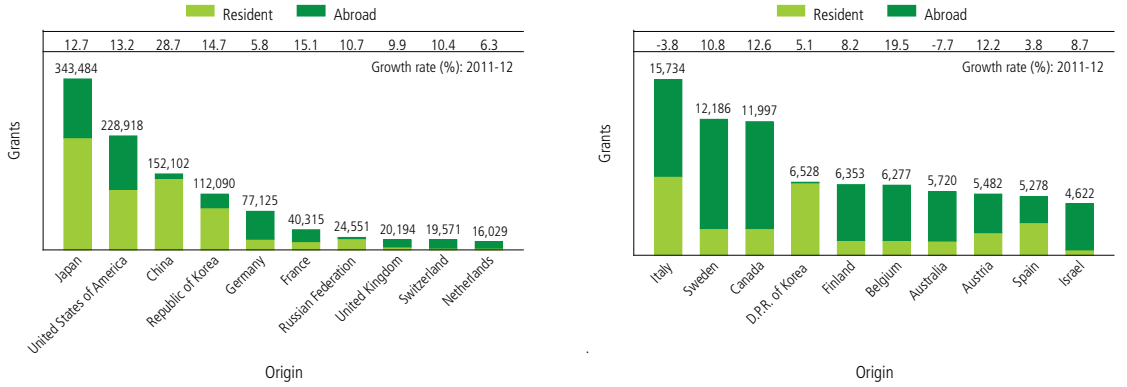
## Figure A.3.1.2 Equivalent patent applications for the top 20 origins, 2012




Note: As some offices do not provide data broken down by origin, the numbers of applications by origin reported here are likely to be lower than their actual numbers.

Source: WIPO Statistics Database, October 2013

**Figure A.3.1.3 Equivalent patent grants for the top 20 origins, 2012**




Note: As some offices do not provide data broken down by origin, the numbers of applications by origin reported here are likely to be lower than their actual numbers. D.P.R. of Korea = Democratic People's Republic of Korea

Source: WIPO Statistics Database, October 2013

For the majority of origins, equivalent patent grants (Figure A.3.1.3) share similarities with equivalent applications (Figure A.3.1.2). However, there are some differences. For example, the application and grant profiles of the top three origins differ significantly. China ranked in first position for applications (Figure A.3.1.2) but in third position for grants. Japan and the US recorded similar volumes of applications, but reported considerable differences for grants. India, one of the top 20 offices for applications, does not feature in the list of top 20 origins. However, care should be taken when comparing application and grant data, as applications require processing times of up to several years. Furthermore, in recent years there has been substantial growth in the number of applications filed by residents of China. Once these applications are processed, China's total grants will increase.

Grants abroad accounted for less than 10% of total grants for China, the Democratic People's Republic of Korea and the Russian Federation. In contrast, applicants domiciled in Sweden and Switzerland received more than four-fifths of their total grants from offices other than their respective national/regional offices.

With the exception of Australia and Italy, the other top 20 origins received more grants in 2012 than in 2011. China (+28.7%) saw the largest growth in grants, followed by Belgium (+19.5%), France (+15.1%) and the Republic of Korea (+14.7%). Growth in resident grants was the main factor influencing the overall growth in grants for China and the Republic of Korea. In contrast, an increase in grants abroad accounted for three-quarters of the total growth for Belgium.

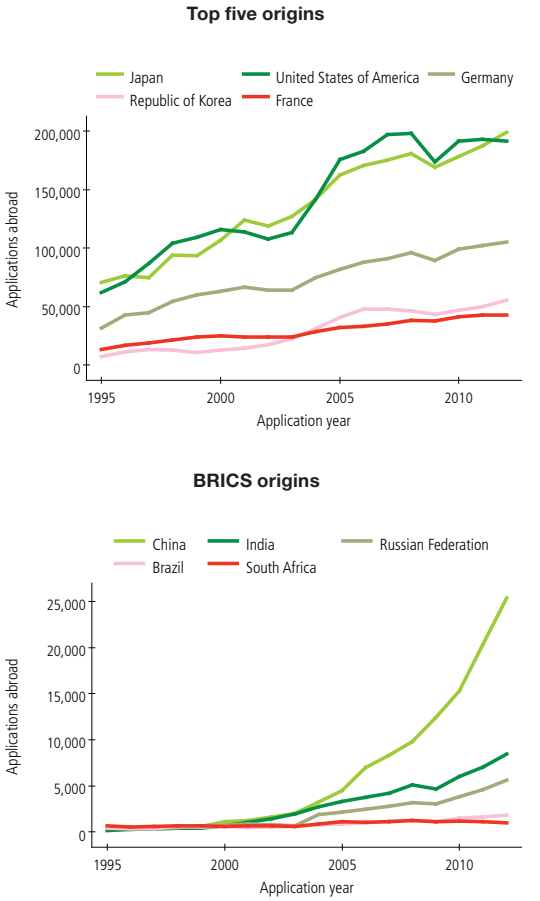
### A.3.2 Applications filed abroad by origin

The volume of filings abroad reflects, to some extent, the impact of globalization on IP protection strategies. Companies that expand their operations to foreign countries may have a business imperative to seek IP protection in those countries.[4] Consequently, patent applications filed abroad provide some indication of how companies are expanding their IP rights in relation with their businesses into overseas markets. As shown in Figure A.3.2.1, Japan with approximately 200,000 applications, filed the largest number applications abroad in 2012, followed closely by the US with its approximately 191,550 applications. Germany accounted for over 100,000 applications, while France and the Republic of Korea each had approximately 50,000.

Brazil, the Russian Federation, India, China and South Africa (the so-called BRICS countries) had similar volumes of applications abroad in the mid-1990s. However, the numbers of applications of Chinese origin filed abroad increased considerably. For example, by 2012 they had increased from approximately 300 to over 25,000 applications, while those of Indian origin had increased from approximately 160 to approximately 8,500.

In 2009 during the global economic crisis, the numbers of applications filed abroad for all reported origins except China decreased. US applicants filed approximately 25,000 fewer applications abroad in 2009 than in 2008. Similarly, applicants resident in Japan filed close to 12,000 fewer applications abroad. The volumes of applications filed abroad have returned to the pre-crisis levels of 2008 for all reported origins, except for the US and South Africa.

**Figure A.3.2.1 Trends in applications filed abroad for the top five origins and BRICS origins**




Note: As some offices do not provide data broken down by origin, the numbers of applications by origin reported here are likely to be lower than their actual numbers. BRICS = Brazil, the Russian Federation, India, China and South Africa.

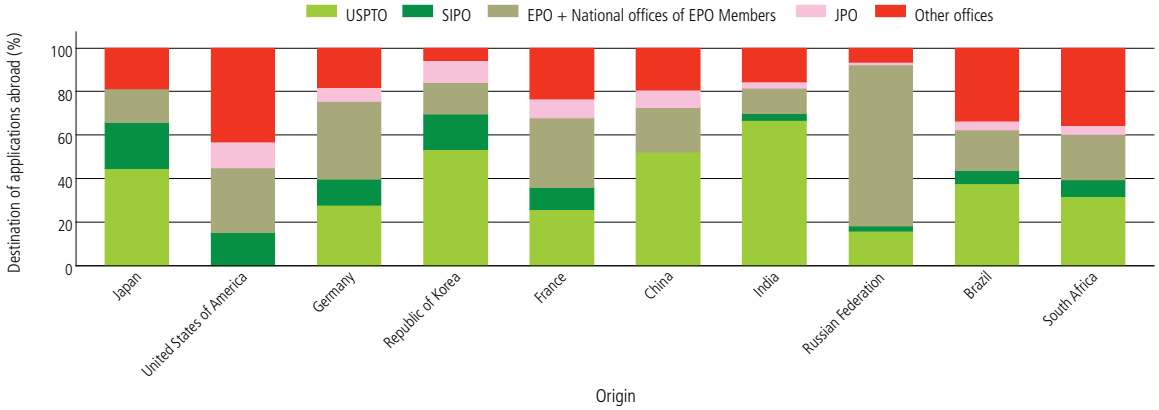
Source: WIPO Statistics Database, October 2013

To provide a detailed picture of patent flows across countries, Figure A.3.2.2 presents a breakdown of patent data by origin and destination office for 2012. For example, residents of Japan filed 199,057 applications abroad in 2012; of these applications, 44.6% were destined for the USPTO, 21.2% for SIPO, 15.6% for Europe and 18.6% for other offices.[5]

4 It goes without saying that expanding operations abroad does not necessarily mean that companies will seek additional patent rights. For example, companies might rely on other types of IP protection, or IP protection might not be necessary at all due to the nature of the business activity.

5 Europe = offices of all European countries, including the EPO and not limited to the EU.

**Figure A.3.2.2 Destination of applications abroad for the top five origins and BRICS origins, 2012**




Note: BRICS = Brazil, the Russian Federation, India, China and South Africa.

Source: WIPO Statistics Database, October 2013

The USPTO received the largest number of applications (i.e., excluding those of US origin) from Japan. However, 67% of total applications filed abroad by residents of India (8,467) were destined for the USPTO. Similarly, the bulk of all applications filed abroad by residents of China (52.3%) and the Republic of Korea (53.3%) were destined for the USPTO. The EPO and offices of EPO member states are a popular destination for applications filed by residents of the Russian Federation and the US. The share of applications received by SIPO from Japan (21.2%), the Republic of Korea (16.3%), the US (15.4%) and Germany (12.1%) are more evenly distributed.

# A.4

## Patent families

Applicants often file patent applications in multiple jurisdictions, thus resulting in some inventions being recorded more than once. In order to take this factor into account, WIPO has developed indicators related to so-called patent families, which are defined as a set of patent applications interlinked by – or by a combination of – priority claim, PCT national phase entry, continuation, continuation-in-part, internal priority, addition or division.[6] A special subset of patent families comprises foreign-oriented patent families, which include only those patent families which have at least one filing office that is different from the office of the applicant's country of origin.[7] By contrast, domestic patent families are patent families that have only one filing office that is the same as the office of the first-named applicant's country of origin.

Figure A.4.1 shows the number of patent families worldwide for 1995-2010.[8] The trend in patent families is similar to that of patent applications (Figure A.1.1.1). The total number of patent families grew continuously until 2009 and, following a sharp decrease in 2009, rebounded strongly with 4.9% growth in 2010. In 2010, the number of patent families across the world totaled approximately 1 million, which is equivalent to 50% of the total number of patent applications filed worldwide in 2010. In other words, one-half of all patent applications worldwide are first filings and the other half comprise subsequent applications.

Figure A.4.2 presents the number of patent families broken down by domestic and foreign-oriented families for the top 20 origins. Between 2008 and 2010, Japan had the largest number of patent families, followed by the US and China. The rankings of the top five origins for patent families and patent applications are identical for each year over the same period. All reported origins, except Brazil and China, are high-income countries.

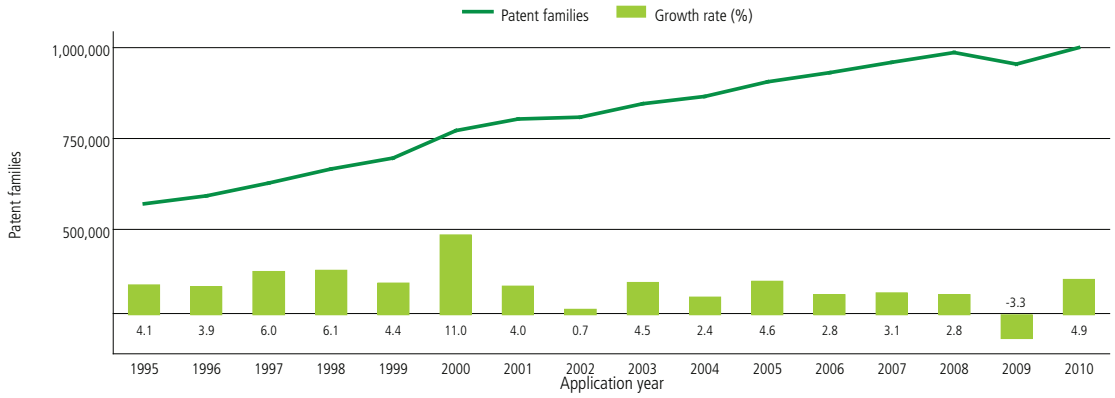
The distribution of domestic and foreign-oriented patent families differed considerably. Foreign-oriented patent families accounted for less than a tenth of total patent families in the case of China, Poland and the Russian Federation. In contrast, Canada, the other European countries, Israel and the US had a high share of foreign-oriented patent families.

6 In this publication, patent families include only those families associated with patent applications for inventions and exclude patent families associated with utility model applications.

7 Some foreign-related patent families include only one filing office, as applicants may choose to file directly with a foreign office. For example, if a Canadian applicant files a patent application directly with the USPTO (without previously filing with the patent office of Canada), that application, and applications filed subsequently with the USPTO, form a foreign-oriented patent family.

8 Patent family data are based on published applications. There is a minimum delay of 18 months between the application date and the publication date. For this reason, 2010 is the latest available year for which complete patent family data exist.

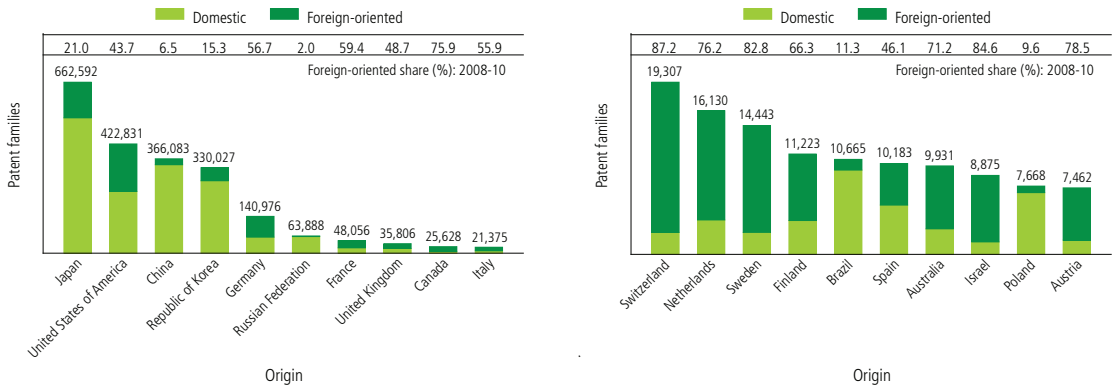
## Figure A.4.1 Trend in patent families




Note: The patent family dataset includes only published patent applications. "Patent family" is defined as a set of patent applications interlinked by – or by a combination of – priority claim, PCT national phase entry, continuation, continuation-in-part, addition or division. "Foreign-oriented patent family" is defined as a patent family having at least one filing office that is different from the office of the first-named applicant's country of origin.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

## Figure A.4.2 Domestic and foreign-oriented patent families for the top origins, 2008-10



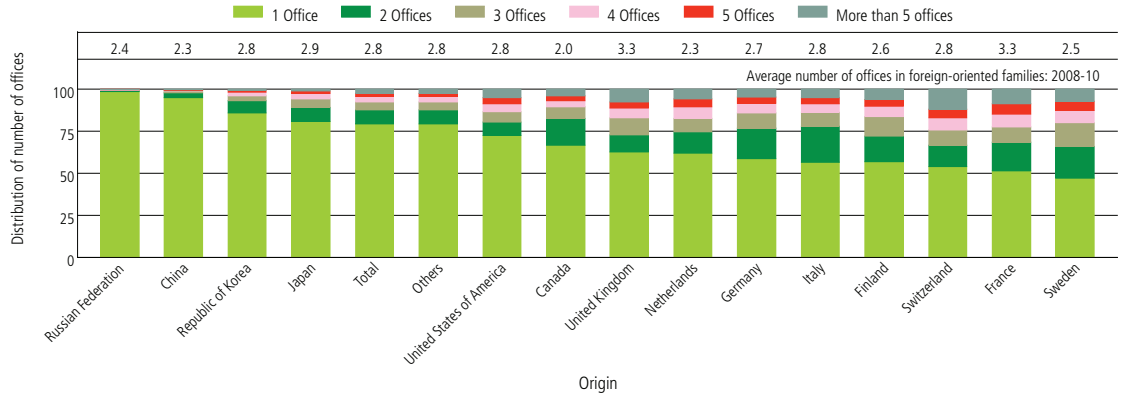

Note: The patent family dataset includes published patent applications only. "Patent family" is defined as a set of patent applications interlinked by – or by a combination of – priority claim, PCT national phase entry, continuation, continuation-in-part, addition or division. "Foreign-oriented patent family" is defined as a patent family having at least one filing office that is different from the office of the first-named applicant's country of origin.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

Figure A.4.3 shows the distribution of total patent families by the number of offices at which they exist for selected origins. The majority of patent families are single-office families, most often the national patent office of the applicant. On average, 21.6% of patent families created worldwide between 2008 and 2010 included at least two patent offices. However, there was considerable variation among the top origins. A small fraction of total patent families originating in the Russian Federation (1.6%) and China (5.9%) included at least two patent offices. In contrast, large shares of patent families originating in EU countries, such as France (49.1%) and Sweden (56.5%), included at least two patent offices.

