INNOVATION UNION SCOREBOARD 2011

The Innovation Union's performance scoreboard for Research and Innovation

7 February 2012

The IUS report, its annexes and the indicators' database are available at http://www.proinno-europe.eu/metrics

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2011 INNOVATION UNION SCOREBOARD

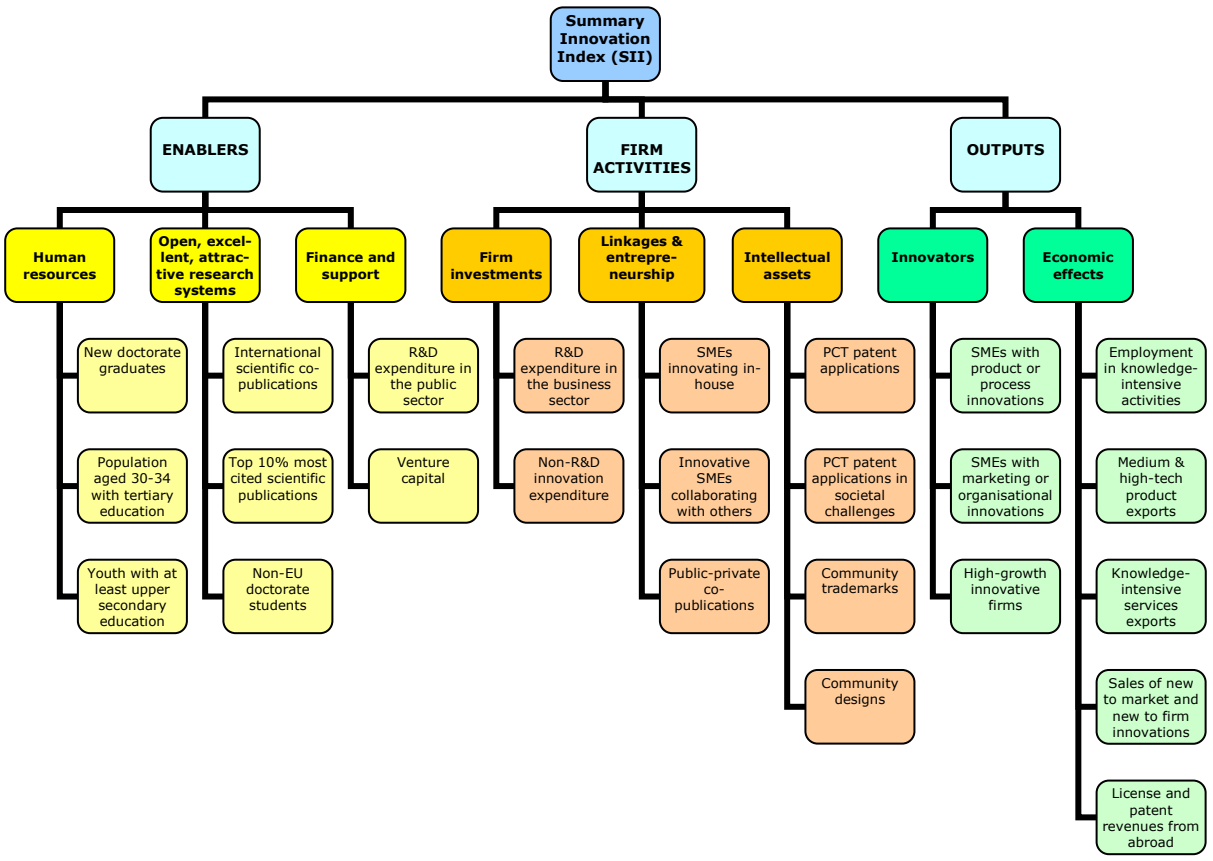
1. EXECUTIVE SUMMARY

This is the second edition of the Innovation Union Scoreboard (IUS). Based on the previous European Innovation Scoreboard (EIS), the tool is meant to help monitor the implementation of the Europe 2020 Innovation Union[1] flagship by providing a comparative assessment of the innovation performance of the EU27 Member States and the relative strengths and weaknesses of their research and innovation systems.

The IUS includes innovation indicators and trend analyses for the EU27 Member States, as well as for Croatia, Iceland, the Former Yugoslav Republic of Macedonia, Norway, Serbia, Switzerland and Turkey. It also includes comparisons based on a more reduced set of indicators between the EU27 and 10 global competitors.

The IUS 2011 distinguishes between 3 main types of indicators and 8 innovation dimensions, capturing in total 25 different indicators (cf. Figure 1).

Figure 1: Framework of the Innovation Union Scoreboard



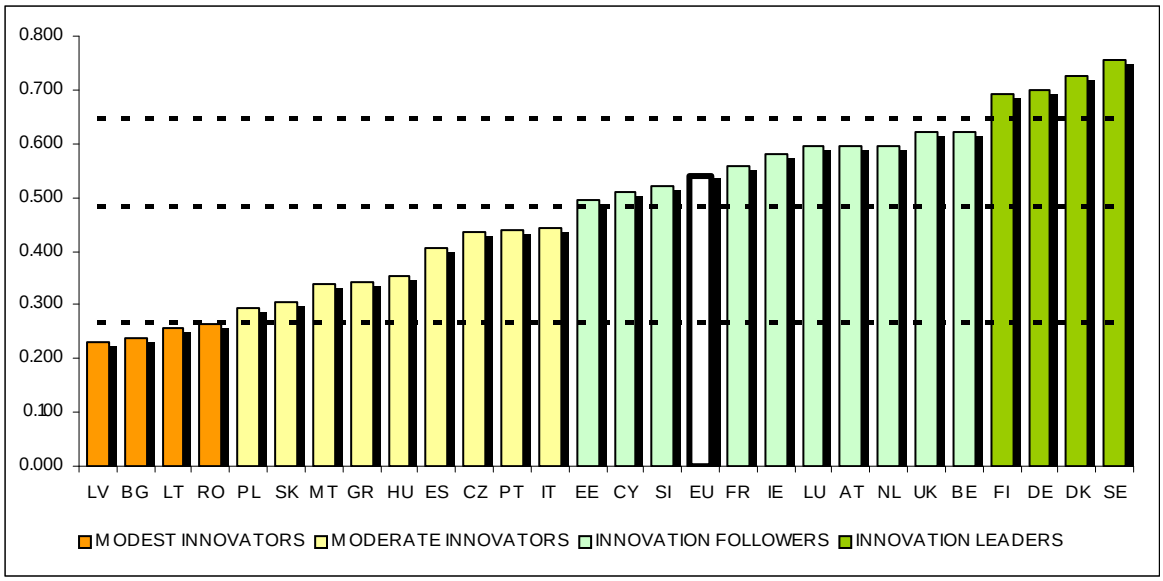
The **Enablers** capture the main drivers of innovation performance external to the firm and cover 3 innovation dimensions: 'Human resources', 'Open, excellent and attractive research systems' as well as 'Finance and support'. **Firm activities** capture the innovation efforts at the level of the firm, grouped in 3 innovation dimensions: 'Firm investments', 'Linkages & entrepreneurship' and 'Intellectual assets'. **Outputs** cover the effects of firms' innovation activities in 2 innovation dimensions: 'Innovators' and 'Economic effects'.

[1] See http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf

The 25 indicators better capture the performance of national research and innovation systems considered as a whole[2]. While some of the indicators of the IUS (such as public R&D expenditure) can be more easily influenced by policy intervention than others (such as SMEs innovating in-house), the overall ambition of the Innovation Union Scoreboard is to inform policy discussions at national and EU level, by tracking progress in innovation performance within and outside the EU over time.

The IUS uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. International sources have been used wherever possible in order to improve comparability between countries. The IUS 2011 may not fully capture the impact of the economic and financial crisis on innovation performance as there is a delay in data availability where data refer to 2009 or 2010 for 14 indicators and to 2007 or 2008 for 10 indicators. The current composite indicator consists of 24 individual indicators since the last indicator on "High-growth innovative enterprises as a percentage of all enterprises" is being developed.

FIGURE 2: EU MEMBER STATES' INNOVATION PERFORMANCE



Note: Average performance is measured using a composite indicator building on data for 24 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2011 reflects performance in 2009/2010 due to a lag in data availability.

Performance groups

Based on their average innovation performance, the Member States fall into **four performance groups** (see section 3.1):

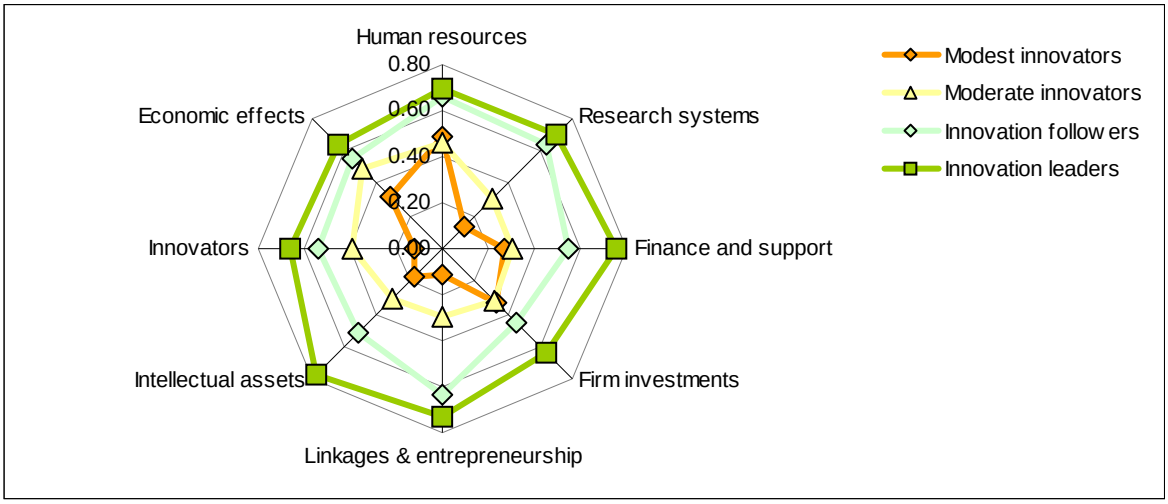
- The performance of Denmark, Finland, Germany and Sweden is well above that of the EU27 average. These countries are the '**Innovation leaders**'.
- Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27 average. These countries are the '**Innovation followers**'.
- The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27 average. These countries are '**Moderate innovators**'.

[2] See Annex C for the definition of indicators

- The performance of Bulgaria, Latvia, Lithuania and Romania is well below that of the EU27 average. These countries are '**Modest innovators**'.

Bulgaria, Estonia, Romania, Portugal and Slovenia are the growth leaders with an average annual growth rate well above 5%. There continues to be **a steady convergence,** where less innovative Member States have – on average – been growing faster than the more innovative Member States. This convergence process however seems to be slowing down (see section 3.2). While the Moderate and Modest innovators clearly catch-up to the higher performance level of both the Innovation leaders and Innovation followers, there is no convergence between the different Member States within the Moderate innovators. Convergence between the Member States does take place within the Innovation leaders, Innovation followers and Modest innovators.

FIGURE 3: COUNTRY GROUPS: INNOVATION PERFORMANCE PER DIMENSION



What do innovation leaders have in common?

Countries at the top of the ranking for the composite innovation indicator share a number of strengths **in their national research and innovation systems with a key role of business activity and public-private collaboration**. While there is not one single way to reach top innovation performance, it is clear that all innovation leaders, Finland, Sweden, Denmark and Germany, perform very well in **Business R&D expenditures. Most of the innovation leaders also perform very well in other innovation indicators related to firm activities** The top EU innovator Sweden dominates in three out of 8 innovation dimensions: Human resources, Finance and support, and Firm investments; while Germany and Denmark perform best in two innovation dimensions each.

All of the innovation leaders have higher than average scores in Public-private co-publications per million populations, which suggests good linkages between the science base and enterprises. All European top innovators also excel in the commercialisation of their technological knowledge, as demonstrated by their good performance on the indicator License and patent revenues from abroad.

The overall good performance of the innovation leaders reflects **a balanced national research and innovation system**. It means that the innovation leaders as well as the innovation followers have the smallest variance in their performance across all the 8 innovation dimensions.

While each country has its own specificities, policy responses should attempt not only to address relative weaknesses in national research and innovation systems, but also to have more balanced performances across all categories of indicators.

It is evident that the moderate and modest innovators are characterised by an unbalanced research and innovation systems. This is particularly clear in the 'Innovators' dimension with very low shares of SMEs introducing product or process innovations as well as SMEs introducing marketing and organisation innovations. At the same time, the growth rates of most of the modest and moderate innovators are the highest among the EU27 which indicates a convergence process with Bulgaria as a EU catching-up leader, followed by Romania and Estonia.

International comparison

A comparison with other European countries not belonging to the European Union shows that Switzerland is the overall Innovation leader continuously outperforming all EU27 countries. Iceland is part of the Innovation followers, Croatia, Norway and Serbia of the Moderate innovators and the Former Yugoslav Republic of Macedonia and Turkey of the Modest innovators. For Croatia, Serbia and Turkey growth has been well above the EU27 average.

Comparing the EU27 with a selected group of major global competitors shows that the US, Japan and South Korea have a performance lead over the EU27. This lead has been increasing for South Korea, has remained stable for the US and has been decreasing for Japan. The global innovation leaders US and Japan are particularly dominating the EU27 in indicators capturing business activity and public-private cooperation: 'R&D expenditure in the business sector', 'Public-private co-publications', 'License and patent revenues from abroad' and 'PCT patent applications'. South Korea which is increasingly outperforming the EU27 is again having its biggest lead in R&D expenditures in the business sector.

The EU27 has a performance lead over Australia, Canada and all BRICS countries (Brazil, Russia, India, China and South Africa). This lead has been increasing compared to Canada, Russia and South Africa, has remained stable to Australia and has been decreasing to Brazil and in particular to China and India. China has been closing the innovation gap to Europe continuously in the last few years.

2. INTRODUCTION

The IUS 2011 largely follows the methodology of previous editions in distinguishing between 3 main types of indicators and 8 innovation dimensions, capturing in total 25 different indicators.

The **Enablers** capture the main drivers of innovation performance external to the firm and it differentiates between 3 innovation dimensions. 'Human resources' includes 3 indicators and measures the availability of a high-skilled and educated workforce. 'Open, excellent and attractive research systems' includes 3 indicators and measures the international competitiveness of the science base. 'Finance and support' includes 2 indicators and measures the availability of finance for innovation projects and the support of governments for research and innovation activities.

Firm activities capture the innovation efforts at the level of the firm and it differentiates between 3 innovation dimensions. 'Firm investments' includes 2 indicators of both R&D and non-R&D investments that firms make in order to generate innovations. 'Linkages & entrepreneurship' includes 3 indicators and measures entrepreneurial efforts and collaboration efforts among innovating firms and also with the public sector. 'Intellectual assets' captures different forms of Intellectual Property Rights (IPR) generated as a throughput in the innovation process.

Outputs capture the effects of firms' innovation activities and it differentiates between 2 innovation dimensions. 'Innovators' includes 3 indicators and measures the number of firms that have introduced innovations onto the market or within their organisations, covering both technological and non-technological innovations and the presence of high-growth firms. The indicator on innovative high-growth firms corresponds to the new EU2020 headline indicator, which will be completed within the next two years. 'Economic effects' includes 5 indicators and captures the economic success of innovation in employment, exports and sales due to innovation activities.

The indicators included in each of these dimensions are listed in Table 1 and indicator definitions are presented in Annex C.

TABLE 1: INNOVATION UNION SCOREBOARD INDICATORS

Main type / innovation dimension / indicator	Data source	Reference year(s)
ENABLERS		
Human resources		
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Eurostat	2005 – 2009
1.1.2 Percentage population aged 30-34 having completed tertiary education	Eurostat	2006 – 2010
1.1.3 Percentage youth aged 20-24 having attained at least upper secondary level education	Eurostat	2006 – 2010
Open, excellent and attractive research systems		
1.2.1 International scientific co-publications per million population	Science-Metrix / Scopus	2006 – 2010
1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	Science-Metrix / Scopus	2003 – 2007
1.2.3 Non-EU doctorate students[3] as a % of all doctorate students	Eurostat	2005 – 2009
Finance and support		
1.3.1 R&D expenditure in the public sector as % of GDP	Eurostat	2006 – 2010
1.3.2 Venture capital (early stage, expansion and replacement) as % of GDP[4]	Eurostat	2006 – 2010

[3] For non-EU countries the indicator measures the share of non-domestic doctoral students.

Main type / innovation dimension / indicator	Data source	Reference year(s)
FIRM ACTIVITIES		
Firm investments		
2.1.1 R&D expenditure in the business sector as % of GDP	Eurostat	2006 – 2010
2.1.2 Non-R&D innovation expenditures as % of turnover	Eurostat	2004, 2006, 2008
Linkages & entrepreneurship		
2.2.1 SMEs innovating in-house as % of SMEs	Eurostat	2004, 2006, 2008
2.2.2 Innovative SMEs collaborating with others as % of SMEs	Eurostat	2004, 2006, 2008
2.2.3 Public-private co-publications per million population	CWTS / Thomson Reuters	2004 – 2008
Intellectual assets		
2.3.1 PCT patents applications per billion GDP (in PPS€)	Eurostat	2004 – 2008
2.3.2 PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	OECD / Eurostat	2004 – 2008
2.3.3 Community trademarks per billion GDP (in PPS€)	OHIM / Eurostat	2006 – 2010
2.3.4 Community designs per billion GDP (in PPS€)	OHIM / Eurostat	2006 – 2010
OUTPUTS		
Innovators		
3.1.1 SMEs introducing product or process innovations as % of SMEs	Eurostat	2004, 2006, 2008
3.1.2 SMEs introducing marketing or organisational innovations as % of SMEs	Eurostat	2004, 2006, 2008
3.1.3 High-growth innovative firms	N/A	N/A
Economic effects		
3.2.1 Employment in knowledge-intensive activities (manufacturing and services) as % of total employment	Eurostat	2008 – 2010
3.2.2 Medium and high-tech product exports as % total product exports	UN / Eurostat	2006 – 2010
3.2.3 Knowledge-intensive services exports as % total service exports	UN / Eurostat	2005 – 2009
3.2.4 Sales of new to market and new to firm innovations as % of turnover	Eurostat	2004, 2006, 2008
3.2.5 License and patent revenues from abroad as % of GDP	Eurostat	2006 – 2010

The IUS uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. International sources have been used wherever possible in order to improve comparability between countries. It is important to note that the data relates to actual performance in 2007 (1 indicator), 2008 (9 indicators[5]), 2009 (3 indicators) and 2010 (11 indicators). As a consequence the IUS 2011 does not capture the most recent changes in innovation performance or the impact of policies introduced in recent years which may take some time to impact on innovation performance. Nor does it fully capture the impact of the financial crisis on innovation performance.

[4] Venture capital data as a share of GDP up until 2009 are available from Eurostat. For 2010 venture capital investment data have been extracted from EVCA's Yearbook 2011. The 2009 Eurostat data for %-shares of GDP have been updated to 2010 percentages by adjusting the 2009 data using the ratio of the 2009-2010 growth rates of these venture capital investments and GDP. The 2010 percentages used in this report are thus estimates and not official Eurostat data.

[5] Of these 6 indicators are from the latest available Community Innovation Survey from 2008.

3. INNOVATION UNION SCOREBOARD: FINDINGS FOR MEMBER STATES

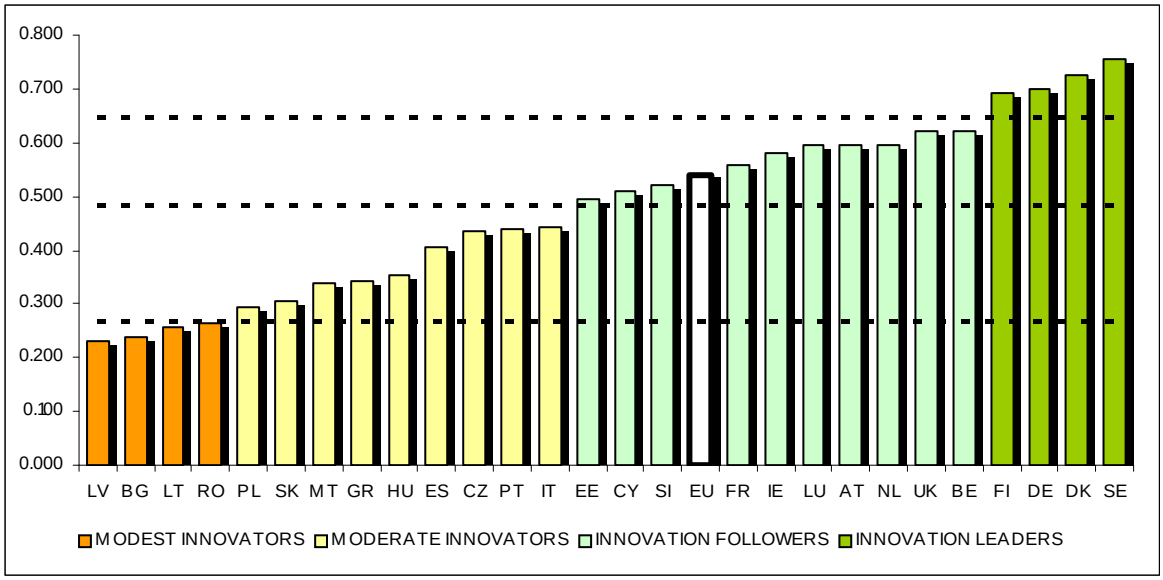
3.1. Innovation performance

A summary picture of innovation performance is provided by the Summary Innovation Index, a composite indicator obtained by an appropriate aggregation of the 24 IUS indicators (see Section 7.1 for a brief explanation of the calculation methodology and the IUS 2010 Methodology report for a more detailed explanation). Figure 4 shows the performance results for 27 EU Member States.

Based on the Summary Innovation Index, the Member States fall into the following four country groups:

- The performance of Denmark, Finland, Germany and Sweden is well above that of the EU27. These countries are the 'Innovation leaders'.
- Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27. These countries are the 'Innovation followers'.
- The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27. These countries are 'Moderate innovators'.
- The performance of Bulgaria, Latvia, Lithuania and Romania is well below that of the EU27. These countries are 'Modest innovators'.

FIGURE 4: EU MEMBER STATES' INNOVATION PERFORMANCE



Note: Average performance is measured using a composite indicator building on data for 24 indicators ranging from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2011 reflects performance in 2009/2010 due to a lag in data availability.

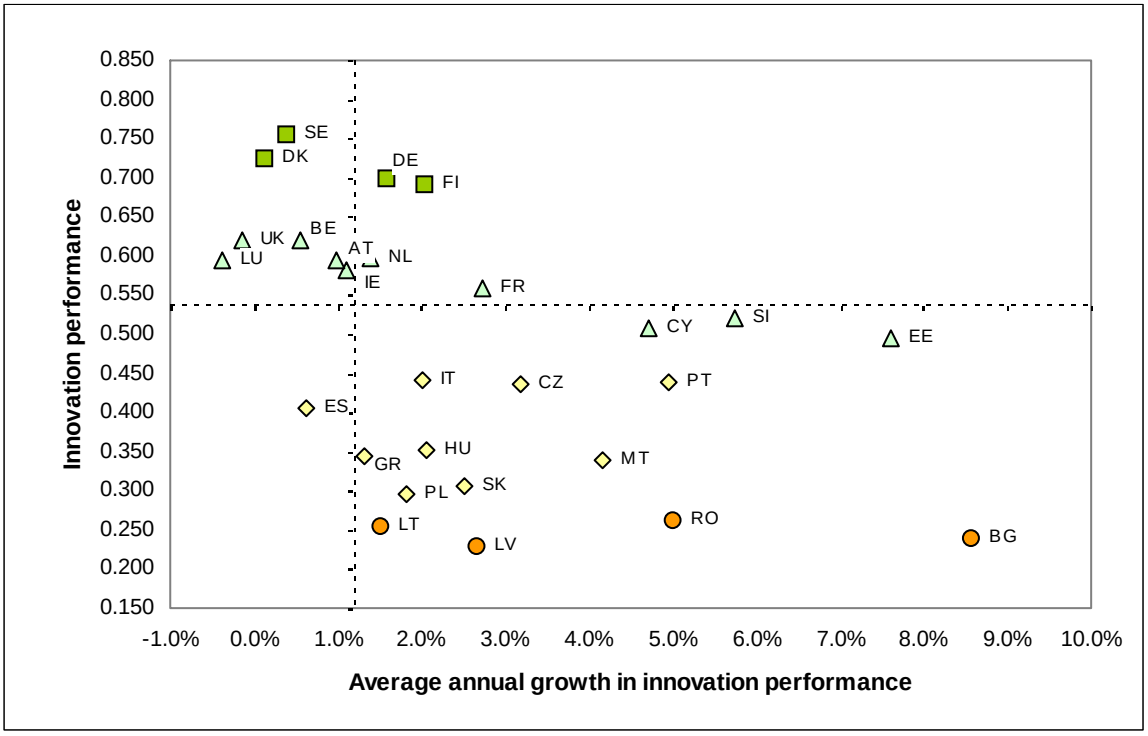
The performance of Innovation leaders is 20% or more above that of the EU27; of Innovation followers it is less than 20% above but more than 10% below that of the EU27; of Moderate innovators it is less than 10% below but more than 50% below that of the EU27; and for Modest innovators it is below 50% that of the EU27.

3.2. Growth performance

The growth in innovation performance has been calculated for each country and for the EU27 using data over a five-year period[6]. All countries except Luxembourg and the UK show an absolute improvement in the innovation performance over time (Figure 5). Bulgaria and Estonia have experienced the fastest growth in performance.

Within the four identified country groups growth performance is very different and Table 2 identifies the growth leaders within each group. Within the Innovation leaders, Finland is the growth leader. Cyprus, Estonia and Slovenia are the growth leaders of the Innovation followers, Malta and Portugal are the growth leaders of the Moderate innovators and Bulgaria is the growth leader of the Modest innovators.

FIGURE 5: CONVERGENCE IN INNOVATION PERFORMANCE



Colour coding matches the groups of countries identified in Section 3.1. Average annual growth rates as calculated over a five-year period. Total growth can be derived by multiplying the average annual growth rate by 4. The dotted lines show EU27 performance and growth.

The average growth rates for the four country groups (Table 2) show that there is an overall convergence between the four performance groups. The Innovation followers grow at a faster rate than the Innovation leaders, the Moderate innovators at a slightly faster rate than the Innovation followers and the Modest innovators grow at a faster rate than the Moderate innovators. Less innovative countries tend to grow faster than more innovative countries and the spread in innovation performance is decreasing.

While the Moderate and Modest innovators clearly catch-up to the higher performance level of both the Innovation leaders and Innovation followers, there is no convergence between the different Member States within the Moderate innovators (Box 1). Convergence between the Member States does take place within the Innovation leaders, Innovation followers and Modest innovators.

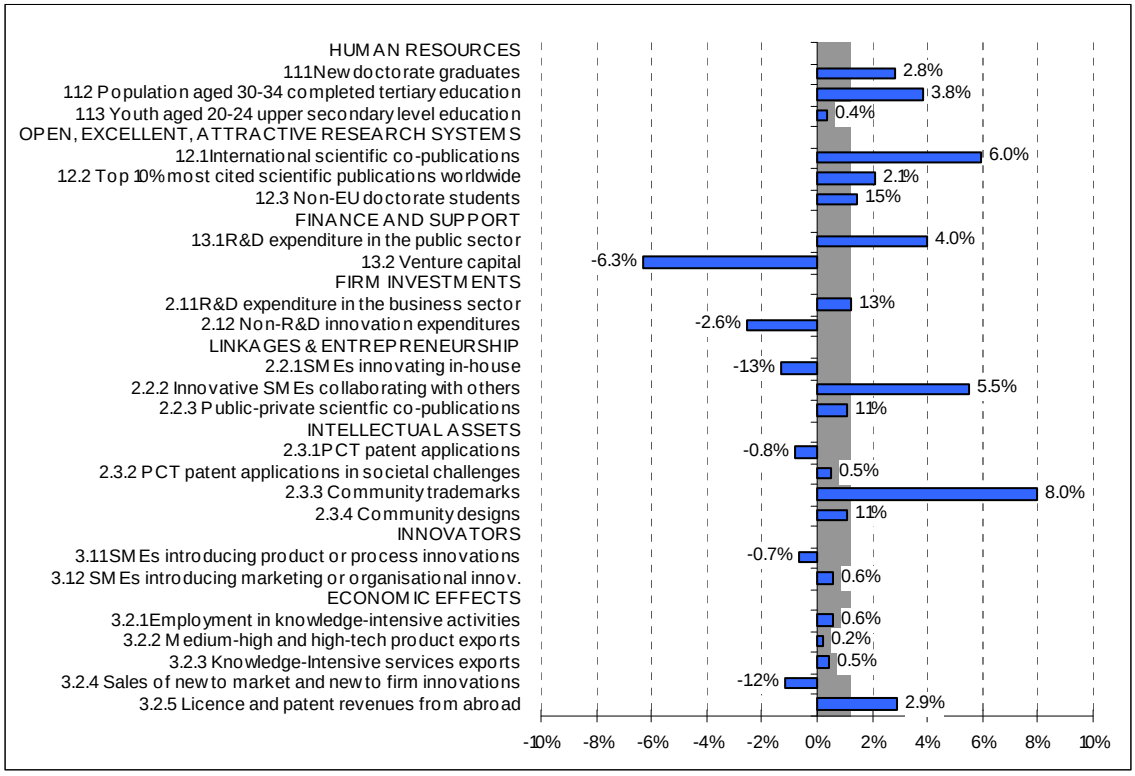
[6] The methodology for calculating growth rates is discussed in Section 7.2.

TABLE 2: INNOVATION GROWTH LEADERS

Group	Growth rate	Growth leaders	Moderate growers	Slow growers
Innovation leaders	1.0%	Finland (FI)	Germany (DE)	Denmark (DK) Sweden (SE)
Innovation followers	2.4%	Cyprus (CY), Estonia (EE) Slovenia (SI)	Austria (AT), Belgium (BE) France (FR), Ireland (IE) Netherlands (NL)	Luxembourg (LU) United Kingdom (UK)
Moderate innovators	2.5%	Malta (MT), Portugal (PT)	Czech Republic (CZ) Hungary (HU), Italy (IT) Poland (PL), Slovakia (SK)	Greece (GR), Spain (ES)
Modest innovators	4.4%	Bulgaria (BG)	Latvia (LV), Romania (RO)	Lithuania (LT)

Average annual growth rates as calculated over a five-year period.

FIGURE 6: EU27 GROWTH PERFORMANCE



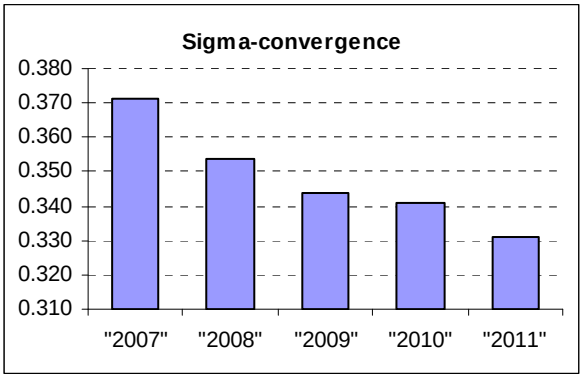
The shaded area gives the average growth rate for the EU27 for all indicators. Growth performance of New doctorate graduates equals 0%.

The EU27 has experienced an improvement in it's innovation performance over the last five years. Growth is particularly strong in Open, excellent and attractive research systems and Intellectual assets (Figure 6). Performance has worsened in Firm investments and Innovators.

For the individual indicators we observe high growth for International scientific co-publications and Community trademarks. A high negative growth rate is observed for Non-R&D innovation expenditure and Venture capital and, to a lesser extent, for SMEs innovating in-house, SMEs with product or process innovations and Sales of new to market and new to firm innovations. Of the indicators with a negative growth performance 4 are derived from the Community Innovation Survey.

Box 1 Sigma and beta convergence

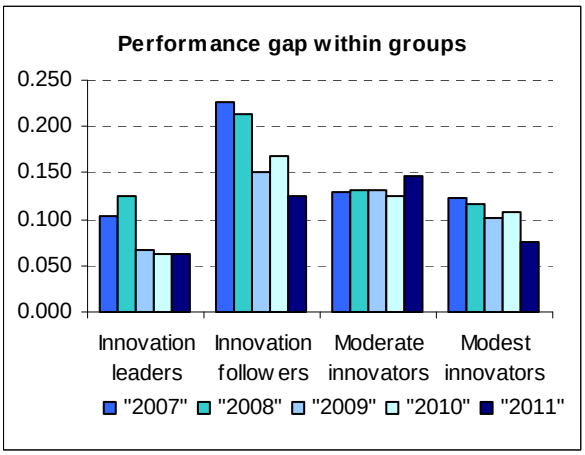
The overall process of catching up can be shown using two types of convergence commonly used in growth studies: sigma-convergence and beta-convergence.



When the spread in innovation performance across a group of economies falls over time, there is sigma-convergence. This spread in convergence is measured by the ratio of the standard deviation and the average performance of the Member States. As shown in the graph on the left, this spread has been reduced over a five year period thereby confirming sigma-convergence but the rate of convergence seems to have slowed down.

Convergence is the dominant phenomenon within 3 of the 4 performance groups, only within the Moderate innovators performance diverges (graph below).

Beta-convergence applies if a less innovative country tends to grow faster than a more innovative country (cf. Figure 4 where beta-convergence should emerge from the apparent downward sloping regression line between the level and growth of performance). Beta-convergence can be measured by the partial correlation between growth in innovation performance over time and its initial level: when this correlation is negative, there is beta-convergence. The correlation between "2007" innovation performance and innovation growth is -0.591 (significant at 1%) indicating the existence of beta-convergence.

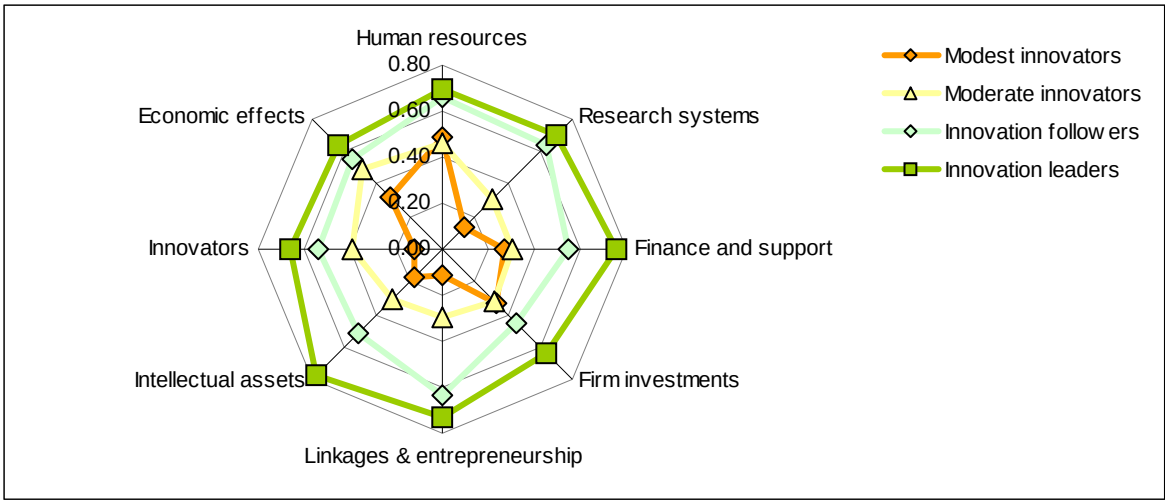


Between the performance groups there is evidence of convergence of the 2 lower performance groups to that of the Innovation leaders and Innovation followers. Between-group convergence appears to be stronger than within group convergence.

3.3. Innovation dimensions

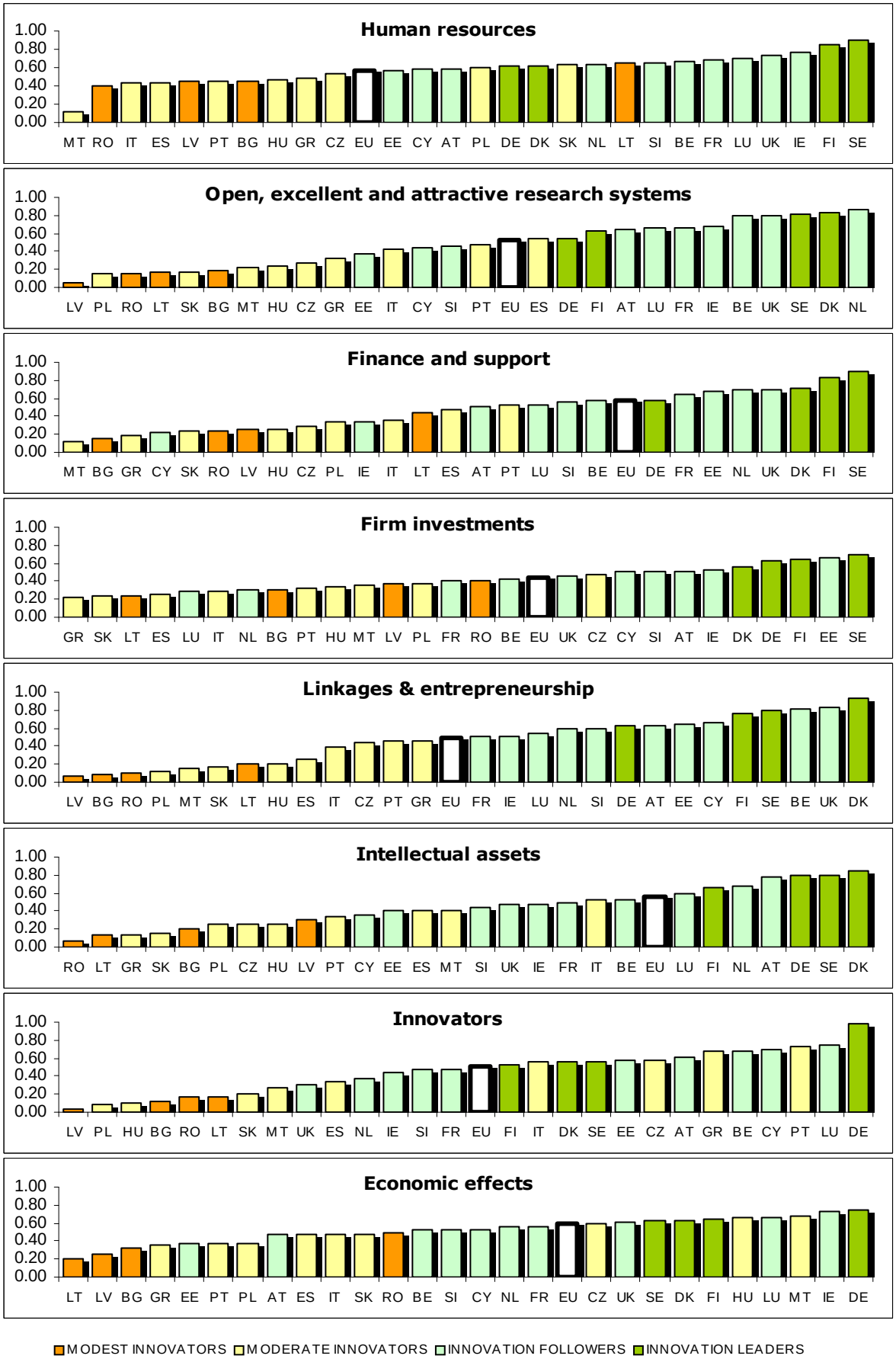
The performance of the four country groups across the different dimensions is shown in Figure 7. The Innovation leaders and the Innovation followers have the smallest variance in their performance across the 8 dimensions, suggesting that to achieve a high level of performance countries need to perform relatively well across all 8 dimensions.

FIGURE 7: COUNTRY GROUPS: INNOVATION PERFORMANCE PER DIMENSION



Country rankings for each innovation dimension are shown in Figure 8. The Innovation leaders dominate performance in Firm investments and Intellectual assets and to a lesser extent in Human resources, Finance and support, Linkages & entrepreneurship and Economic effects. The Innovation followers perform relatively well in Open, excellent and attractive research systems (with the Netherlands leading overall) and Linkages & entrepreneurship. The Moderate innovators perform relatively well in Innovators and Economic effects and the Modest innovators perform relatively well in Human resources, Finance and support and Firm investments. Variance in Member States' performance is smallest in Human resources, Firm investments and Economic effects and largest in Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship.

FIGURE 8: MEMBER STATES' INNOVATION PERFORMANCE PER DIMENSION



4. COMPARISON OF EU27 INNOVATION PERFORMANCE WITH KEY BENCHMARK COUNTRIES

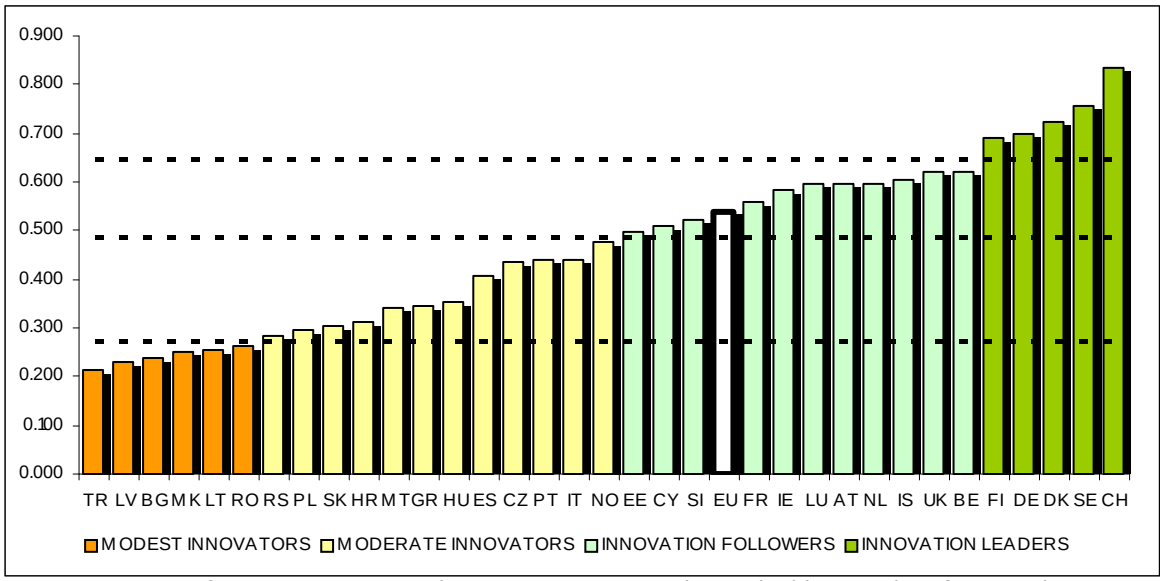
This section focuses on a comparison with non-EU Member States, starting with a comparison with other European countries in section 4.1 and with the EU27's global competitors in section 4.2.

4.1. A comparison with other European countries

Data is available for seven more non-EU European countries to perform a comparison with the Member States (Figure 9). Of these Switzerland belongs to the Innovation leaders, Iceland to the Innovation followers, Croatia, Norway and Serbia to the Moderate innovators and the Former Yugoslav Republic of Macedonia and Turkey to the Modest innovators.

Switzerland is the overall innovation leader, outperforming all Member States. Its growth performance of 1.3% in the lat five years is also above that of the EU27. For Croatia, Serbia and Turkey growth in innovation performance has been between 4.1% and 5.3%, well above that of the EU27 in the same period. For the Former Yugoslav Republic of Macedonia growth performance is also above the EU27 average at 2.3%.

FIGURE 9: EUROPEAN COUNTRIES' INNOVATION PERFORMANCE



Note: Average performance is measured using a composite indicator building on data for 24 indicators ranging from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2011 reflects performance in 2009/2010 due to a lag in data availability.

4.2. A comparison with global competitors

Europe's main global competitors include Australia, the BRICS countries (Brazil, China, India, Russia and South Africa), Canada, Japan and the US. For these countries data availability is more limited than for the European countries (e.g. comparable innovation survey data are not available for many of these countries). Furthermore, the economic and/or population size of these countries outweighs those of many of the individual Member States and we thus compare these countries with the aggregate of the Member States or the EU27.

For the international comparison of the EU27 with these countries a more restricted set of 12 indicators is used of which most are nearly identical to those of the IUS (Table 3). The IUS indicator measuring the share of the population aged 30 to 34 having completed

tertiary education has been replaced by the same indicator but for the larger age group 25 to 64.

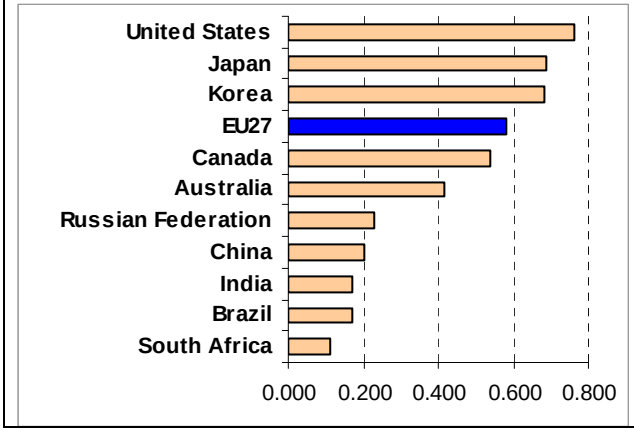
TABLE 3: INDICATORS USED IN THE INTERNATIONAL COMPARISON

Main type / innovation dimension / indicator	Data source	Most recent year	Date not available for
ENABLERS			
Human resources			
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	OECD / Eurostat	2009	CN, IN, SA
1.1.2 Percentage population aged 25-64 having completed tertiary education	OECD / World Bank / Eurostat	2008	
Open, excellent and attractive research systems			
1.2.1 International scientific co-publications per million population	Science-Metrix / Scopus	2010	AU, CA, SA
1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	Science-Metrix / Scopus	2007	AU, CA, SA
Finance and support			
1.3.1 R&D expenditure in the public sector as % of GDP	OECD / Eurostat	2009	
FIRM ACTIVITIES			
Firm investments			
2.1.1 R&D expenditure in the business sector as % of GDP	OECD / Eurostat	2009	
Linkages & entrepreneurship			
2.2.3 Public-private co-publications per million population	CWTS / Thomson Reuters	2008	
Intellectual assets			
2.3.1 PCT patents applications per billion GDP (in PPS€)	OECD / Eurostat	2008	BR, IN
2.3.2 PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	OECD / Eurostat	2008	SA
OUTPUTS			
Economic effects			
3.2.2 Medium and high-tech product exports as % total product exports	UN / Eurostat	2010	
3.2.3 Knowledge-intensive services exports as % total service exports	UN / Eurostat	2009	SA
3.2.5 License and patent revenues from abroad as % of GDP	World Bank / Eurostat	2010	

Figure 10 summarizes the performance for the EU27 and its major global competitors over a 5 year period[7]. Innovation performance in the US, Japan and South Korea is above that of the EU27. The performance of Canada is close to that of the EU27. The EU27 is outperforming the other countries, in particular the BRICS countries.

[7] The methodology for calculating average innovation performance has been revised compared to that used in the IUS 2010 report. The results shown here are thus not comparable with those presented in the IUS 2010 report. More details are provided in Annex 7.3.

FIGURE 10: EU27 INNOVATION PERFORMANCE COMPARED TO MAIN COMPETITORS

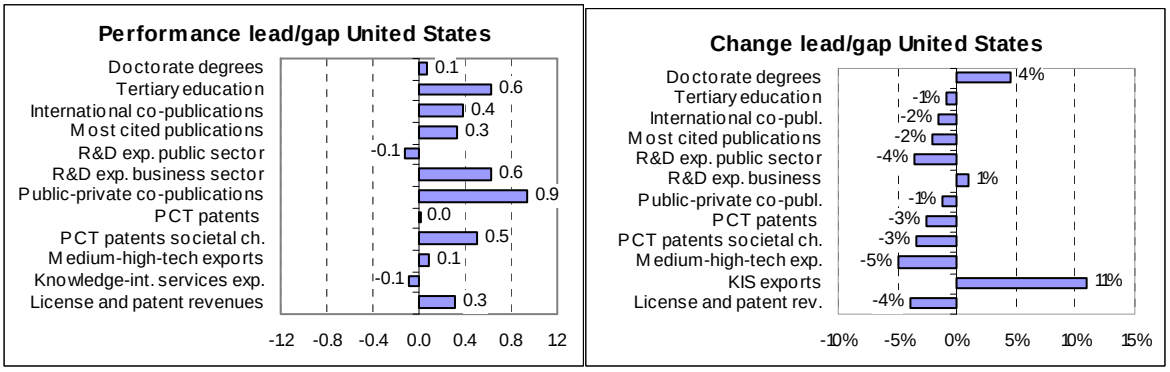


The dynamic performance is shown in a graph similar to that presented in the IUS 2010 (Figure 11). China is catching-up to the EU27. The EU27 is slowly closing its performance gap to Japan and the US and increasing its lead over Canada and Brazil. The lead over Australia, India, Russia and South Africa has been stable. South Korea is increasing its lead over the EU27.

FIGURE 11: EU27 CHANGE IN INNOVATION PERFORMANCE COMPARED TO MAIN COMPETITORS

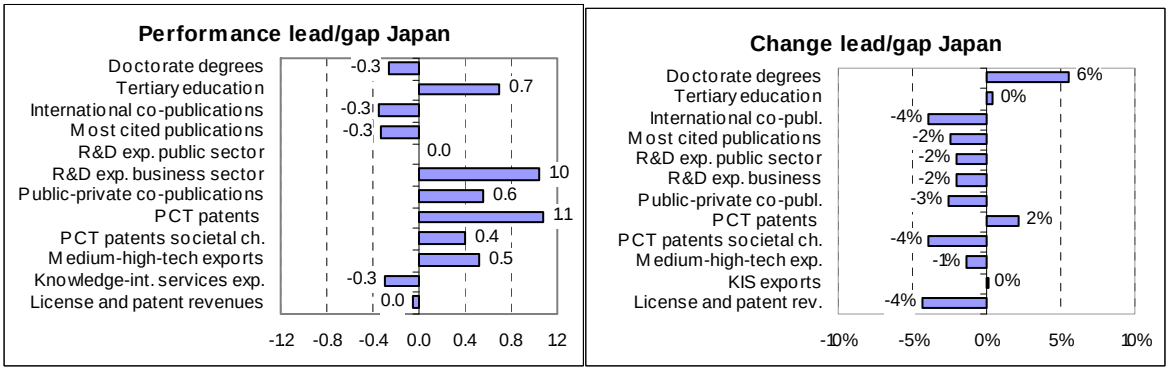
The US is performing better than the EU27 in 10 indicators, in particular in Tertiary education, R&D expenditure in the business sector and Public-private co-publications (Figure 12). In R&D expenditure in the public sector and Knowledge-intensive services exports the EU27 has a small performance lead. Overall there is a clear performance lead in favour of the US but this lead has been declining, in particular since 2009. The US has increased its lead in Doctorate degrees and R&D expenditure in the business sector; the US lead has decreased in Tertiary education, International co-publications, Most cited publications, Public-private co-publications, PCT patents, PCT patents in societal challenges, Medium and high-tech product exports and License and patent revenues from abroad. The EU27 has increased its lead in R&D expenditure in the public sector; the EU27 lead has decreased in Knowledge-intensive services exports.

FIGURE 12: EU27-US COMPARISON



A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

FIGURE 13: EU27-JAPAN COMPARISON



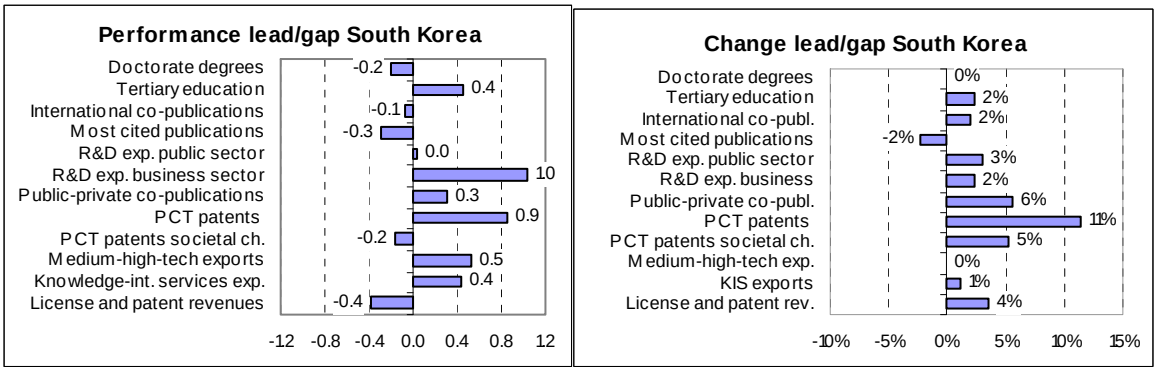
A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

Japan is performing better than the EU27 in 7 indicators, in particular in R&D expenditure in the business sector and PCT patent applications (Figure 13). In New doctorate degrees, International co-publications, Most cited publications and Knowledge-intensive services exports the EU27 is performing better. Overall there is a clear performance lead in favour of Japan but this lead has been decreasing, in particular between 2008 and 2010 with a stable lead in 2011. Japan has increased its lead in PCT patents; Japan's lead has decreased in R&D expenditure in the business sector, Public-private co-publications, PCT patents in societal challenges and Medium and high-tech product exports. The EU27 has increased its lead in International co-publications, Most

cited publications and License and patent revenues from abroad; the EU27 lead has decreased in Doctorate degrees.

