

ANNEX 3.A1

Description of indicators and method

The first graph for each country, the radar graph, illustrates its position against the average performance on a set of common indicators. Where possible, the OECD average is used. Data for non-OECD countries are not included in the average. The selected indicators are based on policy relevance, as well as on the availability of comparable data for the majority of countries in order to provide a broad snapshot of science and innovation performance. They focus on research and innovation inputs, scientific and innovation outcomes, linkages and networks, including international linkages and human resources. As an overview:

- *Gross expenditure on R&D (GERD) as a percentage of GDP* is the main aggregate used for international comparison of R&D expenditures. It represents a country's domestic R&D-related expenditure for a given year.
- *Business enterprise expenditure on R&D (BERD) as a percentage of GDP* is an indicator of R&D activities carried out in the business sector by performing firms and institutes, regardless of the origin of funding. Industrial R&D is most closely linked to the creation of new products and production techniques, as well as to a country's innovation efforts.
- *Venture capital as a percentage of GDP* is a measure of one important source of funding for new technology-based firms. Venture capital plays a crucial role in promoting the radical innovations often developed by such firms and is one of the decisive determinants of entrepreneurship.
- *Triadic patents per million population* is an indicator of innovation outputs, adjusted to account for the size of the country. Triadic patents are a set of patents taken at the European Patent Office, the Japan Patent Office and the US Patent and Trademark Office that protect the same invention. The use of triadic patents as an indicator eliminates the problems of home advantage and influence of geographical locations that are encountered with single-office patent indicators and thus improves the international comparability of the data.
- *Scientific articles per million population* is an indicator often used to highlight the scientific "productivity" of countries and is an important measure of research output, since publication is the main means of disseminating and validating research results. Article counts used in this publication are based on all subject disciplines contained in the Elsevier Scopus Database. Articles are sourced from journals and conference proceedings and include: articles, reviews, conference papers, conference reviews, and notes. Calculations are based on the address of the institution to which authors belong, and fractional counts. Some caveats regarding this indicator should be noted: the journals have good international coverage, although journals of regional or local importance may not be included; there is an English-language bias; the propensity to publish differs across countries and fields of study; and incentives to publish can lead to questions about quality.
- *Percentage of firms with new-to-market product innovations* provides a measure of innovation and novelty. Firms that first develop innovations can be considered as drivers of the process of

innovation. Many new ideas and knowledge originate from these firms, with the full economic impact of their innovations depending on their adoption by other firms.

- *Percentage of firms undertaking non-technological innovation* looks more closely at marketing and organisational innovations, an important dimension of many firms' innovation activities. They are particularly relevant for service firms.
- *Percentage of firms collaborating on innovation* aims to highlight the extent of active participation in joint innovation projects with other organisations. Collaboration is an important part of the innovation activities of many firms, and can involve the joint development of new products, processes or other innovations with customers and suppliers, as well as horizontal work with other enterprises or public research bodies.
- *Patents with foreign co-inventors* is one measure of the internationalisation of research. It constitutes an indicator of formal R&D co-operation and knowledge exchange between inventors located in different countries. It highlights how institutions seek competences or resources beyond their national borders.
- *Percentage of GERD financed by abroad* is another measure of internationalisation. Foreign funding of R&D is an important source of financing for many countries.
- *Researchers per thousand total employment* measures one of the central human resource elements of the research and development system. Researchers are professionals engaged in the conception and creation of new knowledge, products, processes, methods and systems and are directly involved in the management of projects.
- *Science and engineering degrees as a percentage of all new degrees* is an indicator of a country's potential for assimilating, developing and diffusing advanced knowledge and supplying the labour market with human resources that possess critical skills for research and development.
- *HRST occupations as a percentage of total employment* is an indicator of the extent of innovation-related skills in the workforce. This category of workers corresponds to professionals and technicians as defined in the International Standard Classification of Occupations (ISCO-88).

To construct the radar graphs, the raw data for each indicator (shown in Table 3.A1.1 of Annex 3.A1) was transformed into an index, with the OECD country with the maximum value of the indicator taking an index value of 100 and the other countries taking values below this as appropriate. For example, for the indicator on *Gross expenditure on R&D (GERD) as a percentage of GDP*, Israel was the country with the highest value (4.86%) but, at the time of writing, was not yet an OECD country. Sweden had the highest OECD value (3.75%), and therefore took the index value of 100. Following the transformation of the raw data into indices, an OECD average for each indicator was obtained where possible. This allowed the construction of an average value for each indicator (the dotted line in the radar graphs) against which individual country results were plotted (the solid line in the radar graphs). It should be noted that in some cases, OECD countries were excluded from the average due to data comparability (e.g. when the data only represented a particular sector, see notes to Table 3.A1.2). In addition, in some cases, it was not possible to construct an "OECD average" because the data were unavailable, e.g. not all countries run an innovation survey, so an "average" was constructed with available data.

