



 **SCIENCE AND TECHNOLOGY**

RESEARCH AND DEVELOPMENT

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EXPENDITURE ON R&D

Expenditure on research and development (R&D) is a key indicator of countries' innovative efforts.

Definition

Research and development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge (including knowledge of man, culture and society) and the use of this knowledge to devise new applications. R&D covers three activities: basic research, applied research, and experimental development. Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view. Applied research is also original investigation undertaken in order to acquire new knowledge; it is, however, directed primarily towards a specific practical aim or objective. Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

The main aggregate used for international comparisons is gross domestic expenditure on R&D (GERD). This consists of the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc. It includes R&D funded from abroad but excludes domestic funds for R&D performed outside the domestic economy. GERD is here expressed in constant 2005 dollars (adjusted for purchasing power parity) and as a share of GDP (R&D intensity).

Comparability

The R&D data shown here have been compiled according to the guidelines of the OECD *Frascati Manual*. Estimates

of the resources allocated to R&D are affected by national characteristics such as the periodicity and coverage of national R&D surveys across institutional sectors and industries (and the inclusion of firms and organisations of different sizes); and the use of different sampling and estimation methods. R&D typically involves a few large performers, hence R&D surveys use various techniques to maintain up-to-date registers of known performers, while attempting to identify new or occasional performers.

Data for Israel exclude defence. Those for Korea, prior to 2007, exclude social sciences and the humanities. For the United States, R&D capital expenditures are excluded and depreciation charges of the business enterprises are included.

Sources

- OECD (2012), *Main Science and Technology Indicators*, OECD Publishing.

Further information

Analytical publications

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- OECD (2011), *OECD Science, Technology and Industry Scoreboard*, OECD Publishing.

Methodological publications

- OECD (2002), *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development, The Measurement of Scientific and Technological Activities*, OECD Publishing.

Online databases

- OECD Science, Technology and R&D Statistics

Websites

- OECD Science, Technology and Industry, www.oecd.org/sti.
- OECD Main Science and Technology Indicators, www.oecd.org/sti/msti.
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- OECD Frascati Manual 2002 (supplementary material), www.oecd.org/sti/frascaticmanual.

Overview

Total OECD R&D spending in real terms increased in 2010 after shrinking by 1.7% in 2009. This upturn was mainly due to a strong recovery in the level of R&D performed by the business sector. Among the G7 countries for which 2010 data are available, total R&D expenditure grew (in real terms) in Germany (3.7%), Japan (1.4%), Italy (1.3%) and France (1.2%), and declined in both Canada and the United Kingdom (by around 3%).

Among OECD countries, the United States is the main performer with 42% of the total OECD GERD in 2009, followed by Japan (15%) and Germany (9%). Since 1999, real R&D expenditure has been growing the fastest in Estonia, Korea, Portugal and Turkey, with average annual growth rates around 10%. Outside the OECD area, China's average annual real growth in R&D spending has been close to 20%, making it the world's second largest R&D performer and ahead of Japan since 2009.

In 2009, R&D amounted to 2.4% of GDP for the OECD as a whole. Denmark, Finland, Israel, Japan, Korea and Sweden were the only OECD countries whose R&D-to-GDP ratio exceeded 3%.

Over the last decade, R&D intensity grew in the EU (from 1.74% to 1.91%), in Japan (from 3.00% to 3.26%) and in the United States (from 2.71 to 2.90%). Estonia, Korea, Portugal and Turkey were the fastest growing OECD countries. In the same period (2000-10), R&D intensity in China almost doubled, increasing from 0.90% to 1.77%.

SCIENCE AND TECHNOLOGY • RESEARCH AND DEVELOPMENT

Gross domestic expenditure on R&D

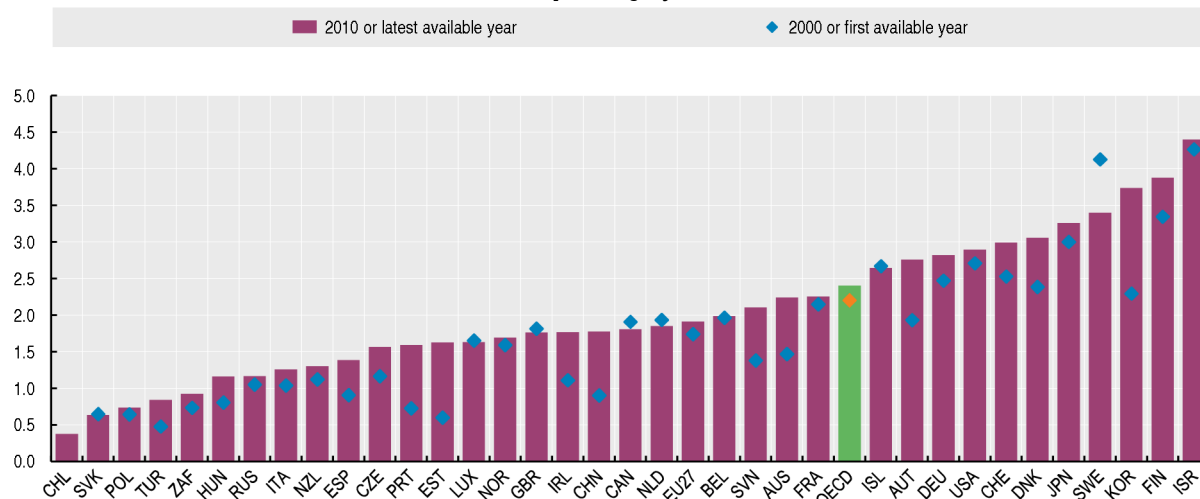
Million US dollars – 2005 constant prices and PPPs

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Australia	..	8 936	..	10 719	..	12 061	..	14 902	..	17 644	..	..	..
Austria	4 636	4 920	5 266	5 546	5 902	6 043	6 803	6 996	7 455	8 052	7 896	8 184	8 417
Belgium	5 810	6 125	6 497	6 165	6 018	6 149	6 171	6 440	6 750	7 081	7 090	7 109	..
Canada	17 032	19 063	21 215	21 352	21 687	22 709	23 090	23 336	23 356	22 796	22 416	21 708	21 448
Chile	..	..	..	..	..	..	..	..	712	889	..	..	..
Czech Republic	1 881	2 079	2 125	2 159	2 335	2 442	2 948	3 467	3 650	3 570	3 582	3 888	..
Denmark	3 554	..	4 063	4 289	4 421	4 363	4 419	4 608	4 875	5 342	5 408	5 471	..
Estonia	98	95	117	128	148	175	207	277	285	324	311	362	..
Finland	4 260	4 733	4 799	4 955	5 170	5 401	5 601	5 846	6 151	6 576	6 406	6 553	..
France	35 799	36 946	38 479	39 521	38 794	39 395	39 236	40 191	40 623	41 394	42 720	43 214	..
Germany	58 231	61 579	62 557	63 289	63 981	63 800	64 299	67 595	69 569	74 705	74 375	77 098	..
Greece	1 291	..	1 356	..	1 449	1 471	1 615	1 670	1 770	..	..	..	..
Hungary	915	1 124	1 348	1 516	1 474	1 447	1 616	1 788	1 751	1 803	1 955	1 967	..
Iceland	185	224	258	258	252	..	287	324	308	308	..	..	..
Ireland	1 360	1 413	1 449	1 543	1 706	1 878	2 009	2 119	2 297	2 528	2 858	2 844	..
Israel	4 700	6 228	6 628	6 607	6 296	6 610	7 146	7 684	8 714	8 937	8 422	8 719	..
Italy	15 474	16 411	17 376	18 110	17 766	17 920	17 999	19 095	20 204	20 527	20 337	20 606	..
Japan	106 715	110 017	113 086	114 930	117 927	120 301	128 695	134 844	139 916	138 684	126 872	128 581	..
Korea	17 574	20 213	22 641	23 586	25 067	28 305	30 618	34 712	38 923	41 685	44 311	49 394	..
Luxembourg	..	441	..	..	476	492	495	554	561	682	563	569	..
Mexico	4 334	4 011	4 239	4 727	4 769	5 014	5 346	5 266	5 215	..	..	..	..
Netherlands	10 220	10 385	10 572	10 290	10 533	10 823	10 904	11 157	11 134	11 071	11 016	11 379	..
New Zealand	831	..	1 006	..	1 144	..	1 189	..	1 304	..	1 427	..	..
Norway	2 687	..	3 009	3 082	3 208	3 175	3 316	3 503	3 832	4 023	4 048	4 024	..
Poland	2 989	2 912	2 850	2 595	2 606	2 831	2 982	3 107	3 384	3 790	4 304	4 876	..
Portugal	1 429	1 574	1 704	1 627	1 565	1 663	1 755	2 256	2 728	3 519	3 728	3 667	..
Slovak Republic	444	444	450	424	446	418	440	459	480	522	506	692	..
Slovenia	513	543	605	616	549	629	675	775	769	911	942	1 081	..
Spain	8 302	9 193	9 607	10 635	11 657	12 203	13 331	14 832	16 220	17 457	17 302	17 240	..
Sweden	8 864	..	10 814	..	10 443	10 233	10 510	11 346	10 809	11 686	10 804	10 835	..
Switzerland	..	6 308	..	..	..	7 525	..	..	..	8 728	..	..	..
Turkey	2 739	2 996	3 171	3 293	3 184	3 735	4 617	4 845	6 314	6 380	7 110	7 664	..
United Kingdom	29 856	31 056	31 594	32 399	32 759	32 524	34 081	35 331	37 219	37 018	36 731	35 615	..
United States	282 775	302 231	306 683	300 510	307 769	310 261	325 936	339 956	355 488	371 813	365 994	..	..
EU27	197 094	208 068	215 363	219 609	221 669	223 960	229 931	242 058	251 118	262 891	262 780	267 201	..
OECD	650 059	690 857	712 638	715 336	730 083	743 415	779 529	818 588	857 502	888 551	873 833	..	..
Brazil	..	..	..	..	..	..	..	..	..	..	..	..	..
China	23 512	30 401	34 673	42 570	49 618	59 264	71 055	83 902	96 304	111 183	140 637	161 552	..
India	..	..	..	..	..	..	..	..	..	..	..	..	..
Indonesia	..	..	..	..	..	..	..	..	..	..	..	..	..
Russian Federation	11 419	13 242	15 602	17 308	19 139	18 364	18 121	19 689	22 230	21 891	24 185	23 394	..
South Africa	2 536	..	2 921	3 271	3 654	4 005	4 179	4 335

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Gross domestic expenditure on R&D

As a percentage of GDP



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RESEARCHERS

Researchers are key actors in the research and development system. On average, in OECD countries, labour costs account for half of the R&D expenditure. Two-thirds of total R&D personnel are estimated to be researchers.