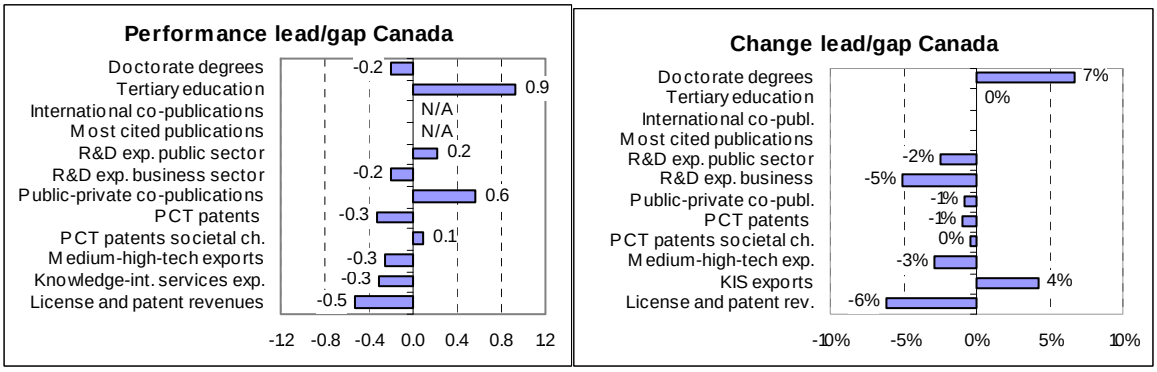
South Korea is performing better than the EU27 in 7 indicators, in particular in R&D expenditure in the business sector and PCT patent applications (Figure 14). The EU27 has a performance lead in Doctorate degrees, Most-cited publications, PCT patent applications in societal challenges and License and patent revenues from abroad. Overall there is a clear performance lead in favour of South Korea and this innovation lead has been increasing up until 2010 and remained stable in 2011. South Korea has increased its lead in Tertiary education, R&D expenditure in the business sector, PCT patents and Knowledge-intensive services exports. The EU27 has increased its lead in Most cited publications; the EU27 lead has decreased in PCT patents in societal challenges and License and patent revenues from abroad.

FIGURE 14: EU27-SOUTH KOREA COMPARISON



A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

FIGURE 15: EU27-CANADA COMPARISON



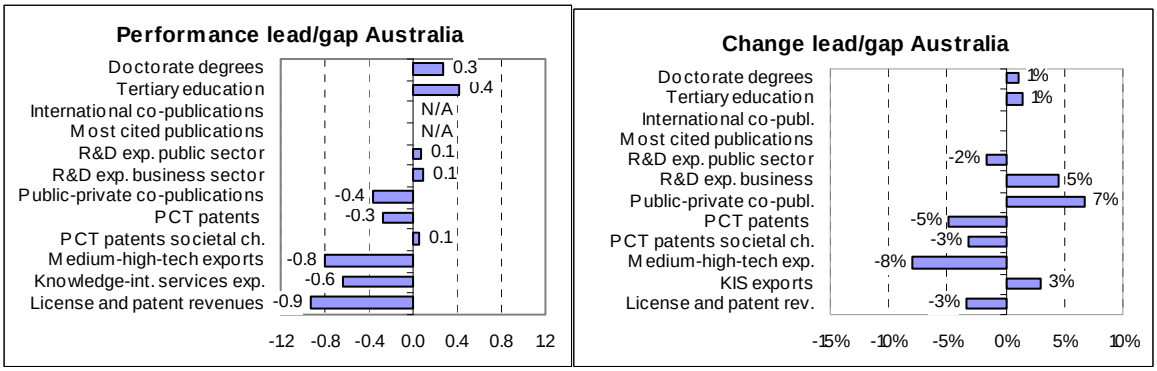
A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

The EU27 has a small performance lead over Canada and this lead has been increasing. Canada is performing better in 4 indicators, in particular in Tertiary education and Public-private co-publications. In PCT patent applications, Medium and high-tech product exports, Knowledge-intensive services exports and License and patent revenues from abroad Canada is showing the largest performance gap towards the EU27. Canada's lead in Tertiary education has remained stable and its lead in R&D expenditure in the public sector and Public-private co-publications has decreased. The EU27 has increased its lead in R&D expenditure in the business sector, PCT patents, Medium and high-tech product

exports and License and patent revenues from abroad; the EU27 lead has decreased in Doctorate degrees and Knowledge-intensive services exports.

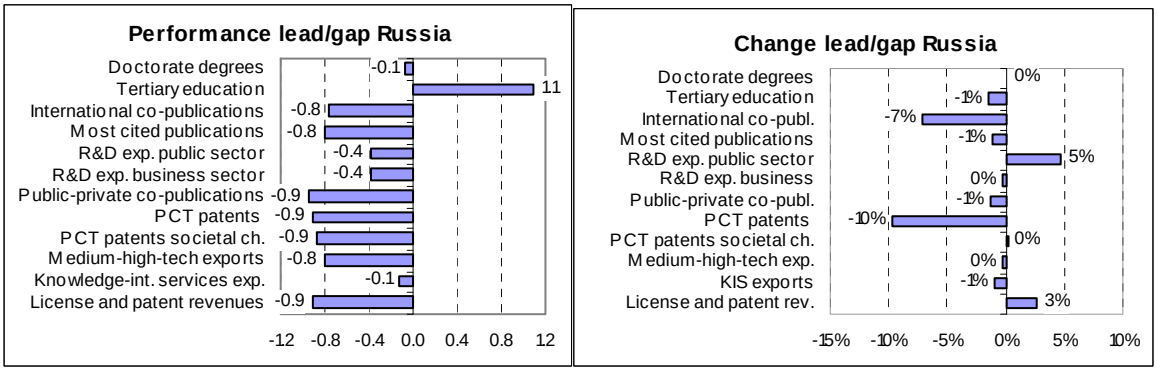
The EU27 has a performance lead over Australia and this lead has remained stable. Australia is performing better in 5 indicators, in particular in Doctorate degrees and Tertiary education. In Medium and high-tech product exports, Knowledge-intensive services exports and License and patent revenues from abroad Australia is showing the largest performance gap towards the EU27. Australia has increased its lead in Doctorate degrees, Tertiary education and R&D expenditure in the business sector; Australia's lead has decreased in R&D expenditure in the public sector and PCT patents in societal challenges. The EU27 has increased its lead in PCT patents, Medium and high-tech product exports and License and patent revenues from abroad; the EU27 lead has decreased in Public-private co-publications and Knowledge-intensive services exports.

FIGURE 16: EU27-AUSTRALIA COMPARISON



A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

FIGURE 17: EU27-RUSSIA COMPARISON



A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

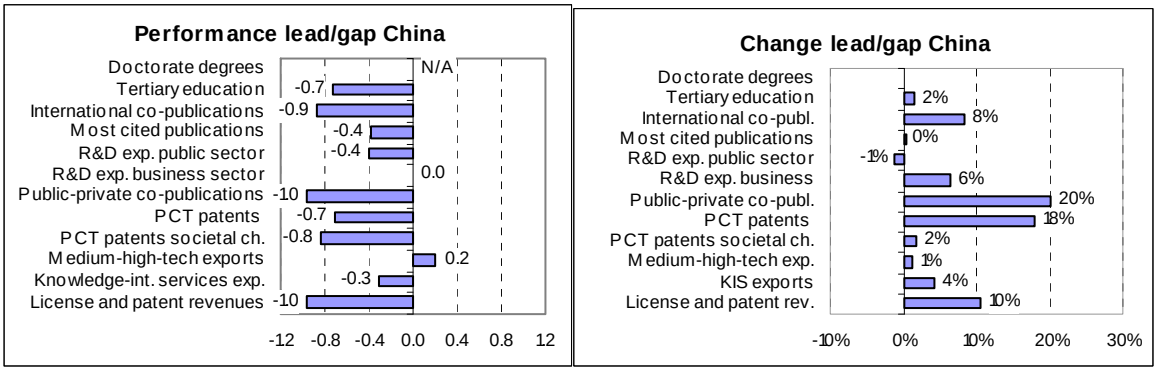
The EU27 has a clear performance lead compared to all five BRICS countries. This lead has decreased with China, remained stable with India, Russia and South Africa and has increased with Brazil.

The EU27 is performing better than Russia in most indicators. Only in Tertiary education Russia is performing much better. Russia is lagging most in Public-private co-publications, PCT patent applications, PCT patent applications in societal challenges and License and patent revenues from abroad. Russia's lead in Tertiary education has decreased. Russia has decreased its gap in R&D expenditure in the public sector and

License and patent revenues from abroad; Russia's gap has increased for International co-publications, Most cited publications, Public-private co-publications, PCT patents and Knowledge-intensive services exports.

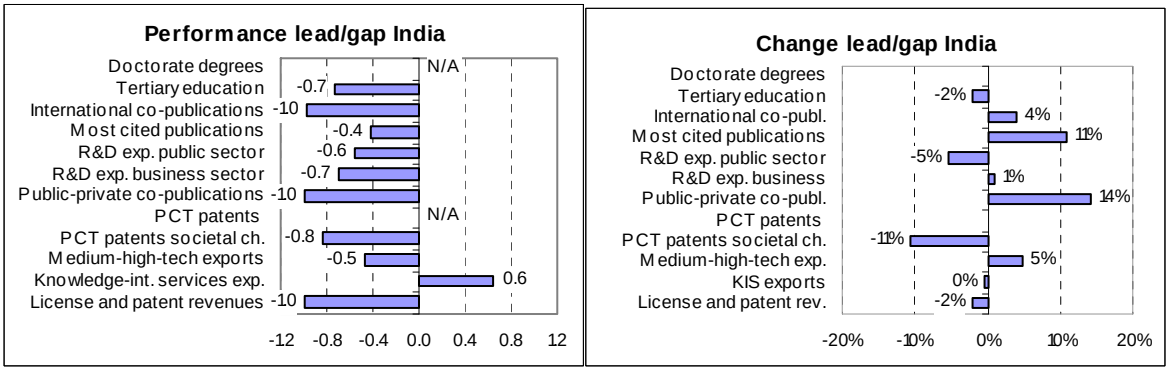
The EU27 is performing better than China in most indicators. Only in Medium and high-tech product exports China is performing better. China is lagging most in Public-private co-publications and License and patent revenues from abroad. China's lead in Medium and high-tech product exports has increased. China has decreased its gap in Tertiary education, International co-publications, Public-private co-publications, PCT patents, PCT patents in societal challenges, Knowledge-intensive services exports and License and patent revenues from broad; China's gap has increased for R&D expenditure in the public sector.

FIGURE 18: EU27-CHINA COMPARISON



A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

FIGURE 19: EU27-INDIA COMPARISON



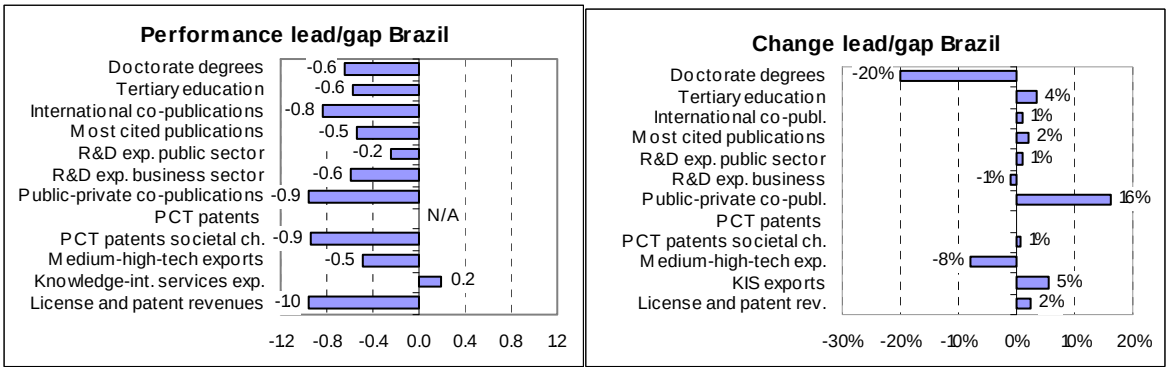
A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

India is lagging in most indicators, in particular in International co-publications, Public-private co-publications and License and patent revenues from abroad. India's performance in Knowledge-intensive services exports is well above that of the EU27. India's lead in Knowledge-intensive services exports has remained stable. India has decreased its gap in International co-publications, Most cited publications, Public-private co-publications and Medium and high-tech product exports; India's gap has increased for Tertiary education, R&D expenditure in the public sector, PCT patents in societal challenges and License and patent revenues from abroad.

Brazil is lagging in most indicators, in particular in Public-private co-publications, PCT patent applications in societal challenges and License and patent revenues from abroad. Brazil's performance in Knowledge-intensive services exports is above that of the EU27. Brazil's lead in Knowledge-intensive services exports has increased. Brazil has decreased its gap in Tertiary education, International co-publications, Most cited publications, R&D expenditure in the public sector, Public-private co-publications, PCT patents in societal challenges and License and patent revenues from abroad; Brazil's gap has increased for Doctorate degrees, R&D expenditure in the business sector and Medium and high-tech product exports.

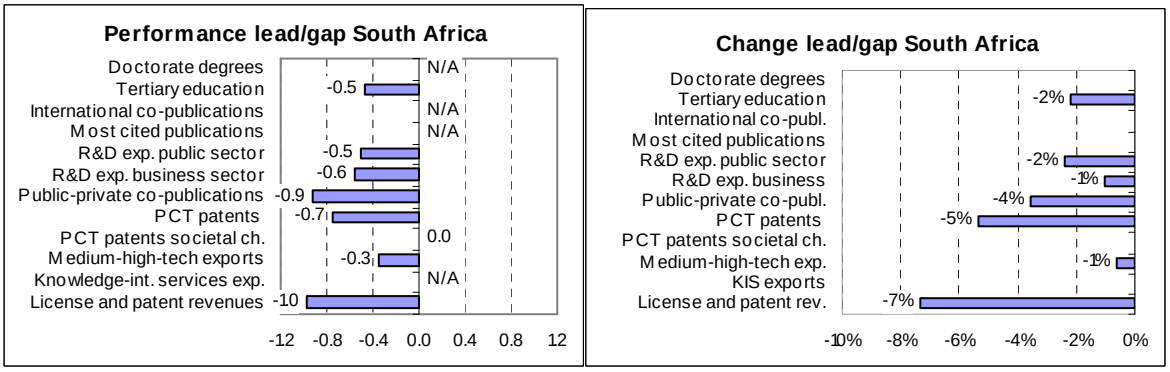
South Africa is lagging in all indicators, in particular in Public-private co-publications and License and patent revenues from abroad. South Africa's gap has increased for almost all indicators.

FIGURE 20: EU27-BRAZIL COMPARISON



A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

FIGURE 21: EU27-SOUTH AFRICA COMPARISON

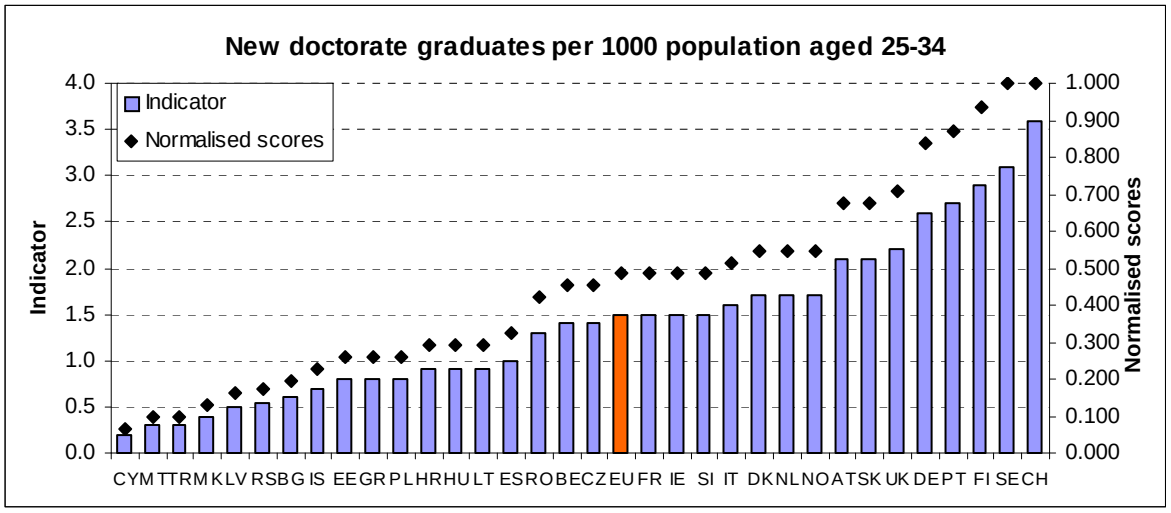


A country has a performance lead if the relative score for the indicator is below 0 and a performance lead in the relative score is above 0. The EU27 has a performance lead if the relative score for the indicator is below 0 and a performance lead if the relative score is above 0. Relative annual growth as compared to that of the EU27 over a 5-year period.

5. PERFORMANCE PER INDICATOR

This section will discuss static and dynamic performance for each of the indicators. In the following plots normalised scores are also displayed. Normalised scores are obtained by transforming raw data such that the minimum value equals zero and the maximum value equals one.

1.1.1 New doctorate graduates (ISCED6) per 1000 population aged 25-34

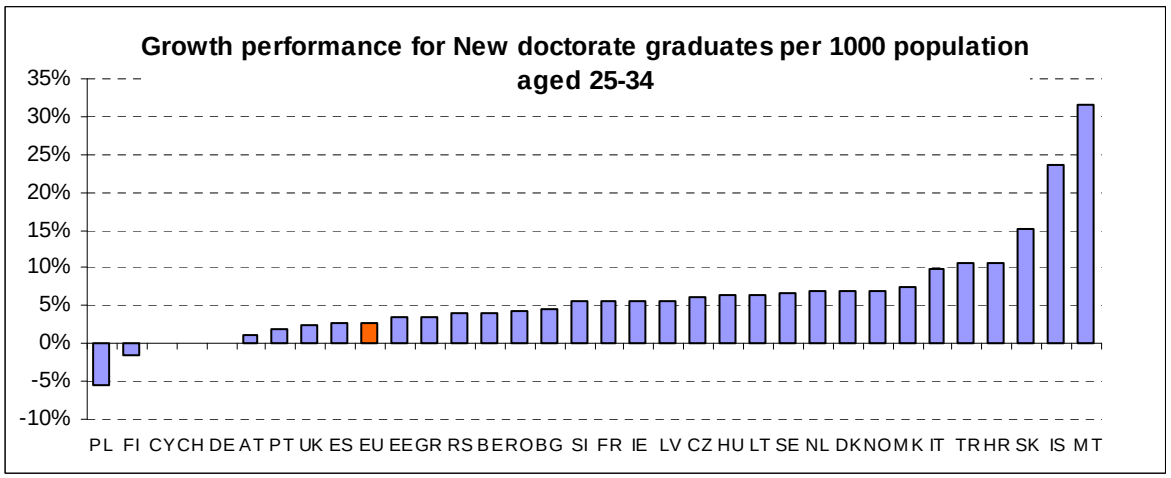


No data for Luxembourg. Statistical outlier: Switzerland

The indicator is a measure of the supply of new second-stage tertiary graduates in all fields of training. For most countries ISCED 6 captures PhD graduates only, with the exception of Finland, Portugal and Sweden where also non-PhD degrees leading to an award of an advanced research qualification are included. In 2009 more than 3 new PhD graduates per 1000 people aged 25 to 34 were awarded in Sweden and Switzerland. The average rate for the EU27 was 1.5.

Growth performance

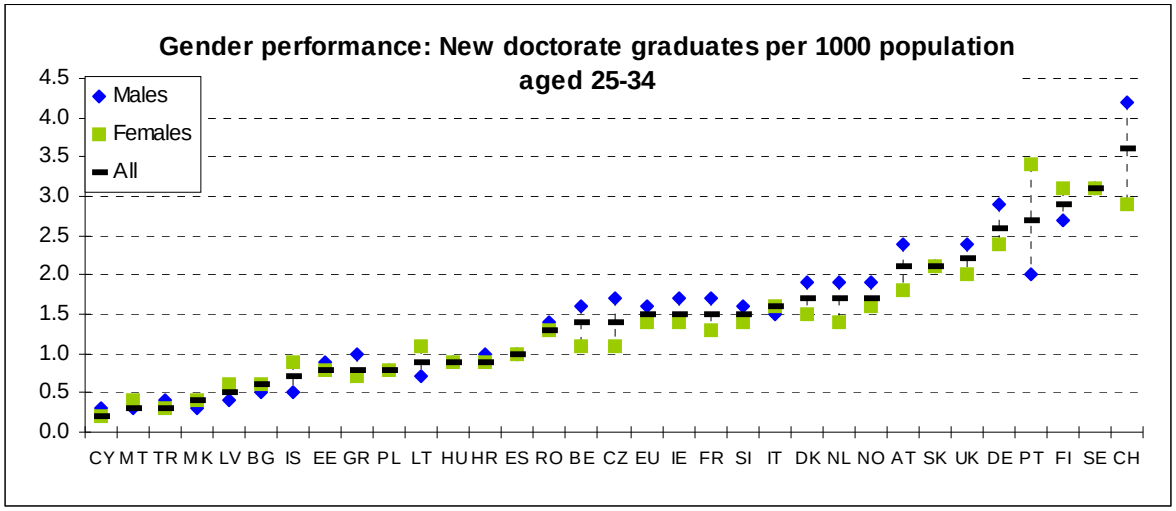
Malta and Iceland have been rapidly increasing their graduation rates over the last 5 years. Graduation rates have declined in Finland and Poland.



No data for Luxembourg.

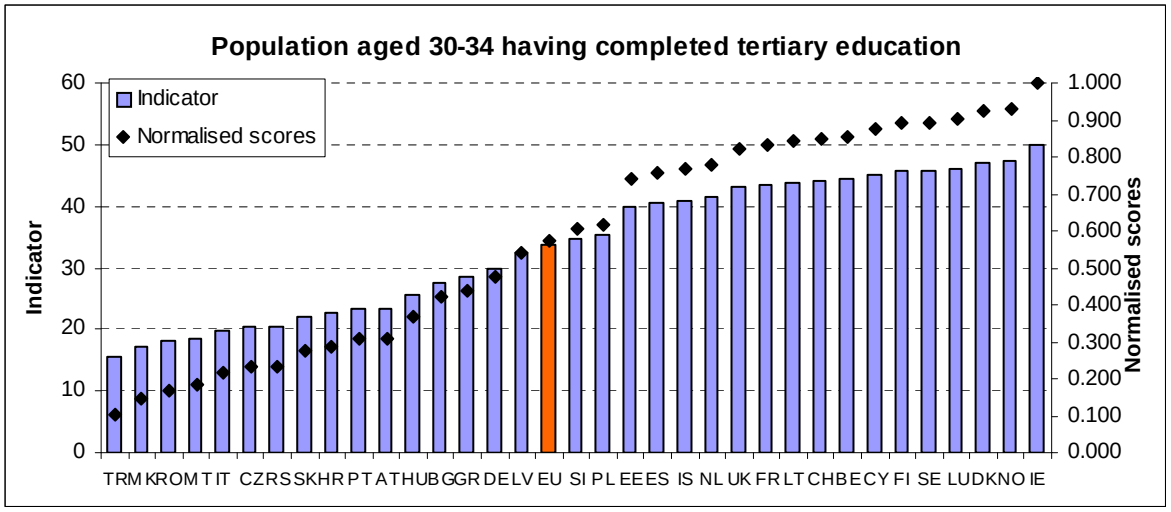
Gender performance

The graph below shows the gender performance for this indicator. Graduation rates in only 9 European countries are higher for females. Female graduation rates in Iceland, Latvia, Lithuania, Malta and Portugal are at least 20% above that of the country; male graduation rates in Czech Republic, Cyprus, Greece and Turkey exceed that of the country by at least 20%.



No gender data for Luxembourg and Serbia.

1.1.2 Percentage population aged 30-34 having completed tertiary education

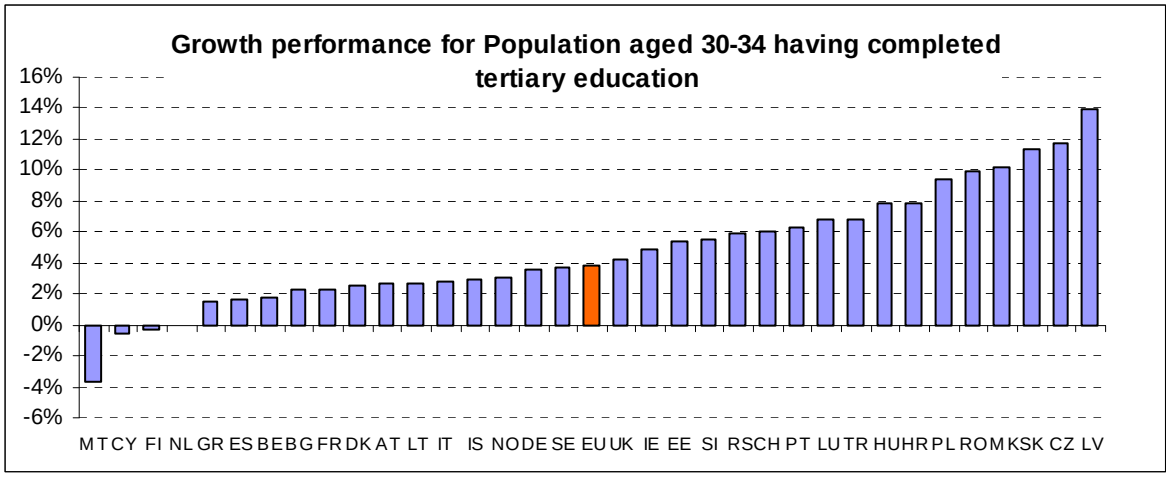


This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields because the adoption of innovations in many areas, in particular in the service sectors, depends on a wide range of skills. International comparisons of educational levels however are difficult due to large discrepancies in educational systems, access, and the level of attainment that is required to receive a tertiary degree. The indicator focuses on a narrow share of the population aged 30 to 34 and it will more easily and quickly reflect changes in educational policies leading to more tertiary graduates. Quality differences between countries' educational systems are not taken into account.

On average 33.6% of the EU27 population aged 30 and 34 have completed tertiary education. But there is room for improvement as shown by the large differences between Member States with more than 45% having completed tertiary education in Cyprus, Denmark, Finland, Ireland, Luxembourg, Sweden and less than 20% in Italy, Romania and Slovakia.

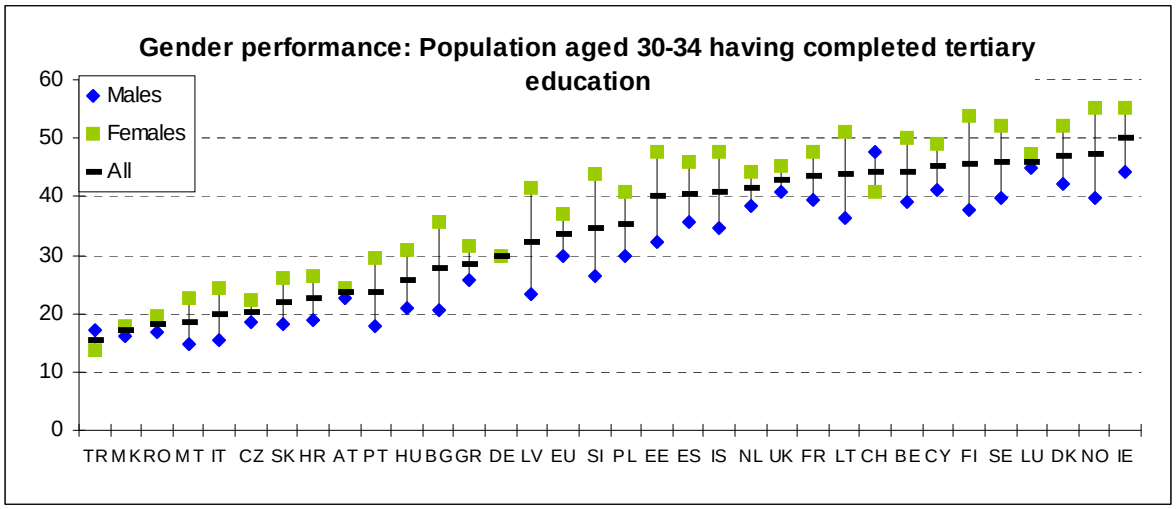
Growth performance

An increasing share of the European population aged 30 to 34 has completed tertiary education. On average this rate has been increasing at 3.8% but in some countries the increase is spectacular. In Poland and Romania it is close to 10%, in the Czech Republic and Slovakia it is above 10% and in Latvia it is almost 14%.



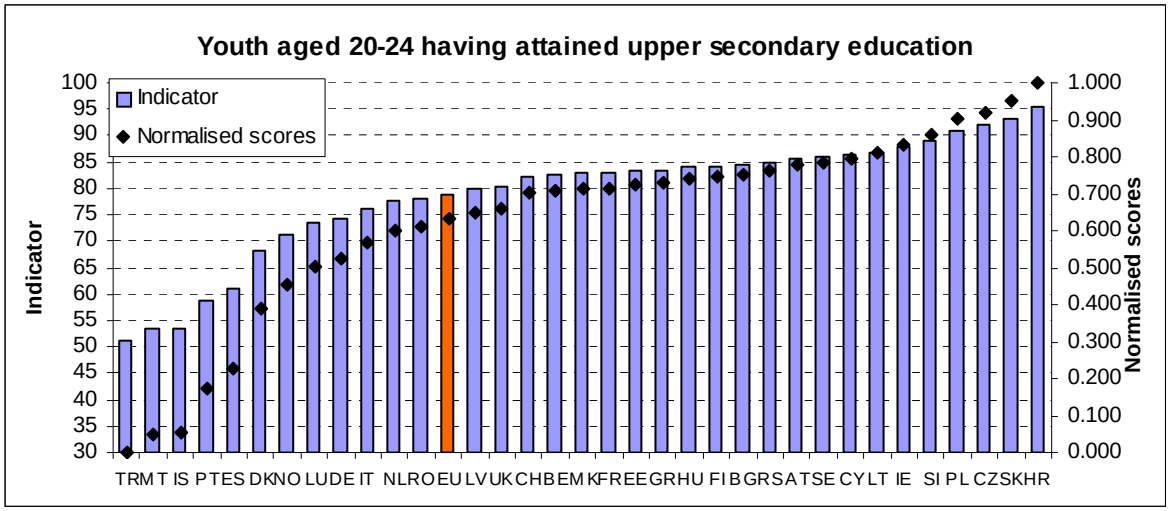
Gender performance

The graph below shows the gender performance for this indicator. In almost all countries a larger share of the female population aged 30 to 34 has completed tertiary education. Only in Germany, Switzerland and Turkey a larger share of the male population has completed tertiary education.



No gender data for Serbia.

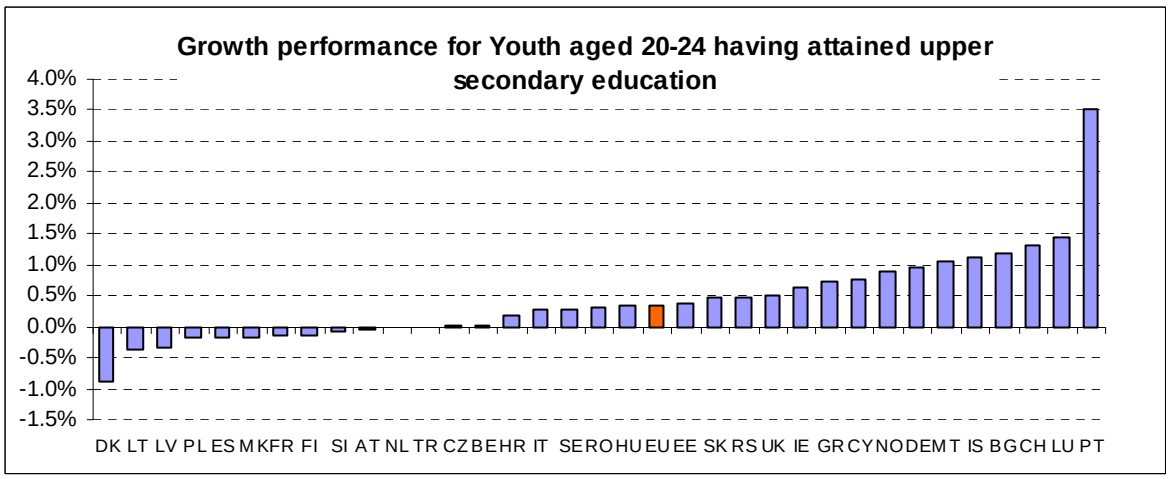
1.1.3 Percentage youth aged 20-24 having attained at least upper secondary level education



The indicator measures the qualification level of the population aged 20-24 years in terms of formal educational degrees. Completed upper secondary education is generally considered to be the minimum level required for successful participation in a knowledge-based society and is positively linked with economic growth.

Almost 80% of EU27 youth has attained at least upper secondary education. But in some countries these shares are still too low, in particular in Iceland, Malta, Portugal, Spain and Turkey where less than 65% of the population aged 20-24 years have attained such education.

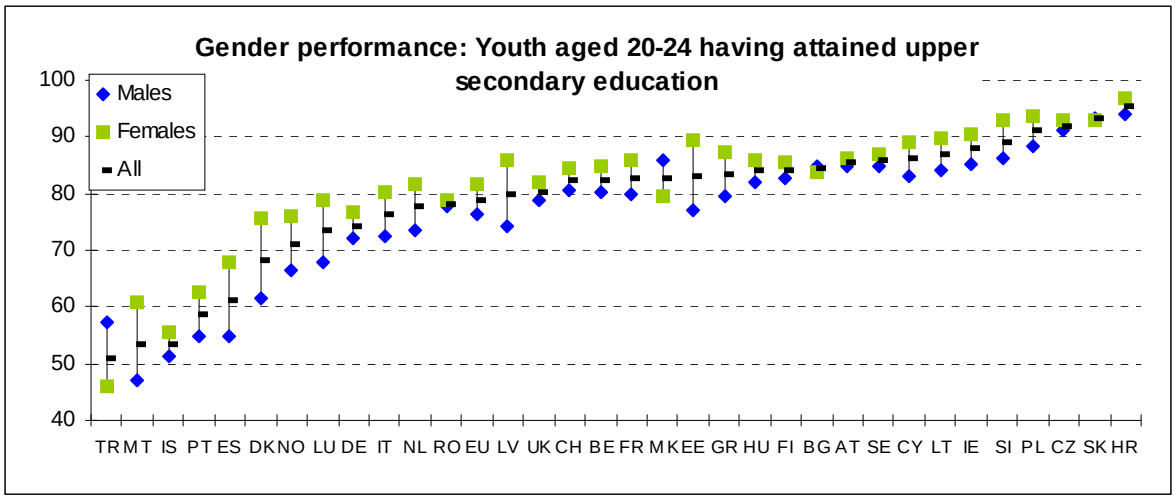
Growth performance



The youth share having attained at least upper secondary education has been growing at a high rate of more than 1.5% per year in Bulgaria. Worrying is the fact that this share has been declining in 10 countries, in particular in Denmark, Latvia and Lithuania.

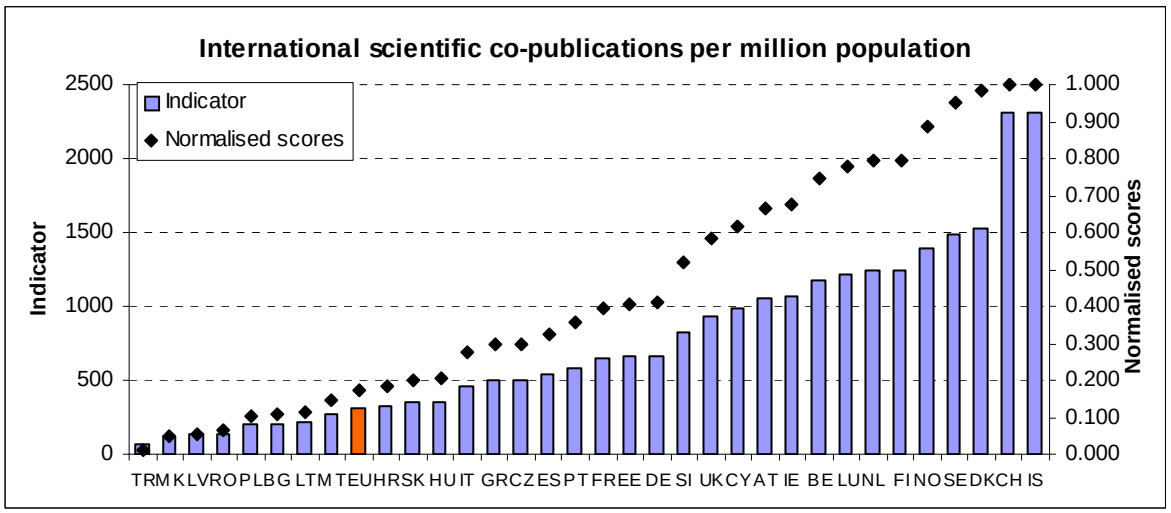
Gender performance

The graph below shows the gender performance for this indicator. In almost all countries a larger share of the female population aged 20 to 24 has attained upper secondary education. Only in Bulgaria, FYROM, Slovakia and Turkey a larger share of the male population has attained upper secondary education.



No gender data for Serbia.

1.2.1 International scientific co-publications per million population

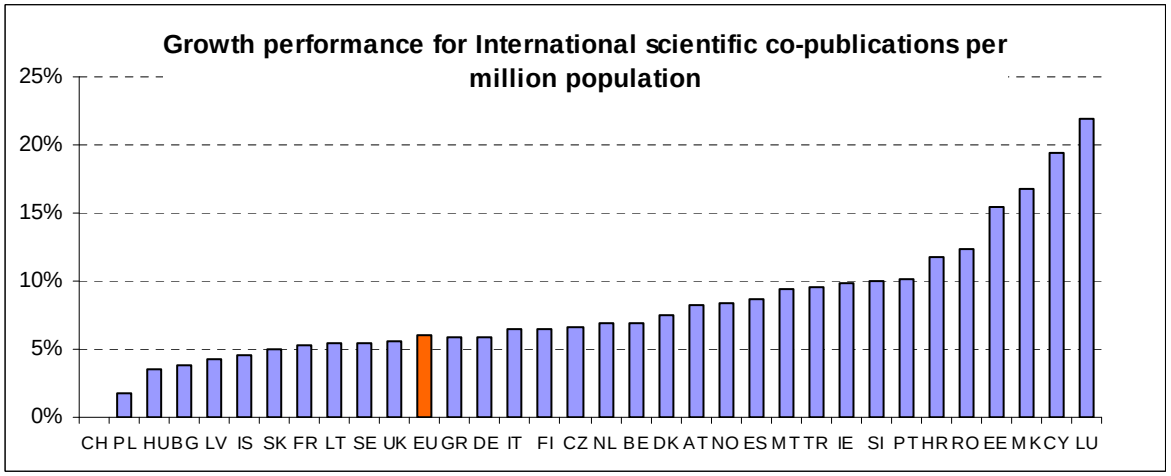


No data for Serbia. Statistical outliers: Denmark, Sweden

International scientific co-publications are a proxy for the quality and openness of scientific research as collaboration increases scientific productivity.

Austria, Belgium, Denmark, Finland, Ireland, Luxembourg, Netherlands, Norway and Sweden have more than 1000 and Iceland and Switzerland more than 2000 co-publications per million population. International research cooperation is less well developed in Latvia and Romania. The indicator is also heavily influenced by the overall publication level of the country per million population. The EU average is relatively low as here only co-publications with non-EU countries are included.

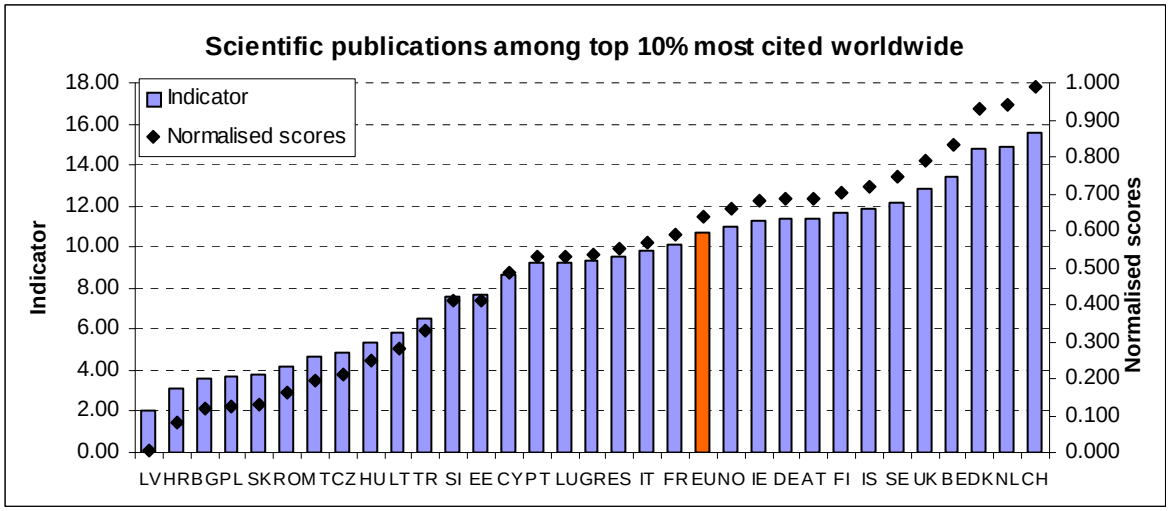
Growth performance



No data for Serbia.

The number of international scientific co-publications has been increasing at high rates. For almost all countries the annual rate of increase has been higher than 5% and in 4 smaller countries these rates have been exceptionally high at 15% or more (Cyprus, Estonia, FYROM and Luxembourg).

1.2.2 Scientific publications among the top-10% most cited publications worldwide as % of total scientific publications of the country

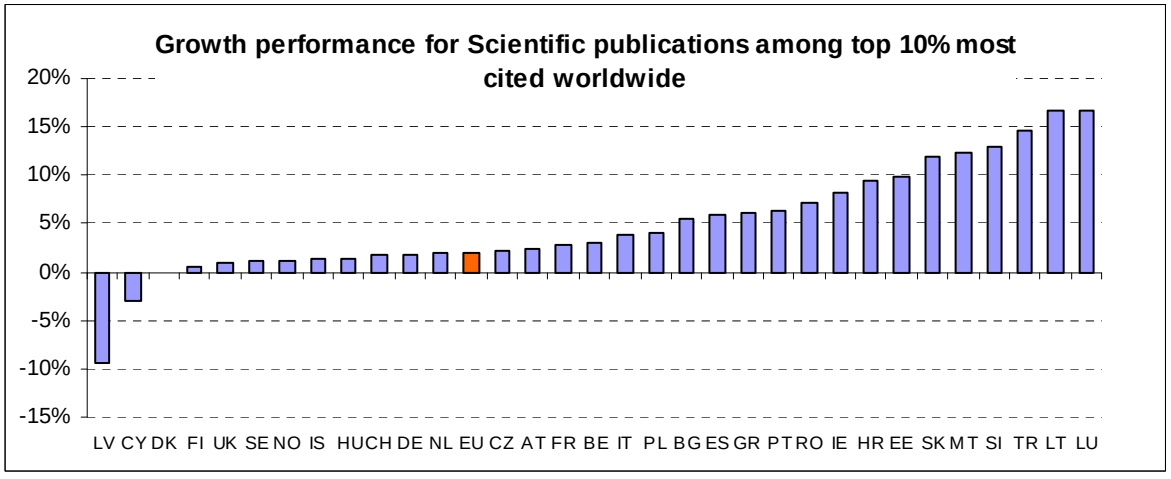


No data for FYROM and Serbia.

The indicator is a proxy for the efficiency of the research system as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English speaking countries given the coverage of Scopus' publication data. Countries like France and Germany, where researchers publish relatively more in their own language, are more likely to underperform on this indicator as compared to their real academic excellence.

The best performance is observed for Denmark, Netherlands and Switzerland. Performance in Latvia is poor and, to a lesser extent, also in Bulgaria, Croatia, Poland, Romania and Slovakia.

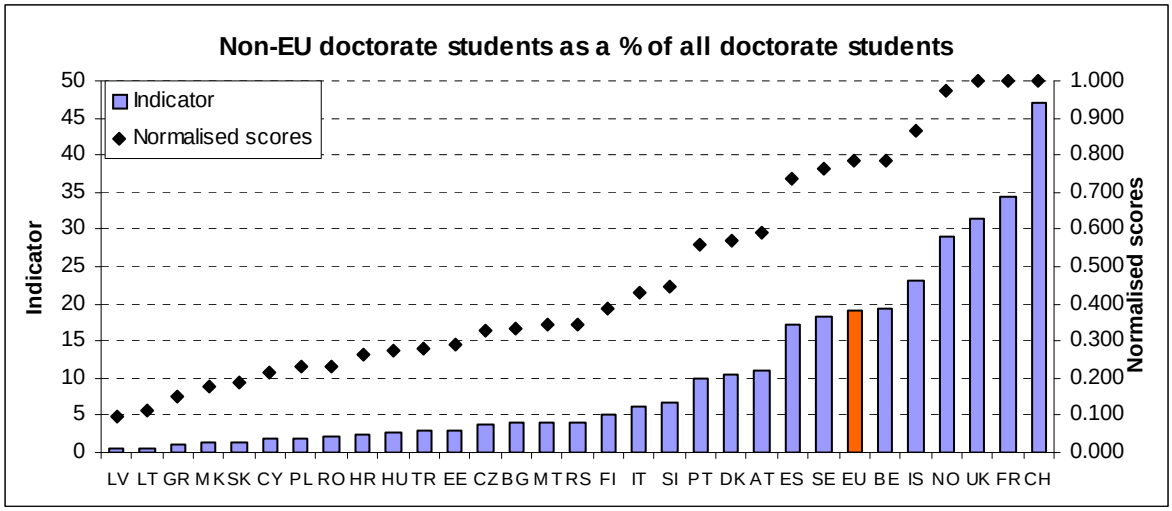
Growth performance



No data for FYROM and Serbia.

The poor performance in Latvia is partly due to a strong decline over the past 5 years of almost 10% per year. Except for Latvia and Cyprus, the indicator has been increasing in all countries, in particular in Lithuania, Luxembourg and Turkey.

1.2.3 Non-EU doctorate students as % of total doctorate students of the country

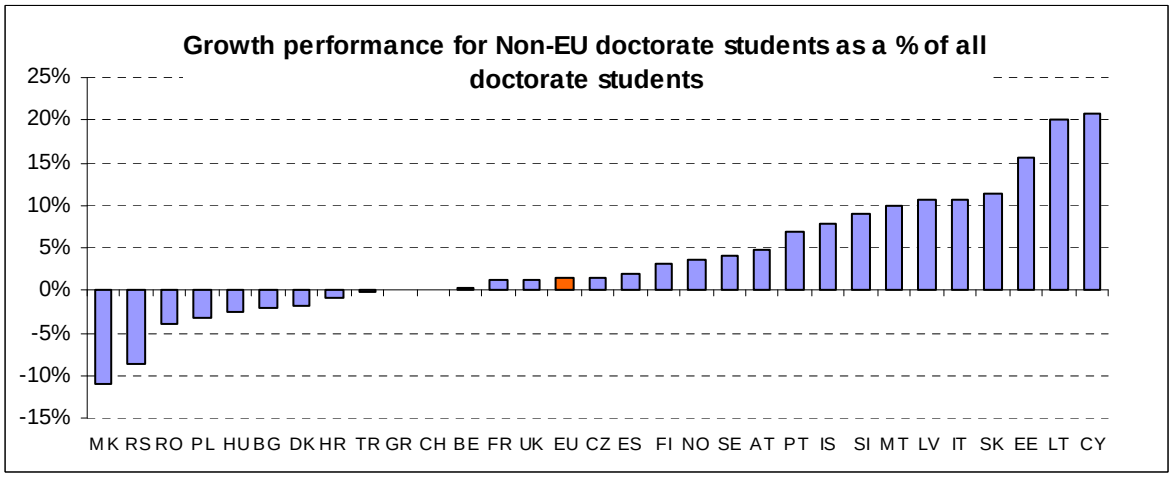


No data for Germany, Ireland, Luxembourg and Netherlands. Statistical outliers: France, Switzerland, UK. Indicator skewed and a square-root transformation has been used for deriving the normalised scores.

The share of non-EU doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students could add to creating a net brain gain and could secure a continuous supply of researchers. There might also be a benefit for the 'donor' country if these students return to their home country after their graduation.

The average share of non-EU doctorate students is almost 20%; in France and the UK this share is between 30% and 35%. In Switzerland almost 1 out of 2 doctorate students is a non-Swiss student. In the New Member States the shares of non-EU doctorate students are still small at rates below 5%.

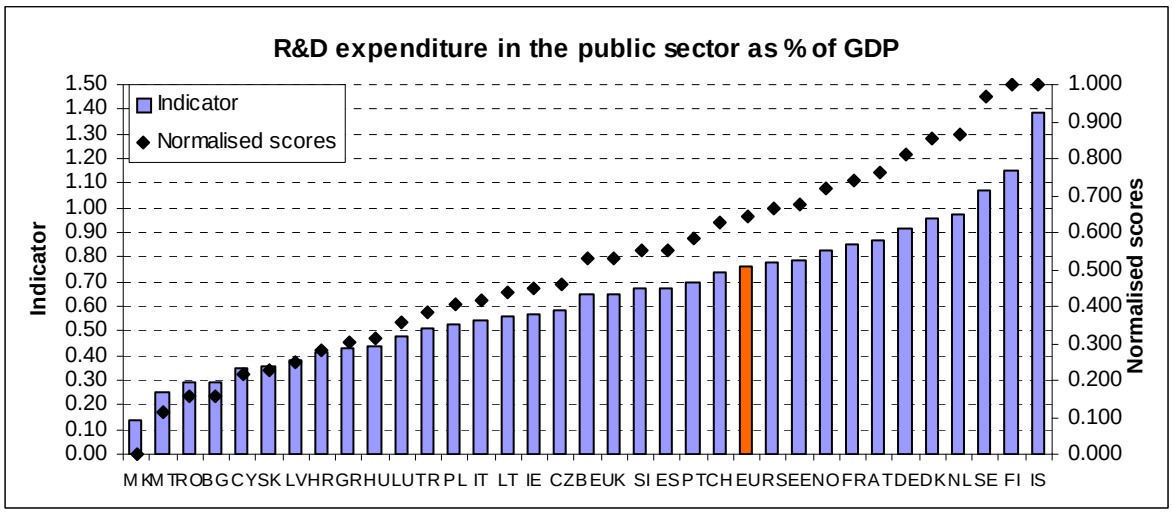
Growth performance



No data for Germany, Ireland, Luxembourg and Netherlands.

Growth performance is diverse with increases over time in 16 countries and decreases in 11 countries. Growth has been very strong in Cyprus and Lithuania with annual increases close to 20%. The share of foreign doctorate students has been declining rapidly in FYROM and Serbia.

1.3.1 R&D expenditure in the public sector as % of GDP

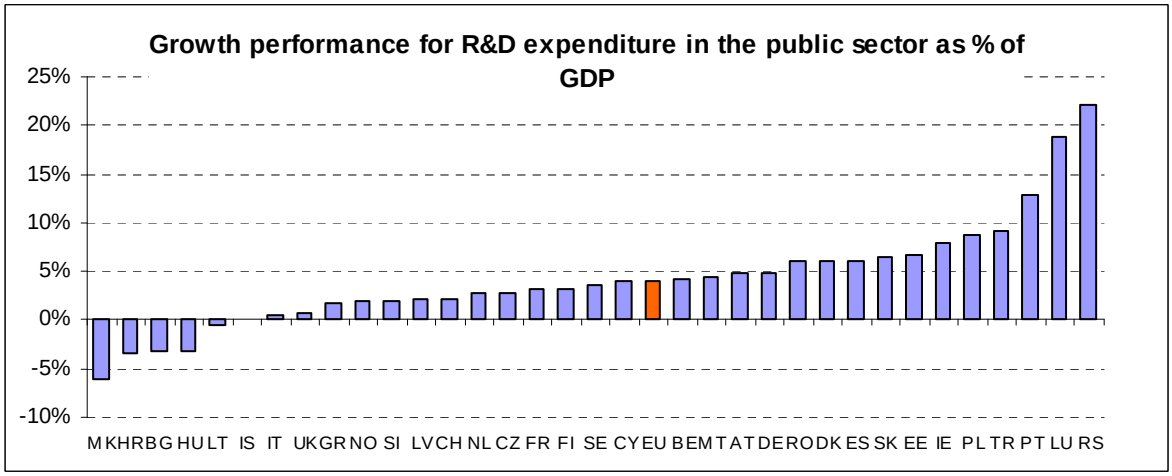


Statistical outliers: Finland and Iceland

R&D expenditures represent one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth.

