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## Greece

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## GREECE

Greece has undergone a pronounced and protracted economic recession since 2008. In response, the Greek government has embarked on deep fiscal adjustments and wide-ranging structural reforms. Improving framework conditions for innovation and overcoming serious weaknesses in the innovation system are important steps in regaining competitiveness and sustainable growth.

**Hot issue 1: Improving framework conditions for innovation (including competitiveness).** Greece's framework conditions for innovation are far from favourable as indicated by the lack of venture capital and the low Ease of Entrepreneurship Index, compared to the OECD median (Panel 1<sup>b, j</sup>). Improving conditions for entrepreneurship is considered critical for Greece's economic recovery, and the government has made sustained efforts to improve framework conditions for innovation as a way to restore competitiveness, growth and job creation. Measures implemented include legislative and policy improvements address STI both directly and indirectly, development of e-infrastructure, support for alternative innovation models (including social and open innovation) and more and better metrics and indicators for STI. More specifically, structural reforms have been undertaken in the competition framework, the labour market and the tax system. The Investment Law (3908/2011) amended in 2012-13 puts more emphasis on young innovative entrepreneurship, on improving the climate for business investment in R&D and on green development. The Hellenic Fund for Entrepreneurship and Development (ETEAN S.A), established in 2011, provides guarantees for loans to SMEs by banks and other financial institutions (such as leasing and venture-capital companies). The national strategic plan for innovation and entrepreneurship aims at enhancing the government-owned VC Fund of Funds (TANEO SA) through new venture funds with the participation of Tier 1 global VCs as general partners. A new Framework Law on Research, Technological Development and Innovation is under preparation. It will help to improve conditions for private R&D investment.

**Hot issue 2: Strengthening public R&D capacity and infrastructure.** Relative to public expenditure on R&D, which is considerably below the OECD median (Panel 1<sup>a</sup>), Greece has comparatively better performance in terms of international

publications and presence among the world's top 500 universities (Panel 1<sup>b, g</sup>). However, the pressures for fiscal consolidation have imposed further cuts on public funding of research in the last two years. To cope with this, the government emphasises efficient use of limited resources. Based on Law 4051/2012, PRIs are being reorganised and merged to improve disciplinary and geographical focus, enhance scientific co-operation within research fields, and reduce cost. The 2013 Athena Plan aims to rationalise higher education. Greece has made substantial efforts to improve its national R&D e-infrastructure through EU-Greece co-funded projects for cloud infrastructure-as-a-service (IaaS) for the research and academic community. Open access policies regarding publications and data have been formulated, and the largest-ever programme for the documentation, grouping and re-use of over two million cultural objects is being carried out. A national strategy and a roadmap for upgrading existing research infrastructure are being drafted and will be finalised in 2014.

