

## CZECH REPUBLIC

The Czech Republic is an open European economy. Industry accounts for more than a third of GDP, considerably above the OECD average. An export-led recovery spurred by the automotive sector started in early 2013, after six quarters of contraction. Economic growth is expected to gather pace in 2014. While its STI system is catching up with OECD standards in some respects, the system as a whole is still lagging behind.

**Hot issue 1: Improving the framework conditions for innovation (including competitiveness).** The Czech Republic's business environment is in need of improvement: while the Ease of Entrepreneurship Index has improved over time, it is still below the OECD median (Panel 1<sup>j</sup>) and venture capital for innovation is scarce (Panel 1<sup>h</sup>). An aim of the 2013 update of the National Research, Development and Innovation Policy (NRDIP) (2009-15 with an outlook to 2020) is to create better framework conditions for innovation. The International Competitiveness Strategy for the Czech Republic (2012-20) introduced more than 40 measures and several hundred sub-measures with a view to creating conducive framework conditions for creative businesses, innovation and growth.

**Hot issue 2: Reforming and improving the public research system (including university research).** The public research system has gradually improved in recent years, but challenges remain. Public R&D expenditures as a percentage of GDP are well above the OECD median, and publications in top quartile journals have almost reached the OECD median (Panel 1<sup>a, c</sup>); however, there are still relatively few top universities (Panel 1<sup>b</sup>). Following the above-mentioned evaluation and update, the NRDIP also seeks to increase the efficiency and responsiveness of public research and cut institutional funding from 56% of GBAORD in 2009 to 50% in 2013. In addition, a new annual performance-based evaluation is to be used to allocate funding to PRIs and universities.

**Hot issue 3: Improving overall human resources, skills and capacity building.** The indicators for innovation skills are mixed: tertiary education expenditure is at the OECD median (Panel 1<sup>s</sup>) and only 17% of the adult population is tertiary-qualified, compared to 27% for the EU28 (Panel 1<sup>t</sup>). However, adults' technical problem-solving ability,

15-year-olds' performance in science, and the share of doctoral graduates in S&E are either above or at the OECD median (Panel 1<sup>u, v, w</sup>). The 2009 White Paper on Tertiary Education is the basis for reform. Co-ordinated and executed by the Ministry of Education, Youth and Sports (MEYS), the reform aims to improve financial support for students, standardise PhD programmes, and increase university research. ERC CZ and NAVRAT (2012-19), both launched in 2012, support research excellence and researcher mobility with USD 80.6 million (CZK 1 065 million).

**Hot issue 4: Encouraging innovation in firms and supporting entrepreneurship and SMEs.** In spite of efforts to move to a knowledge-intensive economy, innovation performance is lagging. While BERD as a share of GDP is slightly below the OECD median (Panel 1<sup>d</sup>), innovation output is far below the median (Panel 1<sup>e, f, g</sup>). Both the NRDIP and the International Competitiveness Strategy seek to strengthen business innovation. In spite of the impact of the economic downturn on public finance, public support for business R&D and innovation has increased in both relative and absolute terms since 2009, accounting for 58% of all public R&D and innovation expenditures in 2012.

