



# Innovation Union Scoreboard 2013



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# Innovation **Union** Scoreboard 2013

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# Executive summary

## Innovation Union Scoreboard 2013: the first edition reflecting the impact of the economic crisis

This year's edition offers a unique opportunity to measure the first effects of the economic crisis on the research and innovation landscape in Europe. It uses the most recent available data from Eurostat and other internationally recognised sources with data referring to 2011 for 12 indicators and 2010 for 9 indicators and to less recent years for only 3 indicators. Six indicators are derived from the recently published Community Innovation Survey 2010, which investigated the innovation activity of the European enterprises during the crisis years 2008-2010.

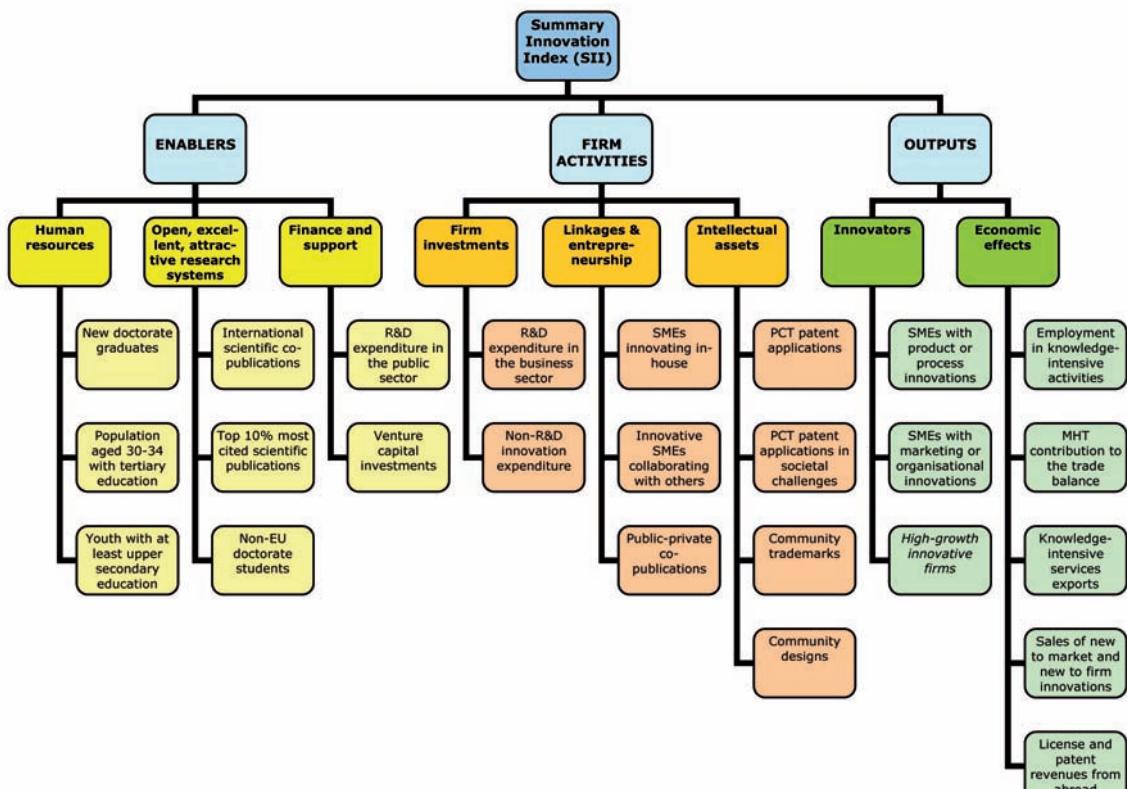
The Innovation Union Scoreboard 2013 gives a comparative assessment of the innovation performance of the EU27 Member States and the relative strengths and weaknesses of their research and innovation systems. It monitors innovation trends across the EU27 Member States, as well as

Croatia, Iceland, the Former Yugoslav Republic of Macedonia, Norway, Serbia, Switzerland and Turkey. It also includes comparisons between the EU27 and 10 global competitors. 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 Innovation Union Scoreboard is accompanied by the Regional Innovation Scoreboard 2012, the pilot European Public Sector Innovation Scoreboard and analytical reports on among others regional research cooperation patterns of European SMEs and the link between regional innovation and socio-economic performance.

## Member States analysed by eight innovation dimensions and 25 indicators...

The measurement framework used in the Innovation Union Scoreboard distinguishes between 3 main types of indicators and 8 innovation dimensions, capturing in total 25 different indicators (Figure 1).

**Figure 1: Measurement 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*.

### **...and based on their average innovation performance are put into four performance groups.**

- 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

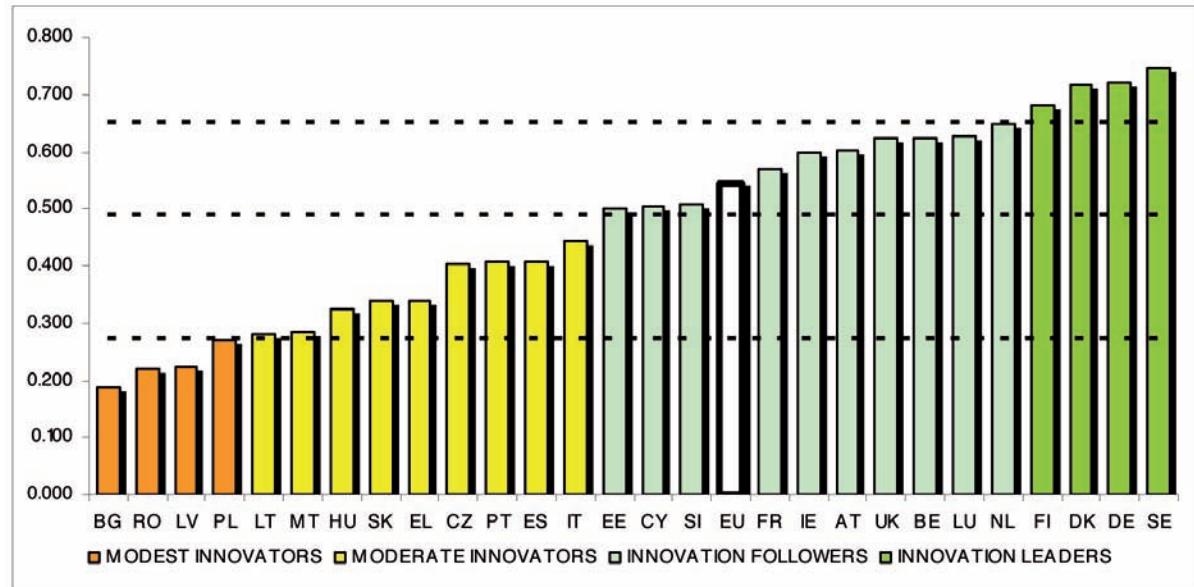
show a performance above or close to that of the EU27 average. These countries are the '*Innovation followers*'.

- The performance of Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Portugal, Slovakia and Spain is below that of the EU27 average. These countries are '*Moderate innovators*'.
- The performance of Bulgaria, Latvia, Poland and Romania is well below that of the EU27 average. These countries are '*Modest innovators*'.

### **The overall ranking remains relatively stable with Sweden confirming its innovation leadership...**

Overall innovation performance ranking remains relatively stable compared to previous IUS editions with Sweden confirming its EU innovation leadership for the third time in a row. It is followed by Germany that switched ranks with Denmark. Finland closes the group of the most innovative Member States.

**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 reflects performance in 2010/2011 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.

### ... but several changes inside the performance groups take place.

Though, there are several upward and downward movements inside each of the performance groups. The Netherlands becomes the top innovation follower and Italy remains the top innovator in the moderate performance group. The bottom end of the ranking is closed by Romania and Bulgaria both being outpaced by Latvia that occupied the last position a year ago.

Two Member States changed the performance group: Lithuania advanced to the moderate innovators and Poland moved down becoming a modest innovator. It should be however noted, that in both cases the change in performance group was due to marginal changes of the innovation performance.

### The EU is increasing its innovation performance with Estonia being the unquestionable innovation growth leader...

Overall, the EU annual average growth rate of innovation performance reached 1.6% over the analysed five-year period 2008-2012.

While almost all Member States improved their innovation performance, Estonia is by far the European innovation growth leader that grew with an average annual rate of 7.1%. It is followed by Lithuania and Latvia that improved at average annual rates of 5.0% and 4.4% respectively. The lowest positive innovation growth rates were recorded in Poland (0.4%), Bulgaria (0.6%) and Sweden (0.6%). In two Member States, Greece and Cyprus, innovation performance has declined at an average annual rate of 1.7% and 0.7% respectively.

### ... but the innovation divide between the Member States is widening.

The results for this year show the process of convergence in innovation performance within the EU has come to a halt: Less innovative countries as a group are no longer catching-up with the most innovative countries. This means that differences in innovation performance in the European Union have started to increase signalling a possible start of a process of divergence in Member States' innovation performance.

### While SMEs and commercialisation of innovation drive the innovation growth...

When looking at individual indicators, the EU innovation performance was driven most by *Innovating SMEs collaborating with others* with an annual average growth rate of 7.9% on that indicator. Other key drivers of innovation performance in Europe were *License and patent revenues from abroad* as well as *Community trademarks* with growth rates of 6.1% and 5.2% respectively. Open, excellent and attractive research systems was another driver where the indicators for *Non-EU doctorate students* and *International scientific publications* grew at annual average rates of 4.1% and 4.0% respectively.

### ... business and venture capital investments are dropping the most.

The economic impact has its harshest impact on *Non R&D innovation expenditures* which dropped by 5.2% annually, followed by *Venture capital investments* that were declining at an average rate of 3.1% annually. The finance and support to innovation was cushioned by *R&D expenditures in the public sector* which increased at an annual average rate of 3.2%. In general, a performance decline or lack of progress was observed on indicators that are affected by short-term decisions, while performance continued to improve on indicators that reflect decisions taken a longer period ago.

### The progress since the launch of the Europe2020 strategy is insufficient...

Since the launch of the Europe 2020 Innovation Union flagship initiative in 2010, most of the Member States improved their innovation performance, in particular all innovation leaders and innovation followers except the UK. However, only few of the moderate innovators (Italy, Lithuania, Slovakia and Spain) and modest innovators (Latvia) managed to improve their innovation performance since the strategy was launched. In total, the innovation index has worsened in 9 countries: with a slight decline in United Kingdom (0.2%) as well as Poland, Czech Republic, Hungary, Portugal, Romania, Greece and the most dramatic deterioration in Bulgaria (-18.7%) and Malta (-16.0%).

