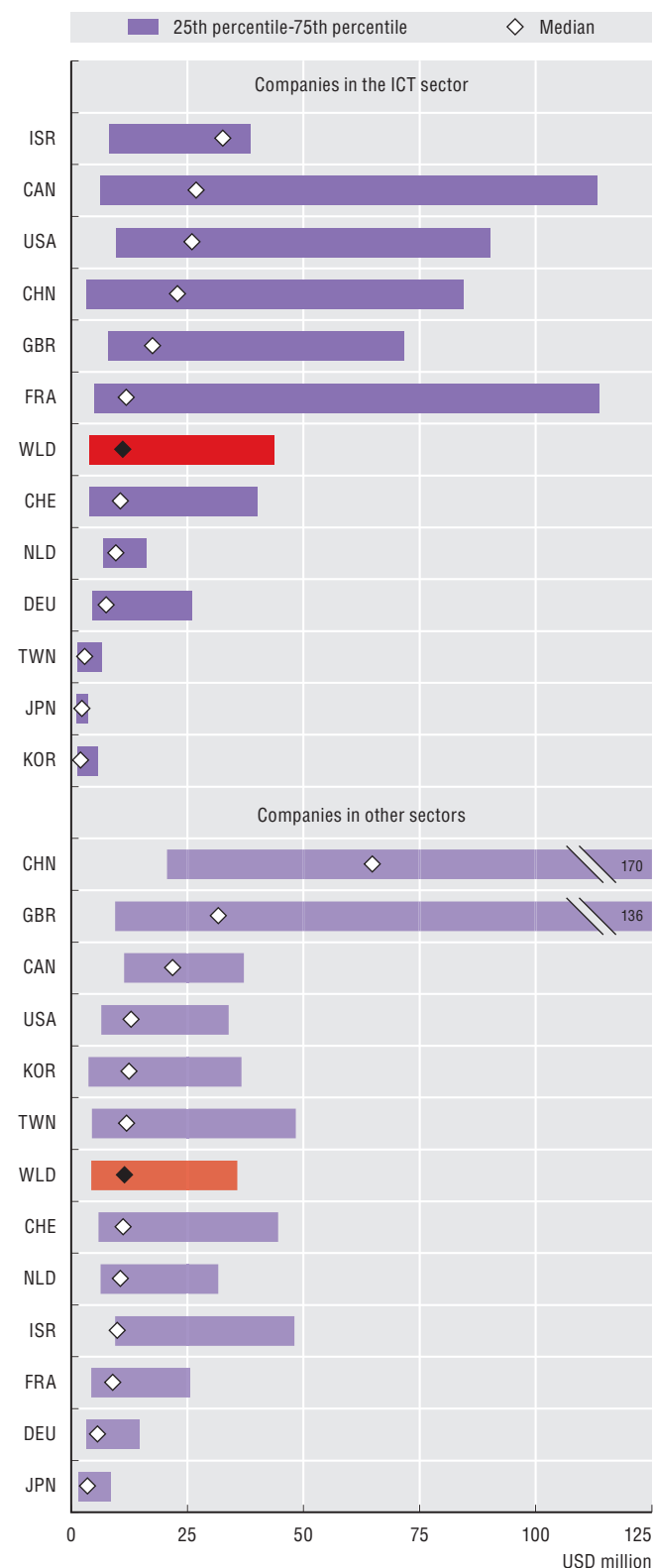


4. INNOVATION IN FIRMS

2. Top R&D players

R&D investment per patent of top corporate R&D investors, by headquarters' location, 2012-14

Million USD per IP5 patent family



Source: OECD calculations based on JRC-OECD, COR&DIP© Database v.1., June 2017. Statlink contains more data. See chapter notes.

StatLink <http://dx.doi.org/10.1787/888933619182>

Did you know?

On average, top ICT corporations worldwide invest more than USD 11 million in R&D per IP5 patent family and up to USD 33 million in Israel.

The world's top corporate research and development (R&D) investors are leading global players at the technology frontier and account for about 64% of all patent families filed at the five largest intellectual property offices worldwide (IP5). Looking at the extent to which these global players invest in R&D, diversify their technological and industrial activities, and use trademarks to compete helps to understand global trends and possible future developments.

The median investment in R&D by top corporate R&D investors in ICT industries varies between about USD 33 million (Israel) and USD 1.9 million (Korea) per IP5 patent family. Median R&D investment per patent in other industries varies between over USD 65 million (China) and USD 3.4 million (Japan). The latter may reflect different propensities to patent worldwide as well as the overall industry composition of economies.

Technological and industrial specialisation do not seem to go hand in hand among top corporate R&D investors. The top four technology areas in which companies specialise vary between median levels of less than 40% in Machinery and Construction to 85% or more in the case of Telecommunications and Scientific R&D. Conversely, in all sectors, 50% or more of the affiliates of top R&D investors operate in only four industries. This share goes above 80% in the case of food products. The median number of economies in which affiliates are located also varies, with most top R&D performers having affiliates in more than ten economies.

