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Hungary

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HUNGARY

Hungary is a central European economy with a strong industry sector in which foreign investment and technology play a significant role. It has a longstanding tradition in scientific research. In June 2013 the government adopted the Investment in the Future: National Research and Development and Innovation Strategy (2013-20), which focuses on key strategic issues.

Hot issue 1: Strengthen public R&D capacity and infrastructures. Given Hungary's very low public R&D expenditure by OECD standards, its research sector's publication performance is quite strong (Panel 1^{a, c}). However, research infrastructures have become increasingly obsolete owing to a lack of investment in maintenance and modernisation in the recent past. The National Research Infrastructure Survey and Roadmap (NEKIFUT), undertaken as a part of the government's mid-term STI strategy for 2007-13, identified measures to be taken and highlighted the importance of accessing international research infrastructure networks. The Extreme Light Infrastructure (ELI) programme to develop a super-laser is supported by both the European Union and the Hungarian government. Now in a preliminary phase, the aim is to have it operational by the end of 2015. The need for public investment in research infrastructure is recognised in the new Economic Development and Innovation Operative Programme (GINOP), which defines development priorities for 2014-20.

Hot issue 2: Strengthening business innovation, entrepreneurship and SMEs. Supporting business innovation and SMEs has always been a focus of Hungarian development policy. The government aims to boost business investment in R&D and innovation (Panel 1^d); it currently emphasises start-ups, young entrepreneurs and incubation processes. Major support measures for business innovation and SMEs include EU co-financed initiatives under the Economic Development and Innovation Operative Programme (GINOP), with a budget of USD 21.1 billion (HUF 2 700 billion) for the next seven years, and the national R&D programmes financed by the Research and Technological Innovation Fund (KTIA) with USD 195 million (HUF 25 billion) a year. Other measures include the tax incentive that allows a deduction of 200% of the amount of R&D expenditures from the income of the

company's pre-tax profit statement. Measures taken in this regard include innovation and technology parks along with the Mentor Programme and InnoPoint, which provide integrated information services, both of which are run by the National Innovation Office and the Open Laboratory programme. The government also supports business innovation through innovation and technology parks, innovative clusters, and improvements in the business infrastructure and investment climate. In the context of Horizon 2020, Hungary plans to launch the Precompetitive Procurement Programme as a new funding instrument to support business innovation in all industries in 2014.

Hot issue 3: Improving the education system. Hungary's public expenditure on higher education as a share of GDP is among the lowest of OECD countries, although it is home to two (to four, depending on the ranking exercise) of the world's top 500 universities (Panel 1^{s, b}). Reform of the education system has long been an issue for the government. Based on the government resolution, the "university of national excellence" classification can be awarded to higher education institutions with strong educational and research capacities and outstanding scientific results in more than one discipline that allow them to contribute significantly to the attainment of national strategic objectives. The transition to tertiary education with a labour-market orientation and the introduction of tuition fees have been the key steps in the reform process. Companies are involved in the design of curricula and establish faculties at universities to teach students with up-to-date knowledge and to facilitate recruitment.