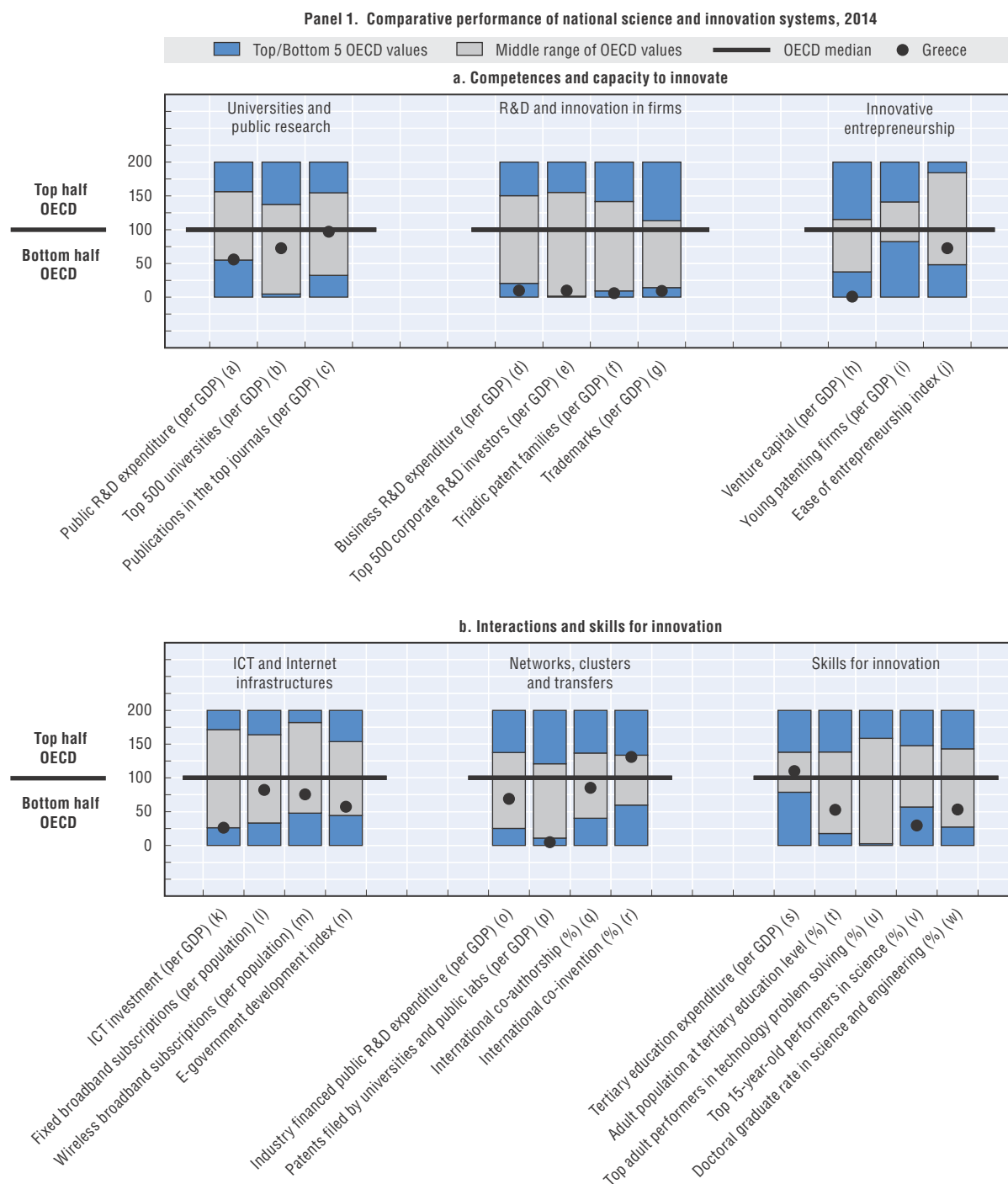
**Hot issue 3: Improving returns to and impact of science.** Greece's public research system is largely insulated from the productive sector. PRIs and universities do not tend to commercialise their research results, as indicated by their extremely low number of patents (Panel 1<sup>P</sup>). Also, the share of industry-financed public R&D is quite low (Panel 1<sup>O</sup>), a further indication of weak links between academia and industry. In addition to supporting commercialisation by improving framework conditions for entrepreneurship, the national strategic plan for innovation and new entrepreneurship has introduced technology transfer offices (TTOs) in each university and PRI. Continuous efforts have been made to increase the protection and exploitation of IPR resulting from public research and to support alternative models of knowledge exploitation. Furthermore, open data policies will be implemented with a view to stimulating research and growth by increasing the return to and impact of public research.

**Hot issue 4: Addressing globalisation and increasing international STI co-operation.** Pressures on national budgets have reinforced the importance of international co-operation on STI, which is also viewed as an opportunity to tap into external funding and infrastructures and profit from international

### Key figures, 2013

Economic and environmental performance	GRC	OECD	Gross domestic expenditure on R&D	GRC	OECD
<b>Labour productivity</b>			<b>GERD</b>		
GDP per hour worked, USD PPP, 2013	35.4	47.7	Million USD PPP, 2012	1 994	1 107 398
(annual growth rate, 2008-13)	(-1.8)	(+0.8)	As a % of total OECD, 2012	0.2	100
<b>Green productivity</b>			<b>GERD intensity and growth</b>		
GDP per unit of CO <sub>2</sub> emitted, USD, 2011	3.0	3.0	As a % of GDP, 2012	0.69	2.40
(annual growth rate, 2007-11)	(0.0)	(+1.8)	(annual growth rate, 2007-12)	(-1.8)	(+2.0)
<b>Green demand</b>			<b>GERD publicly financed</b>		
NNI per unit of CO <sub>2</sub> emitted, USD, 2011	2.8	3.0	As a % of GDP, 2012	0.36	0.77
(annual growth rate, 2007-11)	(-2.0)	(+1.6)	(annual growth rate, 2011-12)	(-1.6)	(+2.8)

