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Spain

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SPAIN

Spain has been immersed in a prolonged recession, but growth is expected in 2014 and 2015. The government is currently deploying policies corresponding to two strategic documents, the Spanish Strategy for Science, Technology and Innovation (SSSTI) (2013-20) and the National/State Plan for Scientific and Technical Research and Innovation (2013-16), both approved by the Ministerial Council in February 2013.

Hot issue 1: Improving overall human resources, skills and capacity building. Spain's investment in tertiary education and the share of tertiary attainment in the adult population are near the OECD median (Panel 1^{s, l}), and the government aims to raise STI skills training capacities to international standards. It also seeks to encourage job placement and opportunities for researchers in the public and private sectors. Both strategic documents establish several instruments to strengthen human resources for STI, including additional resources for doctoral and postdoctoral training grants and the introduction of mobility schemes. Among schemes to promote researcher careers, *Ramón y Cajal* facilitates the recruitment of national and foreign professors in Spain's science system, including an initial grant to begin their research projects in Spain and an additional USD 147 058 (EUR 100 000) for institutions that award them permanent contracts after five years. *Torres Quevedo* promotes permanent employment of PhDs in the private sector, technological centres and other business entities and especially in newly established high-technology enterprises. *Emplea* offers loans for hiring experts in the management of innovation, including the transfer and exploitation of knowledge, on the basis of three-year contracts, to perform these activities in enterprises, technological centres and technological platforms. The government allocated USD 515.7 million (EUR 350.7 million) for this activity in 2013.

Hot issue 2: Strengthening public R&D capacity and infrastructures. Spain's performance in scientific publication is at the OECD median, although the ratio of public R&D expenditures to GDP and the density of global 500 universities are slightly below (Panel 1^{a, b, c}). The government aims to reinforce public research capabilities and to foster

research excellence and infrastructures in order to increase the international impact of universities and research centres. To this end, it sponsors individual R&D projects on basic research and interdisciplinary applications of frontier knowledge. It also funds projects carried out in research centres, including investments to acquire equipment and develop scientific infrastructures. The 2013 budget allocated USD 482 million (EUR 328 million) for this purpose. The *Severo Ochoa* programme identifies, promotes and supports high-quality research centres; in the last three years and on the basis of international peer reviews, it has funded 18 centres, with a total of USD 107.5 million (EUR 72 million).

Hot issue 3: Encouraging innovation in firms and supporting entrepreneurship and SMEs. Business investment in R&D and innovation output are below the OECD median (Panel 1^{d, e, f, g}), and both the business environment and the supply of venture capital require significant improvement (Panel 1^{h, j}). As the country's economic structure is characterised by a predominance of SMEs and low R&D-intensive business sectors, policy will focus on the growth and internationalisation of innovative companies, increased business R&D spending in large companies, strengthening demand for HRST in companies and encouraging the generation and dissemination of emerging technologies. In particular, law to support entrepreneurs and their internationalisation, approved in 2013, provides fiscal incentives and easy access to finance and stipulates measures to boost entrepreneurial initiatives (particularly those that are export-oriented). Disbursements in public calls to support STI activities in firms reached USD 929 million (EUR 632 million) in 2013.