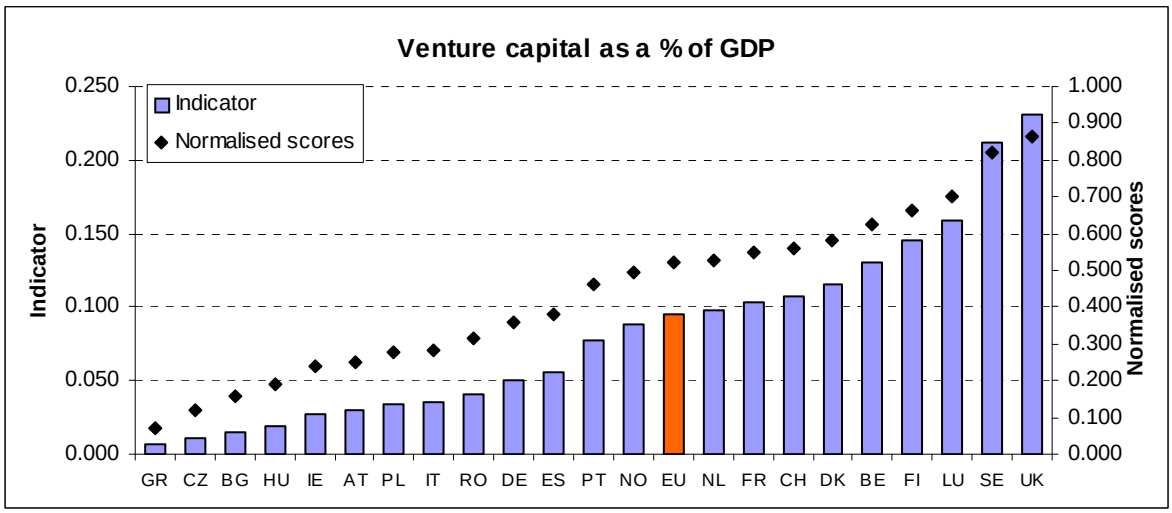
R&D expenditure in the public sector is close to or above 1% of GDP in Finland, Iceland and Sweden. The average intensity is 0.76% for the EU27. In Bulgaria, Cyprus, Luxembourg, Malta and Slovakia R&D intensities are below half that of the EU27.

Growth performance



R&D expenditure in the public sector has been increasing most rapidly in Luxembourg, Portugal and Serbia.

1.3.2 Venture capital (% of GDP)

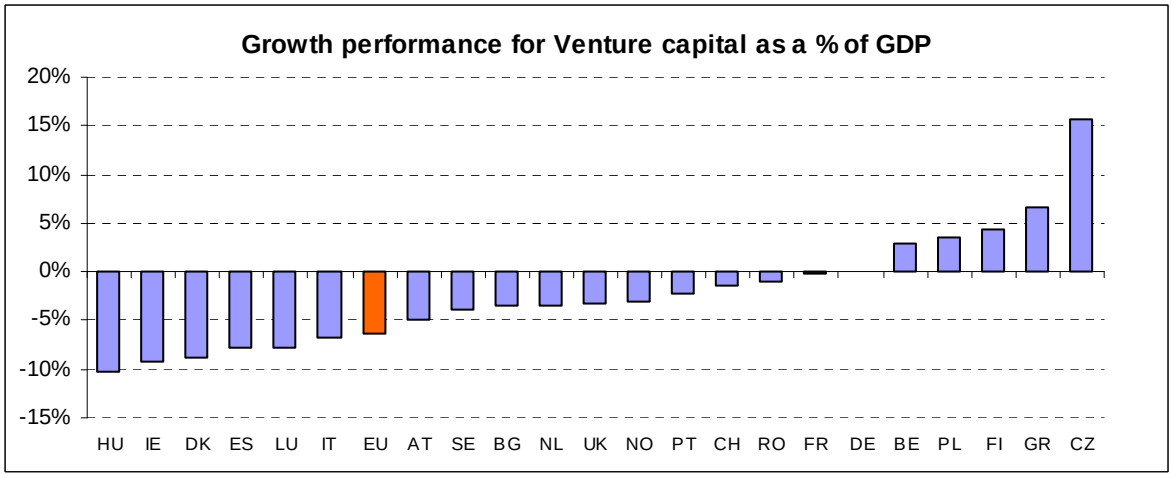


No data for Croatia, Cyprus, Estonia, FYROM, Iceland, Latvia, Lithuania, Malta, Serbia, Slovenia, Slovakia and Turkey. Two-year averages have been used to reduce volatility rates. Indicator skewed and a square-root transformation has been used for deriving the normalised scores.

The amount of venture capital is a proxy for the relative dynamism of new business creation. In particular for enterprises using or developing new (risky) technologies venture capital is often the only available means of financing their (expanding) business.

For several countries data are not available as due to the small size of the venture capital market there are no national venture capital associations to collect such data. The availability of venture capital differs widely in Europe. Only in Luxembourg, Sweden and the UK venture capital represents more than 0.15% of GDP.

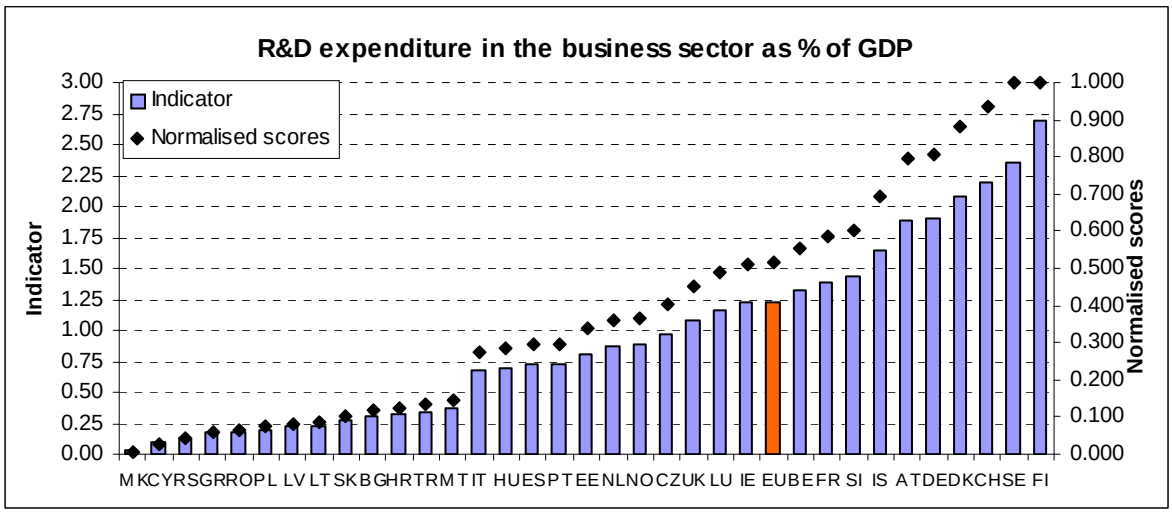
Growth performance



No data for Croatia, Cyprus, Estonia, FYROM, Iceland, Latvia, Lithuania, Malta, Serbia, Slovenia, Slovakia and Turkey.

Growth performance is diverse with decreases over time in 16 countries plus the EU27 and increases in 5 countries. Growth has been very strong in the Czech Republic with an annual increase above 15%. The availability of venture capital has been declining rapidly in Denmark, Hungary and Ireland.

2.1.1 R&D expenditure in the business sector as % of GDP

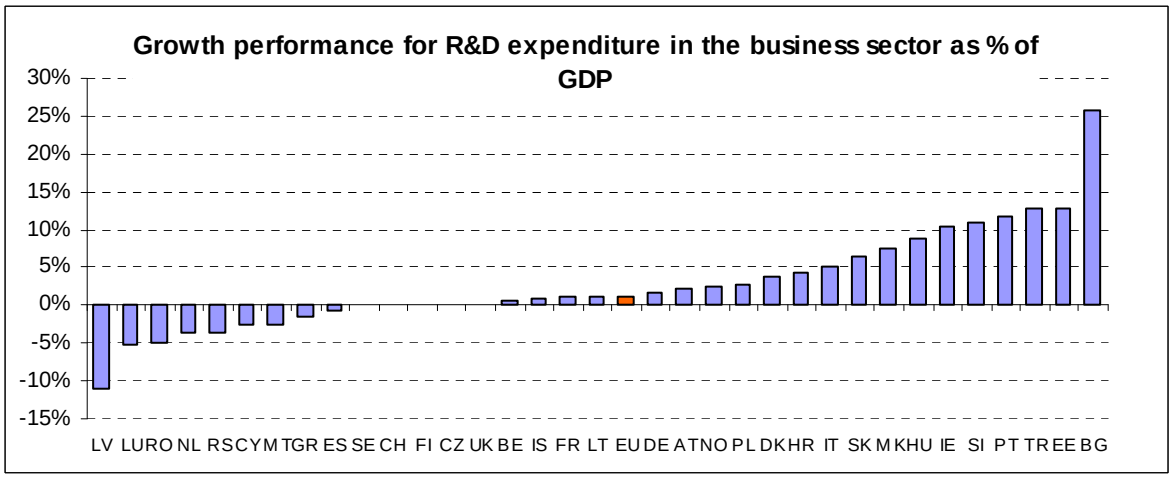


Statistical outliers: Finland, Sweden

R&D expenditure in the business sector captures the formal creation of new knowledge within firms. It is particularly important in the science-based sector (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.

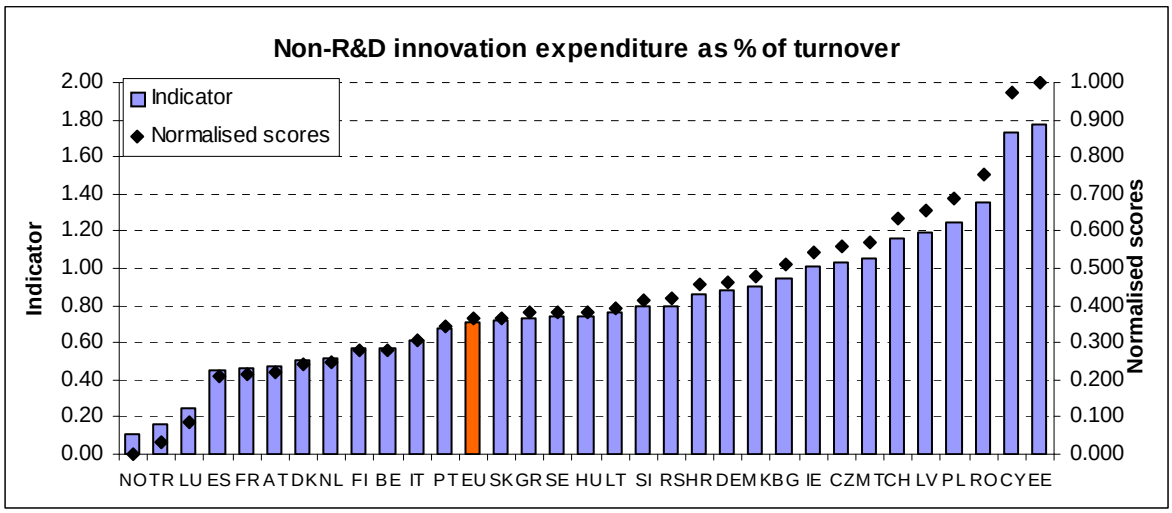
The R&D intensity is above 2% of GDP in only 4 countries: Denmark, Finland, Sweden and Switzerland. The average R&D intensity for the EU27 is 1.25% and for 13 countries the intensity is below 0.50%.

Growth performance



The Innovation Union has renewed the 3% R&D target towards 2020 but more progress needs to be made as the average increase for the EU27 is too weak partly due to decreases in major R&D spending countries as the Netherlands.

2.1.2 Non-R&D innovation expenditure as % of total turnover

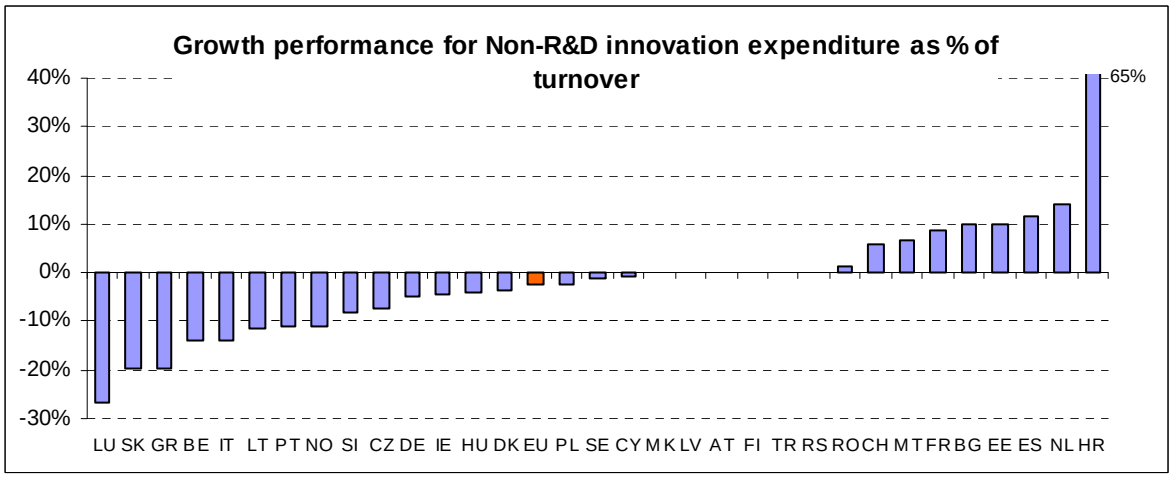


No data for Iceland and UK.

This indicator measures non-R&D innovation expenditure as percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas. The indicator does not include intramural and extramural R&D expenditures and does not overlap with the indicator on business R&D expenditures.

On average 0.7% of total turnover is spent non-R&D innovation in Europe. In Cyprus and Estonia this share is almost 1.8%, while in Luxembourg, Norway and Turkey it is close to or below 0.2%.

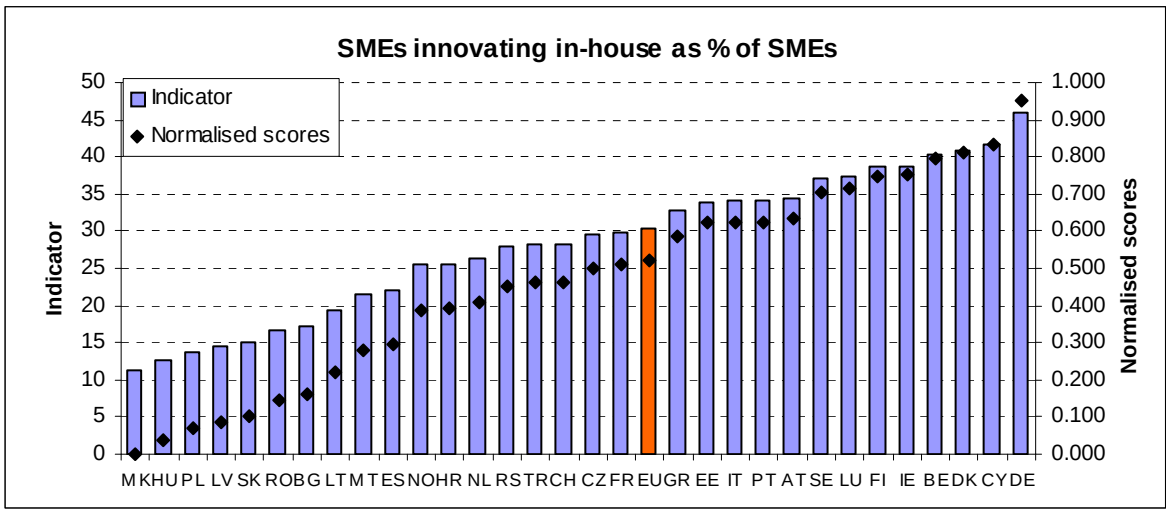
Growth performance



No data for Iceland and UK.

The share of non–R&D innovation expenditures has increased most in Croatia, Netherlands and Spain and has declined most in Greece, Luxembourg and Slovakia. For the EU27 this share has declined with 2.6%.

2.2.1 SMEs innovating in-house as % of all SMEs

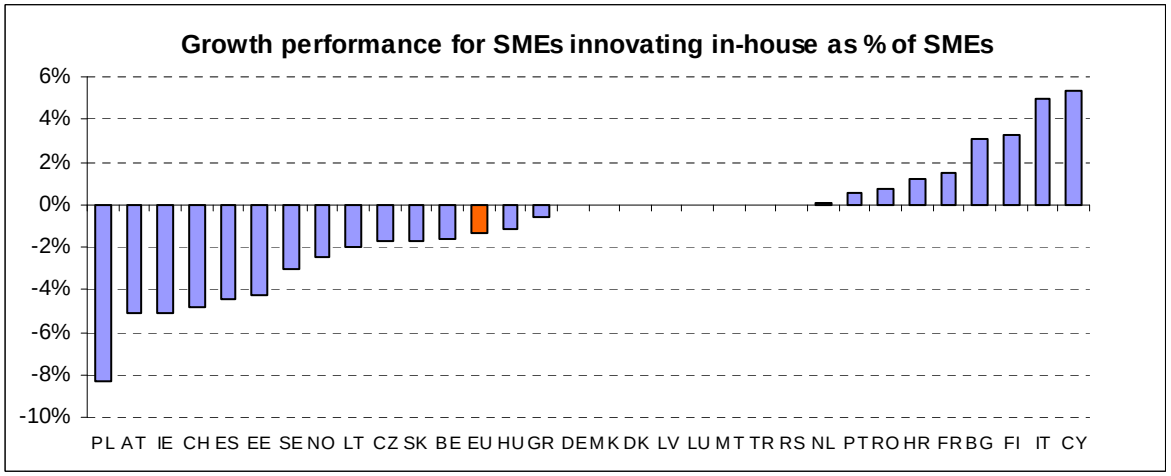


No data for Iceland, Slovenia and UK.

This indicator measures the degree to which SMEs that have introduced any new or significantly improved products or production processes have innovated in-house. The indicator is limited to SMEs because almost all large firms innovate and because countries with an industrial structure weighted towards larger firms tend to do better.

On average 30% of SMEs innovate in-house. Much higher shares are observed for Germany where more than 45% of SMEs innovate in-house. In the Former Yugoslav Republic of Macedonia, Hungary, Latvia, Poland and Slovakia less than 15% of SMEs innovate in-house.

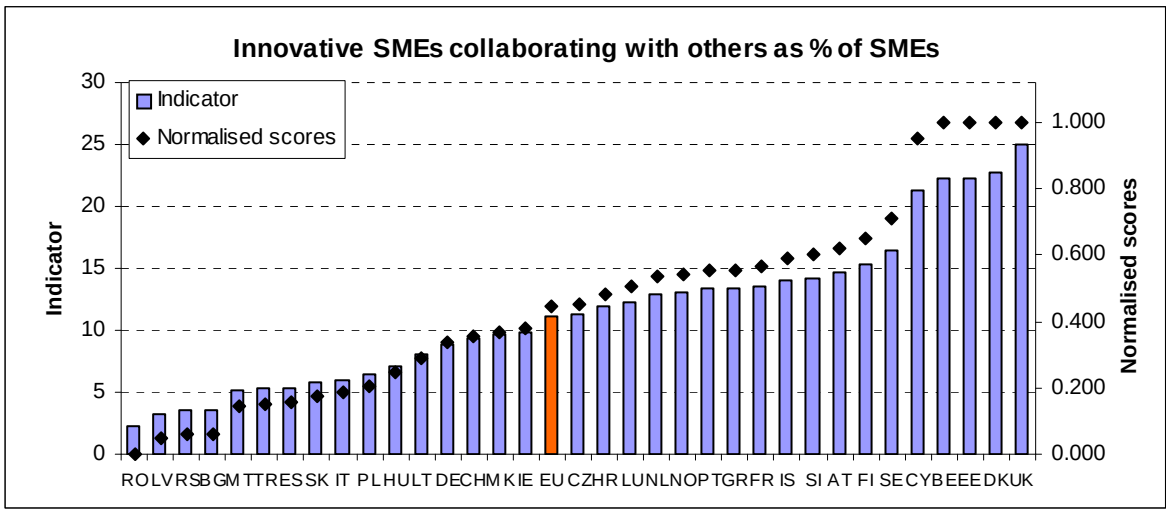
Growth performance



No data for Iceland, Slovenia and UK.

Growth performance is diverse with increases over time in 8 countries and decreases in 15 countries plus the EU27. Growth has been very strong in Cyprus and Italy. The share of SMEs innovating in-house has been declining most rapidly in Austria, Ireland and in particular Poland.

2.2.2 Innovative SMEs co-operating with others (% of all SMEs)

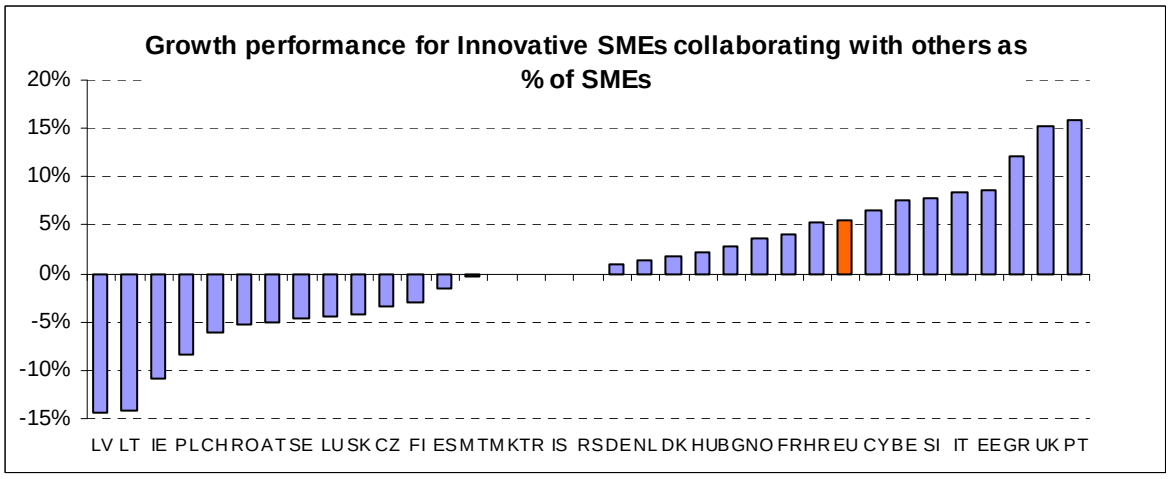


Statistical outliers: Denmark, UK

This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate on the development of an innovation. This indicator measures the flow of knowledge between public research institutions and private firms and between firms and other firms. The indicator is limited to SMEs because almost all large firms are involved in innovation co-operation.

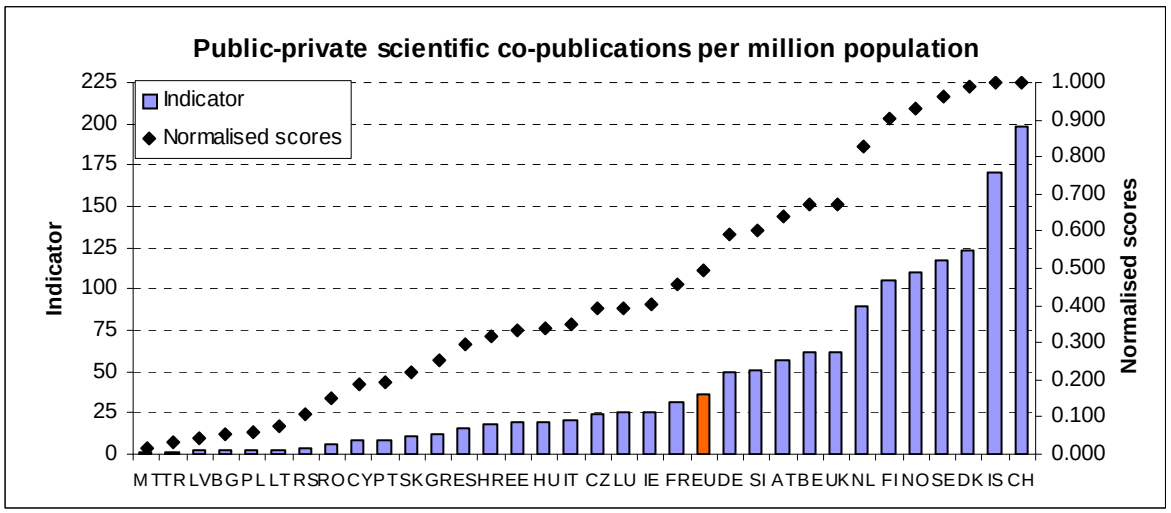
About 11% of EU27 SMEs collaborate with others. In Belgium, Cyprus, Denmark, Estonia and the UK more than 1 out 5 SMEs collaborate, whilst in Bulgaria, Latvia, Serbia and Romania this is less than 1 out of 20.

Growth performance



Growth performance is diverse with increases over time in 16 countries and decreases in 14 countries. Growth has been very strong in Greece, Portugal and the UK with an annual increase above 10%. In Ireland, Latvia and Lithuania the share of SMEs collaborating with others has decreased with more than 10% annually.

2.2.3 Public-private scientific co-publications per million population

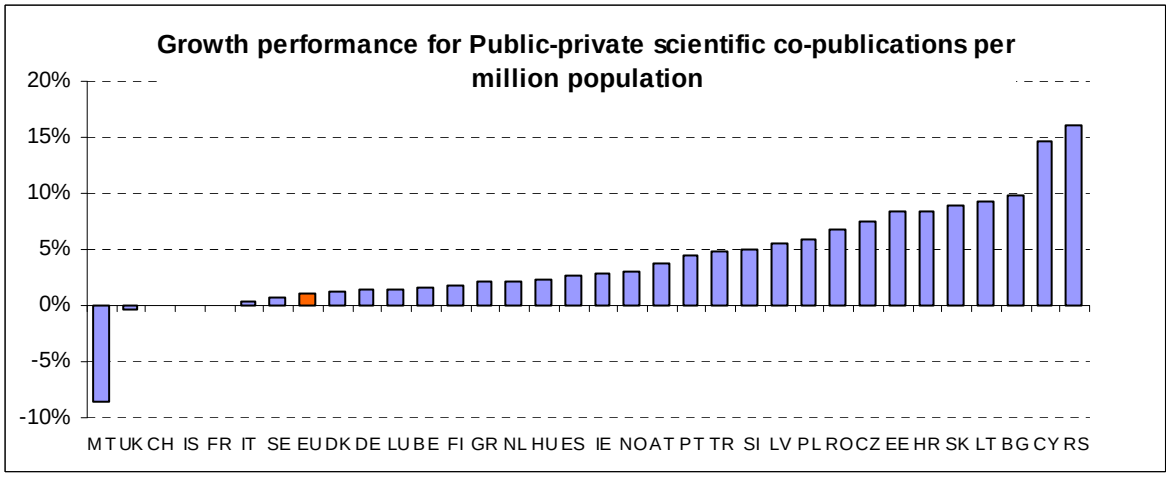


No data for FYROM. Statistical outliers: Iceland, Switzerland. Two-year averages have been used to reduce volatility rates.

This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications. The indicator is heavily influenced by the overall publication level of the country per million population.

On average 36 co-publications are observed for the EU27. But there are large differences, with more than 160 co-publications in Iceland and Switzerland and less than 5 co-publications in Bulgaria, Latvia, Lithuania, Malta, Poland, Serbia and Turkey.

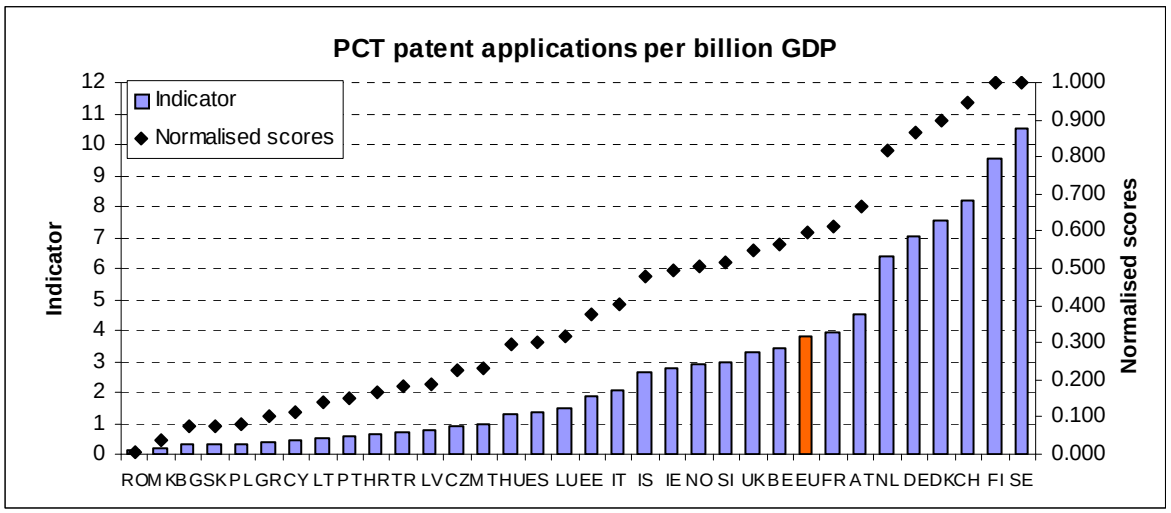
Growth performance



No data for FYROM.

Public-private scientific co-publications have been increasing in almost all countries, in particular in Cyprus and Serbia. In the UK and in particular in Malta we observe a decline for this indicator.

2.3.1 PCT patent applications per billion GDP (in PPP€)

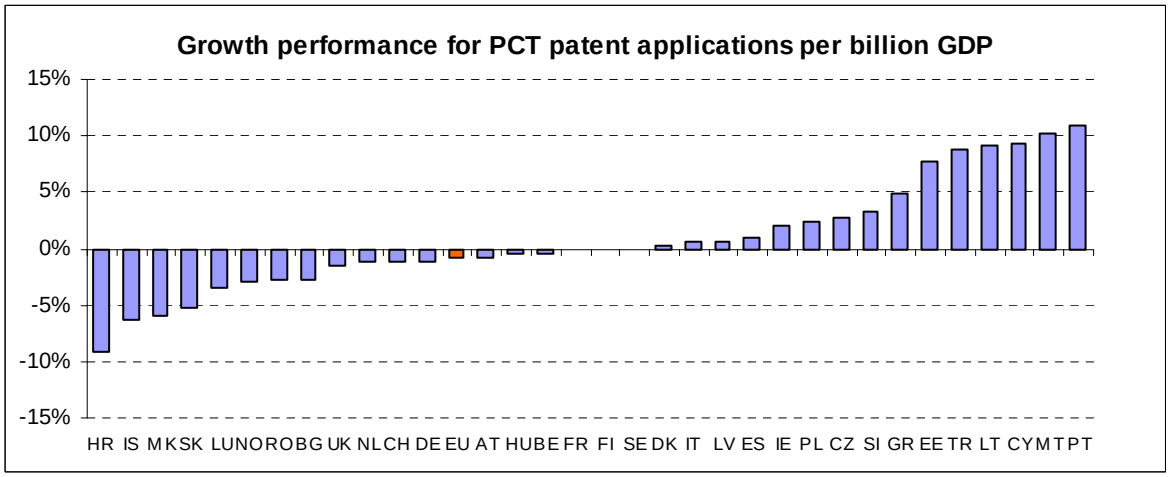


No data for Serbia. Statistical outliers: Finland, Sweden.

The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patent applications (patent applications are used instead of patents granted as the former are more timely available). This indicator measures the number of Patent Cooperation Treaty (PCT) patent applications. As this is an international patent filing procedure, it is largely exempt of the so-called home bias effect, whereby inventors file their patents to their national patent office first. PCT based patent statistics are therefore better suited for international comparisons.

For the EU27 on average 4 PCT patents per billion GDP have been applied for. There are large differences with 9 or more patent applications in Finland and Sweden and less than 1 application in Bulgaria, Cyprus, Czech Republic, Greece, Latvia, Lithuania, the Former Yugoslav Republic of Macedonia, Poland, Portugal, Romania, Slovakia and Turkey.

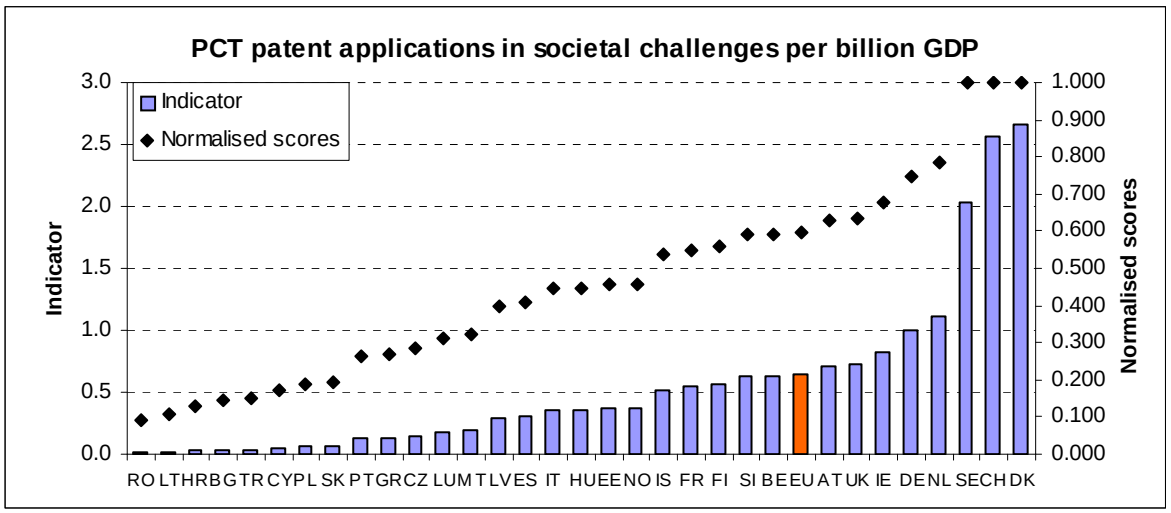
Growth performance



No data for Serbia.

In Cyprus, Estonia, Lithuania, Malta, Portugal and Turkey PCT patent applications have been growing rapidly. In several countries the indicator has been falling, in particular in Croatia, FYROM, Iceland and Slovakia.

2.3.2 PCT patent applications in societal challenges per billion GDP (in PPP€)

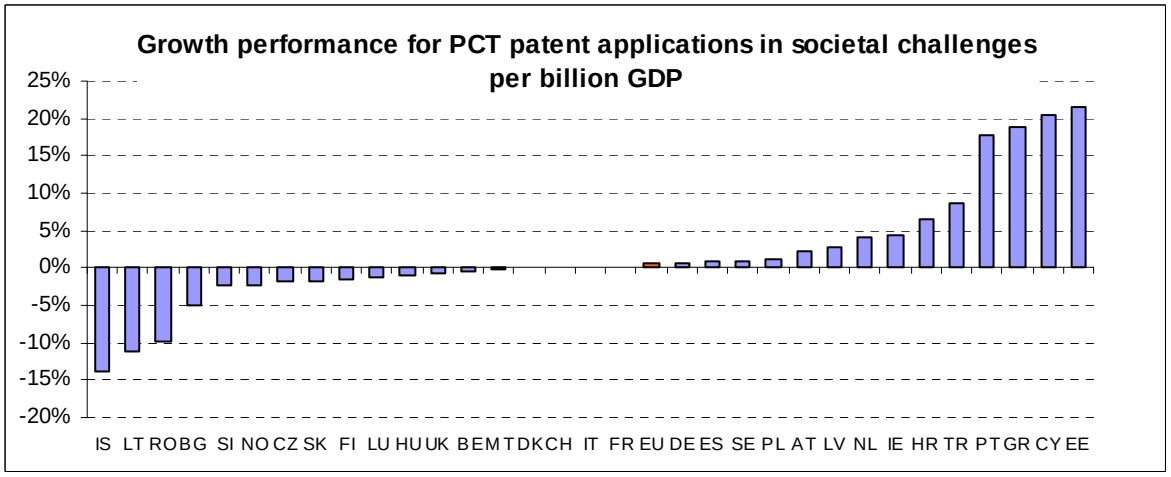


No data for FYROM and Serbia. Statistical outliers: Denmark, Sweden, Switzerland. Indicator skewed and a square-root transformation has been used for deriving the normalised scores.

This indicator measures PCT applications in health technology and climate change mitigation. From a policy point of view the indicator on patent applications in societal challenges is highly relevant as increased number of patent applications in health technology and climate change mitigation will be necessary to meet the societal needs of an ageing European society and sustainable growth.

Denmark, Sweden and Switzerland are the countries with the highest numbers of patent applications in societal challenges. In a large number of countries such applications are very low but this can be partly explained by their overall low number of PCT patent applications.

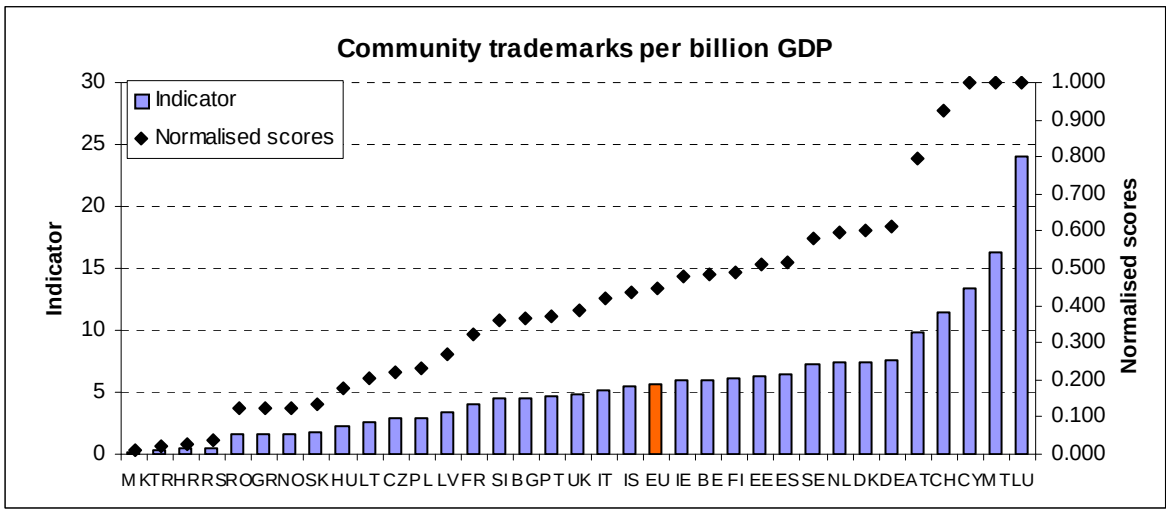
Growth performance



No data for FYROM and Serbia.

Patent applications in societal challenges are growing in 23 countries but are also declining in 8 countries. Decline has been strong in Bulgaria and Lithuania whereas in Latvia, Poland and Portugal growth has been strongest.

2.3.3 Community trademarks per billion GDP (in PPP€)

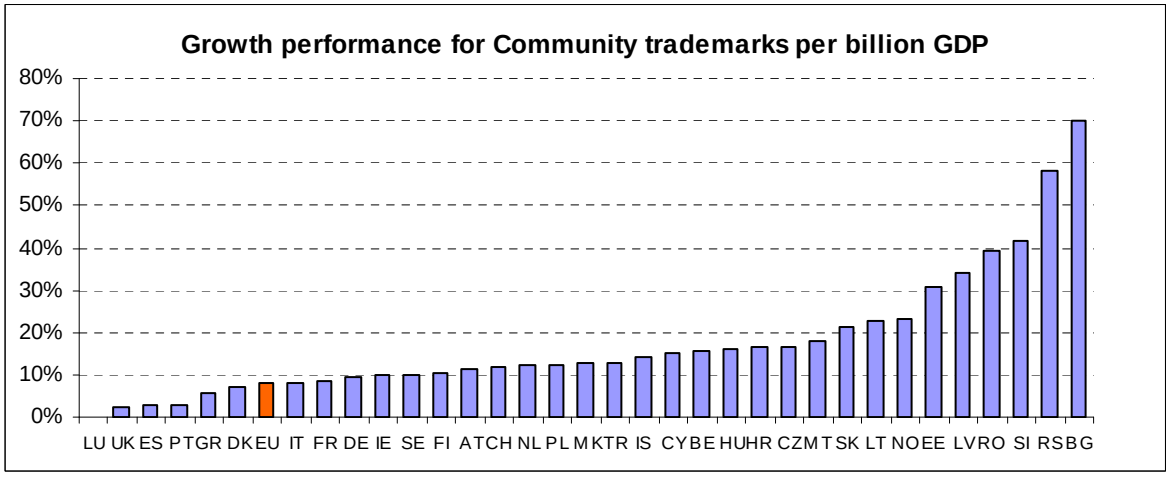


Statistical outliers: Cyprus, Luxembourg, Malta. Two-year averages have been used to reduce volatility rates.

Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and is a form of communication, a basis for publicity and advertising.

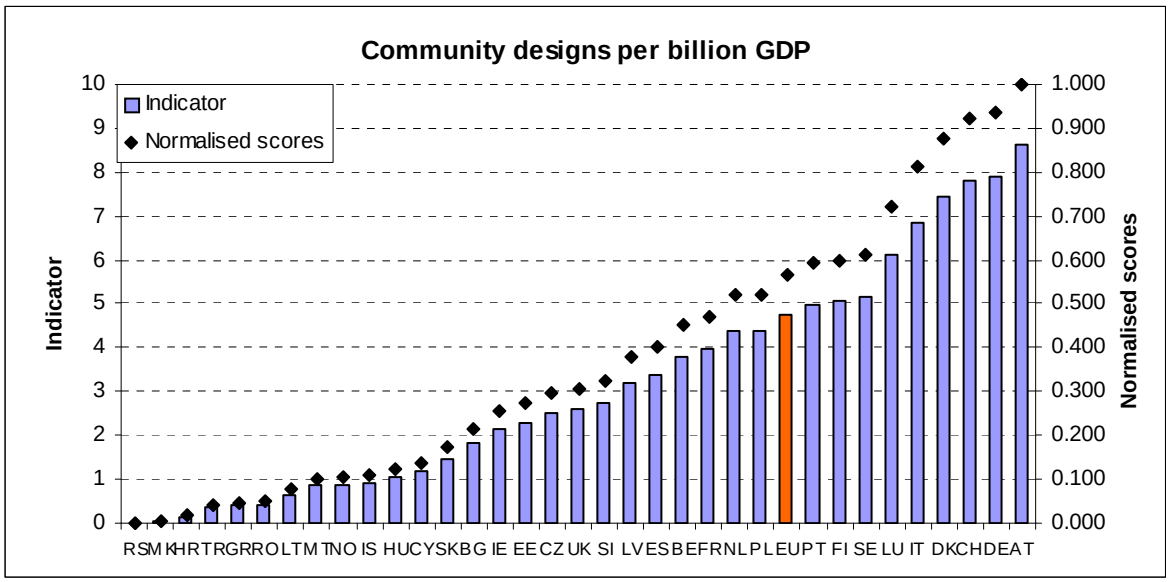
Most trademarks are applied for in Cyprus, Luxembourg and Malta. Trademark applications are low in Croatia, the Former Yugoslav Republic of Macedonia, Serbia and Turkey.

Growth performance



Trademark applications have been growing in all countries, in particular in Bulgaria and Romania.

2.3.4 Community designs per billion GDP (in PPP€)

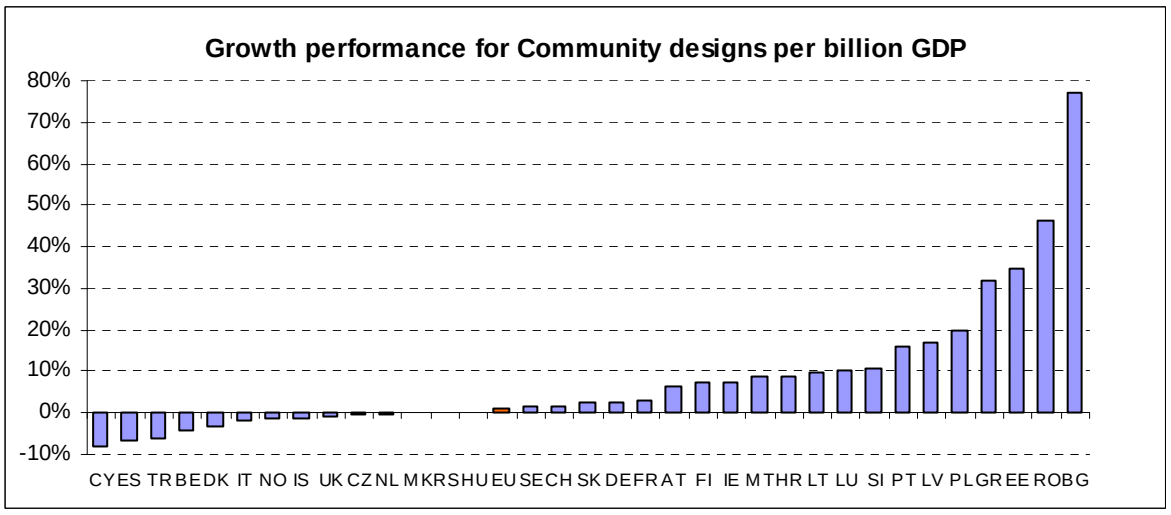


Statistical outlier: Austria. Two-year averages have been used to reduce volatility rates.

A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programs. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States.

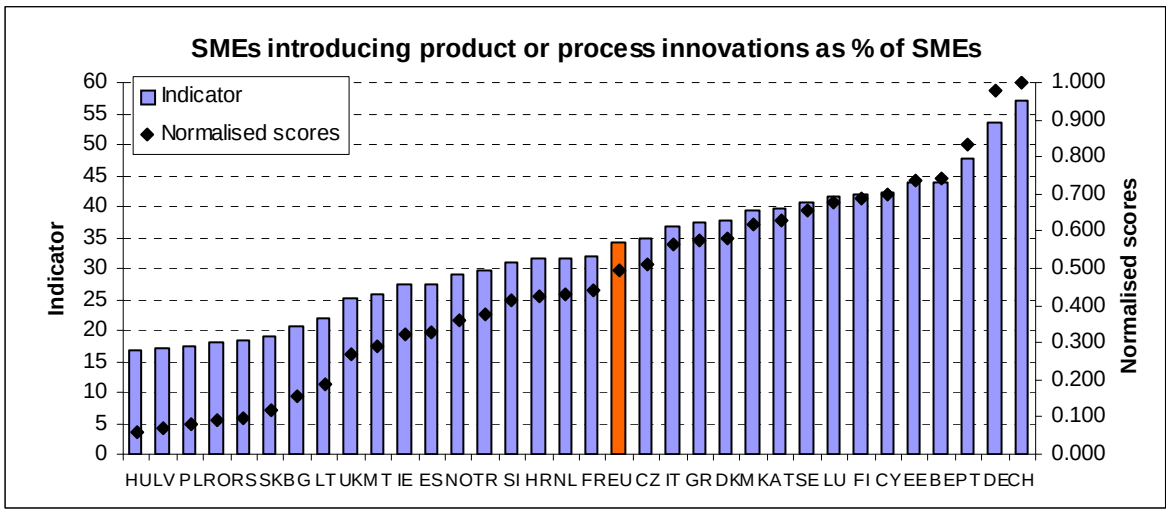
Most designs are applied for Austria, Denmark, Germany and Switzerland. Design applications are low in many of the Eastern European countries.

Growth performance



Growth performance for designs shows that these have been growing in 19 countries but declining in 13 countries. On average there is only a modest increase in the number of designs per billion GDP.

3.1.1 SMEs introducing product or process innovations as % of SMEs

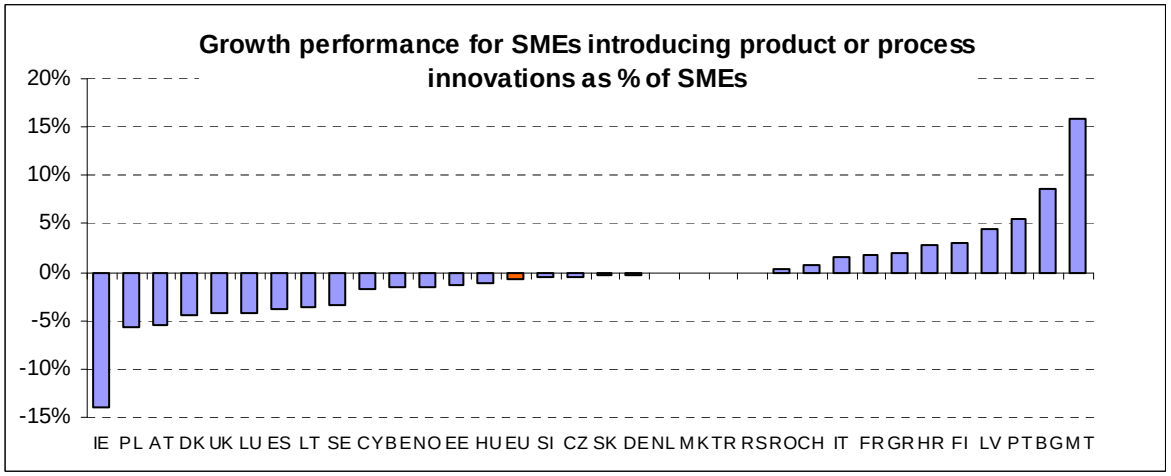


No data for Iceland. Statistical outlier: Switzerland

Technological innovation, as measured by the introduction of new products (goods or services) and processes, is a key ingredient to innovation in manufacturing activities. Higher shares of technological innovators should reflect a higher level of innovation activities.

Almost 35% of EU27 SMEs have innovated by introducing a new product or a new process. In Germany and Switzerland more than 50% of SMEs have introduced a new product or process, in Hungary, Latvia, Poland, Romania, Serbia and Slovakia this share is below 20%.

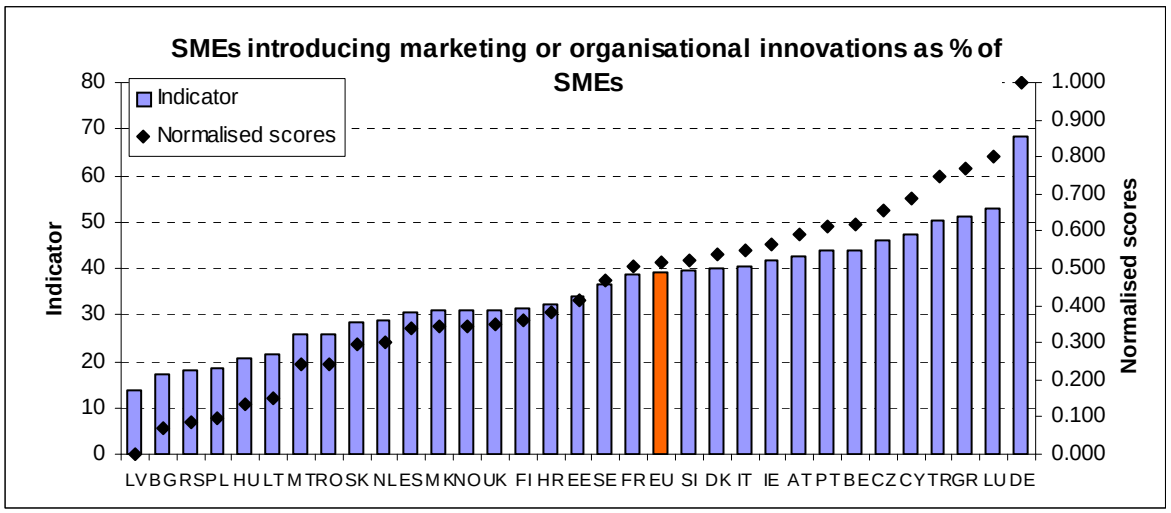
Growth performance



No data for Iceland.

Over the last 5 years on average a smaller share of SMEs has introduced new products or new processes. In most countries shares have been declining; only in 10 countries do we observe a significant increase.

3.1.2 SMEs introducing marketing or organisational innovations as % of SMEs

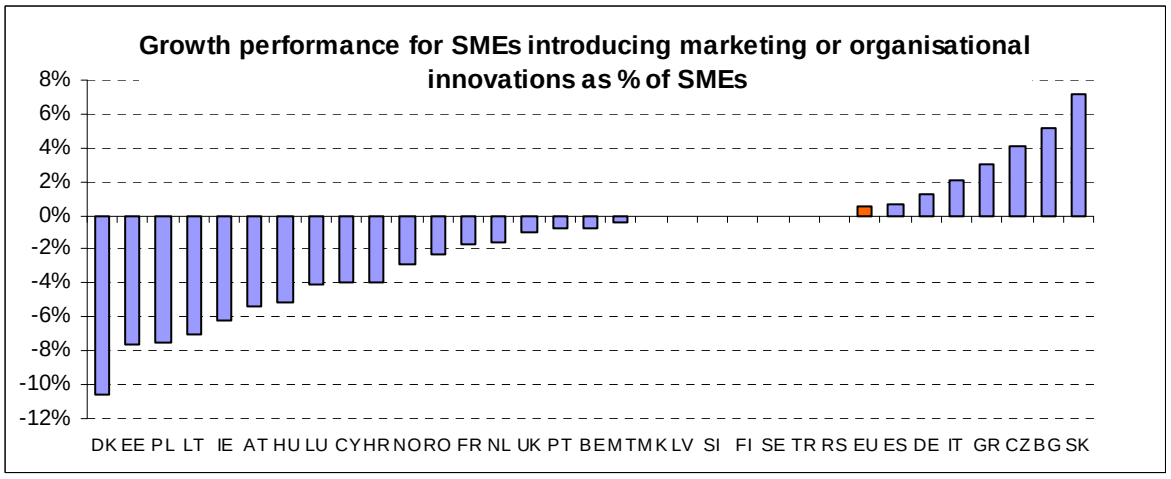


No data for Iceland and Switzerland.