The average number of offices per foreign-oriented patent family ranged from 2 offices for Canada to 3.3 offices for France and the UK. This ratio has remained more or less stable in recent years.

**Figure A.4.3 Distribution of total patent families by number of offices, 2008-10**




Note: The patent family dataset includes only published patent applications. "Patent family" is defined as a set of patent applications interlinked by – or by a combination of – priority claim, PCT national phase entry, continuation, continuation-in-part, addition or division. "Foreign-oriented patent family" is defined as a patent family having at least one filing office that is different from the office of the first-named applicant's country of origin.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

Table A.4.4 illustrates the flow of foreign-oriented patent filings from source countries to destination offices. Numbers reported in this table are lower than those for applications abroad reported in subsection A.3 due to data consolidation – i.e., repeated filings at the same office within the same patent family are counted only once.

The USPTO is the most popular destination for foreign-oriented patent families. Approximately 67% of foreign-oriented patent families, excluding those of US origin, included at least one filing at the USPTO.[9] In contrast, approximately 38% of foreign-oriented patent families, excluding those of Chinese origin, included at least one filing at SIPO. The share for the JPO was approximately 31%.

A high proportion of foreign-oriented patent families originating in the Republic of Korea (83%), Israel (79%), Japan (79%) and China (77%) included filings at the USPTO. In contrast, for a number of European countries (Austria, Belgium, Italy and Spain), their respective shares of foreign-oriented patent families that included filings at the USPTO were below 50%. However, residents of many European origins have a high tendency to file at the EPO. For example, more than 80% of foreign-oriented patent families originating in France and Italy included filings at the EPO. A high share of foreign-oriented families originating in Japan (48%), the US (40%) and the Republic of Korea (36%) included filings at SIPO.

9 The ratio is calculated as follows: the total number of foreign-oriented patent families including at least one filing at the USPTO, excluding those of US origin (504,621 minus 91,222 = 413,399) divided by the total number of foreign-oriented patent families, excluding those of US origin (801,686 minus 184,832 = 616,854).

## Table A.4.4 Foreign-oriented patent families for selected offices and origins, 2008-10

| Origin | Office | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | United States of America | European Patent Office | Japan | China | Republic of Korea | Canada | Germany | Australia | Russian Federation | United Kingdom | Mexico | France | Israel | Argentina | Singapore | Foreign-oriented families |
| United States of America | 91,222 | 83,193 | 63,286 | 74,049 | 39,598 | 43,140 | 9,542 | 23,298 | 8,414 | 8,937 | 13,946 | 889 | 5,925 | 4,210 | 3,461 | 184,832 |
| Japan | 109,471 | 36,987 | 125,060 | 66,488 | 24,052 | 3,034 | 5,275 | 2,534 | 2,136 | 991 | 702 | 566 | 188 | 331 | 1,103 | 139,188 |
| Germany | 37,028 | 57,014 | 14,075 | 23,807 | 8,074 | 5,780 | 46,722 | 2,684 | 4,560 | 990 | 1,946 | 1,477 | 865 | 783 | 604 | 79,880 |
| Republic of Korea | 42,295 | 11,727 | 12,553 | 18,164 | 45,340 | 897 | 1,567 | 753 | 777 | 387 | 374 | 110 | 36 | 29 | 163 | 50,654 |
| France | 15,490 | 22,941 | 7,763 | 9,001 | 4,060 | 4,637 | 521 | 1,564 | 2,166 | 351 | 1,160 | 19,035 | 838 | 593 | 480 | 28,540 |
| China | 18,544 | 7,137 | 3,550 | 17,709 | 1,853 | 868 | 312 | 657 | 780 | 366 | 300 | 199 | 99 | 31 | 191 | 23,945 |
| Canada | 14,173 | 5,752 | 1,916 | 3,001 | 1,800 | 7,049 | 84 | 1,213 | 411 | 558 | 631 | 30 | 239 | 131 | 144 | 19,457 |
| United Kingdom | 12,017 | 11,523 | 4,093 | 4,604 | 1,809 | 3,373 | 232 | 2,564 | 916 | 11,008 | 835 | 121 | 627 | 376 | 430 | 17,423 |
| Switzerland | 7,149 | 10,105 | 4,037 | 4,789 | 2,738 | 2,737 | 2,224 | 1,804 | 1,324 | 614 | 1,351 | 198 | 707 | 624 | 393 | 16,838 |
| Netherlands | 6,234 | 6,516 | 2,930 | 3,486 | 1,642 | 1,015 | 261 | 648 | 886 | 436 | 281 | 50 | 163 | 162 | 144 | 12,290 |
| Sweden | 6,773 | 7,474 | 2,565 | 3,488 | 1,640 | 1,131 | 605 | 749 | 741 | 263 | 401 | 63 | 258 | 276 | 134 | 11,963 |
| Italy | 5,055 | 9,781 | 1,515 | 2,612 | 872 | 1,249 | 267 | 594 | 865 | 120 | 448 | 100 | 249 | 164 | 105 | 11,953 |
| Israel | 5,916 | 2,805 | 1,110 | 1,233 | 910 | 936 | 61 | 656 | 192 | 257 | 191 | 7 | 1,882 | 45 | 76 | 7,508 |
| Finland | 4,432 | 4,414 | 811 | 2,523 | 1,018 | 799 | 297 | 409 | 606 | 180 | 152 | 21 | 74 | 66 | 57 | 7,445 |
| Australia | 4,384 | 2,346 | 1,066 | 1,571 | 940 | 1,357 | 25 | 2,580 | 201 | 292 | 272 | 5 | 183 | 88 | 140 | 7,068 |
| Austria | 2,056 | 3,841 | 677 | 1,205 | 426 | 523 | 1,888 | 294 | 382 | 49 | 131 | 51 | 65 | 48 | 43 | 5,860 |
| Belgium | 1,942 | 3,042 | 828 | 1,022 | 592 | 754 | 131 | 504 | 276 | 643 | 250 | 153 | 175 | 154 | 77 | 4,745 |
| Spain | 1,911 | 3,444 | 551 | 833 | 258 | 552 | 98 | 301 | 309 | 99 | 358 | 140 | 159 | 295 | 58 | 4,692 |
| Singapore | 2,592 | 765 | 637 | 1,279 | 355 | 144 | 380 | 165 | 41 | 162 | 48 | | 31 | 12 | 611 | 4,025 |
| Others | 115,937 | 76,053 | 81,200 | 69,201 | 34,138 | 14,943 | 4,213 | 9,896 | 9,354 | 4,165 | 5,417 | 1,399 | 3,312 | 3,264 | 2,986 | 163,380 |
| **Total families** | **504,621** | **366,860** | **330,223** | **310,065** | **172,115** | **94,918** | **74,705** | **53,867** | **35,337** | **30,868** | **29,194** | **24,614** | **16,075** | **11,682** | **11,400** | **801,686** |

Note: The patent family dataset includes only published patent applications. “Patent family” is defined as a set of patent applications interlinked by – or by a combination of – priority claim, PCT national phase entry, continuation, continuation-in-part, addition or division. “Foreign-oriented patent family” is defined as a patent family having at least one filing office that is different from the patent office of the first-named applicant’s country of origin.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

# A.5

## Patents by field of technology

Patent applications span a wide range of technologies. Furthermore, the tendency to file patent applications differs across technologies, as some technologies depend more heavily on the patent system than do others. In order to understand activity patterns and trends across technologies, this section presents data by field of technology.

Every patent application is assigned one or more International Patent Classification (IPC) symbols in offices that use the IPC. WIPO has developed a concordance table to link these IPC symbols to corresponding field(s) of technology (see *www.wipo.int/ipstats/en*). The data presented here are based on this concordance table. Where a patent application relates to multiple fields of technology, it is divided into equal shares, each representing one field of technology (so-called "fractional counting"). Applications with no IPC symbol are not considered. All data reported in this subsection relate to published patent applications. There is a minimum delay of 18 months between the application date and the publication date. For this reason, 2011 is the latest available year for which statistics on patents by technology field are available.

Table A.5.1 shows the number of published patent applications worldwide by field of technology.[10] In 2011, computer technology (134,272) and electrical machinery (122,697) accounted for the largest numbers of applications. These top two fields accounted for 14.8% of total published applications in 2011, which is considerably higher than their share in 1995 (10.3%).

The majority of fields experienced growth in applications, with food chemistry (+9.2%) and digital communication (+8.4%) exhibiting some of the highest average annual growth rates between 2007 and 2011.[11] Applications in the fields of telecommunications, optics and audio-visual technology dropped sharply over the same period.

10 Approximately 7% of total published applications were missing IPC codes. Therefore, they could not be allocated to fields of technology.

11 The micro-structural and nano-technology field showed the second highest growth (8.6%) in 2011, but accounted for only a small number of applications.

## Table A.5.1 Patent applications worldwide by field of technology

| Field of technology | Publication year | | | | | Growth rate |
|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2007-11 (%) |
| **Electrical engineering** | | | | | | |
| Electrical machinery, apparatus, energy | 101,013 | 105,591 | 111,876 | 116,009 | 122,697 | 5.0 |
| Audio-visual technology | 92,978 | 91,258 | 85,411 | 80,607 | 75,881 | -5.0 |
| Telecommunications | 68,915 | 69,804 | 60,808 | 56,417 | 49,533 | -7.9 |
| Digital communication | 57,696 | 64,237 | 69,191 | 74,389 | 79,726 | 8.4 |
| Basic communication processes | 17,208 | 17,734 | 17,164 | 16,515 | 15,554 | -2.5 |
| Computer technology | 123,504 | 134,493 | 133,072 | 130,052 | 134,272 | 2.1 |
| IT methods for management | 19,370 | 21,684 | 25,022 | 23,261 | 23,532 | 5.0 |
| Semiconductors | 76,617 | 81,238 | 78,685 | 77,547 | 80,049 | 1.1 |
| **Instruments** | | | | | | |
| Optics | 75,328 | 74,435 | 69,346 | 64,099 | 61,438 | -5.0 |
| Measurement | 65,895 | 71,762 | 76,263 | 76,742 | 76,730 | 3.9 |
| Analysis of biological materials | 11,218 | 11,345 | 11,778 | 11,390 | 11,694 | 1.0 |
| Control | 27,357 | 28,617 | 29,024 | 28,662 | 27,635 | 0.3 |
| Medical technology | 74,172 | 77,069 | 77,741 | 77,466 | 78,765 | 1.5 |
| **Chemistry** | | | | | | |
| Organic fine chemistry | 52,609 | 53,873 | 53,009 | 52,559 | 51,271 | -0.6 |
| Biotechnology | 33,929 | 35,654 | 37,652 | 38,423 | 40,849 | 4.7 |
| Pharmaceuticals | 73,345 | 73,769 | 72,126 | 69,258 | 69,311 | -1.4 |
| Macromolecular chemistry, polymers | 27,627 | 28,345 | 28,800 | 28,683 | 28,748 | 1.0 |
| Food chemistry | 21,690 | 23,582 | 27,245 | 27,889 | 30,858 | 9.2 |
| Basic materials chemistry | 38,920 | 41,085 | 42,322 | 43,795 | 45,115 | 3.8 |
| Materials, metallurgy | 30,200 | 33,775 | 34,968 | 36,988 | 38,542 | 6.3 |
| Surface technology, coating | 29,348 | 30,732 | 32,792 | 33,215 | 33,954 | 3.7 |
| Micro-structural and nano-technology | 2,302 | 2,478 | 2,829 | 3,094 | 3,203 | 8.6 |
| Chemical engineering | 33,263 | 35,087 | 35,766 | 36,618 | 37,991 | 3.4 |
| Environmental technology | 21,688 | 22,605 | 24,333 | 25,572 | 26,324 | 5.0 |
| **Mechanical engineering** | | | | | | |
| Handling | 42,764 | 42,783 | 42,764 | 42,414 | 44,344 | 0.9 |
| Machine tools | 36,607 | 38,315 | 40,585 | 43,242 | 46,363 | 6.1 |
| Engines, pumps, turbines | 41,891 | 43,573 | 48,156 | 48,372 | 48,423 | 3.7 |
| Textile and paper machines | 35,815 | 33,681 | 32,251 | 30,633 | 30,364 | -4.0 |
| Other special machines | 44,008 | 45,912 | 47,541 | 49,011 | 50,981 | 3.7 |
| Thermal processes and apparatus | 25,280 | 25,699 | 27,259 | 29,382 | 29,855 | 4.2 |
| Mechanical elements | 43,957 | 47,513 | 47,286 | 46,405 | 46,913 | 1.6 |
| Transport | 65,237 | 67,717 | 70,542 | 67,015 | 65,439 | 0.1 |
| **Other fields** | | | | | | |
| Furniture, games | 44,201 | 44,837 | 43,666 | 42,564 | 42,031 | -1.3 |
| Other consumer goods | 31,831 | 31,974 | 32,119 | 32,172 | 33,306 | 1.1 |
| Civil engineering | 52,704 | 52,495 | 54,835 | 56,067 | 57,414 | 2.2 |

Note: The IPC-technology concordance table (available at: *www.wipo.int/ipstats/en*) was used to convert IPC symbols into 35 corresponding fields of technology. The data refer to published patent applications.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