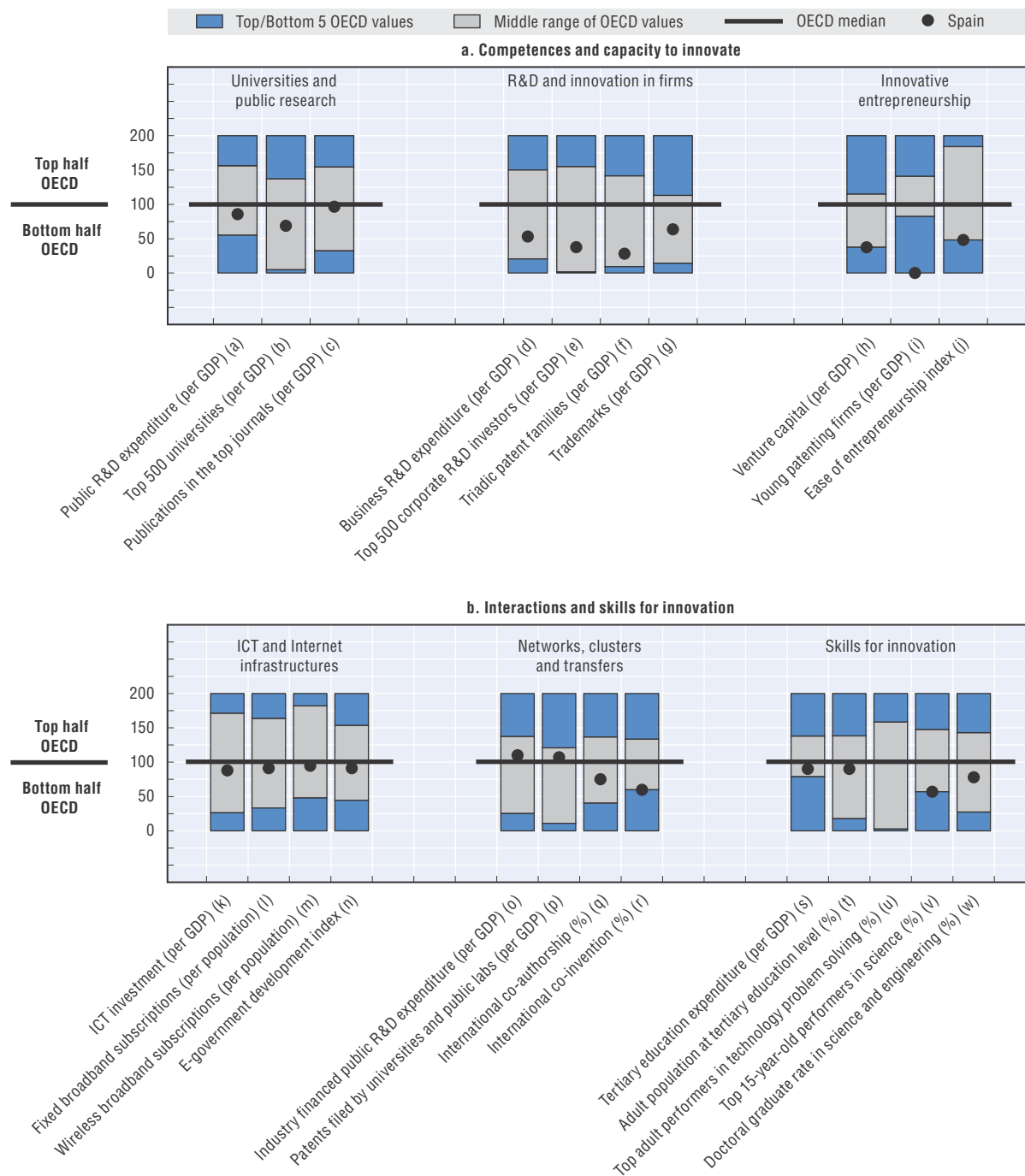
Hot issue 4: Innovation to contribute to addressing social challenges (including inclusiveness). *Retos Innovación* is a specific budget line for projects that address social challenges and key enabling technologies (photonics, microelectronics, nanoelectronics, advanced materials biotechnology and ICTs). In addition, the government sponsors co-operation on R&D projects addressing social challenges (*Retos Colaboración*) between universities, PRIs, private R&D centres and firms. It has also developed strategic actions for health and for the digital society and economy, with a 2013 budget of USD 3.21 billion (EUR 2.1 billion).