### **... as mostly strong innovators increase their innovation growth rates.**

Altogether the innovation leaders and followers managed to increase their innovation growth rates over the crisis period 2008–2012 while in the groups of moderate and modest innovators growth rates plummeted. A trend of divergence emerges where the leading innovators are getting even stronger while moderate and modest innovators fail to catch up.

### **Key strengths of innovation leaders are business activity and higher education sector...**

The most innovative countries in the EU share a number of strengths in their national research and innovation systems with a key role of business activity and the higher education sector. The business sectors of all innovation leaders perform very well as measured by *Business R&D expenditures* and *PCT patent applications*. They also share a well-developed higher education sector as shown by very high scores on *New doctorates graduates*, *International scientific co-publications* and *Public-private co-publications* with the latter also signalling strong linkages between industry and science.

### **... as well as balanced national research and innovation systems.**

The overall good performance of the innovation leaders reflects a balanced national research and innovation system. It means that the innovation leaders 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.

### **Switzerland repeatedly outperforms all EU Member States...**

Taking into account European countries outside the EU, Switzerland confirms its position as the overall Innovation leader continuously outperforming all EU27 countries. Iceland is one of the Innovation followers, Croatia, Norway and Serbia are Moderate innovators and the Former Yugoslav Republic of Macedonia and Turkey are Modest innovators.

### **... and South Korea and the US lead in a global international comparison.**

Comparing the EU27 with a selected group of major global competitors, this year's Innovation Union Scoreboard edition again confirms that the US, Japan and South Korea have a performance lead over the EU27 with South Korea joining the US as most innovative country. Although this lead has been increasing for South Korea, the EU27 has been able to close almost half of the gap with the US and Japan since 2008. The global innovation leaders US, Japan and South Korea are particularly dominating the EU27 in indicators capturing business activity as measured by *R&D expenditures in the business sector*, *Public-private co-publications* and *PCT patents* but also in educational attainment as measured by the *Share of population having completed tertiary education*.

The EU27 continues to have a performance lead over Australia, Canada and all BRICS countries (Brazil, Russia, India, China and South Africa). However, this lead has been declining with China, remained stable with the other BRICS countries and has been increasing compared to Australia and Canada.

# 1. Introduction

The Innovation Union Scoreboard 2013 follows the methodology of previous editions in distinguishing between 3 main types of indicators – Enablers, Firm activities and Outputs – and 8 innovation dimensions, capturing in total 24 indicators. The IUS indicators are listed in Table 1 and full definitions are presented in Annex C.

The **Enablers** capture the main drivers of innovation performance external to the firm and differentiates between 3 innovation dimensions. 'Human resources' includes 3 indicators and measures the availability of a high-skilled and educated workforce. The indicators capture new doctorate graduates, those aged 30-34 with completed tertiary education and those aged 20-24 having completed at least upper secondary education. 'Open, excellent and attractive research systems' includes 3 indicators and measures the international competitiveness of the science base by focusing on the international scientific co-publications, most cited publications and non-EU doctorate students. 'Finance and support' includes 2 indicators and measures the availability of finance for innovation projects by venture capital investments and the support of governments for research and innovation activities by R&D expenditures by universities and government research organisations.

**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 measuring innovation capabilities by looking at SMEs with that innovate in-house and collaboration efforts between innovating firms and research collaboration between the private and public sector. 'Intellectual assets' captures different forms of Intellectual Property Rights (IPR) generated as a throughput in the innovation process including PCT patent applications, Community trademarks and Community designs.

**Outputs** capture the effects of firms' innovation activities and it differentiates between 2 innovation dimensions. 'Innovators' includes 3 indicators measuring the share 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 is under development. 'Economic effects' includes 5 indicators and captures the economic success of innovation in employment in knowledge-intensive activities, the contribution of medium and high-tech product exports to the trade balance, exports of knowledge-intensive services, sales due to innovation activities and license and patent revenues from selling technologies abroad.

The Innovation Union Scoreboard 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 2008 (1 indicator), 2009 (2 indicators), 2010 (9 indicators) and 2011 (12 indicators) (these are the most recent years for which data are available as highlighted by the underlined years in Table 1). As a consequence the Innovation Union Scoreboard 2013 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.

Compared to the IUS 2011, **three indicators have changed**. For two indicators definitions have been changed. First, the definition for venture capital investment has changed due to a new definition of the venture capital phases by the European Venture Capital Association (EVCA). The indicator now includes venture capital investments in the following stages: seed stage, start-up stage, later stage venture, growth capital, rescue/turnaround capital and replacement capital. Secondly, for PCT patent applications in societal challenges measuring health and environmental patents, the latter were captured in the IUS 2011 by applications in climate change mitigation but as updates for these data are no longer made available they have been replaced with applications in environment-related technologies. Thirdly, the IUS 2011 indicator on Medium and high-tech product exports as a percentage share of total product exports has been replaced with an indicator measuring the Contribution of medium and high-tech product exports to the trade balance. These changes limit the direct comparability between the results of the current and last IUS editions.

Table 1: Innovation Union Scoreboard indicators

Main type / innovation dimension / indicator	Data source	Years covered
<b>ENABLERS</b>		
Human resources		
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Eurostat	2006 – <u>2010</u>
1.1.2 Percentage population aged 30-34 having completed tertiary education	Eurostat	2007 – <u>2011</u>
1.1.3 Percentage youth aged 20-24 having attained at least upper secondary level education	Eurostat	2007 – <u>2011</u>
Open, excellent and attractive research systems		
1.2.1 International scientific co-publications per million population	Science-Metrix (Scopus)	2007 – <u>2011</u>
1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	Science-Metrix (Scopus)	2004 – <u>2008</u>
1.2.3 Non-EU doctorate students <sup>1</sup> as a % of all doctorate students	Eurostat	2006 – <u>2010</u>
Finance and support		
1.3.1 R&D expenditure in the public sector as % of GDP	Eurostat	2007 - <u>2011</u>
1.3.2 Venture capital investment as % of GDP	Eurostat	2007 - <u>2011</u>
<b>FIRM ACTIVITIES</b>		
Firm investments		
2.1.1 R&D expenditure in the business sector as % of GDP	Eurostat	2007 - <u>2011</u>
2.1.2 Non-R&D innovation expenditures as % of turnover	Eurostat	2006, 2008, <u>2010</u>
Linkages & entrepreneurship		
2.2.1 SMEs innovating in-house as % of SMEs	Eurostat	2006, 2008, <u>2010</u>
2.2.2 Innovative SMEs collaborating with others as % of SMEs	Eurostat	2006, 2008, <u>2010</u>
2.2.3 Public-private co-publications per million population	CWTS (Thomson Reuters)	2007, <u>2011</u>
Intellectual assets		
2.3.1 PCT patent applications per billion GDP (in PPSE)	Eurostat	2005, <u>2009</u>
2.3.2 PCT patent applications in societal challenges per billion GDP (in PPSE) (environment-related technologies; health)	OECD / Eurostat	2005, <u>2009</u>
2.3.3 Community trademarks per billion GDP (in PPSE)	OHIM <sup>2</sup> / Eurostat	2007, <u>2011</u>
2.3.4 Community designs per billion GDP (in PPSE)	OHIM / Eurostat	2007, <u>2011</u>
<b>OUTPUTS</b>		
Innovators		
3.1.1 SMEs introducing product or process innovations as % of SMEs	Eurostat	2006, 2008, <u>2010</u>
3.1.2 SMEs introducing marketing or organisational innovations as % of SMEs	Eurostat	2006, 2008, <u>2010</u>
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	2007, <u>2011</u>
3.2.2 Contribution of medium and high-tech product exports to the trade balance	UN	2007, <u>2011</u>
3.2.3 Knowledge-intensive services exports as % total service exports	UN / Eurostat	2006, <u>2010</u>
3.2.4 Sales of new to market and new to firm innovations as % of turnover	Eurostat	2006, 2008, <u>2010</u>
3.2.5 License and patent revenues from abroad as % of GDP	Eurostat	2007, <u>2011</u>

<sup>1</sup> For non-EU countries the indicator measures the share of non-domestic doctoral students.<sup>2</sup> Office for Harmonization in the Internal Market

## 2. Innovation Union Scoreboard: Findings for member states

### 2.1. Innovation performance

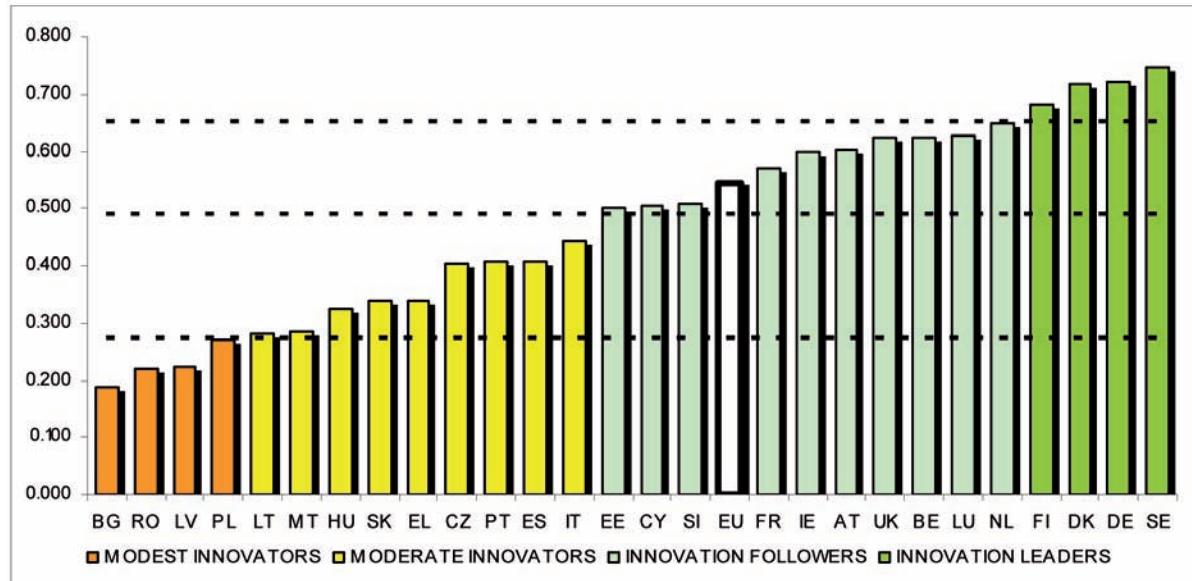
A summary picture of innovation performance is provided by the Summary Innovation Index, a composite indicator obtained by an appropriate aggregation of the 25 indicators used for measuring innovation performance<sup>3</sup>. Figure 3 shows the performance results for the 27 EU Member States. Based on this year's Summary Innovation Index, **the Member States fall into the following four performance groups**:

- The performance of the **Innovation leaders**, including Denmark, Finland, Germany and Sweden, is well above that of the EU27 (i.e. more than 20% above the EU27 average).
- The **Innovation followers** show a performance close to that of the EU27 (i.e. less than 20% above but more than 10% below that of the EU27). Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK are the Innovation followers.