In some instances of data unavailability, alternative indicators were used, if considered a suitable replacement. These alternative indicators are specified in

Table 3.A1.1. For example, for the indicator on *Venture capital as a percentage of GDP*, the alternative indicator *Industry-financed GERD as a percentage of GDP* was used for a number of countries. To calculate the radar indicator in this case, an index for *Industry-financed GERD as a percentage of GDP* was constructed in the same manner as described above. The index values yielded for these countries were then used as an alternative for *Venture capital as a percentage of GDP*.

Table 3.A1.1. Radar graph indicators and values (non-OECD countries are in shaded rows)

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Australia													
Value	1.97	1.22	0.13	14.63	1 447.60	9.56	42.74	11.84	15.62	2.41	8.48	20.39	35.77
Reference year	2006	2007	2008	2008	2008	2006-07	2006-07	2006-07	2005-07	2006	2006	2007	2008
Austria													
Value	2.68	1.89	0.03	51.66	973.34	23.01	55.99	19.70	26.66	16.52	8.39	31.18	29.85
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	2008
Belgium													
Value	1.92	1.32	0.10	38.63	1 110.36	21.59	34.87	18.25	43.71	13.00	8.16	22.85	32.48
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2008	2007	2008
Brazil													
Value	1.09	0.50	–	0.34	141.37	3.56	36.10	2.91	17.72	–	1.48	10.95	% pop. aged 25-64 with tertiary degree (10.80)
Reference year	2008	2008	–	2008	2008	2003-05	2003-05	2003-05	2005-07	–	2006	2007	% pop. aged 25-64 with tertiary degree (2008)
Canada													
Value	1.84	1.00	0.08	19.16	1 356.15	31.20 (manuf. only)	Share of services in business R&D (35.81)	14.10 (manuf. only)	29.08	9.34	8.34	22.44	35.51
Reference year	2008	2008	2008	2008	2008	2002-04 (manuf. only)	Share of services in business R&D (2006)	2002-04 (manuf. only)	2005-07	2008	2007	2007	2008

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows) (cont.)**

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Chile													
Value	0.67	0.31	–	0.36	185.02	11.50	33.40	17.46	38.79	8.67	3.20	18.57	% pop aged 25-64 with tertiary degree (24.19)
Reference year	2004	2004	–	2008	2008	2004-06	2004-06	2004-06	2005-07	2004	2004	2007	% pop aged 25-64 with tertiary degree (2008)
China													
Value	1.54	1.12	Industry-financed GERD as % GDP (1.10)	0.39	156.23	14.64	–	5.98	12.6	1.24	2.06	39.18	% pop aged 25-64 with tertiary degree (9.48)
Reference year	2008	2008	Industry-financed GERD as % GDP (2008)	2008	2008	2004-06	–	2004-06	2005-07	2008	2008	2005	% pop aged 25-64 with tertiary degree (2005)
Czech Republic													
Value	1.47	0.91	0.12	2.24	714.55	13.60	37.79	13.38	33.61	5.35	5.63	24.99	33.81
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	2008
Denmark													
Value	2.72	1.91	0.16	60.47	1 359.22	15.84	46.68	16.05	19.35	9.71	10.49	19.80	39.14
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	2008
Estonia													
Value	1.14	0.50	–	4.47	668.30	15.81	49.38	19.01	30.56	–	5.40	23.44	% pop aged 25-64 with tertiary degree (34.12)
Reference year	2006	2006	–	2008	2008	2004-06	2004-06	2004-06	2005-07	–	2006	2007	% pop aged 25-64 with tertiary degree (2008)

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows) (cont.)**

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Finland													
Value	3.73	2.77	0.24	63.87	1 573.30	22.97	41.94	29.70	17.59	6.64	16.19	28.75	34.20
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	2008
France													
Value	2.02	1.27	0.13	37.90	799.55	12.57	23.08	12.87	21.44	7.99	8.39	27.58	32.25
Reference year	2008	2008	2008	2008	2008	2002-04	2002-04	2002-04	2005-07	2008	2007	2007	2008
Germany													
Value	2.64	1.85	0.09	73.40	819.98	19.02	69.36	10.48	16.74	4.01	7.48	28.05	35.99
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2008	2007	2008
Greece													
Value	0.58	0.16	0.01	1.20	902.16	20.23	51.77	14.21	28.50	18.99	4.43	23.35	23.29
Reference year	2007	2007	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2005	2007	2007	2008
Hungary													
Value	1.00	0.53	0.05	4.86	458.96	6.21	27.59	7.83	29.79	9.27	4.50	14.12	27.77
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	2008
Iceland													
Value	2.65	1.45	Industry-financed GERD as % GDP (1.33)	11.65	1 178.51	27.30	45.70	15.34	37.59	10.04	12.92	12.92	Tertiary level graduates % in total employment (31.31)
Reference year	2008	2008	Industry-financed GERD as % GDP (2008)	2008	2008	2002-04	2002-04	2002-04	2005-07	2008	2008	2007	Tertiary level graduates % in total employment (2007)
India													
Value	0.71	0.14	–	0.14	35.05	AAGR patents (23.45)	–	–	24.54	–	0.35	–	% pop. aged 25-64 with tertiary degree (11.43)
Reference year	2004	2004	–	2008	2008	AAGR patents (1997-2007)	–	–	2005-07	–	2005	–	% pop. aged 25-64 with tertiary degree (2005)