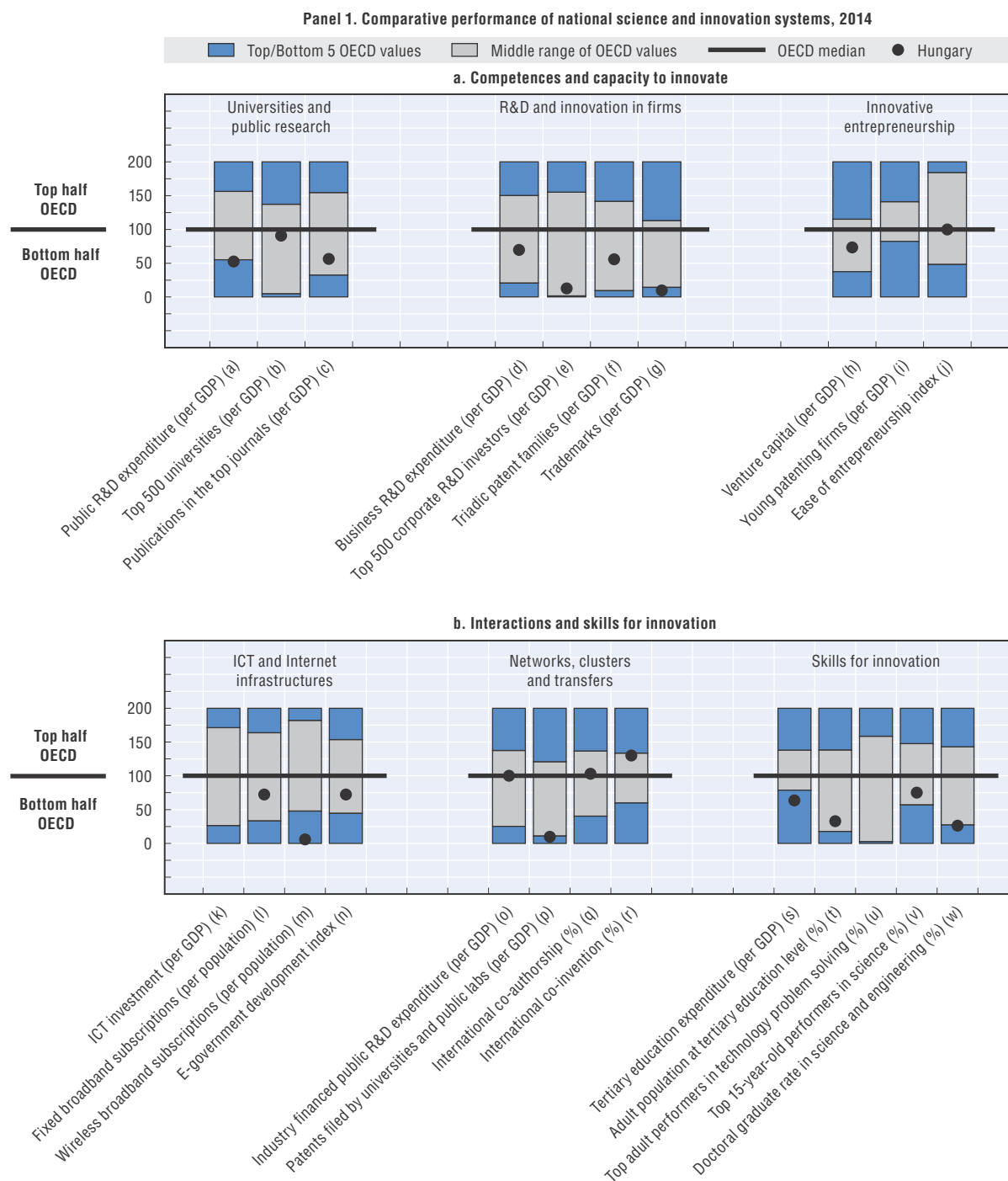
Other important initiatives for the education system and human resources include: the Momentum programme, which aims to foster excellence and reduce brain drain by supporting talented young researchers; the National seeks to attract Hungarian researchers and lecturers working abroad to work in Hungary.

Hot issue 4: Improving the return to and impact of public research. While strong in academic publications, the Hungarian public research sector has weak patenting performance (Panel 1^p), even though business-funded public R&D is at the OECD median (Panel 1^o). To strengthen linkages

Key figures, 2013

Economic and environmental performance	HUN	OECD	Gross domestic expenditure on R&D	HUN	OECD
Labour productivity			GERD		
GDP per hour worked, USD PPP, 2013	29.6	47.7	Million USD PPP, 2012	2 912	1 107 398
(annual growth rate, 2008-13)	(+0.2)	(+0.8)	As a % of total OECD, 2012	0.3	100
Green productivity			GERD intensity and growth		
GDP per unit of CO ₂ emitted, USD, 2011	3.7	3.0	As a % of GDP, 2012	1.30	2.40
(annual growth rate, 2007-11)	(+2.8)	(+1.8)	(annual growth rate, 2007-12)	(+4.6)	(+2.0)
Green demand			GERD publicly financed		
NNI per unit of CO ₂ emitted, USD, 2011	3.7	3.0	As a % of GDP, 2012	0.48	0.77
(annual growth rate, 2007-11)	(+2.4)	(+1.6)	(annual growth rate, 2006-12)	(+0.2)	(+2.8)

Figure 9.18. Science and innovation in Hungary



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

among key players in the national innovation system, the government has made enhancing knowledge flows a key policy objective. In addition, the Research, Development and Innovation Strategy supports knowledge utilisation through accredited technological incubators and the development of a technological start-up ecosystem with an estimated USD 1.1 billion (HUF 140 billion) over 2014-20. It focuses on small innovative firms, medium-sized firms with strong export potential and large firms to capitalise on the innovation potential of public research.