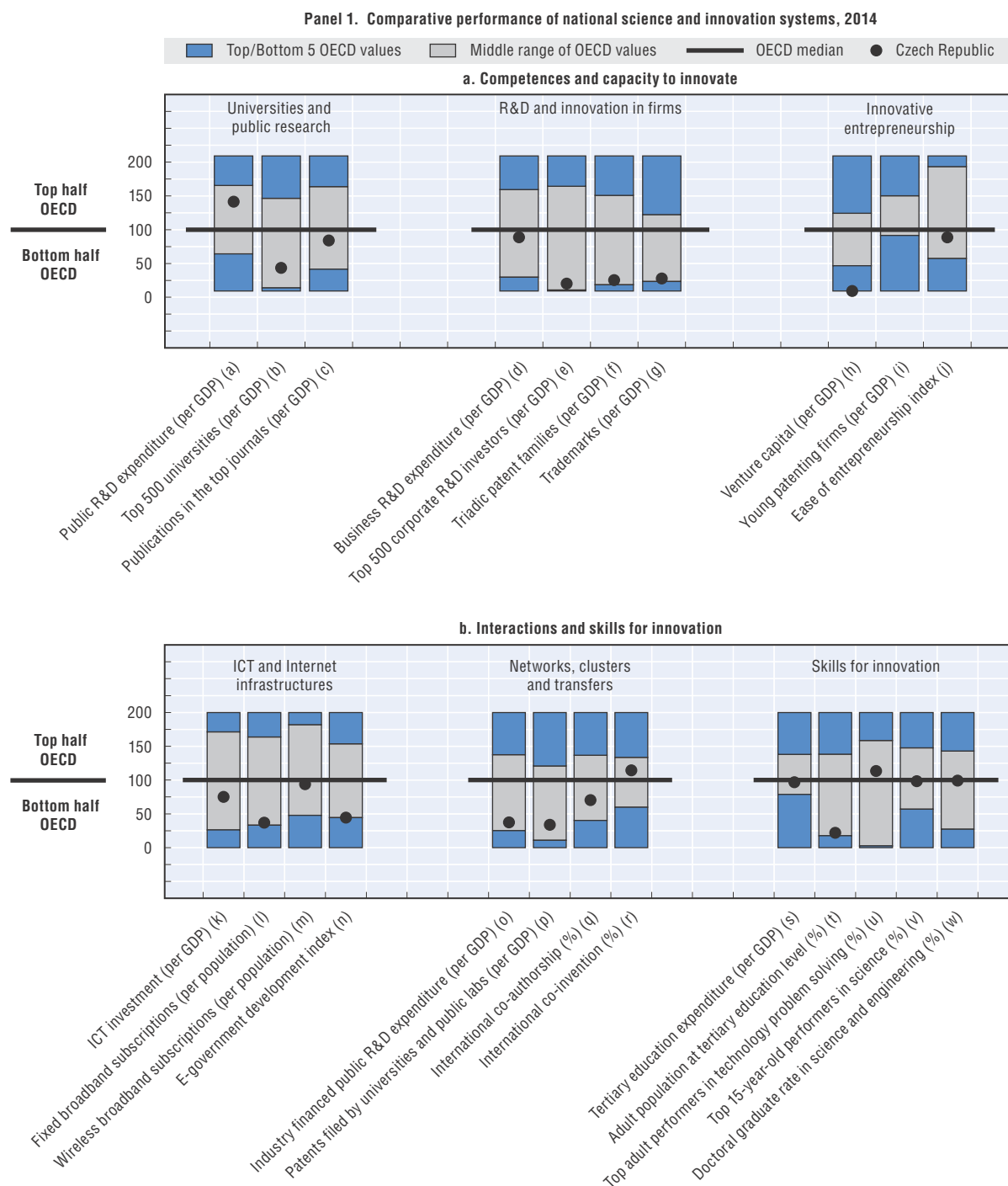
The Centres of Competence programme, launched in 2011, is a major programme aimed at increasing long-term collaboration between public R&D institutions and businesses. The GAMA Programme (2014-19), with a budget of USD 209 million (CZK 2 770 million), promotes transfer of public R&D results by funding the proof-of-concept phase. Similarly, the ALFA Programme (2011-16) seeks to fuel business innovation through collaboration with scientific research on advanced and green technologies with a total budget of USD 556.8 million (CZK 7.5 billion). Furthermore, 10 out of 14 Czech regions have introduced some kind of innovation voucher scheme to support SMEs for purchasing services from HEIs and PRIs.

**Hot issue 5: Addressing the challenges of STI globalisation and increasing international co-operation.** The Czech Republic is linked to global science and innovation networks to varying degrees. International co-patenting is above and international co-authorship is below the OECD median (Panel 1<sup>q, r</sup>). The Interdepartmental Policy of International Co-operation

### Key figures, 2013

Economic and environmental performance	CZE	OECD	Gross domestic expenditure on R&D	CZE	OECD
<b>Labour productivity</b>			<b>GERD</b>		
GDP per hour worked, USD PPP, 2013	32.2	47.7	Million USD PPP, 2012	5 443	1 107 398
(annual growth rate, 2008-13)	(+0.2)	(+0.8)	As a % of total OECD, 2012	0.5	100
<b>Green productivity</b>			<b>GERD intensity and growth</b>		
GDP per unit of CO <sub>2</sub> emitted, USD, 2011	2.2	3.0	As a % of GDP, 2012	1.88	2.40
(annual growth rate, 2007-11)	(+2.9)	(+1.8)	(annual growth rate, 2007-12)	(+7.0)	(+2.0)
<b>Green demand</b>			<b>GERD publicly financed</b>		
NNI per unit of CO <sub>2</sub> emitted, USD, 2011	1.8	3.0	As a % of GDP, 2012	0.71	0.77
(annual growth rate, 2007-11)	(+2.2)	(+1.6)	(annual growth rate, 2007-12)	(+3.0)	(+2.8)