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows) (cont.)**

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Ireland													
Value	1.43	0.93	0.13	18.74	1 064.63	19.26	36.28	12.76	33.91	15.51	6.40	21.14	23.60
Reference year	2008	2008	2008	2008	2008	2004-06	2002-04	2004-06	2005-07	2008	2008	2007	2008
Israel													
Value	4.86	3.93	Industry-financed GERD as % GDP (3.40)	65.86	1 380.41	–	–	Business-funded R&D in HE and GOV (9.28)	15.37	3.02	–	20.80	% pop. aged 25-64 with tertiary degree (43.98)
Reference year	2008	2008	Industry-financed GERD as % GDP (2006)	2008	2008	–	–	Business-funded R&D in HE and GOV (2006)	2005-07	2006	–	2007	% pop. aged 25-64 with tertiary degree (2008)
Italy													
Value	1.19	0.60	0.04	12.46	742.79	10.22	21.34	4.66	13.61	9.52	3.81	20.96	31.47
Reference year	2008	2008	2008	2008	2008	2004-06	2002-04	2004-06	2005-07	2007	2008	2007	2008
Japan													
Value	3.42	2.69	Industry-financed GERD as % GDP (2.68)	110.62	635.13	8.20	61.60	6.61	2.87	0.38	10.64	24.14	14.88
Reference year	2008	2008	Industry-financed GERD as % GDP (2008)	2008	2008	1999-2001	1999-2001	1999-2001	2005-07	2008	2008	2007	2008
Korea													
Value	3.37	2.54	0.07	43.93	762.16	9.20 (manuf only)	17.10 (manuf. only)	8.37 (manuf. only)	4.60	0.31	10.02	35.96	18.59
Reference year	2008	2008	2008	2008	2008	2005-07 (manuf only)	2005-07 (manuf. only)	2005-07 (manuf. only)	2005-07	2008	2008	2007	2008

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows)** (cont.)

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Luxembourg													
Value	1.62	1.32	Industry-financed GERD as % GDP (1.20)	48.67	384.93	28.54	61.76	16.16	60.31	5.66	6.54	31.47	41.55
Reference year	2008	2008	Industry-financed GERD as % GDP (2007)	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2008	2000	2008
Mexico													
Value	0.37	0.18	Industry-financed GERD as % GDP (0.17)	0.14	73.35	13.00	–	Business-funded R&D in HE and GOV (2.24)	21.66	1.38	0.88	24.65	Tertiary-level graduates % in total employment (18.19)
Reference year	2007	2007	Industry-financed GERD as % GDP (2007)	2008	2008	2006-07	–	Business-funded R&D in HE and GOV (2007)	2005-07	2007	2007	2007	Tertiary-level graduates % in total employment (2007)
Netherlands													
Value	1.75	0.89	0.10	65.67	1 330.51	17.07	30.01	13.59	18.98	10.65	5.79	14.18	37.55
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2008	2007	2008
New Zealand													
Value	1.21	0.51	Industry-financed GERD as % GDP (0.48)	10.79	1 329.52	17.56	38.39	15.52	19.26	4.81	10.76	17.31	28.59
Reference year	2007	2007	Industry-financed GERD as % GDP (2007)	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2007	2007	2008

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows) (cont.)**

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Norway													
Value	1.62	0.87	0.16	25.08	1 356.10	14.16	22.73	10.51	21.25	8.31	9.94	15.08	37.97
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2008	2007	2008
Poland													
Value	0.61	0.19	0.02	0.59	410.57	7.53	30.85	11.08	33.20	5.42	3.93	16.95	26.23
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	2008
Portugal													
Value	1.51	0.76	0.03	0.89	668.07	12.29	54.09	7.47	32.81	5.44	7.88	33.10	18.18
Reference year	2008	2008	2008	2008	2008	2004-06	2004-06	2004-06	2005-07	2007	2008	2007	2008
Russian Federation													
Value	1.03	0.65	Industry-financed GERD as % GDP (0.30)	0.45	176.06	1.76	3.26	Business-funded R&D in HE and GOV (15.35)	22.89	5.94	6.36	24.77	% pop. aged 25-64 with tertiary degree (54.37)
Reference year	2008	2008	Industry-financed GERD as % GDP (2008)	2008	2008	2006	2006	Business-funded R&D in HE and GOV (2008)	2005-07	2008	2008	2006	% pop. aged 25-64 with tertiary degree (2002)
Slovak Republic													
Value	0.47	0.20	Industry-financed GERD as % GDP (0.16)	0.68	457.21	9.36	14.13	8.89	46.41	12.29	5.63	23.80	29.05
Reference year	2008	2008	Industry-financed GERD as % GDP 2008	2008	2008	2004-06	2002-04	2004-06	2005-07	2008	2008	2007	2008