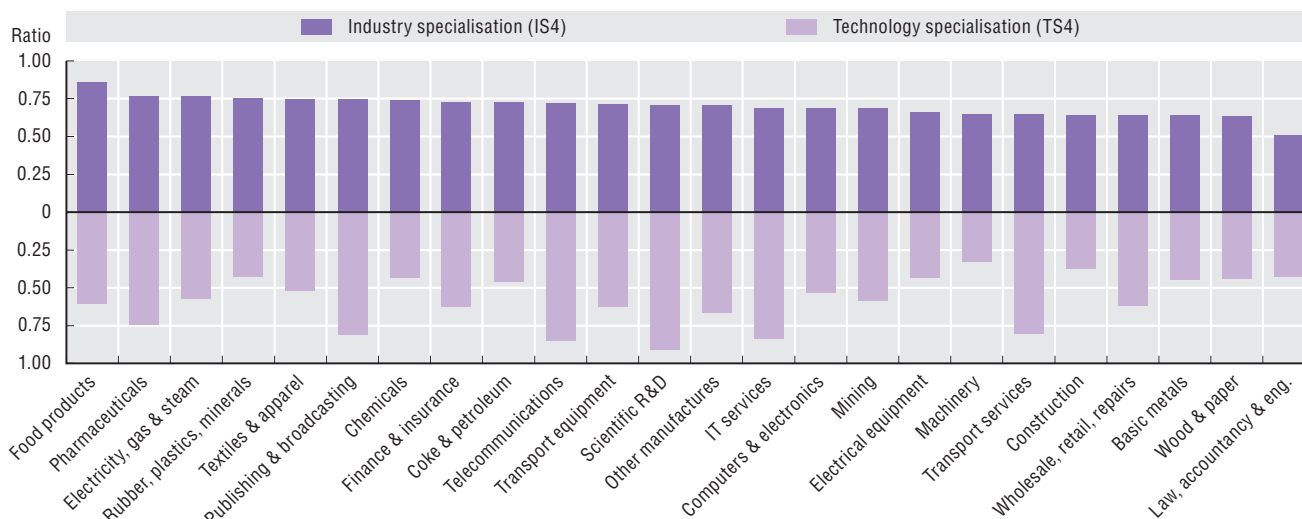
Remarkable differences also exist in terms of the extent to which top R&D investors rely on trademarks. In ICT industries, the median net sales per trademark amount to USD 285 million, compared to almost USD 320 million in other industries. In the latter case, the median values stem from more diversified industry and economy-specific patterns than have been observed for ICT companies, and from their upstream or downstream position in global value chains.

Definitions

Industry and technology specialisation ratios are built in a similar way to concentration ratios (CR). *Industry specialisation* (IS4) ratios reflect the share of affiliates accounted for by the top four industries in which companies' affiliates operate over the total number of affiliates of these top R&D investors in a given industry. *Technology specialisation* (TS4) ratios reflect the share accounted for by the top four technology fields in which companies file patents over the total number of patents filed by these R&D investors in a given industry.

Industrial and technological specialisation of top R&D investors, 2012-14

Specialisation in terms of Concentration Ratio (4) at the industry and technology level

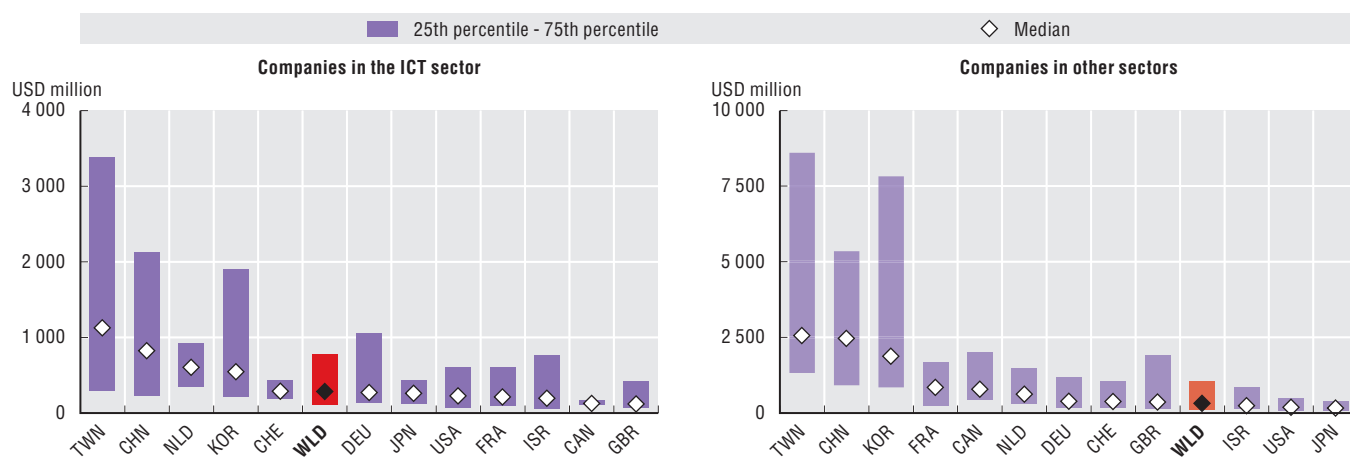


Source: OECD calculations based on JRC-OECD, COR&DIP© Database v.1., June 2017. Statlink contains more data. See chapter notes.