Definition

Researchers are professionals engaged in the conception and creation of new knowledge, products, processes, methods and systems, as well as those who are directly involved in the management of projects for such purposes. They include researchers working in both civil and military research in government, universities and research institutes as well as in the business sector.

Researchers are part of human resources devoted to R&D. Other categories of R&D personnel are technicians (and equivalent staff) who participate in R&D by performing scientific and technical tasks, and other supporting staff (skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects).

The number of researchers is measured in full-time equivalents (i.e. a person working half-time on R&D is counted as 0.5 person-year) and expressed per thousand people employed in each country. The number of researchers includes staff engaged in R&D during the course of one year.

Overview

In the OECD area, around 4.2 million persons were employed as researchers in 2007. There were about 7.6 researchers per thousand of employed people, compared with 5.9 per thousand employed in 1995. This indicator has steadily increased over the last two decades.

The Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) top the table for the numbers of researchers per thousand persons employed, with Finland the highest in the group, and the OECD, recording 17.0 researchers per thousand persons employed in 2010. Among the remaining OECD countries, rates are highest in Korea (11.1), Japan (10.4) and New Zealand (12.4 in 2009). Conversely, researchers per thousand of employed people are low (below 1.0) in Chile and Mexico. Other countries with low rates, below 5.0 researchers per thousand of employed people, include Italy, Poland and Turkey.

Among the major non-member countries, growth in the number of researchers has been steady in China although the overall level, at 1.6 per thousand of people employed in 2010, still remains well below the OECD average. The number of researchers per thousand of people employed for the Russian Federation has been decreasing since 1994 but this level, at 6.3 researchers per thousand employed in 2010, is similar to that of EU countries.

In 2007, in the OECD, about 2.7 million researchers were engaged in the business sector. It represents approximately two-thirds of the total although there are differences across countries: four out of five researchers work in the business sector in the United States, about three out of four in Japan and Korea, but less than one out of two in the EU. Chile, Mexico, Poland, the Slovak Republic and South Africa have a low intensity of business researchers (less than one per 1 000 employees in industry). In these countries, the business sector plays a much smaller role in the national R&D system than the higher education and government sectors.

Comparability

The data on researchers have been compiled on the basis of the methodology of the OECD *Frascati Manual*. Comparability over time is affected to some extent by improvements in the coverage of national R&D surveys and by the efforts of countries to improve the international comparability of their data.

For the United States beginning in 2000, the total numbers of researchers are OECD estimates. Data for the United States exclude military personnel in the government sector since 1985. For China, from 2009 researcher data are collected according to the OECD *Frascati Manual* definition of researcher.

Sources

- OECD (2012), Main Science and Technology Indicators, OECD Publishing.

Further information

Analytical publications

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- OECD Measuring Science and Technology, www.oecd.org/sti/measuring-scitech.
- OECD R&D and GBAORD Sources and Methods Databases, http://webnet.oecd.org/rd_gbaord_metadata.
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Researchers

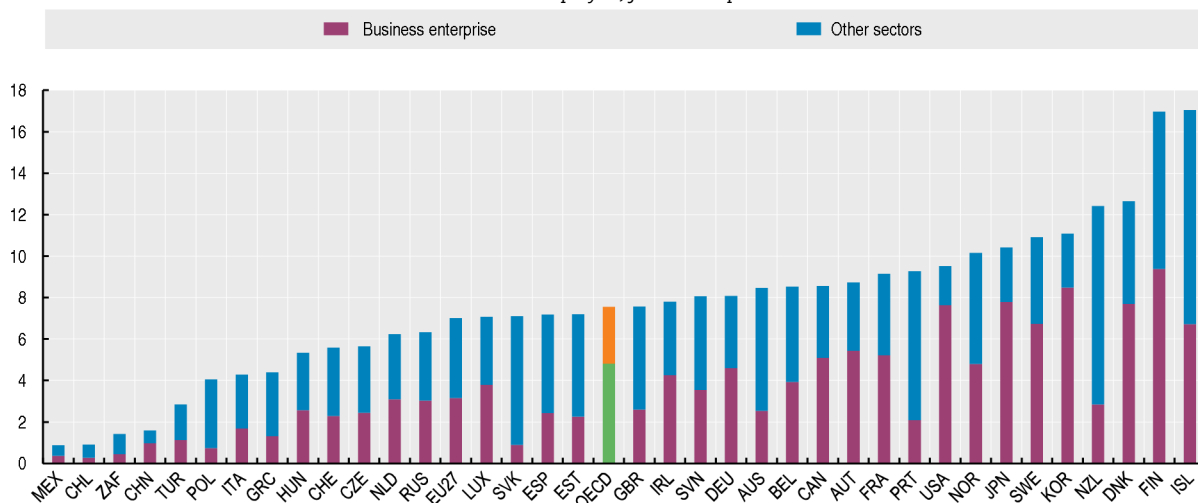
Per thousand employed, full-time equivalent

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Australia	7.3	..	7.3	..	7.8	..	8.3	..	8.5	..	8.5	..	..
Austria	5.1	..	..	..	6.3	..	6.7	7.3	7.3	7.8	8.4	8.5	8.7
Belgium	6.9	7.4	7.4	7.7	7.4	7.4	7.7	7.8	8.1	8.3	8.3	8.6	8.5
Canada	6.6	6.7	7.2	7.5	7.4	7.7	8.1	8.3	8.4	8.8	8.9	8.6	..
Chile	..	..	..	..	..	..	..	..	..	0.9	0.9	..	..
Czech Republic	2.5	2.7	2.8	3.0	3.0	3.2	3.3	4.8	5.2	5.3	5.6	5.5	5.6
Denmark	..	6.9	..	7.0	9.2	9.0	9.6	10.2	10.2	10.4	12.1	12.6	12.6
Estonia	4.9	5.2	4.7	4.6	5.2	5.1	5.7	5.5	5.4	5.6	6.1	7.3	7.2
Finland	13.9	14.5	15.2	15.9	16.5	17.8	17.4	16.6	16.6	15.7	16.2	16.6	17.0
France	6.7	6.8	7.1	7.2	7.5	7.7	8.1	8.1	8.3	8.6	8.8	9.1	..
Germany	6.3	6.6	6.6	6.7	6.8	6.9	6.9	7.0	7.2	7.3	7.5	7.9	8.1
Greece	..	3.5	..	3.4	..	3.5	..	4.3	4.2	4.4	..	..	..
Hungary	2.9	3.0	3.4	3.5	3.5	3.6	3.6	3.8	4.2	4.2	4.5	5.0	5.3
Iceland	9.6	10.3	..	11.7	..	12.2	..	13.4	14.2	12.5	12.9	17.0	..
Ireland	5.1	4.9	5.0	5.1	5.3	5.5	5.9	5.9	6.0	6.0	6.9	7.5	7.8
Israel	..	..	..	..	..	..	..	..	..	..	..	..	..
Italy	2.9	2.9	2.9	2.9	3.0	2.9	3.0	3.4	3.6	3.7	..	4.1	4.3
Japan	9.8	10.0	9.9	10.1	9.8	10.3	10.3	10.6	10.7	10.6	10.2	10.4	10.4
Korea	4.6	4.9	5.1	6.3	6.4	6.8	6.9	7.9	8.6	9.5	10.0	10.4	11.1
Luxembourg	..	..	6.2	..	..	6.7	6.8	7.2	6.4	6.6	6.6	6.8	7.1
Mexico	0.6	0.6	..	..	..	0.9	1.0	1.1	0.9	0.9	..	..	..
Netherlands	5.1	5.3	5.2	5.5	5.3	5.3	5.9	5.8	6.3	5.9	5.8	5.4	6.2
New Zealand	..	6.2	..	9.1	..	10.4	..	10.5	..	10.8	..	12.4	..
Norway	..	7.9	..	8.5	..	8.9	8.9	9.0	9.3	9.6	9.8	10.1	10.1
Poland	3.7	3.8	3.8	4.0	4.1	4.3	4.4	4.4	4.1	4.0	3.9	3.9	4.1
Portugal	3.0	3.2	3.3	3.5	3.7	4.0	4.0	4.1	4.8	5.5	7.8	8.8	9.3
Slovak Republic	4.8	4.5	4.9	4.7	4.5	4.7	5.2	5.2	5.5	5.7	5.6	6.1	7.1
Slovenia	4.9	5.0	4.8	4.9	5.0	4.1	4.4	5.7	6.3	6.5	7.1	7.7	8.1
Spain	4.0	3.9	4.7	4.7	4.8	5.2	5.5	5.7	5.8	5.9	6.4	7.0	7.2
Sweden	..	9.5	..	10.5	..	11.0	11.2	12.7	12.6	10.1	11.0	10.5	10.9
Switzerland	..	..	6.4	..	..	..	6.1	..	..	..	5.6	..	..
Turkey	1.0	1.0	1.2	1.2	1.2	1.7	1.7	2.0	2.1	2.4	2.5	2.7	2.9
United Kingdom	5.5	5.7	5.8	6.1	6.6	7.1	7.5	8.0	8.1	8.0	8.0	8.3	7.6
United States	..	9.3	9.3	9.5	9.7	10.2	9.8	9.6	9.6	9.5	..	..	..
EU27	5.0	5.1	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.4	6.6	6.9	7.0
OECD	..	6.6	6.7	6.9	7.0	7.4	7.3	7.5	7.6	7.6	..	..	..
Brazil	..	..	..	..	..	..	..	..	..	..	..	..	..
China	0.7	0.7	1.0	1.0	1.1	1.2	1.2	1.5	1.6	1.9	2.1	1.5	1.6
India	..	..	..	..	..	..	..	..	..	..	..	..	..
Indonesia	..	..	..	..	..	..	..	..	..	..	..	..	..
Russian Federation	8.4	7.9	7.8	7.8	7.4	7.3	7.1	6.8	6.7	6.6	6.4	6.4	6.3
South Africa	1.3	..	1.2	1.5	1.4	1.5	1.5	1.4

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Researchers

Per thousand employed, full-time equivalent



Statlink  <http://dx.doi.org/10.1787/888932708902>

PATENTS

Patent-based indicators provide a measure of the output of a country's R&D, i.e. its inventions. The methodology used for counting patents can however influence the results, as simple counts of patents filed at a national patent office are affected by various kinds of limitations (such as weak international comparability) and highly heterogeneous patent values. To overcome these limits, the OECD has developed triadic patent families, which are designed to capture all important inventions and to be internationally comparable.