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows) (cont.)**

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Slovenia													
Value	1.66	1.07	Industry-financed GERD as % GDP (1.04)	9.35	1 232.77	17.90	26.86	17.60	19.55	5.59	7.06	18.11	% pop. aged 25-64 with tertiary degree (22.64)
Reference year	2008	2008	Industry-financed GERD as % GDP (2008)	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2008	2007	% pop. aged 25-64 with tertiary degree (2008)
South Africa													
Value	0.92	0.53	Industry-financed GERD as % GDP (0.39)	0.56	109.86	21.10	60.70	22.32	11.23	10.67	1.46	16.41	–
Reference year	2007	2007	Industry-financed GERD as % GDP (2007)	2008	2008	2002-04	2002-04	2002-04	2005-07	2007	2007	2003	–
Spain													
Value	1.35	0.74	0.13	5.13	790.59	6.14	20.90	5.70	18.87	7.01	6.39	24.37	24.75
Reference year	2008	2008	2008	2008	2008	2004-06	2002-04	2004-06	2005-07	2007	2008	2007	2008
Sweden													
Value	3.75	2.78	0.21	88.33	1 557.53	22.85	Share of services in business R&D (15.27)	17.83	19.34	9.32	10.58	24.64	39.55
Reference year	2008	2008	2008	2008	2008	2004-06	Share of services in business R&D (2007)	2004-06	2005-07	2007	2008	2007	2008

Table 3.A1.1. **Radar graph indicators and values (non-OECD countries are in shaded rows)** (cont.)

Country	GERD as % of GDP	BERD as % of GDP	Venture capital as % GDP	Triadic patents per million population	Scientific articles per million population	% of firms with new-to-market product innovations (as a % of all firms)	% of firms undertaking non-technological innovation (as a % of all firms)	% of firms collaborating (as a % of all firms)	% of patents with foreign co-inventors	% of GERD financed by abroad	Researchers per 1 000 total employment	Science and engineering degrees as % of all new degrees	HRST occupations as % of total employment
Switzerland													
Value	3.01	2.21	0.13	113.24	1 769.77	AAGR patents (0.85)	–	Business-funded R&D in HE (6.85)	45.28	5.95	5.59	25.52	Tertiary level graduates % in total employment (34.45)
Reference year	2008	2008	2008	2008	2008	AAGR patents 1998-2008	–	Business-funded R&D in HE (2008)	2005-07	2008	2008	2007	Tertiary level graduates % in total employment (2007)
Turkey													
Value	0.73	0.32	Industry-financed GERD as a % of GDP (0.34)	0.25	271.57	18.70	50.77	5.66	8.81	1.31	2.40	17.61	12.74
Reference year	2008	2008	Industry-financed GERD as a % of GDP (2008)	2008	2008	2004-06	2004-06	2004-06	2005-07	2008	2007	2007	2008
United Kingdom													
Value	1.77	1.10	0.20	27.01	1 249.93	12.03	43.60	11.22	24.46	17.75	7.98	22.78	27.16
Reference year	2008	2008	2008	2008	2008	2004-06	2007	2004-06	2005-07	2008	2008	2007	2008
United States													
Value	2.77	2.01	0.12	48.69	911.07	AAGR patents (0.24)	Share of services in business R&D (29.60)	Business-funded R&D in HE and GOV (3.11)	11.03	R&D exp. of foreign affiliates as a % of R&D exp (14.78)	9.53	14.98	32.32
Reference year	2008	2008	2008	2008	2008	1998-2008	Share of services in business R&D (2006)	Business-funded R&D in HE and GOV (2008)	2005-07	R&D exp. of foreign affiliates as a % of R&D exp (2007)	2007	2007	2008

1. The table shows actual indicator values and reference years. For each indicator in the radar graph, the OECD country with the maximum Value is set at 100 and the average is calculated by taking into account all OECD countries with available data. If a non-OECD country has a Value higher than the OECD Value, it is set as equivalent to the highest OECD Value.

Table 3.A1.2. Radar graph country with maximum value

Indicator	All countries	OECD countries
Gross expenditure on R&D (GERD) as % of GDP	Israel ¹	Sweden
Business expenditure on R&D (BERD) as % of GDP	Israel ¹	Sweden
Venture capital as % GDP	Finland	Finland
Industry-financed GERD as % GDP [*]	Israel ¹	Japan
Triadic patent families per million population	Switzerland	Switzerland
Scientific articles per million population	Switzerland	Switzerland
% of firms with new-to-market product innovations (as a % of all firms)	Luxembourg ²	Luxembourg ²
Average annual growth rate (AAGR) patents 1998-2008 [*]	China	Poland
% of firms undertaking non-technological innovation (as a % of all firms)	Germany ³	Germany ³
Share of services in business R&D [*]	Slovak Republic	Slovak Republic
% of firms collaborating (as a % of all firms)	Finland	Finland
Business funded R&D in the higher education (HE) and government (GOV) sectors	Russian Federation	Turkey
Patents with foreign co-inventors	Luxembourg	Luxembourg
R&D expenditure of foreign affiliates as % R&D expenditure [*]	Ireland	Ireland
% of GERD financed by abroad	Greece	Greece
Researchers per 1 000 total employment	Finland	Finland
Science and engineering degrees as % of all new degrees	Korea	Korea
Human resources for science and technology (HRST) occupations as % of total employment	Luxembourg	Luxembourg
Tertiary-level graduates in total employment [*]	Canada	Canada
Educational attainment as a % of population aged 25 to 64 with tertiary degree [*]	Russian Federation	Canada
Triadic patents average annual growth rate 1997-2007 [*]	Turkey	Turkey

* Represents alternative indicators.