StatLink <http://dx.doi.org/10.1787/888933619201>

Net sales per trademark of top corporate R&D investors in the ICT sector, by headquarters' location, 2012-14

USD million per trademark application, EUIPO, JPO and USPTO



Source: OECD calculations based on JRC-OECD, COR&DIP © Database v.1., June 2017. Statlink contains more data. See chapter notes.

StatLink <http://dx.doi.org/10.1787/888933619220>

Measurability

Industries are defined according to ISIC Rev. 4. The ICT sector comprises: ICT manufacturing industries (classes 2610, 2620, 2630, 2640 and 2680), ICT trade industries (4651 and 4652), ICT services industries (5820), Telecommunications (61), Computer programming (62), Data processing (631), and Repair of computers and communication equipment (951). Patent data refer to patent families filed at the top five intellectual property (IP) offices worldwide: the IP5 (www.fiveipooffices.org). Trademark data refer to new trademark applications filed at the European Union Intellectual Property Office (EU IPO), the Japan Patent Office (JPO) and the US States Patent and Trademark Office (USPTO). R&D expenditures and net sales figures are in USD millions. Patent families are allocated by first filing date; trademarks by filing date. Patents and trademarks are allocated using information about the main industry of the applicant's headquarters and rely on fractional counts. Figures may differ if different patent family types, IP authorities and/or time frames are considered. Comparisons across years are not provided, as top R&D performers and their structure are likely to change over time.

Cyprus

The following note is included at the request of Turkey:

“The information in this document with reference to ‘Cyprus’ relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the ‘Cyprus issue’.”

The following note is included at the request of all of the European Union Member States of the OECD and the European Union:

“The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.”

Israel

“The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

“It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.”

4.1 Business R&D

Business R&D, 2005 and 2015

These statistics are based on the OECD Main Science and Technology Indicators Database (<http://oe.cd/msti>). For more information on these data, including on issues such as breaks in series, please see that source.

For Australia, data refer to 2004 and 2013.

For Chile, data refer to 2007 and 2015.

For Ireland, data refer to 2014.

For Israel, defence R&D is partly excluded from available estimates.

For South Africa, data refer to 2013.

For Switzerland, data refer to 2004 and 2015.

Business R&D and government support for business R&D, by size, 2015

For BERD and government-funded BERD, SMEs figures refer to enterprises with less than 250 persons employed.

These statistics are based on the OECD R&D Statistics database (<http://oe.cd/rds>). For more information on these data, including on issues such as breaks in series, please refer to this source.

For Austria, data refer to 2004 and 2013.

For Belgium, Canada, Denmark, Luxembourg and Sweden, data refer to 2013.

For Chile and New Zealand, data refer to 2007 and 2015.

For France, data refer to 2006 and 2013, for which data were partially available. For the year 2013, estimates based on 2012 breakdowns and 2013 totals were made to complete the series.

For Italy and the Netherlands, data refer to 2003 and 2014.

For Japan, firms with less than JPY 10 million in capital are excluded from the scope of R&D surveys. This leads to overstatement of the share of R&D accounted for large firms.

For Latvia, Poland, Portugal and Slovenia, data refer to 2014.

For Luxembourg, the 2013 SME's share of government-funded BERD is not available for confidentiality reasons.

For the Netherlands, firms with less than 10 employed persons are excluded from the scope of R&D surveys.

For Switzerland, data refer to 2004 and 2015.

For the United Kingdom, data refer to 2006 and 2014.

For the United States, figures reported refer to current expenditures, but include a depreciation component which may differ from the actual level of capital expenditure. In addition, the Business R&D and Innovation Survey does not include companies with fewer than five employees and excludes data for federally funded research and development centres.

R&D intensity by industry, 2015

R&D intensity has been calculated for each industry, where both R&D and Value Added (VA) data were available. These ratios are sensitive to the statistical units used in both frameworks. A broader discussion about coherence between the numerator and the denominator is available in Galindo-Rueda, F. and F. Verger (2016), “OECD Taxonomy of Economic Activities Based on R&D Intensity”, *OECD Science, Technology and Industry Working Papers*, No. 2016/04, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/5jl73sqqp8r-en>. In particular, national practices differ in respect to the treatment of large and complex multi-activity enterprises and those firms specialised in providing R&D services.

Figures are based on estimates of business R&D by industry reported on a main activity basis, in ISIC Rev.4.

The terms “ICT equipment” and “information services” refer to ISIC Rev.4 26 and 58-63, respectively.

For Australia, Austria, Belgium, Canada, France, Greece, Ireland, Korea and Sweden, data refer to 2013.

For Denmark, Finland, Germany, Hungary, Italy, the Netherlands, Poland, Portugal, Slovenia, Spain, the United Kingdom and the United States, data refer to 2014.

Value added is measured at basic prices except for Japan (purchasers’ prices).