Definition

A patent family is defined as a set of patents registered in various countries (i.e. patent offices) to protect the same invention. Triadic patent families are a set of patents filed at three of these major patent offices: the European Patent Office (EPO), the Japan Patent Office (JPO) and the United States Patent and Trademark Office (USPTO).

Triadic patent family counts are attributed to the country of residence of the inventor and to the date when the patent was first registered.

Triadic patent families are expressed as numbers and per million inhabitants.

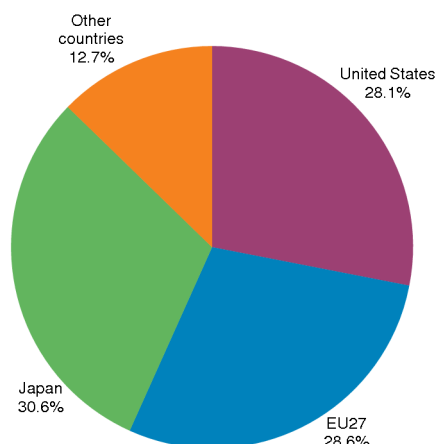
Comparability

The concept of triadic patent families has been developed in order to improve the international comparability and quality of patent-based indicators. Indeed, only patents registered in the same set of countries are included in the family: home advantage and influence of geographical location are therefore eliminated. Furthermore, patents included in the triadic family are typically of higher economic value: patentees only take on the additional costs and delays of extending

the protection of their invention to other countries if they deem it worthwhile.

Share of countries in triadic patent families

Percentage, 2010



Statlink  <http://dx.doi.org/10.1787/888932708959>

Overview

The late 2000s were marked by a decrease in the number of patent filings by minus 0.3% per year on average, after a steady growth observed in the late 1990s. The United States and Japan show a similar declining trend whereas patent filings originating from the European Union remained at a same level.

About 49 000 triadic patent families were filed in 2010, compared to over 45 000 registered in 2000. The United States accounts for 28.1% of patent families, a lower share compared to the one recorded in 2000 (30.5%). The share of triadic patent families originating from Europe has also tended to decrease, losing almost 1 percentage points between 2000 and 2010 (to 28.6% in 2010). The origin of patent families has shifted towards Asian countries. The most spectacular growth was observed by Korea, whose share of all triadic patent families increased from 1.6% in 2000 to 4.4% in 2010. Strong rises are also observed for China and India, with an average growth in the number of triadic patents of more than 28% and 15% a year respectively between 2000 and 2010.

When triadic patent families are expressed relative to the total population Japan, Switzerland, Sweden and Germany were the four most inventive countries in 2010, with the highest values recorded in Japan (118) and Switzerland (109). Ratios for Austria, Denmark, Finland, Israel, Korea, the Netherlands and the United States are also above the OECD average (39). Conversely, China has less than 0.7 patent families per million population.

Sources

- OECD (2011), *OECD Patent Statistics* (database).

Further information

Analytical publications

- OECD (2012), *OECD Science, Technology and Industry Outlook*, OECD Publishing.
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Triadic patent families

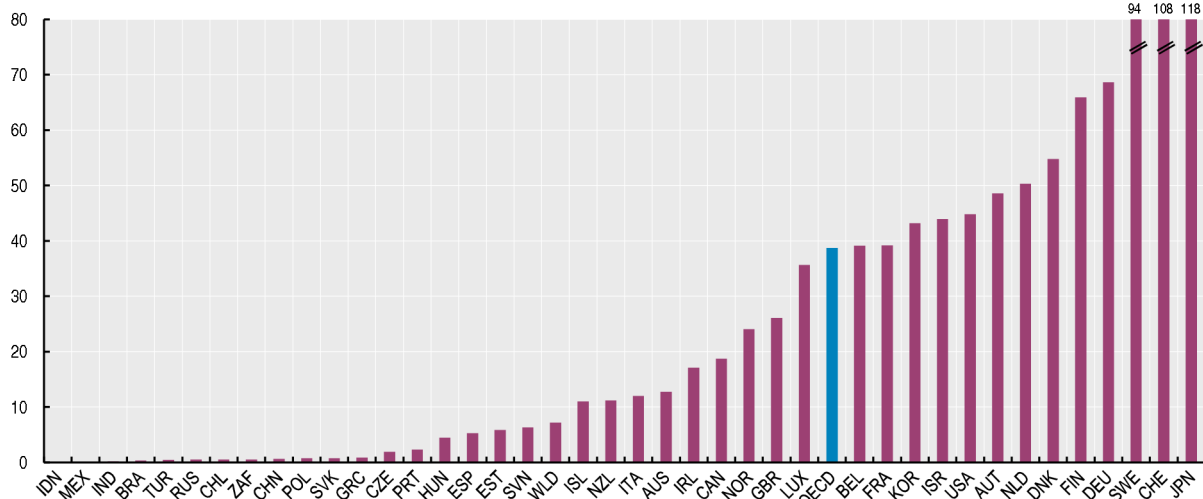
Number

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Australia	301	295	373	276	350	342	367	342	332	318	304	287	284
Austria	270	259	275	257	322	339	384	429	428	411	389	406	407
Belgium	399	374	327	314	343	326	414	379	407	427	403	391	414
Canada	537	524	526	497	594	577	653	668	661	678	611	635	638
Chile	2	2	2	5	5	3	5	5	6	5	5	7	9
Czech Republic	16	10	9	12	14	15	15	15	16	21	22	21	20
Denmark	272	237	223	180	231	246	296	311	304	312	308	297	303
Estonia	2	1	1	2	1	3	1	2	5	5	6	8	8
Finland	454	453	350	303	275	301	339	344	367	364	349	346	353
France	2 289	2 348	2 140	1 960	2 217	2 268	2 412	2 402	2 431	2 477	2 476	2 431	2 447
Germany	6 163	6 016	5 804	5 653	5 502	5 446	5 635	5 779	5 960	5 942	5 741	5 625	5 685
Greece	12	6	6	7	8	13	9	15	14	15	12	12	9
Hungary	18	40	29	31	27	41	44	40	44	47	46	43	44
Iceland	6	7	11	3	9	4	2	4	4	4	4	5	4
Ireland	38	75	31	47	52	66	70	79	74	79	80	78	76
Israel	302	278	321	288	268	295	350	420	420	385	371	341	335
Italy	678	663	638	647	712	710	756	745	756	745	732	713	707
Japan	11 758	13 159	14 749	14 050	14 294	15 016	15 155	14 859	15 048	14 543	13 106	13 070	15 067
Korea	469	581	732	887	1 213	1 695	2 000	2 129	2 134	2 202	1 780	2 067	2 182
Luxembourg	22	22	20	26	10	20	23	18	22	17	21	17	17
Mexico	10	11	9	12	10	15	15	14	19	17	16	13	12
Netherlands	854	915	1 022	1 061	967	939	945	902	1 010	952	939	890	828
New Zealand	52	48	47	33	55	57	63	50	60	55	51	49	49
Norway	97	107	105	78	108	98	107	110	120	119	112	121	118
Poland	4	8	9	12	11	10	17	13	14	17	20	23	27
Portugal	5	5	3	6	6	7	6	12	17	32	30	27	25
Slovak Republic	3	3	2	2	3	5	1	2	3	3	3	3	4
Slovenia	12	4	9	6	14	13	12	18	13	14	16	15	13
Spain	127	126	145	153	164	156	218	220	207	221	227	233	242
Sweden	852	882	618	668	693	674	696	831	899	925	901	870	882
Switzerland	805	773	811	734	806	844	879	870	906	866	850	841	847
Turkey	7	3	4	10	8	9	13	13	14	21	21	26	35
United Kingdom	1 796	1 647	1 622	1 601	1 651	1 666	1 656	1 667	1 705	1 685	1 632	1 613	1 598
United States	14 515	14 574	13 794	13 605	14 471	14 803	15 185	15 352	15 857	15 033	14 096	13 862	13 837
EU27	14 288	14 105	13 291	12 955	13 231	13 289	13 964	14 238	14 707	14 723	14 371	14 072	14 124
OECD	43 145	44 458	44 768	43 427	45 413	47 022	48 744	49 057	50 275	48 956	45 684	45 382	47 527
Brazil	29	27	29	45	42	43	49	52	49	68	67	60	60
China	49	60	71	100	155	219	228	312	365	467	507	709	875
India	32	39	54	83	126	133	115	130	147	150	162	179	201
Indonesia	3	1	4	2	3	2	0	1	4	1	2	2	3
Russian Federation	96	62	73	53	51	53	50	60	70	68	64	65	73
South Africa	37	28	36	17	27	32	30	35	39	32	31	27	26
World	43 588	44 900	45 273	43 984	46 145	47 838	49 591	50 063	51 396	50 250	46 998	46 903	49 304

 Statlink  <http://dx.doi.org/10.1787/888932708921>

Triadic patent families

Number per million inhabitants, 2010


 Statlink  <http://dx.doi.org/10.1787/888932708940>

BIOTECHNOLOGY

Spending on biotechnology research and development (R&D) by the business enterprise sector within a country is a measure of this country's research focus on biotechnology.