The Community Innovation Survey mainly asks firms about their technological innovation. Many firms, in particular in the services sectors, innovate through other non-technological forms of innovation. Examples of these are marketing and organisational innovations. This indicator tries to capture the extent that SMEs innovate through non-technological innovation.

Almost 40% of EU27 SMEs have innovated by introducing a new marketing or new organisational innovation. In Germany more than 60% of SMEs have introduced a new marketing or new organisational innovation, in Bulgaria, Latvia, Poland and Serbia this share is below 20%.

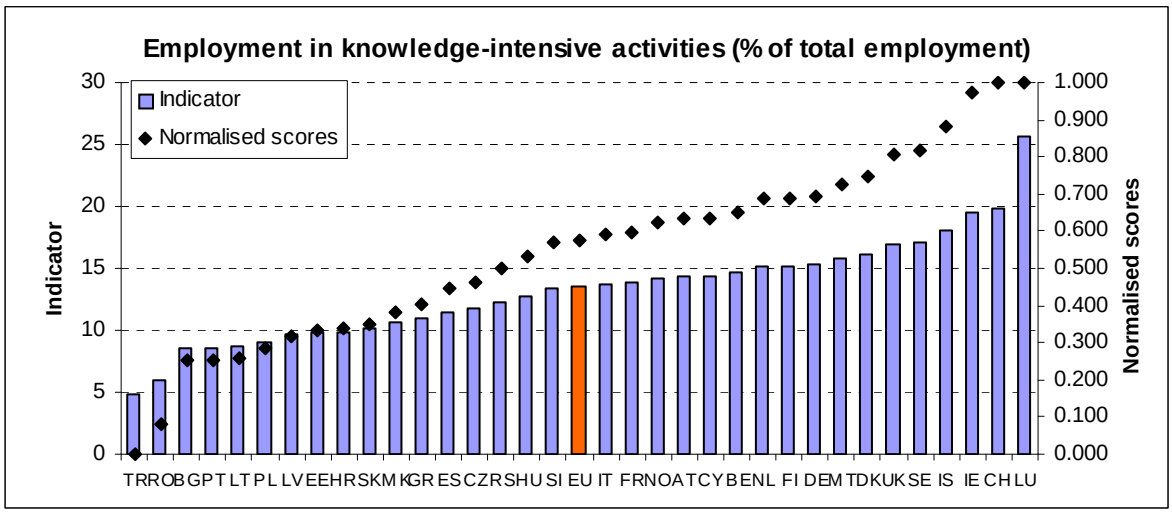
Growth performance



No data for Iceland and Switzerland.

The share of SMEs that have introduced marketing or organisational innovations has been declining for most countries over the last 5 years. Only in 7 countries we observe an increase.

3.2.1 Employment in knowledge-intensive activities as % of total employment

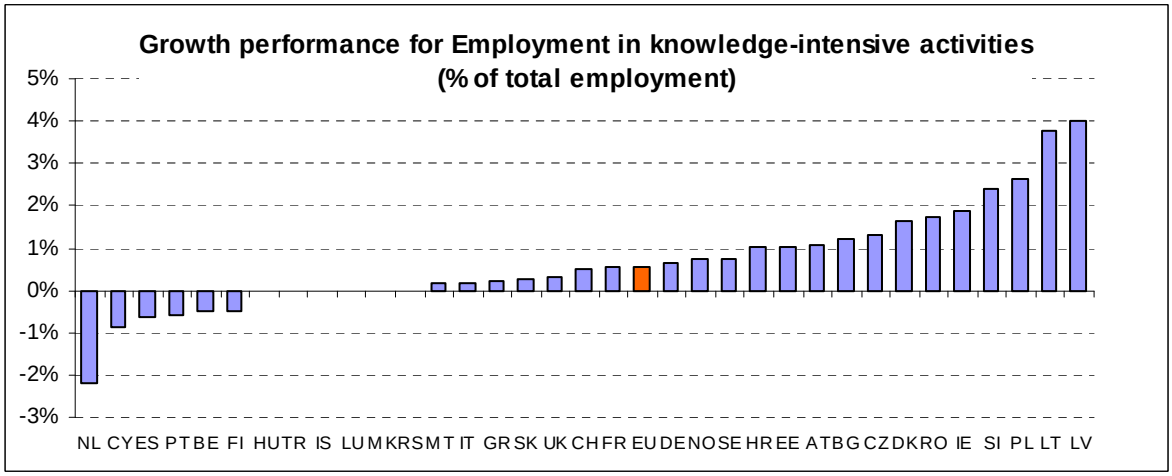


Statistical outlier: Luxembourg

The indicator on knowledge-intensive activities replaces the European Innovation Scoreboard indicators on employment in medium-high and high-tech manufacturing and employment in knowledge-intensive services. Knowledge-intensive activities are defined as those industries where at least 33% of employment has a university degree (ISCED5 or ISCED6).

The average value for the indicator is 13.5%. Countries with high shares of knowledge-intensive activities include Iceland, Ireland, Luxembourg and Switzerland. In Romania and Turkey the share of knowledge-intensive activities is below or close to 5%.

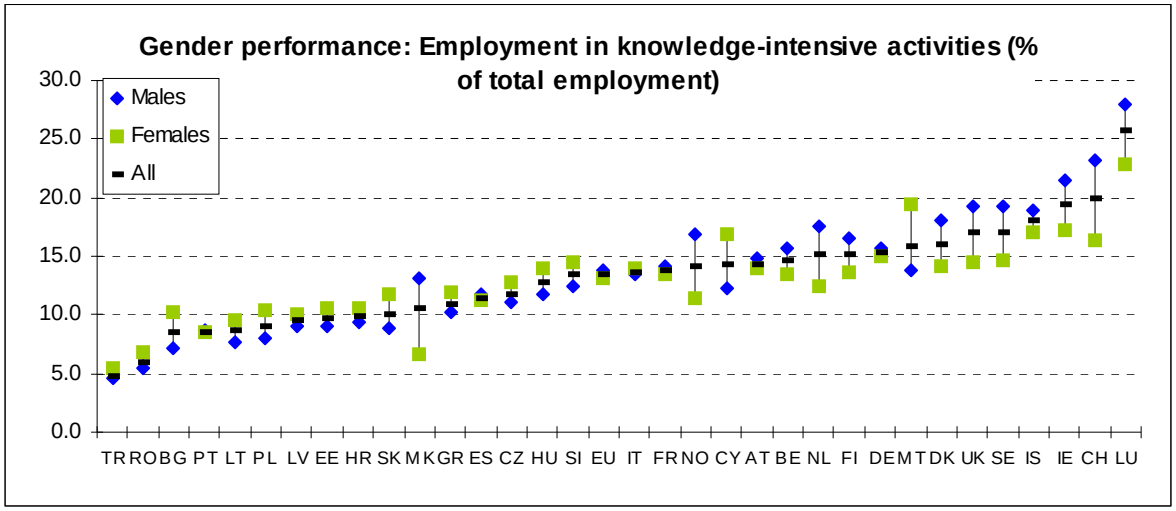
Growth performance



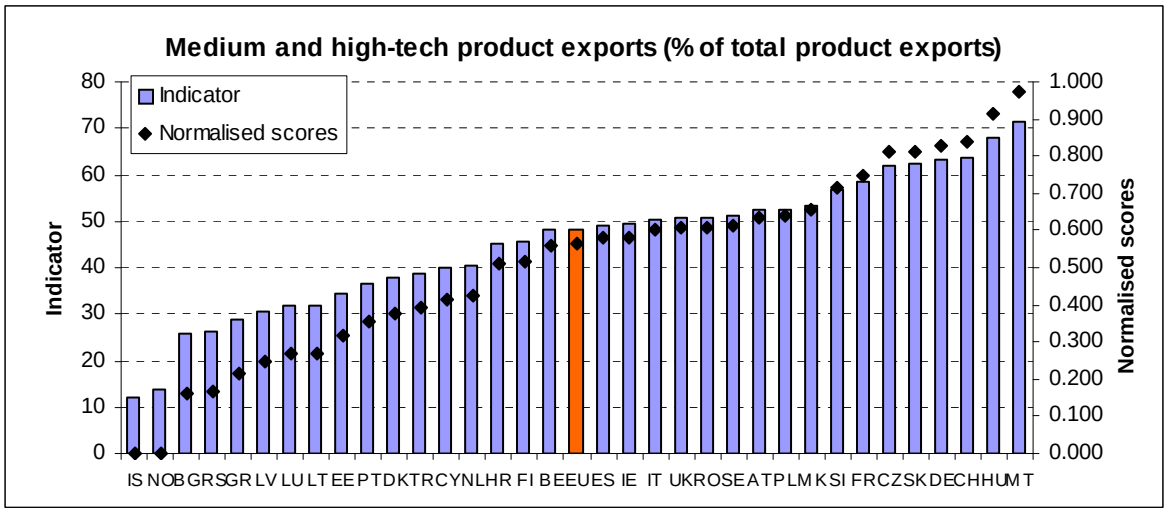
Employment in knowledge-intensive activities has been growing for the EU27 and for most countries. The employment share has decreased with more than 1% annually in the Netherlands.

Gender performance

The graph below shows the gender performance for this indicator. In half of the countries the share of female employment in knowledge-intensive activities exceeds the share of male employment, in particular in Bulgaria, Cyprus, Malta, Poland and Slovakia. Male employment exceeds female employment relatively most in FYROM, Netherlands, Norway and Switzerland.



3.2.2 Medium and high-technology product exports as % of total product exports



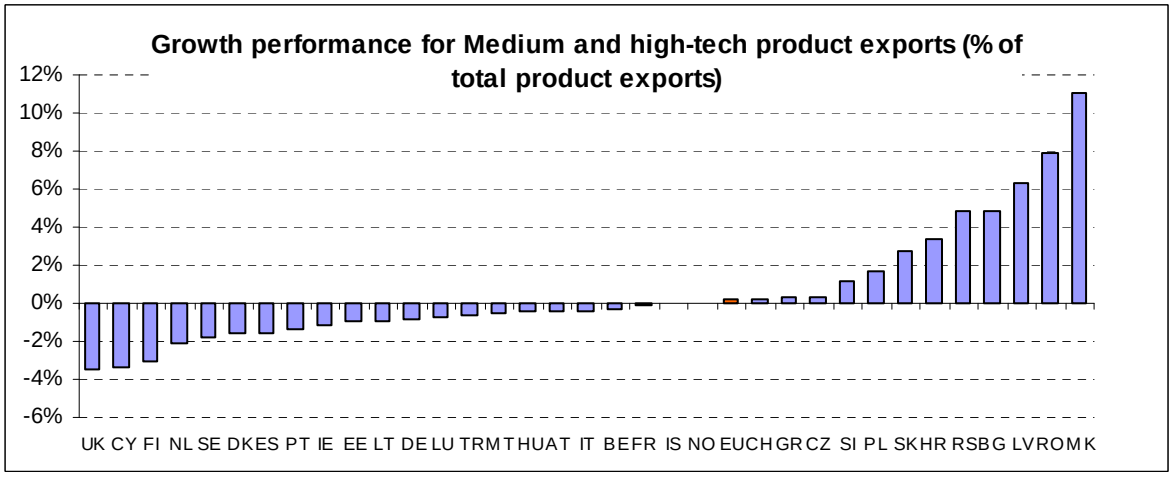
Statistical outliers: Iceland, Norway

The indicator measures the technological competitiveness of the EU i.e. the ability to commercialize the results of research and development (R&D) and innovation in the international markets. It also reflects product specialization by country. Creating, exploiting and commercializing new technologies are vital for the competitiveness of a country in the modern economy. This is because medium and high technology products are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment.

Medium and High-tech exports include exports of the following SITC Rev.3 products: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891.

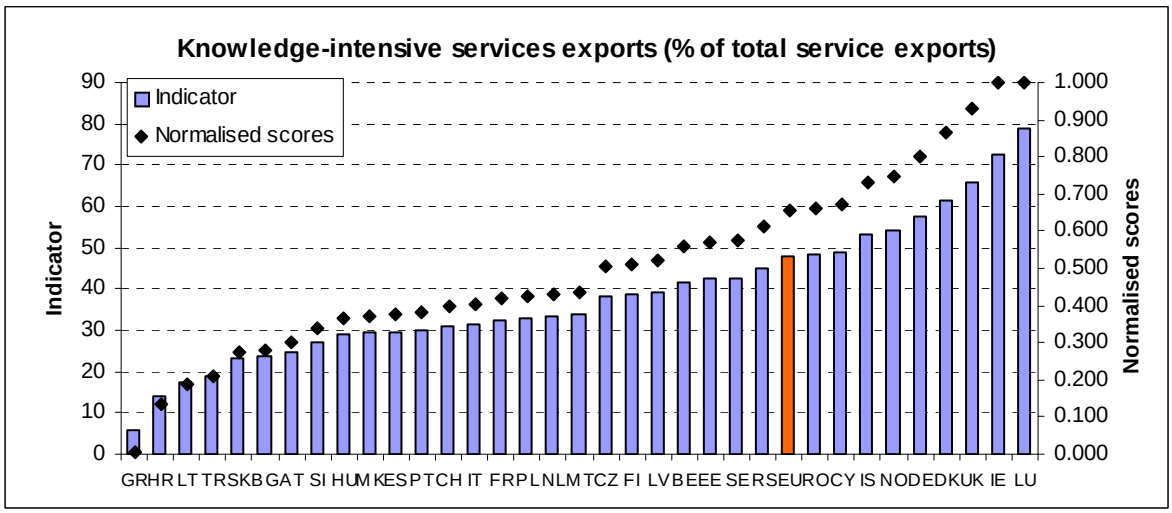
Export shares are very high in Hungary and Malta and very low in Iceland and Norway.

Growth performance



The share of medium and high-tech product exports has been growing rapidly in Latvia, FYROM and Romania. In Cyprus, Finland and the UK the decline has been strongest.

3.2.3 Knowledge-intensive services exports as % of total services exports

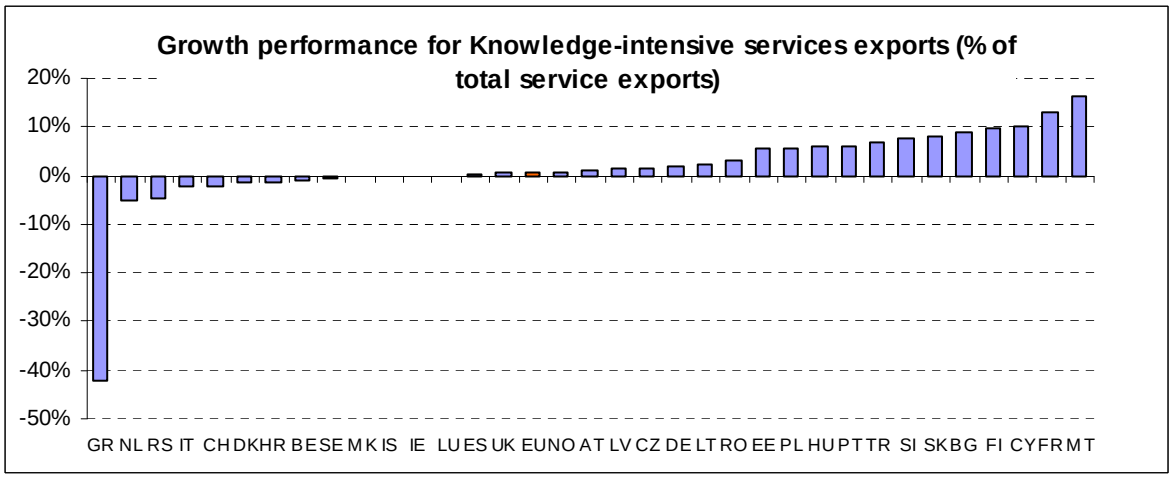


Statistical outliers: Ireland, Luxembourg

The indicator measures the competitiveness of the knowledge-intensive services sector. Exports of knowledge-intensive services are measured by the sum of credits in EBOPS (Extended Balance of Payments Services Classification) 207, 208, 211, 212, 218, 228, 229, 245, 253, 254, 260, 263, 272, 274, 278, 279, 280 and 284.

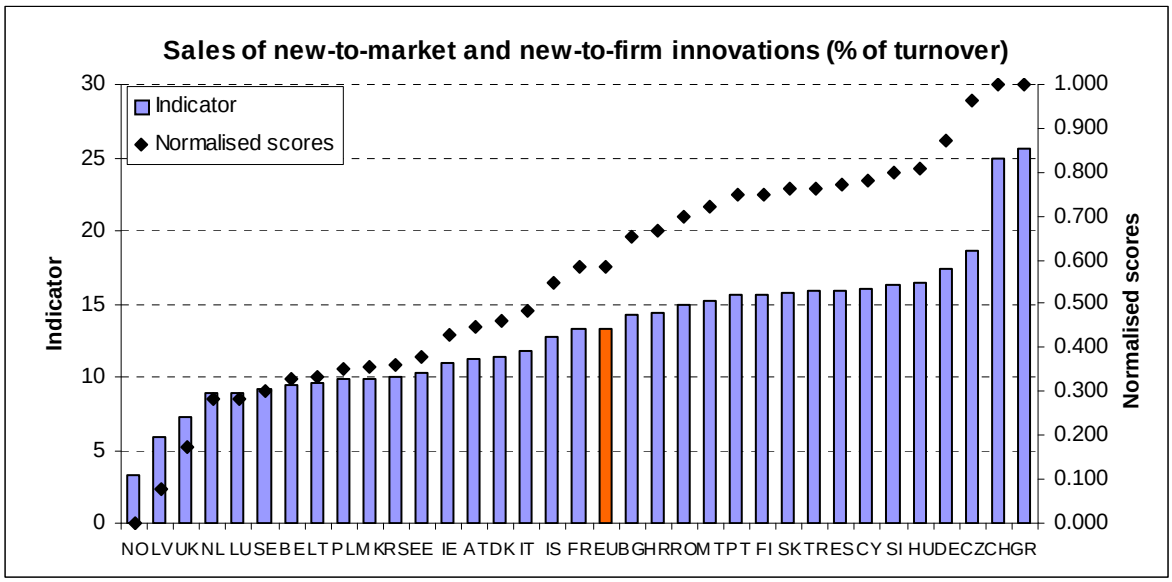
At EU level about half of the total services exports are knowledge-intensive. Export shares are more than 60% in Denmark, Ireland and the UK, and almost 80% in Luxembourg; whilst they are very low in Croatia, Greece, Lithuania and Turkey.

Growth performance



The export share of knowledge-intensive services has been growing at an average rate of 1.5% for the EU27. High growth rates above 10% are observed for Finland, Hungary and Malta. Export shares have declined in Iceland, Lithuania and Sweden at a rate above 5%.

3.2.4 Sales of new-to-market and new-to-firm innovations as % of turnover

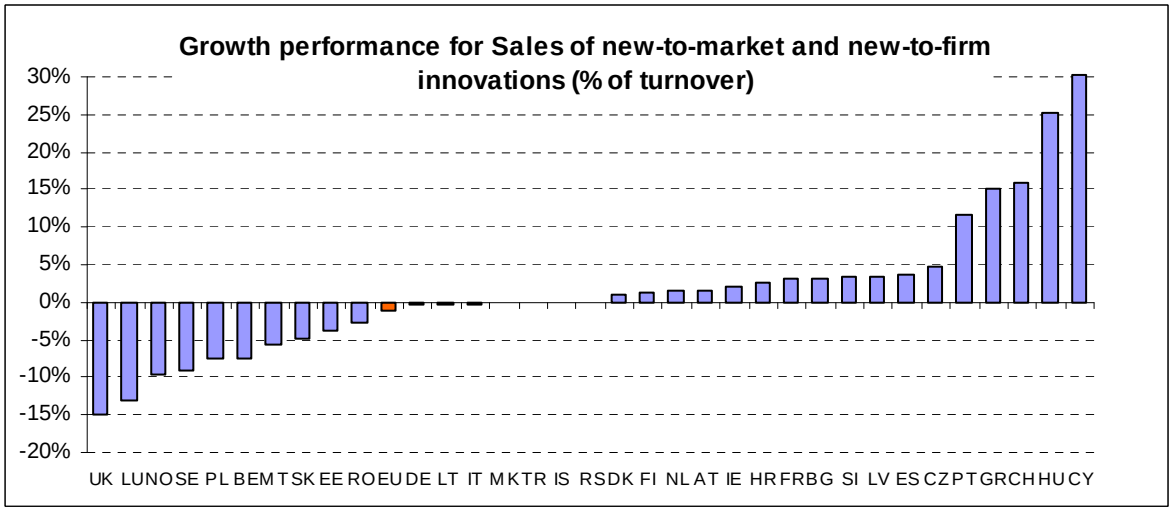


Statistical outliers: Greece, Norway, Switzerland

This indicator measures the share of turnover accountable to new or significantly improved products and includes both products which are only new to the firm and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new to market products) and the diffusion of these technologies (new to firm products).

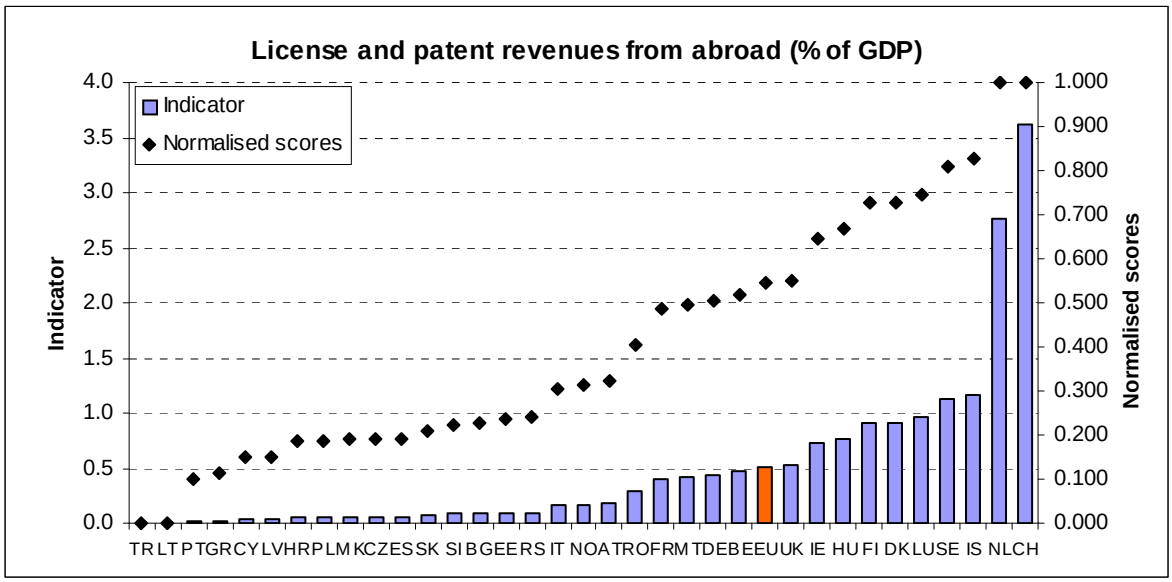
The average score for the EU27 is 13% but in Greece and Switzerland these shares are close to or above 25%. In Norway the sales share of new or significantly improved products is below 5%.

Growth performance



Sales of new-to-market and new-to-firm innovations have shown a strong increase in Cyprus, Greece Hungary and Switzerland. In Luxembourg, Norway and the UK these sales have been falling most.

3.2.5 License and patent revenues from abroad as % of GDP

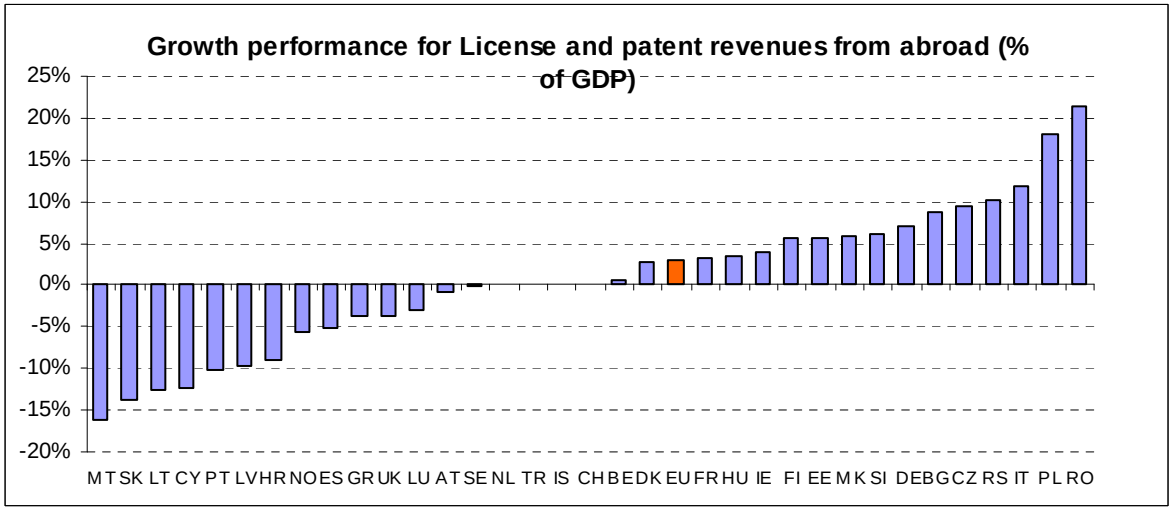


Statistical outliers: Netherlands, Switzerland. Indicator skewed and a square-root transformation has been used for deriving the normalised scores.

License and patent revenues from abroad capture disembodied technology acquisition. Technology exports reflect the successful commercialization of close-to-the-frontier technological activities. In reality, this indicator (license part) is broader than technology (see section 8 on p 47 of the Manual on Statistics of international trade in services of the UN-EC-IMF-OECD-WTO), so it fits better into the broader definition of innovation that has been promoted over the last years.

These revenues are very high at more than 2.5% of GDP in the Netherlands and Switzerland. In most countries these revenues represent less than 0.5% of GDP and in Lithuania and Turkey they are close to zero.

Growth performance

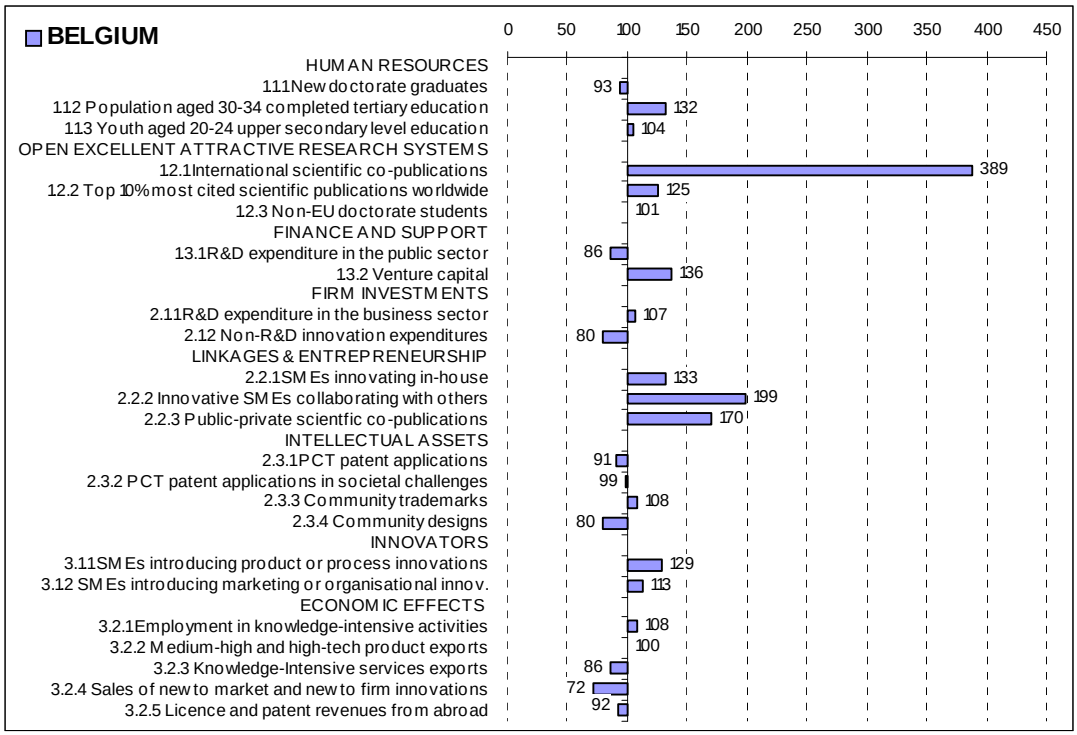


License and patent revenues from abroad have increased in 20 countries, in particular in Poland and Romania. In 13 countries these revenues have decreased relative to GDP.

6. COUNTRY PROFILES

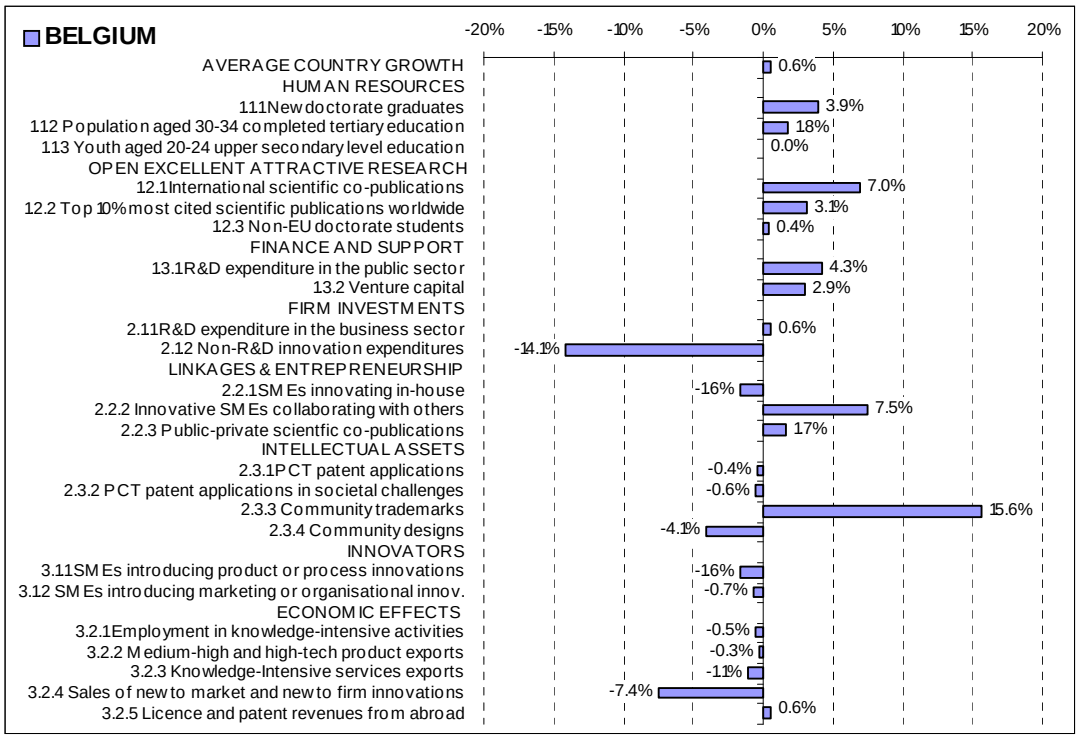
In this section for each country a more detailed country profile is shown highlighting for each country's relative strengths and weaknesses in innovation performance and its main drivers of innovation growth. For each country detailed data tables are available from the INNO Metrics website (http://www.proinno-europe.eu/metrics). Relative strengths and weaknesses are determined by comparing the composite indicator scores for each of the 8 innovation dimensions with the overall composite innovation index.

Belgium is one of the innovation followers with an above average performance. Relative strengths are in Open, excellent and attractive research systems and Linkages & entrepreneurship. Relative weaknesses are in Firm investments, Intellectual assets and Economic effects.



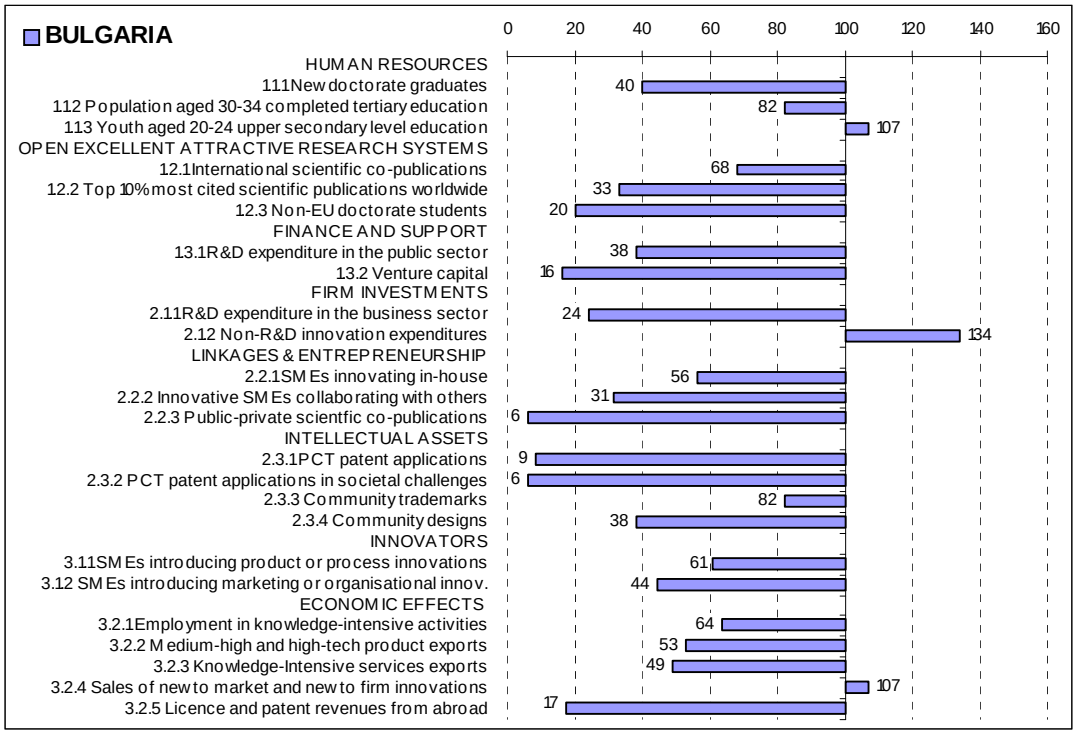
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks. A strong decline is observed for Non-R&D innovation expenditure and Sales of new products. Growth performance in Open, excellent and attractive research systems and Intellectual assets is well above average.



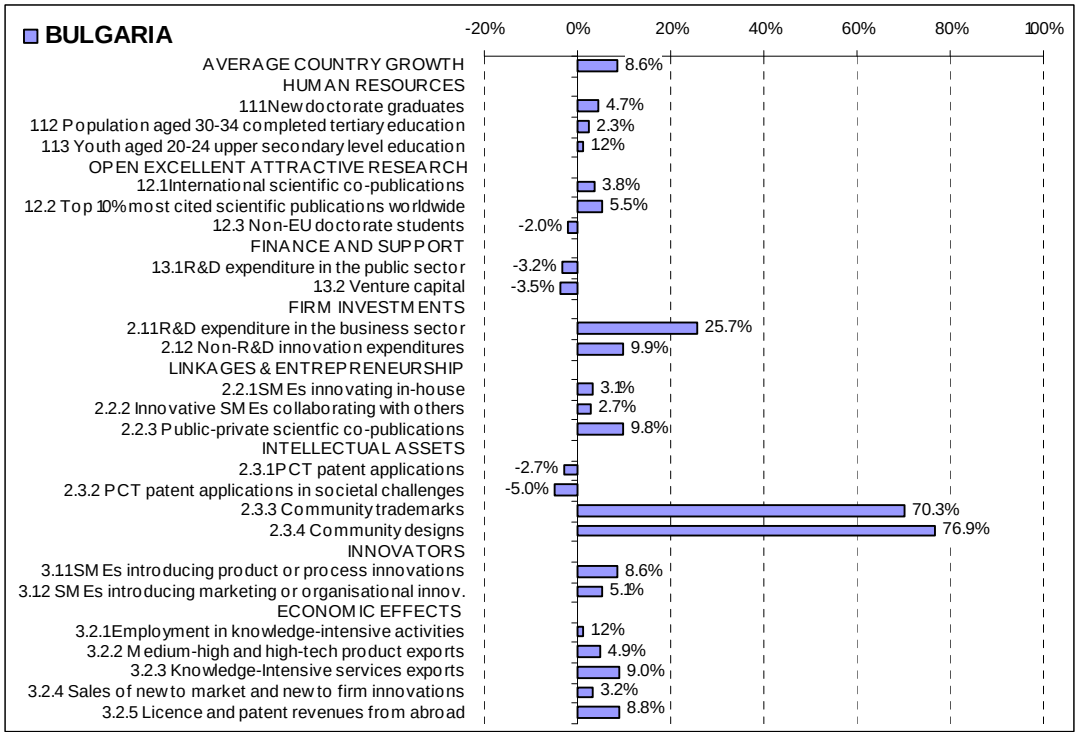
Annual average growth per indicator and average country growth

Bulgaria is one of the modest innovators with a below average performance.
Relative strengths are in Human resources, Firm investments and Economics effects. Relative weaknesses are in Open, excellent and attractive research systems, Linkages & entrepreneurship, Intellectual assets and Innovators.



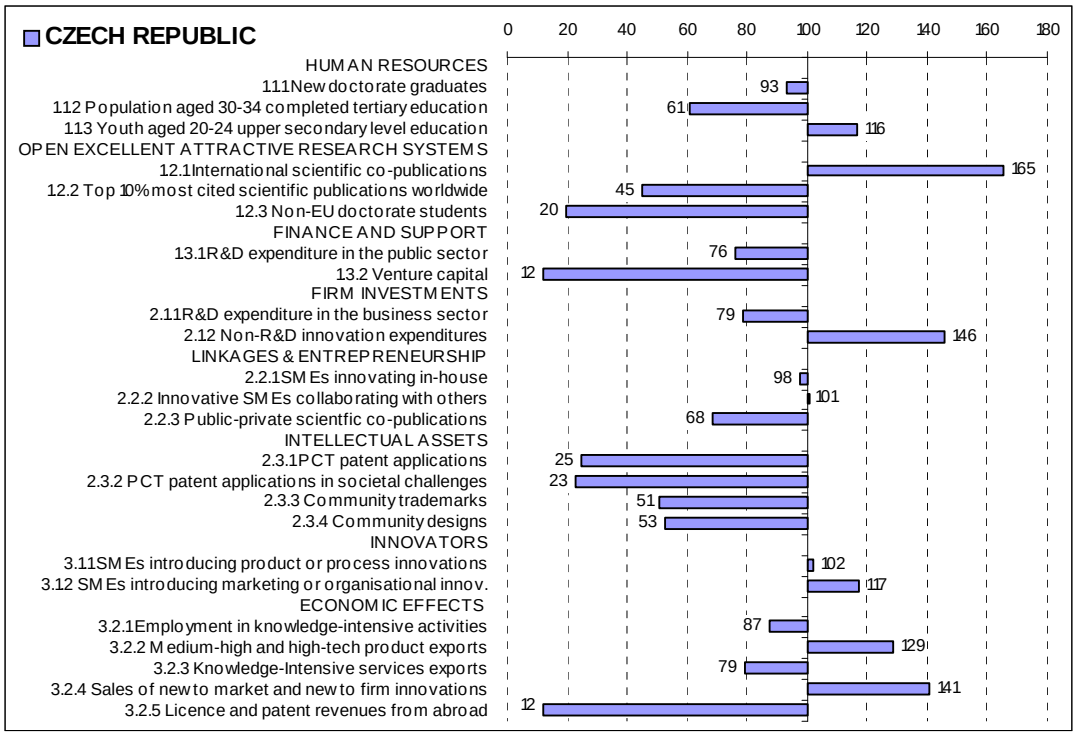
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and Community designs. A relatively strong decline is observed for PCT patent applications in societal challenges. Growth performance in Firm investments and Intellectual assets is well above average.



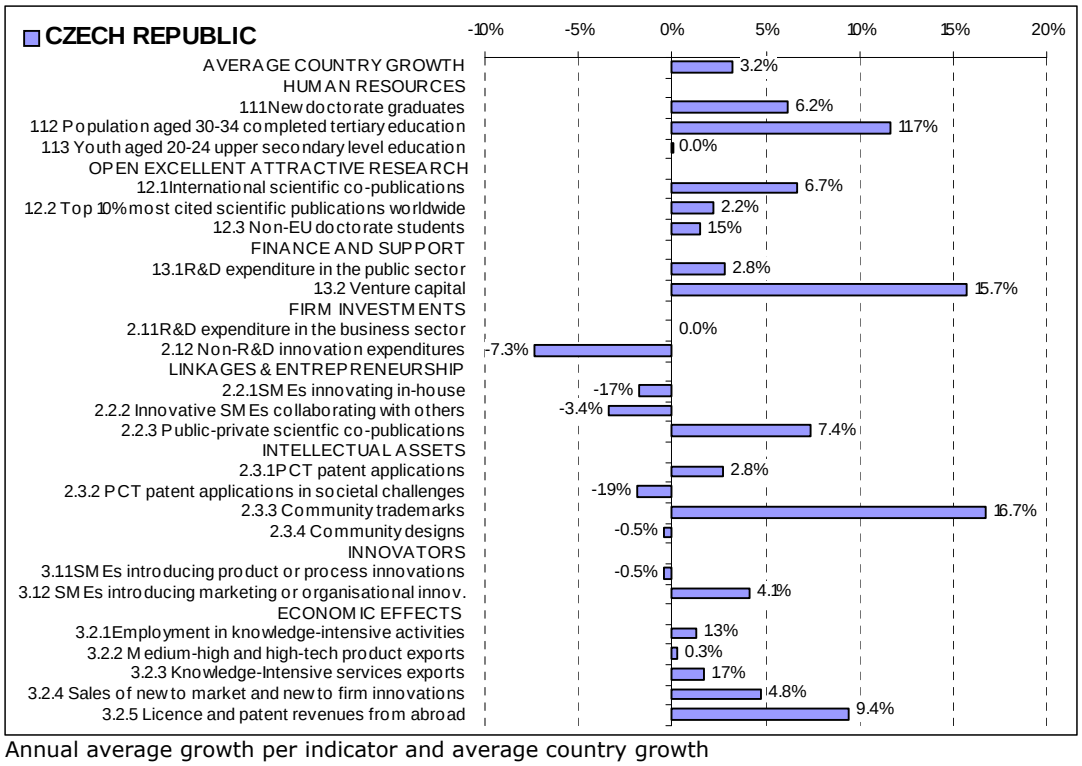
Annual average growth per indicator and average country growth

Czech Republic is one of the moderate innovators with a below average performance. Relative strengths are in Human resources, Innovators and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems, Finance and support and Intellectual assets.



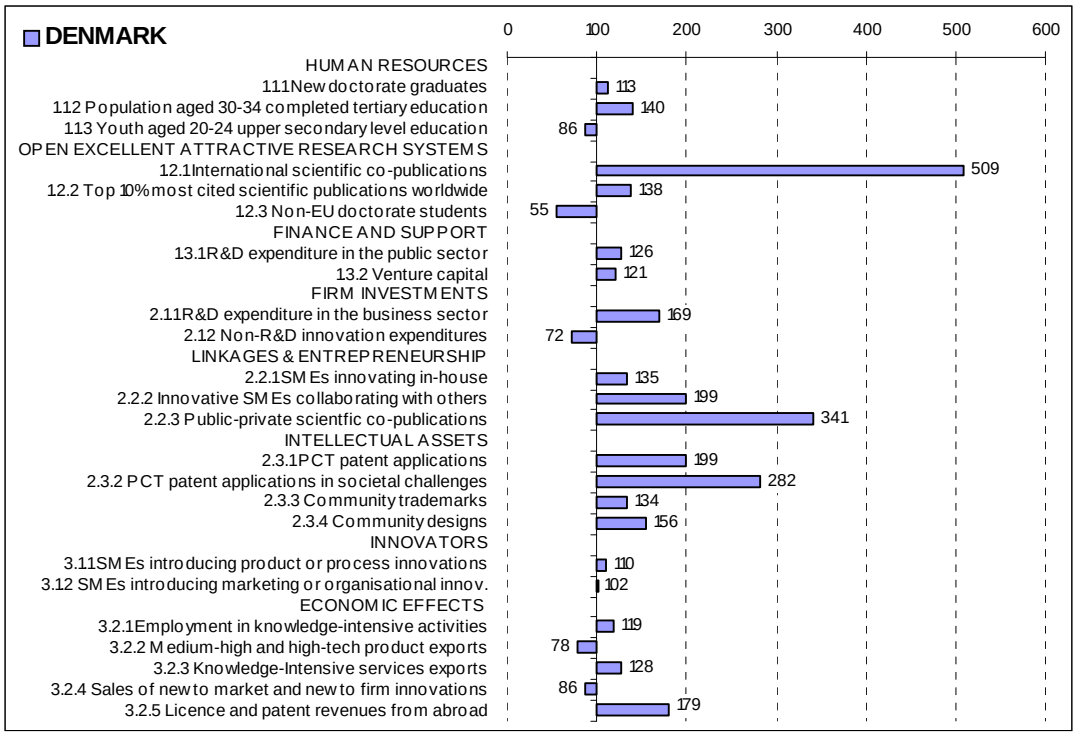
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and Population with a tertiary degree. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Human resources, Open, excellent and attractive research systems, Finance and support and Intellectual assets is above average.



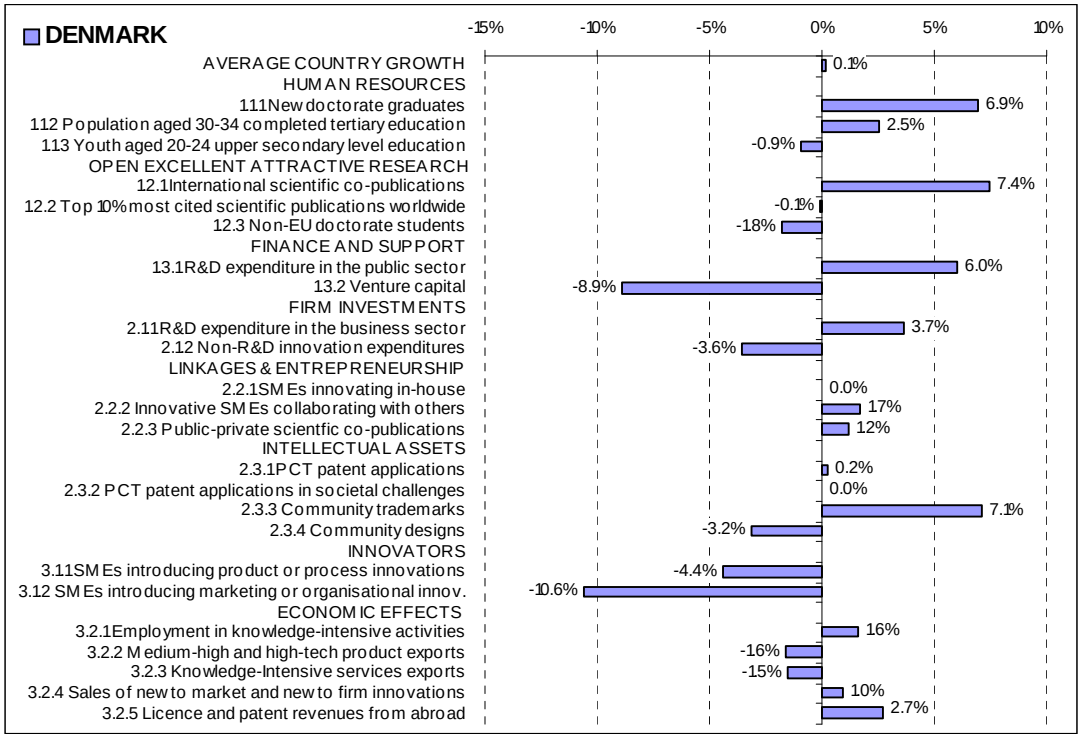
Annual average growth per indicator and average country growth

Denmark is one of the innovation leaders with an above average performance.
Relative strengths are in Open, excellent and attractive research systems, Linkages & entrepreneurship and Intellectual assets. Relative weaknesses are in Human resources, Firm investments, Innovators and Economic effects.



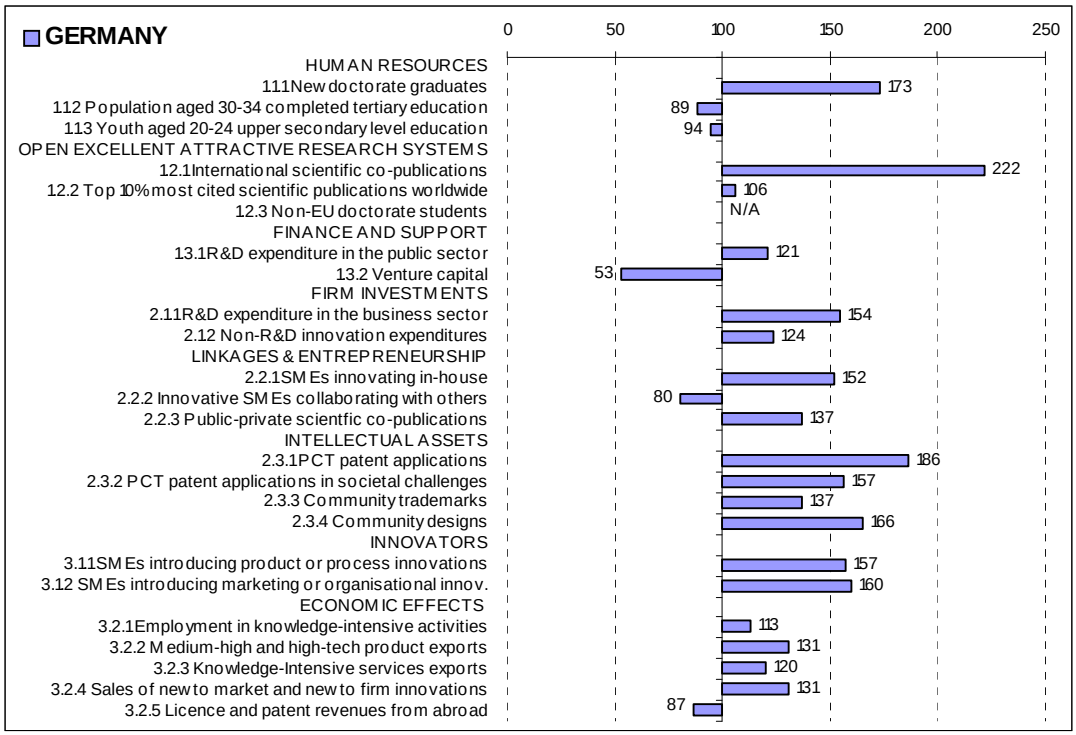
Indicator values relative to the EU27 (EU27=100).

High growth is observed for New doctorate graduates, R&D expenditure in the public sector and Community trademarks. A strong decline is observed for Venture capital and SMEs introducing marketing or organizational innovations. Growth performance in Human resources, Open, excellent and attractive research systems, Linkages & entrepreneurship and Intellectual assets is well above average.



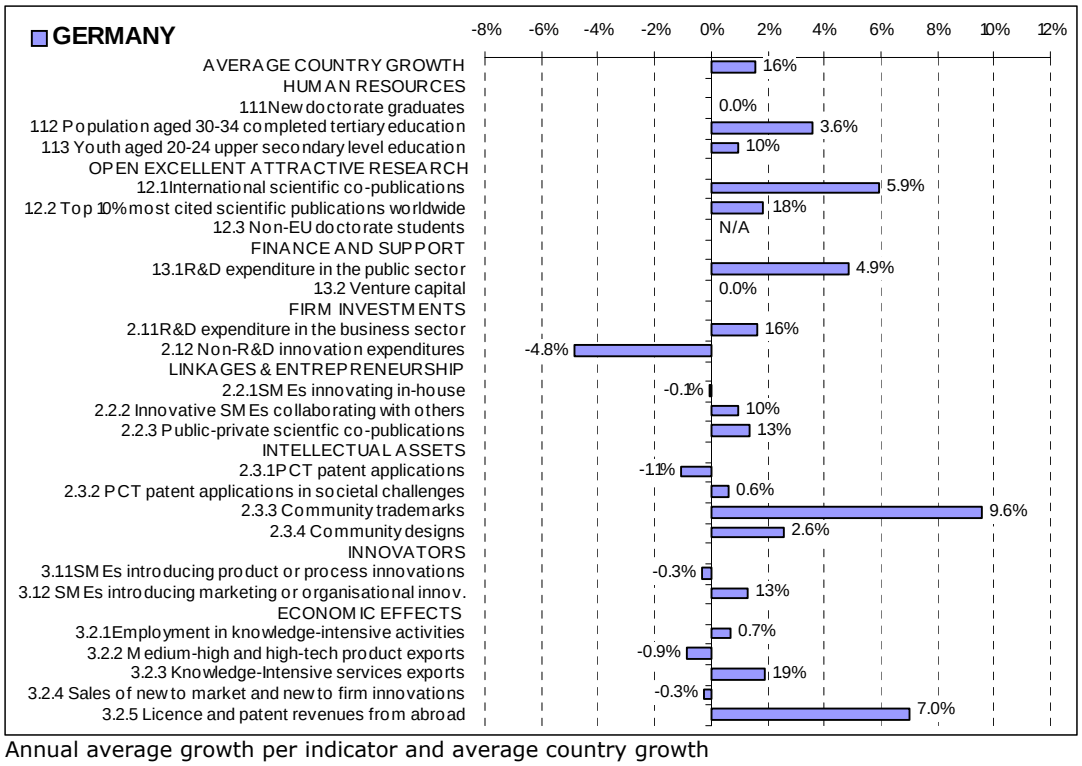
Annual average growth per indicator and average country growth

Germany is one of the innovation leaders with an above average performance. Relative strengths are in Intellectual assets and Innovators. Relative weaknesses are in Human resources, Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship.