Figure 9.17. Science and innovation in Greece



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

transfers of knowledge. Funding from abroad accounted for 15.8% of GERD in 2012, with the European Union the most important external funder of R&D activities. Over the last two years, the Greek government has focused on supporting bilateral scientific co-operation and on encouraging further participation by PRIs and business in international (especially European) programmes, such as the ERA-NET scheme.

**Hot issue 5: Improving overall human resources, skills and capabilities.** Although Greece's expenditure on higher education is at the OECD median, its share of tertiary-qualified adult population is below the median (Panel 1<sup>t, v</sup>). The economic recession has also caused a loss of human resources for S&T and innovation, as austerity measures applied to pension rights have led many senior researchers to retire early, while wage cuts and recruitment freezes have driven a growing number of young scientists out of the country. The recent reform of higher education (laws 4009/2011, 4076/2012 and 4115/2013) has introduced major changes in governance and funding mechanisms to boost university autonomy and to improve the quality of teaching and services for students. The latest reforms (i.e. laws 4093/2012 and 4111/2013) have rationalised the legal framework of post-secondary education and introduced new provisions for the recognition of higher education degrees earned from other EU member states.

### Highlights of the Greek STI system

**New sources of growth:** Micro- and nano-electronics and embedded systems have recently appeared on Greece's R&D landscape. They are developed through domestic measures (the Corallia cluster for microelectronics, 2008-15) and through participation in international programmes: the European Nanoelectronics Initiative Advisory Council and the Advanced Research and Technology for Embedded Intelligence and Systems. Four new clusters in space, gaming, life sciences and green energy are financed over 2011-15 with a total budget of around USD 38 million (EUR 27.6 million).

**New challenges:** The government seeks to improve the alignment of environmental and energy policy with domes-

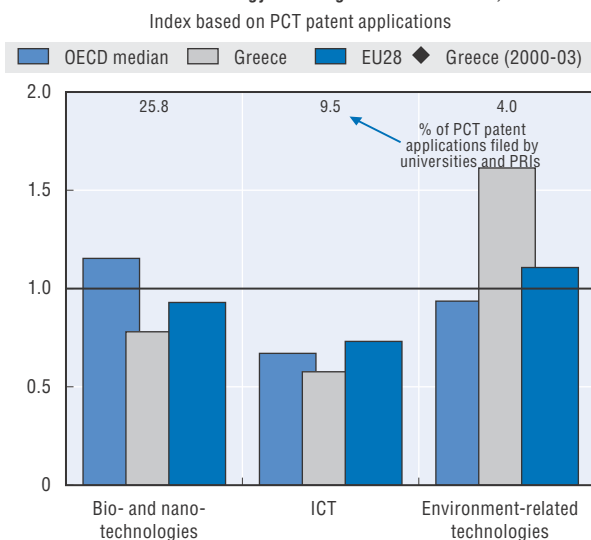
tic technological development, mainly through joint projects under the Co-operation programme. A related initiative is the Green Island – Ai Stratis project (2010) for the development of mature renewable energy and energy-saving technologies to cover the island's needs.

**Innovation in firms:** BERD is well below the OECD median (Panel 1<sup>d</sup>). Greece lacks world leading corporate R&D investors (Panel 1<sup>e</sup>), and the low values of innovation output indicators (Panel 1<sup>f, g</sup>) are the mirror image of the low innovation input of Greek firms. The tax law 4110/2013 (amending a law from 2004) provides for an annual deduction of R&D expenses from firms' net profits at the increased rate of 30% during the fiscal year in which the cost occurred. This tax incentive will apply from 2014 to help boost business R&D expenditures. Important changes to trademark legislation (e.g. reform of trademark registration procedures) were introduced over 2012-13, and modernisation of the country's patent system is currently under consideration.