Data on value added come from the OECD STructural ANalysis (STAN) Database except for Chile, Hungary, Iceland, Ireland, Korea, New Zealand and Turkey (OECD National Accounts Statistics), Canada (national source) and Australia (OECD National Accounts Statistics and, estimates based on ABS Australian National Accounts: Input-Output Tables, 2013-14, for manufacturing industries).

4.2 Top R&D players

R&D investment per patent of top corporate R&D investors by headquarters’ location, 2012-14

Data relate to countries featuring at least five companies’ headquarters in the top 2 000 corporate R&D investors sample having filed for patents in 2012-14. R&D expenditures are presented in USD million. Patent data refer to IP5 patent families by first filing date owned by the top R&D companies.

Industries are defined according to ISIC Rev.4. The ICT sector covers ICT manufacturing industries (classes 2610, 2620, 2630, 2640 and 2680), ICT trade industries (4651 and 4652), ICT services industries (5820), Telecommunications (61), Computer programming (62), Data processing (631), and Repair of computers and communication equipment (951).

Industrial and technological specialisation of top R&D investors, 2012-14

Industry specialisation (concentration ratio – IS4) is the share of the top 4 industries of companies’ affiliates in the total number of affiliates of top R&D investors performing in a given industry. Industries are defined according to ISIC Rev.4.

Technology specialisation (concentration ratio – TS4) is the share of companies’ patent portfolio filed in the top 4 technology fields in which they patent in the total number of patents filed by top R&D companies performing in a given industry. Data refer to IP5 patent families by the first filing date owned by the top R&D companies. Patents are allocated to technology fields on the basis of their International Patent Classification (IPC) codes, following the concordance provided by WIPO (2013).

Data relate to industries featuring at least 10 companies’ headquarters in the top 2 000 corporate R&D sample.

Net sales per trademark of top corporate R&D investors in the ICT sector, by headquarters’ location, 2012-14

Data relate to countries featuring at least five companies’ headquarters in the top 2 000 corporate R&D investors sample having filed for trademarks in 2012-14. Net sales are presented in USD million. Trademark data refer to new trademark applications filed at the EUIPO, the JPO and the USPTO, by filing date, owned by the top R&D companies.

Industries are defined according to ISIC Rev.4. The ICT sector covers ICT manufacturing industries (classes 2610, 2620, 2630, 2640 and 2680), ICT trade industries (4651 and 4652), ICT services industries (5820), Telecommunications (61), Computer programming (62), Data processing (631), and Repair of computers and communication equipment (951).

4.3 IP bundles

ICT-related patents, 2002-05 and 2012-15

Data refer to IP5 families, by filing date, according to the applicants’ residence using fractional counts. Patents in ICT are identified using the list of IPC codes in Inaba and Squicciarini (2017). Only economies with more than 250 patents families in the periods considered are included. 2014 and 2015 figures are estimated based on available data for those years.

4. INNOVATION IN FIRMS

Notes and references

ICT-related trademarks, 2012-15

Data refer to trademarks filed at the European Union Intellectual Property Office (EUIPO), the Japan Patent Office (JPO) and the US Patent and Trademark Office (USPTO), by filing date, according to the applicants' residence using fractional counts. ICT-related trademarks refer to trademark applications designating classes 9, 28, 35, 38, 41 and/or 42 of the Nice Classification and containing ICT-related keywords in the goods and services description (complete list of keywords available on demand). Shares are calculated for countries with more than 250 trademarks filed at the EUIPO or the USPTO and more than 25 trademarks filed at the JPO during the period considered.

ICT-related designs, 2012-15

Data refer to design applications filed at the European Union Intellectual Property Office (EUIPO) and the Japan Patent Office (JPO), and design patents filed at the US Patent and Trademark Office (USPTO), by filing date, according to the applicants' residence using fractional counts. ICT-related designs refer to subclasses 14-01 to 14-04, 14-99, 16-01 to 16-06, 16-99, 18-01 to 18-04, 18-99 of the Locarno Classification. Shares are calculated for countries with more than 100 designs filed at the EUIPO or 100 design patents at the USPTO and more than 25 designs filed at the JPO during the period considered.

4.4 ICT and innovation

R&D expenditure by ICT equipment and information services industries, 2015

Figures are based on estimates of business R&D by industry reported on a main activity basis, in ISIC Rev.4.

These statistics are based upon OECD R&D Statistics (<http://oe.cd/rds>) and ANBERD (<http://oe.cd/anberd>) Databases. For more information on these data, including on issues such as breaks in series, please see those sources.

For Austria, Belgium, Greece and Ireland, data refer to 2013.

For Canada, Denmark, Finland, Hungary, Israel, Italy, the Netherlands, Poland, Portugal, Slovenia, the United Kingdom and the United States, data refer to 2014.

For Estonia, Germany and Japan, data refer to 2007 and 2015.

For France and Sweden, data refer to 2007 and 2013.

For Switzerland, data refer to 2004 and 2015.

Patents in ICT-related technologies and major players, 2012-15

Data refer to IP5 families, by filing date, according to the applicants' residence using fractional counts. Patents in ICT are identified using the list of IPC codes in Inaba and Squicciarini (2017). 2014 and 2015 figures are estimated based on available data for those years.