Highlights of the Hungarian STI system

STI policy governance: The fragmentation of society and of the political system and a weak collaboration culture are considered the main barriers to better co-ordination of national innovation policy. However, the government is remodelling these structures to obtain a better-focused STI system of ministries, institutions and business actors. The Ministry for National Economy has established a working group (Budapest HUB) composed of different stakeholders in Hungarian start-ups, in recognition of the joint responsibility of the government and stakeholders to create a favourable ecosystem for start-ups.

Universities and public research: Hungary has a strong public research sector, notably under the Hungarian Academy of Sciences (MTA). Owing to changes in the governance structure of the Academy, government funding of research institutions has stagnated. The 2011 Act on Higher Education aims to increase the role of universities in public research by granting five universities a research-intensive university status. The new law on higher education adopted in 2012 sets natural sciences and technologies as priorities of public research and education and concentrates public funding of university research in research-intensive universities.

Innovative entrepreneurship: The EU JEREMIE Programme has had a strong positive influence on the development of Hungarian entrepreneurship and the emergence of Hungarian venture capital funds, and Hungary's position in the EU has risen relatively quickly. According to the European Private Equity and Venture Capital Association, Hungary had the highest venture capital investments as a percentage of GDP among EU member states in 2012. In 2013, the National Development Agency (NFÜ) selected eight market intermediaries, each of which was granted USD 23.5 million (HUF 3 billion) to work with Venture Finance Hungary Plc. to strengthen the JEREMIE Fund (also known as the Joint Growth Fund).

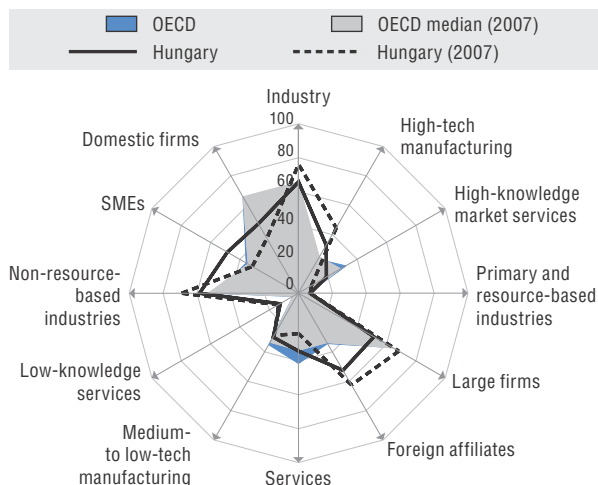
Clusters and smart specialisation: The Hungarian National Strategic Reference Framework (i.e. New Széchenyi Plan) emphasises enterprise networks and cluster development. Hungary is designing its national Smart Specialisation Strategy to promote the development and implementation of regional innovation systems in accordance with the government's decision and the agreement with the EU Commission.

Skills for innovation: In response to signs of skills shortages and needs, the education component of the national R&D and Innovation Strategy focuses on vocational training, interdisciplinary education, business management, fostering entrepreneurial and risk taking attitudes among youth through scholarship programmes and talent identification. To promote employment of researchers and S&E graduates, tax allowances are available for employers hiring doctorate holders, while the Be Entrepreneur in Hungary programme supports technology start-ups.

Recent developments in STI expenditures: In 2013 the Innovation Strategy set a target for GERD of 1.8% of GDP by 2020, with two-thirds of it performed by the business sector. Public budgets for R&D and innovation are expected to increase in the coming years.