Key figures, 2013

Economic and environmental performance	ESP	OECD	Gross domestic expenditure on R&D	ESP	OECD
Labour productivity			GERD		
GDP per hour worked, USD PPP, 2013	52.4	47.7	Million USD PPP, 2012	19 556	1 107 398
(annual growth rate, 2008-13)	(+2.2)	(+0.8)	As a % of total OECD, 2012	1.8	100
Green productivity			GERD intensity and growth		
GDP per unit of CO ₂ emitted, USD, 2011	4.5	3.0	As a % of GDP, 2012	1.30	2.40
(annual growth rate, 2007-11)	(+4.2)	(+1.8)	(annual growth rate, 2007-12)	(-0.4)	(+2.0)
Green demand			GERD publicly financed		
NNI per unit of CO ₂ emitted, USD, 2011	4.4	3.0	As a % of GDP, 2011	0.66	0.77
(annual growth rate, 2007-11)	(+3.7)	(+1.6)	(annual growth rate, 2007-11)	(+1.7)	(+2.8)

Figure 9.41. Science and innovation in Spain

Panel 1. Comparative performance of national science and innovation systems, 2014



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

Hot issue 5: Addressing the challenges of STI globalisation and increasing international co-operation. By OECD standards Spain's science and innovation systems are not well integrated in international networks (Panel 1^q, ^r). The government therefore seeks to expand Spain's participation in the European Commission's Joint Programming projects (e.g. ERA-NETs, JUs and JPIs). It will also foster international collaborative networks between research groups and centres. Spain participates in two future and emerging technologies (FET) initiatives: Graphene and the Human Brain Project. These EU-wide initiatives address science-driven, large-scale multidisciplinary research that offers substantial benefits for European competitiveness and society.

Highlights of the Spanish STI system

STI policy governance: The STI Act provides the legal framework for a new research funding and governance structure for the Spanish STI system through the creation of the State Research Agency (a funding body) and comprehensive reform of PRIs. The Act defines new governance mechanisms to ensure co-ordination of central and regional governments (Council for Science, Technology and Innovation Policy; Advisory Committee for Science, Technology and Innovation; and an STI information system to improve information sharing among central and regional administrations). In addition, the new Ministry for Economy and Competitiveness, created in 2012, took over the competences of the Ministry of Science and Innovation.

New sources of growth: Spain invests in enabling technologies, notably ICTs and biotechnology, which are important for health sciences and energy, but also space-related technologies. Spain has in recent years deepened its RTA in biotechnology and nanotechnologies, in environment-related technologies and in ICTs (Panel 3). Programmes and public-private partnerships (e.g. Strategic Action in Digital Society and Economy) target ICTs and research excellence projects and networks in biomedicine and health.

New challenges: Green innovation is a major focus, not least in renewable energy technologies. To support green growth, Spain has created an Environmental Technology Platform (PLANETA) to promote co-operation on environmental technologies by public and private research organisations.

Innovation in firms: BERD is below the OECD median (Panel 1^d), and international comparisons of business innovation performance reveal weaknesses (Panel 1^e, ^f, ^g), and

SMEs outweigh large firms in terms of performing R&D (Panel 2). The economic crisis has also affected the number of companies carrying out R&D, which increased by 0.3% in 2012 from 2011, the first rise following a decline since 2008. A goal of the SSSTI is to increase BERD from 0.69% of GDP in 2012 to 1.20% in 2020. The government's structural reforms seek to improve the environment for business R&D and innovation by removing the limit on the amount of gross tax against which the tax credit for R&D can be taken and by substantially modifying the patent box tax relief. Finally, the Centre for Development of Industrial Technology (CDTI) offers information services to companies interested in developing R&D projects.