Innovative businesses in ICT manufacturing and information and communication services, 2012-14

International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns. European countries follow harmonised survey guidelines with the Community Innovation Survey. Please see www.oecd.org/sti/inno-stats.htm for more details.

ICT manufacturing refers to ISIC Rev.4 Division 26 (Manufacture of computer, electronic and optical products), while manufacturing refers to Section C. Information and communication services comprise the entire ISIC Rev.4 Division J, while services refer to Sections and Divisions B, C, D, E, G46, H, J, K and M71-72-73.

For countries following the Eurostat CIS 2014, data on innovative enterprises include product, process, organisational or marketing innovative firms (including ongoing or abandoned innovation activities). The Industry core coverage includes ISIC Rev.4 Sections and Divisions B, C, D, E, G46, H, J, K and M71-72-73. Only enterprises with 10 or more employees are covered.

For Australia, data come from the Business Characteristics Survey (BCS) and refer to the financial year 2014/15. Data on innovative enterprises include product, process, organisational or marketing innovative firms (including ongoing or abandoned innovation activities). The sectoral and size coverage of enterprises matches the CIS scope.

For Brazil, data come from the Brazil Innovation Survey 2014 (PINTEC) and refer to 2012-14. Data on innovative enterprises include product, process, organisational or marketing innovative firms (including ongoing or abandoned innovation activities). The industries surveyed differ from the CIS core coverage. ISIC Rev.4 Section E is not included and only a selection of services is covered (Divisions and groups: 592, 61, 62, 631, 71 and 72).

For Estonia, CIS-2014 data were the subject of a methodological review. This causes a break in series when comparing them to previous CIS editions.

For Japan, data come from the Japanese National Innovation Survey (J-NIS 2015). Data refer to the financial years 2012/13, 2013/14 and 2014/15. Data on innovative enterprises include product, process, organisational or marketing innovative firms (including ongoing or abandoned innovation activities). The sectoral and size coverage of enterprises matches the CIS scope.

For Korea, data come from the Korean Innovation Survey. The survey is carried out separately for manufacturing and services, but all data refer to the period 2013-15. Data on innovative enterprises include product, process, organisational or marketing innovative firms (including ongoing or abandoned innovation activities). The sectoral coverage is smaller than CIS for the industrial sector and includes ISIC Rev.4 Section C Manufacturing only. All services are covered except for Section (O) Public administration and defence; compulsory social security.

For New Zealand, data come from the Business Operation Survey (BOS) and refer to the financial years 2012/13 and 2013/14, and firms with six or more employees with an annual Goods and Services Tax (GST) turnover figure greater than NZD 30 000. Data on innovative enterprises refer to product, process, organisational and marketing innovating firms (including ongoing or abandoned innovation activities).

For Switzerland, data come from the Survey of Innovation Activities in the Swiss Economy, and refer to the period 2012-14. Data on innovative enterprises include product, process, organisational or marketing innovative firms (including ongoing or abandoned innovation activities).

4.5 Mixed modes of innovation

Innovation types, by business size, 2012-14

International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns. European countries follow harmonised survey guidelines with the Community Innovation Survey. Please see www.oecd.org/sti/inno-stats.htm for more details.

Size is calculated on the basis of numbers of persons employed. SMEs are defined as businesses with 10 to 249 employees and large firms as businesses with 250 employees or more.

For countries following the Eurostat CIS 2012, the data include ongoing or abandoned innovative activities. The Industry core coverage includes ISIC Rev.4 Sections and Divisions B, C, D, E, G46, H, J, K and M71-72-73. Only enterprises with 10 or more employees are covered.

For Australia, data come from the Business Characteristics Survey (BCS) and refer to financial year 2014/15. The data include ongoing or abandoned innovative activities. The sectoral and size coverage of enterprises matches the CIS scope.

For Brazil, data come from the Brazil Innovation Survey 2014 (PINTEC) and refer to 2012-14. The data do not include ongoing or abandoned innovative activities. The industries surveyed differ from the CIS core coverage. ISIC Rev.4 Section E is not included and only selected services are covered (Divisions and groups: 592, 61, 62, 631, 71 and 72).

For Chile, data come from the Chilean Innovation Survey 2015 and refer to 2013-14. The data do not include ongoing or abandoned innovative activities. The survey covers firms with more than UF 2 400 in annual revenue, no cut-off by size is applied. Sectoral coverage is larger for the industrial sector and besides CIS core activities includes: ISIC Rev.3 Sections A, Agriculture, hunting and forestry; B, Fishing and F, Construction. The services covered are ISIC Rev.3 (G, I, J and K).

For Estonia, CIS-2014 data were the subject of a methodological review. This causes a break in series when comparing them to previous CIS editions.

For Japan, data come from the Japanese National Innovation Survey (J-NIS 2015). Data refer to the financial years 2012/13, 2013/14 and 2014/15. The data include ongoing or abandoned innovative activities. The sectoral and size coverage of enterprises matches the CIS scope.