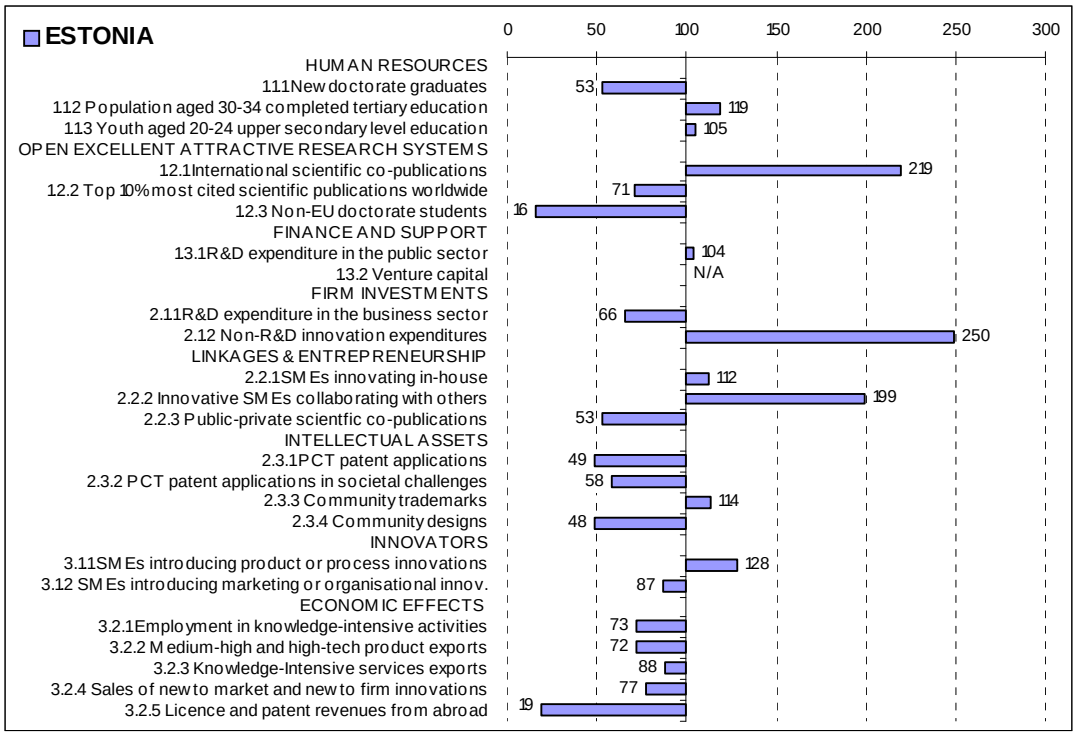
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks, License and patent revenues from abroad and International scientific co-publications. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Open, excellent and attractive research systems and Intellectual assets is well above average.



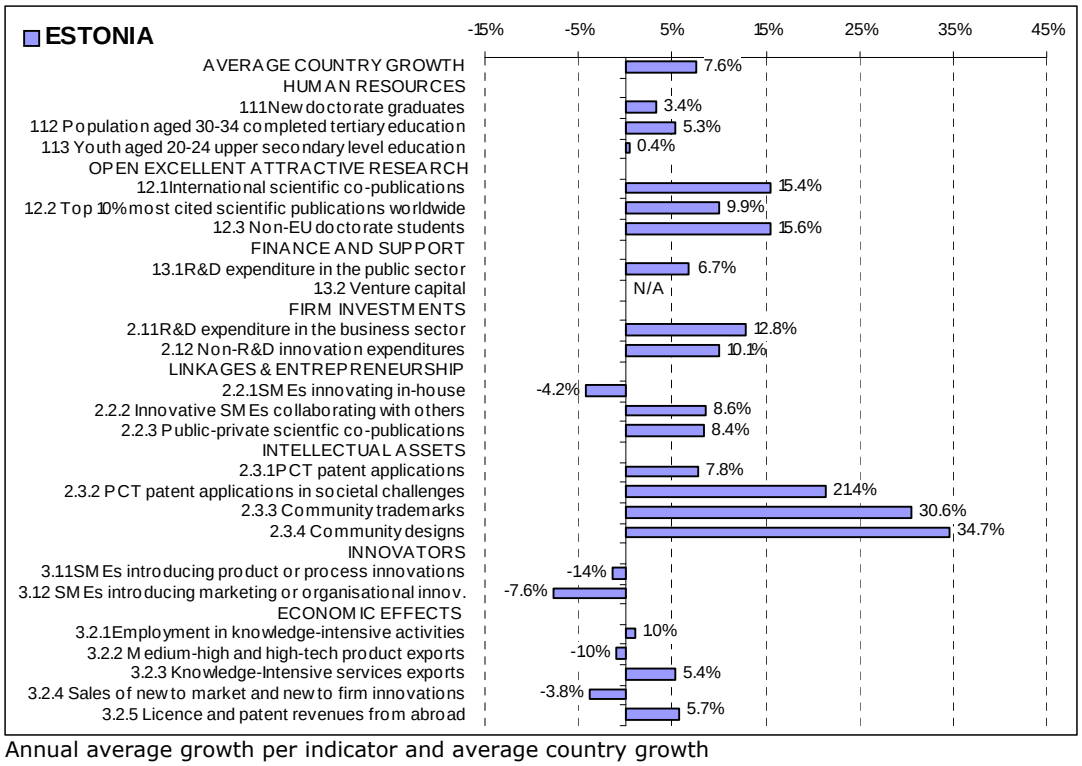
Annual average growth per indicator and average country growth

Estonia is one of the innovation followers with a close to average performance. Relative strengths are in Human resources, Finance and support, Firm investments, Linkages & entrepreneurship and Innovators. Relative weaknesses are in Open, excellent and attractive research systems, Intellectual assets and Economic effects.



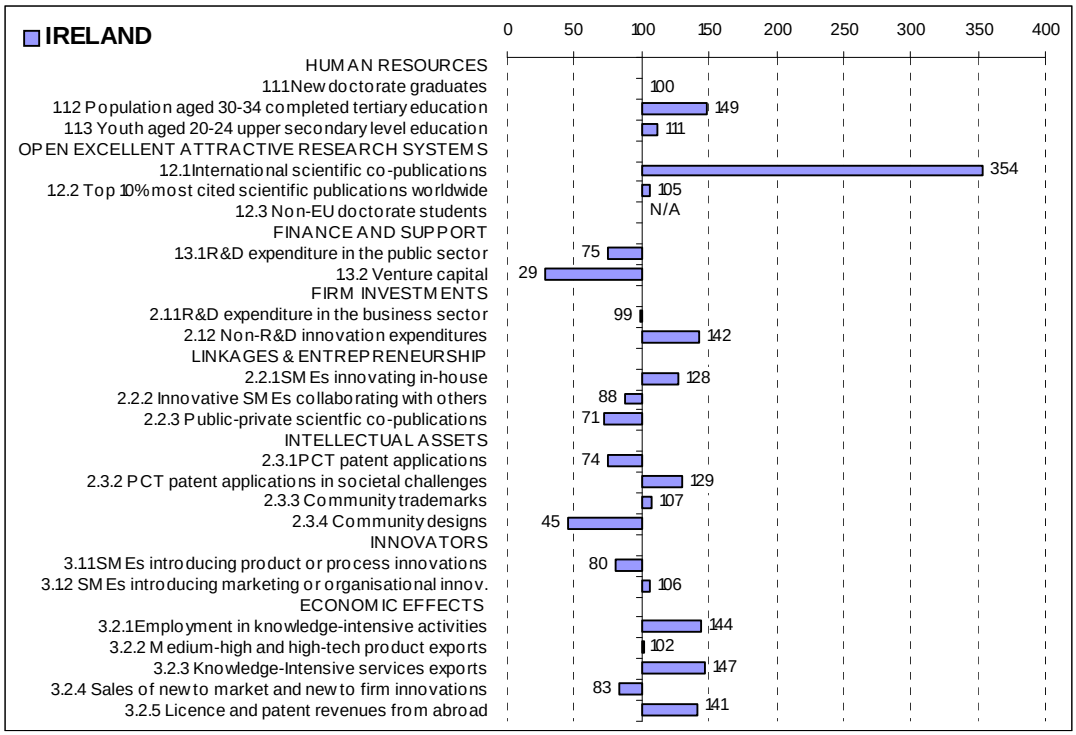
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and Community designs. A relatively strong decline is observed for SMEs introducing marketing or organizational innovations. Growth performance in Open, excellent and attractive research systems, Finance and support, Firm investments and Intellectual assets is well above average.



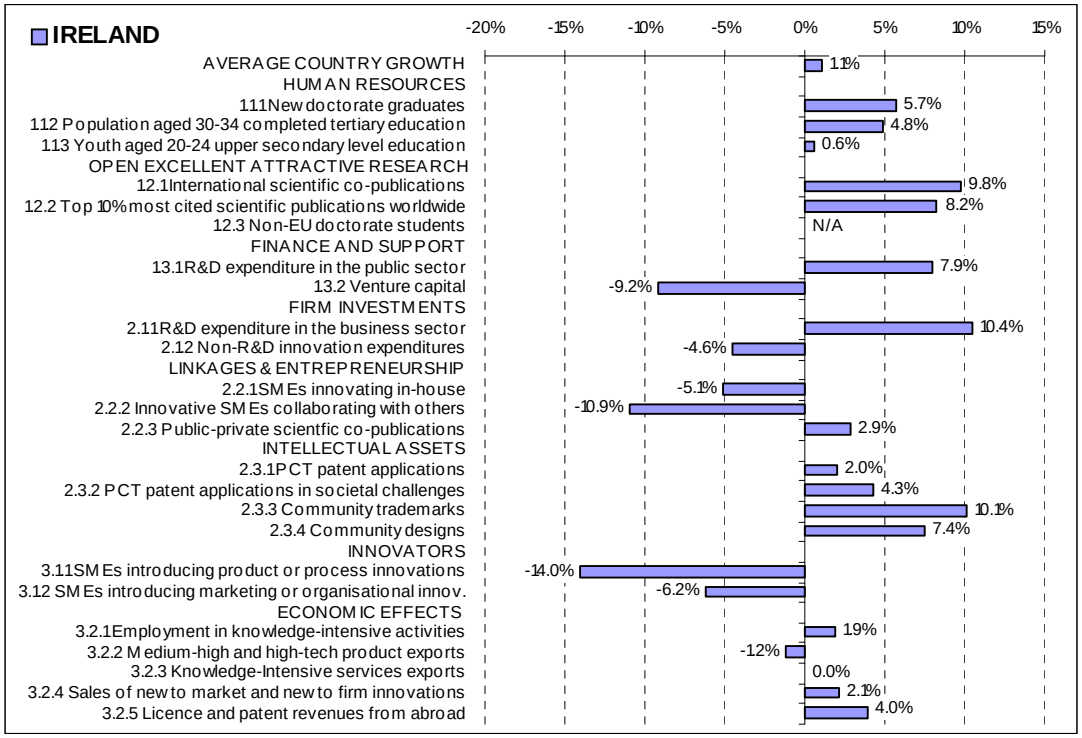
Annual average growth per indicator and average country growth

Ireland is one of the innovation followers with an above average performance. Relative strengths are in Human resources, Open, excellent and attractive research systems and Economic effects. Relative weaknesses are in Finance and support, Linkages & entrepreneurship, Intellectual assets and Innovators.



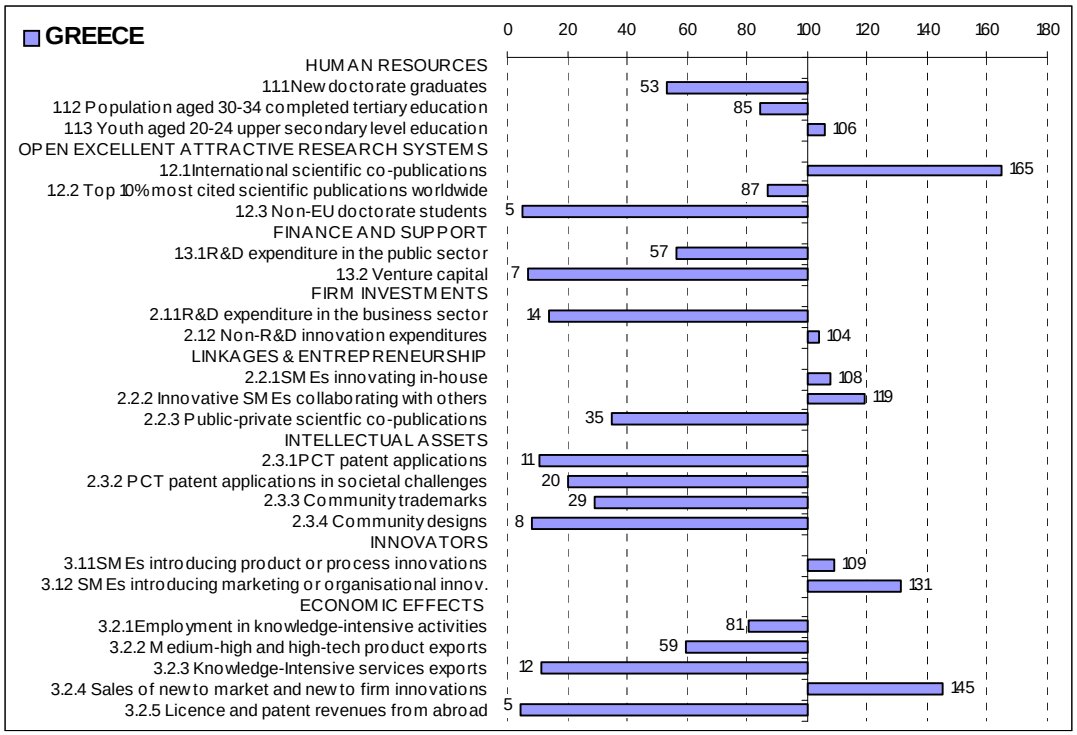
Indicator values relative to the EU27 (EU27=100).

High growth is observed for International scientific co-publications and Community designs. A strong decline is observed for SMEs introducing product or process innovations and SMEs collaborating with others. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is well above average.



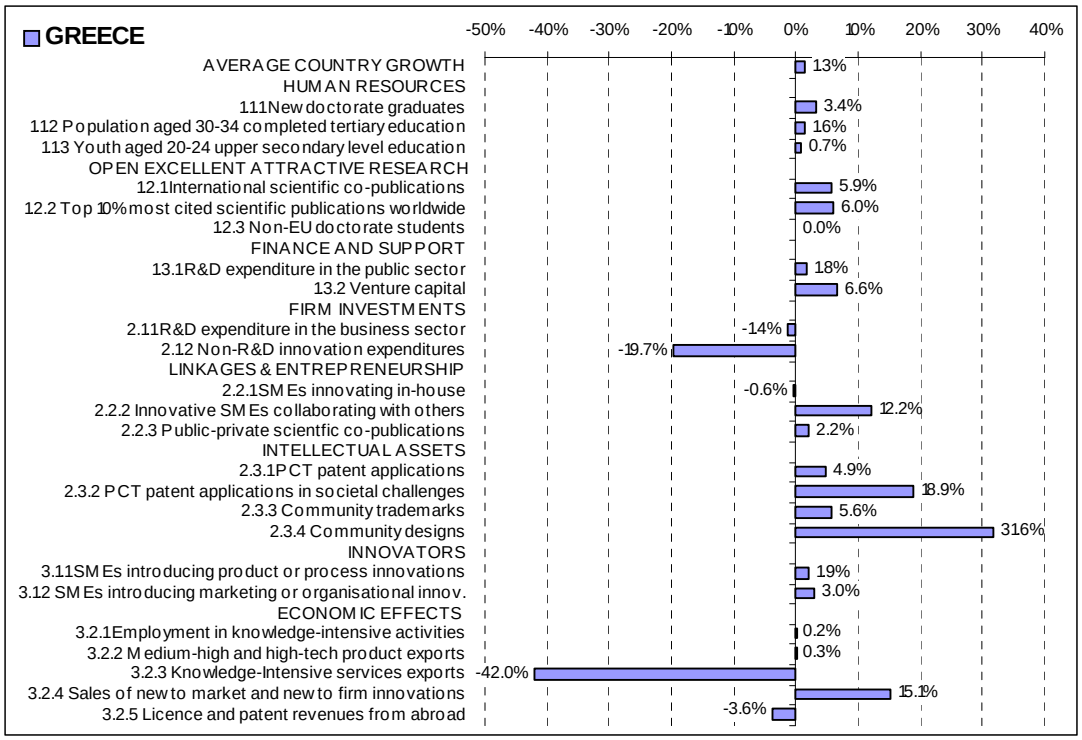
Annual average growth per indicator and average country growth

Greece is one of the moderate innovators with a below average performance. Relative strengths are in Human resources, Linkages & entrepreneurship and Innovators. Relative weaknesses are in Finance and support, Firm investments and Intellectual assets.



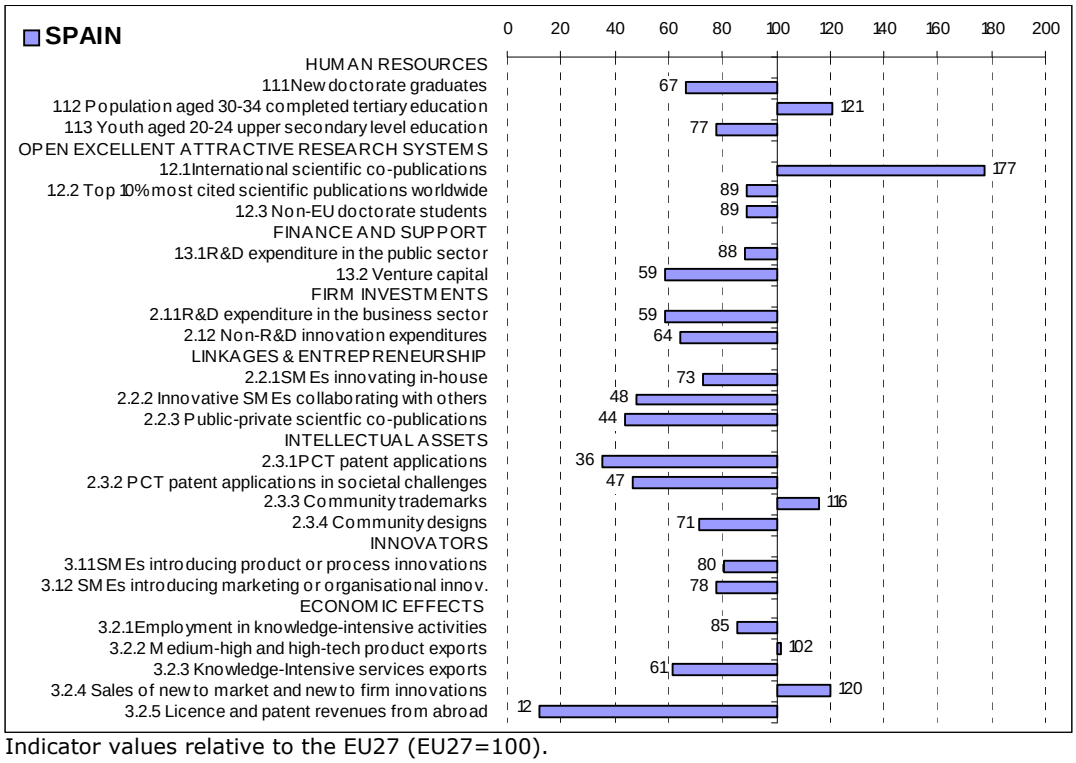
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community designs. A relatively strong decline is observed for Non-R&D innovation expenditure and Knowledge-intensive services exports. Growth performance in Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship and Intellectual assets is well above average.



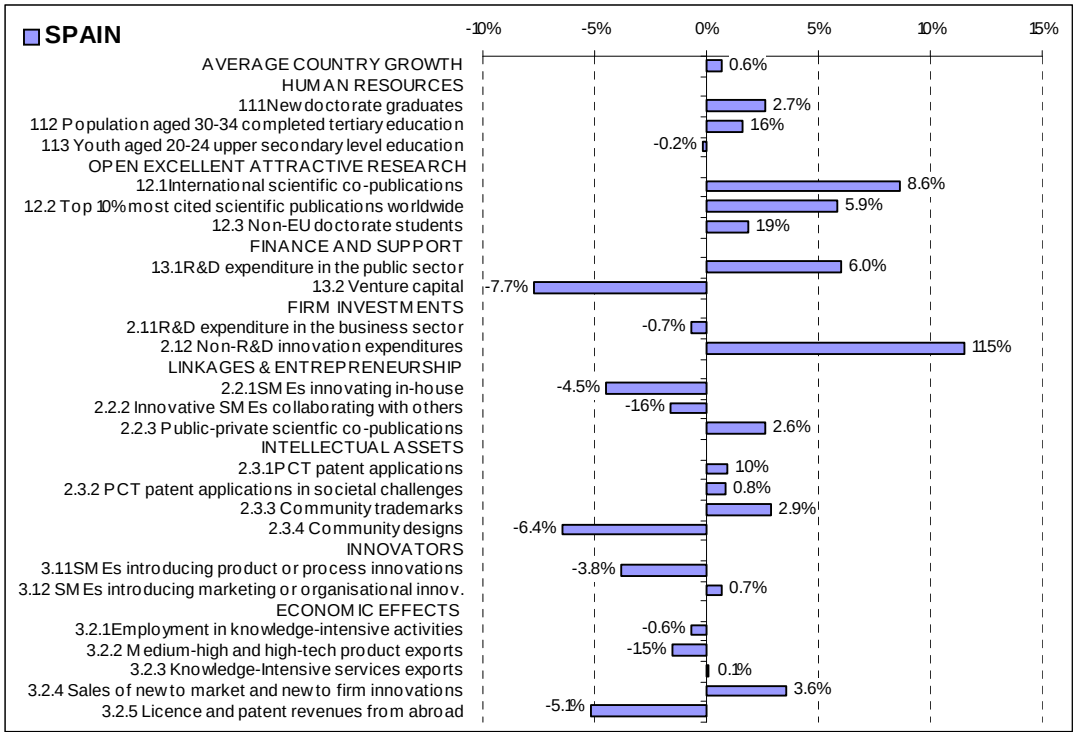
Annual average growth per indicator and average country growth

Spain is one of the moderate innovators with a below average performance.
Relative strengths are in Open, excellent and attractive research systems (in particular international scientific co-publications) Finance and support and Economic effects (except on License and patent revenues from abroad). Relative weaknesses are in Firm investments, Linkages & entrepreneurship and Innovators.



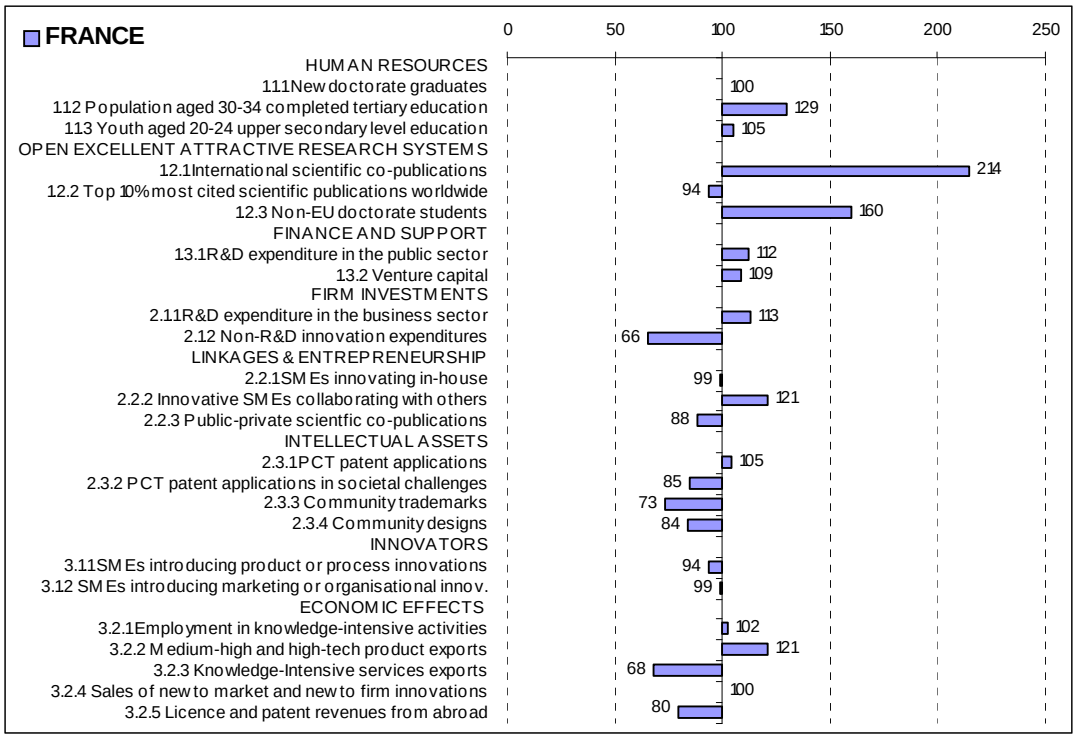
Indicator values relative to the EU27 (EU27=100).

High growth is observed for International scientific co-publications and Non-R&D innovation expenditure. The strongest decline is observed for Venture capital and Community designs. Growth performance in Open, excellent and attractive research systems and Firm investments is well above average.



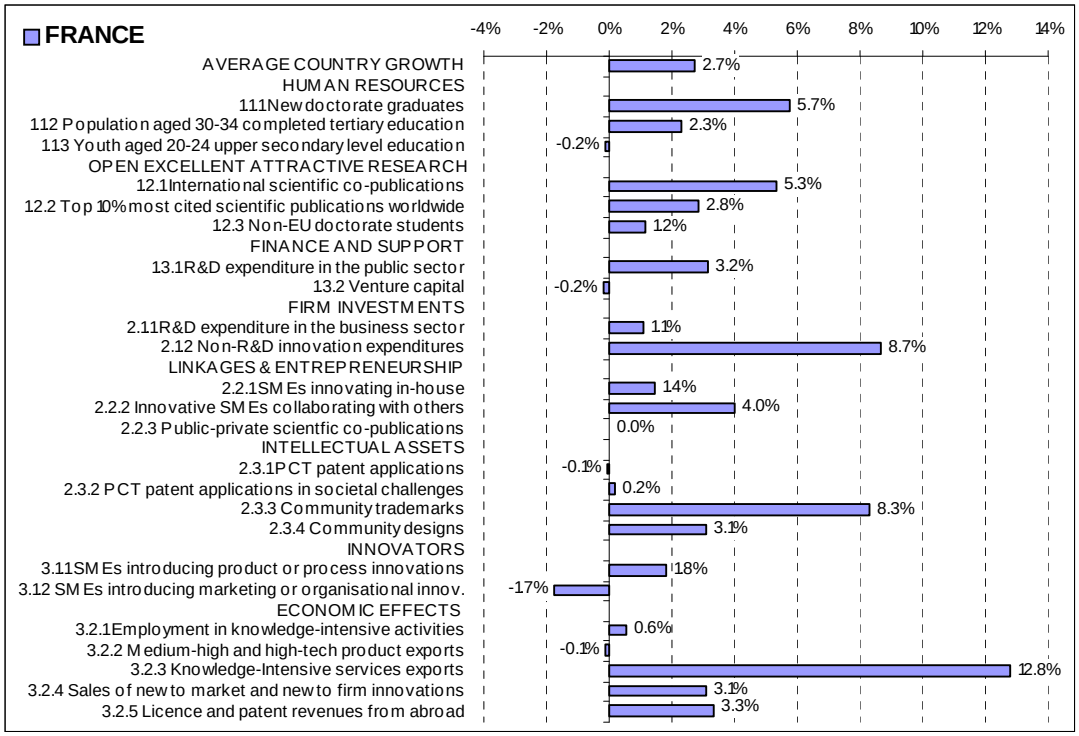
Annual average growth per indicator and average country growth

France is one of the innovation followers with an above average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems and Finance and support. Relative weaknesses are in Firm investments, Intellectual assets and Innovators.



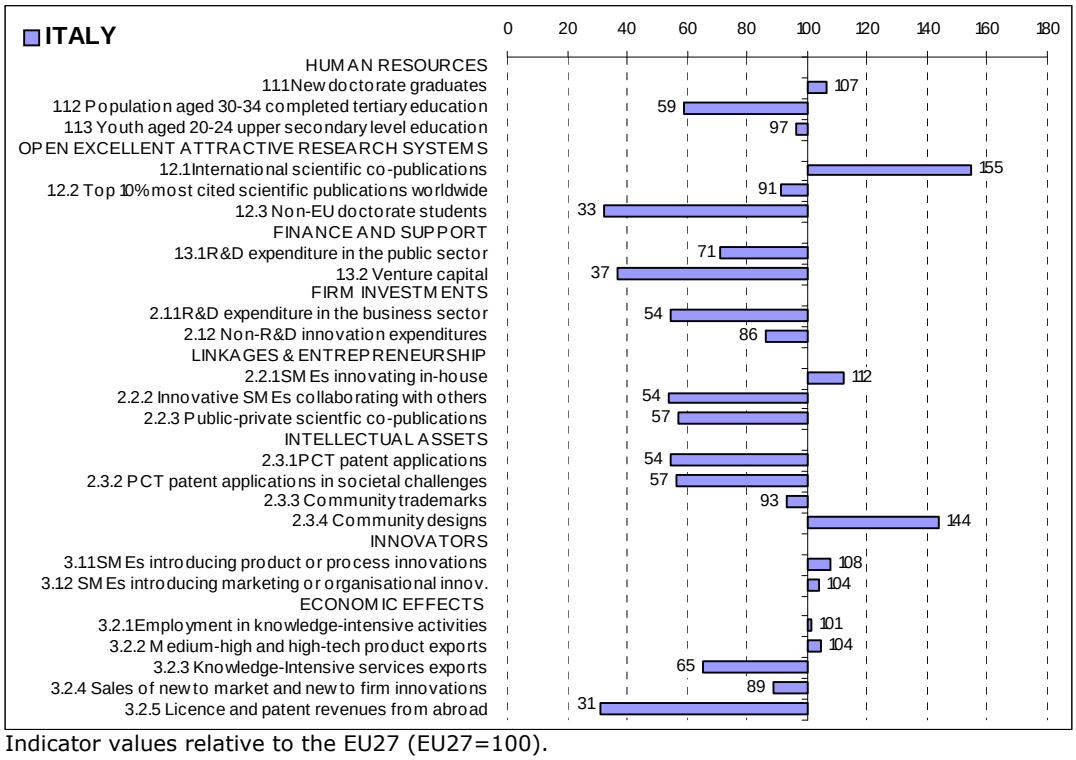
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Non-R&D innovation expenditure, Community trademarks and Knowledge-intensive services exports. Growth performance in Firm investments and Economic effects is well above average.



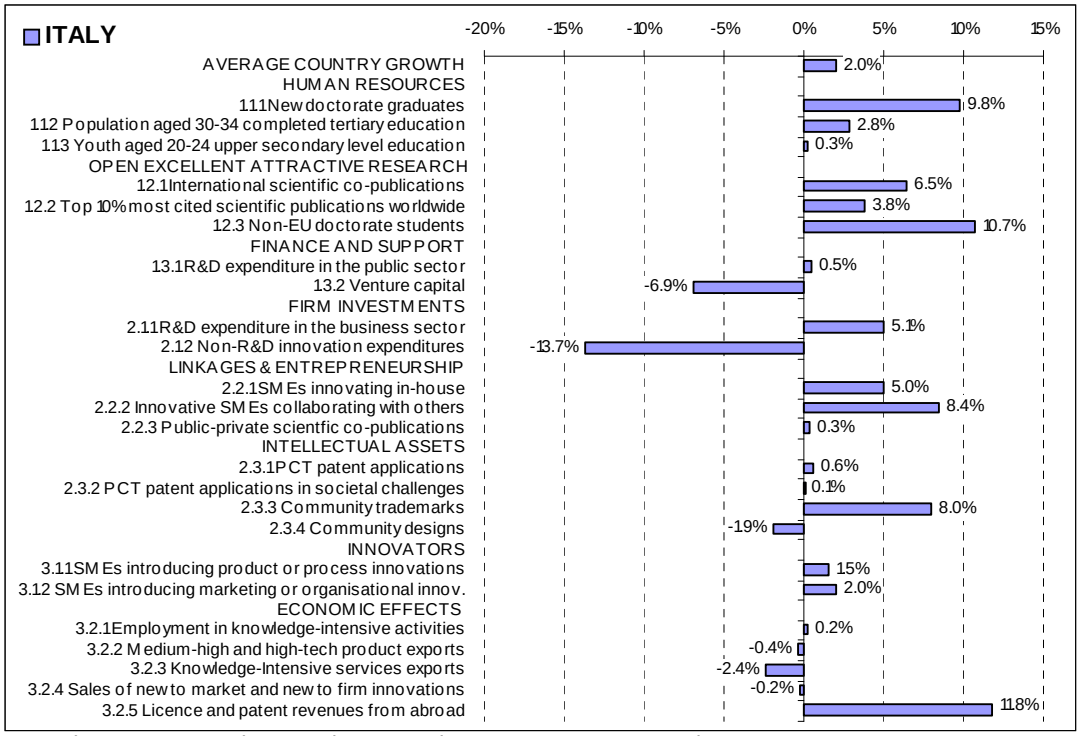
Annual average growth per indicator and average country growth

Italy is one of the moderate innovators with a below average performance. Relative strengths are in Intellectual assets and Innovators. Relative weaknesses are in Firm investments and Linkages & entrepreneurship.



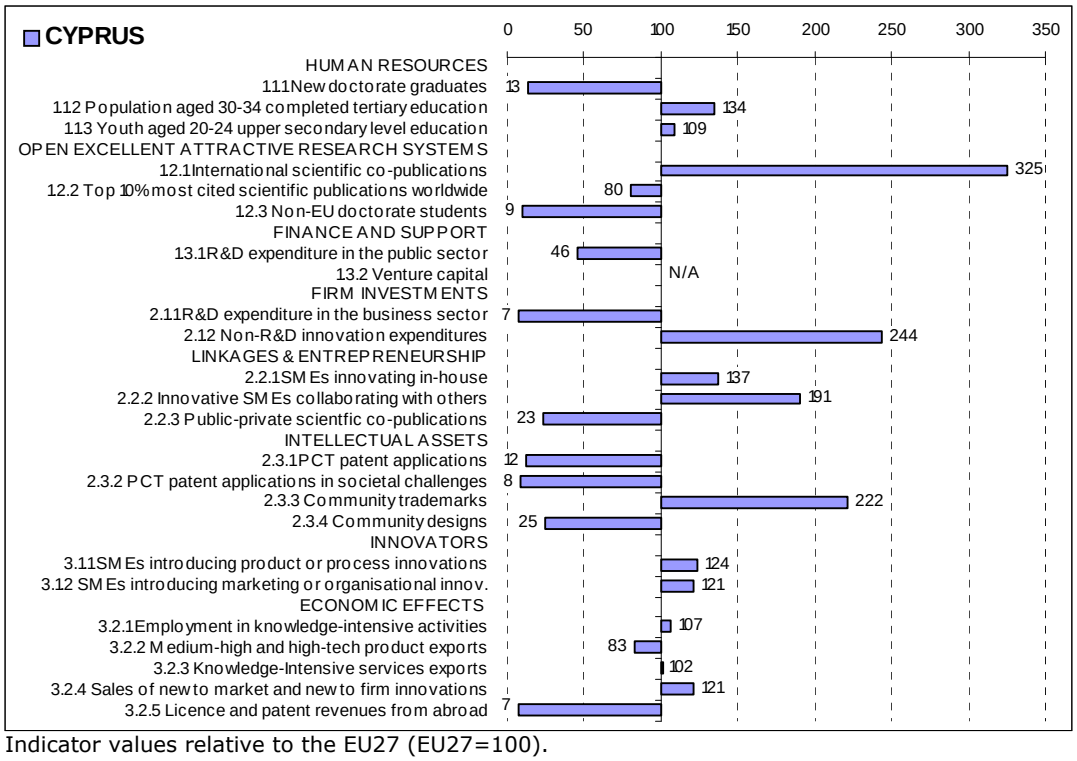
Indicator values relative to the EU27 (EU27=100).

High growth is observed for New doctorate graduates, Non-EU doctoral students and License and patent revenues from abroad. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Human resources, Open, excellent and attractive research systems and Linkages & entrepreneurship is well above average.



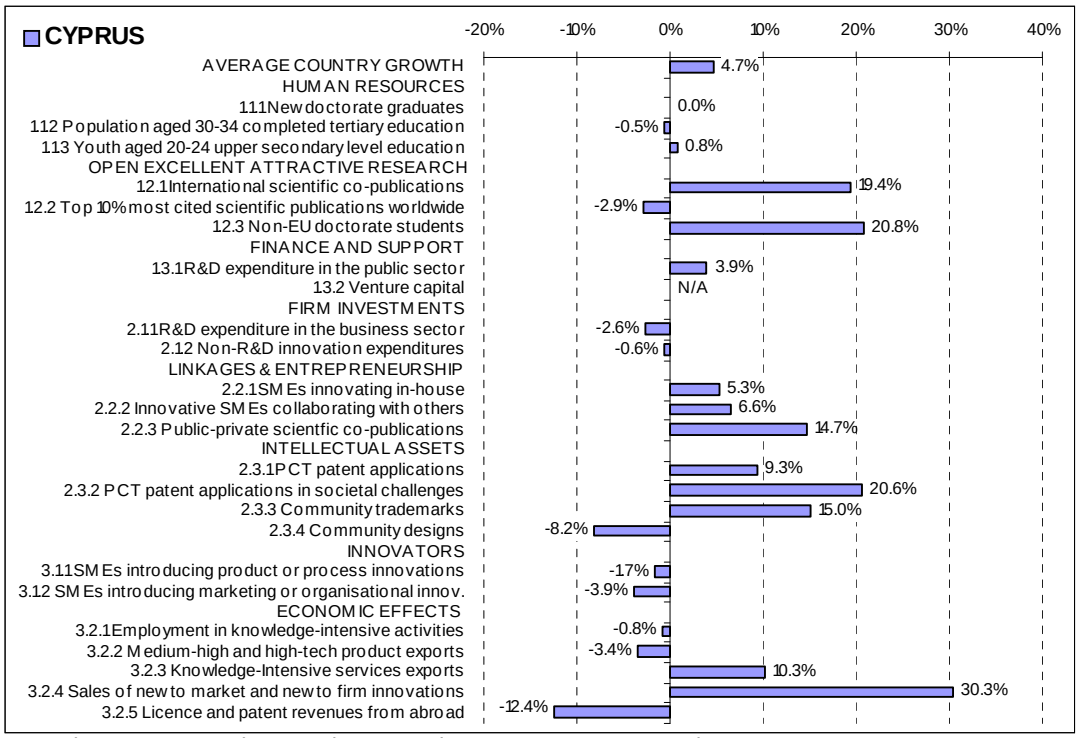
Annual average growth per indicator and average country growth

Cyprus is one of the innovation followers with a close to average performance. Relative strengths are in Human resources, Linkages & entrepreneurship and Innovators. Relative weaknesses are in Open, excellent and attractive research systems, Finance and support and Intellectual assets.



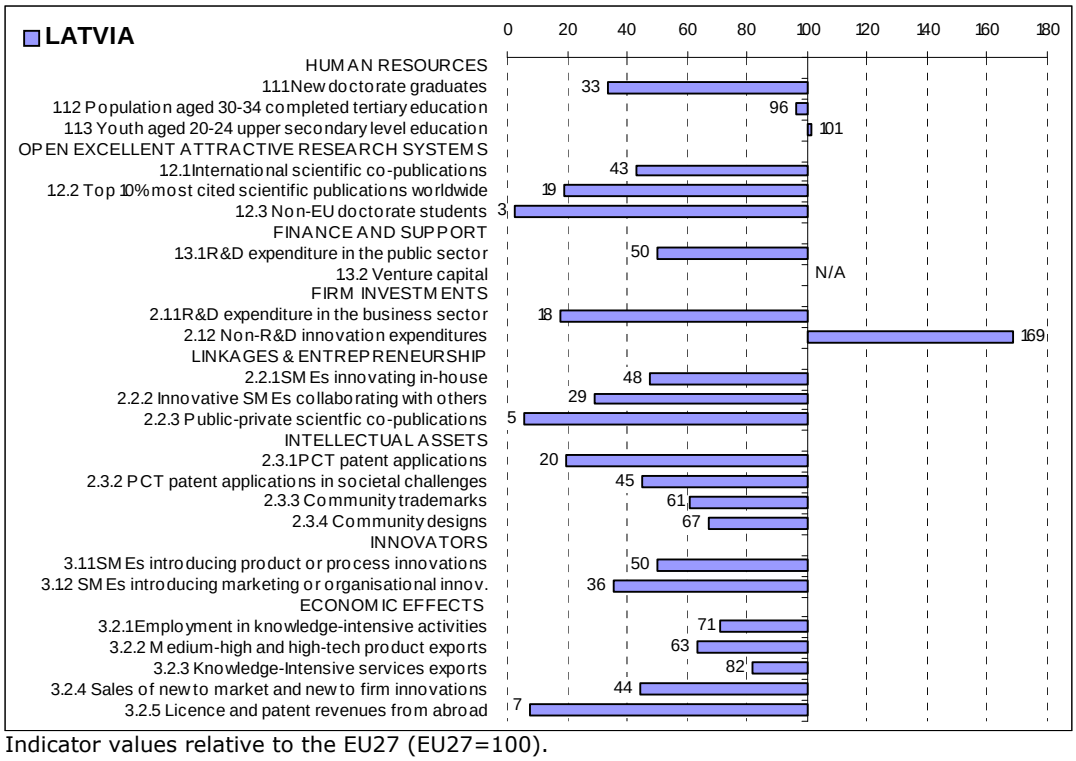
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Non-EU doctorate students and Sales of new products. A strong decline is observed for Community designs and License and patent revenues from abroad. Growth performance in Open, excellent and attractive research systems and Linkages & entrepreneurship is well above average.



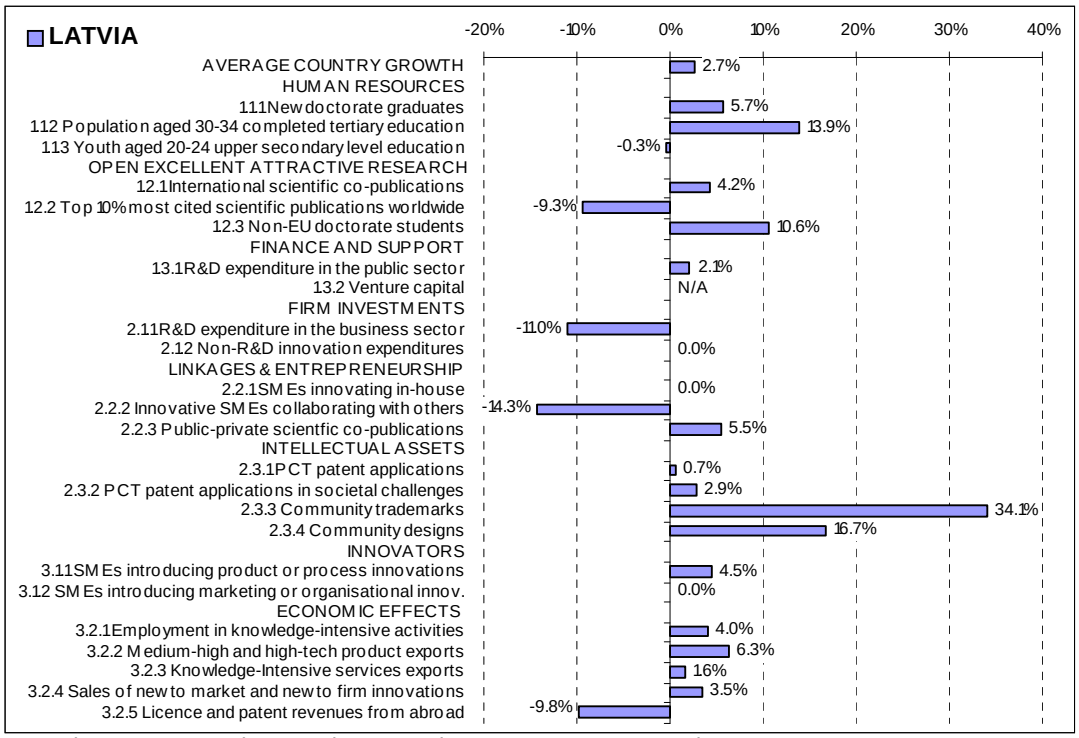
Annual average growth per indicator and average country growth

Latvia is one of the modest innovators with a below average performance.
Relative strengths are in Human resources, Firm investments, Intellectual assets and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship and Innovators.



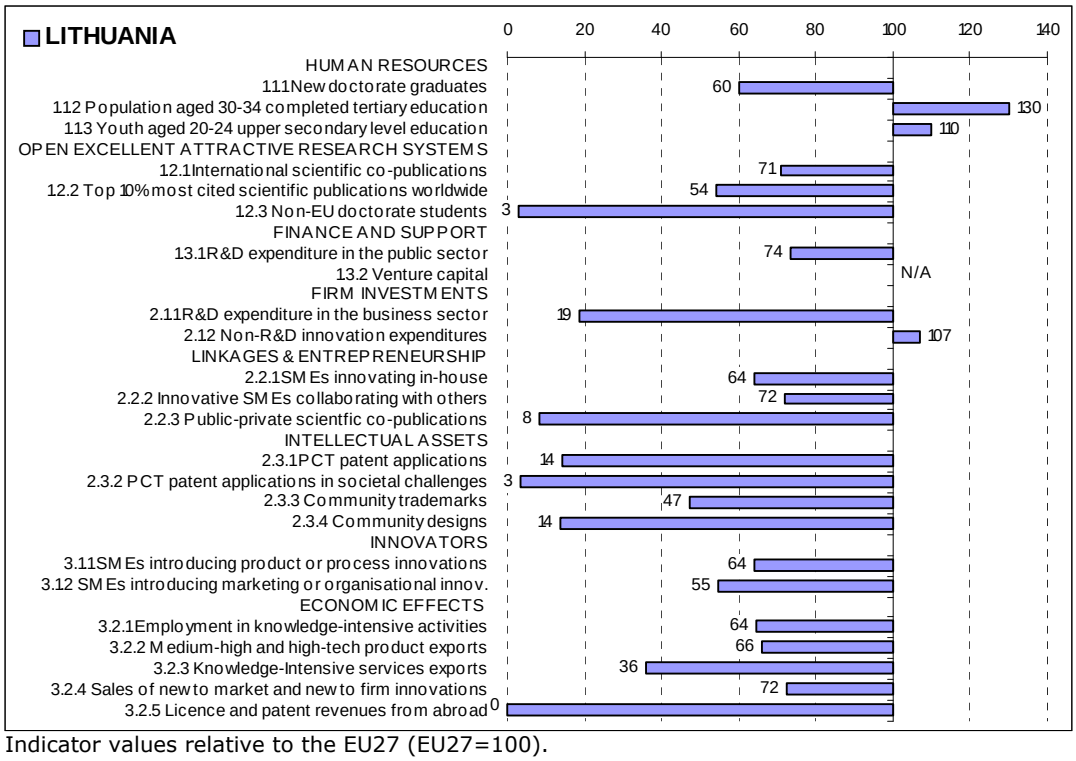
Indicator values relative to the EU27 (EU27=100).

High growth is observed Community trademarks and Community designs. A strong decline is observed for Innovative SMEs collaborating with others and License and patent revenues from abroad. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is well above average.



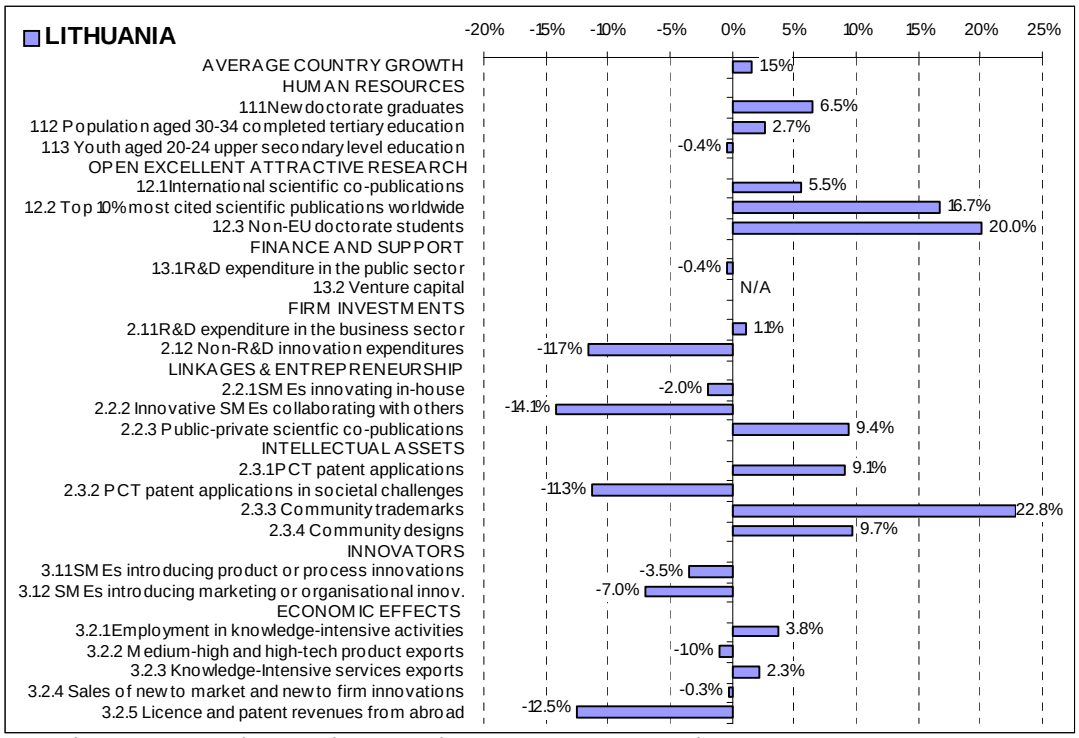
Annual average growth per indicator and average country growth

Lithuania is one of the modest innovators with a below average performance. Relative strengths are in Human resources and Finance and support. Relative weaknesses are in Open, excellent and attractive research systems, Linkages & entrepreneurship, Intellectual assets, Innovators and Economic effects.



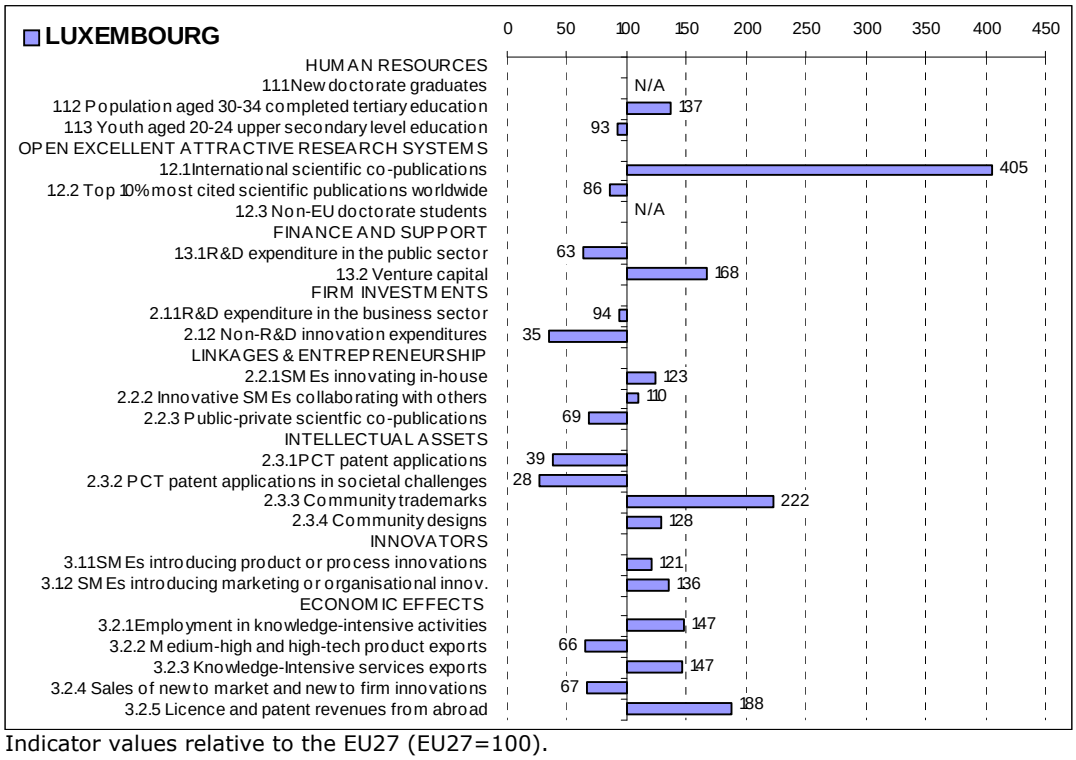
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Non-EU doctorate students and Community trademarks. A strong decline is observed for Innovative SMEs collaborating with others and License and patent revenues from abroad. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is well above average.