1. On 7 September 2010, Israel became a member of the OECD. However, references to OECD historical averages in this chapter do not yet include Israel.
2. Canada had the highest value in the OECD; however, the data refer to manufacturing only and were therefore excluded from the average. Luxembourg's value was used to set the maximum. See Table 3.A1.3.
3. Japanese data refer to the period 1999-2001 and were therefore excluded from the average.

Table 3.A1.3. **Radar graph data sources and methodological notes**

Indicator	Notes	Source
Gross expenditure on R&D (GERD) as % of GDP	See MSTI for full notes. Data collected from national sources might not be fully compatible with OECD data.	OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; data for Brazil, Chile, Estonia and India have been compiled from national sources.
Business expenditure on R&D (BERD) as % of GDP	See MSTI for full notes. Data collected from national sources might not be fully compatible with OECD data.	OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; Data for Brazil, Chile (CONICYT), Estonia and India compiled from national sources.
Venture capital as % GDP	The OECD defines venture capital (VC) as the sum of “seed/start-up stages” and “early development and expansion stages”. The coverage of VC stages within these two broad groups differs across countries and the data may therefore not be fully comparable. For example, “early development and expansion stages” includes: For Australia, early expansion, late expansion and turnaround; for Canada, other early stage, expansion and turnaround; for Korea, initial-early stage, middle stage-early (firms 3-5 years), and middle stage-late (firms 5-7 years); for the United Kingdom, other early stage and expansion; for the United States and Israel, early stage and expansion; for European countries (except United Kingdom), growth and rescue/turnaround. The OECD is currently revising its VC data and the future definition of VC is likely to exclude turnaround, rescue and late expansion stages. Due to data availability, the average does not include Chile, Iceland, Japan, Luxembourg, Mexico, New Zealand, Slovak Republic, Slovenia, or Turkey.	OECD, based on data from Thomson Financial, PwC, EVCA, National Venture Capital Associations, and Venture Enterprise Centre. OECD, <i>Entrepreneurship Financing Database</i> , 2009. Australia’s data are sourced from the Australian Bureau of Statistics. Its preferred definition of VC includes investment at the pre-seed, seed, start-up and early expansion stages of development only.
Industry-financed GERD as % GDP	See MSTI for full notes.	OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1
Triadic patents per million population	Patent counts are based on the earliest priority date, the inventor’s country of residence and fractional counts. Triadic patents refers to patents filed at the European Patent Office (EPO), the US Patent and Trademark Office (USPTO) and the Japan Patent Office (JPO) which protect the same invention.	OECD, <i>Patent Database</i> , 2010, based on <i>EPO Worldwide Statistical Patent Database (PATSTAT)</i> , 2010). Population data sourced from OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010-1. For Brazil, Chile, Estonia, and India: population data come from the International Monetary Fund, <i>World Economic Outlook Database</i> , April 2010.
Scientific articles per million population	Calculations based on the address of the institution to which authors belong, and fractional counts. The calculations include articles, reviews, conference papers, conference reviews and notes sourced from journals and conference proceedings.	OECD Calculations, based on Scopus Custom Data, Elsevier, December 2009. Population data sourced from OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> , December 2009. For Brazil, Chile, Estonia, and India: population data come from the International Monetary Fund, <i>World Economic Outlook Database</i> , April 2010.
% of firms with new-to-market product innovations (as a % of all firms)	Innovation survey data from Canada, France, Korea and Japan were not included when calculating the average. Data collected from national sources might not be fully compatible with the OECD Innovation Microdata Project.	OECD, Working Party of National Experts in Science and Technology (NESTI) Innovation Microdata Project based on CIS-2006, June 2009, and national data. For Australia (2006-07), Business Characteristics Survey 2006-07; Canada (2002-04, manufacturing), Survey of Innovation 2005; Iceland (2002-04), CIS-4; Japan (1999-2001), J-NIS 2003; Korea (2005-07, manufacturing), Korean Innovation Survey 2008; Mexico (2006-07), Research and Technological Development Survey 2008; New Zealand (2006-07), Business Operations Survey 2007; South Africa (2002-04), South African Innovation Survey 2005. Data for Brazil, the Russian Federation and China have been compiled from national sources.
Average annual growth rate (AAGR) patents 1997-2007	Patent counts are based on the earliest priority date, the inventor’s country of residence and fractional counts. Triadic patents refers to patents filed at the European Patent Office (EPO), the US Patent and Trademark Office (USPTO) and the Japan Patent Office (JPO) which protect the same invention.	OECD, <i>Patent Database</i> , 2010.