- The performance of the **Moderate innovators** is below that of the EU27 (i.e. between 50% and 90% of the performance of the E27). Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Portugal, Slovakia and Spain are all Moderate innovators.
- The **Modest innovators** show a performance level well below that of the EU27 (i.e. more than 50% below that of the EU27) and include Bulgaria, Latvia, Poland and Romania.

Compared to the IUS 2011 **only Lithuania has managed to improve group membership** from a Modest innovator in the IUS 2011 to a Moderate innovator in the IUS 2013. Poland has dropped from the group of Moderate innovators and is now a Modest innovator. All other countries are in the same performance group as last year<sup>4</sup>.

**Figure 3: 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 reflects performance in 2010/2011 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.

<sup>3</sup> Technical Annex 6.1 gives a brief explanation of the calculation methodology. The IUS 2010 Methodology report provides a detailed explanation.

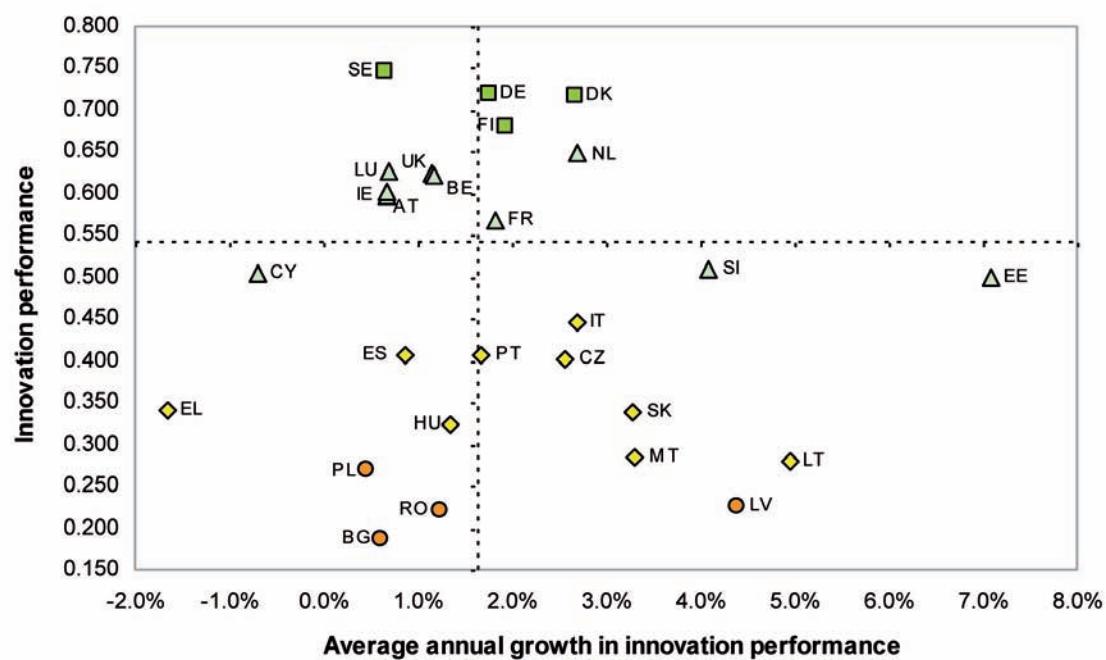
<sup>4</sup> The IUS performance groups are relative performance groups with countries' group membership depending on their performance relative to that of the EU27. With a growing EU27 innovation performance, the thresholds between these groups will thus also be increasing over time. Another straightforward result is that if one country manages to move up to a higher performance group it becomes more likely that another country will move down, as is the case for Lithuania and Poland.

## 2.2. Growth performance 2008-2012

As in previous IUS editions changes in innovation performance are monitored over a five-year period. Over the period 2008-2012 all countries except Cyprus and Greece show an improvement in their innovation performance (Figure 4). Estonia has experienced the fastest annual average growth in performance (7.1%) of all Member States. For only two countries growth has been negative: where Cyprus is showing a small decline (-0.7%), Greece's innovation performance is declining more rapidly at an annual average rate of -1.7%.

**The overall process of convergence** witnessed in previous IUS editions **has come to a halt**. The spread in innovation performance as measured by sigma-convergence has started to increase in 2012 after having fallen continuously up until 2011 (see Box 1). Already last year these were signs of a slowing down of the convergence process as shown by a much smaller reduction in this spread in performance from 2010 to 2011 as compared to previous years.

Figure 4: Growth in innovation performance 2008-2012



Colour coding matches the groups of countries identified in Section 3.1. Average annual growth rates as calculated over a five-year period<sup>5</sup>. Total growth over this five-year period can be derived by multiplying the average annual growth rate by 4. The dotted lines show EU27 performance and growth.

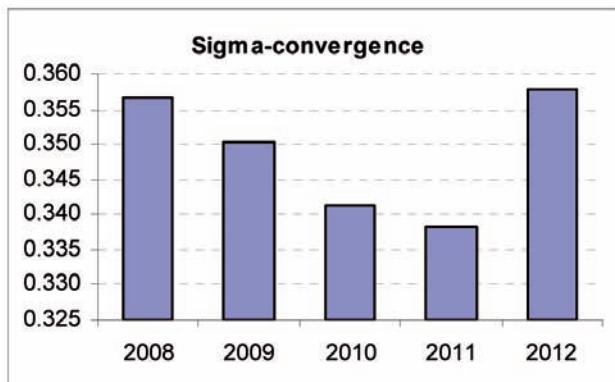
Less innovative countries on average are also no longer catching-up to more innovative countries. This type of convergence is known as beta-convergence and would be shown by a negative relation between the 2008 levels of innovation performance and innovation growth between 2008 and 2012. The discussion in Box 1

shows that there is no statistical proof for the existence of such a negative relation for the IUS 2013 whereas such a negative relation was confirmed for previous IUS editions. Future IUS editions will show if this is a temporary stand-still of the convergence process or if it is the start of a more long lasting process of divergence.

<sup>5</sup> The methodology for calculating growth rates is explained in Technical Annex 6.2.

### 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.



Sigma-convergence occurs when the spread in innovation performance across a group of economies falls over time. This spread in convergence is measured by the ratio of the standard deviation and the average performance of all EU27 Member States. As shown in the graph, this spread has been reduced up until last year confirming sigma-convergence but the rate of convergence has been slowing down and has even reversed into divergence in 2012: **differences in countries' innovation performance have started to increase.**

Beta-convergence applies if a less innovative country tends to grow faster than a more innovative country. Beta-convergence can be measured by the partial correlation between growth in innovation performance over time and its initial level: a significant negative correlation confirms beta-convergence. The correlation between "2008" innovation performance and 2008-2012 innovation growth is -0.220 but not significant indicating that there is no beta-convergence.

Within the four country groups growth performance is also very different with some countries growing relatively quickly and others more slowly (Table 2). Within the Innovation leaders, Denmark is the growth leader. Estonia and Slovenia are the growth leaders of the Innovation followers, Lithuania is the growth

leader of the Moderate innovators and Latvia is the growth leader of the Modest innovators. Differences in average annual growth rates between the four performance countries are relatively small with the Innovation leaders growing at an annual rate of 1.8% and the Modest innovators at 1.7%.

**Table 2: Innovation growth leaders**

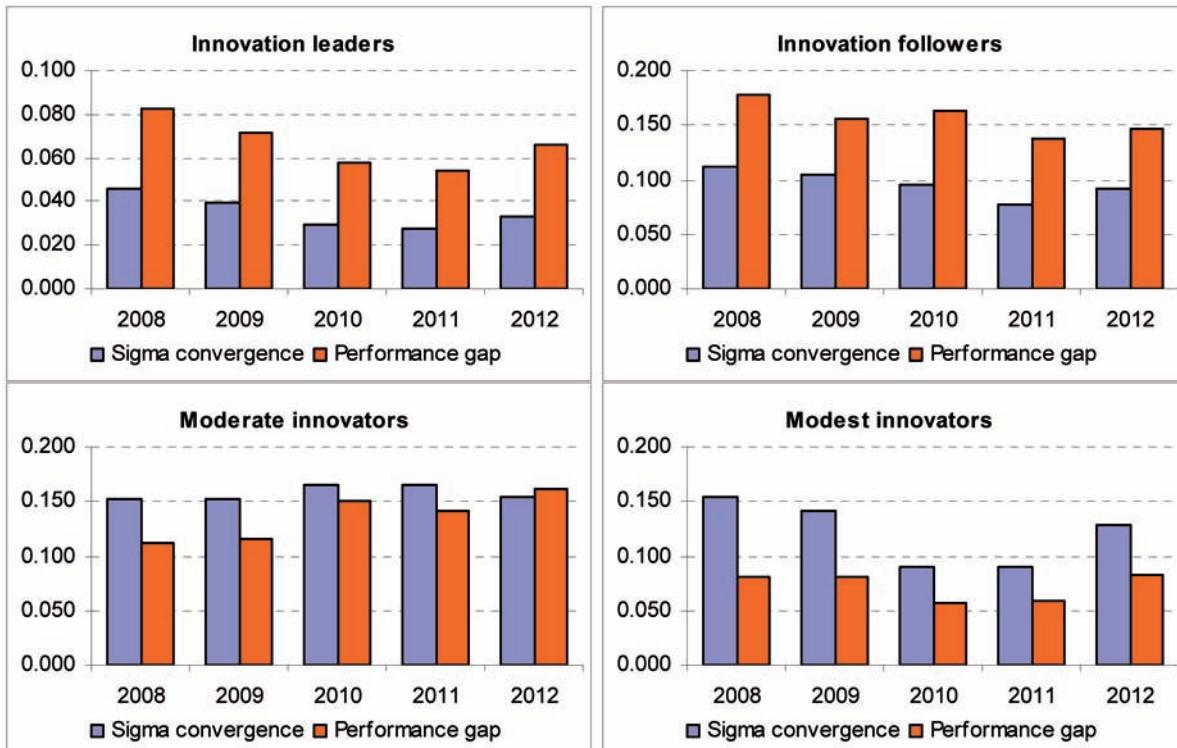
Group	Growth rate 2008-2012	Growth leaders	Moderate growers	Slow growers
Innovation leaders	1.8%	Denmark (DK 2.7%)	Finland (FI 1.9%) Germany (DE 1.8%)	Sweden (SE 0.6%)
Innovation followers	1.9%	Estonia (EE 7.1%) Slovenia (SI 4.1%)	Netherlands (NL 2.7%) France (FR 1.8%) United Kingdom (UK 1.2%) Belgium (BE 1.1%) Luxembourg (LU 0.7%) Austria (AT 0.7%) Ireland (IE 0.7%)	Cyprus (CY -0.7%)
Moderate innovators	2.1%	Lithuania (LT 5.0%)	Malta (MT 3.3%) Slovakia (SK 3.3%) Italy (IT 2.7%) Czech Republic (CZ 2.6%) Portugal (PT 1.7%) Hungary (HU 1.4%) Spain (ES, 0.9%)	Greece (GR -1.7%)
Modest innovators	1.7%	Latvia (LV 4.4%)	Romania (RO 1.2%) Bulgaria (BG 0.6%)	Poland (PL 0.4%)

Average annual growth rates as calculated over a five-year period. Countries are classified following their growth performance relative to that of their performance group.