For Korea, data come from the Korean Innovation Survey. The survey is carried out separately for manufacturing and services, but both sets of data refer to 2013-15. Data do not include ongoing or abandoned innovative activities. The phrasing of the question on product innovation is slightly different from the guidelines given in the Oslo Manual. As a result, the introduction of new services by manufacturing firms or of new goods by service firms might be under reported. Sectoral coverage is smaller than CIS for the industrial sector and includes ISIC Rev.4 Section C Manufacturing only. All services are covered except for Section (O) Public administration and defence; compulsory social security.

For New Zealand, data come from the Business Operation Survey (BOS) and refer to the financial years 2012/13 and 2013/14, and firms with six or more employees with an annual Goods and Services Tax (GST) turnover figure greater than NZD 30 000. Data do not include ongoing or abandoned innovative activities. The sectoral and size coverage of enterprises matches the CIS scope.

For Switzerland, data come from the Survey of Innovation Activities in the Swiss Economy and refer to 2012-14. The data include ongoing or abandoned innovative activities. The sectoral and size coverage of enterprises matches the CIS scope.

New-to-market innovators, manufacturing and services, 2012-14

International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns. European countries follow harmonised survey guidelines with the Community Innovation Survey. Please see www.oecd.org/sti/inno-stats.htm for more details.

Manufacturing refers to ISIC Rev.4 Section C, while services refer to Sections and Divisions B, C, D, E, G46, H, J, K and M71-72-73.

For countries following the Eurostat CIS 2014, only enterprises with 10 or more employees are covered. The core coverage for services includes ISIC Rev.4 Sections and Divisions G46, H, J, K and M71-72-73.

For Australia, data come from the Business Characteristics Survey (BCS) and refer to financial year 2014/15. BCS does not have a single response for new to market, but combining New to Industry, New to Australia and New to World captures the same data (i.e. excludes new to firm only). The sectoral and size coverage of enterprises matches the CIS scope.

For Brazil, data come from the Brazil Innovation Survey 2014 (PINTEC) and refer to 2012-14. Data refer to product innovative enterprises with product innovation new to the national market. Only selected CIS core ISIC Rev.4 services are covered (Divisions and groups: 592, 61, 62, 631, 71 and 72).

For Chile, data come from the 9th Chilean Innovation Survey and refer to 2013-14. The survey covers firms with more than UF 2 400 in annual revenue, no cut-off by size is applied. The services covered are ISIC Rev.3 (G, I, J and K).

For Estonia, CIS-2014 data were the subject of a methodological review. This causes a break in series when comparing them to previous CIS editions.

For Japan, data come from the Japanese National Innovation Survey (J-NIS 2015). Data refer to the financial years 2012/13, 2013/14 and 2014/15. The sectoral and size coverage of enterprises matches the CIS scope.

For Korea, data come from the Korean Innovation Survey and refer to 2013-15. The phrasing of the question on product innovation is slightly different from the guidelines given in the Oslo Manual. As a result, the introduction of new services by manufacturing firms or of new goods by service firms might be under reported. Services coverage is larger than CIS core and includes all services except for Section (O) Public administration and defence; compulsory social security.

For New Zealand, data come from the Business Operation Survey (BOS) and refer to the financial years 2012/13 and 2013/14, and firms with six or more employees with an annual Goods and Services Tax (GST) turnover figure greater than NZD 30 000. BOS does not have a single response for new to market, but combining New to New Zealand and New to World captures the same data (i.e. excludes new to firm only).

For the Russian Federation, data refer to 2012-14 and firms with 15 or more employees. The industries surveyed differ from the CIS core coverage. ISIC Rev.3.1 Sections C, Mining and quarrying, D, Manufacturing, E, Electricity, gas and water supply and Divisions 64, 72, 73 and 74 for services are covered.

For Switzerland, data come from the Survey of Innovation Activities in the Swiss Economy, 2013. Data refer to 2010-12. The sectoral and size coverage of enterprises matches the CIS scope.

For the United States, data come from the Business R&D and Innovation Survey (BRDIS), 2014 and refer to 2012-14. The sectoral and size coverage of enterprises matches the CIS size and sectoral scope but item non response to new to the market product innovation question has been reported as non-new-to-market.

New-to-market innovators, by size, 2012-14

International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns. European countries follow harmonised survey guidelines with the Community Innovation Survey. Please see www.oecd.org/sti/inno-stats.htm for more details.

Size is calculated on the basis of numbers of persons employed. SMEs are defined as businesses with 10 to 249 employees and large firms as businesses with 250 employees or more.

For countries following the Eurostat CIS 2014, the Industry core coverage includes ISIC Rev.4 Sections and Divisions B, C, D, E, G46, H, J, K and M71-72-73. Only enterprises with 10 or more employees are covered.

For Australia, data come from the Business Characteristics Survey (BCS) and refer to financial year 2014/15. BCS does not have a single response for new to market, but combining New to Industry, New to Australia and New to World captures the same data (i.e. excludes new to firm only).

For Brazil, data come from the Brazil Innovation Survey 2015 (PINTEC) and refer to 2012-14. Data refer to product innovative enterprises with product innovation new to their national market. Only selected CIS core ISIC Rev.4 services are covered (Divisions and groups: 592, 61, 62, 631, 71 and 72).