Table 3.A1.3. **Radar graph data sources and methodological notes (cont.)**

Indicator	Notes	Source
% of firms undertaking non-technological innovation (as a % of all firms)	Innovation survey data from Australia, Canada, France, Ireland, Italy, Korea, Japan, the Slovak Republic and Spain were not included in the average. Data collected from national sources might not be fully compatible with the OECD microdata project.	OECD, Working Party of National Experts in Science and Technology (NESTI) Innovation Microdata Project based on CIS-2006, June 2009 and national data sources. For Australia (2006-07), Business Characteristics Survey 2006-07; Canada (2002-04, manufacturing), Survey of Innovation 2005; Iceland (2002-04), CIS-4; Japan (1999-2001), J-NIS 2003; Korea (2005-07, manufacturing), Korean Innovation Survey 2008; New Zealand (2006-07), Business Operations Survey 2007; South Africa (2002-04), South African Innovation Survey 2005. Data for Brazil, the Russian Federation and China have been compiled from national sources.
Share of services in business R&D	–	OECD, <i>ANBERD Database</i> , 2009.
% of firms collaborating (as a % of all firms)	Innovation survey data from Canada, France, Korea and Japan were not included in the average (manufacturing data only and old data). Data collected from national sources might not be fully compatible with the OECD microdata project.	OECD, Working Party of National Experts in Science and Technology (NESTI) Innovation Microdata Project based on CIS-2006, June 2009 and national data sources. Data for Brazil and China have been compiled from national sources.
Business-funded R&D in the higher education (HE) and government (GOV) sectors (as a % of R&D performed in these sectors – combined)	Switzerland, only in the higher education sector.	OECD, <i>R&D Database</i> , June 2010.
Patents with foreign co-inventors	Patent counts are based on the earliest priority date, the inventor's country of residence, using simple counts. Share of patent applications to the European Patent Office (EPO) with at least one foreign co-inventor in total patents invented.	OECD, <i>Patent Database</i> , 2010.
R&D expenditure of foreign affiliates as % of R&D expenditure	See MSTI for full notes.	OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.
% of GERD financed by abroad	See MSTI for full notes. Data collected from national sources might not be fully compatible with OECD data. Due to data availability, the average does not include Chile, Greece, Switzerland and the United States.	OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; CONICYT for Chile.
Researchers per 1 000 total employment	See MSTI for full notes. Data collected from national sources might not be fully compatible with OECD data.	OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1, data for Brazil, Chile and Estonia have been compiled from national sources; for India, from UNESCO based on national sources.
Science and engineering degrees as % of all new degrees	Data collected from national sources might not be fully compatible with OECD data.	OECD, <i>Education Database</i> 2009, UNESCO Institute for Statistics and <i>China Statistical Yearbook</i> .
Human resources for science and technology (HRST) occupations as % of total employment	OECD <i>Science, Technology and Industry Scoreboard 2009</i> and OECD calculations. Total HRST for Japan are likely to be underestimated. Owing to data availability, the OECD average does not include Chile, Iceland, Mexico, Slovenia or Switzerland.	OECD, <i>Science and Technology and Industry Scoreboard 2009</i> . OECD calculations, based on data from the EU Labour Force Survey; US Current Population Survey; Australian, Canadian, Japanese and New Zealander labour force surveys, as well as Korean Economically Active Population Survey.
Tertiary-level graduates in total employment	–	OECD, <i>Educational Attainment Database</i> , 2009.
% population aged 25-64 with tertiary degree	Includes tertiary type-A and type-B degrees as well as advanced research programmes.	OECD, <i>Education Database</i> 2010.

Table 3.A1.4. **Country-specific figures, data sources and notes**

Countries	Left figure	Right figure
Australia	Scientific articles published, per million population, 1998 and 2008. Source: OECD, Main Science and Technology Indicators, June 2010; OECD Calculations, based on Scopus Custom Data, Elsevier, December 2009.	Firms with collaboration on innovation, 2004-06, or latest available years. As a percentage of innovative firms. Industries included are: Mining and quarrying; manufacturing; electricity, gas and water; wholesale trade; transport and storage; communications; financial intermediation; computer and related activities; architectural and engineering activities; technical testing and analysis. Sources: OECD, Innovation Microdata Project based on CIS-2006, June 2009 and national data sources (for Australia: Business Characteristics Survey 2006-07; Iceland (2002-04), CIS-4; Japan (1999-2001, J-NIS 2003; New Zealand (2006-07), Business Operations Survey 2007; South Africa (2002-04), South African Innovation Survey 2005)..
Austria	Firms collaborating internationally on innovation, as a percentage of all firms, 2004-06, or latest available years. OECD, NESTI Innovation Microdata Project based on CIS-2006, June 2009 and national data sources.	Venture capital investment, as a percentage of GDP, 2008. OECD, <i>Entrepreneurship Financing Database</i> , 2009.
Belgium	Foreign ownership of domestic inventions, 2004-06, percentage. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD, <i>Patent Database</i> , June 2009.	Percentage of BERD financed by government, share of total BERD, 1991-2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i> .
Brazil	Patents with foreign co-inventors, percentage of PCT applications, 2005-07. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD, <i>Patent Database</i> , June 2009.	Gross expenditure on R&D, as a percentage of GDP, selected countries, 2008, or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i> ; data for Brazil, Chile, Estonia and India have been compiled from national sources.
Canada	Human resources in science and technology indicators, 2007 and 2008. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD calculations.	Gross expenditure on R&D, as a percentage of GDP, 2000-08. OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i> .
Chile	Gross expenditure on R&D, as a percentage of GDP, 2007 or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i> .	Patents with foreign co-inventors, percentage of PCT applications, 2005-07. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD, <i>Patent Database</i> , June 2009.
China	Gross expenditure on R&D, as a percentage of GDP, 1991-2008 OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i>	Science and engineering degrees, as a percentage of all new degrees, 2007, or latest available year. OECD, <i>Education Database</i> , September 2009; <i>China Statistical Yearbook 2008</i> .
Czech Republic	Labour productivity growth, average annual growth rate, 2000-08. <i>OECD.Stat Database, Productivity: Labour productivity-Total economy</i> .	Foreign direct investment inflows, as a percentage of GDP, average 2003-08. <i>OECD, Science, Technology and Industry Scoreboard 2009</i> ; IMF, <i>Balance of Payments Statistics</i> , July 2009.
Denmark	Firms with new-to-market product innovations, 2004-06, or latest available years, as a percentage of all firms. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; Eurostat, CIS-2006, May 2009.	HRST occupations in total employment, as a percentage of total employment, 2008. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD calculations.
Estonia	Growth in business R&D, 1998-2008, compound annual growth rate. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i>	Scientific articles published, 1998 and 2008, per million population. OECD, <i>Main Science and Technology Indicators</i> , June 2010; OECD calculations, based on Scopus Custom Data, Elsevier, December 2009; International Monetary Fund, <i>World Economic Outlook Database</i> , April 2010.
Finland	Gross expenditure on R&D, as a percentage of GDP, 2000-08 OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i> .	Gross expenditure on R&D financed from abroad, as a percentage of the total, 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i> .
France	GERD per capita (current USD PPP), 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database 2010/1</i>	HRST occupations as a percentage of total employment, 2008. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD calculations.