## Table A.5.2 Patent applications by field of technology and for the top origins, 2007-2011

| Origin | Field of technology | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Australia | Canada | China | Finland | France | Germany | Italy | Japan | Netherlands | Republic of Korea | Russian Federation | Sweden | Switzerland | United Kingdom | United States of America | Others |
| **Electrical engineering** | | | | | | | | | | | | | | | | |
| Electrical machinery, apparatus, energy | 1,091 | 3,814 | 42,219 | 1,960 | 17,004 | 61,905 | 4,766 | 197,827 | 9,567 | 61,109 | 4,067 | 2,445 | 8,865 | 8,307 | 82,461 | 20,060 |
| Audio-visual technology | 912 | 2,771 | 25,561 | 2,441 | 12,583 | 14,462 | 904 | 179,123 | 12,840 | 65,266 | 870 | 2,976 | 2,522 | 4,742 | 57,935 | 11,774 |
| Telecommunications | 889 | 5,074 | 29,704 | 6,049 | 9,406 | 11,010 | 1,164 | 88,238 | 3,809 | 49,319 | 1,378 | 9,255 | 1,304 | 4,447 | 67,291 | 7,930 |
| Digital communication | 631 | 9,449 | 72,161 | 12,196 | 16,215 | 14,332 | 1,629 | 54,972 | 5,752 | 35,513 | 450 | 17,069 | 1,596 | 5,782 | 88,706 | 7,694 |
| Basic communication processes | 96 | 910 | 4,367 | 636 | 2,775 | 5,228 | 341 | 26,542 | 2,532 | 7,450 | 967 | 1,199 | 748 | 1,326 | 21,004 | 3,284 |
| Computer technology | 2,920 | 10,417 | 45,047 | 6,572 | 15,946 | 26,782 | 2,208 | 160,422 | 11,819 | 60,955 | 1,519 | 6,410 | 4,359 | 10,327 | 231,206 | 21,514 |
| IT methods for management | 1,267 | 2,149 | 4,454 | 657 | 1,881 | 3,213 | 382 | 17,336 | 764 | 20,015 | 306 | 753 | 1,126 | 2,066 | 44,905 | 5,022 |
| Semiconductors | 454 | 839 | 16,275 | 500 | 6,644 | 20,779 | 1,148 | 153,940 | 7,105 | 75,733 | 828 | 574 | 1,587 | 2,246 | 67,591 | 8,964 |
| **Instruments** | | | | | | | | | | | | | | | | |
| Optics | 688 | 1,195 | 15,372 | 609 | 5,614 | 13,964 | 975 | 185,947 | 7,593 | 42,440 | 894 | 1,060 | 1,936 | 3,041 | 39,464 | 6,376 |
| Measurement | 1,835 | 3,979 | 37,530 | 2,031 | 14,023 | 45,541 | 3,214 | 97,013 | 9,976 | 20,510 | 8,247 | 3,616 | 11,337 | 9,570 | 74,063 | 17,627 |
| Analysis of biological materials | 695 | 1,094 | 3,596 | 347 | 2,975 | 5,624 | 625 | 7,649 | 1,535 | 2,523 | 1,947 | 1,083 | 2,427 | 2,769 | 19,921 | 5,259 |
| Control | 1,092 | 1,592 | 12,432 | 581 | 4,605 | 15,000 | 1,637 | 37,437 | 1,957 | 10,135 | 1,647 | 1,365 | 2,370 | 3,514 | 33,085 | 7,644 |
| Medical technology | 4,558 | 4,584 | 13,394 | 1,036 | 11,413 | 36,343 | 4,989 | 54,919 | 9,809 | 15,918 | 9,496 | 7,048 | 16,787 | 11,722 | 156,990 | 32,418 |
| **Chemistry** | | | | | | | | | | | | | | | | |
| Organic fine chemistry | 1,164 | 2,798 | 18,900 | 539 | 20,317 | 38,897 | 4,436 | 38,136 | 6,148 | 10,424 | 2,185 | 5,375 | 17,365 | 12,314 | 75,204 | 30,237 |
| Biotechnology | 2,592 | 3,432 | 17,402 | 804 | 8,107 | 16,915 | 2,306 | 20,814 | 5,500 | 9,165 | 1,822 | 1,765 | 7,316 | 7,058 | 67,521 | 21,840 |
| Pharmaceuticals | 3,647 | 6,297 | 38,194 | 958 | 18,328 | 31,204 | 7,370 | 28,798 | 6,362 | 10,514 | 5,692 | 7,748 | 23,615 | 15,563 | 123,173 | 50,208 |
| Macromolecular chemistry, polymers | 382 | 816 | 11,135 | 2,173 | 4,439 | 20,009 | 2,446 | 45,323 | 4,576 | 7,906 | 935 | 325 | 3,439 | 1,714 | 31,810 | 7,538 |
| Food chemistry | 875 | 1,122 | 19,191 | 428 | 2,595 | 5,330 | 1,070 | 13,272 | 6,409 | 12,111 | 17,015 | 337 | 4,744 | 2,464 | 19,963 | 11,149 |
| Basic materials chemistry | 1,002 | 1,992 | 24,266 | 901 | 6,012 | 35,527 | 1,536 | 42,724 | 7,038 | 11,113 | 3,343 | 690 | 6,970 | 6,340 | 51,100 | 13,535 |
| Materials, metallurgy | 1,697 | 1,569 | 30,285 | 1,729 | 6,697 | 17,150 | 1,480 | 43,685 | 1,846 | 12,235 | 8,359 | 1,514 | 2,186 | 2,422 | 20,753 | 12,182 |
| Surface technology, coating | 670 | 1,386 | 11,959 | 1,185 | 4,907 | 15,954 | 1,642 | 52,591 | 1,933 | 10,246 | 1,779 | 1,200 | 2,604 | 2,498 | 36,858 | 7,336 |
| Micro-structural and nano-technology | 116 | 96 | 1,710 | 124 | 606 | 1,371 | 94 | 2,405 | 254 | 2,579 | 587 | 134 | 153 | 158 | 2,486 | 683 |
| Chemical engineering | 1,479 | 2,235 | 16,952 | 1,840 | 7,352 | 25,809 | 2,846 | 32,504 | 4,788 | 13,354 | 4,426 | 2,422 | 4,287 | 5,490 | 40,121 | 13,512 |
| Environmental technology | 762 | 1,514 | 13,620 | 855 | 5,042 | 13,594 | 1,481 | 27,259 | 2,533 | 12,888 | 2,303 | 1,116 | 1,765 | 2,719 | 20,263 | 8,002 |
| **Mechanical engineering** | | | | | | | | | | | | | | | | |
| Handling | 1,797 | 2,408 | 9,631 | 2,806 | 8,760 | 28,312 | 7,386 | 57,829 | 4,521 | 12,958 | 1,664 | 2,352 | 10,832 | 5,998 | 42,214 | 15,734 |
| Machine tools | 1,077 | 1,962 | 19,041 | 977 | 5,633 | 34,126 | 3,830 | 47,492 | 1,507 | 14,407 | 4,251 | 3,640 | 3,590 | 2,958 | 34,039 | 11,867 |
| Engines, pumps, turbines | 1,088 | 2,608 | 12,220 | 587 | 13,365 | 45,511 | 3,158 | 67,102 | 1,390 | 14,451 | 4,935 | 2,546 | 3,338 | 6,053 | 41,745 | 15,425 |
| Textile and paper machines | 2,469 | 613 | 10,516 | 2,764 | 3,018 | 20,824 | 2,643 | 69,579 | 2,369 | 8,618 | 637 | 1,013 | 4,453 | 2,065 | 21,310 | 6,620 |
| Other special machines | 1,945 | 4,010 | 18,176 | 1,474 | 9,894 | 29,522 | 5,623 | 51,267 | 5,897 | 18,865 | 6,705 | 2,578 | 4,611 | 4,813 | 43,166 | 19,475 |
| Thermal processes and apparatus | 786 | 1,391 | 15,072 | 999 | 4,560 | 16,775 | 2,801 | 36,403 | 1,569 | 18,904 | 2,358 | 1,763 | 2,087 | 2,213 | 16,026 | 10,488 |
| Mechanical elements | 1,570 | 2,153 | 13,024 | 826 | 10,531 | 55,018 | 4,082 | 60,806 | 2,280 | 13,535 | 3,314 | 4,280 | 3,326 | 5,830 | 41,299 | 13,114 |
| Transport | 1,460 | 3,683 | 13,686 | 807 | 27,909 | 72,762 | 5,980 | 95,703 | 3,153 | 32,986 | 4,663 | 6,594 | 2,861 | 6,782 | 49,750 | 17,211 |
| **Other fields** | | | | | | | | | | | | | | | | |
| Furniture, games | 2,601 | 2,885 | 10,631 | 396 | 5,976 | 15,876 | 4,310 | 49,227 | 3,346 | 20,680 | 1,070 | 1,982 | 4,159 | 6,863 | 45,442 | 14,695 |
| Other consumer goods | 1,335 | 1,773 | 10,968 | 416 | 6,878 | 18,753 | 3,944 | 29,623 | 2,220 | 25,420 | 2,035 | 1,199 | 4,533 | 5,489 | 30,029 | 12,701 |
| Civil engineering | 3,943 | 6,582 | 22,049 | 1,924 | 11,532 | 29,818 | 5,638 | 39,426 | 6,981 | 33,014 | 7,908 | 3,991 | 3,730 | 9,597 | 48,726 | 28,220 |

Note: The IPC-technology concordance table (available at: *www.wipo.int/ipstats/en*) was used to convert IPC symbols into 35 corresponding fields of technology. The data refer to published patent applications.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

The aggregate data reported in Table A.5.1 provide an overview of applications by field of technology. However, they do not provide any insight into the innovative strength of countries in relation to different technology fields. Table A.5.2 reports patent application data by field of technology for the top origins, thereby showing how they differ across origins. For example, digital communications accounted for the largest share of total applications for China, Finland and Sweden – one-fifth of all applications from Finland belong to this field. China and Finland also exhibit large numbers of applications in the computer technology field. Computer technology accounted for the largest share of applications originating in Canada and the US. Switzerland and the UK tended to file large numbers of applications for pharmaceuticals. In the case of France and Germany, transport accounted for the largest share of total applications. Japan filed the largest number of applications in electrical machinery, while for the Netherlands, audio-visual technology accounted for the largest share.

Patent applications originating in Finland, the Russian Federation, Sweden and Switzerland are concentrated in a just a few fields, while applications originating in France, Germany, Italy, the Netherlands and the UK are spread across a wide range of fields. The combined share of the top five fields for each origin (top five fields vary across origins) ranged from 49.7% for Finland to 31.8% for France and the UK.

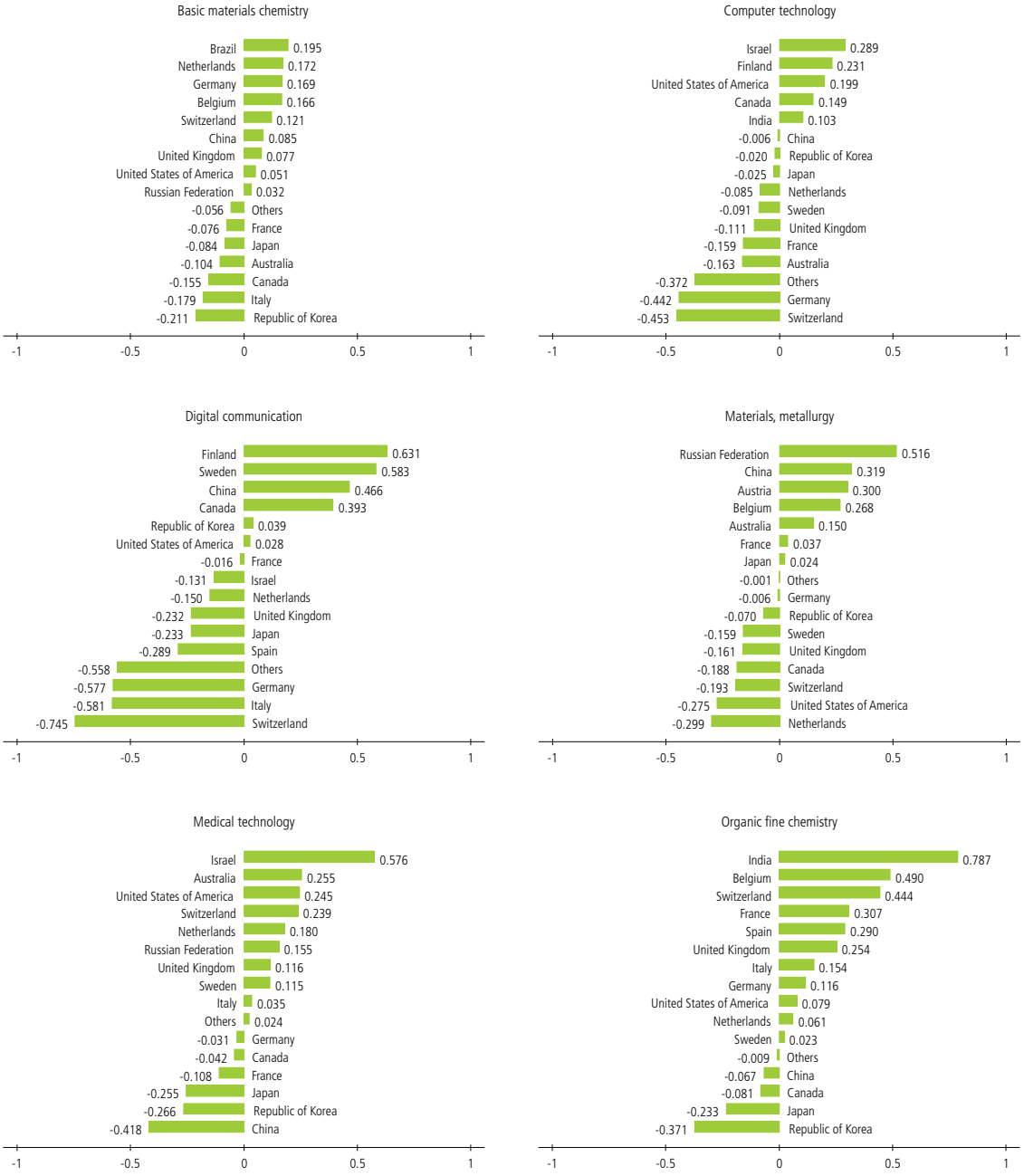
Another way to measure innovative strength is to calculate a country's relative specialization index (RSI). The RSI corrects for the effects of country size and focuses on the concentration in specific technology fields; in particular, it seeks to capture whether a given country tends to have a lower or a higher propensity to file in certain technology fields. The RSI is calculated using the following formula:

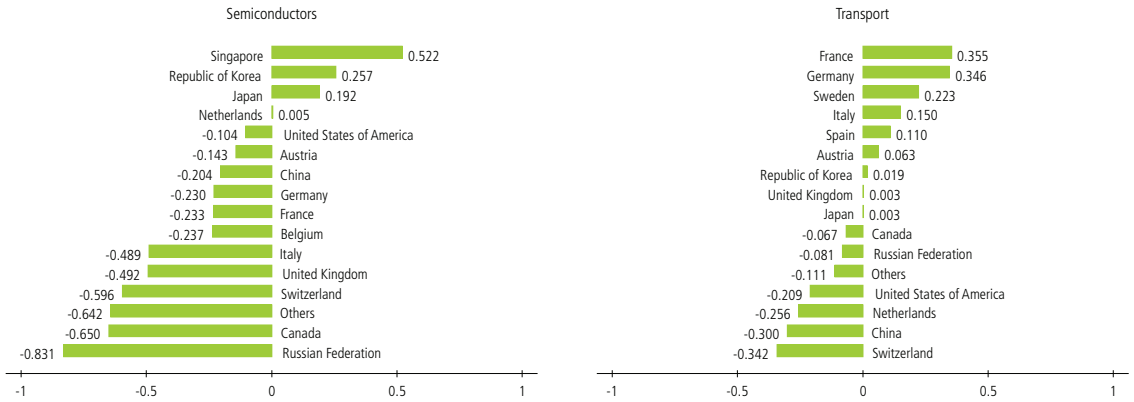
$$RSI = Log\left(\frac{F_{CT}\sum F_{CT}}{\sum F_C \sum F_T}\right)$$

whereby FC and FT denote applications from country C and in technological field T, respectively.

A positive RSI value for a technology indicates that a particular country has a relatively high share of patent filings related to that field of technology. Figure A.5.3 shows the 2011 RSI for selected fields of technology. It shows that RSI values differ across origins and technology. Brazil, the Netherlands, Germany, Belgium and Switzerland have a high concentration of applications in basic materials chemistry. Israel had the highest RSI value for computer technology and medical technology. Austria, Belgium, China and the Russian Federation have an above-average concentration of applications in materials, metallurgy technology. European countries such as France, Germany, Sweden, Italy and Spain have higher shares of applications in transport-related technology. Japan, the Republic of Korea and Singapore have the highest RSI value for semiconductors. The majority of the reported origins have positive RSI values for organic fine chemistry, with India showing the highest value. The distribution of RSI value differs across technology. RSI values for digital communications and semiconductors are skewed toward just a few origins, whereas RSI values for basic materials chemistry and materials metallurgy are more evenly distributed.

## Figure A.5.3 Relative specialization index for patent applications for selected fields of technology, 2011

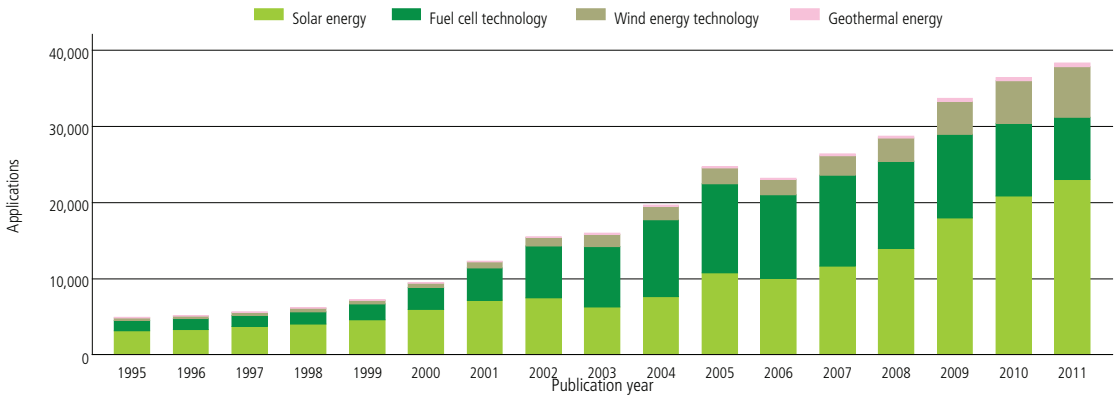





Note: The IPC-technology concordance table (available at: *www.wipo.int/ipstats/en*) was used to convert IPC symbols into 35 corresponding fields of technology. The data refer to published patent applications.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

## Figure A.5.4 Trend in patent applications in energy-related technologies




Note: For definitions of the technologies, refer to Annex A.

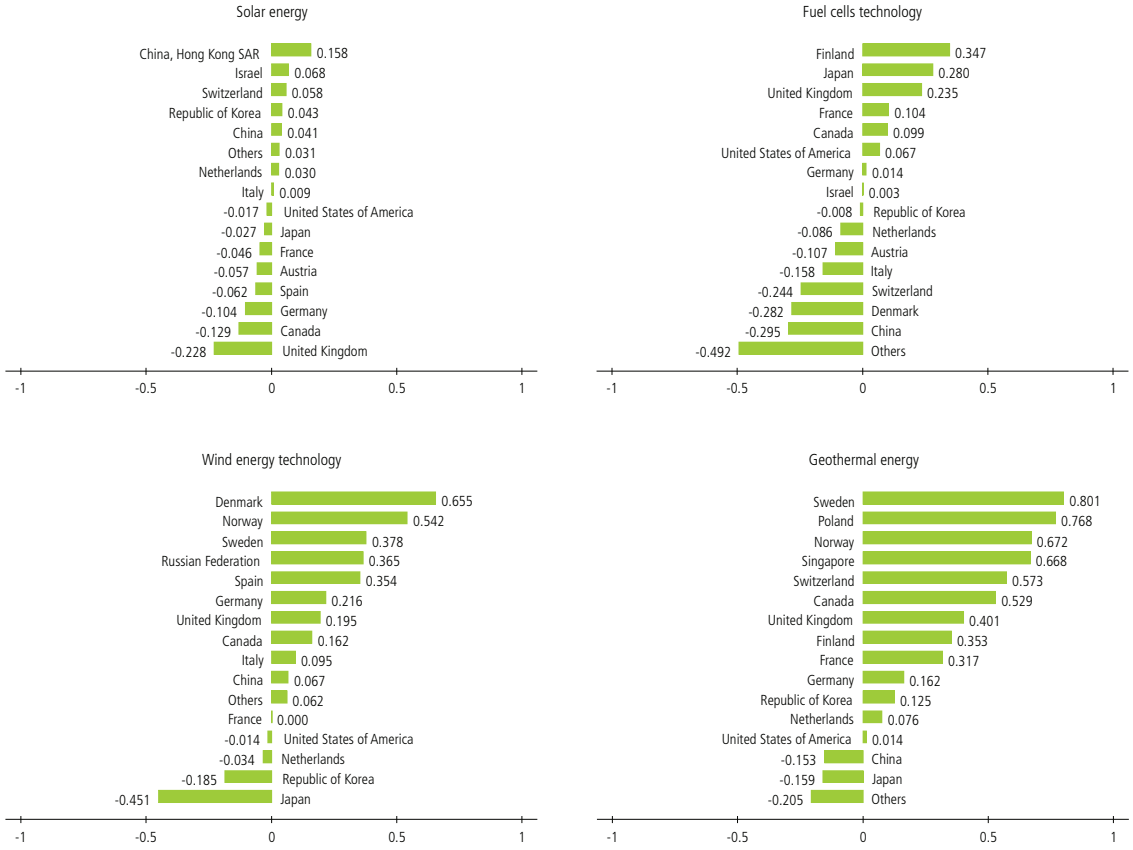
Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

The development of energy-related technologies, such as those associated with renewable energy, plays an important role in tackling climate change. Figures A.5.4 and A.5.5 present patent application data for selected energy-related technologies – namely, fuel cells, geothermal, solar and wind energy. Annex A provides definitions of these technologies according to IPC symbols.[12]

The total number of patent applications in the four energy-related fields grew continuously between 1995 and 2011, with the exception of 2006, when a small decrease was recorded. Since the early 2000s, the numbers of applications related to solar energy and wind energy have followed an upward trend, while those for fuel cell technology grew until 2007, after which a continuous downward trend insued.