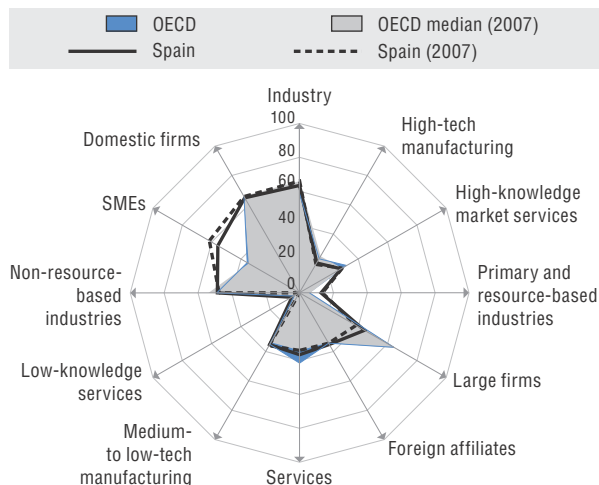
Innovative entrepreneurship: The rate of patenting by young Spanish firms is at the lower end of the middle range (Panel 1ⁱ). To address the lack of venture capital (Panel 1^h) CDTI created in 2012 two venture capital firms (INNVIERTE programme) to promote venture capital in Spanish technological firms and support the creation and growth of new innovative firms. The CDTI remains responsible for funding industrial and innovative activities nearer to the market. It also supports the creation of business consortia in regions (e.g. Andalusia, Extremadura, Galicia) to develop strategic projects. The 2013 budget for these initiatives was USD 194 million (EUR 132 million).

ICT and Internet infrastructures: The Spanish government also attaches importance to of ICT infrastructure (the Digital Agenda for Spain 2013-20 replaces the Strategy for Avanza2). Support for ICT firms to innovate and conduct R&D (Strategic Action on Digital Society and Economy) amounted to USD 808 million (EUR 550 million). The Digital Agenda for Spain also includes ecommerce, eAdministration, health care, and telecommunication networks, with a budget of USD 1.5 billion (EUR 1 billion).

Technology transfer and commercialisation: Spanish PRIs and universities are quite active in patenting (Panel 1^p). The challenge is to enhance the contribution of public research to the economy and society. Evaluations involving international assessment monitor and measure the impact and progress of *Campus de Excelencia Internacional*. The SSSTI (2013-20) has integrated technology and innovation activities with scientific research and aims to promote technology transfer through knowledge circulation and co-creation based on long-term public-private partnerships and commitments and reinforced researcher mobility between public and private research centres.

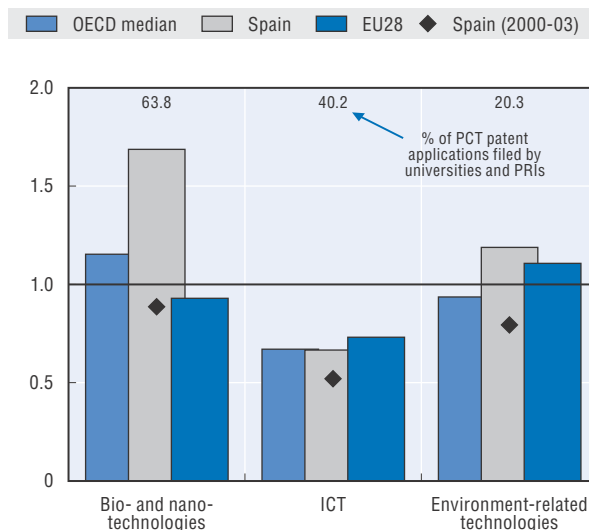
Panel 2. Structural composition of BERD, 2011