Figure 9.11. Science and innovation in the Czech Republic



in R&D (see below) will set objectives for increasing international collaboration in STI, for improving conditions for the participation of Czech researchers in international research programmes, and for increasing the effectiveness of R&D co-operation. National initiatives to foster internationalisation include COST CZ (2011-17), EUREKA CZ (2011-17), EUPRO II (2011-17), KONTAKT II (2011-17), MOBILITY (2011-18), GESHER (2010-16) and INGO II (2011-17).

### **Highlights of the Czech STI system**

**STI policy governance:** The Technology Agency of the Czech Republic was established to make the governance of the public support system for applied research and development more efficient by removing overlaps. There is no comprehensive strategy for the internationalisation of STI. The Interdepartmental Policy of International Co-operation in R&D is being developed as part of the update of the NRDIP by the end of 2014.

**New challenges:** New long-term national priorities have been prepared through the Review of National Priorities for Research, Experimental Development and Innovation, which seeks to identify future challenges, threats, needs and opportunities. The priorities reflected in the updated NRDIP (2009-15) are: competitive knowledge-based economy; sustainability of energy and material resources, environment for quality life; social and cultural challenges; healthy population and safe society. Implementation plans were approved in 2013. In line with the priorities set by the NRDIP, as well as the thematic focus of other programmes, the Omega Programme seeks to strengthen research activi-

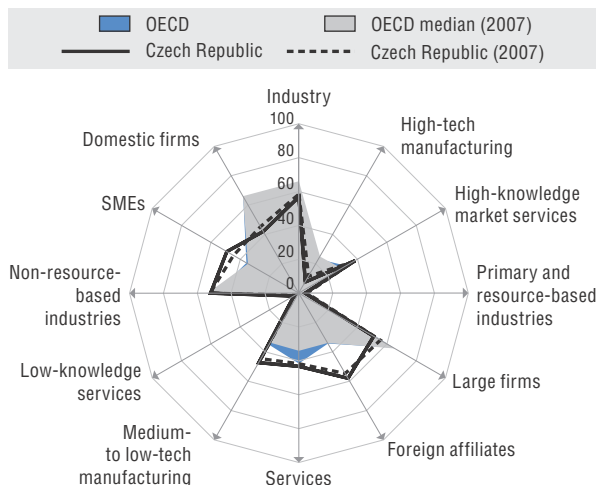
ties in the applied social sciences to increase the competitiveness of the Czech Republic, enhance the quality of life of its citizens and balance socio-economic development. A total of USD 23.2 million (CZE 309 million) will be invested between 2012 and 2017.

**Clusters and smart specialisation:** The National Smart Specialisation Strategy, with 14 regional strategies (annexes), is being developed and co-ordinated by MEYS. Science and technology parks, regional innovation centres and agencies play a significant role in the regional innovation infrastructure and in the formulation, implementation and evaluation of regional strategies. The European Union and the Czech government have invested USD 7.7 million (CZK 102 million) in the establishment of these parks, e.g. Technology and Innovation Centre of the Czech Technical University in Prague, the South Moravian Innovation Centre in Brno, the Science and Technology Park of Palacky University and the University of West Bohemia in Plzeň, and the Innovation Centre of the Technical University in Ostrava.

**Recent developments in STI expenditures:** The NRDIP (2009-15) set targets of GERD at 2.7% of GDP and public R&D expenditures at 1% of GDP by 2020. GERD increased from 1.37% of GDP in 2007 to 1.88% of GDP in 2012, averaging a 7% increase a year over 2007-12, well above the OECD average. The share of industry-funded GERD dropped from 47.2% to 36.4%, and government-funded GERD from 44.7% to 36.8%. GERD financed from abroad rose from 7.3% to 25.9%, during the period with EU funding and foreign companies (Panel 2) the main sources of the increase.