Table 3.A1.4. **Country-specific figures, data sources and notes (cont.)**

Countries	Left figure	Right figure
Germany	Venture capital investment as a percentage of GDP, 2008. OECD, <i>Entrepreneurship Financing Database</i> 2009.	Triadic patents per million population, 2008. OECD, <i>Patent Database</i> , January 2010. Population data sourced from OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> , 2010-1.
Greece	Share of business R&D, by firm size, as a percentage of total business R&D, 2007, or latest available year. OECD <i>Science, Technology and Industry Scoreboard</i> 2009.	GERD funding by source of financing, share of the total, 2008, or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.
Hungary	Growth of real business R&D, compound annual growth rate, 1998-2008. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1	Growth of researchers, average annual growth rate 1998-2008, or nearest available years. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD, <i>R&D Database</i> , May 2009.
Iceland	Gross domestic product, annual real growth rates, 2000-09 OECD <i>Stat Database, Key Short-Term Economic Indicators</i> .	Gross expenditure on R&D, as a percentage of GDP, 2008. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.
India	Patent applications with co-inventor located abroad, percentage of all patent applications, 2005-07. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD, <i>Patent Database</i> , 2010.	Educational attainment, percentage of population aged 25-64 with tertiary degree, 2008, or nearest available year. OECD, <i>Education Database</i> 2010.
Indonesia	Top left: Change in contribution of high-technology industries to manufacturing trade balance, as a percentage of manufacturing trade, 1997 and 2007. OECD, <i>STAN Indicators Database</i> , 2009 edition. Underlying series from <i>STAN Bilateral Trade Database</i> . Bottom left: Growth of high- and medium-high technology exports, average annual growth rate, 1998-2008, or nearest available years. OECD, <i>STAN Indicators Database</i> 2010 edition. Underlying series from <i>STAN Bilateral Trade Database</i> .	Top right: Total exports and imports, average, as a percentage of GDP, 1997 and 2007. OECD, <i>National Accounts Database</i> , June 2009 and International Monetary Fund. Bottom right: Growth of foreign scholars in the United States, by country of origin, average annual growth rate, 1997-2007, or nearest available years. OECD, based on Institute of International Education (IIE); OECD, <i>Research and Development Statistics</i> , June 2009.
Ireland	Gross expenditure on R&D financed from abroad, as a percentage of total GERD, 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	Gross domestic product, average annual growth rate, 2000-09. OECD <i>Stat Database, Key Short-Term Economic Indicators</i> .
Israel	Gross expenditure on R&D, as a percentage of GDP, 2008, or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	Gross expenditure on R&D financed from abroad, as a percentage of total GERD, 2008, or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.
Italy	Science and engineering degrees, as a percentage of all new degrees, 2007, or latest available year. OECD, <i>Education Database</i> , September 2009.	Venture capital investment, as a percentage of GDP, 2008. OECD, <i>Entrepreneurship Financing Database</i> 2009.
Japan	Gross expenditure on R&D, as a percentage of GDP, 2008 OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	Science and engineering degrees, as a percentage of all new degrees, 2007, or latest available year. OECD, <i>Education Database</i> , September 2009.
Korea	Growth of business researchers, average annual growth rate, 1998-2008, or nearest available years. OECD, <i>MSTI Database</i> 2010/1.	Patents with foreign co-inventors, percentage of all PCT applications, 2005-07. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD, <i>Patent Database</i> , 2010.
Luxembourg	Growth in business researchers, average annual growth rate, 1998-2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	HRST occupations as share of total employment, selected countries, 2008. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD calculations.
Mexico	High- and medium-high-technology exports, average annual growth rate, 1998-2008. OECD, <i>STAN Indicators Database</i> 2010 edition. Underlying series from <i>STAN Bilateral Trade Database</i> .	Tertiary-level graduates in total employment, 2007, as a percentage of total employment. OECD, <i>Educational Attainment Database</i> , 2009.
Netherlands	BERD and GERD intensity, as a percentage of GDP, 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	HRST occupations as share of total employment, 2008. OECD <i>Science, Technology and Industry Scoreboard</i> 2009; OECD calculations.