As a % of total BERD or sub-parts of BERD

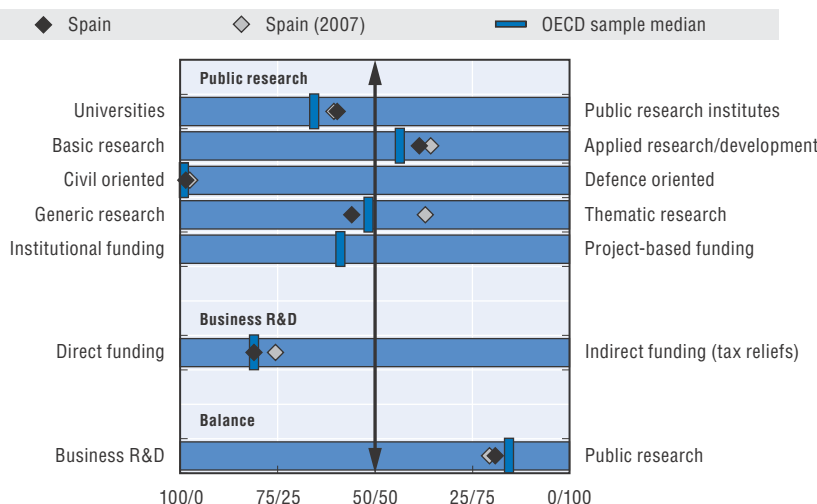


Panel 3. Revealed technology advantage in selected fields, 2009-11

Index based on PCT patent applications



Panel 4. Allocation of public funds to R&D, by sector, type and mode of funding, 2012



Note: Policy information comes from country responses to the OECD STI Outlook policy questionnaires 2014 and 2012. Spain's responses are available in the OECD STI Outlook Policy Database, edition 2014 at <http://qdd.oecd.org/Table.aspx?Query=AAB982AA-A642-472A-B5A0-8BE4A87288D0>.

Source: See reader's guide and methodological annex.

StatLink <http://dx.doi.org/10.1787/888933152412>

STI country profiles reader's guide

The country profiles (CPs) in the 2014 *OECD STI Outlook* (STIO) are designed to provide a concise overview of science, technology and innovation (STI) policy and performance in OECD members and selected non-OECD economies. Each country profile is based on information gathered from the country's response to the OECD STIO policy questionnaires 2012 and 2014, as well as various additional OECD and non-OECD sources.

Headings in the country profiles are linked to the STIO policy profiles, which examine the main global STI policy trends across countries. Issues featuring in both the policy and country profiles are: i) innovation policy governance; ii) new sources of growth; iii) new challenges; iv) universities and public research; v) innovation in firms; vi) innovative entrepreneurship; vii) technology transfer and commercialisation; viii) clusters and smart specialisation; ix) globalisation; and x) skills for innovation.

The table of key figures presents indicators on the country's economic performance (labour productivity), environmental performance (green productivity and demand), the size of its R&D system as measured by gross domestic expenditure on R&D (GERD), the degree of public commitment to S&T as measured by the share of GERD that is publicly financed, and the changes in these indicators over the past five years. In the text, all amounts are given both in USD in purchasing power parities (PPP) of the relevant year (if available) and in national currencies.

Panel 1 contains a double figure that sheds light on the strengths and weaknesses of the country's STI performance. It uses indicators on the country's national innovation system and performance with respect to: universities and public research, business R&D and innovation, innovative entrepreneurship, information and communication technology (ICT) and Internet infrastructure, networks, clusters and transfers, and skills for innovation. The dot for each indicator positions the country relative to the OECD median and to the top and bottom five OECD countries. Non-OECD countries are also compared to the OECD benchmarks, and may fall out of the range indicated in the figure (e.g. below the lowest OECD country). All indicators are normalised (by GDP and population cohorts) to take account of the size of the economy and the relevant population cohorts, and are presented as indices (OECD median = 100) for benchmarking purposes.

Panel 2 shows the structural composition of business expenditure on R&D (BERD) in terms of performance of the main industry sectors, firm size and firms' national affiliation. It reflects the country's industry structure and its business innovation efforts. Panel 3 presents the country's revealed technological advantage (RTA), as measured by international patent applications filed under the Patent Cooperation Treaty (PCT) in three key technology fields (bio- and nano-technology, ICTs, and environment-related technologies). It also shows the number of patents filed by universities and public research institutions in these fields.

Panel 4 gives an overview of the country's policy mix for public R&D, i.e. the orientation and funding modes of public research. It also illustrates changes in the policy mix for R&D over the past five years. Finally, Panel 5, a new feature in STIO 2014, reflects the balance and relative importance of various government measures to support business R&D and innovation. It is based on the country's self-assessment in its reply to the OECD STIO 2014 policy questionnaire.