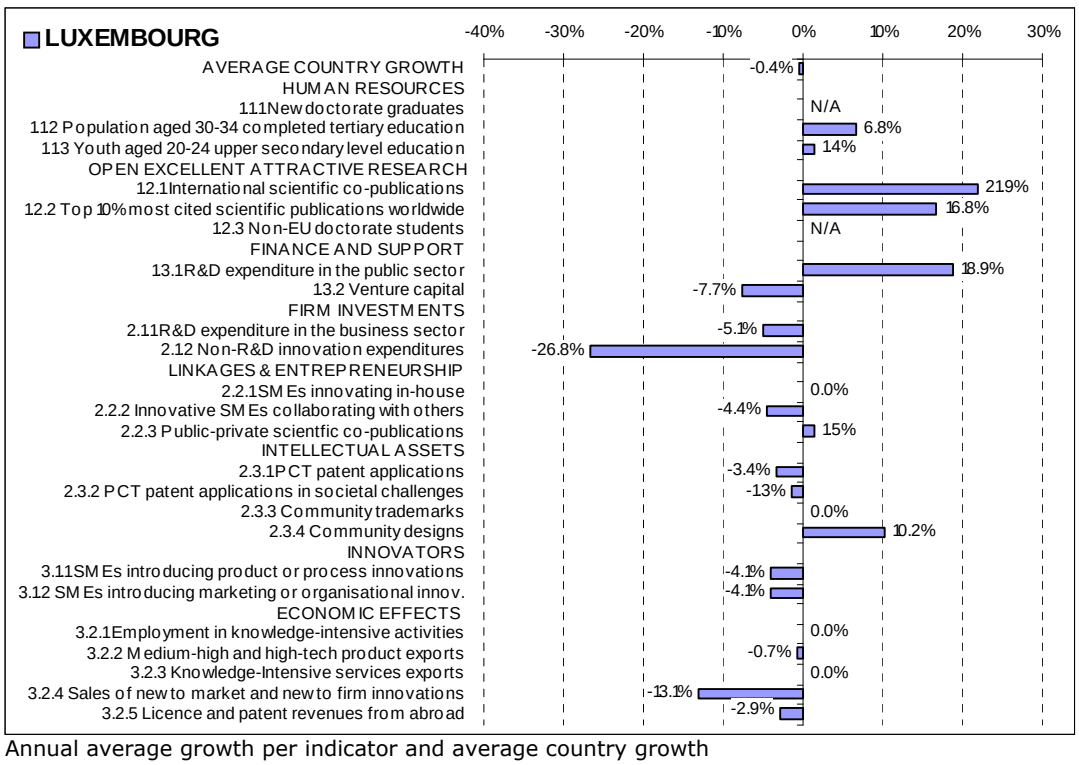
Annual average growth per indicator and average country growth

Luxembourg is one of the innovation followers with an above average performance. Relative strengths are in Human resources and Innovators. Relative weaknesses are in Firm investments and Linkages & entrepreneurship.



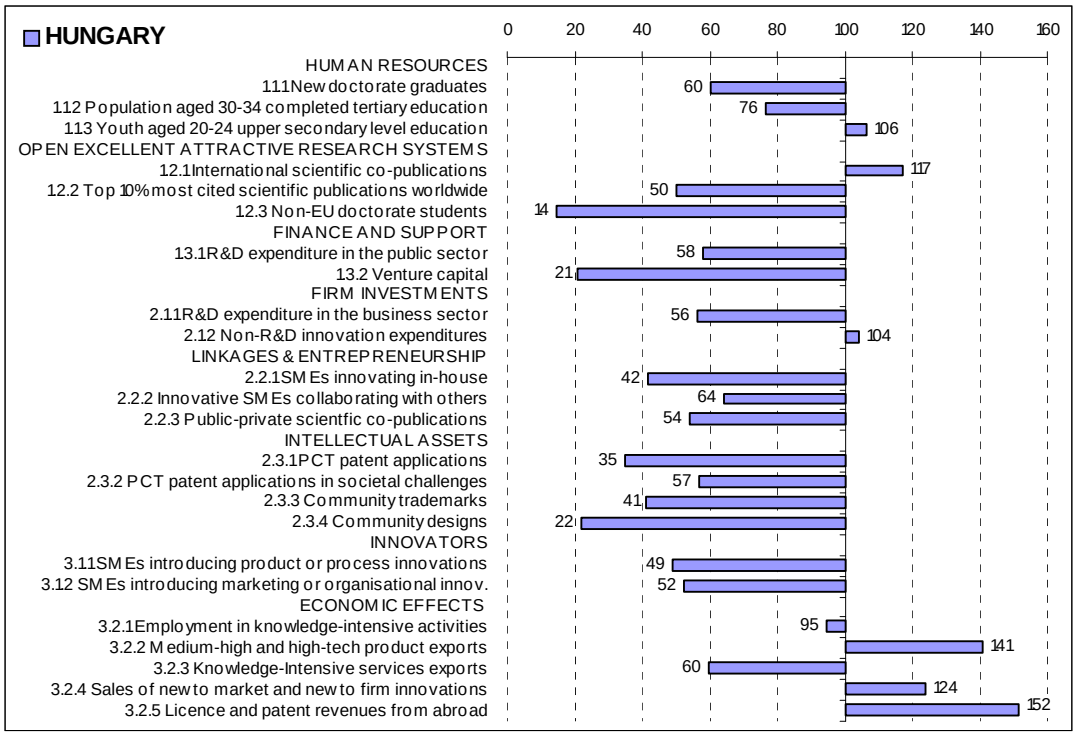
Indicator values relative to the EU27 (EU27=100).

High growth is observed for International co-publications, Most cited publications and R&D expenditure in the public sector. A strong decline is observed for Non-R&D innovation expenditure and Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems, Finance and support and Intellectual assets is well above average.



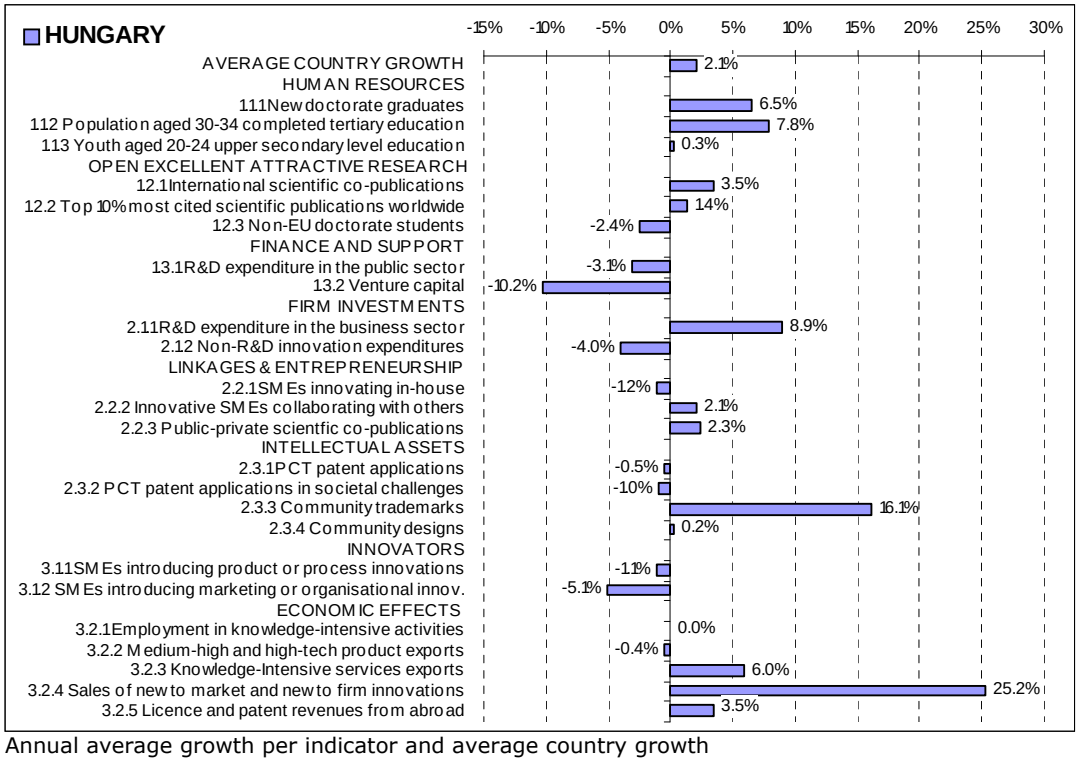
Annual average growth per indicator and average country growth

Hungary is one of the moderate innovators with a below average performance. Relative strengths are in Human resources and Economic effects. Relative weaknesses are Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship, Intellectual assets and Innovators.



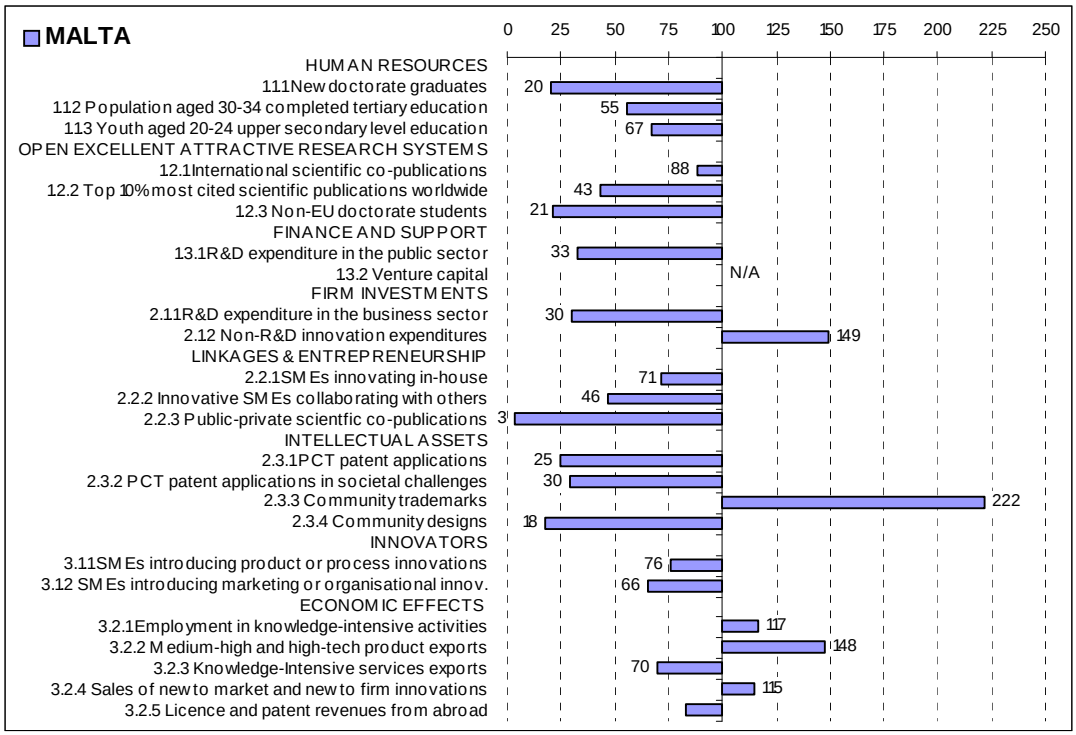
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and Sales of new products. A strong decline is observed for Venture capital. Growth performance in Human resources, Firm investments, Intellectual assets and Economic effects is well above average.



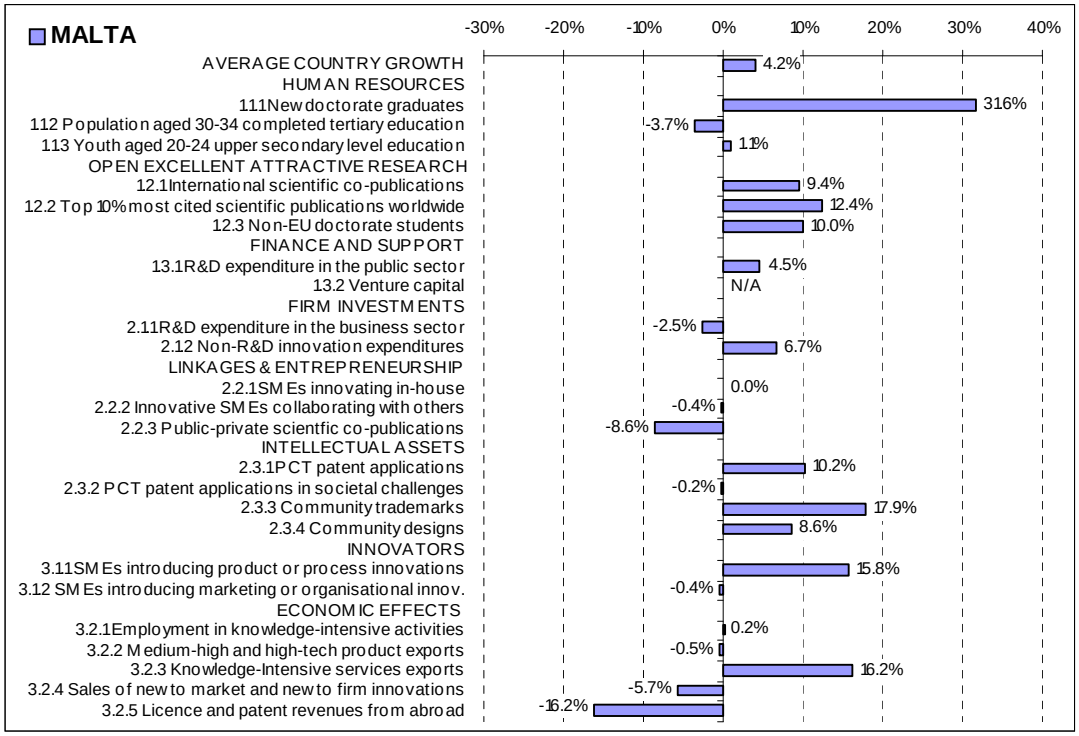
Annual average growth per indicator and average country growth

Malta is one of the moderate innovators with a below average performance.
Relative strengths are in Intellectual assets and Economic effects. Relative weaknesses are in Human resources, Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship and Innovators.



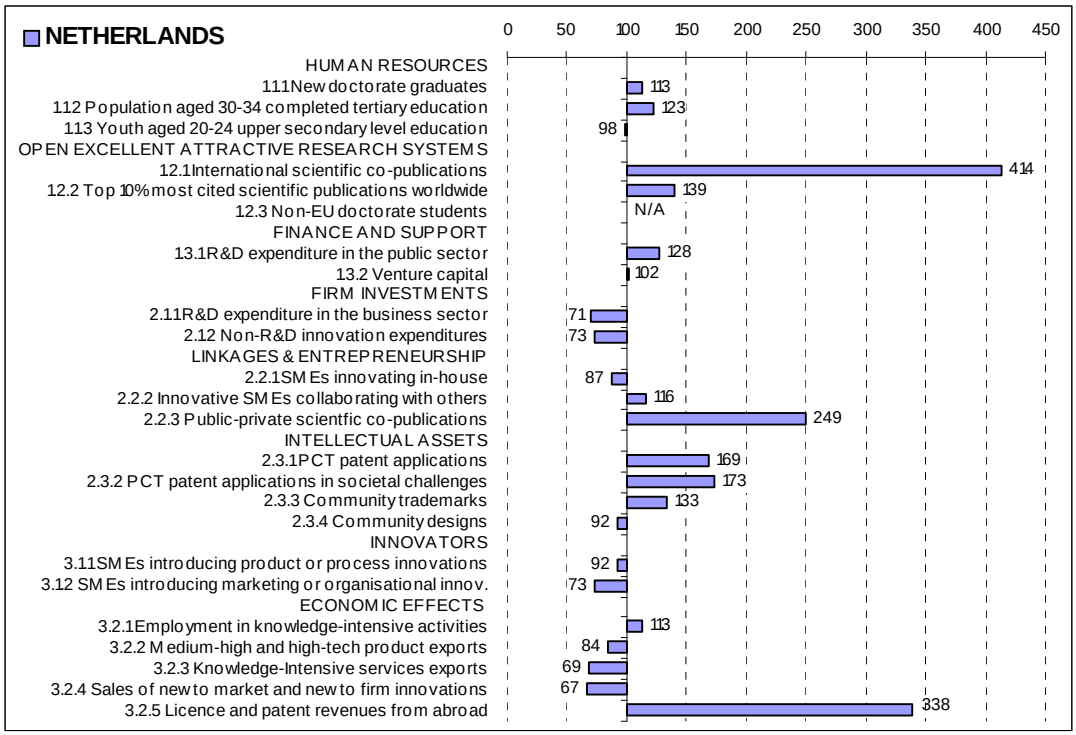
Indicator values relative to the EU27 (EU27=100).

High growth is observed for New doctorate graduates, International scientific co-publications, Community trademarks and Knowledge-intensive services exports. A strong decline is observed for Public-private co-publications and License and patent revenues from abroad. Growth performance in Human resources, Open, excellent and attractive research systems, Intellectual assets and Innovators is well above average.



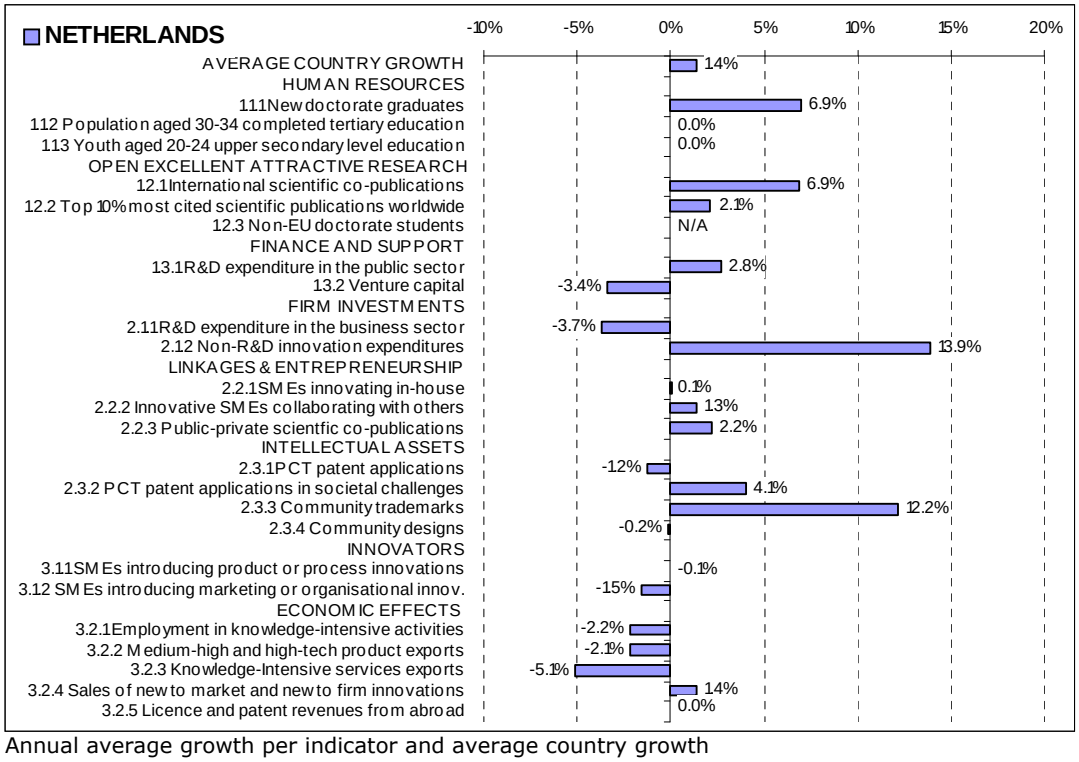
Annual average growth per indicator and average country growth

The **Netherlands** is one of the innovation followers with an above average performance. Relative strengths are in Open, excellent and attractive research systems, Finance and support and Intellectual assets. Relative weaknesses are in Firm investments and Innovators.



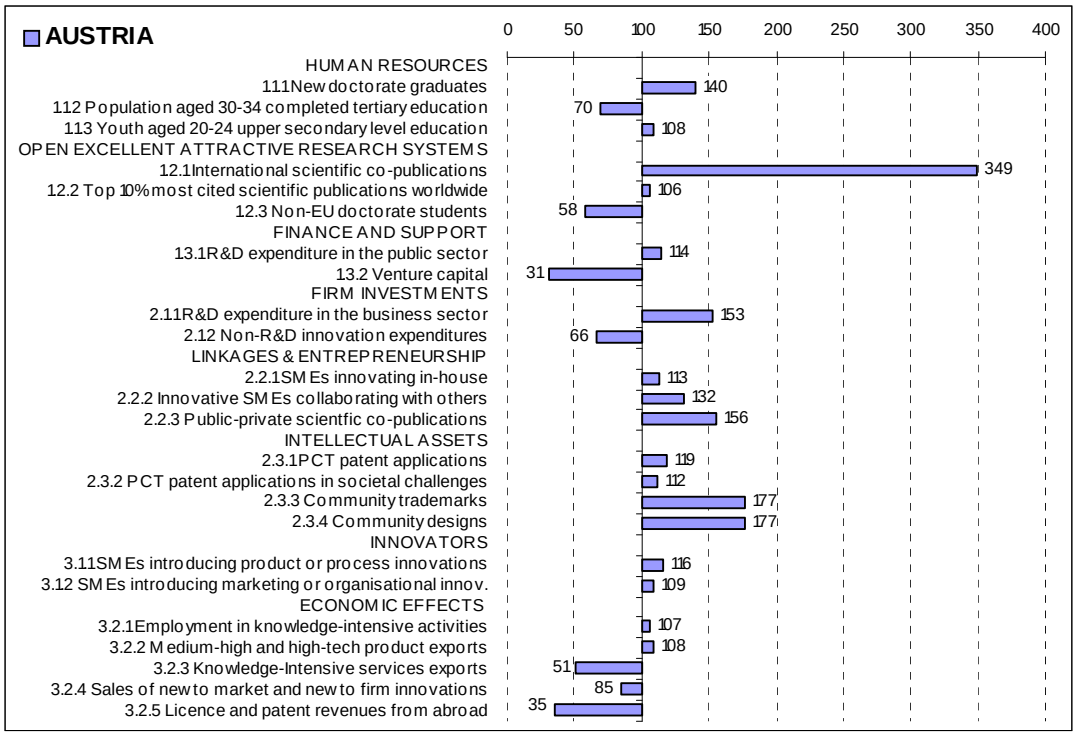
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Non-R&D innovation expenditure and Community trademarks. Growth performance in Open, excellent and attractive research systems, Firm investments and Intellectual assets is well above average.



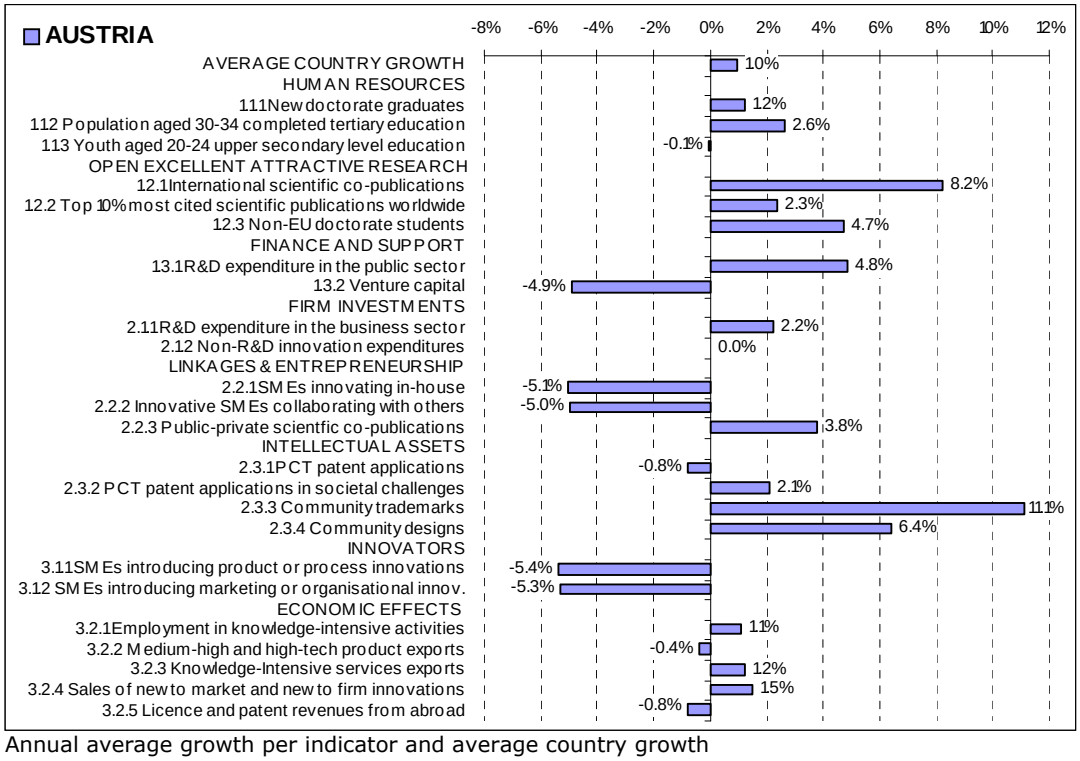
Annual average growth per indicator and average country growth

Austria is one of the innovation followers with an above average performance. Relative strengths are in Open, excellent and attractive research systems and Intellectual assets. Relative weaknesses are in Finance and support and Economic effects.



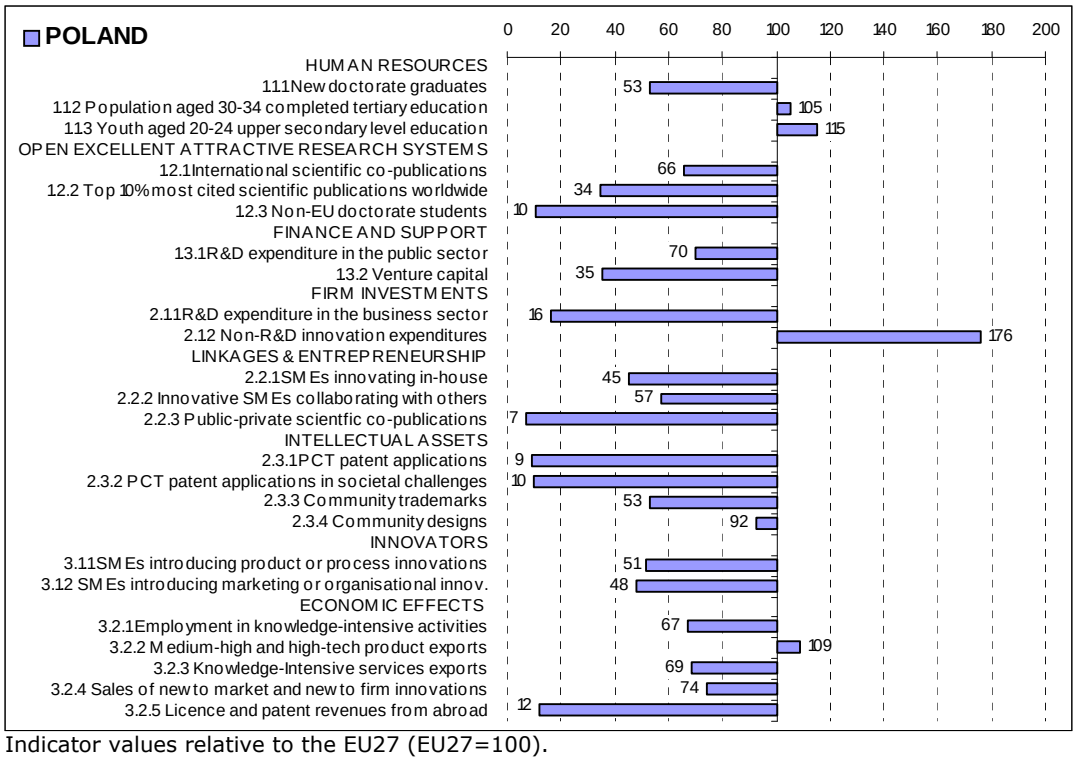
Indicator values relative to the EU27 (EU27=100).

High growth is observed for International scientific co-publications and Community trademarks. A strong decline is observed for Venture capital, SMEs innovating in-house, SMEs collaborating with others, SMEs introducing product or process innovations and SMEs introducing marketing or organisational innovations. Growth performance in Open, excellent and attractive research systems and Intellectual assets is well above average.



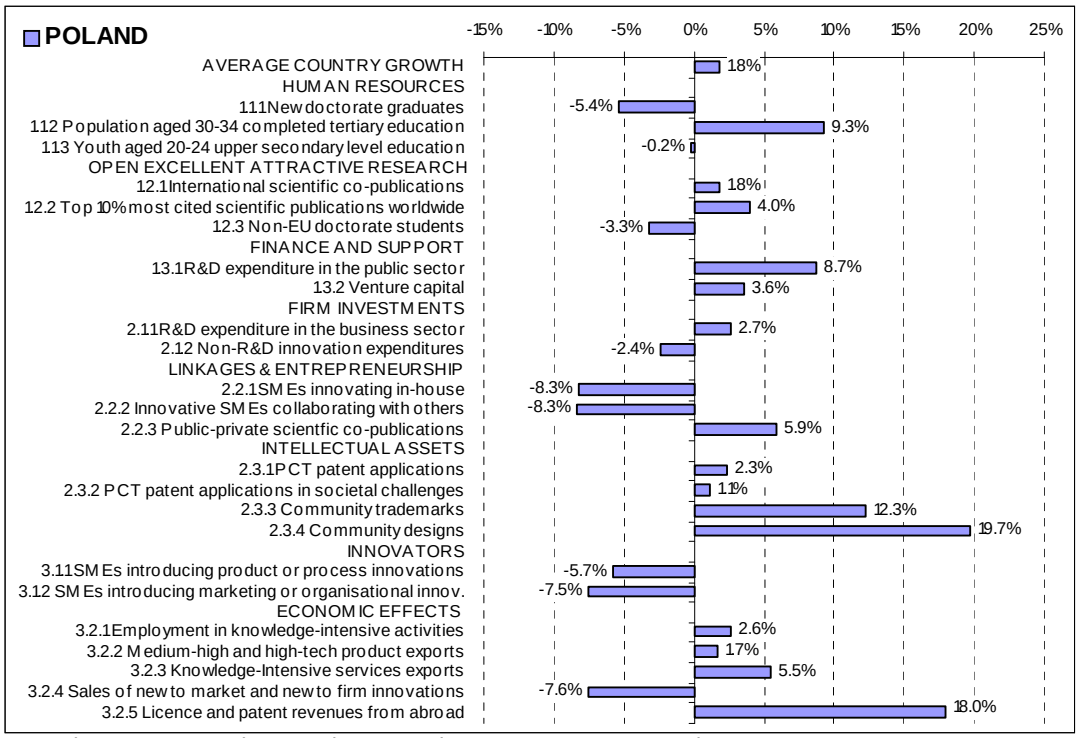
Annual average growth per indicator and average country growth

Poland is one of the moderate innovators with a below average performance. Relative strengths are in Human resources, Finance and support, Firm investments and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems, Linkages & entrepreneurship, Intellectual assets and Innovators.



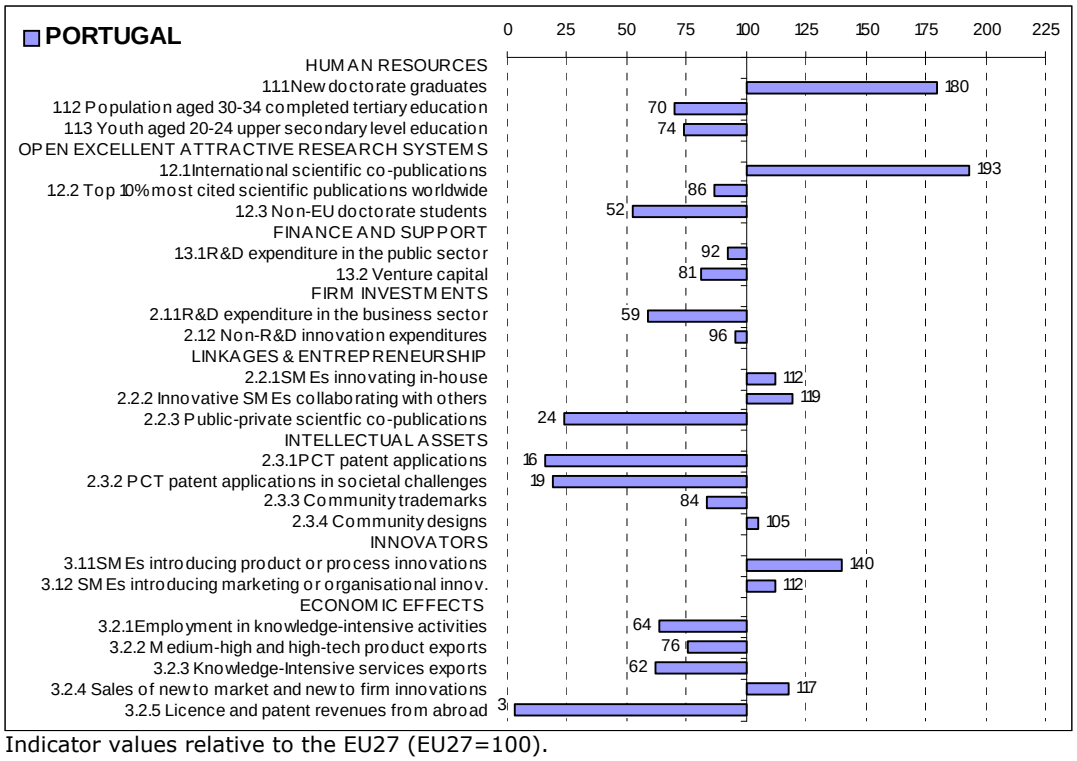
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community designs and License and patent revenues from abroad. A relatively strong decline is observed for SMEs innovating in-house and Innovative SMEs collaborating with others. Growth performance in Intellectual assets and Economic effects is well above average.



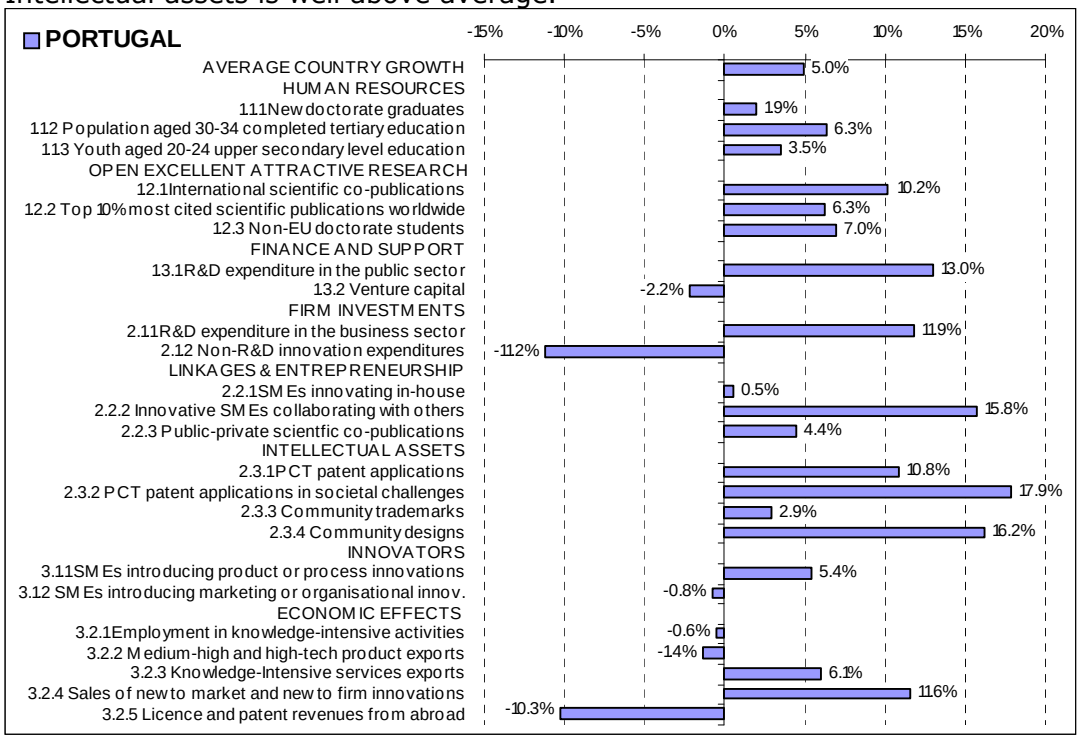
Annual average growth per indicator and average country growth

Portugal is one of the moderate innovators with a below average performance. Relative strengths are in Open, excellent and attractive research systems, Finance and support and Innovators. Relative weaknesses are in Firm investments, Intellectual assets and Economic effects.



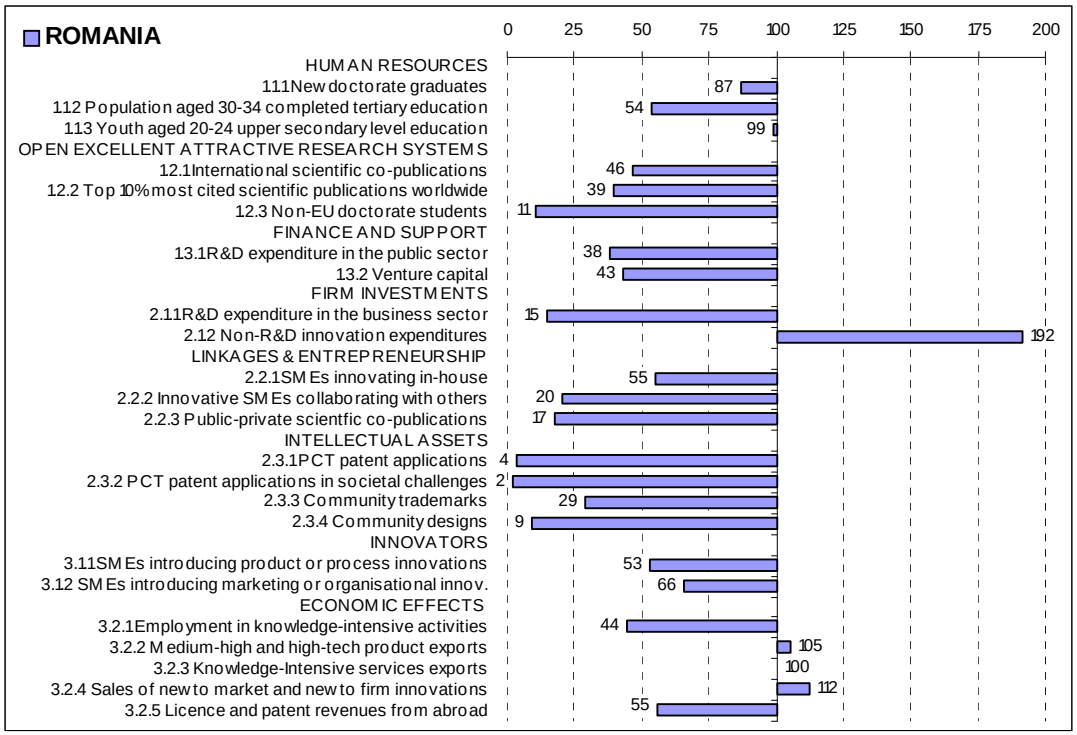
Indicator values relative to the EU27 (EU27=100).

High growth is observed for R&D expenditure in the business sector, R&D expenditure in the public sector, Innovative SMEs collaborating with others, PCT patent applications in societal challenges and Community designs. A strong decline is observed for Non-R&D innovation expenditures and License and patent revenues from abroad. Growth performance in Open, excellent and attractive research systems, Firm investments and Intellectual assets is well above average.



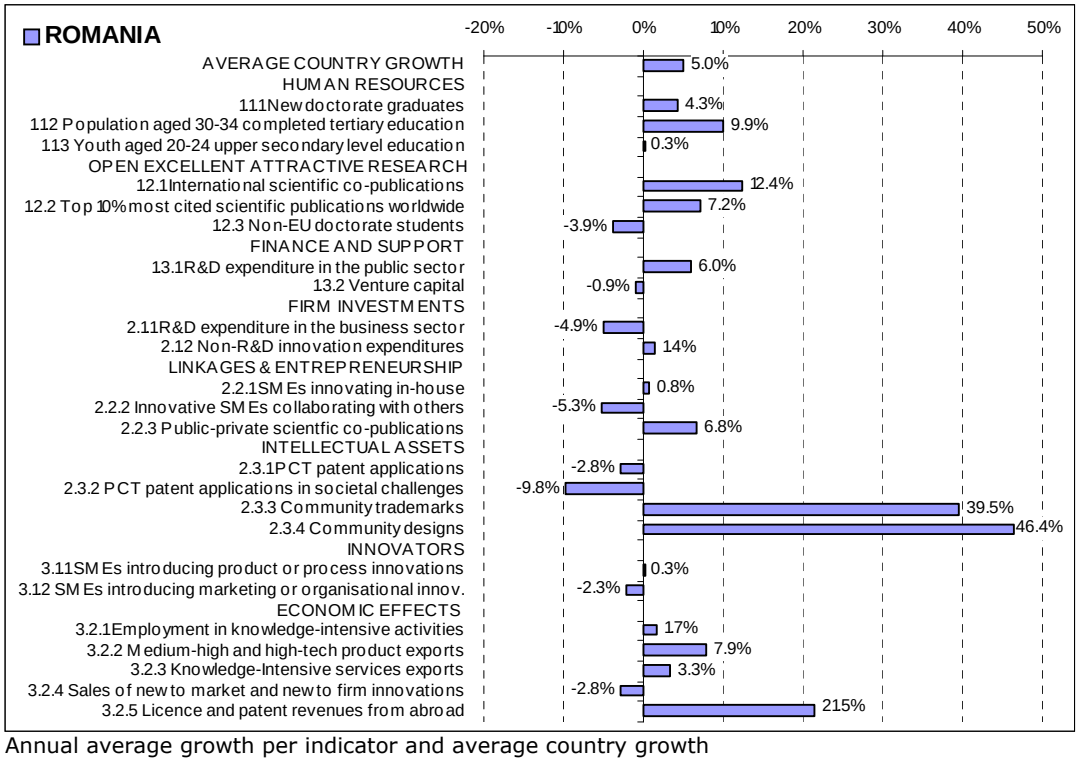
Annual average growth per indicator and average country growth

Romania is one of the modest innovators with a below average performance.
Relative strengths are in Human resources, Firm investments and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems, Linkages & entrepreneurship, Intellectual assets and Innovators.



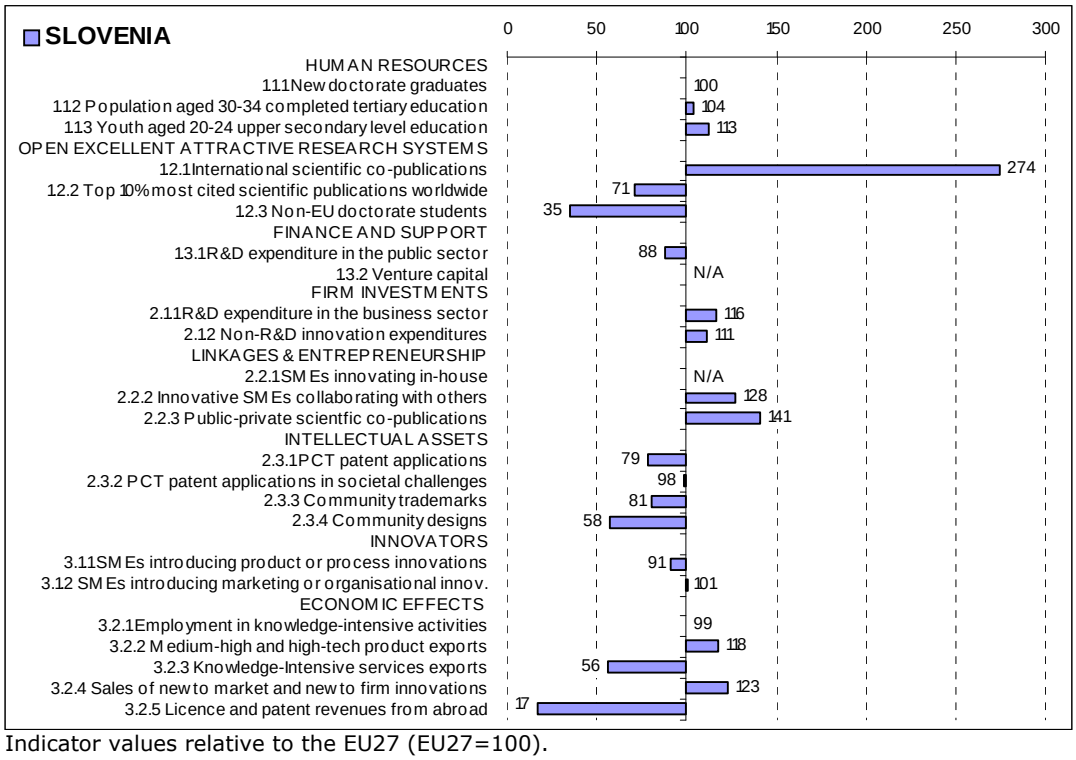
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks, Community designs and License and patent revenues from abroad. Growth performance in Finance and support and Intellectual assets is well above average.



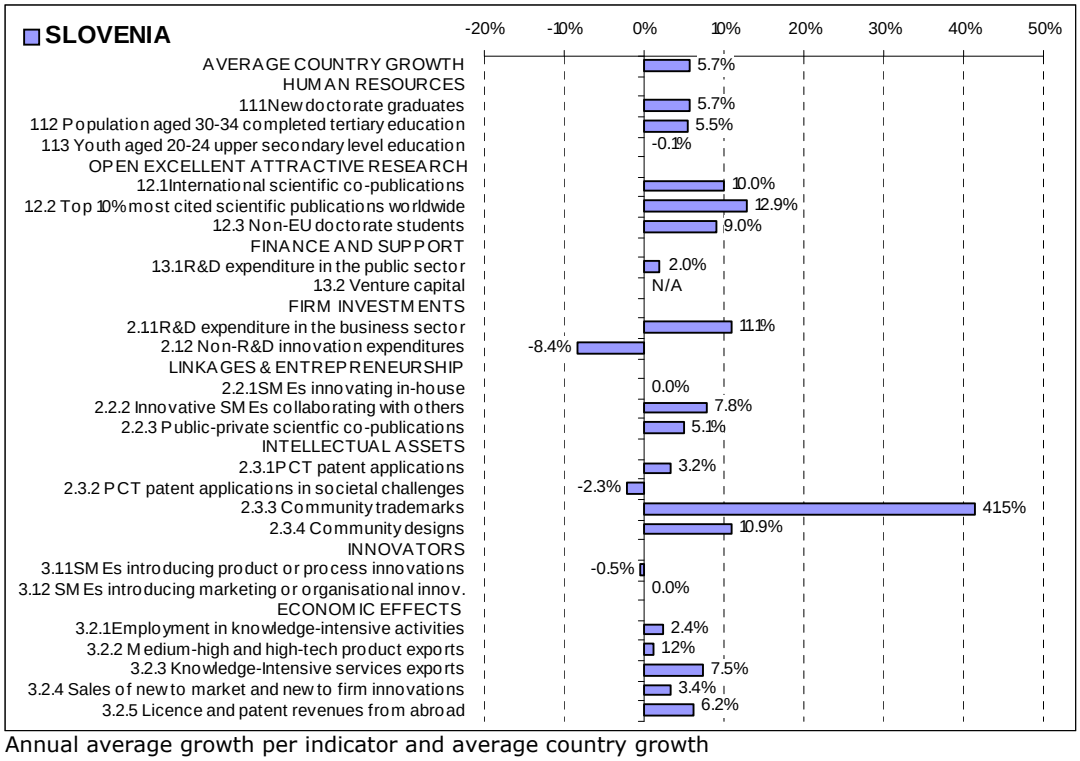
Annual average growth per indicator and average country growth

Slovenia is one of the innovation followers with a below average performance. Relative strengths are in Human resources and Linkages & entrepreneurship. Relative weaknesses are in Intellectual assets and Innovators.



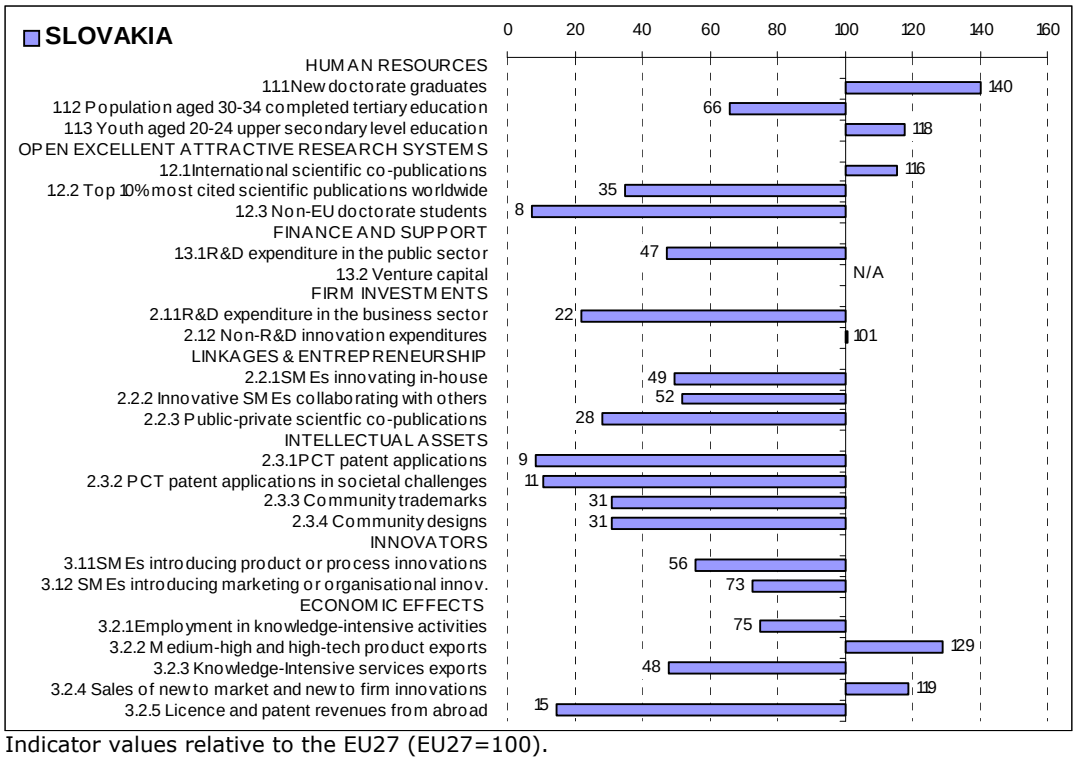
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and International scientific co-publications. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Open, excellent and attractive research systems and Intellectual assets is well above average.



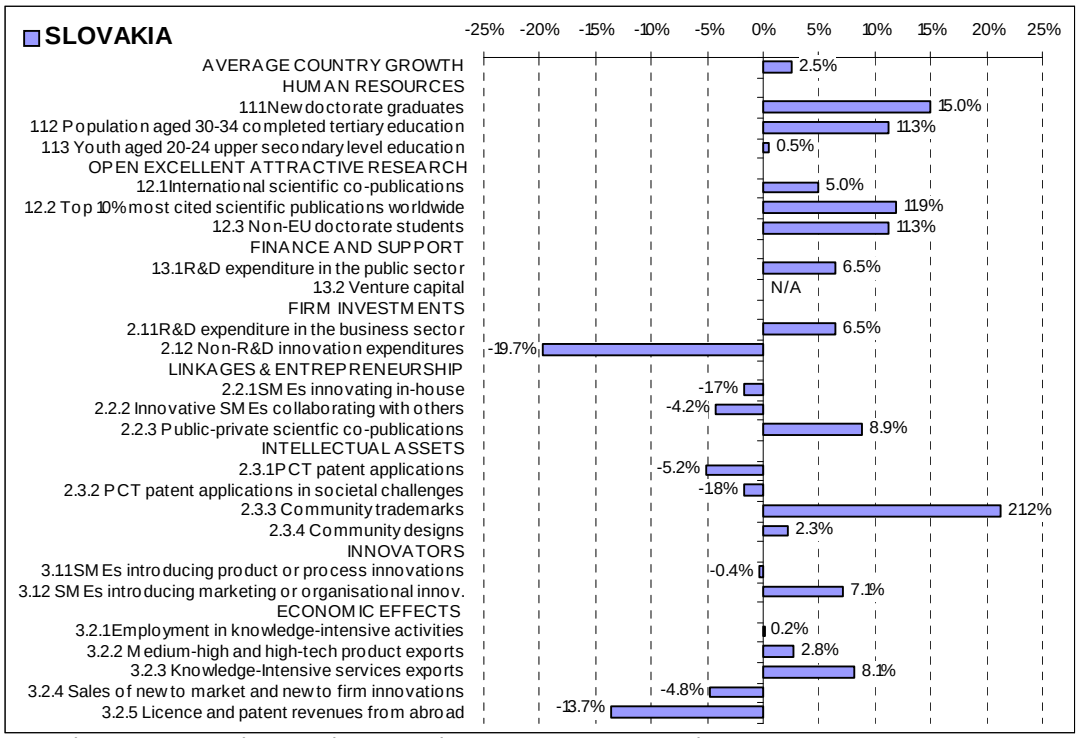
Annual average growth per indicator and average country growth

Slovakia is one of the moderate innovators with a below average performance. Relative strengths are in Human resources and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems, Finance and support, Firm investments, Linkages & entrepreneurship, Intellectual assets and Innovators.