Definition

The OECD developed both a single definition and a list-based definition of biotechnology. The single definition is deliberately broad. It covers all modern biotechnology but also many traditional or borderline activities. For this reason, the single definition should always be accompanied by the list-based definition.

The single definition is: The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

The (indicative, not exhaustive) list-based definition, which serves as an interpretative guideline to the single definition includes seven categories, and respondents are usually given a write-in option for new biotechnologies that do not fit any of the categories. A firm that reports activity in one or more categories is defined as a biotechnology firm. The categories are as follows:

DNA/RNA: Genomics, pharmacogenomics, gene probes, genetic engineering, DNA/RNA sequencing/synthesis/amplification, gene expression profiling, and use of antisense technology.

Proteins and other molecules: Sequencing/synthesis/engineering of proteins and peptides (including large molecule hormones); improved delivery methods for large molecule drugs; proteomics, protein isolation and purification, signaling, identification of cell receptors.

Cell and tissue culture and engineering: Cell/tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cellular fusion, vaccine/immune stimulants, embryo manipulation.

Process biotechnology techniques: Fermentation using bioreactors, bioprocessing, bioleaching, biopulping, bioleaching, biodesulphurisation, bioremediation, biofiltration and phytoremediation.

Gene and RNA vectors: Gene therapy, viral vectors.

Bioinformatics: Construction of databases on genomes, protein sequences; modelling complex biological processes, including systems biology.

Nanobiotechnology: Applies the tools and processes of nano/microfabrication to build devices for studying biosystems and applications in drug delivery, diagnostics, etc.

Comparability

Data availability and comparability depends on how each country collects biotechnology statistics.

A biotechnology firm is a firm engaged in biotechnology using at least one biotechnology technique to produce goods or services and/or to perform biotechnology R&D. Some firms may be large, with only a small share of total economic activity attributable to biotechnology.

Countries that collect biotechnology statistics through their R&D surveys may underestimate biotechnology activity by firms, as firms that use biotechnology but do not perform biotechnology R&D are excluded.

Although every effort has been made to maximise comparability across countries, caution must be used in comparing biotechnology activities among countries when the data are obtained from studies with very different methodologies.

Sources

- Key Biotechnology Indicators, www.oecd.org/sti/biotechnology/indicators.

Further information

Analytical publications

- OECD (2012), *Knowledge Networks and Markets in the Life Sciences*, OECD Publishing.
- OECD (2011), *Future Prospects for Industrial Biotechnology*, OECD Publishing.
- OECD (2011), *OECD Science, Technology and Industry Scoreboard*, OECD Publishing.
- OECD (2009), *OECD Biotechnology Statistics 2009*, OECD Publishing.

Methodological publications

- OECD (2009), "Guidelines for a Harmonised Statistical Approach to Biotechnology Research and Development in the Government and Higher Education Sectors", OECD Working Party of National Experts on Science and Technology Indicators, unclassified document DSTI/EAS/STP/NESTI(2009)1/FINAL.
- OECD (2005), "A Framework for Biotechnology Statistics", OECD Working Party of National Experts on Science and Technology Indicators.
- OECD (2002), *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development*, The Measurement of Scientific and Technological Activities, OECD Publishing.

Websites

- OECD Key Biotechnology Indicators, www.oecd.org/sti/biotechnology/indicators.

Overview

The United States spends the most on biotechnology Business Enterprise R&D (BERD), PPP USD 22 030 million or approximately 7.8% of total US BERD. This accounts for almost 64% of total biotechnology BERD expenditures in the 26 countries for which data are available.

Biotechnology BERD as a share of total BERD is an indicator of country's research focus on biotechnology. On average, biotechnology BERD accounted for 5.7% of total BERD. Ireland spends the most as a percentage of BERD (15.1%). Belgium and Switzerland follow, both recording BERD spending of 12.6%.

Biotechnology R&D intensity (biotechnology R&D as a percentage of industry value added) is highest in Denmark (0.388%), followed by Switzerland (0.369%) and Belgium (0.258%).

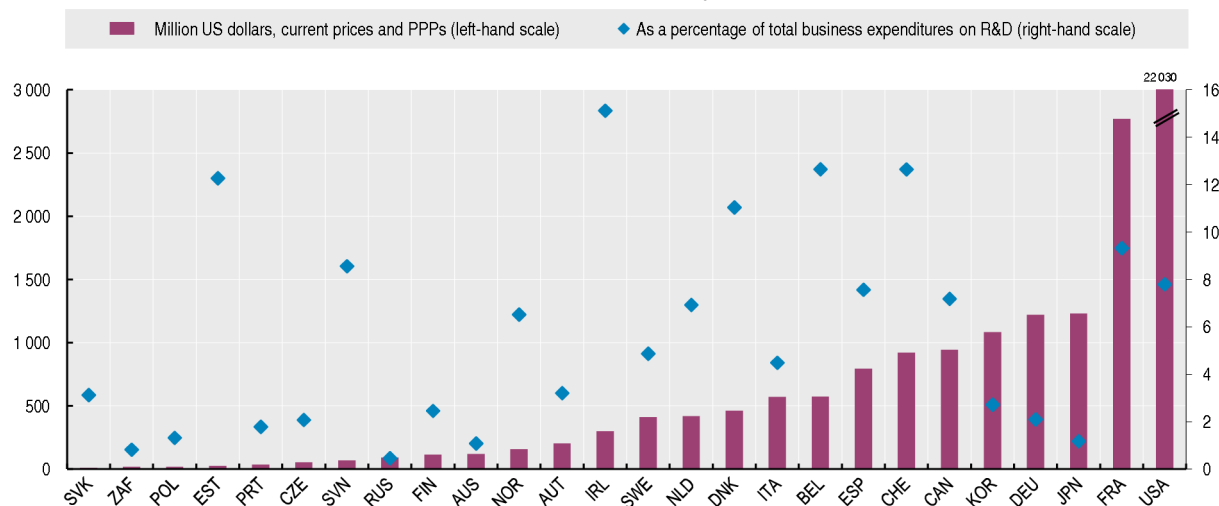

Biotechnology R&D expenditures in the business sector

2010 or latest available year

	Million US dollars, current prices and PPPs	As a percentage of total business enterprise R&D	As a percentage of industry value added
Australia	119.3	1.1	0.020
Austria	203.4	3.2	0.093
Belgium	574.0	12.6	0.258
Canada	944.5	7.2	0.109
Chile	..	..	..
Czech Republic	53.6	2.1	0.029
Denmark	463.7	11.0	0.388
Estonia	27.3	12.3	0.145
Finland	115.6	2.5	0.097
France	2 769.3	9.3	0.220
Germany	1 221.5	2.1	0.062
Greece	..	..	..
Hungary	..	..	..
Iceland	..	..	..
Ireland	301.6	15.1	0.244
Israel	..	..	..
Italy	572.4	4.5	0.049
Japan	1 230.1	1.2	0.043
Korea	1 082.7	2.7	0.114
Luxembourg	..	..	..
Mexico	..	..	..
Netherlands	420.2	6.9	0.095
New Zealand	..	..	..
Norway	158.6	6.5	0.085
Poland	19.6	1.3	0.004
Portugal	36.9	1.8	0.024
Slovak Republic	10.9	3.1	0.011
Slovenia	69.2	8.6	0.185
Spain	794.1	7.6	0.079
Sweden	411.3	4.9	0.194
Switzerland	922.3	12.6	0.369
Turkey	..	..	..
United Kingdom	..	..	..
United States	22 030.0	7.8	0.256
EU27	..	..	..
OECD	..	..	..
Brazil	..	..	..
China	..	..	..
India	..	..	..
Indonesia	..	..	..
Russian Federation	91.8	0.5	0.005
South Africa	19.0	0.8	0.006

 Statlink  <http://dx.doi.org/10.1787/888932708978>
Total biotechnology R&D expenditures in the business sector

2010 or latest available year


 Statlink  <http://dx.doi.org/10.1787/888932708978>

SIZE OF THE ICT SECTOR

Information and communication technologies (ICT) have been at the heart of economic changes for more than a decade and have proven to be resilient during the recent economic crisis. The ICT sector contributes to technological progress, output and productivity growth. The impacts of the ICT sector can be examined in several ways – directly, through its contribution to output, employment or productivity growth, or indirectly, as a source of technological change affecting other parts of the economy for instance.

Definition

In 1998, OECD member countries agreed on a definition of the ICT sector as a combination of manufacturing and services industries whose products capture, transmit or display data and information electronically. The industry-based definition of the ICT sector was based on Revision 3 of the *International Standard Industrial Classification* (ISIC Rev. 3). This definition was slightly revised in 2002 according to the release of ISIC Rev. 3.1.

The principles underlying this definition were the following. For manufacturing industries, an ICT product must fulfil the function of information processing and communication, including transmission and display; or must use electronic processing to detect, measure and/or record physical phenomena or to control a physical process. For services industries, ICT products must enable information processing and communication by electronic means.

In 2007, these principles were reviewed leading to a narrower definition. The production (goods and services) of an ICT industry must primarily fulfil or enable the function of information processing and communication by electronic means, including transmission and display. The revised definition is now based on ISIC Rev. 4.