Further details on the methodology, data sources and descriptions of indicators used in the country profile are provided in Annex 9.A. Data, metadata as well as the original sources and databases of the indicators used in the STIO 2014 are accessible at the statistical portal IPP.Stat (cut-off date: 8 July 2014).

Abbreviations used in the country profiles

BERD:	Business expenditure on research and development
EU:	European Union
FDI:	Foreign direct investment
GDP:	Gross domestic product
GERD:	Gross expenditure on research and development
HEIs:	Higher education institutions
IPRs:	Intellectual property rights
MNEs:	Multinational enterprises
PRIs:	Public research institutes
R&D:	Research and development
S&E:	Science and engineering
SSS:	Smart specialisation strategy (also known as 3S)
STI:	Science, technology and innovation
S&T:	Science and technology
3S:	See SSS
STEM:	Science, technology, engineering and mathematics
USD:	United States dollars (converted using the purchasing power parities of the relevant year)
VC:	Venture capital

Synthetic table

Table 9.1. Comparative performance of national science and innovation systems, 2014

Country relative position: in the top 5 OECD or above (★), in the middle range on par or above OECD median (▲), in the middle range below OECD median (Δ) and in the bottom 5 OECD or below (○)

		Competences and capacity to innovate									
		Universities and public research			R&D and innovation in firms				Innovative entrepreneurship		
		Public R&D expenditure (per GDP)	Top 500 universities (per GDP)	Publications in the top-quartile journals (per GDP)	Business R&D expenditure (per GDP)	Top 500 corporate R&D investors (per GDP)	Triadic patent families (per GDP)	Trademarks (per GDP)	Venture capital (per GDP)	Young patenting firms (per GDP)	Ease of entrepreneurship index