Convergence has also been the dominant phenomenon within 3 of the 4 performance groups up until 2011, only within the Moderate innovators performance was already diverging (Figure 5). This convergence process up until 2011 is confirmed by both the development

in sigma-convergence and the performance gap in each performance group. But **for 2012 the process of convergence has been reversed to one of divergence** for the Innovation leaders, Innovations followers and Modest innovators.

**Figure 5: Convergence in innovation performance**

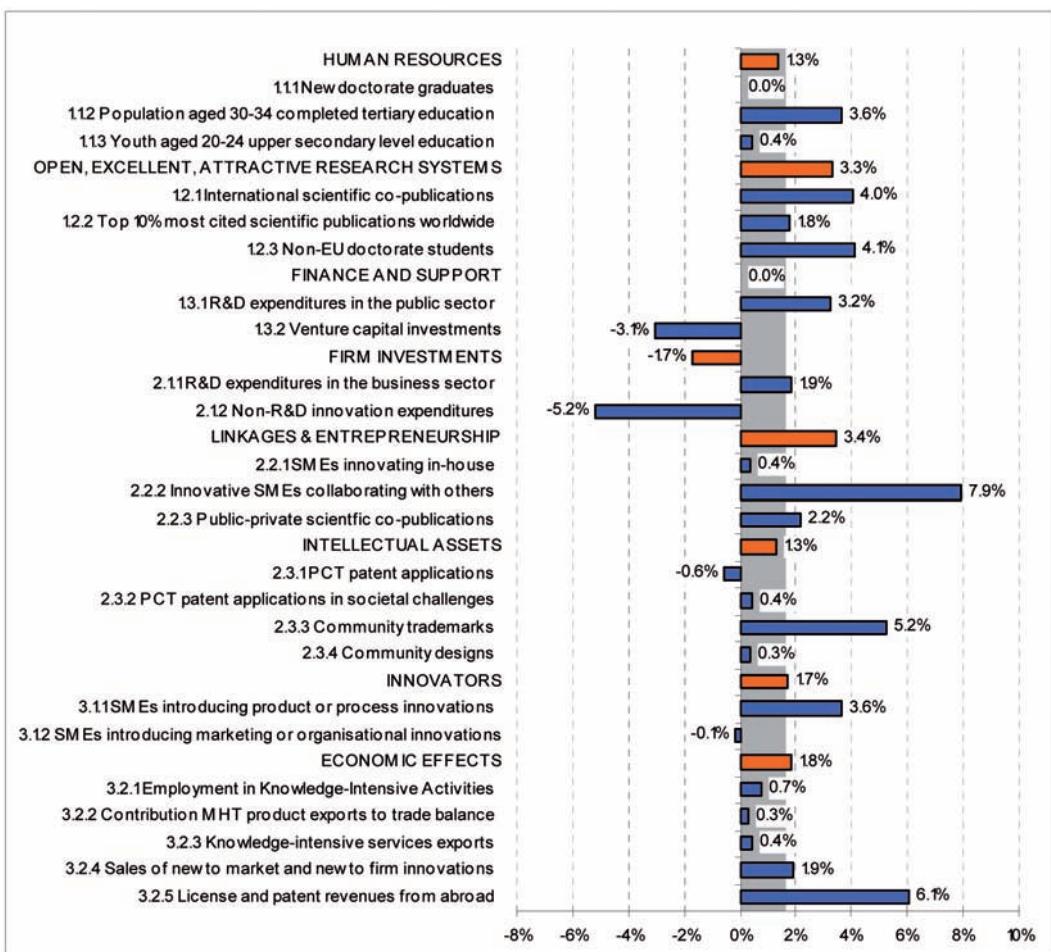


Sigma convergence is equal to the ratio of the standard deviation and average performance of the countries in each performance group. Sigma convergence is equal to the ratio of the standard deviation and average performance of the countries in each performance group. The performance gap is equal to the difference between the performance score of the best and worst performing country in each performance group.

**For the EU27 innovation performance has increased at an average rate of 1.6% over the period 2008-2012.** Growth has been above average in Open, excellent and attractive research systems (3.3%) and Linkages & entrepreneurship (3.4%), in particular due to high growth in International scientific co-publications, Non-EU doctorate students and Innovative SMEs collaborating with others (Figure 6). Growth has been close to average for Human resources, Intellectual assets, Innovators and Economic effects despite high growth in Population aged 30-34 with completed tertiary education, Community trademarks, SMEs having introduced

a new product or process innovation and License and patent revenues from abroad. For Finance and support growth has been close to 0%, where above average growth in R&D expenditures in the public sector has been offset by negative growth in Venture capital investments. For Firm investments growth has been negative due to Non-R&D innovation expenditures declining at a rate of 5.2%. The decline in Non-R&D innovation expenditures is observed for the majority of Member States, only in Lithuania and the Netherlands these expenditures have increased significantly.

Figure 6: EU27 Growth performance



The shaded area gives the average growth rate for the EU27 for all indicators.

### 2.3. Performance changes since the launch of the Europe 2020 strategy

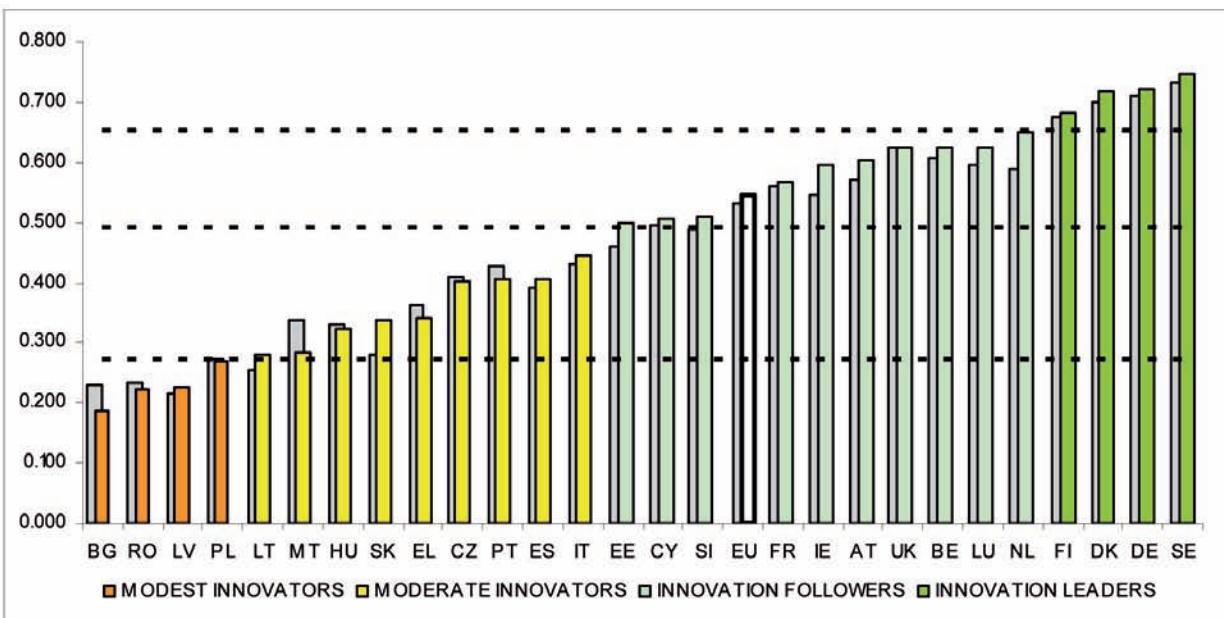
The Europe 2020 Innovation Union flagship initiative was launched by the European Commission in October 2010 aiming to improve Europe's innovation performance. In this section the IUS 2013 analyses progress made since late 2010 by comparing innovation performance for 2012 with that of 2010 using the IUS 2013 indicators.

Most Member States and the EU27 have improved their innovation performance between 2010 and 2012 as shown in Figure 7. In particular all Innovation leaders and Innovation followers, except the UK, have improved their performance. For 6 Moderate innovators performance has decreased: for Czech Republic (-1.5%), Poland (-1.3%) and Hungary (-1.9%) the decrease is

quite small but for Greece (-6.0%), Portugal (-4.9%) and in particular Malta (-16.0%) performance has decreased more significantly. For two Modest innovators performance has also decreased: for Romania (-5.1%) and most notably for Bulgaria (-18.7%).

These results match those shown in section 3.2 that the overall process of convergence up until 2011 is followed by increasing differences in Member States' innovation performance in 2012. The divergence in 2012 is the result of the fact that innovation performance has declined for almost half of the Moderate and Modest innovators whereas it keeps improving for all Innovation leaders and Innovation followers.

Figure 7: Progress since the launch of the Europe 2020 strategy



The grey coloured columns show performance in 2010 as measured using the IUS 2013 set of indicators.

The change in innovation performance between 2010 and 2012 is equal to the percentage change between the innovation indexes for 2010 and 2012 as shown on the vertical axis.