For Chile, data come from the 9th Chilean Innovation Survey and refer to 2013-14. The survey covers firms with more than UF 2 400 in annual revenue, no cut-off by size is applied. Sectoral coverage is larger for the industrial sector and besides CIS core activities includes: ISIC Rev.3 Sections A, Agriculture, hunting and forestry; B, Fishing and F, Construction. The services covered are ISIC Rev.3 (G, I, J and K).

For Estonia, CIS-2014 data were the subject of a methodological review. This causes a break in series when comparing them to previous CIS editions.

For Japan, data come from the Japanese National Innovation Survey (J-NIS 2015). Data refer to the financial years 2012/13, 2013/14 and 2014/15. The sectoral and size coverage of enterprises matches the CIS scope.

For Korea, data come from the Korean Innovation Survey. The phrasing of the question on product innovation is slightly different from the guidelines given in the Oslo Manual. As a result, the introduction of new services by manufacturing firms or of new goods by service firms might be under reported. The survey is carried out separately for manufacturing and services, but both sets of data refer to 2013-15. Sectoral coverage is smaller than CIS for the industrial sector and includes ISIC Rev.4 Section C Manufacturing only. All services are covered except for Section (O) Public administration and defence; compulsory social security.

For New Zealand, data come from the Business Operation Survey (BOS) and refer to the financial years 2012/13 and 2013/14, and firms with six or more employees with an annual Goods and Services Tax (GST) turnover figure greater than NZD 30 000. BOS does not have a single response for new to market, but combining New to New Zealand and New to World captures the same data (i.e. excludes new to firm only).

For the Russian Federation, data refer to 2012-14 and firms with 15 or more employees. The industries surveyed differ from the CIS core coverage. ISIC Rev.3.1 Sections C, Mining and quarrying, D, Manufacturing, E, Electricity, gas and water supply and Divisions 64, 72, 73 and 74 for services are covered.

For Switzerland, data come from the Survey of Innovation Activities in the Swiss Economy. Data refer to 2012-14. The sectoral and size coverage of enterprises matches the CIS scope.

For the United States, data come from the Business R&D and Innovation Survey (BRDIS), 2014 and refer to 2012-14. The sectoral and size coverage of enterprises matches the CIS size and sectoral scope but item non response to new to the market product innovation question has been reported as non-new-to-market.

4.6 R&D tax incentives

Direct government funding and tax support for business R&D, 2015

For more information on R&D tax incentives, see <http://oe.cd/rdtax>, and for general notes and country-specific notes for this R&D tax incentive indicator, see http://oe.cd/sb2017_notes_rdtax.

Change in government support for business R&D through direct funding and tax incentives, 2006 and 2015

For more information on R&D tax incentives, see <http://oe.cd/rdtax>, and for general notes and country-specific notes for this R&D tax incentive indicator, see http://oe.cd/sb2017_notes_rdtax.

Tax subsidy rates on R&D expenditures, 2017

This is an experimental indicator based on quantitative and qualitative information representing a notional level of tax subsidy rate under different scenarios. It requires a number of assumptions and calculations specific to each country. International comparability may be limited.

For more information on R&D tax incentives, see <http://oe.cd/rdtax>, and for general notes and country-specific notes for this R&D tax incentive indicator, see http://oe.cd/sb2017_notes_rdtax.

4.7. Policy environment and demand for innovation

Venture capital investment, 2016

The early stage includes: for Australia, pre-seed, seed and start-up stage; for Canada and the United States, seed and early stage; for European countries, seed and start-up stage; for Israel, seed/start-up stage and early/expansion stage and for Japan, seed, early stage and expansion stage.

The later stage includes: for Australia, early expansion stage and for the United States, expansion and later stage.

Korea, New Zealand, the Russian Federation and South Africa do not provide breakdowns of venture capital by stage that would allow for meaningful international comparisons.

4. INNOVATION IN FIRMS

Notes and references

For Japan and Israel, data refer to 2014.

For the United States, data include venture capital investments done by other investors alongside venture capital firms, but exclude investment deals that are 100% financed by corporations and/or business angels.

Data providers are: InvestEurope (European countries), ABS (Australia), CVCA (Canada), KVCA (Korea), NVCA (United States), NZVCA (New Zealand), PwCMoneyTree (Israel), RVCA (the Russian Federation), SAVCA (South Africa) and VEC (Japan).

SMEs participating in international and public sector markets, by innovation status, 2012-14

International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns. Please see www.oecd.org/sti/inno-stats.htm for more details.

The international and public sector market participation of firms within the scope of innovation surveys is compared according to the innovation status of firms. Innovative firms are defined as those which have introduced a new product, process, organisational or marketing methods over the reference period.

Size is calculated on the basis of numbers of persons employed. SMEs are defined as businesses with 10 to 249 employees and large firms as businesses with 250 employees or more.

For countries following the Eurostat CIS 2014 the Industry core coverage includes ISIC Rev.4 Sections and Divisions B, C, D, E, G46, H, J, K, and M71-72-73. Only enterprises with 10 or more employees are covered.

For Australia, data come from the Business Characteristics Survey (BCS). Data refer to financial year 2014/15. The sectoral and size coverage of enterprises matches the CIS scope.