12 The correspondence between IPC symbols and technology fields is not always clear-cut (i.e., there is no one-to-one relationship). It is therefore difficult to capture all patents in a specific technology field. Nonetheless, the IPC-based definitions of the four energy-related technologies employed here are likely to capture the vast majority of patent applications in these areas.

**Figure A.5.5 Relative specialization index for patent applications in selected energy-related technologies for the top origins, 2011**




Note: For definitions of the technologies, refer to Annex A.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

In 2011, the total number of patent applications for these four categories amounted to approximately 38,300, representing a 5.3% increase on 2010. Applications related to solar energy accounted for the largest share (60%), followed by fuel cell technology (21.2%) and wind energy (17.4%). The number of geothermal energy-related patent applications was low.

Figure A.5.5 presents the RSI values in each of the four energy-related technology fields for the top origins. China Hong Kong (SAR), Israel and Switzerland each show a high concentration of applications in the solar energy technology field. Finland, Japan and the UK have an above average concentration of applications in the fuel cell technology field. The majority of the reported origins have a positive RSI value in both wind energy and geothermal energy, with Denmark and Norway showing the highest value in wind energy, and Sweden and Poland having the highest value in geothermal energy.

# A.6

## PATENT APPLICATIONS FILED THROUGH THE PATENT COOPERATION TREATY (PCT) SYSTEM

The PCT, an international treaty administered by WIPO, offers applicants an advantageous route for additional or seeking patent protection internationally. It serves as an additional or alternative route to the Paris Convention for the Protection of Industrial Property (the Paris Convention) for pursuing the acquisition of patent rights in different countries. The main advantages of the PCT system are that applicants and patent offices of PCT contracting states benefit from uniform formality requirements, international search, optional supplementary international search and preliminary examination reports, and centralized international publication. This can lead to time and cost savings for applicants. The PCT, which had only 18 members in 1978, had 146 members in 2012.

The PCT application data presented in section A.6.1 refer to the international phase of the PCT procedure, while the data presented in A.6.2 refer to PCT national phase entries.

### A.6.1 PCT applications

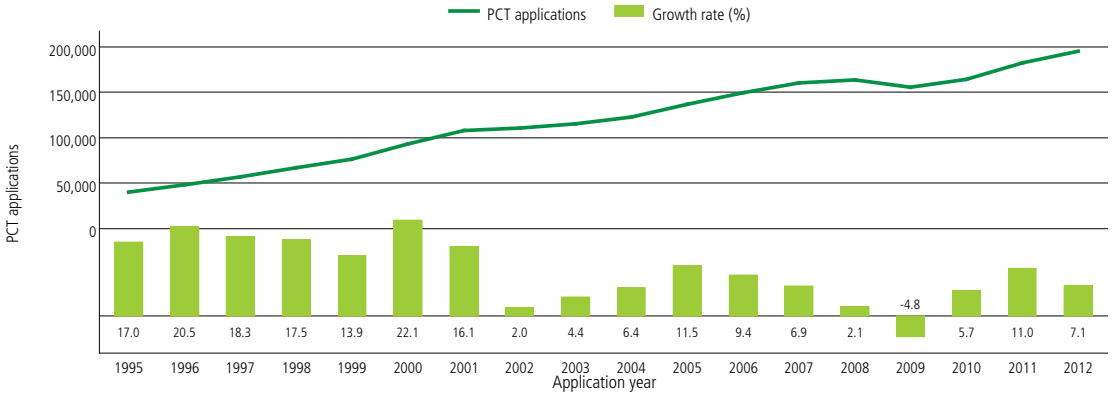
After the decrease in the number of PCT applications witnessed in 2009, filing activity has since rebounded strongly, with 5.7%, 11% and 7.1% growth in 2010, 2011 and 2012, respectively (Figure A.6.1.1).[13] Between 2010 and 2012, the number of PCT applications grew by 30,968, for which Japan was responsible for 37% of the total increase, while China and the US accounted for 21% each.

In 2012, a total of 195,308 applications were filed under the PCT system, which is more than double that recorded in 2000. The long-term trend shows that the number of PCT applications grew at double-digit rates between 1995 and 2001, followed by a slowdown in growth between 2002 and 2004.

Figure A.6.1.2 describes the trend in PCT filings for the top five origins. In 2012, the US, with 51,643 filings remained the largest user of the PCT system. However, its share of total PCT applications has decreased since the mid-1990s, while Japan saw considerable increases in its share over the same period. China has also increased its share of the world total since the mid-2000s. The combined share of the top five origins increased from 63.3% in 1995 to 74% in 2012. The concentration in filings among the top five origins was, in 2012, the highest recorded over the past two decades.

13 Since the PCT system was established, 2009 was the only year which saw a decrease in the number of applications.

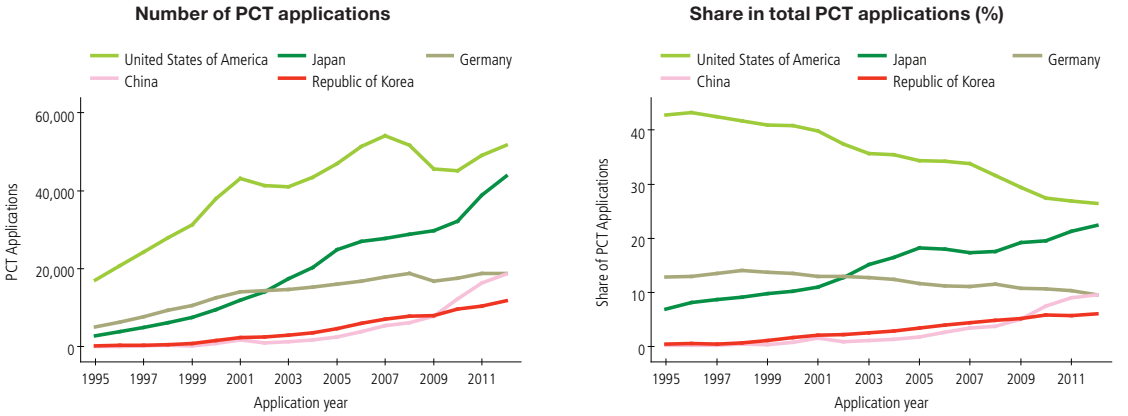
## Figure A.6.1.1 Trend in PCT applications




Note: Data refer to the international phase of the PCT system. Counts are based on the international application date.

Source: WIPO Statistics Database, October 2013

## Figure A.6.1.2 Trend in PCT applications for the top five origins




Note: Data refer to the international phase of the PCT system. Counts are based on the residency of the first-named applicant and the international application date.

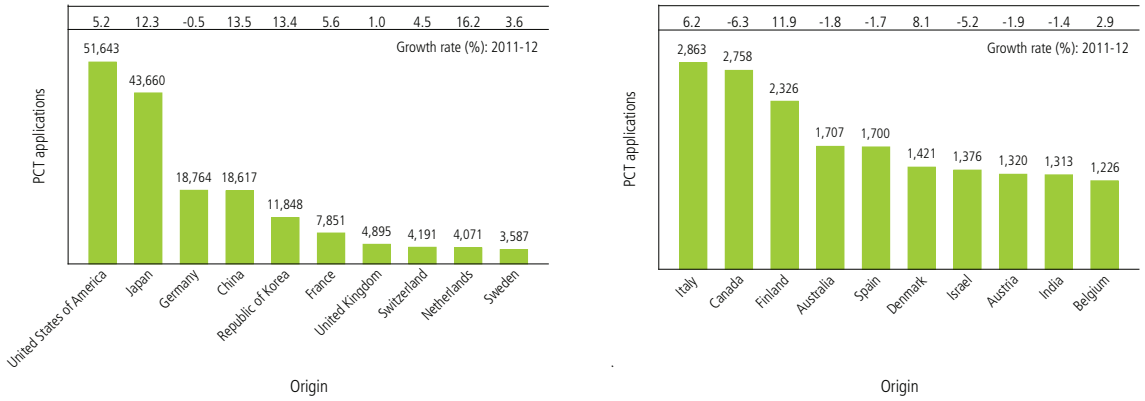
Source: WIPO Statistics Database, October 2013

The list of top 20 origins consists mostly of high-income countries – China and India being the exceptions (Figure A.6.1.3).[14] The order of ranking in 2012 is similar to that of 2011. The US, with 51,643 applications, was the largest user of the PCT system in 2012, followed by Japan (43,660), Germany (18,764) and China (18,617). The numbers of applications originating in the US have returned to their pre-economic crisis levels. The US and Japan each had more than twice as many applications as Germany or China.

For the top 20 origins, the Netherlands (+16.2%) saw the fastest growth in applications in 2012 after having witnessed two consecutive years of decline from 2009 to 2011. China, Finland, Japan and the Republic of Korea also saw double-digit growth. The 13.5% increase in applications experienced by China represents a significantly slower growth rate when compared with its previous three year-on-year growth rates. A number of origins saw decreases in PCT applications in 2012, most notably Canada (-6.3%) and Israel (-5.2%).

14 The share of high-income countries in total PCT applications was approximately 88% in 2012.

**Figure A.6.1.3 PCT applications for the top 20 origins, 2012**




Note: Data refer to the international phase of the PCT system. Counts are based on the residency of the first-named applicant and the international application date.

Source: WIPO Statistics Database, October 2013

Table A.6.1.4 lists the top 50 PCT applicants based on the residency of the first-named applicant and on the publication date of the application. It shows that ZTE Corporation of China remained the top applicant in 2012, with 3,906 published applications, followed by Panasonic Corporation (2,951) and Sharp Kabushiki (2,001) - the two other applicants with more than 2,000 published applications. Between 2010 and 2012, applications from ZTE Corporation increased twofold. Most of the top applicants reported growth in published applications in 2012 compared to 2011. The top two applicants also reported the strongest increases in published applications, with an additional 1,080 and 488 more applications, respectively. Of the countries on the top 50 list, Japan, with 20 different applicants had the most.

### A.6.2 PCT national phase entries

The PCT application process begins with the international phase and concludes with the national phase. The national or regional patent office at which the applicant enters the PCT national phase initiates the granting procedure according to prevailing national law. PCT national phase entry (NPE) statistics shed light on international patenting strategies. The NPE data presented here refer only to non-resident applications. In other words, resident application data for the national phase are excluded. For example, if a PCT application filed by a resident of China enters the national phase procedure at SIPO, it is excluded from the statistics reported here.

In 2012, the number of non-resident PCT NPEs was estimated at around 458,800, representing a 6.2% increase on 2011 (Figure A.6.2.1).[15] The growth in non-resident NPEs at the USPTO and SIPO accounted for 60% of the growth in NPEs worldwide. Although not shown in the graph, the USPTO was the most preferred office by destination in 2012, receiving 20% of all non-resident PCT NPEs, followed by SIPO (14.7%) and the EPO (10.7%).

15 The total number of PCT NPEs in 2012 was estimated at approximately 540,200 and comprised 15% resident NPEs and 85% non-resident NPEs.

The long-term trend shows strong year-on-year growth in non-resident NPEs for all years except 2003 and 2009. Growth in NPEs partly reflects the increasing trend of protecting inventions abroad as well as increasing PCT membership, which has made the PCT system more attractive to its users.

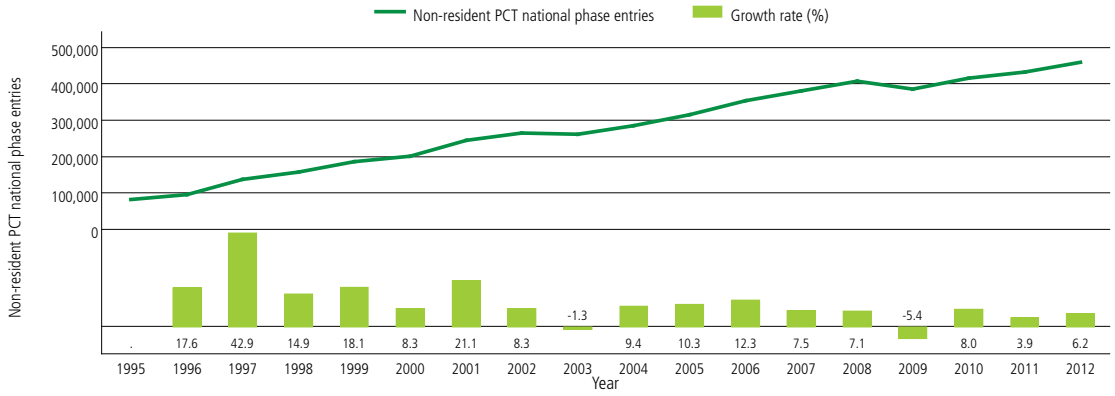
### Table A.6.1.4 Top PCT applicants

| Ranking | Applicant's name | Origin | PCT applications | | | Change compared to 2011 |
|---|---|---|---|---|---|---|
| | | | 2010 | 2011 | 2012 | |
| 1 | ZTE CORPORATION | China | 1,868 | 2,826 | 3,906 | 1,080 |
| 2 | PANASONIC CORPORATION | Japan | 2,153 | 2,463 | 2,951 | 488 |
| 3 | SHARP KABUSHIKI KAISHA | Japan | 1,286 | 1,755 | 2,001 | 246 |
| 4 | HUAWEI TECHNOLOGIES CO., LTD. | China | 1,527 | 1,831 | 1,801 | -30 |
| 5 | ROBERT BOSCH CORPORATION | Germany | 1,302 | 1,518 | 1,775 | 257 |
| 6 | TOYOTA JIDOSHA KABUSHIKI KAISHA | Japan | 1,095 | 1,417 | 1,652 | 235 |
| 7 | QUALCOMM INCORPORATED | United States of America | 1,675 | 1,494 | 1,305 | -189 |
| 8 | SIEMENS AKTIENGESELLSCHAFT | Germany | 830 | 1,039 | 1,272 | 233 |
| 9 | KONINKLIJKE PHILIPS ELECTRONICS N.V. | Netherlands | 1,433 | 1,148 | 1,230 | 82 |
| 10 | TELEFONAKTIEBOLAGET LM ERICSSON (PUBL) | Sweden | 1,147 | 1,116 | 1,197 | 81 |
| 11 | LG ELECTRONICS INC. | Republic of Korea | 1,297 | 1,336 | 1,094 | -242 |
| 12 | MITSUBISHI ELECTRIC CORPORATION | Japan | 726 | 834 | 1,042 | 208 |
| 13 | NEC CORPORATION | Japan | 1,106 | 1,056 | 999 | -57 |
| 14 | FUJIFILM CORPORATION | Japan | 275 | 414 | 891 | 477 |
| 15 | HITACHI, LTD. | Japan | 372 | 547 | 745 | 198 |
| 16 | SAMSUNG ELECTRONICS CO., LTD. | Republic of Korea | 574 | 757 | 683 | -74 |
| 17 | FUJITSU LIMITED | Japan | 475 | 494 | 671 | 177 |
| 18 | NOKIA CORPORATION | Finland | 632 | 698 | 670 | -28 |
| 19 | BASF SE | Germany | 817 | 773 | 644 | -129 |
| 20 | INTEL CORPORATION | United States of America | 201 | 309 | 640 | 331 |
| 21 | HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P. | United States of America | 564 | 591 | 620 | 29 |
| 22 | 3M INNOVATIVE PROPERTIES COMPANY | United States of America | 586 | 563 | 586 | 23 |
| 23 | SONY CORPORATION | Japan | 347 | 471 | 578 | 107 |
| 24 | MITSUBISHI HEAVY INDUSTRIES, LTD. | Japan | 391 | 480 | 566 | 86 |
| 25 | SUMITOMO CHEMICAL COMPANY, LIMITED | Japan | 323 | 446 | 558 | 112 |
| 26 | SANYO ELECTRIC CO., LTD. | Japan | 129 | 285 | 537 | 252 |
| 27 | MICROSOFT CORPORATION | United States of America | 470 | 446 | 531 | 85 |
| 28 | INTERNATIONAL BUSINESS MACHINES CORPORATION | United States of America | 416 | 661 | 528 | -133 |
| 29 | CANON KABUSHIKI KAISHA | Japan | 379 | 499 | 480 | -19 |
| 30 | MURATA MANUFACTURING CO., LTD. | Japan | 305 | 318 | 462 | 144 |
| 31 | E.I. DUPONT DE NEMOURS AND COMPANY | United States of America | 452 | 424 | 457 | 33 |
| 32 | BOSCH-SIEMENS HAUSGERATE GMBH | Germany | 371 | 421 | 448 | 27 |
| 33 | GOOGLE, INC. | United States of America | 171 | 224 | 421 | 197 |
| 34 | PROCTER & GAMBLE COMPANY | United States of America | 359 | 488 | 413 | -75 |
| 35 | YAZAKI CORPORATION | Japan | 76 | 205 | 402 | 197 |
| 36 | KABUSHIKI KAISHA TOSHIBA | Japan | 319 | 517 | 397 | -120 |
| 37 | BAKER HUGHES INCORPORATED | United States of America | 307 | 336 | 396 | 60 |
| 38 | COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES | France | 308 | 371 | 391 | 20 |
| 39 | APPLE COMPUTER, INC. | United States of America | 182 | 269 | 388 | 119 |
| 40 | KYOCERA CORPORATION | Japan | 279 | 356 | 353 | -3 |
| 41 | LG CHEM, LTD. | Republic of Korea | 203 | 214 | 352 | 138 |
| 42 | UNIVERSITY OF CALIFORNIA | United States of America | 304 | 277 | 351 | 74 |
| 43 | SCHAEFFLER TECHNOLOGIES AG & CO. KG | Germany | | | 347 | 347 |
| 44 | ALCATEL LUCENT | France | 275 | 287 | 346 | 59 |
| 45 | HONDA MOTOR CO., LTD. | Japan | 309 | 418 | 341 | -77 |
| 46 | NOKIA SIEMENS NETWORKS OY | Finland | 345 | 332 | 326 | -6 |
| 47 | GENERAL ELECTRIC COMPANY | United States of America | 274 | 291 | 320 | 29 |
| 48 | DOW GLOBAL TECHNOLOGIES INC. | United States of America | 288 | 399 | 317 | -82 |
| 49 | NISSAN MOTOR CO., LTD. | Japan | 113 | 174 | 308 | 134 |
| 50 | NITTO DENKO CORPORATION | Japan | 128 | 195 | 306 | 111 |