There is a marked difference in the change in five-year growth performance in the 2006-2010 period as captured in the IUS 2010 and that in 2008-2012<sup>6</sup>. Where the Innovation leaders and Innovation followers have managed to sustain their growth performance, five-year growth for the Moderate innovators has declined on average by 1.7%-points and for the Modest innovators by 4.5%-points (Table 3). But within these performance groups we also observe remarkable differences. Within the Modest innovators growth has plummeted from almost 11% to just 0.6% for Bulgaria and also for Romania growth has dropped more than 3%-points. Within the Moderate innovators five-year growth has dropped significantly for Greece, Malta and Portugal. Only Czech Republic, Lithuania and Slovakia have managed to increase their growth rates for 2008-2012 as compared to 2006-2010. Half of the Innovation followers have experienced a slowdown in their growth performance, in particular

Cyprus and Slovenia. For Belgium, the UK and in particular Estonia, Ireland and the Netherlands growth performance has improved. Slower growth is also observed for two of the Innovation leaders: Finland and Germany. For Sweden growth has remained the same but Denmark has managed to more than triple its growth. Overall for 15 Member States growth in 2008-2012 has been slowing down compared to growth in 2006-2010 clearly contributing to slower growth for the EU27 at large dropping from 1.8% for 2006-2010 to 1.6% for 2008-2012.

<sup>6</sup> The growth rates for 2006-2010 are not identical to those reported in the IUS 2010 as the set of indicators has changed and also the reference years used for 2006-2010 in this year's report can differ for several indicators to those used in the IUS 2010 depending on differences in data updates.

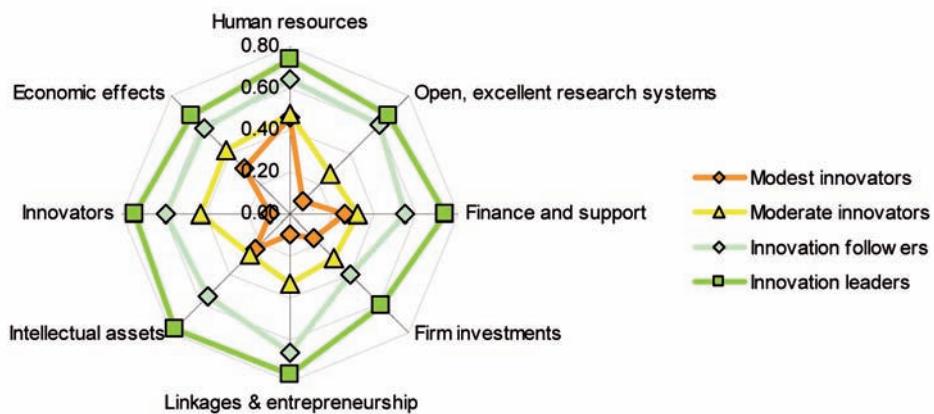
Table 3: Change in growth performance

	Growth rate 2006-2010	Growth rate 2008-2012	Change in growth performance
<b>MODEST INNOVATORS</b>	<b>6.2%</b>	<b>1.7%</b>	<b>-4.5%</b>
Bulgaria	10.7%	0.6%	-10.1%
Romania	4.7%	1.2%	-3.4%
Latvia	3.1%	4.4%	1.3%
Poland	1.6%	0.4%	-1.1%
<b>MODERATE INNOVATORS</b>	<b>3.8%</b>	<b>2.1%</b>	<b>-1.7%</b>
Portugal	7.2%	1.7%	-5.6%
Malta	7.7%	3.3%	-4.4%
Greece	2.4%	-1.7%	-4.1%
Hungary	3.0%	1.4%	-1.7%
Italy	3.5%	2.7%	-0.8%
Spain	0.8%	0.9%	0.0%
Czech Republic	2.4%	2.6%	0.2%
Slovakia	3.0%	3.3%	0.3%
Lithuania	4.2%	5.0%	0.7%
<b>EU27</b>	<b>1.8%</b>	<b>1.6%</b>	<b>-0.2%</b>
<b>INNOVATION FOLLOWERS</b>	<b>1.7%</b>	<b>1.9%</b>	<b>0.2%</b>
Cyprus	1.4%	-0.7%	-2.1%
Slovenia	5.6%	4.1%	-1.5%
France	2.6%	1.8%	-0.8%
Austria	1.4%	0.7%	-0.7%
Luxembourg	1.4%	0.7%	-0.7%
United Kingdom	0.8%	1.2%	0.4%
Belgium	0.7%	1.1%	0.4%
Ireland	-0.3%	0.7%	0.9%
Estonia	6.1%	7.1%	1.0%
Netherlands	1.7%	2.7%	1.0%
<b>INNOVATION LEADERS</b>	<b>1.5%</b>	<b>1.8%</b>	<b>0.2%</b>
Germany	2.4%	1.8%	-0.6%
Finland	2.3%	1.9%	-0.4%
Sweden	0.6%	0.6%	0.0%
Denmark	0.7%	2.7%	1.9%

## 2.4. Innovation dimensions

Where section 3.1 introduced four performance groups based on countries' average performance on 24 innovation indicators, a more interesting pattern emerges when we compare performance of these groups across the different dimensions (Figure 8). The Innovation leaders have the smallest variation in their performance across the 8 dimensions (Table 4), confirming last year's result **that**

**to achieve a high level of performance countries need a balanced innovation system performing well across all dimensions.** The Innovation leaders perform best on all dimensions, followed by the Innovation followers. The Moderate innovators perform better on most dimensions than the Modest innovators, but the latter come close on Human resources and Intellectual assets.

**Figure 8: Country groups: innovation performance per dimension**

Country rankings for each innovation dimension are shown in Figure 9. The Innovation leaders dominate performance in Finance and support, Firm investments, Intellectual assets and Economic effects and to a lesser extent in Linkages & entrepreneurship as is also shown by their low average rank performance for these dimensions (Table 4). The Innovation followers perform relatively well in Human resources, Open, excellent and attractive research

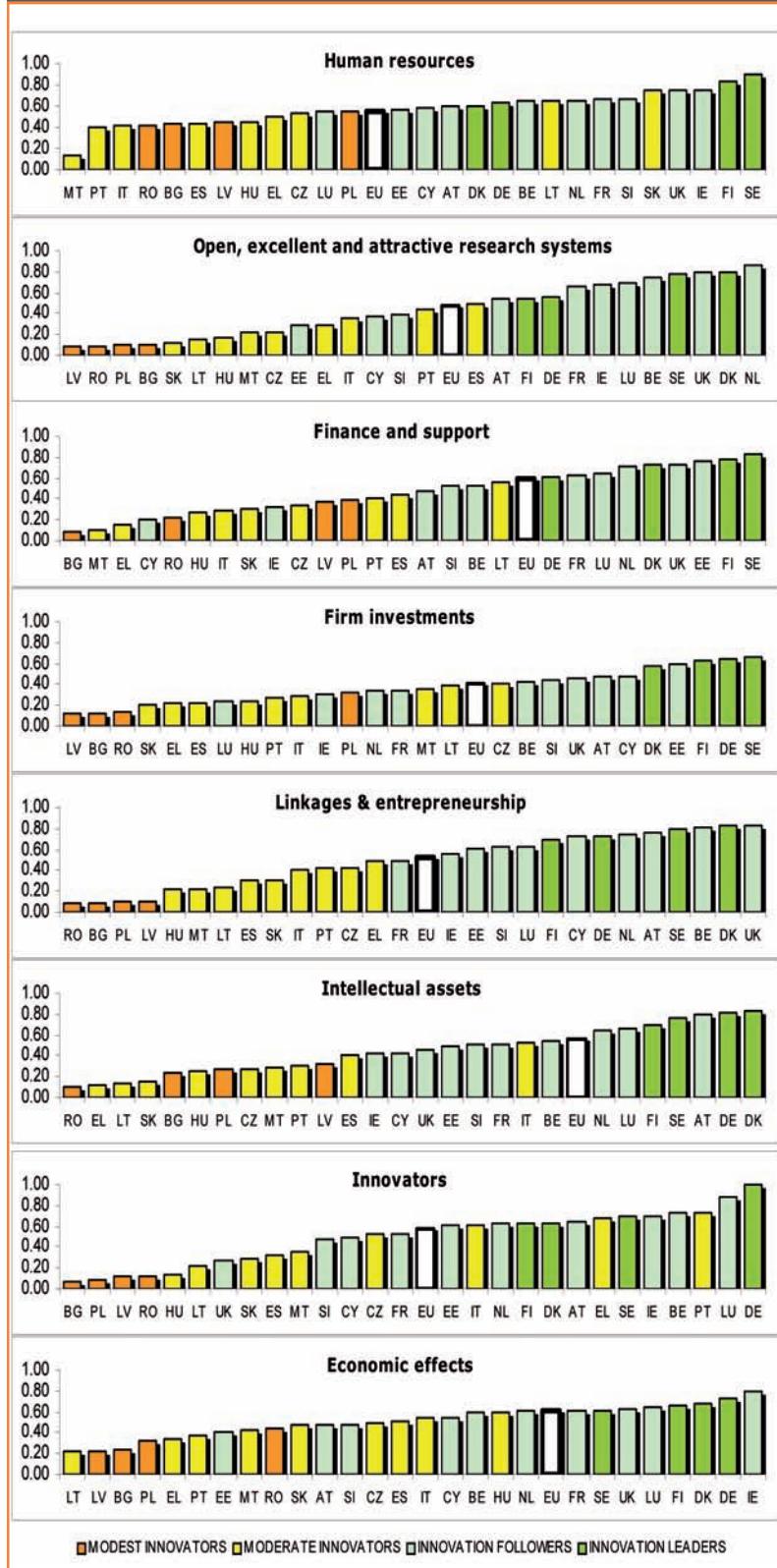
systems and Linkages & entrepreneurship. The Moderate innovators perform relatively well in Firm investments and Innovators and the Modest innovators perform relatively well in Finance and support and Intellectual assets. Variation in Member States' performance is smallest in Human resources, Firm investments and Economic effects and largest in Open, excellent and attractive research systems, Linkages & entrepreneurship and Innovators.

**Table 4: Average rank performance and variation**

	<b>Variation</b>	<b>Modest innovators</b>	<b>Moderate innovators</b>	<b>Innovation followers</b>	<b>Innovation leaders</b>
<b>Variation</b>		1.49%	0.58%	0.54%	0.26%
		<b>Average rank</b>	<b>Average rank</b>	<b>Average rank</b>	<b>Average rank</b>
<b>Innovation performance</b>		26.0	19.5	9.5	2.5
Human resources	2.34%	22.0	19.8	9.8	6.5
Research systems	6.25%	26.5	19.0	9.1	6.3
Finance and support	4.62%	21.8	20.0	11.2	4.3
Firm investments	2.37%	24.5	18.9	11.5	2.8
Linkages & entrepreneurship	6.19%	26.5	20.0	8.4	5.5
Intellectual assets	4.65%	23.0	20.9	10.6	3.0
Innovators	6.10%	26.5	16.1	11.5	6.5
Economic effects	2.18%	24.5	19.5	11.2	4.0

Figure 9 also shows that none of the Modest innovators manages to perform above the EU27 average for any of the 8 innovation dimensions. The Moderate innovators manage to perform better than the EU27 seven times, in Human resources (2), Open, excellent and attractive

research systems (1), Firm investments (1) and Innovators (3). The Innovation followers combine above and below average performance on all dimensions in line with the fact that 3 Innovation followers have an overall performance score below that of the EU27

**Figure 9: Innovation performance per dimension**

and 7 Innovation followers have a score above that of the EU27. None of the Innovation leaders performs below average on any of the 8 innovation dimensions highlighting their balanced innovation system.