Overview

The share of the ICT sector in the total business sector value added within the OECD has remained relatively stable over time, exhibiting a slight upward compound annual growth rate (CAGR) of 0.5% since 1995. In 2009, the share of value added attributed to the ICT sector was 8.3%, up from 7.7% in 1995. This upward trend indicates that output in the ICT sector is growing relative to the rest of the economy, highlighting the importance of the ICT sector overall. Data in the graph shows that in 2009, the ICT sector accounted for more than 10% of total business sector value added in Korea (13.2%), followed by Israel (13%), Ireland (11.4%) and with Finland, Sweden and Hungary (close to 11%).

The recent economic crisis has put pressure on the ICT labour market, but recovery in ICT services employment and ICT-skilled employment has been much faster than across the economy as a whole. The ICT sector contributes to a significant share of total employment, accounting for almost 15 million people in OECD countries in 2009, or almost 6% of total OECD business sector employment. Finland and Sweden represented the largest shares of ICT employment in total business employment at over 8%, shares that have increased markedly over time. The share of employment in the ICT sector declined in countries such as Austria, Ireland and the United States.

For this indicator, the ICT sector is measured as a share of the total business sector value added and employment.

Comparability

The existence of a widely accepted definition of the ICT sector is the first step towards making comparisons across time and countries possible. However, the implementation of the 2006-07 ICT sector definition is not feasible yet since not all OECD countries are using ISIC Rev.4 in their national statistical systems. To assure comparability, the 2002 definition of the ICT sector has been used to measure the size of the sector. As the ICT sector is an activity-based definition, a total business sector defined by activities may be preferable as a denominator, rather than a total business sector defined on an institutional basis. The business sector is usually used for international comparisons, and here it is defined as per the ISIC Rev. 3.1 activities 10 to 74, excluding 70 (i.e. excluding Agricultural activities, Real Estate and Community and personal services).

Data provided by OECD countries have been combined with different data sources to estimate ICT aggregates compatible with national accounts totals. For this reason, statistics presented here may differ from data contained in national reports and in previous OECD publications. OECD shares are estimates based on available data.

Sources

- OECD (2012), *OECD Internet Economy Outlook*, OECD Publishing.

Further information

Analytical publications

- OECD (2012), "ICT Skills and Employment: New Competences and Jobs for a Greener and Smarter Economy", *OECD Digital Economy Papers*, No. 198.
- OECD (2012), *OECD Science, Technology and Industry Outlook*, OECD Publishing.
- OECD (2010), *Information Technology Outlook*, OECD Publishing.

Statistical publications

- OECD (2011), *OECD Guide to Measuring the Information Society 2011*, OECD Publishing.


Websites

- OECD Information economy, www.oecd.org/sti/information-economy.
- OECD Key ICT indicators, www.oecd.org/sti/ictindicators.
- OECD Science, Technology and Industry, www.oecd.org/sti.

Share of ICT in value added and in employment

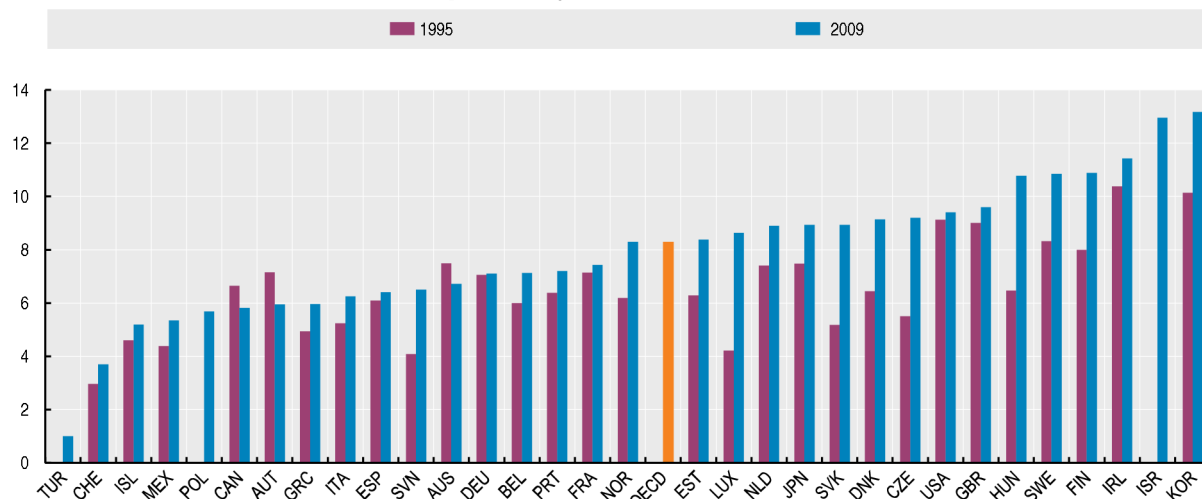
Percentage

	Share of ICT value added in business sector value added		Share of ICT employment in business sector employment	
	2009 or latest available year	Percentage point change 1995-2009	2009 or latest available year	Percentage point change 1995-2009
Australia	6.7	-0.8	4.7	0.0
Austria	5.9	-1.3	4.9	-0.3
Belgium	7.1	1.2	5.0	1.1
Canada	5.8	-1.1	5.6	0.1
Chile	..	..	..	..
Czech Republic	9.2	3.7	5.9	3.0
Denmark	9.1	2.5	7.0	1.4
Estonia	8.4	2.1	2.6	..
Finland	10.9	2.2	9.4	1.7
France	7.4	0.3	6.5	0.3
Germany	7.1	0.0	5.3	0.5
Greece	6.0	1.3	3.3	2.3
Hungary	10.8	3.7	6.7	3.5
Iceland	5.2	1.0	..	..
Ireland	11.4	0.7	7.5	-0.2
Israel	13.0	..	..	..
Italy	6.2	1.3	5.5	1.4
Japan	8.9	1.3	6.2	0.4
Korea	13.2	1.9	6.1	0.8
Luxembourg	8.6	5.2	6.0	6.0
Mexico	5.3	1.4	..	..
Netherlands	8.9	1.3	6.6	1.5
New Zealand	..	..	..	..
Norway	8.3	2.1	6.2	1.8
Poland	5.7	..	..	..
Portugal	7.2	1.1	3.0	0.2
Slovak Republic	8.9	4.0	6.1	0.9
Slovenia	6.5	3.4	3.1	3.9
Spain	6.4	0.3	3.7	0.4
Sweden	10.9	1.9	8.7	0.8
Switzerland	3.7	2.0	4.0	4.2
Turkey	1.0	..	..	..
United Kingdom	9.6	0.5	6.2	0.8
United States	9.4	0.2	5.7	-0.5
EU27	..	..	..	..
OECD	8.3	0.5	5.7	0.3
Brazil	..	..	..	..
China	..	..	..	..
India	..	..	..	..
Indonesia	..	..	..	..
Russian Federation	..	..	..	..
South Africa	..	..	..	..

 Statlink  <http://dx.doi.org/10.1787/888932709016>

Share of ICT in value added

As a percentage of business sector value added


 Statlink  <http://dx.doi.org/10.1787/888932709035>

INVESTMENT IN ICT

Investment in information and communication technology (ICT) was the most dynamic component of investment in the late 1990s and early 2000s. This investment enabled new technologies to enter the production process, to expand and renew the capital stock, and to sustain economic growth.

Definition

Investment is defined in accordance with the 1993 System of National Accounts. ICT investment covers the acquisition of equipment and computer software that is used in production for more than one year. ICT has three components: information technology equipment (computers and related hardware); communications equipment; and software. Software includes acquisition of pre-packaged software, customised software and software developed in-house.

The investment shares presented here are percentages of each country's gross fixed capital formation, excluding residential construction.

Comparability

Data availability and measurement of ICT investment vary considerably across OECD countries, especially in terms of measurement of investment in software, deflators applied, breakdown by institutional sector and temporal coverage.

In the system of national accounts, expenditure on ICT is considered as investment only if the products can be physically isolated (i.e. ICT embodied in equipment is considered not as investment but as intermediate consumption). This may affect the comparability of ICT investment across countries depending on how they differentiate between intermediate consumption and investment in practice. In addition the form and nature of transactions, particularly those relating to software, can cause differences in recorded ICT investment. For example software purchased as a one-year license will be recorded as intermediate consumption but software purchased with a license for a longer period will be treated as investment. In addition measures of the individual components of ICT investment will differ depending on whether, for example, software is sold separately or bundled within other ICT products, such as hardware. However in practice these differences are not

expected to significantly affect international comparability of total ICT investment.

Note that ICT components that are incorporated in other products, such as motor vehicles or machine tools, are included in the value of those other products and excluded from ICT investment as defined here.

Sources

- OECD (2012), OECD Productivity Statistics (database).

Further information

Analytical publications

- OECD (2012), *OECD Internet Economy Outlook*, OECD Publishing.
- OECD (2011), *OECD Communications Outlook*, OECD Publishing.
- OECD (2011), *OECD Information Technology Outlook*, OECD Publishing.
- OECD (2011), *OECD Science, Technology and Industry Scoreboard 2011*, OECD Publishing.
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- OECD (2012), *National Accounts of OECD Countries*, OECD Publishing.

Methodological publications

- Ahmad, N. (2003), "Measuring Investment in Software", *OECD Science, Technology and Industry Working Papers*, No. 2003/6.
- Lequillier, F. et al. (2003), "Report of the OECD Task Force on Software Measurement in the National Accounts", *OECD Statistics Working Papers*, No. 2003/1.
- OECD (2010), *Handbook on Deriving Capital Measures of Intellectual Property Products*, OECD Publishing.
- OECD/Federal Statistical Office (2009), *Productivity Measurement and Analysis*, OECD Publishing.

Online databases

- STAN: OECD Structural Analysis Statistics.

Websites

- OECD work on patent statistics, www.oecd.org/sti/ipr-statistics.
- OECD Productivity statistics, www.oecd.org/statistics/productivity.