Note: Data refer to the international phase of the PCT system. Due to confidentiality requirements, counts are based on publication date. Top applicants were selected according to their 2012 totals.

Source: WIPO Statistics Database, October 2013

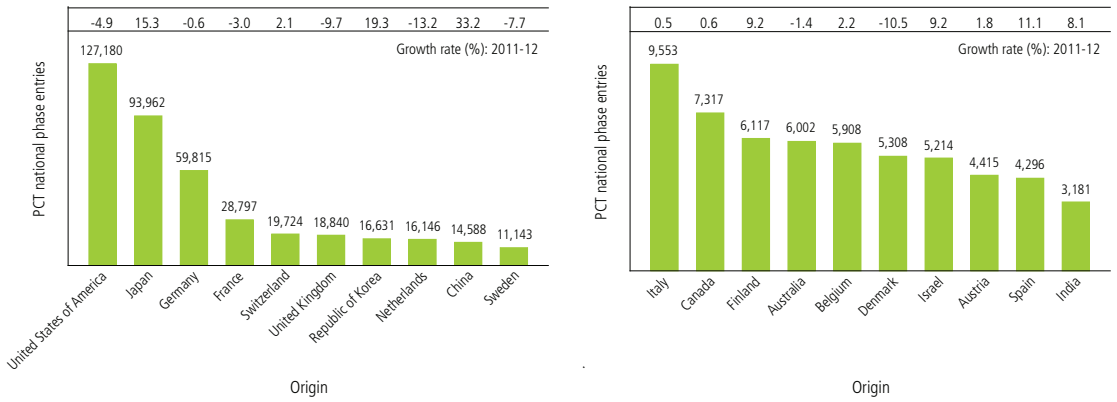
### Figure A.6.2.1 Trend in non-resident PCT national phase entries




Note: Total non-resident NPEs are WIPO estimates covering 90 offices.

Source: WIPO Statistics Database, October 2013

### Figure A.6.2.2 PCT national phase entries abroad for the top 20 origins, 2012



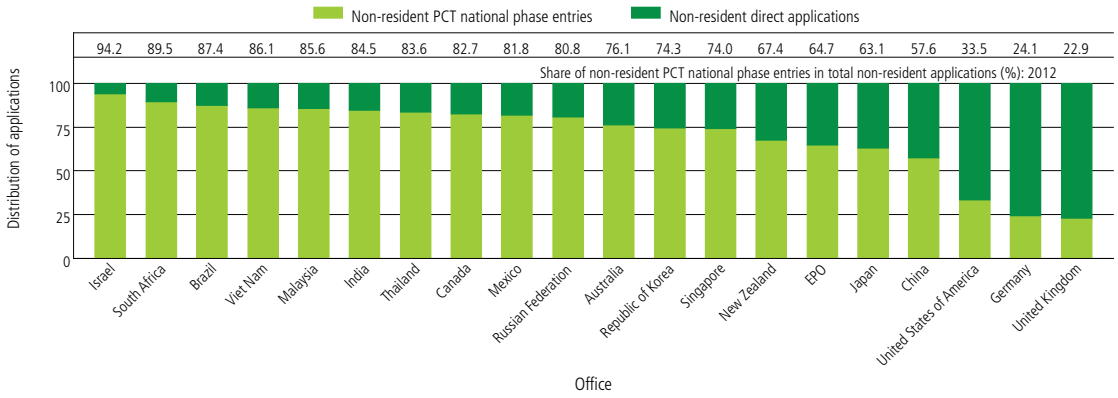

Note: Data refer to the national phase of the PCT system. Counts are based on the first-named applicant.

Source: WIPO Statistics Database, October 2013

Figure A.6.2.2 reports data on PCT NPEs abroad for the top 20 origins. The list of the top 20 origins mainly comprises high-income countries – China and India being the exceptions. The list of the top 20 origins for PCT international applications and PCT NPEs abroad are identical. The US was the largest user of the PCT system, filing 127,180 PCT NPEs in offices other than the USPTO. However, this represents a 4.9% reduction compared to 2011, whereas the consistent growth for Japan appears to be closing the gap between the two largest users of the PCT system.

For the top 20 origins, China (+33.2%) saw the fastest growth in the number of PCT NPEs abroad between 2011 and 2012. This period also saw considerable growth in PCT NPE filings originating in the Republic of Korea (+19.3%) and Japan (+15.3%). The Netherlands (-13.2%) and Denmark (-10.5%) each recorded sharp decreases in the number of filings between 2011 and 2012.

**Figure A.6.2.3 Share of PCT non-resident national phase entries in total non-resident applications for selected offices, 2012**

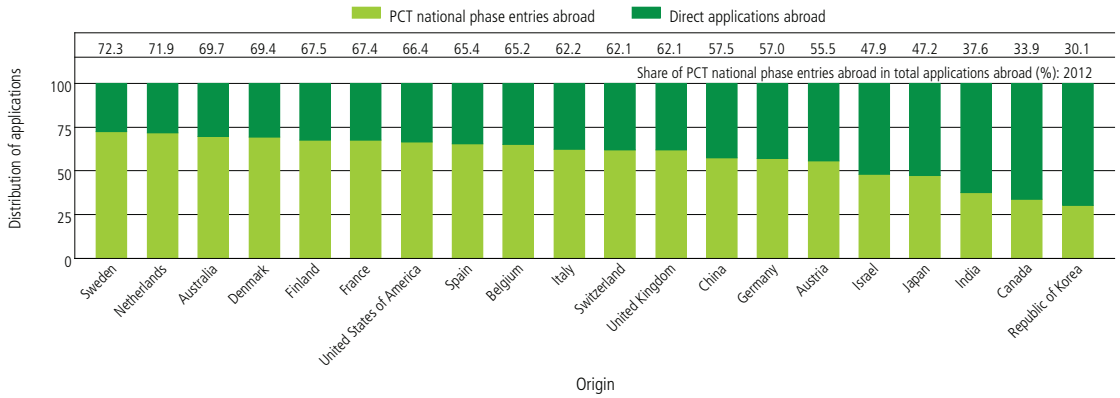



Source: WIPO Statistics Database, October 2013

A patent office may receive patent applications filed either directly (Paris route) with the office or through the PCT system (PCT NPEs). Figure A.6.2.3 shows the distribution of non-resident applications filed at selected offices, and comprises both direct filings and PCT NPEs. At the global level, the share of PCT NPEs in total non-resident applications was approximately 55%, but this share varies across individual offices. Use of the PCT system is popular for filing applications in the patent offices of middle-income countries. For example, the PCT NPE shares at the patent offices of Brazil, Israel, Malaysia, South Africa and Viet Nam were above 85%. In contrast, several offices of high-income countries – Germany (24.1%), the UK (22.9%) and the US (33.5%) – exhibited the lowest PCT NPE shares.

Among the top five offices in terms of PCT NPEs filings (i.e., the EPO, the JPO, KIPO, SIPO and the USPTO), PCT NPEs accounted for the bulk of non-resident applications received by four offices – the USPTO being the exception. In addition, the shares of PCT NPEs at the top five offices have increased over time. For example, at the EPO, the PCT NPE share increased from 50.3% to 64.7% between 2000 and 2012.

**Figure A.6.2.4 PCT non-resident national phase entries abroad in total applications abroad for selected origins, 2012**




Source: WIPO Statistics Database, October 2013

Figure A.6.2.3 provides information on the use of the PCT system from the perspective of the patent office, while Figure A.6.2.4 presents data based on origin. It shows the distribution of total applications abroad for selected origins. Just as the numbers of applications filed varies across patent offices, the same applies to origin data. For the reported origins, the share of PCT NPEs in total applications abroad ranged from 72.3% for Sweden to 30.1% for the Republic of Korea. A third of the reported 20 origins filed more than two-thirds of their applications abroad using the PCT system. Most of the reported origins have increasingly been using the PCT system for filings abroad. For example, the share of PCT NPEs in total filings abroad for China and Japan increased from 37.5% and 33.1% in 2007 to 57.5% and 47.2%, respectively in 2012.

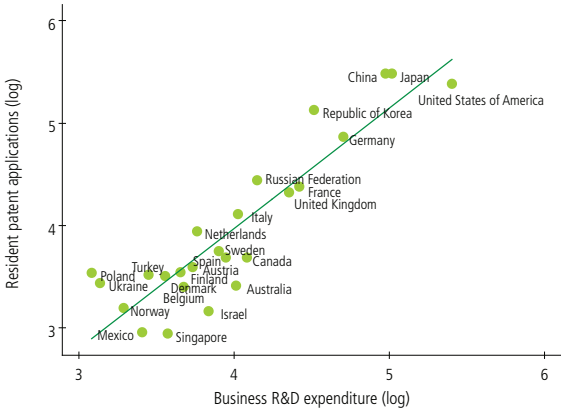
# A.7

## Patents per GDP, R&D expenditure and population

Differences in patent activity across economies reflect both the size and the level of development in those countries. For the purposes of cross-country comparison it is instructive to express the number of resident patent applications relative to GDP, population and research and development (R&D) expenditure.[16] These factors are frequently referred to as "patent activity intensity" indicators.

Figure A.7.1 shows the relationship between R&D expenditure and resident patent applications for the top origins in terms of patent applications. By examining the data highlighted here, one can see that countries with a high R&D expenditure, such as China, Japan, Germany, the Republic of Korea and the US, are also associated with large numbers of resident patent applications.

**Figure A.7.1 Resident patent applications and business sector R&D expenditure, 2007-12**




Note: Business sector R&D expenditure is in constant 2005 purchasing power parity (PPP) US dollars, and R&D data lag by one year in order to derive the patent-to-R&D dollar ratio.

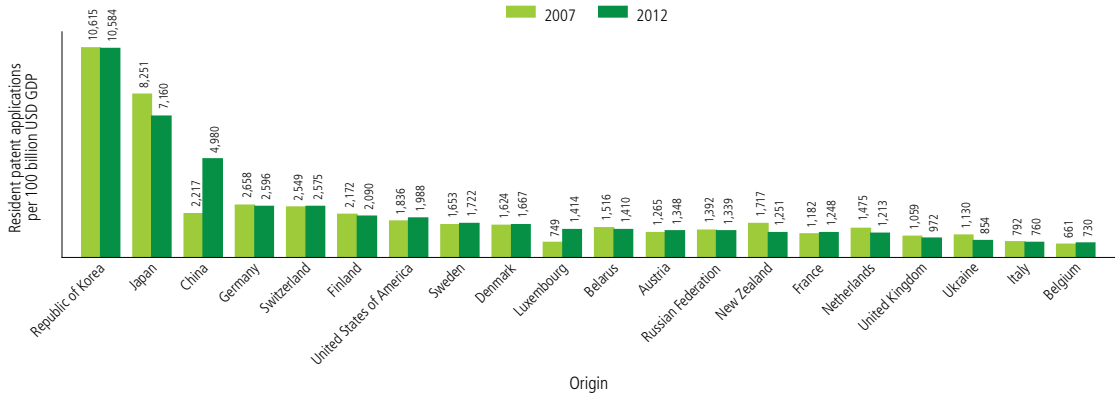
Sources: WIPO Statistics Database and UNESCO Institute for Statistics, October 2013

The global resident patent applications per GDP ratio (2,211) masks considerable variations across origins. For the top 20 origins, the number of resident applications relative to GDP varied from 10,584 for the Republic of Korea to 730 for Belgium (Figure A.7.2).[17] Resident applications-to-GDP ratios for China, Japan and the Republic of Korea are far higher than those for European countries and the US. In 2012, China ranked number one in terms of resident patent applications, but its applications-to-GDP ratio is considerably lower than that of the Republic of Korea. Similarly, the US, which was ranked third for resident patent applications, had a lower resident applications-to-GDP ratio than Finland, Germany and Switzerland. For 11 of the 20 reported origins, applications-to-GDP ratios for 2012 were lower than those for 2007. China, on the other hand, saw its applications-to-GDP ratio more than double from 2,217 in 2007 to 4,980 in 2012. This increase was due to China's resident patent applications growing faster than its GDP. The fall in the applications-to-GDP ratio reported for Japan was mainly due to a decrease in the number of its resident patent applications.

16 GDP and R&D expenditure are in constant 2005 PPP US dollars.

17 The global resident applications-to-GDP ratio is based on data from 110 origins.

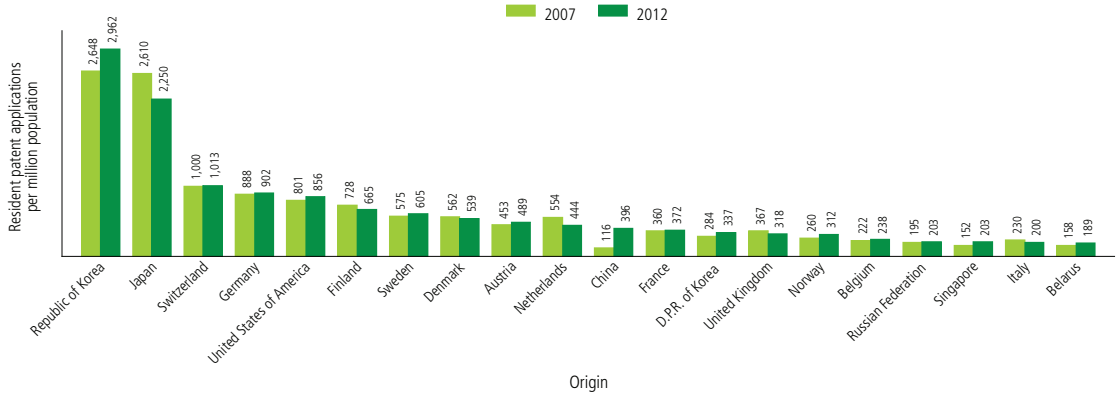
## Figure A.7.2 Resident patent applications per GDP for the top 20 origins




Note: GDP data are in constant 2005 PPP US dollars. For the resident patent-per-GDP indicator, countries were selected if they had a GDP greater than 25 billion PPP US dollars and more than 100 resident patent applications. However, due to space constraints only the top 20 origins that fulfill these criteria are included in the graphs.

Sources: WIPO Statistics Database and World Bank, October 2013

## Figure A.7.3 Resident patent applications per million population for the top 20 origins




Note: For the resident patent applications-per-population indicator, countries of origin were included if they had a population greater than 5 million and if they had more than 100 resident patent applications. However, due to space constraints only the top 20 origins that fulfill these criteria are included in the graphs.