Several countries perform much better than expected based on their performance group. Slovakia and Lithuania, both Moderate innovators, perform above average on Human resources. Slovakia performs very well due to its very strong performance in New doctorate graduates and Youth with upper secondary level education. Lithuania performs above average due to its relatively good performance in Population aged 30-34 with completed tertiary education and Youth with upper secondary level education.

The Netherlands has the most open, excellent and attractive research system due to its strong performance in both International scientific co-publications and Most cited publications. However, as data for Non-EU doctorate students are not available, average Dutch performance for this dimension is measured using data for only two indicators whereas for most of the other countries it is based on three indicators.

The United Kingdom performs best in Linkages & entrepreneurship as a result from having the highest share of Innovative SMEs collaborating with others. Also for the UK average performance is measured using data for only two indicators as data on the share of SMEs innovating in-house are not available.

Portugal performs very well on the Innovators dimension due to a 20% higher share of both SMEs introducing product or process innovations and SMEs introducing marketing or organisational innovations as compared to the average shares for the EU27. Also Greece performs above average for this dimension due to the very high share of SMEs introducing marketing or organisational innovations.

Ireland has the highest performance for Economic effects due to its highly above average performance in Employment in knowledge-intensive activities, Contribution of medium and high-tech product exports to the trade balance, Knowledge-intensive services exports and License and patent revenues from abroad. Ireland only performs below average for Sales of new-to-market and new-to-firm innovations. Hungary's above average performance is due to its exceptional strong performance in Contribution of medium and high-tech product exports to the trade balance where it has the third-best performance of all Member States.

### **3. Comparison of EU27 innovation performance with key benchmark countries**

This section focuses on a comparison with other European countries in section 4.1 and with the EU27's global competitors in section 4.2.

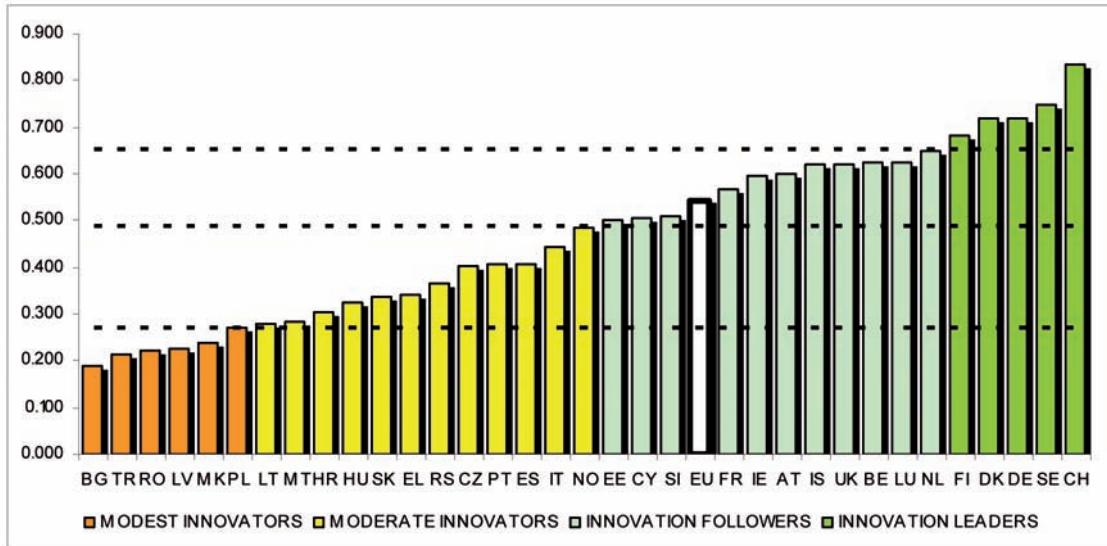
### 3.1. A comparison with other European countries

Switzerland is the overall innovation leader, outperforming all Member States (Figure 10). Its growth performance of 0.5% in the last five years is below that of the EU27. Switzerland's strong performance is linked to being among the top-3 performers for 15 indicators, in particular in Open, excellent and attractive research systems where it has best performance in all three indicators, Firm investments, Intellectual assets, Innovators and Economic effects. Switzerland's relative weakness is in having below average shares of SMEs innovating in-house, SMEs collaborating with others and Knowledge-intensive services exports.

Iceland is an Innovation follower and has the highest performance in three indicators: International scientific

co-publications, Public R&D expenditures and Public-private co-publications. Iceland's growth performance is above that of the EU27 with an average annual growth rate of 2.6. Croatia, Norway and Serbia are Moderate innovators with Norway's innovation performance coming close to that of the Innovation followers in particular due to its strong performance in Open, excellent and attractive research systems. Croatia has the overall highest performance in Youth with upper secondary education and Serbia performs very well in Non-R&D innovation expenditures. Norway's innovation performance has improved at a below average rate of 0.9% whereas Croatia (2.1%) and in particular Serbia (6.8%) have grown at a faster rate than that of the EU27.

**Figure 10: 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 reflects performance in 2010/2011 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.

The Former Yugoslav Republic of Macedonia and Turkey are Modest innovators. Both countries perform below average for most indicators, but also show particular strengths. Turkey scores top-5 positions for SMEs introducing marketing or organisational innovations and for

Sales of new-to-market and new-to-firm products and Macedonia for the Contribution of medium and high-tech products to the trade balance. Both countries have improved their innovation performance at a rate above that of the EU27 at 2.6% for Macedonia and 3.6% for Turkey.

### 3.2. A comparison with global competitors

This section provides a comparison of the EU27 with some of its main global competitors including Australia, the BRICS countries (Brazil, China, India, Russia and South Africa), Canada, Japan, South Korea and the US.

**The EU27 has managed to significantly close its performance gap with both the US and Japan** but the gap with South Korea has increased. The EU27 has increased its performance lead over Australia and Canada and has kept its lead over Brazil, India, Russia and South Africa. **Of the BRICS countries only the performance lead over China has decreased.**

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 global competitors a more restricted set of 12 indicators (Table 5) is used of which most are nearly identical to those used in section for comparing performance of the EU Member States (cf. Table 1). Most of these indicators focus on performance related to R&D activities (R&D expenditures, publications, patents) and there are no indicators using innovation survey data as such data are not available for all countries or are not directly comparable with the European CIS data. The 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 as more detailed age group data are not available for most countries. Data availability for China and South Africa has improved compared to the IUS 2011.

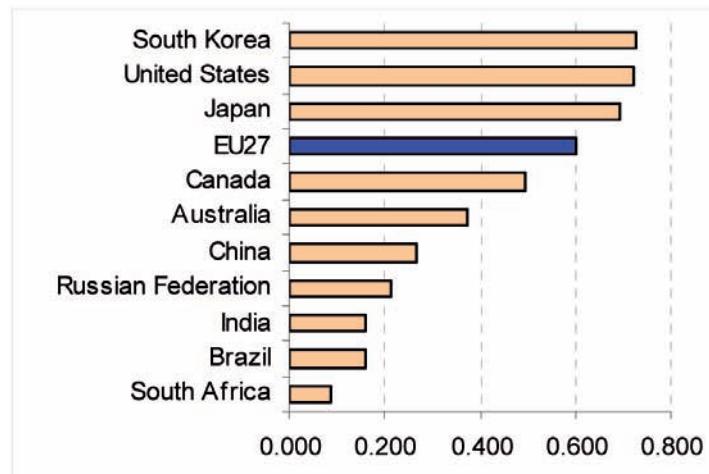
Table 5: Indicators used in the international comparison

Main type / innovation dimension / indicator	Data source	Most recent year	Date not available for
<b>ENABLERS</b>			
Human resources			
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	OECD, Eurostat	2010	India
1.1.2 Percentage population aged 25-64 having completed tertiary education	OECD, World Bank, Eurostat	2010	
Open, excellent and attractive research systems			
1.2.1 International scientific co-publications per million population	Science-Metrix (Scopus)	2011	Australia, Canada, South Africa
1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	Science-Metrix (Scopus)	2008	Australia, Canada, South Africa
Finance and support			
1.3.1 R&D expenditure in the public sector as % of GDP	OECD, Eurostat	2010	
<b>FIRM ACTIVITIES</b>			
Firm investments			
2.1.1 R&D expenditure in the business sector as % of GDP	OECD, Eurostat	2010	
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	2010	Brazil
2.3.2 PCT patents applications in societal challenges per billion GDP (in PPS€) (environment-related technologies; health)	OECD, Eurostat	2009	
<b>OUTPUTS</b>			
Economic effects			
3.2.2 Contribution of medium and high-tech product exports to the trade balance	UN, Eurostat	2011	
3.2.3 Knowledge-intensive services exports as % total service exports	UN, Eurostat	2010	South Africa
3.2.5 License and patent revenues from abroad as % of GDP	World Bank, Eurostat	2011	

Figure 11 summarizes the performance for the EU27 and its major global competitors<sup>7</sup>. Innovation performance in the US, Japan and South Korea is above that of the EU27. Compared to last year's results, **South Korea has joined the US as the global innovation leader**. The EU27 is outperforming the other countries, in particular all BRICS countries. South Korea has joined the US as the most innovative country compared to the IUS 2011.

The dynamic innovation performance over a five-year period is shown in Figure 12. The EU27's performance lag to South Korea has almost tripled. The EU27 is closing its performance gap to Japan and the US and is increasing its lead over Australia and Canada. The performance lead compared with the other countries is more stable and even slightly increasing with Brazil, India, Russia and South Africa. Of the BRICS countries only China is gradually closing the gap with the EU27.

**Figure 11: EU27 innovation performance compared to main competitors**



Note: Average performance is measured using a composite indicator building on data for 12 indicators ranging from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance reflects performance in 2010/2011 due to a lag in data availability.

<sup>7</sup> The methodology for calculating average innovation performance is explained in the Technical Annex 6.3.

Figure 12: EU27 change in innovation performance compared to main competitors



The numbers in the graphs show the performance lead/gap of each country compared to the EU27. A score above 0 shows that the country has a performance lead (e.g. a score of 20 says that the country is performing 20% better than the EU27), a score below 0 shows that the country has a performance gap (e.g. a score of -20 says that the country is performing 20% worse than the EU27).