Table 3.A1.4. **Country-specific figures, data sources and notes (cont.)**

Countries	Left figure	Right figure
New Zealand	High-technology exports, as a percentage of total manufacturing exports, 2008. OECD, <i>STAN Indicators Database</i> , 2010 edition. Underlying series from <i>STAN Bilateral Trade Database</i> .	Graduation rates at first-stage university level, as a percentage of relevant age cohort, 2006. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD, <i>Education at a Glance 2008</i> ; <i>OECD Indicators</i> , 2008; UNESCO Institute for Statistics 2009; <i>China Statistical Yearbook 2008</i> .
Norway	R&D intensity, GERD as a percentage of GDP, 2000-08. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	HRST occupations as share of total employment, 2008, or latest available year. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD calculations.
Poland	Science and engineering degrees, as a percentage of all new degrees, 2007. OECD, <i>Education Database</i> , September 2009.	Researchers, per thousand employment, 2008 or latest available year. OECD, <i>Main Science and Technology Indicators</i> 2010-1.
Portugal	Science and engineering degrees, as a percentage of all new degrees, 2007. OECD, <i>Education Database</i> , September 2009.	Scientific articles published, per million population, 1998 and 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; OECD calculations, based on Scopus Custom Data, Elsevier, December 2009.
Russian Federation	Educational attainment, percentage of population aged 25-64 with tertiary degree. OECD, <i>Education Database</i> , 2010.	Gross expenditure on R&D, as a percentage of GDP, 1990-2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.
Slovak Republic	Science and engineering degrees, as a percentage of all new degrees, 2007. OECD, <i>Education Database</i> , September 2009.	Scientific articles published, per million population, 1998 and 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; OECD calculations, based on Scopus Custom Data, Elsevier, December 2009.
Slovenia	R&D intensity, GERD and BERD as a percentage of GDP, 1993-2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	Government-financed business R&D by firm size, percentage share, 2007. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.
South Africa	Gross expenditure on R&D, as a percentage of GDP, 1983-2007. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	Firms undertaking non-technological innovation, as a percentage of all firms, 2004-06, or latest available year. Eurostat, Community Innovation Survey (New Cronos) 2009; data for Australia, Brazil, Japan, New Zealand, the Russian Federation and South Africa have been compiled from national sources.
Spain	Science and engineering degrees, as a percentage of all new degrees, 2007. OECD, <i>Education Database</i> , September 2009.	Venture capital intensity by stage, as a percentage of GDP, 2008. OECD, <i>Entrepreneurship Financing Database</i> 2009.
Sweden	Venture capital intensity, as a percentage of GDP, 2008. OECD, <i>Entrepreneurship Financing Database</i> 2009.	Share of BERD performed in service industries, as a percentage of total BERD, selected countries, 2007 or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; OECD, <i>ANBERD Database</i> , 2009
Switzerland	Gross expenditure on R&D financed from abroad, selected countries, percentage of total GERD, 2008, or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1.	PCT patent applications, percentage of applications with co-inventors located abroad, 2005-07. <i>OECD Science, Technology and Industry Scoreboard 2009</i> ; OECD, <i>Patent Database</i> 2010, based on <i>EPO Worldwide Statistical Patent Database (PATSTAT)</i> , 2010)
Turkey	Firms with new-to-market product innovation, as a percentage of all firms, 2004-06. Eurostat, Community Innovation Survey (New Cronos) 2009 and national data sources.	Business expenditure on R&D, as a percentage of GDP, 2008, or latest available year. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; Data for Brazil, Chile (CONICYT), Estonia and India compiled from national sources.
United Kingdom	Complementary innovation strategies in services, 2004-06, as a percentage of all services firms. OECD, Innovation Microdata Project based on CIS-2006, June 2009 and national data sources.	Venture capital investment, USD million and percentage of GDP, 2008. OECD, <i>Entrepreneurship Financing Database</i> 2009.
United States	US venture capital investment by industry, USD million, 1995-2009. <i>OECD Science, Technology and Industry Scoreboard 2009</i> , PricewaterhouseCoopers/National Venture Capital Association MoneyTree(tm) Report	Scientific articles published, per million population, 1998 and 2008. OECD, <i>Main Science and Technology Indicators (MSTI) Database</i> 2010/1; OECD calculations, based on Scopus Custom Data, Elsevier, December 2009.



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