Overview

ICT shares in total non-residential investment in 2010 (or the latest year available) differ significantly among OECD countries but were particularly high (at 20% or more of the total) in the United States, Sweden, Denmark, the United Kingdom and New Zealand, while they were only slightly above 10% in Italy and Korea.

Software has been the main component of ICT investment in many countries. Its share in non-residential investment in 2010 (or the latest year available) was highest in the United States, Sweden, Denmark, and the United Kingdom while it was below 6% in Italy and Austria. The share of IT equipment was highest in Denmark and in the United States, while it was lowest in Korea, France and Spain. The share of communication equipment in non-residential investment was higher than 5% in the United States, New Zealand and Switzerland and was below 2% in Denmark, Sweden and Japan.

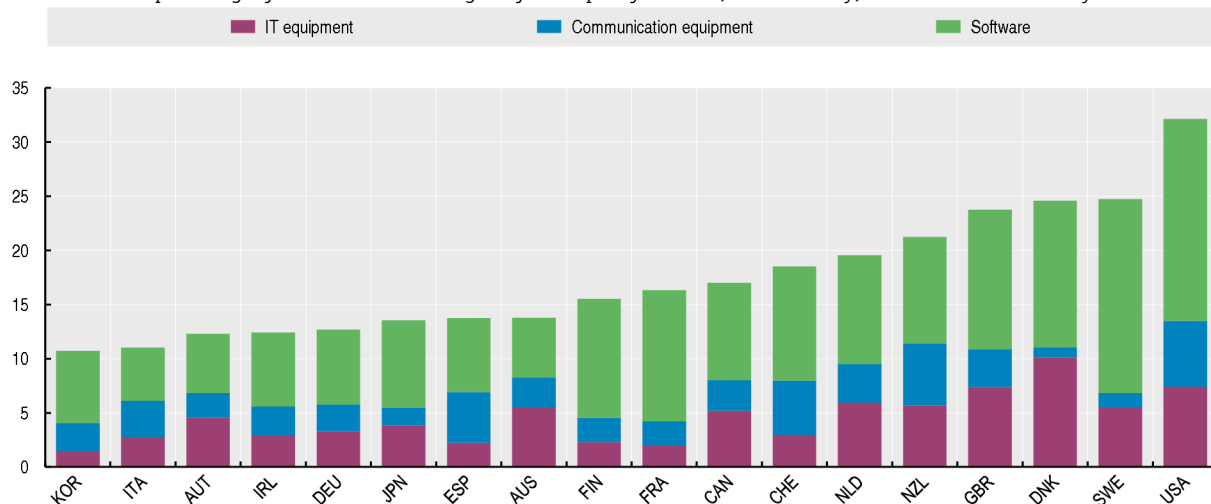
Shares of ICT investment in non-residential gross fixed capital formation

As a percentage of total non-residential gross fixed capital formation, total economy

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Australia	20.2	21.5	24.0	22.5	19.9	19.7	17.3	15.3	14.6	14.2	13.8	..	..
Austria	12.6	13.5	13.4	14.0	14.5	13.1	12.4	11.9	12.1	12.3	..	..	..
Belgium	..	..	..	..	..	..	..	..	..	..	..	..	..
Canada	18.8	19.9	20.6	20.2	19.2	18.8	18.5	17.6	16.8	16.7	15.9	17.5	17.0
Chile	..	..	..	..	..	..	..	..	..	..	..	..	..
Czech Republic	..	..	..	..	..	..	..	..	..	..	..	..	..
Denmark	19.5	21.6	19.9	19.2	22.0	22.1	23.7	24.8	24.5	24.6	..	..	..
Estonia	..	..	..	..	..	..	..	..	..	..	..	..	..
Finland	13.8	14.6	13.2	11.7	11.1	14.5	14.4	15.0	15.4	14.3	12.8	14.4	15.5
France	18.7	19.9	19.2	20.5	19.2	18.6	17.6	17.5	17.0	16.2	16.2	16.3	..
Germany	15.2	16.5	17.3	17.5	16.6	15.1	14.5	15.0	15.2	14.0	13.0	13.2	12.7
Greece	..	..	..	..	..	..	..	..	..	..	..	..	..
Hungary	..	..	..	..	..	..	..	..	..	..	..	..	..
Iceland	..	..	..	..	..	..	..	..	..	..	..	..	..
Ireland	11.6	11.0	11.0	11.2	9.3	9.1	9.0	7.5	9.0	8.9	7.5	11.3	12.4
Israel	..	..	..	..	..	..	..	..	..	..	..	..	..
Italy	14.2	13.9	14.6	13.6	12.3	11.6	11.5	11.7	10.9	10.7	10.4	10.9	11.0
Japan	12.0	13.0	15.0	15.1	14.8	14.8	14.6	14.3	13.5	13.4	13.5	..	..
Korea	12.8	15.8	18.0	17.0	15.7	13.2	11.9	12.2	12.4	12.1	11.7	11.4	10.7
Luxembourg	..	..	..	..	..	..	..	..	..	..	..	..	..
Mexico	..	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	18.9	19.1	19.9	19.9	19.1	20.0	21.3	22.0	22.3	19.5	..	..	..
New Zealand	24.4	23.3	26.1	22.3	21.1	21.8	21.7	21.6	22.3	22.4	22.9	21.6	21.2
Norway	..	..	..	..	..	..	..	..	..	..	..	..	..
Poland	..	..	..	..	..	..	..	..	..	..	..	..	..
Portugal	..	..	..	..	..	..	..	..	..	..	..	..	..
Slovak Republic	..	..	..	..	..	..	..	..	..	..	..	..	..
Slovenia	..	..	..	..	..	..	..	..	..	..	..	..	..
Spain	14.7	14.9	14.7	14.3	13.8	13.6	13.3	12.7	12.7	13.1	13.6	13.7	13.8
Sweden	27.8	28.8	30.3	27.9	26.2	24.9	24.8	25.1	24.4	23.0	21.9	24.7	..
Switzerland	16.5	17.5	17.2	17.8	18.9	18.3	19.0	18.4	17.9	17.7	17.9	18.8	18.5
Turkey	..	..	..	..	..	..	..	..	..	..	..	..	..
United Kingdom	25.6	27.2	30.0	28.0	26.5	24.5	25.0	24.6	24.7	23.8	..	..	..
United States	29.3	31.0	32.6	31.2	30.3	30.5	29.8	27.8	26.7	26.3	26.4	30.6	32.1
EU27	..	..	..	..	..	..	..	..	..	..	..	..	..
OECD	..	..	..	..	..	..	..	..	..	..	..	..	..
Brazil	..	..	..	..	..	..	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..	..	..	..	..	..	..
India	..	..	..	..	..	..	..	..	..	..	..	..	..
Indonesia	..	..	..	..	..	..	..	..	..	..	..	..	..
Russian Federation	..	..	..	..	..	..	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..	..	..	..	..	..	..

 Statlink  <http://dx.doi.org/10.1787/888932709054>
Shares of ICT investment in non-residential gross fixed capital formation

As a percentage of total non-residential gross fixed capital formation, total economy, 2010 or latest available year


 Statlink  <http://dx.doi.org/10.1787/888932709073>

EXPORTS OF ICT GOODS

Information and communication (ICT) goods have been among the most dynamic components of international trade over the last decade.

Definition

Exports in ICT goods data are calculated using the World Customs Organisation's *Harmonised System* (HS) classifications.

A definition of ICT products (including ICT goods) was designed by the OECD to facilitate the construction of internationally comparable indicators on ICT consumption, investment, trade and production.

The first definition of ICT goods was established in 2003, based on a list of 6-digit items according to the HS 1996 and HS 2002. The second definition of ICT products was adopted in 2008, based on the then newly released second revision of the *Central Product Classification* (CPC rev. 2). The new definition includes ICT goods, ICT services and the first content and media product classification. The scope of the 2008 ICT goods definition is narrower than the 2003 definition.

The 2008 definition is based on principles which emphasise the intended use or functionality of products. The guiding principles for the delineation of the ICT sector led to a definition of ICT goods as follows:

ICT goods must either be intended to fulfill the function of information processing and communication by electronic means, including transmission and display, or use electronic processing to detect, measure and/or record physical phenomena, or to control a physical process.

The result is an ICT goods definition which consists in the selection of 95 items from the 2007 version of the HS classification. ICT goods exports are presented here in US dollars.

Comparability

Data are taken from the *International Trade by Commodity Statistics* database.

These are compiled according to internationally agreed standards and are generally considered to assure good comparability.

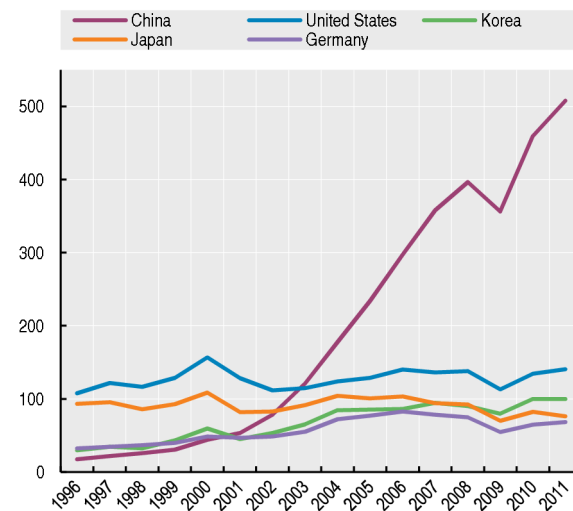
It is however difficult to compare values of the OECD ICT goods trade for 2007 and following years with those for earlier years owing to the new HS classification adopted

in 2007, which differs radically from earlier revisions. The OECD developed a correspondence between the HS 1996, HS 2002 and the HS 2007 for ICT goods.

Adjustment efforts were required to quantify and correct the impact of Missing Trader Intra-Community (MTIC) VAT Fraud from the mid-2000s, which mainly affected the movements of ICT goods within the EU. Trade data for China are not corrected for re-exports.