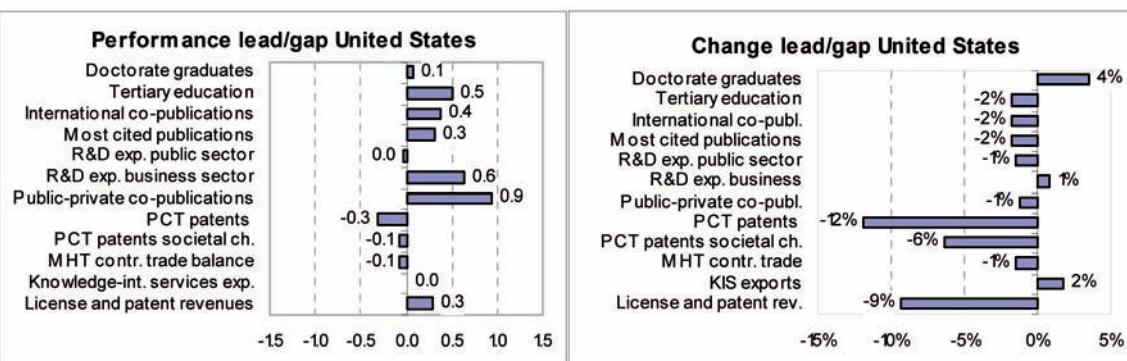
Due to small changes in the methodology the scores are not directly comparable to those presented in the IUS 2011. The IUS 2011 indicator on Medium and high-tech product exports as % of total exports has been replaced with the indicator on the Contribution of Medium and high-tech product exports to the trade balance and for the indicator on PCT patent applications in societal challenges applications in climate change mitigation have been replaced with applications in environment-related technologies.

### 3.2.1. Global innovation leaders

The **United States** is performing better than the EU27 in 7 indicators, in particular in Tertiary education, R&D expenditure in the business sector and Public-private co-publications (Figure 13). The EU27 has a small performance lead in R&D expenditure in the public sector, PCT patents, PCT patents in societal challenges and Contribution of medium-high-tech product exports to the trade balance. Overall there is a clear performance lead in favour of the US but this lead has been declining. The US has increased its lead in New

doctorate graduates and R&D expenditure in the business sector and has reversed its lag in Knowledge-intensive services exports into a performance lead. The US lead has decreased in Tertiary education, International co-publications, Most cited publications, Public-private co-publications and License and patent revenues from abroad. The US has lost its lead in PCT patents and PCT patents in societal challenges. The EU27 has increased its lead in R&D expenditure in the public sector and Contribution of medium-high-tech product exports to the trade balance.

Figure 13: EU27-US comparison

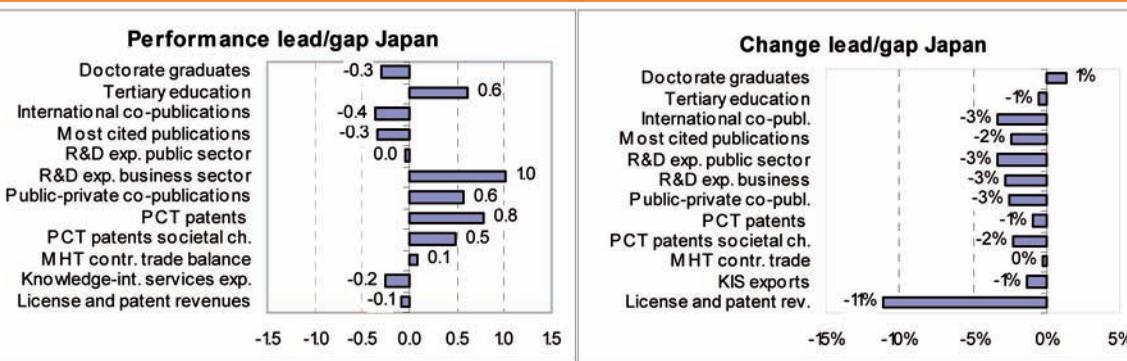


A country has a performance lead over the EU27 if the relative score for the indicator is above 0 and a performance gap with the EU27 if the relative score is below 0 (or the EU27 has a performance lead if the relative score for the indicator is below 0 and a performance gap if the relative score is 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 6 indicators, in particular in Tertiary education, R&D expenditure in the business sector, Public-private co-publications, PCT patents and PCT patents in societal challenges (Figure 14). For New doctorate graduates, International co-publications, Most cited publications, R&D expenditure in the public sector, Knowledge-intensive services exports and License and patent revenues from abroad the EU27 is performing better than Japan. Overall there is a clear performance lead in favour of Japan but this lead has been

decreasing. Japan's performance lead has decreased in Tertiary education, R&D expenditure in the business sector, Public-private co-publications, PCT patents, PCT patents in societal challenges and Contribution of medium-high-tech product exports to the trade balance. The EU27 has increased its lead in International co-publications, Most cited publications, R&D expenditure in the public sector, Knowledge-intensive services exports and License and patent revenues from abroad. The EU27 performance lead has decreased in New doctorate graduates.

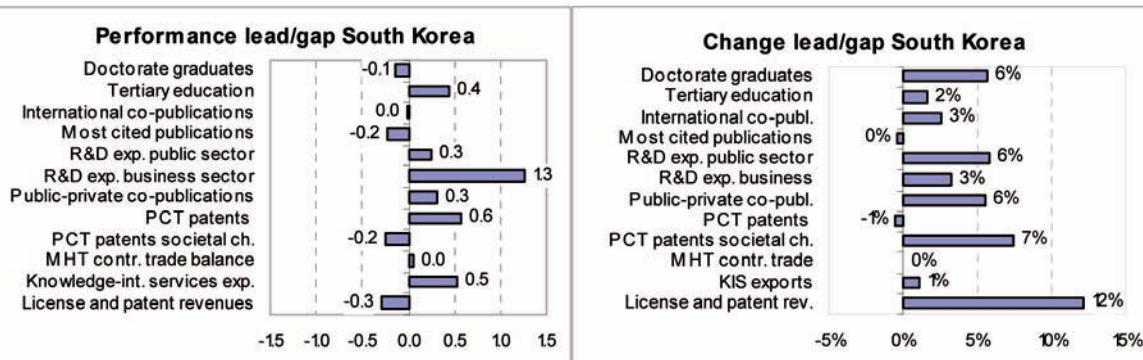
Figure 14: EU27-Japan comparison



**South Korea** is performing better than the EU27 in 8 indicators, in particular in R&D expenditure in the business sector, PCT patents and Knowledge-intensive services exports (Figure 15). The EU27 has a performance lead in New doctorate graduates, Most-cited publications, PCT patents 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 continuously and has almost tripled. South Korea has increased its lead in Tertiary

education, R&D expenditures in the public and business sector, PCT patents in societal challenges and Knowledge-intensive services exports. South Korea's lead in Contribution of medium-high-tech product exports to the trade balance has remained stable and its lead in PCT patents has decreased. The EU27 has increased its lead in Most cited publications. The EU27 has a decreasing lead in New doctorate graduates, International co-publications, PCT patents in societal challenges and License and patent revenues from abroad.

Figure 15: EU27-South Korea comparison

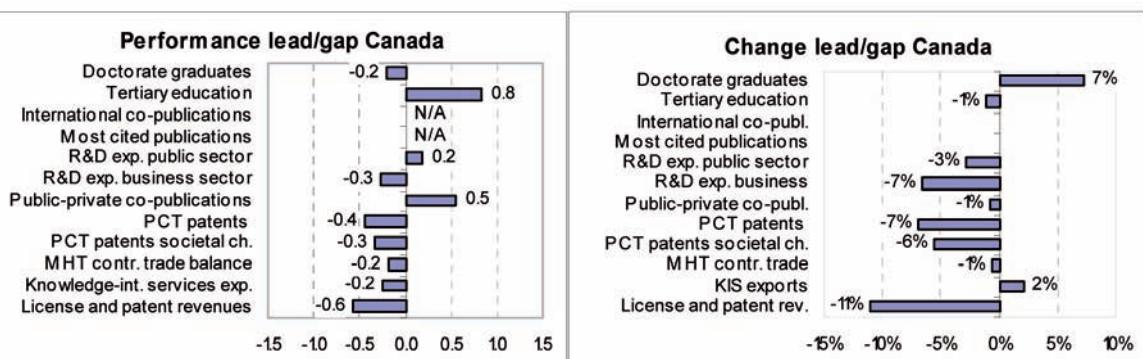


### 3.2.2. Other developed countries

The EU27 has a performance lead over **Canada** and this lead has more than doubled. Canada is performing better in 3 indicators, in particular in Tertiary education and Public-private co-publications (Figure 16). In R&D expenditure in the business sector, PCT patents, PCT patents in societal challenges and License and patent revenues from abroad Canada is showing the largest performance gap towards the EU27. Canada's lead in

Tertiary education, 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, PCT patents in societal challenges, Contribution of medium-high-tech product exports to the trade balance and License and patent revenues from abroad. The EU27 lead has decreased in New doctorate graduates and Knowledge-intensive services exports.

Figure 16: EU27-Canada comparison

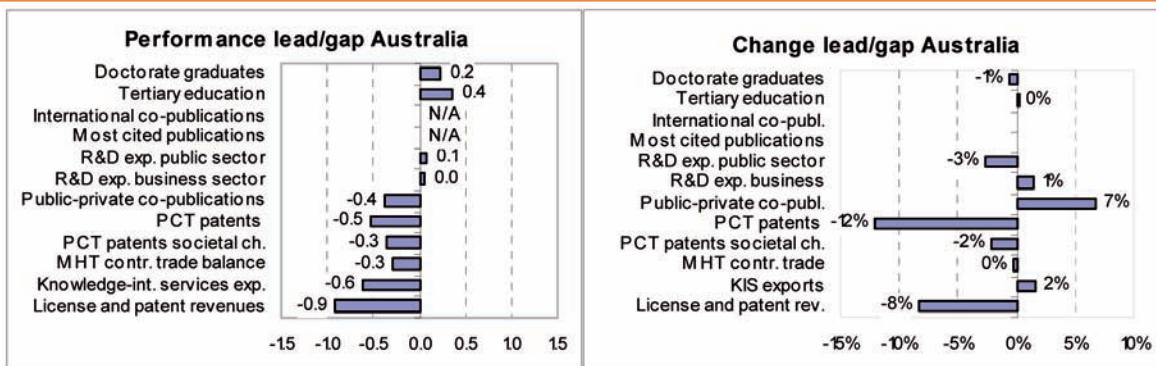


No data for International co-publications and Most cited publications.