For Brazil, data come from the Brazil Innovation Survey 2015 (PINTEC) and refer to 2012-14. The industries surveyed differ from the CIS core coverage. ISIC Rev.4 Section E is not included and only selected services are covered (Divisions and groups: 592, 61, 62, 631, 71 and 72).

For Chile, data come from the 9th Chilean Innovation Survey and refer to 2013-14. The survey covers firms with more than UF 2 400 in annual revenue, no cut-off by size is applied. Sectoral coverage is larger than CIS core for the industrial sector and also includes: ISIC Rev. 3 Sections A, Agriculture, hunting and forestry; B, Fishing and F, Construction. The services covered are ISIC Rev.3 (G, I, J and K).

For Estonia, CIS-2014 data were the subject of a methodological review. This causes a break in series when comparing them to previous CIS editions.

For Japan, data come from the Japanese National Innovation Survey (J-NIS 2015). Data refer to the fiscal years 2012/14, 2010/11 and 2011/12. The sectoral and size coverage of enterprises matches the CIS scope.

For Korea, data come from the Korean Innovation Survey. The survey is carried out separately for manufacturing and services, but data refer to the same period 2013-15. Sectoral coverage is smaller than CIS for the industrial sector and includes ISIC Rev.4 Section C Manufacturing only. All services are covered except for Section (O) Public administration and defence; compulsory social security.

For Switzerland, data come from the Survey of Innovation Activities in the Swiss Economy. Data refer to 2012-14. The sectoral and size coverage of enterprises matches the CIS scope.

Businesses receiving public support for innovation, by size, 2012-14

International comparability may be limited due to differences in innovation survey methodologies and country-specific response patterns. European countries follow harmonised survey guidelines with the Community Innovation Survey. Please see www.oecd.org/sti/inno-stats.htm and chapter notes for more details.

Size is calculated on the basis of numbers of persons employed. SMEs are defined as businesses with 10 to 249 employees and large firms as businesses with 250 employees or more.

For countries following the Eurostat CIS 2014 the data on public support for innovation include product or process innovative firms (including ongoing or abandoned innovation activities). The Industry core coverage includes ISIC Rev.4 Sections and Divisions B, C, D, E, G46, H, J, K and M71-72-73. Only enterprises with 10 or more employees are covered.

For Australia, data come from the Business Characteristics Survey (BCS) and refer to financial year 2014/15 and 2012/13. Data on public support for innovation include product, process, marketing and organisational innovative firms (including ongoing or abandoned innovation activities). The BCS asks a yes/no question as to whether government financial assistance has been received. The sectoral and size coverage of enterprises matches the CIS scope.

For Brazil, data come from the Brazil Innovation Survey 2015 (PINTEC) and refer to 2012-14 and 2009-11. Data on public support for innovation include product or process innovative firms (including ongoing or abandoned innovation activities). The industries surveyed differ from the CIS core coverage. ISIC Rev.4 Section E is not included and only selected services are covered (Divisions and groups: 592, 61, 62, 631, 71 and 72).

For Chile, data come from the 9th Chilean Innovation Survey and refer to 2013-14 and 2009-11. Data on public support for innovation include product, process, organisational and marketing innovative firms (ongoing or abandoned innovative activities are not identified). The survey covers firms with more than UF 2 400 in annual revenue, no cut-off by size is applied. The sectoral coverage is larger for the industrial sector and besides CIS core activities includes: ISIC Rev.3 Sections A, Agriculture, hunting and forestry; B, Fishing and F, Construction. The services covered are ISIC Rev.3 (G, I, J and K).

For Estonia, CIS-2014 data were the subject of a methodological review. This causes a break in series when comparing them to previous CIS editions.

For Japan, data come from the Japanese National Innovation Survey (J-NIS 2015 and J-NIS 2012). Data refer to the financial years 2012/13, 2013/14 and 2014/15 and to 2009/10, 2010/11 and 2011/12. Data on public support for innovation include product or process innovative firms (including ongoing or abandoned innovation activities). The sectoral and size coverage of enterprises matches the CIS scope.

For Korea, data come from the Korean Innovation Survey. The survey is carried out separately for manufacturing and services, but both sets of data refer to 2013-15 and 2011-13. Data on public support for innovation include product, process, organisational and marketing innovative firms (including ongoing or abandoned innovation activities). Sectoral coverage is smaller than CIS for the industrial sector and includes ISIC Rev.4 Section C Manufacturing only. All services are covered except for Section (O) Public administration and defence; compulsory social security.

For the Russian Federation, data refer to 2012-14 and 2009-11 and firms with 15 or more employees. Data on public support for innovation include product or process innovative firms (including ongoing or abandoned innovation activities). The industries surveyed differ from the CIS core coverage. ISIC Rev.3.1 Sections C, Mining and quarrying; D, Manufacturing; E, Electricity, gas and water supply and Divisions 64, 72, 73 and 74 for services, are covered.

For Switzerland, data come from the Survey of Innovation Activities in the Swiss Economy. Data refer to 2012-14 and 2010-12. The sectoral and size coverage of enterprises matches the CIS scope.

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