		PUB_XGDP	UNI500_GDP	PUB25_GDP	BE_XGDP	CORPRD500_GDP	PTRIAD_GDP	TRDMRK_GDP	VC_XGDP	PTYG_GDP	EASE_I
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Argentina	ARG	Δ	Δ	○	○	○	○	○			
Australia	AUS	▲	▲	▲	▲	Δ	Δ	▲	Δ		▲
Austria	AUT	▲	★	▲	▲	▲	▲	Δ	Δ	★	▲
Belgium	BEL	Δ	▲	▲	▲	Δ	▲	Δ	▲	Δ	Δ
Brazil	BRA		Δ	○		Δ	○	○			Δ
Canada	CAN	▲	▲	▲	Δ	Δ	▲	★	★	○	▲
Chile	CHL	○	Δ	○	○	○	○	Δ			Δ
China	CHN	Δ	Δ	○	▲	Δ	Δ	○			○
Colombia	COL	○	○	○	○						
Costa Rica	CRI	○	○	○	○	○					
Czech Republic	CZE	▲	Δ	Δ	Δ	Δ	Δ	Δ	○		Δ
Denmark	DNK	★	▲	★	▲	★	▲	▲	▲		▲
Estonia	EST	▲		▲	▲	○	Δ	Δ	▲		▲
Finland	FIN	★	★	▲	★	★	★	▲	★	★	▲
France	FRA	▲	Δ	Δ	▲	▲	▲	▲	▲	Δ	▲
Germany	DEU	★	▲	Δ	▲	▲	★	▲	▲	★	▲
Greece	GRC	○	Δ	Δ	○	Δ	○	○	○		Δ
Hungary	HUN	○	Δ	Δ	Δ	Δ	Δ	○	Δ		Δ
Iceland	ISL	★	○	★	▲	▲	Δ	★			Δ
India	IND	Δ	○	○	○	○	Δ	○			○
Indonesia	IDN		○	○	○		○	○			Δ
Ireland	IRL	Δ	▲	▲	Δ	▲	▲	▲	★	○	Δ
Israel	ISR	Δ	★	▲	★	▲	▲	▲	★		○
Italy	ITA	Δ	Δ	Δ	Δ	Δ	Δ	Δ	○	▲	★
Japan	JPN	▲	Δ	○	★	▲	★	Δ	Δ	○	▲
Korea	KOR	▲	Δ	Δ	★	▲	▲	▲	▲		Δ
Latvia	LVA	Δ	○	○	○		Δ				
Lithuania	LTU	Δ	○	○	○		Δ				
Luxembourg	LUX	○	○	Δ	Δ	★	▲	★	Δ		Δ
Malaysia	MYS	Δ	Δ	○	Δ	Δ					
Mexico	MEX	○	○	○	○	○	○	Δ			○
Netherlands	NLD	▲	▲	★	▲	▲	▲	▲	▲	▲	★
New Zealand	NZL	Δ	★	▲	Δ	Δ	Δ	★	Δ		★
Norway	NOR	▲	▲	Δ	Δ	▲	Δ	Δ	Δ	▲	Δ
Poland	POL	Δ	Δ	Δ	○	○	Δ	○	○		○
Portugal	PRT	Δ	▲	▲	Δ	Δ	Δ	Δ	Δ		▲
Russian Federation	RUS	Δ	○	○	Δ	Δ	○	○	Δ		Δ
Slovak Republic	SVK	Δ	○	○	○	○	○	○			★
Slovenia	SVN	Δ	▲	▲	▲	Δ	Δ	Δ	Δ		Δ
South Africa	ZAF	○	Δ	○	Δ	Δ	Δ	Δ	Δ		○
Spain	ESP	Δ	Δ	Δ	Δ	Δ	Δ	Δ	○	○	○
Sweden	SWE	★	★	★	★	★	★	▲	▲	★	Δ
Switzerland	CHE	▲	▲	★	▲	★	★	★	▲	★	▲
Turkey	TUR	Δ	○	○	Δ	Δ	○	○			○
United Kingdom	GBR	Δ	▲	▲	Δ	▲	▲	▲	▲	Δ	▲
United States	USA	▲	Δ	Δ	▲	▲	▲	▲	★	○	★
EU28	EU28	▲	▲	★	▲	Δ	▲	Δ	▲	▲	