Sources: WIPO Statistics Database and World Bank, October 2013

At the global level, approximately 245 resident patents per million population were filed in 2012. However, for the top 20 origins, the ratio varied from 2,962 for the Republic of Korea to 189 for Belarus (Figure A.7.3). China – the origin with the most resident patent applications – is ranked in 11th position, which is considerably lower than its ranking for the resident applications-to-GDP ratio. The majority of these reported origins saw increases in their applications-to-population ratios between 2007 and 2012. China and the Republic of Korea saw the most notable increases, while Japan and the Netherlands reported the steepest decreases.

# A.8

## PATENTS IN FORCE

Patent rights are granted for a limited period – generally 20 years from the date of filing subject to the payment of maintenance fees. Patents in force indicators provide information on the volume of patents currently valid, as well as the historical "patent life cycle".

The estimated number of patents in force worldwide increased from 8.03 million in 2011 to 8.66 million in 2012. This estimate is based on data from 82 offices, including all of the top 20 offices, with the exception of the patent offices in the Democratic People's Republic of Korea and Singapore.[18]

Figure A.8.1 shows the number of patents in force by patent office for the top 20 offices. The USPTO had the largest number of patents in force – approximately 2.24 million patents or 26% of the world total. The JPO also had a substantial number of patents in force equal to 1.69 million or 20% of the world total.

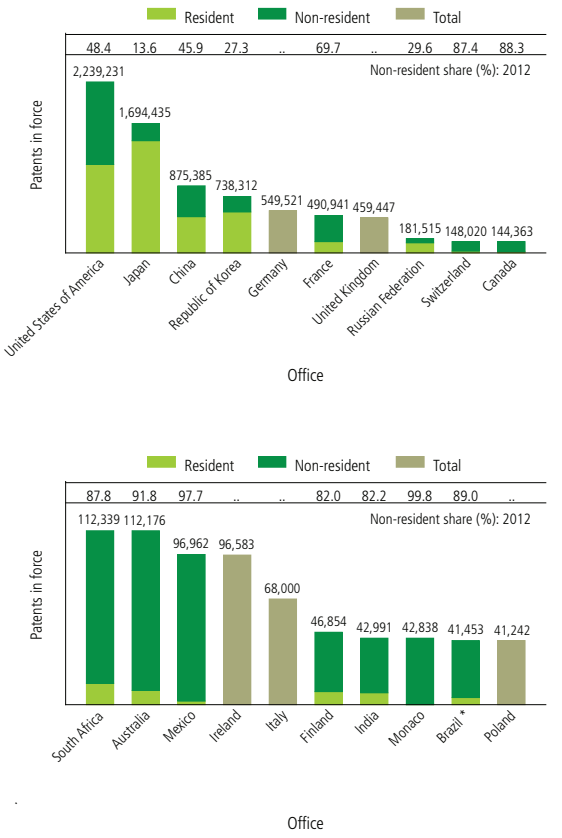
The number of patents in force at SIPO was considerably below that of the JPO and the USPTO. This is due to the low number of patent grants issued by SIPO during the early 2000s. However, in recent years the number of patents granted by SIPO has greatly increased, resulting in substantial growth in the number of patents in force at this office. For example, patents in force at SIPO increased from approximately 272,000 in 2007 to approximately 875,000 in 2012.

18 The term "top 20 offices" refers to offices that granted the largest numbers of patents in 2012, as reported in Figure A.2.2.1.

Among the top four offices, SIPO (54% resident share) and the USPTO (52%) reported an almost equal distribution among their respective resident and non-resident patent holders, whereas at KIPO (73%) and the JPO (86%), the distribution was skewed towards resident holders. In the case of all other patent offices referred to in Figure A.8.1, except the Russian Federation office, non-resident patent holders accounted for the bulk of patents in force.

With the exception of Monaco, all offices referred to in Figure A.8.1 had higher numbers of patents in force in 2012 than in 2011. The patent offices of China, Italy and Poland saw the most notable growth.

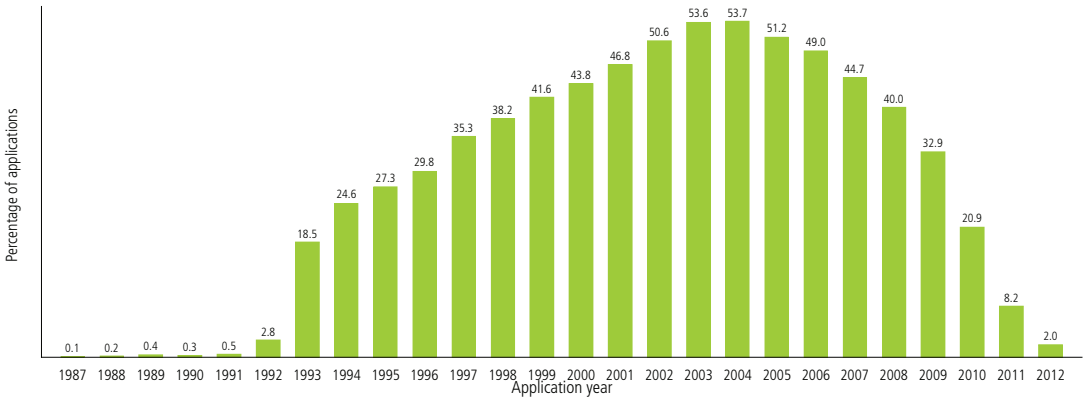
**Figure A.8.1 Patents in force by office for the top 20 offices, 2012**




Note: *2011 data and growth rate refers to 2010-2011; ".." = not available.

Source: WIPO Statistics Database, October 2012

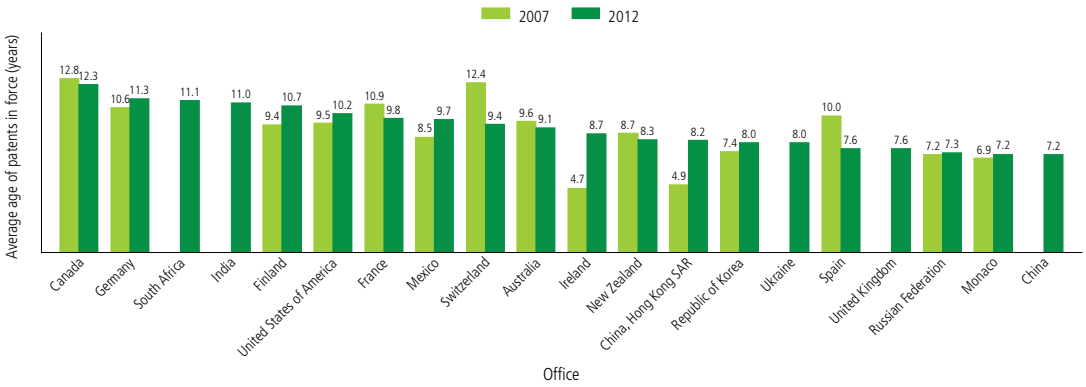
**Figure A.8.2 Patents in force in 2012 as a percentage of total applications**




Note: Percentages are calculated as follows: the number of patent applications filed in year t and in force in 2012 divided by the total number of patent applications filed in year *t*. The graph is based on data from 68 offices.

Source: WIPO Statistics Database, October 2013

**Figure A.8.3 Average age of patents in force at selected patent offices, 2012**




Source: WIPO Statistics Database, October 2013

Patent holders must pay maintenance fees in order to maintain the validity of their patents. Depending on technological and commercial considerations, patent holders may opt to let a patent lapse before the end of the full protection term. Figure A.8.2 shows the distribution of patents in force in 2012 as a percentage of total applications in the year of filing. Unfortunately, not all offices provide these data. However, the available data show that more than half of the applications for which patents were eventually granted remained in force for at least eight years after the application date. Approximately 18.5% of these patents lasted the full 20-year patent term. The distribution has remained stable over the past few years.

Figure A.8.3 shows the average age of patents in force at selected patent offices. The average age of all patents in force in Canada in 2012 was approximately 12.3 years. In contrast, the average age of patents in force in 2012 at the offices of China, Monaco, the Russian Federation, Spain and the UK was below eight years. The low average age of patents in China is partly due to the fact that the majority of patents in force at SIPO were granted in recent years. India and South Africa each have a higher average patent age compared to a number of European countries and the US.

# A.9

## Pending patent applications and pendency time

The processing of patents is both time consuming and resource intensive. Patent offices must carefully assess whether the inventions as claimed in patent applications meet the standards of novelty, non-obviousness and industrial applicability, as set out in national laws. For operational planning purposes, and also in order to assess the effectiveness of the patent system more broadly, it is important to know how many patent applications are pending.

Unfortunately, differences in procedures across patent offices complicate the measurement of pending applications. In some offices, such as the USPTO, patent applications automatically proceed to the examination stage unless applicants withdraw them. In contrast, patent applications filed at other offices do not proceed to the examination stage unless applicants file a separate request for examination. For example, in the case of the JPO, applicants have up to three years to file such a request.

For offices that automatically examine all patent applications, it seems appropriate to count as pending all applications that are awaiting a final decision. However, where offices require separate examination requests, it may be more fitting to consider pending applications to be those for which the applicant has requested examination. In order to take account of this procedural difference, pending application data for both definitions of pendency are presented in this subsection. In particular, statistics on potentially pending applications include all patent applications, at any stage in the process, that are awaiting a final decision by a patent office, including those applications for which applicants have not filed a request for examination (where applicable). Statistics on pending patent applications undergoing examination include only those applications for which the applicant has requested examination (where such separate requests are necessary).

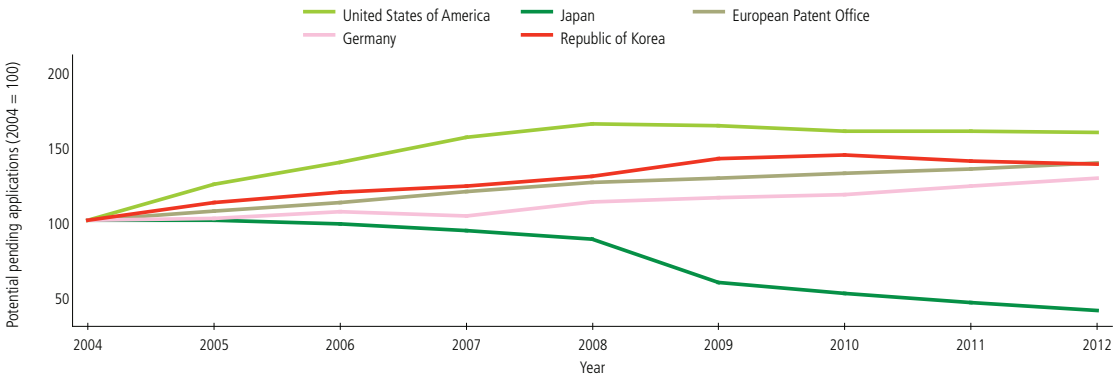
### A.9.1 Pending applications

Since the mid-2000s, a number of offices have seen a rise in the number of pending applications. However, growth in the number of pending applications has varied across offices. Figure A.9.1.1 presents data on growth in pending applications for selected offices.[19] The USPTO saw the fastest growth in potentially pending applications until 2008. However, potentially pending applications have decreased in recent years. The EPO, the German office and KIPO witnessed upward trends over the same period, which were in sharp contrast to the substantial decrease in pending applications at the JPO.

The total number of applications that were potentially pending across the world in 2012 is estimated at approximately 5 million, which represents a considerable decrease from their 2009 level (5.5 million). However, this figure would be higher if data from SIPO – the largest patent office in the world in terms of applications filed – were taken into account. The world total is based on data from 81 patent offices, which include the top 20 offices, with the exception of SIPO and the office of the Democratic People's Republic of Korea.

19 SIPO, the largest office in terms of patent applications, is not included due to unavailability of data.

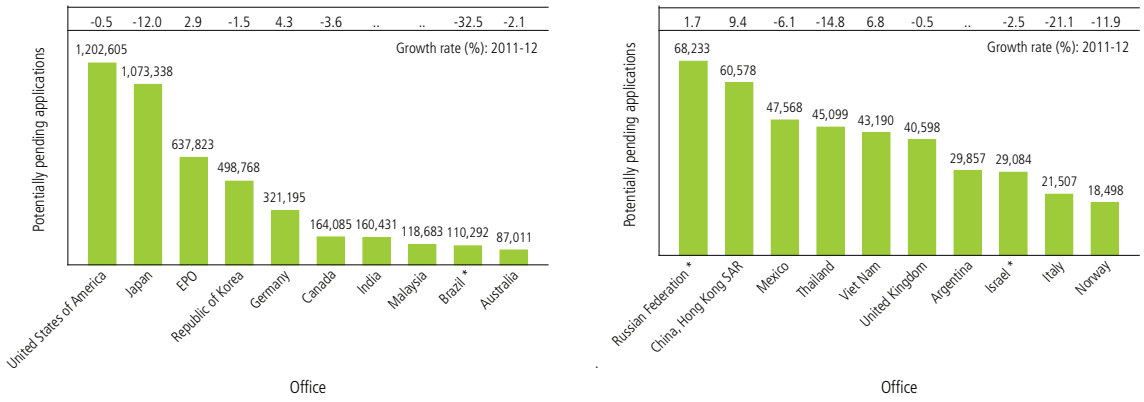
**Figure A.9.1.1 Trend in potentially pending applications for selected offices, 2004 = 100**




Note: Potentially pending applications include all patent applications, at any stage in the process, awaiting a final decision by a patent office, including those applications for which applicants have not filed a request for examination (where applicable). Data for SIPO, the largest office in terms of patent applications, were unavailable.

Source: WIPO Statistics Database, October 2013

**Figure A.9.1.2 Potentially pending applications, 2012**



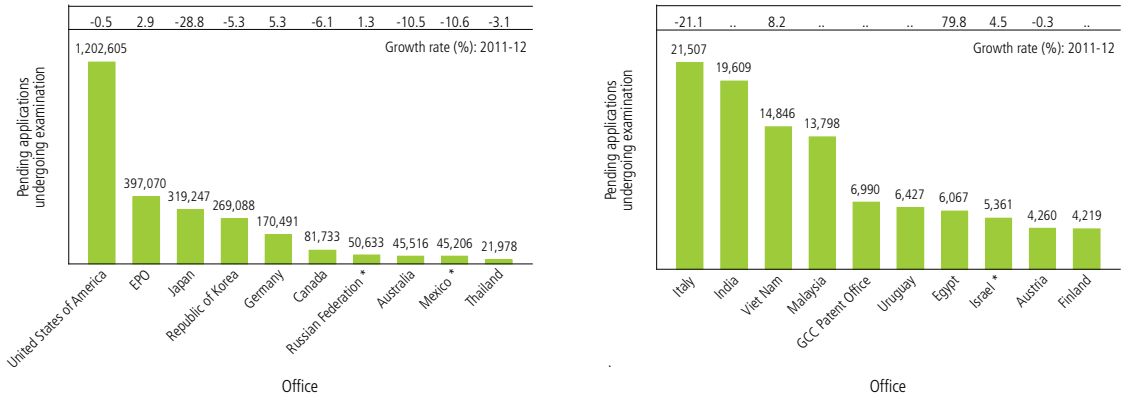

Note: *2011 data; growth rate refers to 2010-2011; ".." = not available. Potentially pending applications include all patent applications, at any stage in the process, awaiting a final decision by a patent office, including those applications for which applicants have not filed a request for examination (where applicable).

Source: WIPO Statistics Database, October 2013

In absolute terms, the USPTO had the largest number of potentially pending applications in 2012 (Figure A.9.1.2). The JPO has seen a continuous decrease in potentially pending applications since 2004. However, despite this substantial decrease, it still had more than 1 million in 2012. A number of offices of large middle-income countries had substantial numbers of pending applications. For example, Brazil, India and Malaysia each had more than 100,000 in 2012. Furthermore, these offices had high numbers of pending applications relative to their incoming patent applications. This was also the case for the offices of Thailand and Viet Nam.

Three of the top four offices (the JPO, KIPO and the USPTO) had fewer potentially pending applications in 2012 than in 2011, with the EPO being the exception.