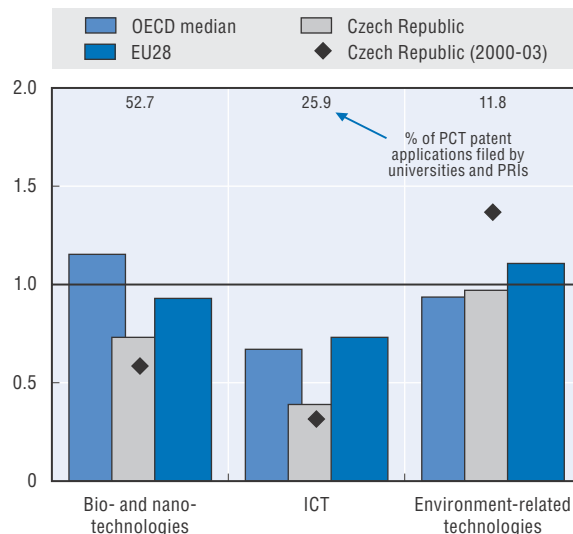
**Panel 2. Structural composition of BERD, 2011**

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



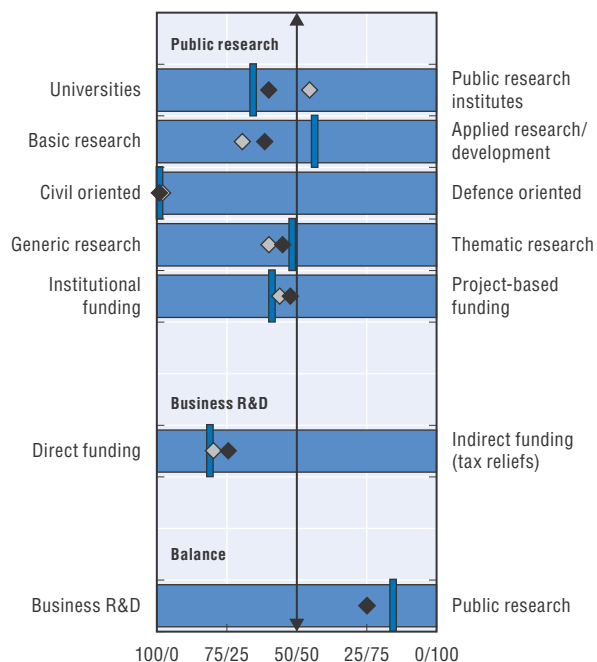
**Panel 3. Revealed technology advantage in selected fields, 2009-11**

Index based on PCT patent applications

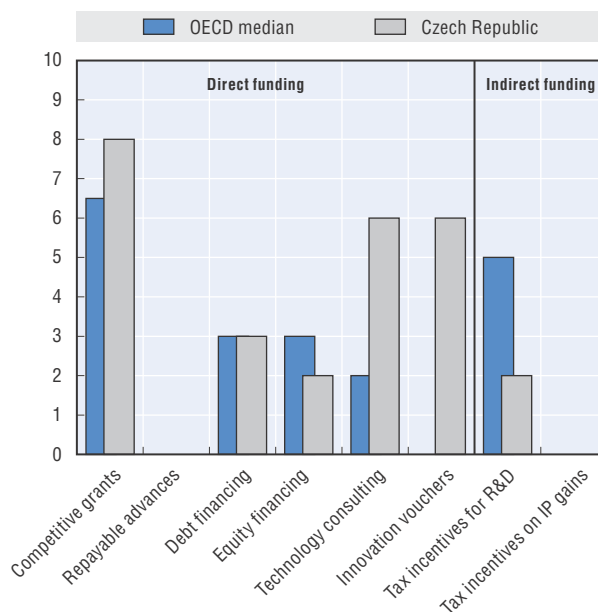


**Panel 4. Allocation of public funds to R&D, by sector, type and mode of funding, 2012.**

◆ Czech Republic    ◇ Czech Republic (2007)  
— OECD sample median



**Panel 5. 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. Czech Republic's responses are available in the *OECD STI Outlook Policy Database*, edition 2014 at <http://qdd.oecd.org/Table.aspx?Query=6B36463F-C683-4F05-ADB6-8628A93E050A>.  
Source: See reader's guide and methodological annex.

StatLink <http://dx.doi.org/10.1787/888933152118>

## 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.



## References

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