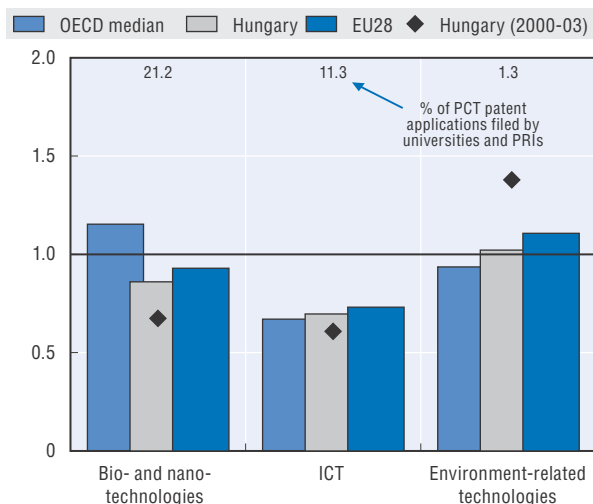
Panel 2. Structural composition of BERD, 2011

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



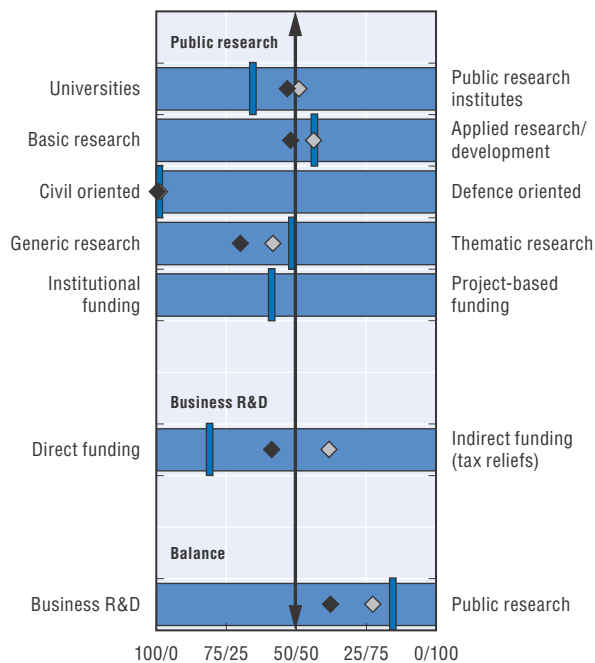
Panel 3. Revealed technology advantage in selected fields, 2009-11

Index based on PCT patent applications

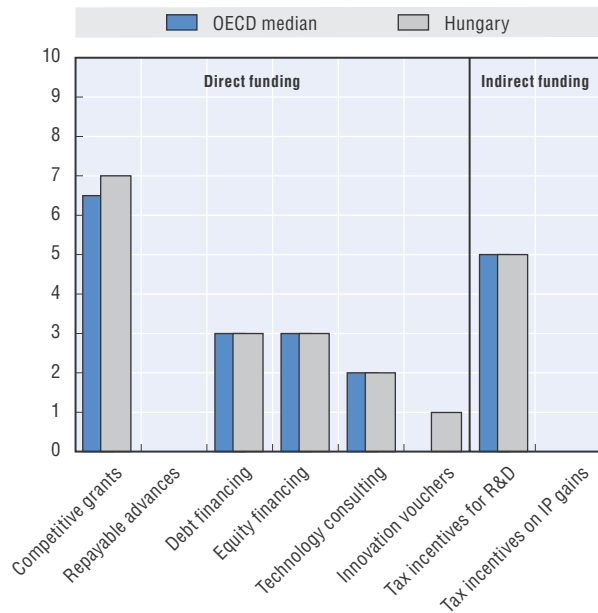


Panel 4. Allocation of public funds to R&D, by sector, type and mode of funding, 2012

Legend: Hungary (black diamond), Hungary (2007) (grey diamond), OECD sample median (blue line).



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. Hungary's responses are available in the OECD STI Outlook Policy Database, edition 2014 at <http://qdd.oecd.org/Table.aspx?Query=4EB98911-4070-4821-A4E7-5D36060F9CF0>. Source: See reader's guide and methodological annex.

StatLink <http://dx.doi.org/10.1787/888933152184>

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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