**Figure A.9.1.3 Pending applications undergoing examination, 2012**




Note: *2011 data; growth rate refers to 2010-2011; ".." = not available. GCC Patent Office = The Patent Office of the Cooperation Council for the Arab States of the Gulf

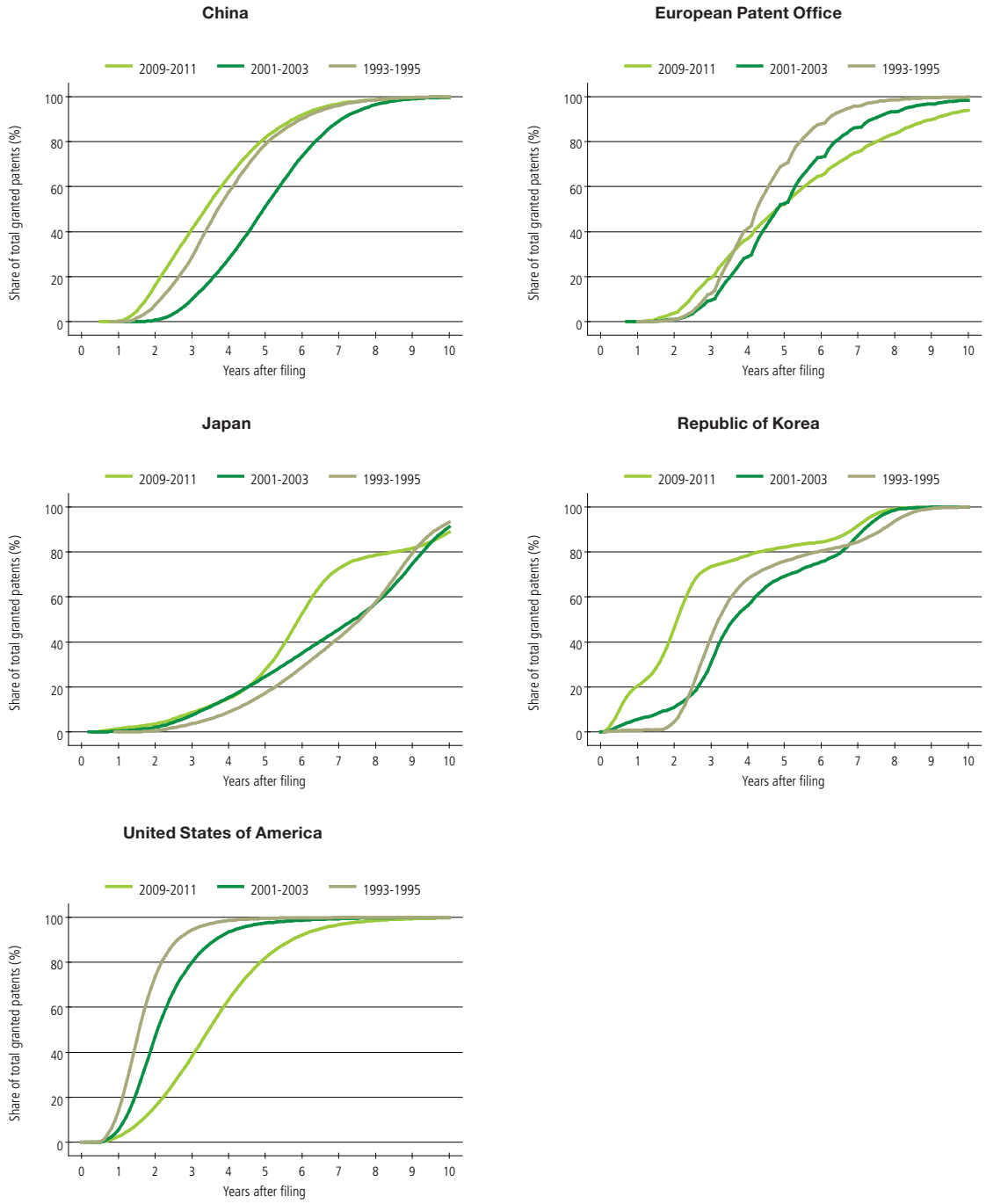
Source: WIPO Statistics Database, October 2013

Figure A.9.1.3 shows the number of pending applications undergoing examination. The USPTO had the largest number of pending applications undergoing examination, followed by the EPO, the JPO and KIPO. The majority of these reported offices had fewer pending applications undergoing examination in 2012 than in 2011. In contrast, Egypt saw considerable growth over the same period.

### A.9.2 Pendency time

Along with the growing number of pending applications, a number of offices have witnessed increases in pendency time (i.e., the time it takes an office to process an application and decide whether to reject it or grant a patent). Few offices report pendency time indicators. And, as no standard methodology to calculate such indicators exists, it is difficult to compare pendency time across offices. In order to measure pendency time at a given office, it is possible to construct a proxy for pendency time using patent application and grant dates from the EPO PATSTAT Database. However, one drawback of this approach is that pendency time is calculated for granted patents only. Pendency time for patents that have been withdrawn, abandoned or refused are not included.

## Figure A.9.2 Distribution of pendency time for the top five offices




Note: Pendency time here is defined as the difference between the application date and the grant date. Pendency time can vary between offices for a number of reasons. Therefore, pendency time should be compared across time at individual offices and not across offices.

Sources: WIPO Statistics Database and EPO PATSTAT Database, October 2013

As outlined above, pendency time here is defined as the difference between the application date and the grant date. It would be more meaningful to compute the pendency time indicator as the difference between the date of the request for examination and the date of the final decision issued by the patent office. Unfortunately, such detailed data are not available. Pendency time can vary among offices for a number of reasons; for example, an applicant may file an application and then decide to delay the request for examination – where such a system exists.[20] Consequently, comparison of pendency time between offices can be misleading. In order to create a meaningful comparison, pendency time indicators reported here should be compared across time at individual offices.

Figure A.9.2 shows the distribution of pendency time to grant patents for the top five offices. The three lines represent average pendency time for 1993-95, 2001-03 and 2009-11. The JPO, KIPO and SIPO showed improvements in pendency time for granted patents between 2001-03 and 2009-11. For example, at SIPO, the share of total grants within five years from the application date increased from approximately 50% in 2001-03 to approximately 80% in 2009-11. Similarly, at KIPO, 80% of all patent grants occurred within 4.4 years in 2009-11, compared to 6.6 years in 2001-03.

In contrast, the EPO and the USPTO saw increases in pendency time for granted patents. For example, at the USPTO, 80% of all grants were issued within three years from the application filing date in 2001-03, compared to approximately five years in 2009-11.

20 For example, at the USPTO, patent applications automatically proceed to examination. In contrast, at the JPO, applicants are required to request an examination, and this request may be delayed for up to three years from the filing date.

# A.10

## Patent prosecution highway

As described earlier, there has been an increase in the number of cross-border applications i.e., a patent application for the same invention filed in multiple jurisdictions. In such situations, the same application is examined multiple times by different patent offices. Although there are substantial differences between certain national patent laws, the criteria for granting patents are similar: novelty, inventive step and industrial applicability. Therefore, the same set of questions is asked multiple times: Is the claimed invention new? Is it is obvious? Can one make industrial use of it?

Due to the increasing number of applications, coupled with limited patent office resources, offices may find it difficult to process applications in a timely manner. This is reflected by the large stock of pending applications across the world (See A.9).

In order to avoid unnecessary duplication of work and to improve the efficiency of the examination process, patent offices increasingly seek to make use of the search and examination results of other offices. The so-called Patent Prosecution Highways (PPHs) have institutionalized such cooperation between offices. A PPH refers to a bilateral agreement between two offices that enables applicants to request a fast-track examination procedure whereby patent examiners can make use of the work of the other office. This includes positive search and examination results from the office of first filing. It can also include the positive results of a written opinion by the International Searching Authority (ISA), the written opinion of the International Preliminary Examining Authority (IPEA) or the international preliminary examination report issued within the framework of the PCT – a practice referred to as PCT-PPH. Since offices handling subsequent filings would use the work done earlier by other offices, they can shorten processing time and contribute to better examination quality.

## Table A.10.1 Number of PPH requests, cumulative total up to the end of June 2013

| Office of first filing | Australia | Austria | Canada | China | Colombia | Czech Republic | Denmark | Eurasian Patent Organization | European Patent Office | Finland | Germany | Hungary | Iceland | Indonesia | Israel | Japan | Mexico | Norway | Philippines | Poland | Portugal | Republic of Korea | Russian Federation | Singapore | Spain | United Kingdom | United States of America | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Office of subsequent filing | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Australia | n/a | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 228 | - | **228** |
| Austria | - | n/a | - | 0 | - | - | - | - | - | 0 | - | 0 | - | - | - | 3 | - | - | - | - | - | 0 | - | - | - | - | 2 | - | **5** |
| Canada | - | - | n/a | - | - | - | 0 | - | - | 1 | 0 | - | - | - | 0 | 13 | - | - | - | - | - | 6 | - | - | 0 | 0 | 228 | - | **248** |
| China | - | 0 | - | n/a | - | - | 0 | - | - | 0 | 6 | - | - | - | - | 19 | 0 | - | - | - | - | 7 | 5 | - | - | - | 124 | - | **161** |
| Colombia | - | - | - | - | n/a | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | **0** |
| Czech Republic | - | - | - | - | - | n/a | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | **0** |
| Denmark | - | - | 2 | 0 | - | - | n/a | - | - | - | - | - | - | - | 0 | 14 | - | - | - | - | - | 12 | 0 | - | - | - | 132 | - | **160** |
| Eurasian Patent Organization | - | - | - | - | - | - | - | n/a | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - | - | - | **0** |
| European Patent Office | - | - | - | - | - | - | - | - | n/a | - | - | - | - | - | - | 192 | - | - | - | - | - | - | - | - | - | - | 534 | - | **726** |
| Finland | - | 0 | 6 | 0 | - | - | - | - | - | n/a | - | 0 | - | - | 0 | 8 | - | - | - | - | - | 4 | 1 | - | 0 | - | 38 | - | **57** |
| Germany | - | - | 48 | 18 | - | - | - | - | - | - | n/a | - | - | - | - | 128 | - | - | - | - | - | 24 | - | - | - | 4 | 126 | - | **348** |
| Hungary | - | 0 | - | - | - | - | - | - | - | 0 | - | n/a | - | - | - | 2 | - | - | - | - | - | 0 | - | - | - | - | 4 | - | **6** |
| Iceland | - | - | - | - | - | - | - | - | - | - | - | - | n/a | - | - | 0 | - | - | - | - | - | - | - | - | - | - | 1 | - | **1** |
| Indonesia | - | - | - | - | - | - | - | - | - | - | - | - | - | n/a | - | 0 | - | - | - | - | - | - | - | - | - | - | 0 | - | **0** |
| Israel | - | - | 1 | - | - | - | 0 | - | - | 0 | - | - | - | - | n/a | 0 | - | - | - | - | - | - | - | - | - | - | 9 | - | **10** |
| Japan | - | 0 | 180 | 1,770 | - | - | 3 | 0 | 1,174 | 2 | 929 | 0 | 0 | 0 | 0 | n/a | 40 | 2 | 0 | 0 | 0 | 2,228 | 104 | 17 | 0 | 36 | 7,488 | 429 | **14,400** |
| Mexico | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - | - | 0 | n/a | - | - | - | - | 0 | - | - | 0 | - | 6 | - | **6** |
| Norway | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | n/a | - | - | - | - | - | - | - | - | 8 | - | **8** |
| Philippines | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | n/a | - | - | - | - | - | - | - | 0 | - | **0** |
| Poland | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | - | n/a | - | - | - | - | - | - | - | - | **0** |
| Portugal | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | - | - | n/a | - | - | - | 0 | - | - | - | **0** |
| Republic of Korea | - | 0 | 8 | 61 | - | - | 0 | - | - | 0 | 9 | 0 | - | - | - | 263 | 0 | - | - | - | - | n/a | 11 | 2 | 2 | 6 | 1,198 | - | **1,560** |
| Russian Federation | - | - | - | 2 | - | - | 0 | - | - | 0 | - | - | - | - | - | 6 | - | - | - | - | - | 2 | n/a | - | 0 | - | 22 | - | **32** |
| Singapore | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 0 | - | n/a | - | - | 4 | - | **5** |
| Spain | - | - | 0 | - | - | - | - | - | - | 0 | - | - | - | - | - | 0 | 0 | - | - | - | 0 | 0 | 0 | - | n/a | - | 0 | - | **0** |
| United Kingdom | - | - | 24 | - | - | - | - | - | - | - | 2 | - | - | - | - | 106 | - | - | - | - | - | 45 | - | - | - | n/a | 440 | - | **617** |
| United States of America | 451 | 0 | 3,283 | 1,102 | 1 | 0 | 10 | - | 747 | 3 | 169 | 2 | 0 | - | 11 | 2,490 | 109 | 18 | 0 | - | 0 | 1,033 | 66 | 13 | 1 | 87 | n/a | 416 | **10,012** |
| Others | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | 8 | n/a | **10** |
| **Total** | **451** | **0** | **3,552** | **2,953** | **1** | **0** | **13** | **0** | **1,921** | **6** | **1,115** | **2** | **0** | **0** | **11** | **3,247** | **149** | **20** | **0** | **0** | **0** | **3,361** | **185** | **32** | **3** | **133** | **10,600** | **845** | **28,600** |

Note: A definition of PPH statistics is available at: *www.jpo.go.jp/ppph-portal/statistics.htm*

Source: WIPO, based on data from the JPO, October 2013

**Table A.10.2 Number of PCT-PPH requests, cumulative total up to the end of June 2013**

| | | Office of filing | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Australia | Austria | Canada | China | Czech Republic | Denmark | Eurasian Patent Organization | European Patent Office | Finland | Iceland | Indonesia | Israel | Japan | Mexico | Norway | Philippines | Poland | Portugal | Republic of Korea | Russian Federation | Spain | Sweden | United States of America | Total |
| ISA or IPEA | Australia | 27 | | | | | | | | | | | | | | | | | | | | | | 257 | **284** |
| | Austria | | | | | | | | | 0 | | | | | | | | | | 0 | | | | 25 | **25** |
| | Canada | | | 123 | | | | | | | | | | | | | | | | | | | | 9 | **132** |
| | China | | 0 | | | | 0 | | | 0 | | | | 27 | 0 | | | | | 7 | 2 | | | 386 | **422** |
| | European Patent Office | | | | | | | | | | | | | 639 | | | | | | | | | | 2,017 | **2,656** |
| | Finland | | 0 | | 0 | | | | | | | | 0 | 0 | | | | | | | 1 | 0 | | 50 | **51** |
| | Israel | | | | | | 0 | | | 0 | | | | 0 | | | | | | | | | | 6 | **6** |
| | Japan | | | | 519 | | 0 | 0 | 475 | 0 | 0 | 0 | 0 | 2,004 | 6 | 0 | 17 | 0 | 0 | 198 | 0 | 1 | 5 | 1,314 | **4,539** |
| | Nordic Patent Institute | | | | | | | | | | | | | 7 | | | | | | | | | | 63 | **70** |
| | Republic of Korea | | 0 | | 364 | | | | | | | | | 32 | | | | | | 79 | | | | 2,531 | **3,006** |
| | Russian Federation | | | | 5 | | 0 | | | 0 | | | | 0 | | | | | | | | 0 | | 35 | **40** |
| | Spain | | | | | | | | | 0 | | | | 2 | 1 | | | | 0 | | 1 | | | 9 | **13** |
| | Sweden | | | | | | | | | | | | | 18 | | | | | | | | | 1 | 94 | **113** |
| | United States of America | 15 | 0 | 6 | 26 | 0 | 0 | | 48 | 0 | 0 | | 0 | 23 | | 0 | 1 | | 0 | 34 | 11 | 1 | 0 | 352 | **517** |
| | Total | 42 | 0 | 129 | 914 | 0 | 0 | 0 | 523 | 0 | 0 | 0 | 0 | 2,752 | 7 | 0 | 18 | 0 | 0 | 318 | 15 | 2 | 6 | 7,148 | **11,874** |

Note: The following offices are party to PPH agreements, but are not listed in the table because they did not receive any PCT-PPH requests in their capacity as an office of filing: the Czech Republic, Denmark, the Eurasian Patent Organization, Iceland, Indonesia, Norway, Poland and Portugal. A definition of PPH statistics is available at: *www.jpo.go.jp/ppph-portal/statistics.htm*

Source: WIPO, based on data from the JPO, October 2013

This section presents statistics relating to the use of the PPH system at several offices.[21] Table A.10.1 shows the number of PPH requests made up to the end of June 2013 (the cumulative total from the date on which the PPH became operational).[22]

The offices listed in Table A.10.1 received 28,600 patent applications for which applicants subsequently filed PPH requests. However, distribution among offices is skewed towards just a few of them. For example, the JPO and the USPTO accounted for 85% of total applications for which applicants subsequently filed PPH requests. Similarly, five offices (Canada, the JPO, KIPO, SIPO and the USPTO) accounted for 83% of all PPH requests.

The JPO received 14,400 applications that resulted in subsequent PPH requests. The USPTO (as an office of subsequent filing) received the largest share of PPH requests (52%) for the JPO applications, followed by KIPO (15.5%) and SIPO (12.3%). In the case of applications filed at the USPTO, the Canadian patent office received the largest share of PPH requests (32.8%), followed by the JPO (24.9%), SIPO (11%) and KIPO (10.3%).

Table A.10.2 presents data on PCT-PPH requests. Similar trends can be seen for both PCT-PPH and PPH. The JPO and the USPTO received 83% of applications that resulted in PCT-PPH requests. In the case of ISA/IPEA for PCT-PPH requests, Japan accounted for the largest share (38%), while the Republic of Korea accounted for 25% and the EPO accounted for 22%.[23]

21 Further information and a definition of PPH statistics are available at: *www.jpo.go.jp/ppph-portal/statistics.htm*

22 Cumulative total data are reported here due to a lack of available data by calendar year. As the duration of agreements between offices differs, care should be taken when making comparisons across offices.

23 ISA = International Searching Authority. IPEA = International Preliminary Examining Authority.

# A.11

## Utility model applications

This subsection reports utility model (UM) application data by office and origin. Data for UM grants are not reported, as the grant profiles by office and origin are similar to those for applications. Data for applications and grants are similar due to the examination procedure for UMs, which is less extensive than that for patents. UM grants are available through WIPO's IP Statistics Data Center (*www.wipo.int/ipstats/en/*).