Table 9.1. **Comparative performance of national science and innovation systems, 2014** (cont.)

Country relative position: in the top 5 OECD or above (★), in the middle range on par or above OECD median (▲), in the middle range below OECD median (△) and in the bottom 5 OECD or below (○)

		Interactions and skills for innovation												
		ICT and Internet infrastructures				Networks, clusters and transfers				Skills for innovation				
		ICT investment (per GDP)	Fixed broadband subscribers (per population)	Wireless broadband subscribers (per population)	E-government readiness index	Industry financed public R&D expenditure (per GDP)	Patents filed by universities and public labs (per GDP)	International co-authorship (%)	International co-invention (%)	Tertiary education expenditure (per GDP)	Adult population at tertiary education level (%)	Top adult performers in technology problem solving (%)	Top 15 year-old performers in science (%)	Doctoral graduate rate in science and engineering (%)
		ICTINV_XGDP	FBBAND_HAB	WBBAND_HAB	EGOV_I	PUB_BEF_XGDP	PATPRI_XGDP	INTCOA_XSA	COPAT_XPCT	TER_XGDP	ADTERPOP_XT	TOPAD_PST_XAD	TOP15_SCI_XT	PHDR_SCIENG_XCOH
		(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)
Argentina	ARG	○	○	○	○	○		△	★	▲	○		○	○
Australia	AUS	▲	△	★	▲	▲	▲	△	△	▲	▲	▲	★	▲
Austria	AUT	▲	△	▲	△	▲	△	★	▲	△	△	△	△	▲
Belgium	BEL	▲	▲	△	△	▲	▲	★	★	△	▲		▲	▲
Brazil	BRA		○	△	○		△	○	△	○	○		○	○
Canada	CAN	△	▲	△	▲	▲	▲	△	▲	★	★	▲	▲	▲
Chile	CHL		○	○	△	○	△	▲	△	★	○		○	○
China	CHN		○	○	○	▲	△	○	○		○			○
Colombia	COL		○	○	△			▲	△	★	△		○	
Costa Rica	CRI		○	○	○			★	★		△		○	
Czech Republic	CZE	△	△	△	○	△	△	△	▲	△	△	△	△	△
Denmark	DNK	★	★	★	★	△	★	▲	▲	▲	△	★	△	▲
Estonia	EST		△	▲	△	△		▲	★	▲	▲	○	★	△
Finland	FIN	△	▲	★	▲	★	▲	▲	△	★	▲	★	★	★
France	FRA	△	★	△	▲	△	★	▲	△	▲	△		▲	▲
Germany	DEU	△	▲	△	▲	★	▲	△	△	△	△	▲	▲	★
Greece	GRC	○	△	△	△	△	○	△	▲	▲	△		○	△
Hungary	HUN		△	○	△	▲	○	▲	▲	○	△		△	○
Iceland	ISL		▲	▲	△	★		★	▲	○	▲		△	△
India	IND		○	○	○		△	○	▲	○				
Indonesia	IDN		○	○	○			▲	★	○	○		○	○
Ireland	IRL	○	△	▲	△	○	★	▲	▲	▲	▲	○	▲	▲
Israel	ISR		△	△	▲	▲	★	△	△	▲	★		△	▲
Italy	ITA	△	△	△	△	○	△	△	○	○	○		△	△
Japan	JPN	★	▲	▲	▲	△	▲	○	○	▲	★	▲	★	△
Korea	KOR	▲	★	★	★	▲	★	○	○	★	★	○	▲	△
Latvia	LVA		△	△	△	▲		△	★	▲	△		○	△
Lithuania	LTU		△	○	△	★		△	△		▲		△	
Luxembourg	LUX	○	▲	▲	▲	△	△	★	★	○	▲		▲	
Malaysia	MYS		○	○	△			△	△	★	○		○	
Mexico	MEX	○	○	○	○	○	○	△	▲	△	○		○	○
Netherlands	NLD	▲	★	▲	★	★	▲	▲	△	▲	△	★	▲	△
New Zealand	NZL	★	▲	▲	▲	★	△	▲	△	▲	▲		★	▲
Norway	NOR		▲	▲	▲	▲	△	▲	△	▲	▲	★	△	▲
Poland	POL		○	▲	○	△	△	○	★	△	△	○	▲	○
Portugal	PRT	▲	△	○	△	○	○	△	▲	△	○		○	△
Russian Federation	RUS		○	△	△	★	○	○	△	△	★		○	○
Slovak Republic	SVK	○	○	△	○	△		△	▲	○	△	○	△	▲
Slovenia	SVN	△	△	△	△	▲	△	△	△	△	△		▲	▲
South Africa	ZAF		○	○	○	△	△	△	△	○	○			○
Spain	ESP	△	△	△	△	▲	▲	△	△	△	△		△	△
Sweden	SWE	★	▲	★	▲	▲	○	▲	△	▲	▲	★	△	★
Switzerland	CHE	★	★	△	▲	▲	▲	★	★	△	▲		▲	★
Turkey	TUR		○	○	○	▲	○	○	○	△	○		○	○
United Kingdom	GBR	▲	▲	▲	★	△	▲	△	▲	△	▲		▲	★
United States	USA	▲	▲	▲	★	△	▲	○	○	★	★	△	△	△
EU28	EU28	△	▲	▲		△	▲	▲	▲		△		△	▲

Note: Non-OECD countries are also compared to OECD countries and may therefore be out of range (e.g. lower than the lowest OECD country). They appear in this table with top five and bottom five OECD values

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

Source: See references and methodological annex of the OECD STI Outlook 2014 country profiles.

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