Exports of ICT goods

Billion US dollars



Statlink <http://dx.doi.org/10.1787/888932709130>

Overview

The global financial crisis significantly disturbed trade worldwide, however recent figures on ICT goods exports shows significant signs of recovery. Exports of ICT goods by all OECD countries and the non-OECD countries listed reached about USD 1.25 trillion in 2011. During the global financial crisis, ICT goods experienced a similar situation to that of the dotcom bubble, following which ICTs recovered and grew strongly, for instance the exports of ICT goods grew of 26% in the last two years.

The leading OECD exporters of ICT goods are the United States, Korea, Japan, Germany and the Netherlands. China is the world's largest player. In 2003, China overtook the United States in ICT goods exports. The OECD exporters mentioned above managed to develop their leading position in the export of communications equipment over the previous decade.

Sources

- OECD (2012), *International Trade by Commodity Statistics*, OECD Publishing.

Further information

Analytical publications

- OECD (2012), *OECD Science, Technology and Industry Working Papers*, OECD Publishing.
- OECD (2011), *OECD Communications Outlook*, OECD Publishing.
- OECD (2010), *OECD Information Technology Outlook*, OECD Publishing.

Methodological publications

- OECD (2011), *OECD Guide to Measuring the Information Society 2011*, OECD Publishing.

Websites

- OECD Key ICT indicators, www.oecd.org/sti/ictindicators.

Exports of ICT goods

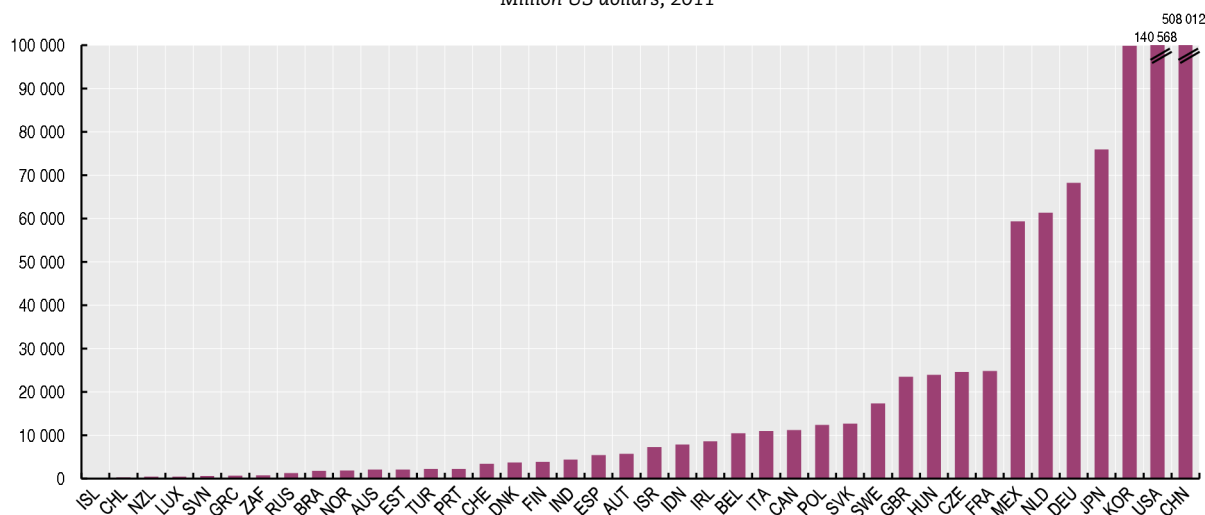

Million US dollars

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Australia	1 562	1 727	1 619	1 372	1 571	1 713	1 781	1 788	1 918	2 076	1 646	1 992	2 043
Austria	3 176	3 941	4 006	4 533	5 002	5 908	6 467	6 710	7 315	7 469	5 272	5 720	..
Belgium	8 963	10 825	11 453	9 734	11 591	12 527	13 458	12 300	11 602	12 388	9 296	9 609	10 417
Canada	14 317	20 967	13 094	10 163	10 052	11 845	13 990	14 878	15 065	14 129	10 944	10 687	11 186
Chile	31	30	33	36	32	33	44	52	76	300	300	264	293
Czech Republic	752	1 334	2 582	4 148	5 207	7 907	8 668	12 330	16 806	20 614	16 305	19 835	24 593
Denmark	3 385	3 654	3 470	4 692	4 282	4 662	5 783	5 248	4 746	3 921	3 164	3 516	3 686
Estonia	408	967	853	579	820	1 126	1 405	1 310	730	743	494	1 006	2 074
Finland	8 499	10 781	8 526	8 944	10 026	10 412	13 238	13 243	13 994	14 421	6 745	4 463	3 875
France	29 015	31 939	26 310	23 629	23 277	26 864	27 331	31 584	26 140	25 342	19 762	22 584	24 814
Germany	39 677	48 717	46 634	48 601	55 200	72 250	77 168	82 809	78 319	74 643	54 743	64 652	68 219
Greece	280	466	347	338	389	511	490	629	562	667	496	542	638
Hungary	5 521	7 231	7 244	8 804	10 899	15 694	15 944	17 841	21 301	24 522	21 465	24 218	23 913
Iceland	1	2	2	2	3	2	3	5	7	9	3	3	4
Ireland	25 589	27 697	31 638	27 430	22 524	23 482	24 675	24 140	22 780	19 989	12 802	8 866	8 596
Israel	4 745	6 668	5 842	4 367	4 228	5 133	3 210	3 527	..	6 299	7 854	7 178	7 247
Italy	9 712	10 675	10 612	9 239	9 851	11 455	11 581	11 376	11 142	10 529	8 210	9 626	10 959
Japan	92 974	108 795	81 953	82 922	91 436	104 335	100 814	103 139	94 022	92 513	70 164	82 141	75 968
Korea	43 453	59 426	44 871	53 500	65 323	84 555	85 314	86 167	94 694	90 337	79 508	99 813	99 857
Luxembourg	707	889	1 179	945	720	859	998	840	757	526	402	399	452
Mexico	27 472	34 771	34 943	33 345	31 845	37 003	38 533	46 916	48 149	56 897	49 764	60 159	59 368
Netherlands	33 805	38 160	34 286	28 578	42 666	53 615	58 717	62 308	67 738	63 156	53 342	61 367	61 367
New Zealand	148	158	141	152	284	351	369	374	414	402	348	372	446
Norway	1 149	1 104	1 165	952	1 015	1 169	1 268	1 471	1 670	2 116	1 771	1 864	..
Poland	1 162	1 290	1 619	1 980	2 339	2 819	3 558	5 519	7 858	11 949	12 808	15 119	12 361
Portugal	1 472	1 492	1 701	1 711	2 364	2 545	2 972	3 673	4 041	3 843	1 758	1 941	2 254
Slovak Republic	354	388	487	492	852	1 698	2 991	5 267	8 454	11 823	11 574	12 245	12 633
Slovenia	130	169	204	220	251	275	229	291	384	618	520	528	556
Spain	5 367	5 355	5 270	5 000	6 523	7 014	7 197	7 347	6 688	6 820	4 883	5 395	..
Sweden	14 079	15 487	8 485	9 228	10 153	13 640	14 613	15 115	14 533	15 830	11 788	15 477	17 318
Switzerland	2 816	3 080	2 680	1 910	2 204	2 595	3 408	3 015	3 034	3 366	2 746	3 214	3 442
Turkey	840	1 024	1 056	1 603	1 988	2 933	3 227	3 178	2 884	2 407	2 033	2 094	2 236
United Kingdom	44 529	50 419	47 999	46 747	37 280	37 736	42 777	50 761	29 491	27 710	23 400	24 233	23 503
United States	128 678	156 670	128 513	111 448	114 860	124 097	128 943	140 314	136 219	138 001	113 157	134 549	140 568
EU27	..	..	..	..	..	..	..	..	..	..	..	..	..
OECD	554 359	665 331	569 962	546 763	586 237	687 636	719 756	774 156	706 855	761 545	619 467	715 671	727 865
Brazil	1 243	2 232	2 329	2 178	2 106	2 013	3 701	3 969	2 975	3 139	2 320	1 985	1 792
China	30 522	44 135	53 221	78 243	121 365	177 742	234 086	297 653	357 974	396 424	356 301	459 522	508 012
India	501	714	858	781	957	1 082	1 113	1 344	..	..	6 099	4 404	4 404
Indonesia	3 069	7 573	6 095	6 301	5 687	6 527	6 944	6 138	6 025	6 517	6 921	7 862	7 845
Russian Federation	441	411	284	311	324	451	423	771	778	784	838	926	1 227
South Africa	432	417	442	390	462	578	587	745	846	805	677	695	763

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Exports of ICT goods

Million US dollars, 2011


 Statlink  <http://dx.doi.org/10.1787/888932709111>

COMPUTER, INTERNET AND TELECOMMUNICATION

Communication access and computers are increasingly present in homes in OECD countries, both in countries that already have high penetration rates and in those where adoption has lagged.

Definition

Access to home computers is the number of households that reported having at least one personal computer in working order in their home.

Also presented are the percentage of households who reported that they had access to the Internet. In almost all cases this access is via a personal computer either using a dial-up, ADSL or cable broadband access.

The third part of the table shows a different approach to Internet access with the Fixed (wired) broadband subscriptions per 100 inhabitants. This indicator is based on the Fixed broadband subscriptions which include the total number of subscriptions to the following broadband technologies with download speeds greater than 256 kbit/s: DSL, Cable modem, fiber-to-the-home and other fixed technologies (such as broadband over power-line and leased lines). Fixed (wired) broadband data are presented as a ratio of subscriptions per 100 inhabitants.

Comparability

The OECD has addressed issues of international comparability by developing a model survey on ICT used in households and by individuals. The model survey uses modules addressing different topics so that additional components can be added reflecting usage practices and policy interests. The ICT access and use by households and individuals model survey is available on the OECD website.