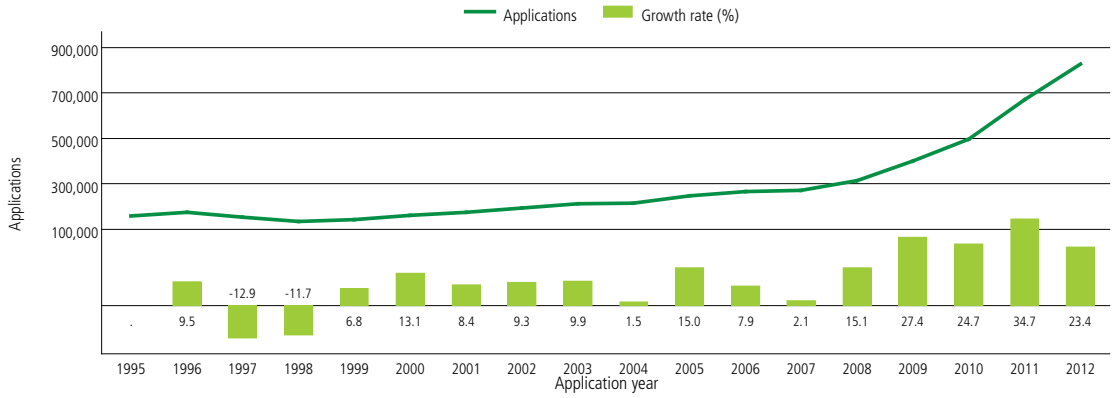
Figure A.11.1 presents the number of UM applications filed worldwide between 1995 and 2012. Since 1995, the numbers of UM filings have increased continuously, with the exception of 1997 and 1998, when applications worldwide decreased by 12.9% and 11.7%, respectively. This was due to a sharp drop in applications at KIPO i.e., from approximately 69,000 in 1996 to 29,000 in 1998. The continued and solid growth in filings at SIPO explains the sharp increase in UM filings observed over the past five years. In fact, since 2003 the majority of applications filed across the world have originated in China. The SIPO share of world filings has increased, on average, by 4.2 percentage points per year since 2003, reaching 89.5% of total filings worldwide in 2012. An estimated 827,500 UM applications were filed worldwide in 2012, representing an increase of 23.4% on 2011 figures. When SIPO data are excluded from the world estimate, the total number of UMs filed in 2012 was 87,200, corresponding to an increase of 2.2% in UM filings worldwide when compared with figures for 2011.

Figure A.11.2 shows the number of UM applications broken down by resident and non-resident filings for the top 20 offices. In 2012, SIPO received 740,290 applications, followed by the offices of Germany, the Russian Federation, the Republic of Korea and Ukraine – each of which receiving between 10,000 and 16,000 UM filings.

Analysis of UM application data for the top 20 offices show that the UM system is mainly used by residents. In 2012, resident applicants accounted for 98.1% of total applications filed worldwide. The share of non-resident applications at SIPO (0.8%) was the lowest among these top 20 offices. However, in absolute terms, with 5,853 applications, SIPO received the largest number of non-resident applications, followed by the offices of Germany (3,551) and the Russian Federation (1,820). In relative terms, with 35.1% of total filings, Australia had the largest non-resident share among these offices, followed by China Hong Kong SAR (31.3%), Austria (26.9%), Germany (22.9%) and Japan (22.4%).

With a 26.4% increase, SIPO saw the fastest growth in UM applications in 2012. It received almost 155,000 more applications than in 2011. Four other offices saw double-digit growth, namely Turkey (+15.5%), the Czech Republic (+13.2%), Italy (+11.7%) and Thailand (+10.7%). By contrast, several offices experienced decreases in applications, the sharpest of which occurring at the offices of Austria (-12.4%) and Germany (-3.3%).

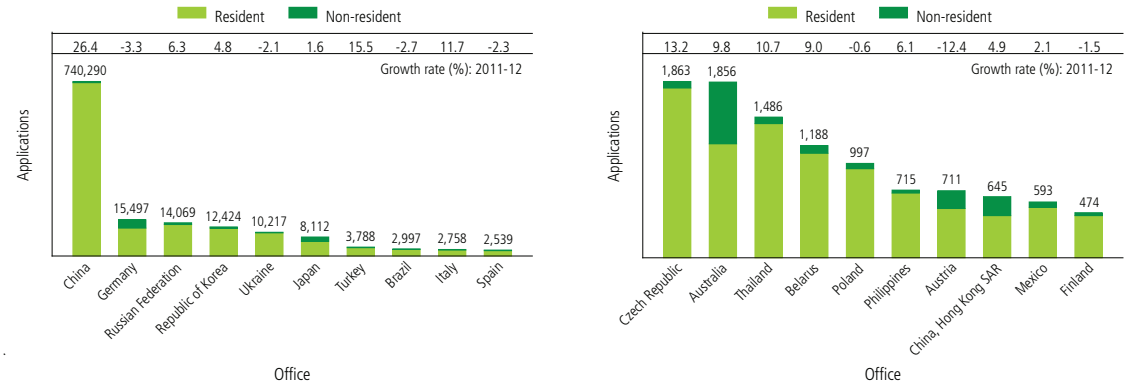
## Figure A.11.1 Trend in utility model applications worldwide




Note: World totals are WIPO estimates covering approximately 75 patent offices (see Data Description). These estimates include direct applications and PCT national phase entries.

Source: WIPO Statistics Database, October 2013

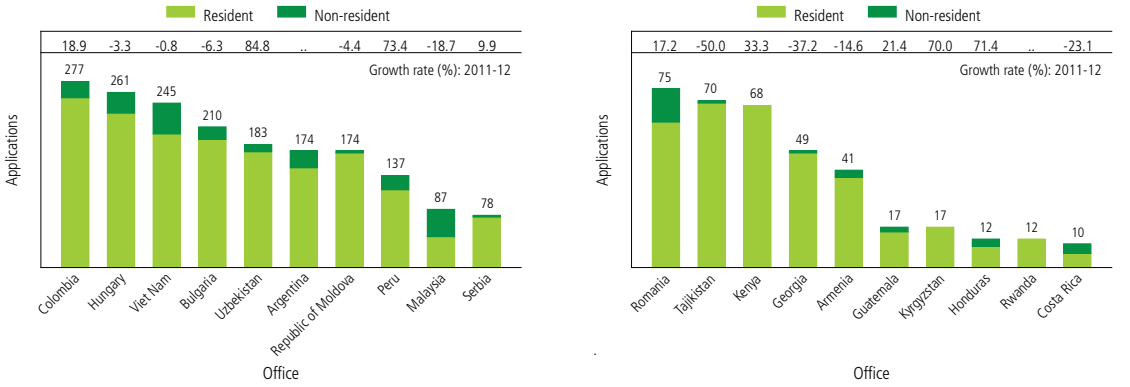
## Figure A.11.2 Utility model applications for the top 20 offices, 2012




Source: WIPO Statistics Database, October 2013

Figure A.11.3 shows the numbers of UM applications received by offices of selected middle- and low-income countries. Similar to the trend observed for the top 20 offices (Figure A.11.2), resident applications accounted for the largest share of total applications. The resident shares ranged from 52.9% in Malaysia to 100% in Kenya, Kyrgyzstan and Rwanda. Growth rates varied across offices, with some offices receiving more applications in 2012 than in 2011, and others fewer.

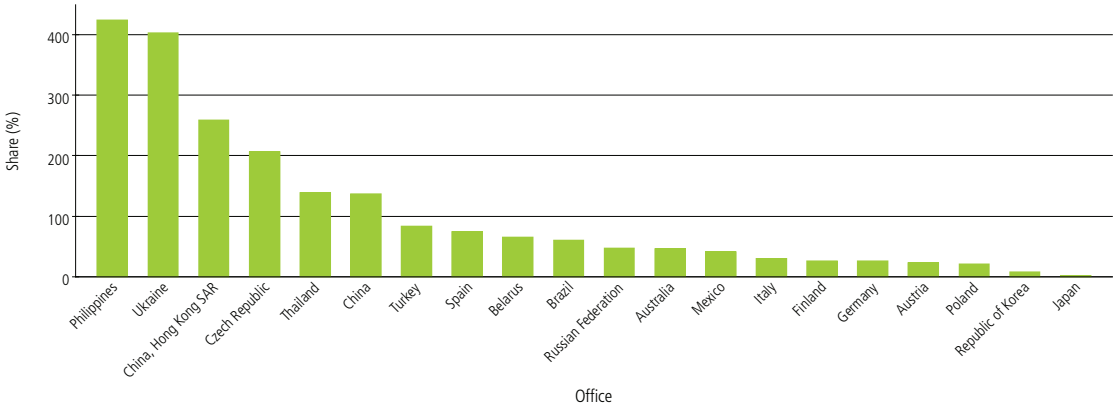
**Figure A.11.3 Utility model applications for offices of selected middle- and low-income countries, 2012**




Note: ".." = not available.

Source: WIPO Statistics Database, October 2013

**Figure A.11.4 Resident utility model applications as a percentage of resident patent applications, 2012**

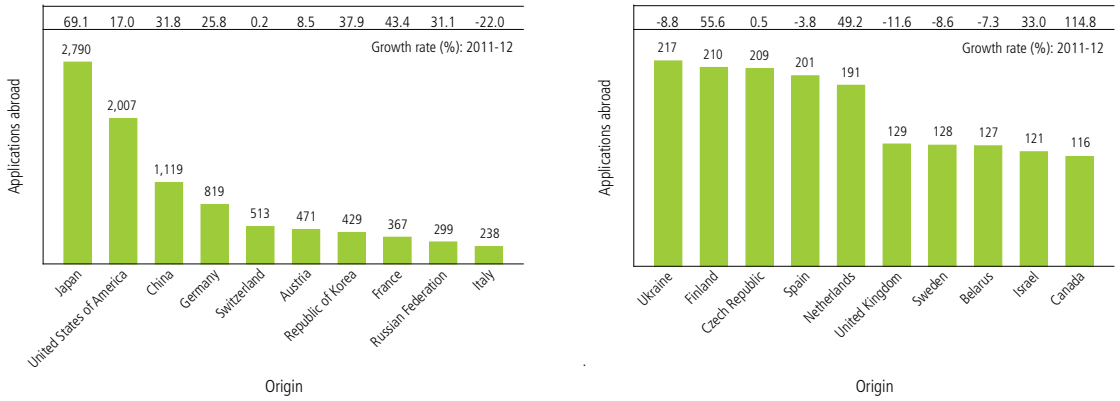



Source: WIPO Statistics Database, October 2013

In order to better illustrate the use of the UM system, Figure A.11.4 shows resident UM applications relative to resident patent applications. Compared to the patent system, the UM system is used intensively by residents of China, China Hong Kong (SAR), the Czech Republic, the Philippines, Thailand and Ukraine. For example, in 2012, residents of the Philippines filed over four times more UM applications than patent applications. Residents of middle-income countries tend to use the UM system more intensively than the patent system. In contrast, residents of high-income countries, such as Germany, Japan and the Republic of Korea, use the patent system more frequently.

In general, the UM system is mostly used by residents to seek protection within their own country, however, it is also used to protect inventions abroad. Figure A.11.5 presents data on applications filed abroad for the top 20 origins. Applicants from Japan (2,790), the US (2,007) and China (1,119) filed the largest numbers of UM applications abroad in 2012. These were the only three origins from which more than a thousand UM applications were filed abroad.

**Figure A.11.5 Utility model applications filed abroad for top 20 origins, 2012**




Note: As some offices do not provide data broken down by origin, the numbers of applications by origin reported here are likely to be lower than their actual numbers.

Source: WIPO Statistics Database, October 2013

In 2012, a large proportion (39.9%) of total UMs filed abroad were destined for SIPO. For several origins, SIPO was the destination for the vast majority of applications abroad. For example, residents of Japan filed 93% of their total applications abroad at SIPO. Residents of France (67%), Germany (63.6%), the US (62.8%) and the Republic of Korea (56.2%) also filed mostly at SIPO when seeking protection abroad. Apart from these examples, residents of China filed half of their applications abroad at two foreign offices, with Australia recording 27.5% of such filings, and Germany recording 22.9%.

The top four origins experienced double-digit growth in 2012. Residents of Japan increased their filings abroad by 69.1% when compared with 2011 figures. They were followed by residents of China (+31.8%), Germany (+25.8%) and the US (+17%). Several other origins, such as Finland (+55.6%) and the Netherlands (+49.2%) saw substantial growth, albeit from a low base. By contrast, Italy (-22%), the UK (-11.6%) and Ukraine (-8.8%) experienced the sharpest decreases on 2011 figures.

# A.12

## Microorganisms

In 2012, there were a total of 78 contracting parties (i.e. countries) to the Budapest Treaty, in which 41 International Depositary Authorities (IDAs) were located. During 2012, Bahrain, Brunei Darussalam and Panama signed the treaty, and the Colección Chilena de Recursos Genéticos Microbianos (CChRGM) of Chile became an IDA.

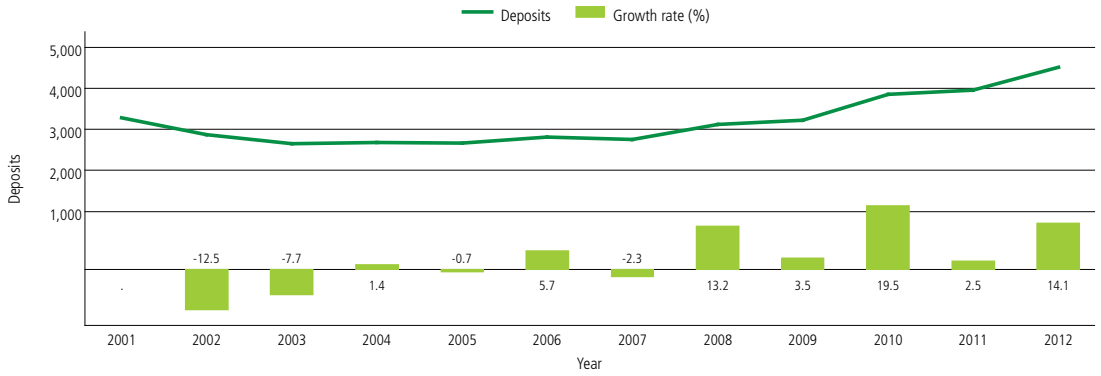
Figure A.12.1 shows the long-term trend of total deposits made with all IDAs that receive and store microorganisms. The number of deposits fell from 3,279 in 2001 to 2,667 in 2005. They then gradually increased – apart from in 2007 – until 2012, when they reached their highest level recorded of 4,510 deposits. The high growth of 14.1% in 2012 can be attributed to increases in the numbers of deposits made at the top three IDAs: the China General Microbiological Culture Collection Center (CGMCC), the China Center for Type Culture Collection (CCTCC), and the American Type Culture Collection (ATCC) of the US. Together, these three IDAs accounted for more than 98% of total growth.

Figure A.12.2 shows deposits for the top 10 IDAs, which were selected on the basis of total deposits made at IDAs in 2012. One of these IDAs, CGMCC, which is located in China, recorded the highest number of deposits (1,387), followed by ATCC in the US (891) and CCTCC, also located in China (781). These three authorities each recorded the largest shares of total deposits among all IDAs. Together, they accounted for 67.8% of all deposits, up from a combined share of 60.7% in 2011. Germany's Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH (DSMZ, 5.9%) had the next largest share, followed by the Korean Culture Center of Microorganisms (KCTC, 5%). The shares held by these IDAs in terms of total deposits has remained stable since 2001.

Nearly all of the top 10 IDAs showed substantial growth in deposits. The most prolific three – India's Microbial Type Culture Collection and Gene Bank (MTCC, +47.9%) and the two US authorities – ATCC (+42.6%) and Agricultural Research Service Culture Collection (NRRL, +31.3%) – each had growth exceeding 30%. After a one-off sharp decrease in deposits made at ATCC (-30.6%) in 2011, the high growth achieved in 2012 resulted in a return to its 2010 level. By contrast, deposits at France's Collection Nationale de Cultures de Micro-organismes (CNCM) fell by 33.7%, while at the Republic of Korea's KCTC, deposits fell by 15%.

From a long-term growth perspective, China's CGMCC and CCTCC as well as India's MTCC had the highest five-year average annual growth rates among the top 10 IDAs between 2008 and 2012, with growth of 27.2%, 21.5% and 26.5%, respectively. By contrast, CNCM has shown long-term average annual decreases of 15% over the past five years.

## Figure A.12.1 Trend in microorganism deposits worldwide




Source: WIPO Statistics Database, October 2013

## Figure A.12.2 Deposits for the top 10 IDAs


Note: ATCC (American Type Culture Collection, United States of America), CCTCC (China Center for Type Culture Collection), CGMCC (China General Microbiological Culture Collection Center), CNCM (Collection Nationale de Cultures de Micro-organismes, France), DSMZ (Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, Germany), KCCM (Korean Culture Center of Microorganisms, Republic of Korea), Leibniz-Institut - KCTC (Korean Collection for Type Cultures, Republic of Korea), MTCC (Microbial Type Culture Collection and Gene Bank, India), NPMD (National Institute of Technology and Evaluation, Patent Microorganisms Depositary, Japan) and NRRL (Agricultural Research Service Culture Collection, United States of America)

Source: WIPO Statistics Database, October 2013