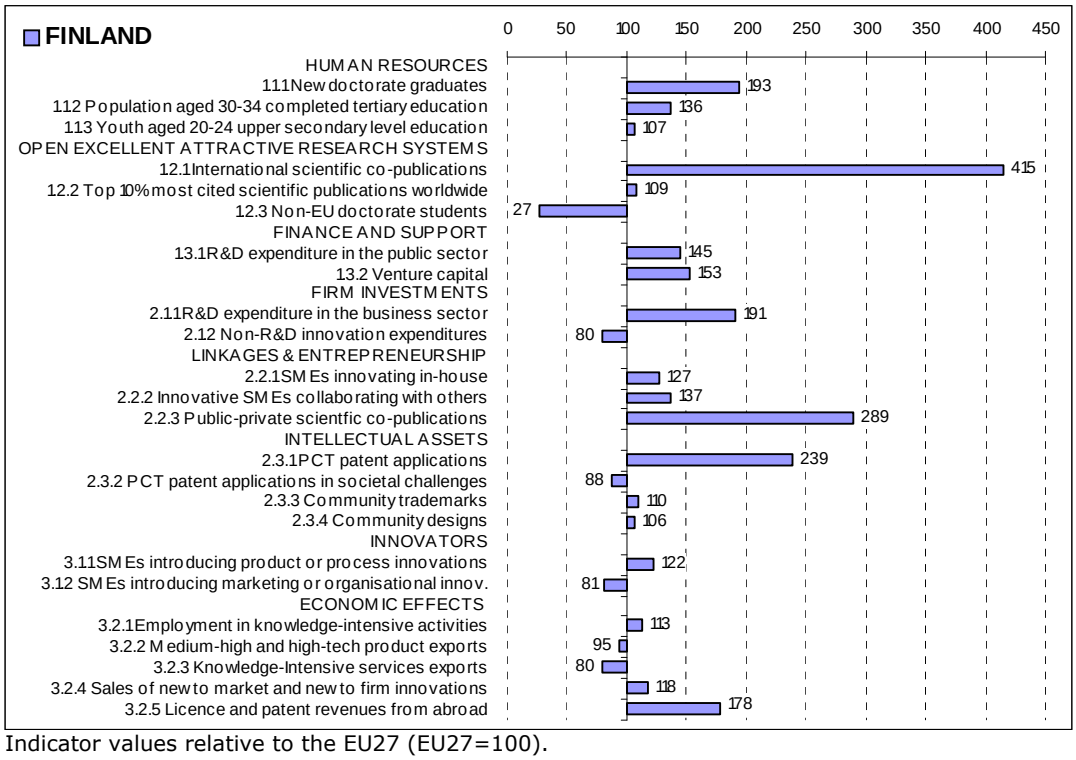
Indicator values relative to the EU27 (EU27=100).

High growth is observed for New doctorate graduates and Community trademarks. A strong decline is observed for Non-R&D innovation expenditure and License and patent revenues from abroad. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is well above average.



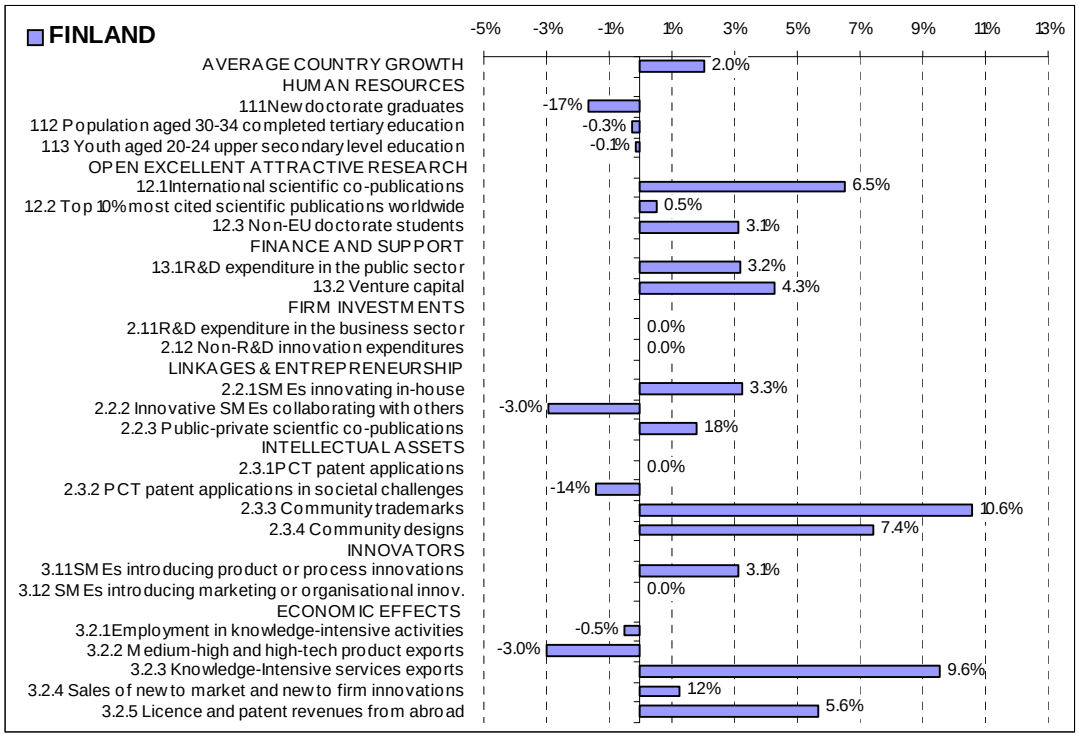
Annual average growth per indicator and average country growth

Finland is one of the innovation leaders with an above average performance. Relative strengths are in Human resources, Finance and support and Linkages & entrepreneurship. Relative weaknesses are in Innovators.



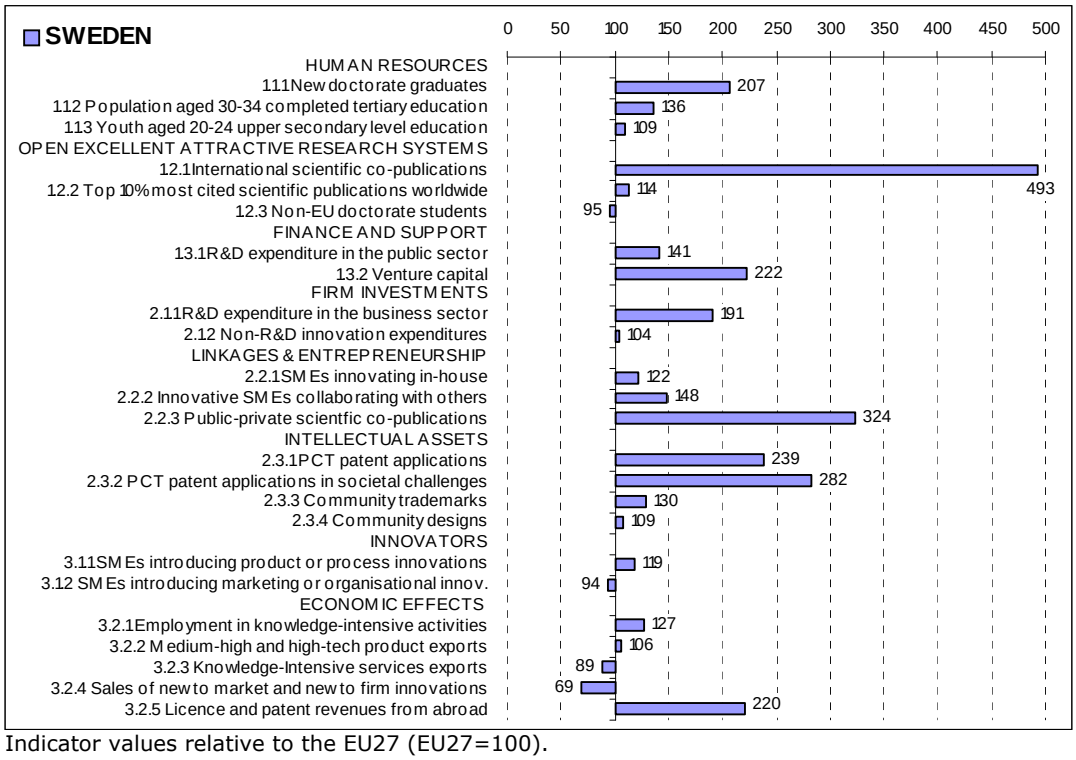
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and Knowledge-intensive services exports. A relatively strong decline is observed for Innovative SMEs collaborating with others and Medium and high-tech product exports. Growth performance in Open, excellent and attractive research systems, Finance and support and Intellectual assets is well above average.



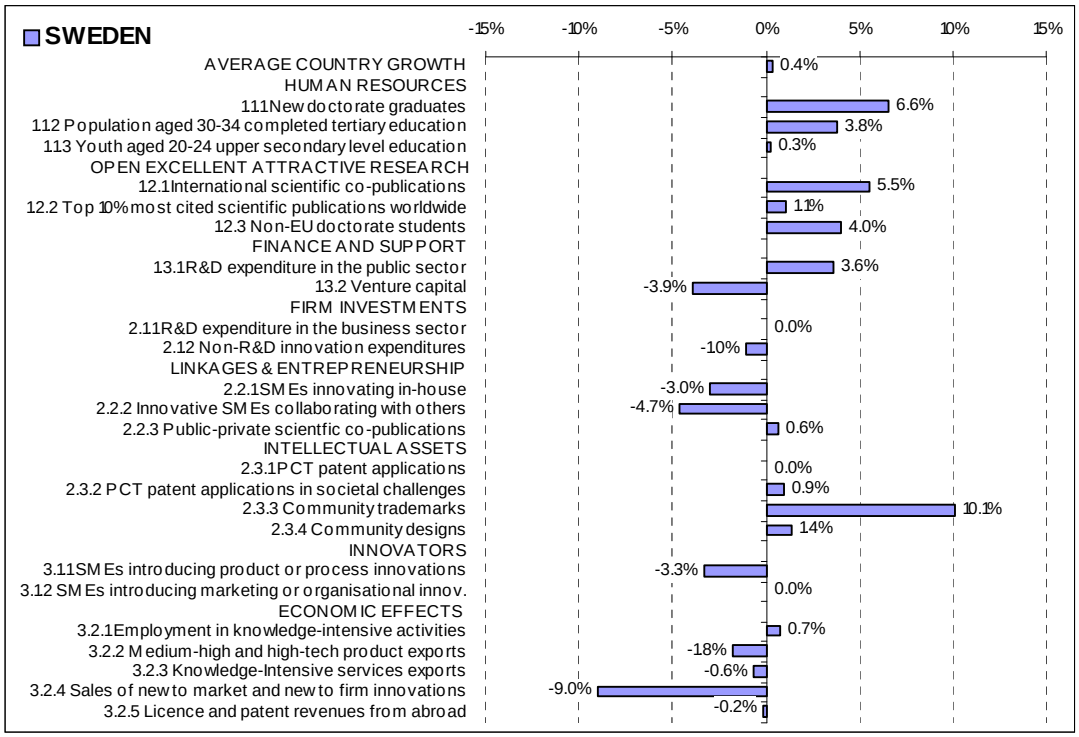
Annual average growth per indicator and average country growth

Sweden is one of the innovation leaders with an above average performance. Relative strengths are in Human resources and Finance and support. Relative weaknesses are in Innovators and Economic effects.



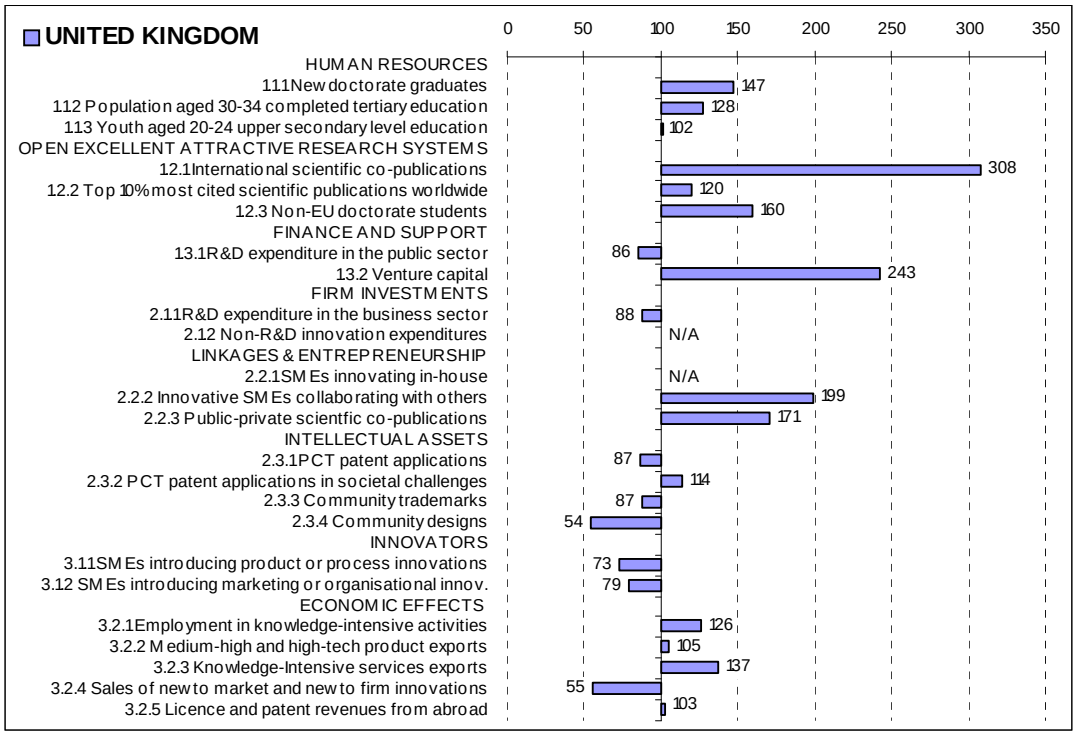
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks. A strong decline is observed for Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is well above average.



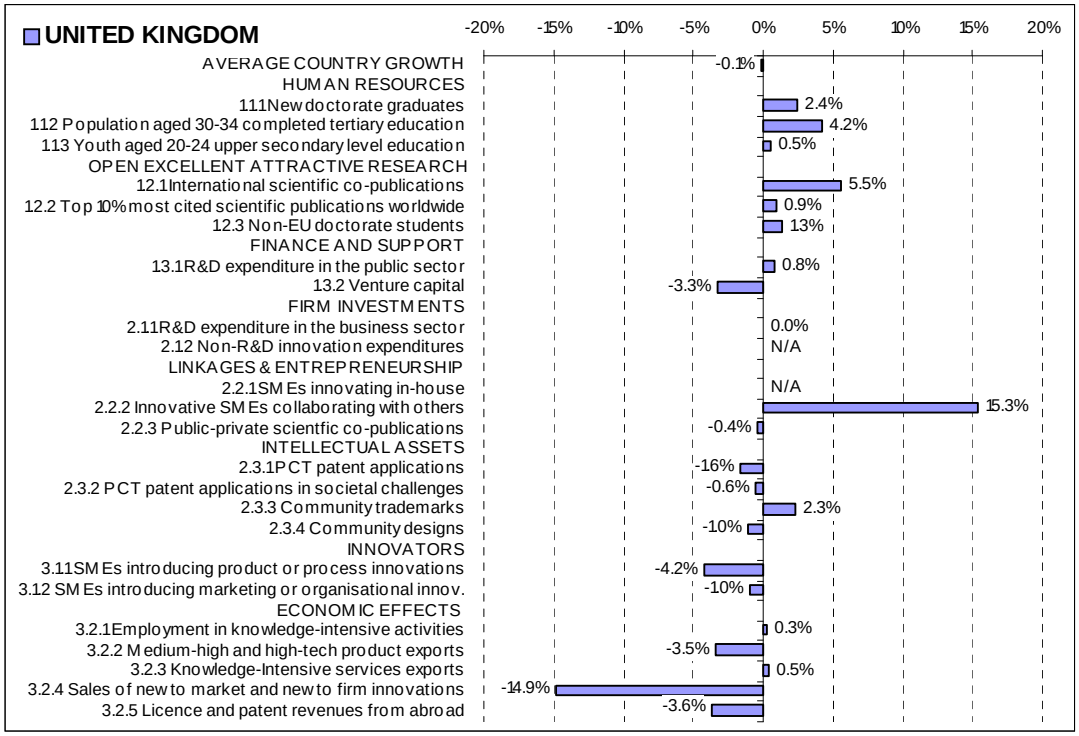
Annual average growth per indicator and average country growth

The **United Kingdom** is one of the innovation followers with an above average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship. Relative weaknesses are in Firm investments, Intellectual assets and Innovators.



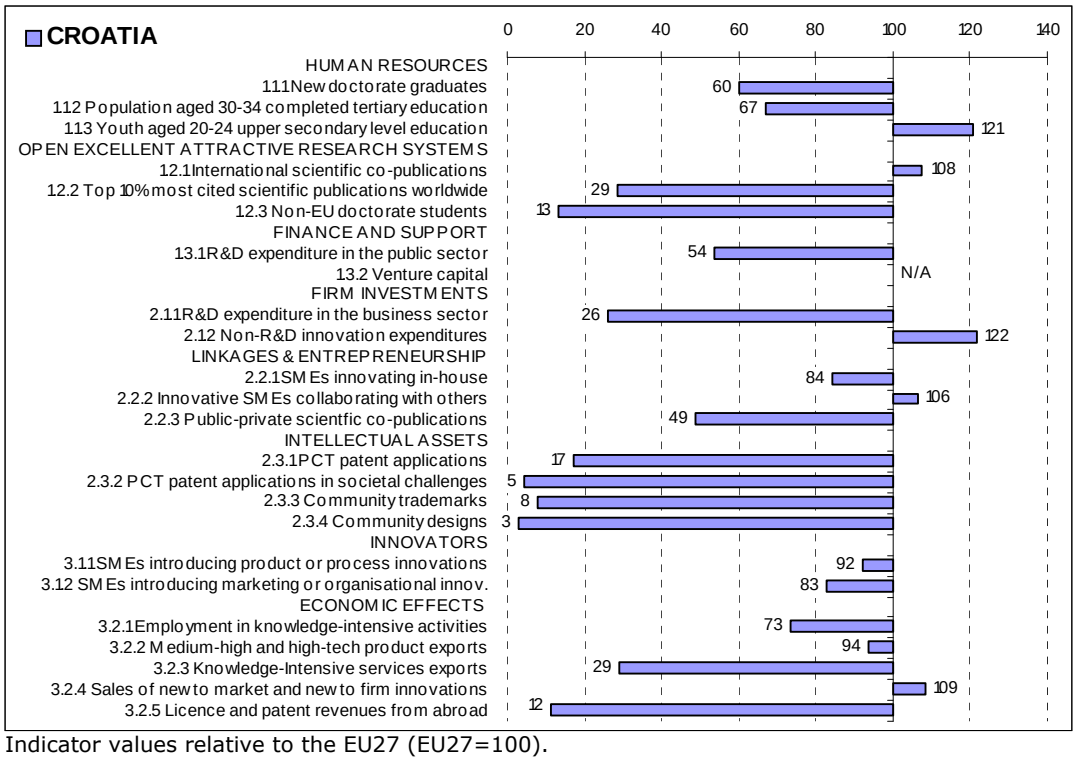
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Innovative SMEs collaborating with others. A strong decline is observed for Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems, Firm investments and Linkages & entrepreneurship is well above average.



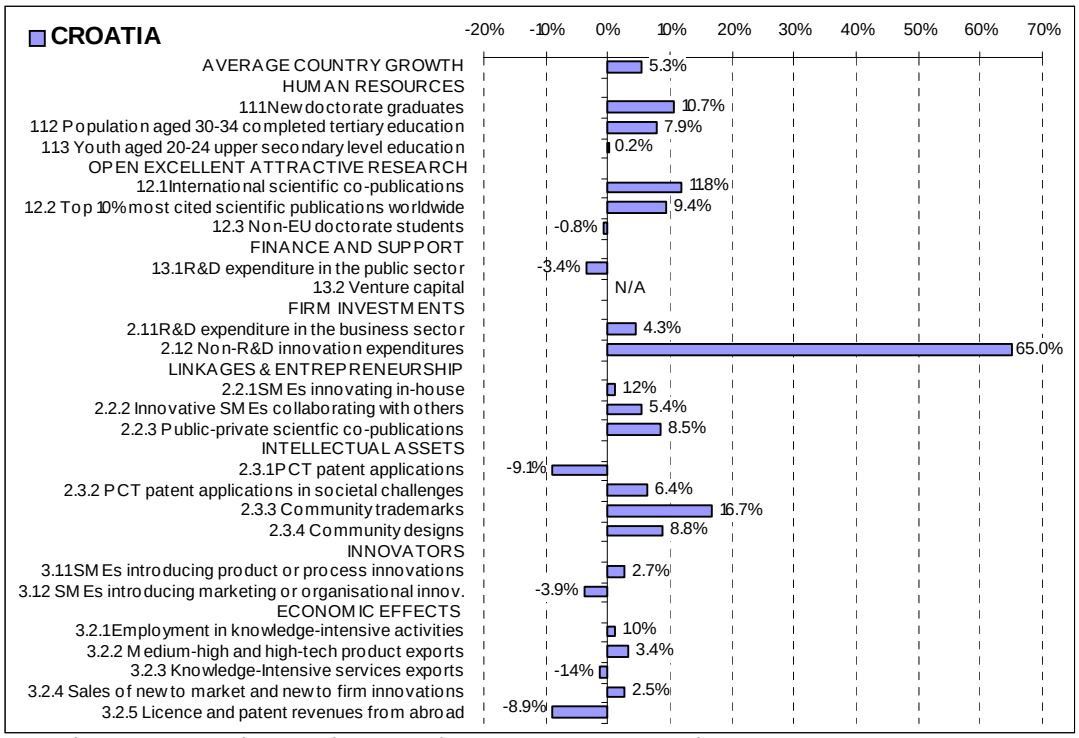
Annual average growth per indicator and average country growth

Croatia is one of the moderate innovators with a below average performance. Relative strengths are in Human resources, Finance and support, Innovators and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems and Intellectual assets.



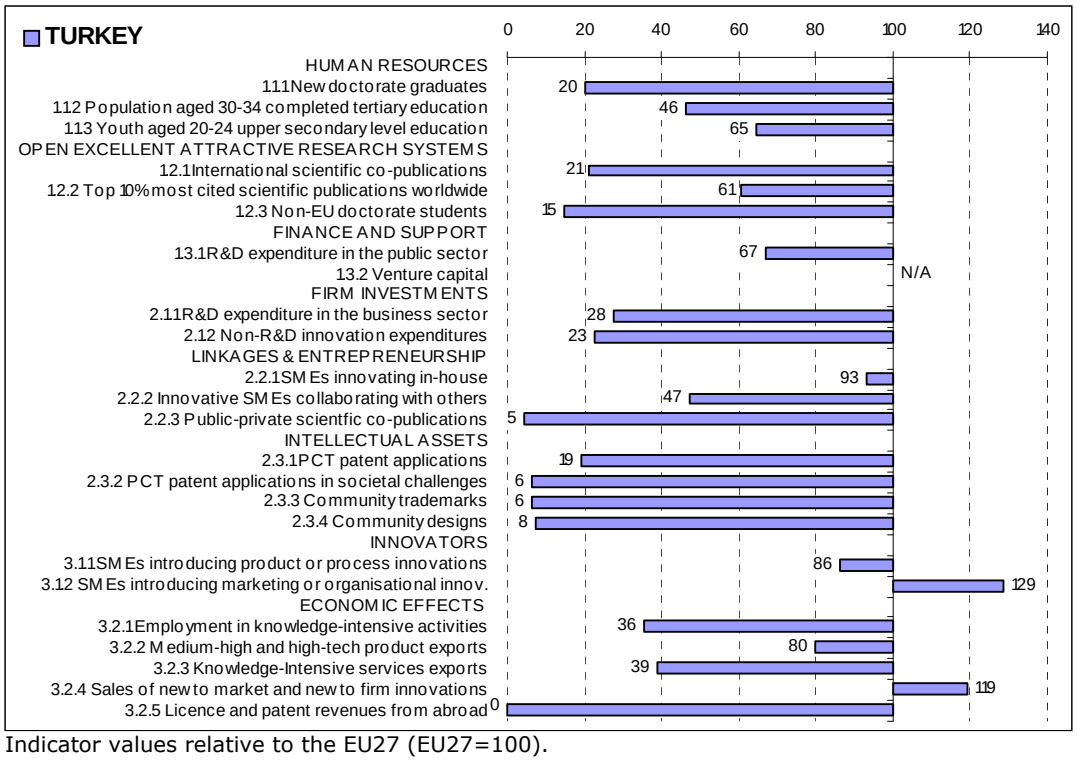
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Non-R&D innovation expenditure and Community trademarks. A strong decline is observed for PCT patent applications and License and patent revenues from abroad. Growth performance in Firm investments is well above average.



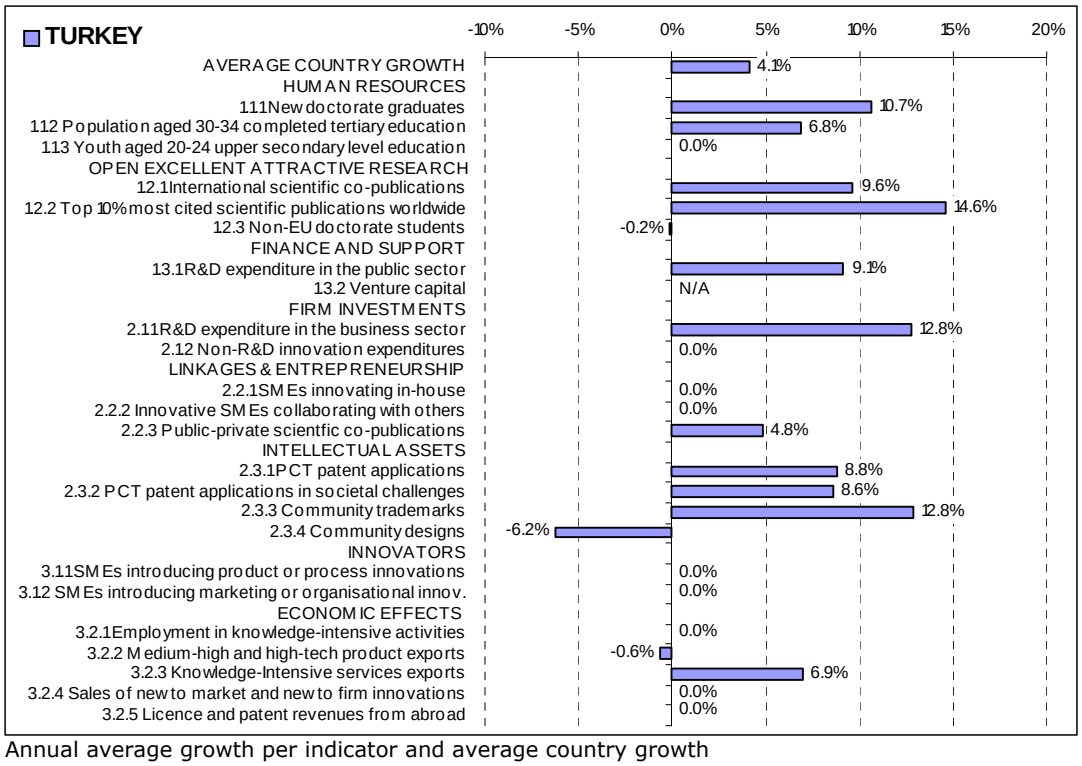
Annual average growth per indicator and average country growth

Turkey is one of the modest innovators with a below average performance.
Relative strengths are in Open, excellent and attractive research systems, Finance and support, Innovators and Economic effects. Relative weaknesses are in Human resources, Firm investments and Intellectual assets.



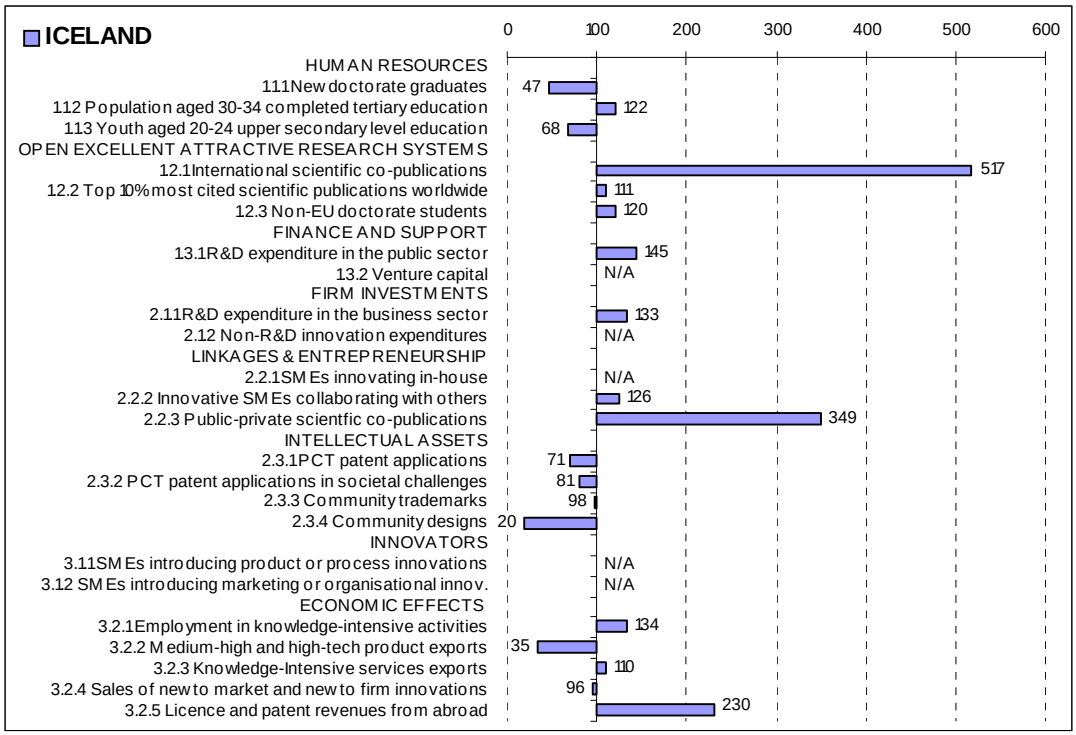
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Most cited scientific publications, R&D expenditure in the business sector and Community trademarks. A strong decline is observed for Community designs. Growth performance in Human resources, Open, excellent and attractive research systems, Finance and support and Firm investments is well above average.



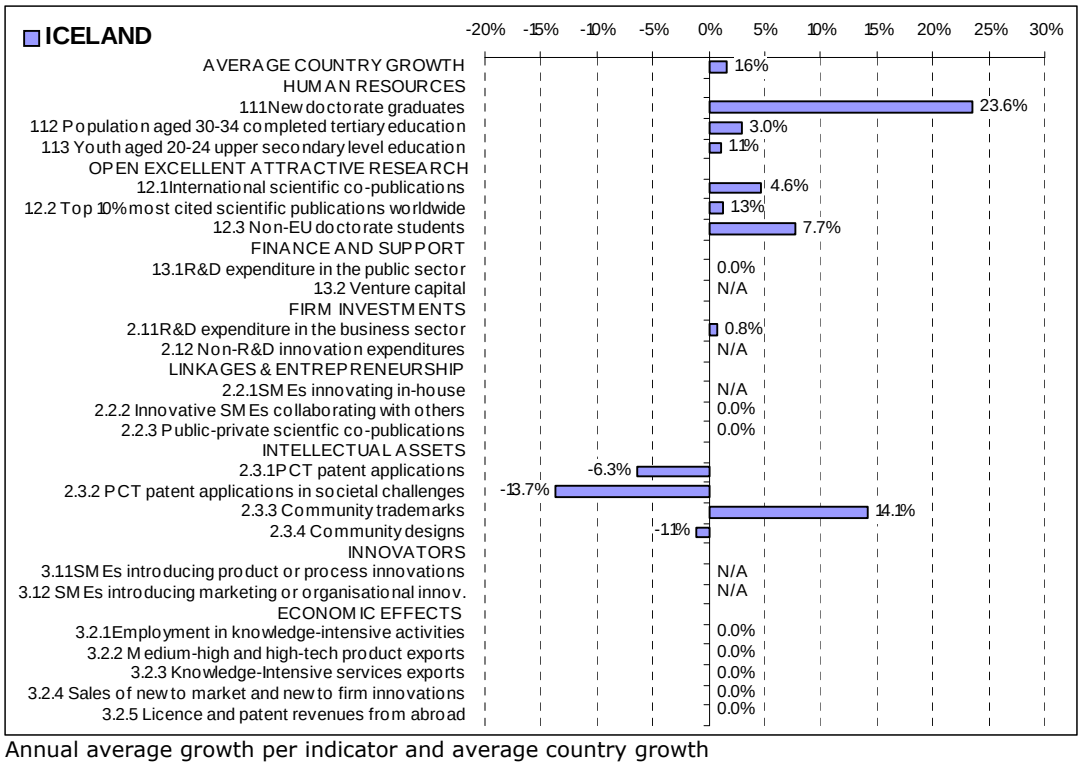
Annual average growth per indicator and average country growth

Iceland is one of the innovation followers with a below average performance.
Relative strengths are in Open, excellent and attractive research systems, Finance and support, Firm investments and Linkages & entrepreneurship. Relative weaknesses are in Human resources and Intellectual assets.



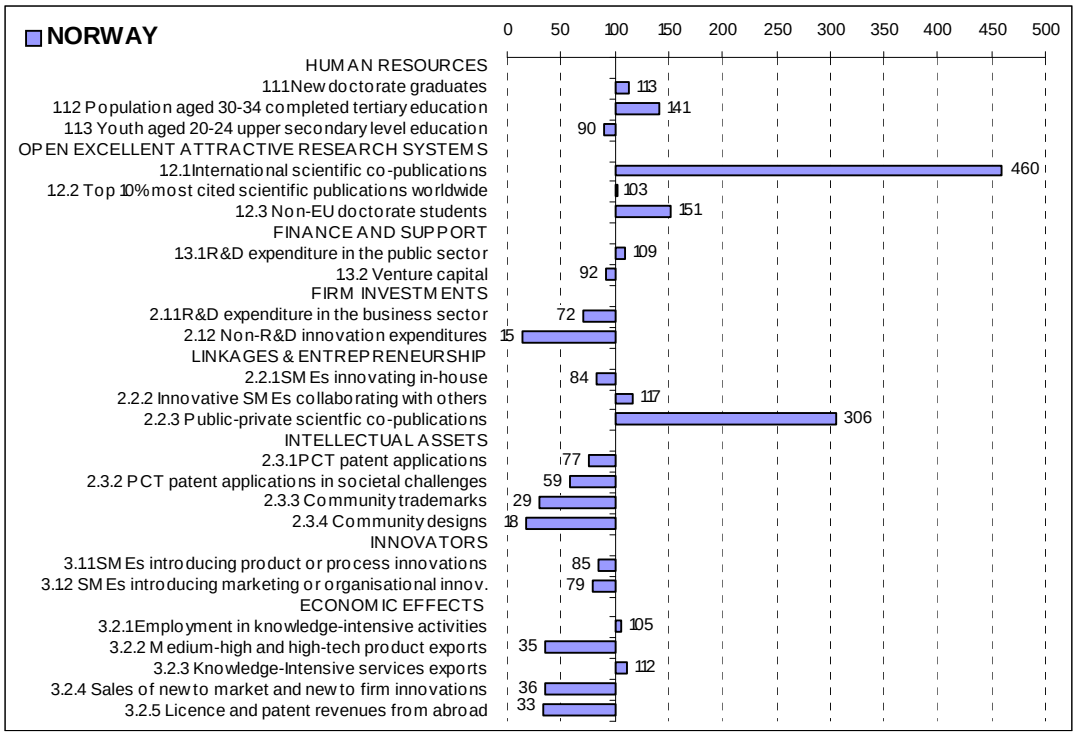
Indicator values relative to the EU27 (EU27=100).

High growth is observed for New doctorate students and Community trademarks. A strong decline is observed for both indicators on PCT patent applications. Growth performance in Human resources, Open, excellent and attractive research systems and Firm investments is well above average.



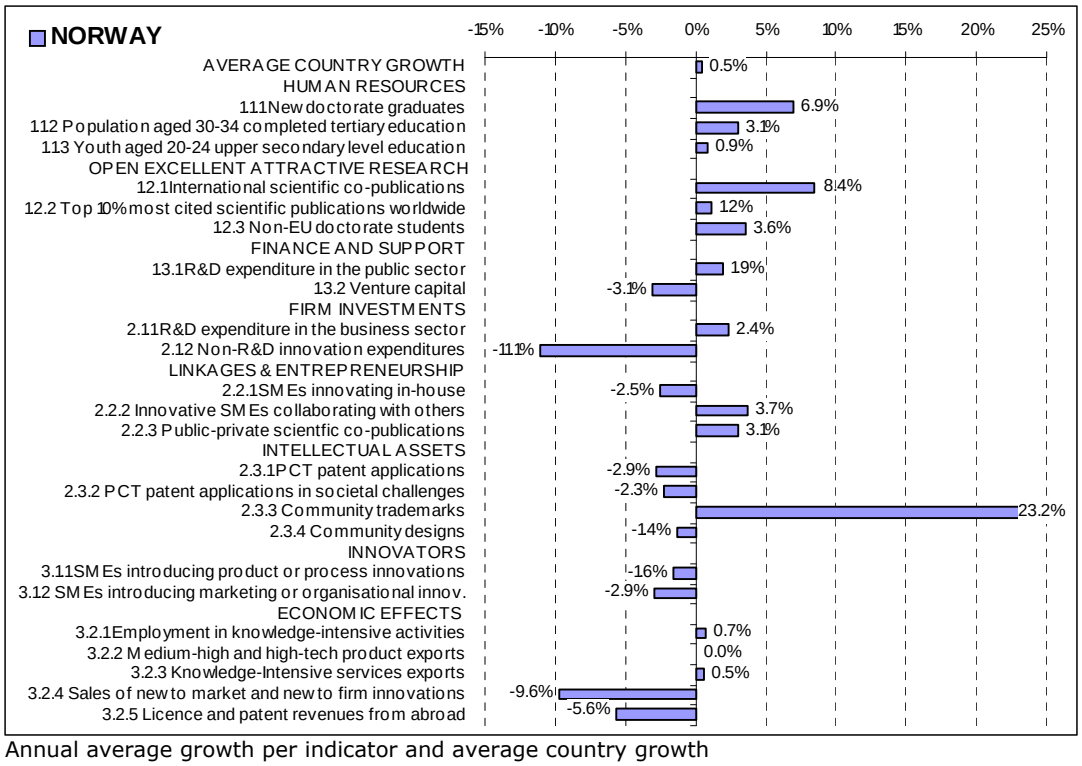
Annual average growth per indicator and average country growth

Norway is one of the moderate innovators with a below average performance. Relative strengths are in Human resources, Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship. Relative weaknesses are in Firm investments, Intellectual assets, Innovators and Economic effects.



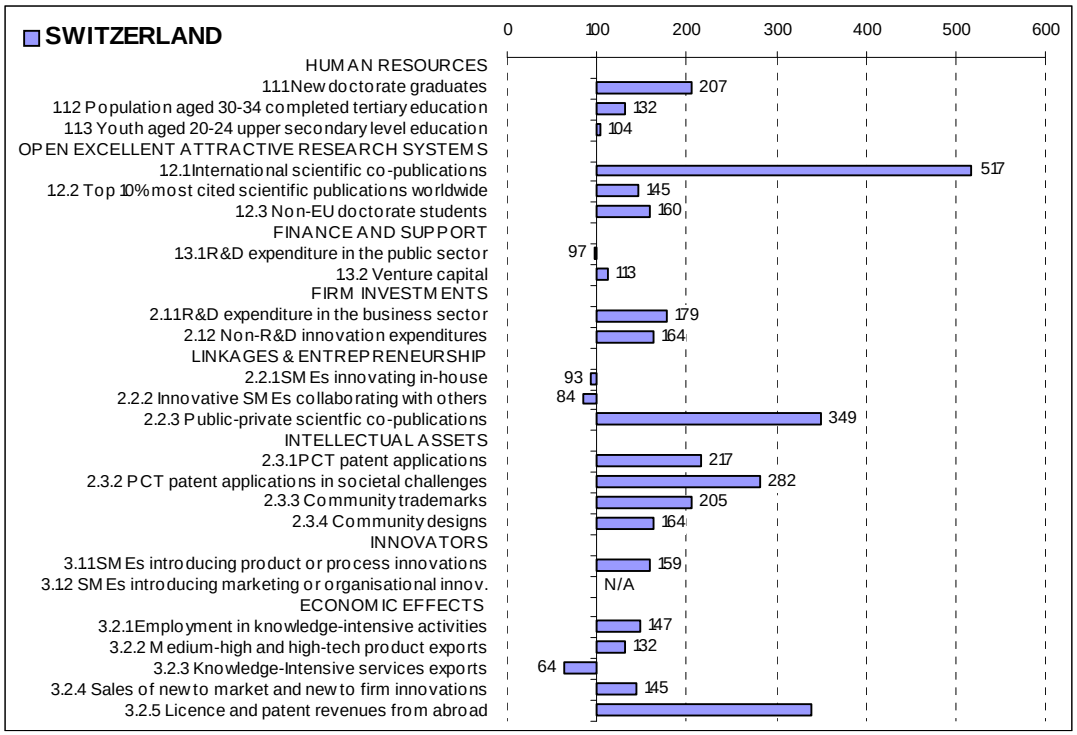
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks. A strong decline is observed for Non-R&D innovation expenditure and Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is well above average.



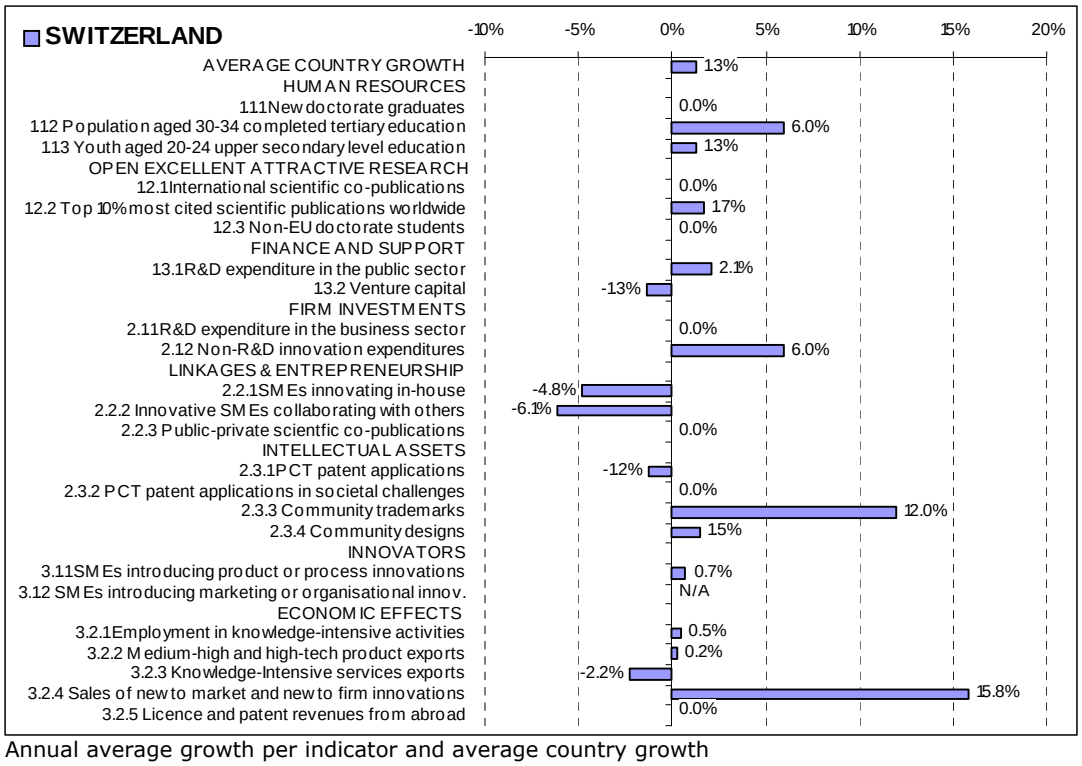
Annual average growth per indicator and average country growth

Switzerland is one of the innovation leaders with an above average performance. Relative strengths are in Open, excellent and attractive research systems, Intellectual assets and Innovators. Relative weaknesses are in Finance and support and Linkages & entrepreneurship.



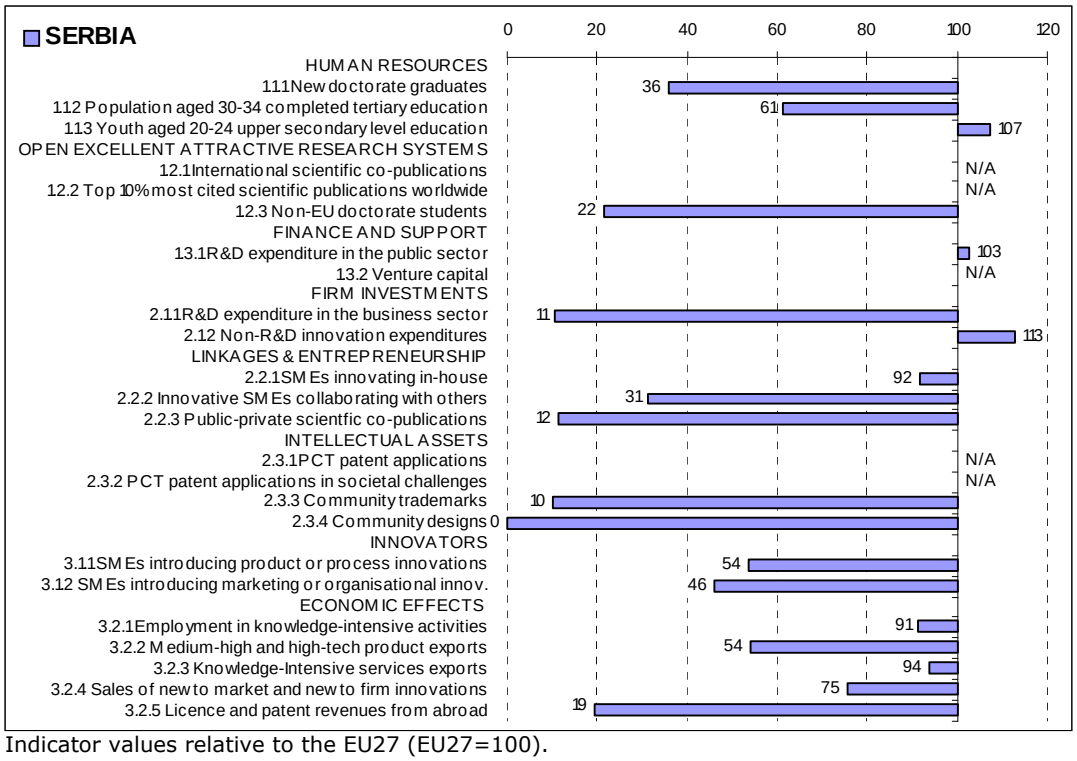
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks and Sales of new products. A relatively strong decline is observed for SMEs innovating in-house and Innovative SMEs collaborating with others. Growth performance in Finance and support, Firm investments, Intellectual assets and Economic effects is well above average.



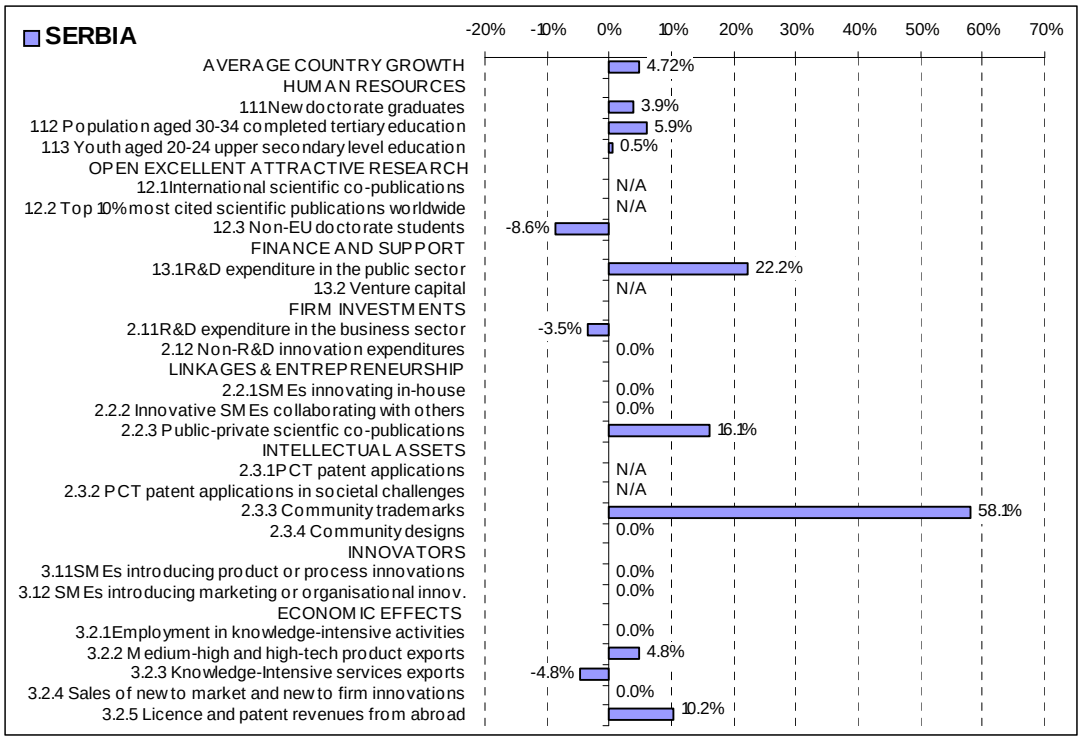
Annual average growth per indicator and average country growth

Serbia is one of the moderate innovators with a below average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems, Finance and support and Economic effects. Relative weaknesses are in Firm investments, Linkages & entrepreneurship, Intellectual assets and Innovators.



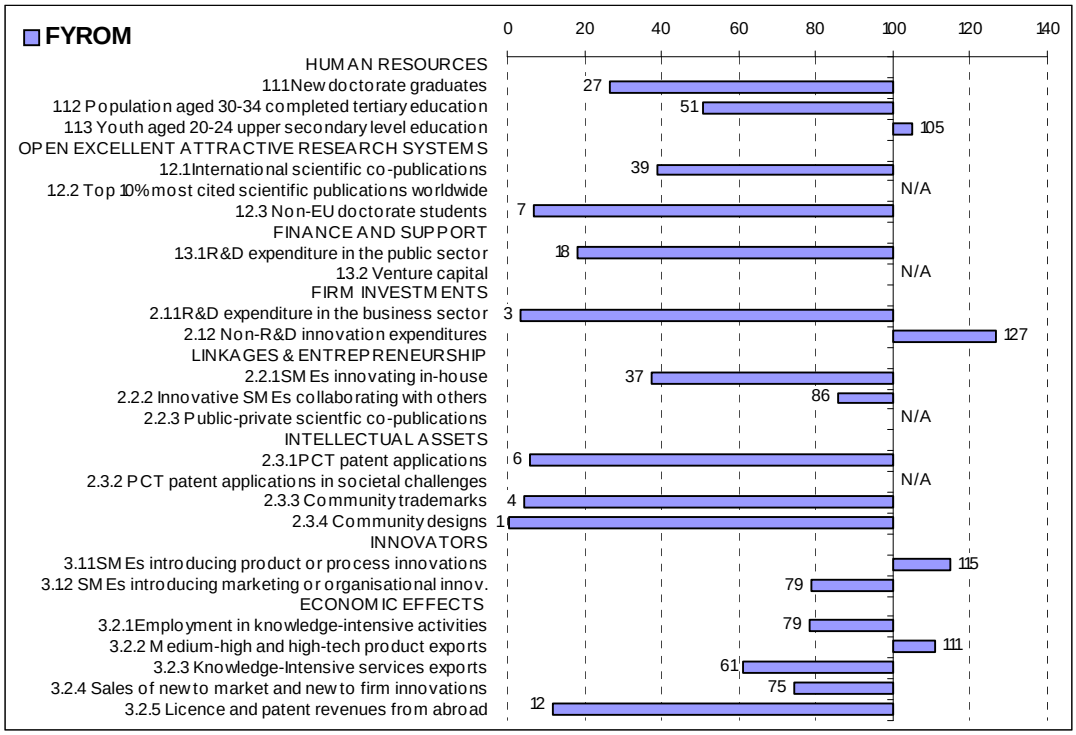
Indicator values relative to the EU27 (EU27=100).

High growth is observed for R&D expenditure in the public sector, Public-private co-publications, and Community trademarks. A strong decline is observed for Non-EU doctorate students. Growth performance in Finance and support and Intellectual assets is well above average.