Statistics on ICT use by households may run into problems of international comparability because of structural differences in the composition of households. On the other hand, statistics on ICT use by individuals may refer to people of different ages, and age is an

important determinant of ICT use. Household- and person-based measures yield different figures in terms of levels and growth rates of ICT use. Such differences complicate international comparisons and make benchmarking exercises based on a single indicator of Internet access or use misleading, since country rankings change according to the indicator used.

Fixed (wired) broadband subscriptions per 100 inhabitants data for OECD and non-OECD countries are collected according to agreed definitions and are highly comparable. The data shown for non-OECD countries were collected according to OECD definitions and provided by the International Telecommunication Union (ITU). The broadband definitions used by the ITU are harmonised with the OECD definitions. Data collected before 2009, Fixed wireless and Satellite subscriptions were included in the Fixed (wired) broadband data. From 2009 these two broadband technologies are excluded.

Overview

Computer penetration rates are the highest in Iceland, the Netherlands, Luxembourg, Sweden, Norway and Denmark where over 90% of households had access to a home computer by 2011. Penetration rates in Chile and Mexico remain below 30%. Between 2000 and 2011, the share of households with access to a home computer increased by over 40 percentage points in France, Ireland, the United Kingdom, Austria and Spain.

The picture with regard to Internet access is similar. In Korea, the Netherlands, Iceland, Norway, Sweden, Luxembourg and Denmark, over 90% of all households had Internet access in 2011. In Turkey, Mexico and Chile less than 50% of all households had Internet access.

Fixed wired broadband subscriptions reached 314 million in the OECD area at the end of 2011, although growth slowed to 1.8% in the second half of the year. Year-on-year subscriptions rose by 4.1%. Greece, Poland and Chile experienced the highest growth (5%), to reach 21.8, 15.0 and 11.7 fixed wired broadband subscriptions respectively in 2011.

In 2011, Switzerland tops, for the first time, the OECD fixed broadband rankings, with 39.9 subscribers per 100 inhabitants, followed closely by the Netherlands (39.1) and Denmark (37.9). The OECD average is 25.6 subscribers per 100 inhabitants.

Sources

- Key ICT indicators, www.oecd.org/sti/ICTindicators
- OECD Broadband Portal, www.oecd.org/sti/ict/broadband

Further information

Analytical publications

- OECD (2012), *OECD Internet Economy Outlook*, OECD Publishing.
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Statistical publications

- Eurostat (2012), *Eurostat community survey on ICT usage in households and by individuals*, Eurostat, Luxembourg.

Online databases

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Websites

- OECD Science, Technology and Industry, www.oecd.org/sti.
- OECD Telecommunications and Internet Policy, www.oecd.org/sti/telecom.

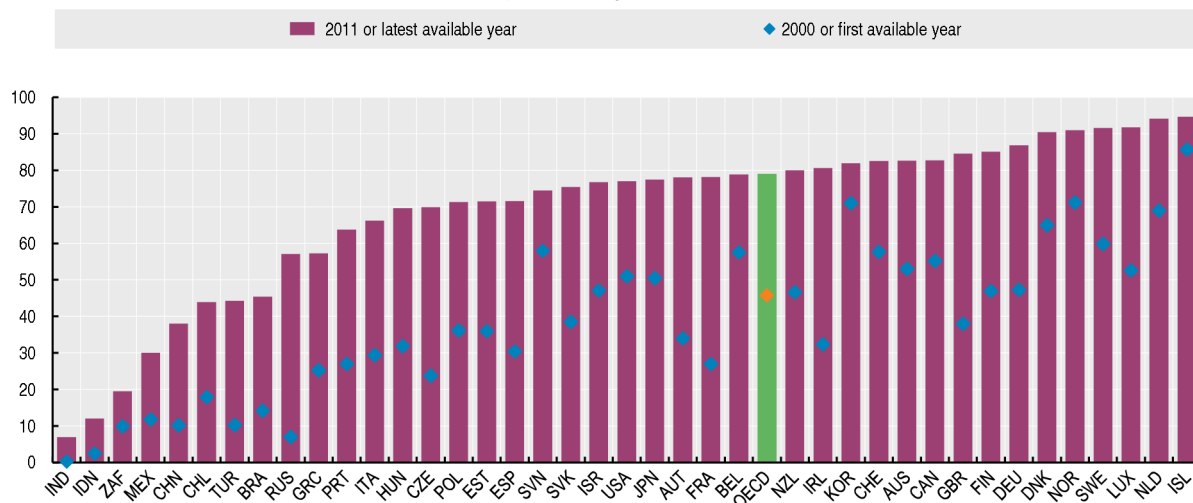
Households with access to home computers, Internet and telephone

	Percentage of households with access to a home computer				Percentage of households with access to the Internet				Fixed (wired) broadband subscriptions per 100 inhabitants			
	2000	2005	2010	2011	2000	2005	2010	2011	2005	2007	2009	2011
Australia	53.0	70.0	82.6	..	32.0	60.0	78.9	..	13.2	22.8	23.1	24.6
Austria	34.0	63.1	76.2	78.1	19.0	46.7	72.9	75.4	14.1	19.3	22.5	25.5
Belgium	..	..	76.7	78.9	..	50.2	72.7	76.5	18.2	25.7	28.9	32.4
Canada	55.2	72.0	82.7	..	42.6	64.3	78.4	..	20.6	27.2	29.6	32.0
Chile	17.9	..	..	..	8.7	..	..	..	..	..	9.7	11.7
Czech Republic	..	30.0	64.1	69.9	..	19.1	60.5	66.6	4.5	14.6	12.9	15.7
Denmark	65.0	83.8	88.0	90.4	46.0	74.9	86.1	90.1	22.5	35.8	37.0	37.9
Estonia	..	43.0	69.2	71.4	..	38.7	67.8	70.8	..	..	22.5	24.8
Finland	47.0	64.0	82.0	85.1	30.0	54.1	80.5	84.2	22.3	30.7	28.7	29.6
France	27.0	..	76.5	78.2	11.9	..	73.6	75.9	15.1	24.6	30.7	35.9
Germany	47.3	69.9	85.7	86.9	16.4	61.6	82.5	83.3	12.9	23.7	30.5	33.3
Greece	..	32.6	53.4	57.2	..	21.7	46.4	50.2	1.4	9.7	17.0	21.8
Hungary	..	42.3	66.4	69.7	..	22.1	60.5	65.2	6.2	13.9	17.8	21.0
Iceland	..	89.3	93.1	94.7	..	84.4	92.0	92.6	25.8	32.2	32.8	34.6
Ireland	32.4	54.9	76.5	80.6	20.4	47.2	71.7	78.1	5.6	17.6	19.5	22.2
Israel	47.1	62.4	76.7	..	19.8	48.9	68.1	..	..	..	23.6	24.6
Italy	29.4	45.7	64.8	66.2	18.8	38.6	59.0	61.6	11.2	17.2	20.3	22.4
Japan	50.5	80.5	83.4	77.4	..	57.0	..	..	18.1	22.5	24.8	27.4
Korea	71.0	78.9	81.8	81.9	49.8	92.7	96.8	97.2	25.3	30.5	33.5	35.4
Luxembourg	..	74.5	90.2	91.7	..	64.6	90.3	90.6	14.4	27.3	29.2	32.6
Mexico	..	18.6	29.9	30.0	..	9.0	22.3	23.3	2.2	4.2	8.6	10.8
Netherlands	..	77.9	92.0	94.2	41.0	78.3	90.9	93.6	25.2	34.4	37.1	39.1
New Zealand	..	..	..	..	..	..	..	..	8.7	18.1	23.1	26.9
Norway	..	74.2	90.9	91.0	..	64.0	89.8	92.2	21.4	30.8	33.8	35.7
Poland	..	40.1	69.0	71.3	..	30.4	63.4	66.6	2.3	8.6	12.8	15.0
Portugal	27.0	42.5	59.5	63.7	8.0	31.5	53.7	58.0	11.0	14.3	17.7	21.1
Slovak Republic	..	46.7	72.2	75.4	..	23.0	67.5	70.8	2.3	7.7	11.6	13.7
Slovenia	..	61.0	70.5	74.4	..	48.2	68.1	72.6	..	..	22.0	24.2
Spain	30.4	54.6	68.7	71.5	..	35.5	59.1	63.9	11.4	17.9	21.2	24.5
Sweden	59.9	79.7	89.5	91.6	48.2	72.5	88.3	90.6	20.6	30.6	31.5	32.5
Switzerland	57.7	76.5	..	..	..	..	85.0	..	23.1	32.3	35.6	39.9
Turkey	..	12.2	44.2	..	6.9	7.7	41.6	..	2.1	5.9	9.0	10.4
United Kingdom	38.0	70.0	82.6	84.6	19.0	60.2	79.6	82.7	16.0	25.8	30.3	33.3
United States	51.0	..	77.0	..	41.5	..	71.1	..	15.8	23.4	25.5	27.7
EU27	..	58.0	74.4	76.7	..	48.4	70.1	73.2	..	..	..	..
OECD	45.7	59.0	74.7	79.0	26.7	48.5	71.6	74.9	12.6	19.6	23.1	25.6
Brazil	..	18.5	34.9	45.4	..	13.6	27.1	37.8	2.3	4.6	11.9	10.8
China	..	25.0	35.4	38	..	11.0	23.7	30.9	5.6	6.5	8.4	..
India	..	2.0	6.1	6.9	..	1.6	4.2	6.0	0.6	1.1	1.3	1.5
Indonesia	..	3.7	10.8	12	..	1.0	4.6	7.0	0.8	0.7	0.7	..
Russian Federation	..	14.0	55	57.1	..	7.0	41.3	46.0	13.2	17.3	41.7	..
South Africa	..	13.0	18.3	19.5	..	3.0	10.1	9.8	..	..	..	..

 Statlink  <http://dx.doi.org/10.1787/888932709149>

Households with access to home computers

As a percentage of all households


 Statlink  <http://dx.doi.org/10.1787/888932709149>