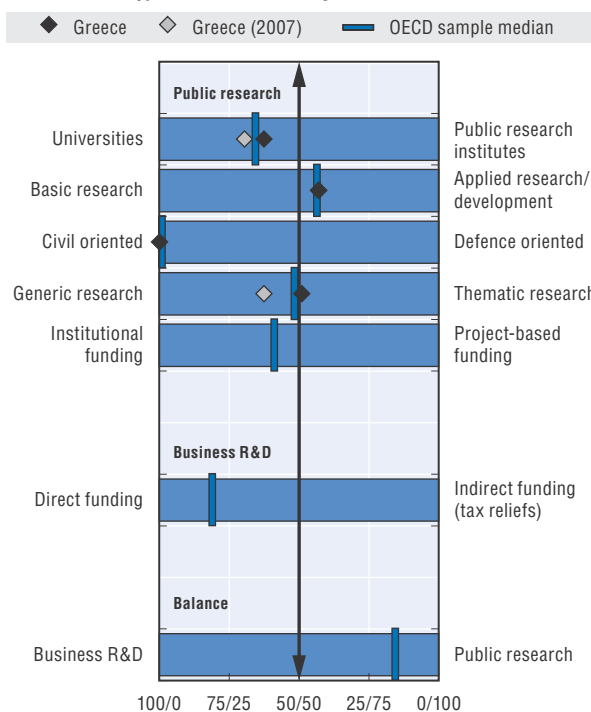
**Innovative entrepreneurship:** Enterprise Europe Network-Hellas (EEN-Hellas) provides initial support to innovative Greek enterprises wishing to enter global value chains and become more export-oriented by using knowledge from third parties, transferring their knowledge to other parties and increasing the level of patenting and licensing. The new EEN programme is expected to commence in the last quarter of 2014.

**Clusters and smart specialisation:** Since the beginning of 2012, smart specialisation strategies have been elaborated both at the national and regional level. National innovation platforms have been set up since 2013 in the framework of the EU's Research and Innovation Strategy for Smart Specialisation (RIS3) for 2014-20. Formed around the priority sectors, they involve all relevant stakeholders in priority setting for the ICT, energy, environment and agro-food sectors. They address the needs of enterprises (particularly SMEs) and other private investors in order to encourage R&D in the private sector.

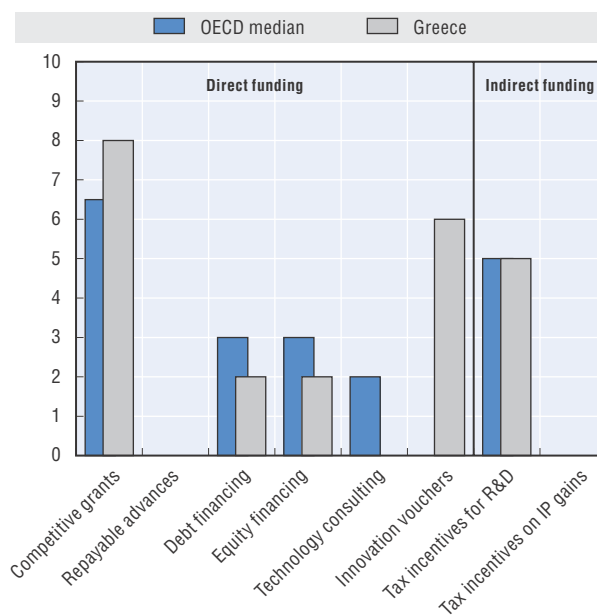
**Panel 2. Revealed technology advantage in selected fields, 2009-11**



**Panel 3. Allocation of public funds to R&D, by sector, type and mode of funding, 2012**



**Panel 4. Most relevant instruments of public funding of business R&D, 2014**



Note: Policy information comes from country responses to the OECD STI Outlook policy questionnaires 2014 and 2012. Greece's responses are available in the OECD STI Outlook Policy Database, edition 2014 at <http://qdd.oecd.org/Table.aspx?Query=2D786F62-2F8F-4160-A934-636EAF1E4D50>.  
 Source: See reader's guide and methodological annex.

StatLink <http://dx.doi.org/10.1787/888933152170>

## 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 (△) 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	△	△	○	○	○	○	○			
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	▲	▲	★	▲	△	▲	△	▲	▲	

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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