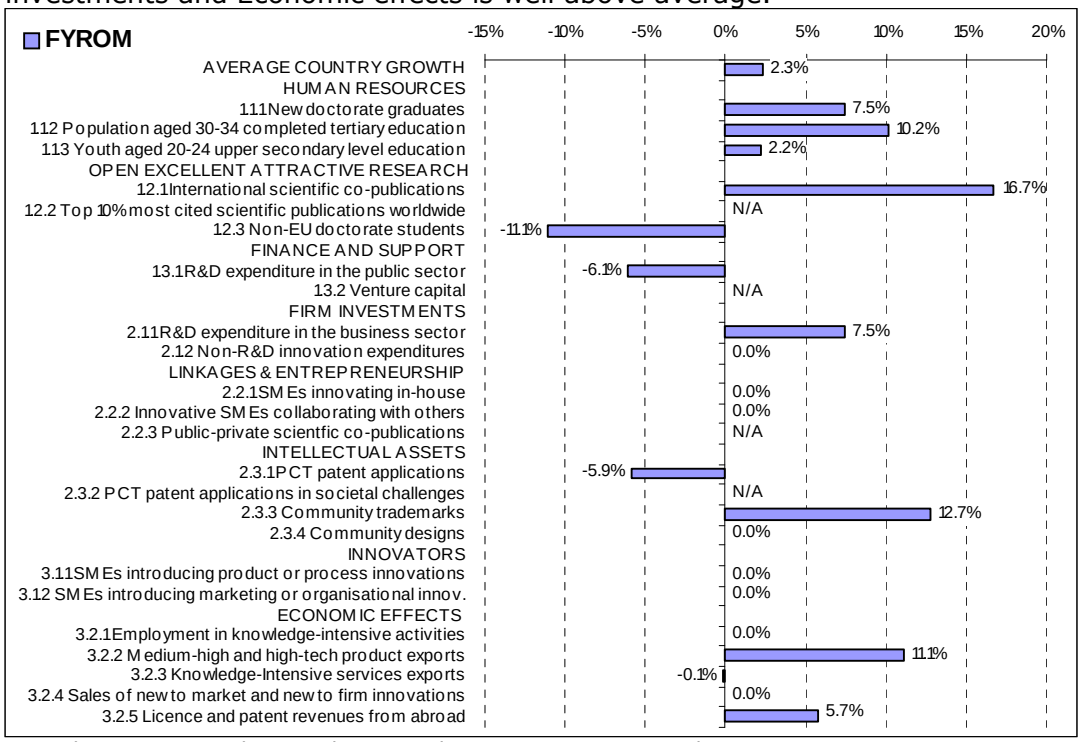
Annual average growth per indicator and average country growth

The **Former Yugoslav Republic of Macedonia** is one of the modest innovators with a below average performance.
Relative strengths are in Human resources, Innovators and Economic effects. Relative weaknesses are in Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship and Intellectual assets.



Indicator values relative to the EU27 (EU27=100).

High growth is observed for Population with completed tertiary education, International scientific co-publications, Community trademarks and Medium-high and high-tech product exports. A strong decline is observed for Non-EU doctorate students and R&D expenditure in the public sector. Growth performance in Human resources, Firm investments and Economic effects is well above average.



Annual average growth per indicator and average country growth

7. TECHNICAL ANNEX

7.1. Calculating composite scores

The overall innovation performance of each country has been summarized in a composite indicator (the Summary Innovation Index). The methodology used for calculating this composite innovation indicator will now be explained in detail.

Step 1: Identifying and replacing outliers

Positive outliers are identified as those relative scores which are higher than the mean plus 2 times the standard deviation[8]. Negative outliers are identified as those relative scores which are smaller than the mean minus 2 times the standard deviation. These outliers are replaced by the respective maximum and minimum values observed over all the years and all countries.

Step 2: Setting reference years

For each indicator a reference year is identified based on data availability for all countries (for all countries data availability is at least 75%). For most indicators this reference year will be lagging 1 or 2 years behind the year to which the IUS refers. Thus for the IUS 2011 the reference year will be 2009 or 2010 for most indicators (cf. Table 1).

Step 3: Imputing for missing values

Reference year data are then used for "2010", etc. If data for a year-in-between is not available we substitute with the value for the previous. If data are not available at the beginning of the time series, we replace missing values with the latest available year. The following examples clarify this step and show how 'missing' data are imputed. If for none of the years data is available no data will be imputed.

Example 1 (latest year missing)	"2011"	"2010"	"2009"	"2008"	"2007"
Available relative to EU27 score	N/A	150	120	110	105
Use most recent year	**150**	150	120	110	105
Example 2 (year-in-between missing)	"2011"	"2010"	"2009"	"2008"	"2007"
Available relative to EU27 score	150	N/A	120	110	105
Substitute with previous year	150	**120**	120	110	105
Example 3 (beginning-of-period missing)	"2011"	"2010"	"2009"	"2008"	"2007"
Available relative to EU27 score	150	130	120	N/A	N/A
Substitute with latest available year	150	130	120	**120**	**120**

Step 4: Determining Maximum and Minimum scores

The Maximum score is the highest relative score found for the whole time period within all countries excluding positive outliers. Similarly, the Minimum score is the lowest relative score found for the whole time period within all countries excluding negative outliers.

Step 5: Transforming data if data are highly skewed

Most of the indicators are fractional indicators with values between 0% and 100%. Some indicators are unbound indicators, where values are not limited to an upper threshold. These indicators can be highly volatile and can have skewed data distributions (where most countries show low performance levels and a few countries show exceptionally high performance levels). For the following

[8] This approach follows Chauvenet's criterion for determining spurious observations.

indicators skewness is above 1 and data have been transformed using a square root transformation: Non-EU doctorate students, Venture capital, PCT patents in societal challenges and License and patent revenues from abroad.

Step 6: Calculating re-scaled scores

Re-scaled scores of the relative scores for all years are calculated by first subtracting the Minimum score and then dividing by the difference between the Maximum and Minimum score. The maximum re-scaled score is thus equal to 1 and the minimum re-scaled score is equal to 0. For positive and negative outliers and small countries where the value of the relative score is above the Maximum score or below the Minimum score, the re-scaled score is thus set equal to 1 respectively 0.

Step 7: Calculating composite innovation indexes

For each year a composite Summary Innovation Index is calculated as the unweighted average of the re-scaled scores for all indicators.

7.2. Calculating growth rates

For the calculation of the average annual growth rate in innovation performance we have adopted a generalized approach[9]:

Step 1: We first define growth for each country *c* per indicator *i* as $y_{ic}^{t} / y_{ic}^{t-1}$, i.e. as the ratio between the non-normalised values for year t and year t-1. In order to minimize the effect of growth outliers on the overall growth rate, these ratios are restricted to a maximum of 2 (such that growth in an individual indicator is restricted to 100%) and 0.5 (such that a decrease in an individual indicator is limited to -50%).

Step 2: We aggregate these indicator growth rates between year t and year t-1 using a geometric average[10] to calculate the average yearly growth rate τ_c^t:

$$1 + \tau_c^t = \prod_{i \in I} \left(\frac{y_{ic}^t}{y_{ic}^{t-1}} \right)^{w_i}$$

where I is the set of innovation indicators used for calculating growth rates and where all indicators receive the same weight w_i (i.e. 1/25 if data for all 25 indicators are available).

The average yearly growth rate τ_c^t is invariant to any ratio-scale transformation and indicates how much the overall set of indicators has progressed with respect to the reference year t-1.

Step 3: We then calculate for each country *c* the average annual growth rate in innovation performance as the geometric average of all yearly growth rates:

$$1 + InnovationGrowthRate_c = \prod_t \left(1 + \tau_c^t\right)^{w_t}$$

[9] Cf. Tarantola, S., (2008), "European Innovation Scoreboard: strategies to measure country progress over time", Joint Research Centre.
http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/921/1/report%231.pdf

[10] A geometric mean is an average of a set of data that is different from the arithmetic average. The geometric mean is of two data points X and Y is the square root of (X*Y), the geometric mean of X, Y and Z is the cube root of (X*Y*Z), and so on.

where $t \in [2006,2010]$ and each average yearly growth rate receives the same weight w_t.

7.3. International benchmarking

The methodology for calculating average innovation performance for the EU27 and its major global competitors has been revised with regard to that used in the IUS 2010.

In the IUS 2010 the average performance scores were calculated as:

1. Calculate index scores for all indicators by dividing the value for each country by that of the EU27 as $100*X_i/X_{EU27}$ (where *X* is the indicator and *i* is the country)
2. Calculate the arithmetic average over the index scores (= $INDEX_i$)
3. The performance gap/lead to the EU27 is then equal to $INDEX_i$ - 100 (cf. Figure 9 in IUS 2010 report)

Note that the results for country *i* are therefore independent from the other countries.

In the IUS 2011 we follow a similar methodology to that used for calculating average innovation performance for the EU Member States:

1. Calculate normalised scores for all indicators as follows: Y_i = ((X_i - smallest X for all countries) / (largest X for all countries – smallest X for all countries) such that all normalised scores are between 0 and 1
2. Calculate the arithmetic average over these index scores (CI_i)
3. Calculate performance relative to that of the EU27: $CI_i^* = 100*CI_i/CI_{EU27}$
4. The performance gap/lead to the EU27 is then equal to CI_i^* - 100 (cf. Figure 11)

Note that the results for country *i* are therefore dependent on the data from the other countries as the smallest and largest scores used in the normalisation procedure are calculated over all countries.

ANNEXES

Annex A: Current performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	HU	MT
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	1.5	1.4	0.6	1.4	1.7	2.6	0.8	1.5	0.8	1.0	1.5	1.6	0.2	0.5	0.9	N/A	0.9	0.3
1.1.2 Population completed tertiary education	33.6	44.4	27.7	20.4	47.0	29.8	40.0	49.9	28.4	40.6	43.5	19.8	45.1	32.3	43.8	46.1	25.7	18.6
1.1.3 Youth with upper secondary level education	79.0	82.5	84.4	91.9	68.3	74.4	83.2	88.0	83.4	61.2	82.8	76.3	86.3	79.9	86.9	73.4	84.0	53.3
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	301	1170	206	497	1533	668	660	1066	496	534	645	465	980	129	214	1221	352	265
1.2.2 Scientific publications among top 10% most cited	10.73	13.42	3.59	4.86	14.78	11.41	7.64	11.31	9.32	9.52	10.09	9.80	8.63	2.05	5.82	9.28	5.38	4.66
1.2.3 Non-EU doctorate students	19.19	19.34	3.93	3.74	10.48	N/A	3.00	N/A	1.00	17.10	30.62	6.24	1.81	0.49	0.61	N/A	2.76	4.05
Finance and support																		
1.3.1 R&D expenditure in the public sector	0.76	0.65	0.29	0.58	0.96	0.92	0.79	0.57	0.43	0.67	0.85	0.54	0.35	0.38	0.56	0.48	0.44	0.25
1.3.2 Venture capital	0.095	0.130	0.015	0.011	0.115	0.051	N/A	0.027	0.007	0.056	0.103	0.035	N/A	N/A	N/A	0.160	0.020	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 R&D expenditure in the business sector	1.23	1.32	0.30	0.97	2.08	1.90	0.81	1.22	0.17	0.72	1.39	0.67	0.09	0.22	0.23	1.16	0.69	0.37
2.1.2 Non-R&D innovation expenditure	0.71	0.57	0.95	1.04	0.51	0.88	1.77	1.01	0.74	0.46	0.47	0.61	1.73	1.20	0.76	0.25	0.74	1.06
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	30.31	40.24	17.09	29.58	40.81	46.03	33.97	38.76	32.70	22.06	29.95	34.09	41.55	14.44	19.39	37.39	12.60	21.56
2.2.2 Innovative SMEs collaborating with others	11.16	22.23	3.50	11.28	22.23	8.95	22.23	9.82	13.31	5.34	13.52	5.98	21.31	3.29	8.03	12.33	7.15	5.19
2.2.3 Public-private co-publications	36.2	61.5	2.3	24.7	123.2	49.5	19.0	25.8	12.5	15.9	31.8	20.7	8.3	2.0	3.0	24.9	19.6	1.2
Intellectual Assets																		
2.3.1 PCT patent applications	3.78	3.44	0.32	0.93	7.52	7.04	1.85	2.81	0.40	1.34	3.95	2.05	0.45	0.75	0.54	1.46	1.31	0.94
2.3.2 PCT patent applications in societal challenges	0.64	0.63	0.04	0.14	1.80	1.00	0.37	0.83	0.13	0.30	0.54	0.36	0.05	0.29	0.02	0.18	0.36	0.19
2.3.3 Community trademarks	5.59	6.03	4.59	2.83	7.49	7.64	6.37	5.99	1.62	6.48	4.09	5.23	12.41	3.40	2.63	12.41	2.30	12.41
2.3.4 Community designs	4.77	3.80	1.83	2.51	7.43	7.90	2.31	2.14	0.40	3.39	3.98	6.86	1.17	3.20	0.65	6.11	1.04	0.85
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	34.18	44.01	20.72	34.86	37.63	53.61	43.92	27.34	37.31	27.50	32.09	36.91	42.24	17.22	21.93	41.49	16.82	25.94
3.1.2 SMEs introducing marketing/organisational innovations	39.09	44.08	17.35	45.87	40.02	62.63	34.10	41.55	51.29	30.35	38.51	40.62	47.34	13.95	21.39	53.02	20.52	25.63
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	13.50	14.60	8.60	11.80	16.10	15.30	9.80	19.50	10.90	11.50	13.80	13.70	14.40	9.60	8.70	19.90	12.80	15.80
3.2.2 Medium and high-tech product exports	48.23	48.07	25.66	62.10	37.77	63.18	34.51	49.36	28.64	49.16	58.56	50.36	39.97	30.46	31.82	31.74	68.03	71.35
3.2.3 Knowledge-intensive services exports	48.13	41.58	23.48	38.03	61.60	57.63	42.40	70.53	5.60	29.55	32.58	31.47	49.06	39.34	17.25	70.53	28.88	33.65
3.2.4 Sales of new to market and new to firm innovations	13.26	9.50	14.20	18.67	11.44	17.38	10.23	11.01	19.23	15.91	13.25	11.79	16.07	5.88	9.59	8.87	16.44	15.22
3.2.5 Licence and patent revenues from abroad	0.51	0.47	0.09	0.06	0.91	0.44	0.09	0.72	0.02	0.06	0.41	0.16	0.04	0.04	0.00	0.96	0.77	0.42

Annex A: Current performance

	EU27	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	*HR*	*TR*	*IS*	*NO*	*CH*	*RS*	*MK*
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	1.5	1.7	2.1	0.8	2.7	1.3	1.5	2.1	2.9	3.1	2.2	0.9	0.3	0.7	1.7	3.1	0.5	0.4
1.1.2 Population completed tertiary education	33.6	41.4	23.5	35.3	23.5	18.1	34.8	22.1	45.7	45.8	43.0	22.6	15.5	40.9	47.3	44.2	20.5	17.1
1.1.3 Youth with upper secondary level education	79.0	77.6	85.6	91.1	58.7	78.2	89.1	93.2	84.2	85.9	80.4	95.3	51.1	53.4	71.1	82.3	84.9	82.8
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	301	1247	1050	198	582	140	827	348	1249	1485	928	324	64	1557	1386	1557	N/A	117
1.2.2 Scientific publications among top 10% most cited	10.73	14.93	11.42	3.68	9.26	4.22	7.62	3.76	11.65	12.19	12.83	3.07	6.51	11.87	11.03	15.59	N/A	N/A
1.2.3 Non-EU doctorate students	19.19	N/A	11.13	1.98	10.01	2.06	6.62	1.44	5.12	18.27	30.62	2.55	2.85	23.05	29.07	30.62	4.13	1.31
Finance and support																		
1.3.1 R&D expenditure in the public sector	0.76	0.97	0.87	0.53	0.70	0.29	0.67	0.36	1.10	1.07	0.65	0.41	0.51	1.10	0.83	0.74	0.78	0.14
1.3.2 Venture capital	0.095	0.097	0.029	0.034	0.077	0.041	N/A	N/A	0.145	0.212	0.231	N/A	N/A	N/A	0.088	0.107	N/A	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 R&D expenditure in the business sector	1.23	0.87	1.88	0.20	0.72	0.18	1.43	0.27	2.35	2.35	1.08	0.32	0.34	1.64	0.88	2.20	0.13	0.04
2.1.2 Non-R&D innovation expenditure	0.71	0.52	0.47	1.25	0.68	1.36	0.79	0.72	0.57	0.74	N/A	0.86	0.16	N/A	0.10	1.16	0.80	0.90
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	30.31	26.27	34.37	13.76	34.10	16.66	N/A	14.98	38.60	37.02	N/A	25.60	28.18	N/A	25.42	28.20	27.83	11.30
2.2.2 Innovative SMEs collaborating with others	11.16	12.97	14.71	6.40	13.31	2.27	14.24	5.76	15.30	16.51	22.23	11.88	5.28	14.05	13.06	9.40	3.50	9.60
2.2.3 Public-private co-publications	36.2	90.0	56.3	2.5	8.7	6.3	51.0	10.3	104.7	117.3	61.7	17.7	1.7	126.2	110.6	126.2	4.2	N/A
Intellectual Assets																		
2.3.1 PCT patent applications	3.78	6.39	4.51	0.34	0.59	0.15	2.97	0.33	9.03	9.03	3.27	0.66	0.72	2.67	2.89	8.18	N/A	0.22
2.3.2 PCT patent applications in societal challenges	0.64	1.11	0.72	0.06	0.12	0.01	0.63	0.07	0.56	1.80	0.73	0.03	0.04	0.52	0.38	1.80	N/A	N/A
2.3.3 Community trademarks	5.59	7.46	9.87	2.95	4.68	1.60	4.51	1.72	6.15	7.25	4.88	0.44	0.35	5.46	1.64	11.46	0.56	0.24
2.3.4 Community designs	4.77	4.38	8.45	4.40	5.00	0.42	2.75	1.48	5.05	5.18	2.59	0.14	0.36	0.93	0.87	7.81	0.00	0.03
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	34.18	31.58	39.55	17.55	47.73	18.03	31.02	19.04	41.83	40.59	25.10	31.48	29.52	N/A	28.91	54.37	18.32	39.20
3.1.2 SMEs introducing marketing/organisational innovations	39.09	28.62	42.78	18.65	43.84	25.80	39.37	28.34	31.49	36.73	31.06	32.46	50.31	N/A	30.80	N/A	18.05	30.80
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	13.50	15.20	14.40	9.10	8.60	6.00	13.40	10.10	15.20	17.10	17.00	9.90	4.80	18.10	14.20	19.90	12.32	10.60
3.2.2 Medium and high-tech product exports	48.23	40.46	52.30	52.39	36.62	50.72	56.84	62.27	45.61	50.99	50.60	45.17	38.61	16.70	16.70	63.62	26.08	53.43
3.2.3 Knowledge-intensive services exports	48.13	33.25	24.70	33.05	29.89	48.35	27.11	23.13	38.50	42.74	65.80	14.01	18.83	53.00	53.96	31.02	45.20	29.35
3.2.4 Sales of new to market and new to firm innovations	13.26	8.85	11.24	9.84	15.57	14.87	16.31	15.79	15.60	9.16	7.31	14.41	15.82	12.69	4.79	19.23	10.01	9.90
3.2.5 Licence and patent revenues from abroad	0.51	1.72	0.18	0.06	0.02	0.28	0.08	0.07	0.91	1.12	0.52	0.06	0.00	1.17	0.17	1.72	0.10	0.06

Annex B: Growth performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	HU	MT
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	2.8%	3.9%	4.7%	6.2%	6.9%	0.0%	3.4%	5.7%	3.4%	2.7%	5.7%	9.8%	0.0%	5.7%	6.5%	N/A	6.5%	31.6%
1.1.2 Population completed tertiary education	3.8%	1.8%	2.3%	11.7%	2.5%	3.6%	5.3%	4.8%	1.6%	1.6%	2.3%	2.8%	-0.5%	13.9%	2.7%	6.8%	7.8%	-3.7%
1.1.3 Youth with upper secondary level education	0.4%	0.0%	1.2%	0.0%	-0.9%	1.0%	0.4%	0.6%	0.7%	-0.2%	-0.2%	0.3%	0.8%	-0.3%	-0.4%	1.4%	0.3%	1.1%
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	6.0%	7.0%	3.8%	6.7%	7.4%	5.9%	15.4%	9.8%	5.9%	8.6%	5.3%	6.5%	19.4%	4.2%	5.5%	21.9%	3.5%	9.4%
1.2.2 Scientific publications among top 10% most cited	2.1%	3.1%	5.5%	2.2%	-0.1%	1.8%	9.9%	8.2%	6.0%	5.9%	2.8%	3.8%	-2.9%	-9.3%	16.7%	16.8%	1.4%	12.4%
1.2.3 Non-EU doctorate students	1.5%	0.4%	-2.0%	1.5%	-1.8%	N/A	15.6%	N/A	0.0%	1.9%	1.2%	10.7%	20.8%	10.6%	20.0%	N/A	-2.4%	10.0%
Finance and support																		
1.3.1 R&D expenditure in the public sector	4.0%	4.3%	-3.2%	2.8%	6.0%	4.9%	6.7%	7.9%	1.8%	6.0%	3.2%	0.5%	3.9%	2.1%	-0.4%	18.9%	-3.1%	4.5%
1.3.2 Venture capital	-6.3%	2.9%	-3.5%	15.7%	-8.9%	0.0%	N/A	-9.2%	6.6%	-7.7%	-0.2%	-6.9%	N/A	N/A	N/A	-7.7%	-10.2%	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 R&D expenditure in the business sector	1.3%	0.6%	25.7%	0.0%	3.7%	1.6%	12.8%	10.4%	-1.4%	-0.7%	1.1%	5.1%	-2.6%	-11.0%	1.1%	-5.1%	8.9%	-2.5%
2.1.2 Non-R&D innovation expenditure	-2.6%	-14.1%	9.9%	-7.3%	-3.6%	-4.8%	10.1%	-4.6%	-19.7%	11.5%	8.7%	-13.7%	-0.6%	0.0%	-11.7%	-26.8%	-4.0%	6.7%
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	-1.3%	-1.6%	3.1%	-1.7%	0.0%	-0.1%	-4.2%	-5.1%	-0.6%	-4.5%	1.4%	5.0%	5.3%	0.0%	-2.0%	0.0%	-1.2%	0.0%
2.2.2 Innovative SMEs collaborating with others	5.5%	7.5%	2.7%	-3.4%	1.7%	1.0%	8.6%	-10.9%	12.2%	-1.6%	4.0%	8.4%	6.6%	-14.3%	-14.1%	-4.4%	2.1%	-0.4%
2.2.3 Public-private co-publications	1.1%	1.7%	9.8%	7.4%	1.2%	1.3%	8.4%	2.9%	2.2%	2.6%	0.0%	0.3%	14.7%	5.5%	9.4%	1.5%	2.3%	-8.6%
Intellectual Assets																		
2.3.1 PCT patent applications	-0.8%	-0.4%	-2.7%	2.8%	0.2%	-1.1%	7.8%	2.0%	4.9%	1.0%	-0.1%	0.6%	9.3%	0.7%	9.1%	-3.4%	-0.5%	10.2%
2.3.2 PCT patent applications in societal challenges	0.5%	-0.6%	-5.0%	-1.9%	0.0%	0.6%	21.4%	4.3%	18.9%	0.8%	0.2%	0.1%	20.6%	2.9%	-11.3%	-1.3%	-1.0%	-0.2%
2.3.3 Community trademarks	8.0%	15.6%	70.3%	16.7%	7.1%	9.6%	30.6%	10.1%	5.6%	2.9%	8.3%	8.0%	15.0%	34.1%	22.8%	0.0%	16.1%	17.9%
2.3.4 Community designs	1.1%	-4.1%	76.9%	-0.5%	-3.2%	2.6%	34.7%	7.4%	31.6%	-6.4%	3.1%	-1.9%	-8.2%	16.7%	9.7%	10.2%	0.2%	8.6%
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	-0.7%	-1.6%	8.6%	-0.5%	-4.4%	-0.3%	-1.4%	-14.0%	1.9%	-3.8%	1.8%	1.5%	-1.7%	4.5%	-3.5%	-4.1%	-1.1%	15.8%
3.1.2 SMEs introducing marketing/organisational innovations	0.6%	-0.7%	5.1%	4.1%	-10.6%	1.3%	-7.6%	-6.2%	3.0%	0.7%	-1.7%	2.0%	-3.9%	0.0%	-7.0%	-4.1%	-5.1%	-0.4%
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	0.6%	-0.5%	1.2%	1.3%	1.6%	0.7%	1.0%	1.9%	0.2%	-0.6%	0.6%	0.2%	-0.8%	4.0%	3.8%	0.0%	0.0%	0.2%
3.2.2 Medium and high-tech product exports	0.2%	-0.3%	4.9%	0.3%	-1.6%	-0.9%	-1.0%	-1.2%	0.3%	-1.5%	-0.1%	-0.4%	-3.4%	6.3%	-1.0%	-0.7%	-0.4%	-0.5%
3.2.3 Knowledge-intensive services exports	0.5%	-1.1%	9.0%	1.7%	-1.5%	1.9%	5.4%	0.0%	-42.0%	0.1%	12.8%	-2.4%	10.3%	1.6%	2.3%	0.0%	6.0%	16.2%
3.2.4 Sales of new to market and new to firm innovations	-1.2%	-7.4%	3.2%	4.8%	1.0%	-0.3%	-3.8%	2.1%	15.1%	3.6%	3.1%	-0.2%	30.3%	3.5%	-0.3%	-13.1%	25.2%	-5.7%
3.2.5 Licence and patent revenues from abroad	2.9%	0.6%	8.8%	9.4%	2.7%	7.0%	5.7%	4.0%	-3.6%	-5.1%	3.3%	11.8%	-12.4%	-9.8%	-12.5%	-2.9%	3.5%	-16.2%

Annex B: Growth performance

	EU27	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	*HR*	*TR*	*IS*	*NO*	*CH*	*RS*	*MK*
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	2.8%	6.9%	1.2%	-5.4%	1.9%	4.3%	5.7%	15.0%	-1.7%	6.6%	2.4%	10.7%	10.7%	23.6%	6.9%	0.0%	3.9%	7.5%
1.1.2 Population completed tertiary education	3.8%	0.0%	2.6%	9.3%	6.3%	9.9%	5.5%	11.3%	-0.3%	3.8%	4.2%	7.9%	6.8%	3.0%	3.1%	6.0%	5.9%	10.2%
1.1.3 Youth with upper secondary level education	0.4%	0.0%	-0.1%	-0.2%	3.5%	0.3%	-0.1%	0.5%	-0.1%	0.3%	0.5%	0.2%	0.0%	1.1%	0.9%	1.3%	0.5%	2.2%
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	6.0%	6.9%	8.2%	1.8%	10.2%	12.4%	10.0%	5.0%	6.5%	5.5%	5.5%	11.8%	9.6%	4.6%	8.4%	0.0%	N/A	16.7%
1.2.2 Scientific publications among top 10% most cited	2.1%	2.1%	2.3%	4.0%	6.3%	7.2%	12.9%	11.9%	0.5%	1.1%	0.9%	9.4%	14.6%	1.3%	1.2%	1.7%	N/A	N/A
1.2.3 Non-EU doctorate students	1.5%	N/A	4.7%	-3.3%	7.0%	-3.9%	9.0%	11.3%	3.1%	4.0%	1.3%	-0.8%	-0.2%	7.7%	3.6%	0.0%	-8.6%	-11.1%
Finance and support																		
1.3.1 R&D expenditure in the public sector	4.0%	2.8%	4.8%	8.7%	13.0%	6.0%	2.0%	6.5%	3.2%	3.6%	0.8%	-3.4%	9.1%	0.0%	1.9%	2.1%	22.2%	-6.1%
1.3.2 Venture capital	-6.3%	-3.4%	-4.9%	3.6%	-2.2%	-0.9%	N/A	N/A	4.3%	-3.9%	-3.3%	N/A	N/A	N/A	-3.1%	-1.3%	N/A	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 R&D expenditure in the business sector	1.3%	-3.7%	2.2%	2.7%	11.9%	-4.9%	11.1%	6.5%	0.0%	0.0%	0.0%	4.3%	12.8%	0.8%	2.4%	0.0%	-3.5%	7.5%
2.1.2 Non-R&D innovation expenditure	-2.6%	13.9%	0.0%	-2.4%	-11.2%	1.4%	-8.4%	-19.7%	0.0%	-1.0%	N/A	65.0%	0.0%	N/A	-11.1%	6.0%	0.0%	0.0%
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	-1.3%	0.1%	-5.1%	-8.3%	0.5%	0.8%	N/A	-1.7%	3.3%	-3.0%	N/A	1.2%	0.0%	N/A	-2.5%	-4.8%	0.0%	0.0%
2.2.2 Innovative SMEs collaborating with others	5.5%	1.3%	-5.0%	-8.3%	15.8%	-5.3%	7.8%	-4.2%	-3.0%	-4.7%	15.3%	5.4%	0.0%	0.0%	3.7%	-6.1%	0.0%	0.0%
2.2.3 Public-private co-publications	1.1%	2.2%	3.8%	5.9%	4.4%	6.8%	5.1%	8.9%	1.8%	0.6%	-0.4%	8.5%	4.8%	0.0%	3.1%	0.0%	16.1%	N/A
Intellectual Assets																		
2.3.1 PCT patent applications	-0.8%	-1.2%	-0.8%	2.3%	10.8%	-2.8%	3.2%	-5.2%	0.0%	0.0%	-1.6%	-9.1%	8.8%	-6.3%	-2.9%	-1.2%	N/A	-5.9%
2.3.2 PCT patent applications in societal challenges	0.5%	4.1%	2.1%	1.1%	17.9%	-9.8%	-2.3%	-1.8%	-1.4%	0.9%	-0.6%	6.4%	8.6%	-13.7%	-2.3%	0.0%	N/A	N/A
2.3.3 Community trademarks	8.0%	12.2%	11.1%	12.3%	2.9%	39.5%	41.5%	21.2%	10.6%	10.1%	2.3%	16.7%	12.8%	14.1%	23.2%	12.0%	58.1%	12.7%
2.3.4 Community designs	1.1%	-0.2%	6.4%	19.7%	16.2%	46.4%	10.9%	2.3%	7.4%	1.4%	-1.0%	8.8%	-6.2%	-1.1%	-1.4%	1.5%	0.0%	0.0%
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	-0.7%	-0.1%	-5.4%	-5.7%	5.4%	0.3%	-0.5%	-0.4%	3.1%	-3.3%	-4.2%	2.7%	0.0%	N/A	-1.6%	0.7%	0.0%	0.0%
3.1.2 SMEs introducing marketing/organisational innovations	0.6%	-1.5%	-5.3%	-7.5%	-0.8%	-2.3%	0.0%	7.1%	0.0%	0.0%	-1.0%	-3.9%	0.0%	N/A	-2.9%	N/A	0.0%	0.0%
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	0.6%	-2.2%	1.1%	2.6%	-0.6%	1.7%	2.4%	0.2%	-0.5%	0.7%	0.3%	1.0%	0.0%	0.0%	0.7%	0.5%	0.0%	0.0%
3.2.2 Medium and high-tech product exports	0.2%	-2.1%	-0.4%	1.7%	-1.4%	7.9%	1.2%	2.8%	-3.0%	-1.8%	-3.5%	3.4%	-0.6%	0.0%	0.0%	0.2%	4.8%	11.1%
3.2.3 Knowledge-intensive services exports	0.5%	-5.1%	1.2%	5.5%	6.1%	3.3%	7.5%	8.1%	9.6%	-0.6%	0.5%	-1.4%	6.9%	0.0%	0.5%	-2.2%	-4.8%	-0.1%
3.2.4 Sales of new to market and new to firm innovations	-1.2%	1.4%	1.5%	-7.6%	11.6%	-2.8%	3.4%	-4.8%	1.2%	-9.0%	-14.9%	2.5%	0.0%	0.0%	-9.6%	15.8%	0.0%	0.0%
3.2.5 Licence and patent revenues from abroad	2.9%	0.0%	-0.8%	18.0%	-10.3%	21.5%	6.2%	-13.7%	5.6%	-0.2%	-3.6%	-8.9%	0.0%	0.0%	-5.6%	0.0%	10.2%	5.7%

Annex C: Definitions of indicators

	Indicator	Definition numerator	Definition denominator	Interpretation	Source
1.1.1	New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Number doctorate graduates (ISCED 6)	Population between 25 and 34 years	The indicator is a measure of the supply of new second-stage tertiary graduates in all fields of training. For most countries ISCED 6 captures PhD graduates only, with the exception of Finland, Portugal and Sweden where also non-PhD degrees leading to an award of an advanced research qualification are included.	Eurostat
1.1.2	Percentage population aged 30-34 having completed tertiary education	Number of persons in age class with some form of post-secondary education (ISCED 5 and 6)	Population between 30 and 34 years	This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields because the adoption of innovations in many areas, in particular in the service sectors, depends on a wide range of skills. International comparisons of educational levels however are difficult due to large discrepancies in educational systems, access, and the level of attainment that is required to receive a tertiary degree. The indicator focuses on a narrow share of the population aged 30 to 34 and it will more easily and quickly reflect changes in educational policies leading to more tertiary graduates.	Eurostat
1.1.3	Percentage youth aged 20-24 having attained at least upper secondary education	Number of young people aged 20-24 years having attained at least upper secondary education attainment level, i.e. with an education level ISCED 3a, 3b or 3c long minimum	Population between 20 and 24 years	The indicator measures the qualification level of the population aged 20-24 years in terms of formal educational degrees. It provides a measure for the "supply" of human capital of that age group and for the output of education systems in terms of graduates. Completed upper secondary education is generally considered to be the minimum level required for successful participation in a knowledge-based society and is positively linked with economic growth.	Eurostat
1.2.1	International scientific co-publications per million population	Number of scientific publications with at least one co-author based abroad (where abroad is non-EU for the EU27)	Total population	International scientific co-publications are a proxy for the quality of scientific research as collaboration increases scientific productivity.	Science-Metrix / Scopus (Elsevier)
1.2.2	Scientific publications among the top-10% most cited publications worldwide as % of total scientific publications of the country	Number of scientific publications among the top-10% most cited publications worldwide	Total number of scientific publications	The indicator is a proxy for the efficiency of the research system as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English speaking countries given the coverage of Scopus' publication data. Countries like France and Germany, where researchers publish relatively more in their own language, are more likely to underperform on this indicator as compared to their real academic excellence.	Science-Metrix / Scopus (Elsevier)
1.2.3	Non-EU doctorate students as a % of all doctorate holders	For EU Member States: number of doctorate students from non-EU countries (for non-EU countries: number of non-national doctorate students)	Total number of doctorate students	The share of non-EU doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students will add to creating a net brain gain and will secure a continuous supply of researchers.	Eurostat

	Indicator	Definition numerator	Definition denominator	Interpretation	Source
1.3.1	R&D expenditure in the public sector (% of GDP)	All R&D expenditures in the government sector (GOVERD) and the higher education sector (HERD)	Gross Domestic Product	R&D expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth.	Eurostat
1.3.2	Venture capital (% of GDP)	Venture capital investment is defined as private equity being raised for investment in companies. Management buyouts, management buyins, and venture purchase of quoted shares are excluded. Venture capital includes early stage (seed + start-up) and expansion and replacement capital	Gross Domestic product	The amount of venture capital is a proxy for the relative dynamism of new business creation. In particular for enterprises using or developing new (risky) technologies venture capital is often the only available means of financing their (expanding) business. *Comment: Two-year averages have been used*	Eurostat
2.1.1	R&D expenditure in the business sector (% of GDP)	All R&D expenditures in the business sector (BERD)	Gross Domestic Product	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sector (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.	Eurostat
2.1.2	Non-R&D innovation expenditures (% of turnover)	Sum of total innovation expenditure for enterprises, in thousand Euros and current prices excluding intramural and extramural R&D expenditures	Total turnover for all enterprises	This indicator measures non-R&D innovation expenditure as percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas.	Eurostat (Community Innovation Survey)
2.2.1	SMEs innovating in-house (% of SMEs)[11]	Sum of SMEs with in-house innovation activities. Innovative firms are defined as those firms which have introduced new products or processes either 1) in-house or 2) in combination with other firms	Total number of SMEs	This indicator measures the degree to which SMEs, that have introduced any new or significantly improved products or production processes, have innovated in-house. The indicator is limited to SMEs because almost all large firms innovate and because countries with an industrial structure weighted towards larger firms tend to do better.	Eurostat (Community Innovation Survey)

[11] This indicator is not directly available from Eurostat. The 2010 Methodology report provides detailed instructions how to calculate this indicator (http://www.proinno-europe.eu/sites/default/files/page/11/12/IUS_2010_Methodology_report.pdf).

	Indicator	Definition numerator	Definition denominator	Interpretation	Source
2.2.2	Innovative SMEs collaborating with others (% of SMEs)	Sum of SMEs with innovation co-operation activities, i.e. those firms that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years of the survey period	Total number of SMEs	This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate on the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms and between firms and other firms. The indicator is limited to SMEs because almost all large firms are involved in innovation co-operation.	Eurostat (Community Innovation Survey)
2.2.3	Public-private co-publications per million population	Number of public-private co-authored research publications. The definition of the "private sector" excludes the private medical and health sector. Publications are assigned to the country/countries in which the business companies or other private sector organisations are located	Total population	This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications.	CWTS / Thomson Reuters
2.3.1	PCT patent applications per billion GDP (in PPP€)	Number of patent applications filed under the PCT, at international phase, designating the European Patent Office (EPO). Patent counts are based on the priority date, the inventor's country of residence and fractional counts.	Gross Domestic Product in Purchasing Power Parity Euros	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents. This indicator measures the number of PCT patent applications.	OECD / Eurostat
2.3.2	PCT patent applications in societal challenges per billion GDP (in PPP€)	Number of PCT patent applications in Climate change mitigation and Health. Patents in Climate change mitigation equal those in Renewable energy, Electric and hybrid vehicles and Energy efficiency in buildings and lighting. Patents in health-related technologies include those in Medical technology (IPC codes (8th edition) A61[B, C, D, F, G, H, J, L, M, N], H05G) and Pharmaceuticals (IPC codes A61K excluding A61K8)	Gross Domestic Product in Purchasing Power Parity Euros	This indicator measures PCT applications in health technology and climate change mitigation and is highly relevant as increased numbers of patent applications in health technology and climate change mitigation will be necessary to meet the societal needs of an ageing European society and sustainable growth.	OECD / Eurostat

	Indicator	Definition numerator	Definition denominator	Interpretation	Source
2.3.3	Community trademarks per billion GDP (in PPP€)	Number of new community trademarks applications	Gross Domestic Product in Purchasing Power Parity Euros	Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and is a form of communication, a basis for publicity and advertising. *Comment: two-year averages have been used*	OHIM / Eurostat
2.3.4	Community designs per billion GDP (in PPP€)	Number of new community designs applications	Gross Domestic Product in Purchasing Power Parity Euros	A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programs. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States. *Comment: two-year averages have been used*	OHIM / Eurostat
3.1.1	SMEs introducing product or process innovations (% of SMEs)	Number of SMEs who introduced a new product or a new process to one of their markets	Total number of SMEs	Technological innovation, as measured by the introduction of new products (goods or services) and processes, is a key ingredient to innovation in manufacturing activities. Higher shares of technological innovators should reflect a higher level of innovation activities.	Eurostat (Community Innovation Survey)
3.1.2	SMEs introducing marketing or organisational innovations (% of SMEs)	Number of SMEs who introduced a new marketing innovation or organisational innovation to one of their markets	Total number of SMEs	The Community Innovation Survey mainly asks firms about their technological innovation. Many firms, in particular in the services sectors, innovate through other non-technological forms of innovation. Examples of these are marketing and organisational innovations. This indicator tries to capture the extent that SMEs innovate through non-technological innovation.	Eurostat (Community Innovation Survey)
3.1.3	High-growth innovative firms	--	--	--	--

	Indicator	Definition numerator	Definition denominator	Interpretation	Source
3.2.1	Employment in knowledge-intensive activities as % of total employment	Number of employed persons in knowledge-intensive activities in business industries. Knowledge-intensive activities are defined, based on EU Labour Force Survey data, as all NACE Rev.2 industries at 2-digit level where at least 33% of employment has a higher education degree (ISCED5 or ISCED6)	Total employment	Knowledge-intensive activities provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy.	Eurostat
3.2.2	Medium and high-tech product as % of total product exports	Value of medium and high-tech exports. These exports include exports of the following SITC Rev.3 products: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891	Value of total exports	The indicator measures the technological competitiveness of the EU i.e. the ability to commercialise the results of research and development (R&D) and innovation in the international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies are vital for the competitiveness of a country in the modern economy. This is because medium and high technology products are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment.	UN Comtrade
3.2.3	Knowledge-intensive services exports as % of total services exports	Exports of knowledge-intensive services are measured by the sum of credits in EBOPS (Extended Balance of Payments Services Classification) 207, 208, 211, 212, 218, 228, 229, 245, 253, 260, 263, 272, 274, 278, 279, 280 and 284	Total services exports as measured by credits in EBOPS 200	The indicator measures the competitiveness of the knowledge-intensive services sector. The indicator is comparable to indicator 3.2.2 on high-tech manufacturing export performance. Knowledge-intensive services are defined as NACE classes 61-62 and 64-72. These can be related to the above-mentioned EBOPS classes using the correspondence table between NACE, ISIC and EBOPS as provided in the UN Manual on Statistics of International Trade in Services (UN, 2002).	UN / Eurostat
3.2.4	Sales of new-to-market and new-to-firm innovations as % of turnover	Sum of total turnover of new or significantly improved products, either new to the firm or new to the market, for all enterprises	Total turnover for all enterprises	This indicator measures the turnover of new or significantly improved products and includes both products which are only new to the firm and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new to market products) and the diffusion of these technologies (new to firm products).	Eurostat (Community Innovation Survey)
3.2.5	License and patent revenues from abroad as % of GDP	Export part of the international transactions in royalties and license fees	Gross Domestic Product	Trade in technology comprises four main categories: Transfer of techniques (through patents and licences, disclosure of know-how); Transfer (sale, licensing, franchising) of designs, trademarks and patterns; Services with a technical content, including technical and engineering studies, as well as technical assistance; and Industrial R&D. TBP receipts capture disembodied technology exports.	Eurostat

Annex D: Country abbreviations

AT	Austria	IS	Iceland
AU	Australia	IT	Italy
BE	Belgium	JP	Japan
BG	Bulgaria	KR	South Korea
BR	Brazil	LT	Lithuania
CA	Canada	LU	Luxembourg
CH	Switzerland	LV	Latvia
CN	China	MK	Former Yugoslav Republic of Macedonia
CY	Cyprus	MT	Malta
CZ	Czech Republic	NL	Netherlands
DE	Germany	NO	Norway
DK	Denmark	PL	Poland
EE	Estonia	PT	Portugal
ES	Spain	RO	Romania
EU27	EU27	RS	Serbia
FI	Finland	RU	Russia
FR	France	SA	South Africa
FYROM	Former Yugoslav Republic of Macedonia	SE	Sweden
GR	Greece	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	TR	Turkey
IE	Ireland	UK	United Kingdom
IN	India	US	United States

Annex E: Summary Innovation Index (SII) time series

	2007	2008	2009	2010	2011
EU27	0.517	0.526	0.526	0.533	0.539
BE	0.606	0.617	0.604	0.625	0.621
BG	0.173	0.192	0.205	0.216	0.239
CZ	0.397	0.404	0.386	0.400	0.436
DK	0.727	0.718	0.688	0.704	0.724
DE	0.660	0.668	0.693	0.711	0.700
EE	0.395	0.410	0.476	0.492	0.496
IE	0.576	0.597	0.574	0.571	0.582
GR	0.329	0.355	0.343	0.339	0.343
ES	0.397	0.404	0.408	0.410	0.406
FR	0.505	0.515	0.531	0.540	0.558
IT	0.413	0.423	0.424	0.429	0.441
CY	0.418	0.474	0.474	0.483	0.509
LV	0.191	0.205	0.215	0.213	0.230
LT	0.265	0.272	0.242	0.258	0.255
LU	0.610	0.622	0.624	0.651	0.595
HU	0.314	0.316	0.320	0.333	0.352
MT	0.292	0.312	0.345	0.383	0.340
NL	0.570	0.575	0.590	0.595	0.596
AT	0.576	0.593	0.613	0.626	0.595
PL	0.284	0.293	0.292	0.304	0.296
PT	0.340	0.372	0.412	0.426	0.438
RO	0.226	0.242	0.265	0.259	0.263
SI	0.431	0.454	0.485	0.499	0.521
SK	0.295	0.309	0.307	0.322	0.305
FI	0.643	0.642	0.687	0.708	0.691
SE	0.746	0.767	0.753	0.766	0.755
UK	0.620	0.625	0.600	0.599	0.620
HR	0.260	0.269	0.283	0.281	0.310
TR	0.181	0.191	0.200	0.208	0.213
IS	0.543	0.573	0.586	0.616	0.603
NO	0.458	0.471	0.472	0.485	0.478
CH	0.779	0.805	0.821	0.818	0.833
RS	0.252	0.259	0.257	0.284	0.282
MK	0.225	0.224	0.237	0.252	0.252

Annex F: Performance scores per dimension

	Human resources	Research systems	Finance and support	Firm invest-ments	Linkages & entrepre-neurship	Intellec-tual assets	Innovators	Economic effects
EU27	0.563	0.530	0.584	0.440	0.487	0.551	0.506	0.585
BE	0.672	0.788	0.578	0.417	0.822	0.522	0.680	0.523
BG	0.455	0.187	0.156	0.312	0.092	0.201	0.114	0.314
CZ	0.534	0.279	0.290	0.482	0.448	0.257	0.584	0.586
DK	0.620	0.829	0.719	0.564	0.932	0.845	0.558	0.635
DE	0.613	0.550	0.584	0.635	0.627	0.790	0.991	0.741
EE	0.575	0.370	0.677	0.668	0.651	0.403	0.576	0.366
IE	0.772	0.677	0.343	0.528	0.511	0.476	0.445	0.727
GR	0.475	0.328	0.188	0.220	0.464	0.135	0.670	0.348
ES	0.436	0.537	0.466	0.255	0.248	0.407	0.332	0.472
FR	0.677	0.663	0.643	0.402	0.511	0.490	0.473	0.567
IT	0.433	0.427	0.349	0.290	0.387	0.520	0.555	0.477
CY	0.578	0.440	0.219	0.501	0.657	0.356	0.691	0.530
LV	0.451	0.053	0.250	0.369	0.061	0.309	0.035	0.262
LT	0.646	0.168	0.438	0.240	0.195	0.133	0.170	0.209
LU	0.702	0.655	0.528	0.288	0.538	0.589	0.740	0.659
HU	0.467	0.242	0.251	0.333	0.206	0.261	0.098	0.657
MT	0.110	0.228	0.115	0.359	0.148	0.413	0.264	0.671
NL	0.642	0.869	0.696	0.305	0.592	0.680	0.366	0.565
AT	0.589	0.647	0.506	0.508	0.631	0.773	0.611	0.468
PL	0.593	0.151	0.341	0.380	0.112	0.256	0.087	0.377
PT	0.451	0.481	0.522	0.321	0.458	0.345	0.724	0.366
RO	0.400	0.153	0.235	0.409	0.100	0.067	0.167	0.490
SI	0.649	0.458	0.552	0.508	0.601	0.447	0.469	0.528
SK	0.634	0.173	0.229	0.236	0.165	0.145	0.206	0.482
FI	0.858	0.630	0.833	0.639	0.768	0.662	0.523	0.638
SE	0.893	0.820	0.895	0.691	0.793	0.799	0.562	0.622
UK	0.730	0.792	0.697	0.453	0.836	0.469	0.309	0.613
HR	0.525	0.176	0.281	0.291	0.397	0.085	0.404	0.367
TR	0.066	0.208	0.385	0.084	0.216	0.099	0.562	0.273
IS	0.348	0.861	1.000	0.694	0.795	0.391	:	0.597
NO	0.644	0.840	0.608	0.183	0.620	0.298	0.354	0.337
CH	0.852	0.997	0.592	0.785	0.607	0.948	1.000	0.847
MK	0.329	0.114	0.000	0.241	0.184	0.018	0.483	0.391
RS	0.390	0.345	0.667	0.230	0.207	0.019	0.091	0.376

Annex G: Gender data

1.1.1 Doctorate graduates				1.1.2 Tertiary education				1.1.3 Youth education				3.2.1 KIA employment			
	All	Males	Females		All	Males	Females		All	Males	Females		All	Males	Females
EU	1.5	1.6	1.4	EU	33.6	30.0	37.2	EU	79.0	76.2	81.8	EU	13.5	13.8	13.1
BE	1.4	1.6	1.1	BE	44.4	39.0	50.0	BE	82.5	80.3	84.7	BE	14.6	15.6	13.4
BG	0.6	0.5	0.6	BG	27.7	20.7	35.5	BG	84.4	85.0	83.6	BG	8.6	7.1	10.2
CZ	1.4	1.7	1.1	CZ	20.4	18.6	22.3	CZ	91.9	91.1	92.8	CZ	11.8	11.1	12.8
DK	1.7	1.9	1.5	DK	47.0	42.2	52.1	DK	68.3	61.4	75.6	DK	16.1	18.0	14.1
DE	2.6	2.9	2.4	DE	29.8	29.9	29.7	DE	74.4	72.2	76.7	DE	15.3	15.6	15.0
EE	0.8	0.9	0.8	EE	40.0	32.2	47.7	EE	83.2	76.9	89.5	EE	9.8	9.1	10.5
IE	1.5	1.7	1.4	IE	49.9	44.4	55.3	IE	88.0	85.3	90.6	IE	19.5	21.5	17.3
GR	0.8	1.0	0.7	GR	28.4	25.7	31.4	GR	83.4	79.5	87.2	GR	10.9	10.2	12.0
ES	1.0	1.0	1.0	ES	40.6	35.7	45.9	ES	61.2	54.7	67.9	ES	11.5	11.7	11.3
FR	1.5	1.7	1.3	FR	43.5	39.3	47.7	FR	82.8	79.8	85.8	FR	13.8	14.2	13.4
IT	1.6	1.5	1.6	IT	19.8	15.5	24.2	IT	76.3	72.6	80.2	IT	13.7	13.4	14.0
CY	0.2	0.3	0.2	CY	45.1	41.3	48.9	CY	86.3	83.2	89.0	CY	14.4	12.2	16.9
LV	0.5	0.4	0.6	LV	32.3	23.4	41.4	LV	79.9	74.1	85.9	LV	9.6	9.1	10.1
LT	0.9	0.7	1.1	LT	43.8	36.3	51.2	LT	86.9	84.2	89.7	LT	8.7	7.7	9.6
LU	--	--	--	LU	46.1	44.8	47.4	LU	73.4	67.9	78.7	LU	25.7	27.9	22.8
HU	0.9	0.9	0.9	HU	25.7	21.0	30.7	HU	84.0	82.0	85.9	HU	12.8	11.8	13.9
MT	0.3	0.3	0.4	MT	18.6	14.6	22.7	MT	53.3	47.0	60.8	MT	15.8	13.8	19.5
NL	1.7	1.9	1.4	NL	41.4	38.4	44.4	NL	77.6	73.7	81.6	NL	15.2	17.5	12.5
AT	2.1	2.4	1.8	AT	23.5	22.5	24.5	AT	85.6	84.9	86.2	AT	14.4	14.8	13.9
PL	0.8	0.8	0.8	PL	35.3	29.8	40.8	PL	91.1	88.4	93.8	PL	9.1	8.0	10.4
PT	2.7	2.0	3.4	PT	23.5	17.7	29.4	PT	58.7	54.8	62.7	PT	8.6	8.7	8.5
RO	1.3	1.4	1.3	RO	18.1	16.7	19.6	RO	78.2	77.7	78.8	RO	6.0	5.4	6.8
SI	1.5	1.6	1.4	SI	34.8	26.4	44.0	SI	89.1	86.1	92.8	SI	13.4	12.5	14.5
SK	2.1	2.1	2.1	SK	22.1	18.2	26.2	SK	93.2	93.2	93.1	SK	10.1	8.8	11.7
FI	2.9	2.7	3.1	FI	45.7	37.7	54.0	FI	84.2	82.8	85.6	FI	15.2	16.6	13.7
SE	3.1	3.1	3.1	SE	45.8	39.8	52.1	SE	85.9	84.9	86.9	SE	17.1	19.3	14.6
UK	2.2	2.4	2.0	UK	43.0	40.9	45.1	UK	80.4	78.9	82.0	UK	17.0	19.2	14.5
HR	0.9	1.0	0.9	HR	22.6	19.0	26.4	HR	95.3	94.0	96.8	HR	9.9	9.4	10.5
TR	0.3	0.4	0.3	TR	15.5	17.3	13.6	TR	51.1	57.2	46.0	TR	4.8	4.6	5.5
IS	0.7	0.5	0.9	IS	40.9	34.5	47.5	IS	53.4	51.4	55.5	IS	18.1	19.0	17.1
NO	1.7	1.9	1.6	NO	47.3	39.7	55.2	NO	71.1	66.4	75.9	NO	14.2	16.8	11.4
CH	3.6	4.2	2.9	CH	44.2	47.5	40.9	CH	82.3	80.5	84.3	CH	19.9	23.1	16.3
MK	0.4	0.3	0.4	MK	17.1	16.2	18.0	MK	82.8	86.0	79.5	MK	10.6	13.1	6.6
RS	--	--	--	RS	--	--	--	RS	--	--	--	RS	--	--	--