The EU27 has a performance lead over **Australia** and this lead has been increasing slowly. Australia is performing better in 4 indicators, in particular in New doctorate graduates and Tertiary education (Figure 17). In PCT patents, Knowledge-intensive services exports and License and patent revenues from abroad Australia is showing the largest performance gap towards the EU27. Australia is showing a small increase in its lead in Tertiary education and R&D expenditure

in the business sector. Australia's lead has decreased in New doctorate graduates and R&D expenditure in the public sector. The EU27 has increased its lead in PCT patents, Contribution of medium-high-tech product exports to the trade balance and License and patent revenues from abroad and has reversed the gap into a lead for PCT patents in societal challenges. The EU27 performance lead has decreased in Public-private co-publications and Knowledge-intensive services exports.

Figure 17: EU27-Australia comparison



No data for International co-publications and Most cited publications.

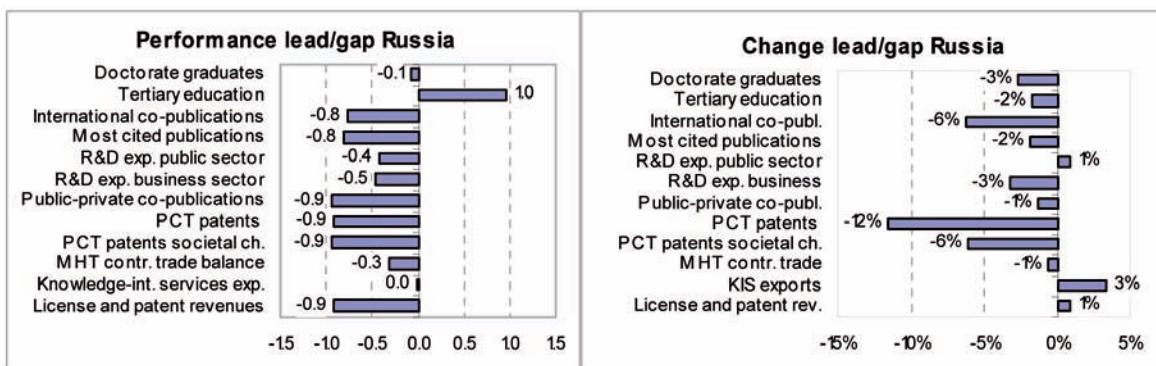
### 3.2.3. BRICS countries

The EU27 has a clear performance lead compared to all five BRICS countries. This lead has been slightly increasing with Brazil, India, India, Russia and South Africa. Only China is gradually closing the gap with the EU27.

The EU27 is performing better than **Russia** in most indicators (Figure 18). Only in Tertiary education Russia is performing much better. Russia is lagging most in Public-private co-publications, PCT patents, PCT patents 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, License and patent revenues from abroad and Knowledge-intensive services exports. Russia's gap has increased for New doctorate graduates, International co-publications, Most cited publications, R&D expenditure in the business sector, Public-private co-publications, PCT patents, PCT patents in societal challenges and Contribution of medium-high-tech product exports to the trade balance.

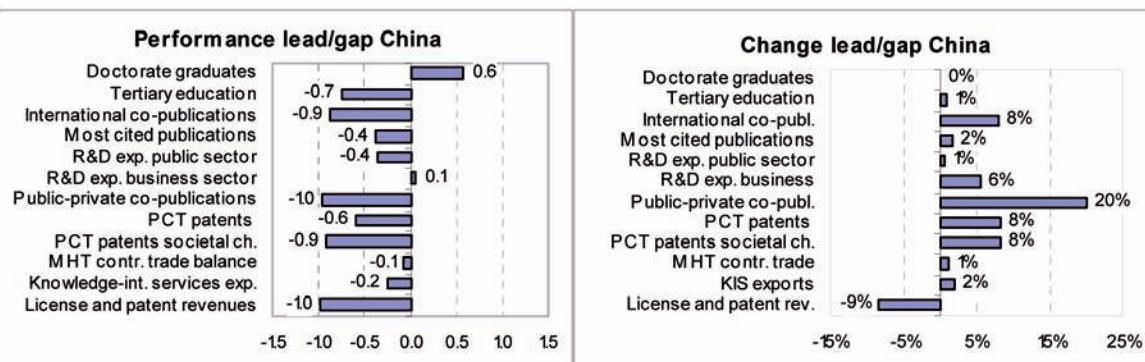
Figure 18: EU27-Russia comparison



The EU27 is performing better than **China** in most indicators (Figure 19). Only in New doctorate graduates and R&D expenditure in the business sector China is performing better. China is lagging most in International co-publications, Public-private co-publications, PCT patents in societal challenges and License and patent revenues from abroad. China's lead in R&D ex-

penditure in the business sector has increased and its lead in New doctorate graduates has remained stable. China has decreased its gap most strongly for International co-publications, Public-private co-publications, PCT patents and PCT patents in societal challenges. China's performance gap has only increased for License and patent revenues from abroad.

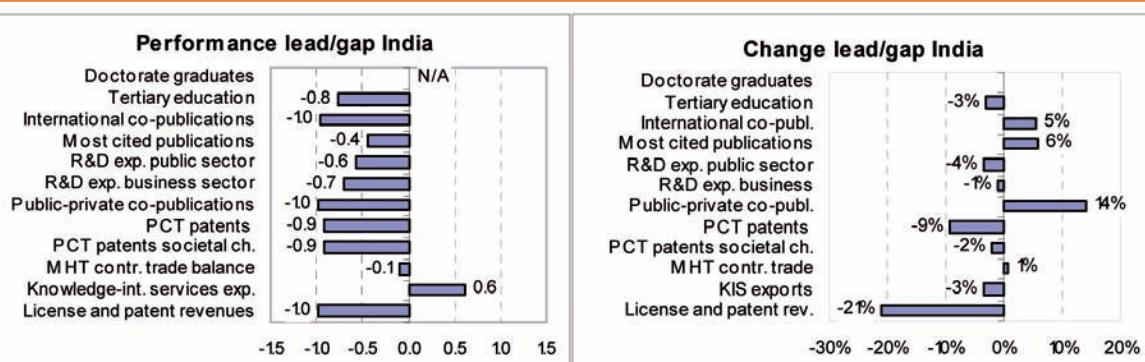
Figure 19: EU27-China comparison



**India** is lagging in innovation performance in most indicators, in particular in International co-publications, Public-private co-publications, PCT patents, PCT patents in societal challenges and License and patent revenues from abroad (Figure 20). India's performance in Knowledge-intensive services exports is well above that of the EU27 but its lead has been slightly

decreasing. India has decreased its performance gap in International co-publications, Most cited publications and Public-private co-publications. India's performance gap has increased for Tertiary education, R&D expenditures in the public and business sector, PCT patents, PCT patents in societal challenges and License and patent revenues from abroad.

Figure 20: EU27-India comparison

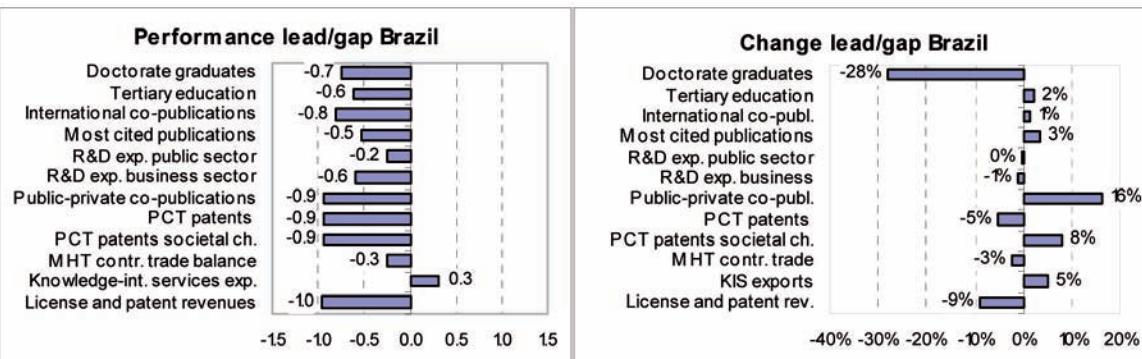


No data for New doctorate graduates.

**Brazil** is lagging in most indicators, in particular in Public-private co-publications, PCT patents, PCT patents in societal challenges and License and patent revenues from abroad (Figure 21). Brazil's performance in Knowledge-intensive services exports is above that of the EU27 and has been increasing. Brazil has decreased its gap in Tertiary education, International

co-publications, Most cited publications, PCT patents in societal challenges, and most notably in Public-private co-publications. Brazil's gap has increased for New doctorate graduates, PCT patents, Contribution of medium-high-tech product exports to the trade balance, R&D expenditure in the business sector and License and patent revenues from abroad.

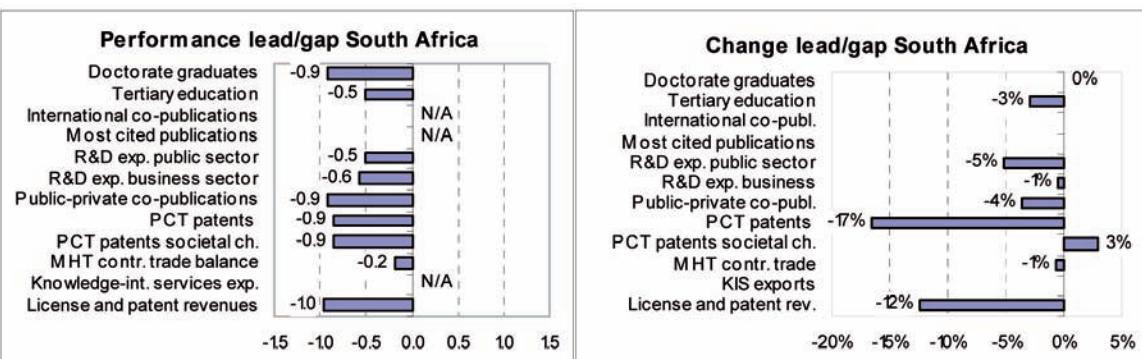
Figure 21: EU27-Brazil comparison



**South Africa**'s innovation performance is lagging in all indicators, in particular in New doctorate graduates, Public-private co-publications, PCT patents, PCT patents in societal challenges and License and patent revenues from abroad (Figure 22). South Africa's gap has increased for almost all indicators, in particular for PCT patents and License

and patent revenues from abroad. South Africa has reduced its performance gap in PCT patents in societal challenges.

Figure 22: EU27-South Africa comparison

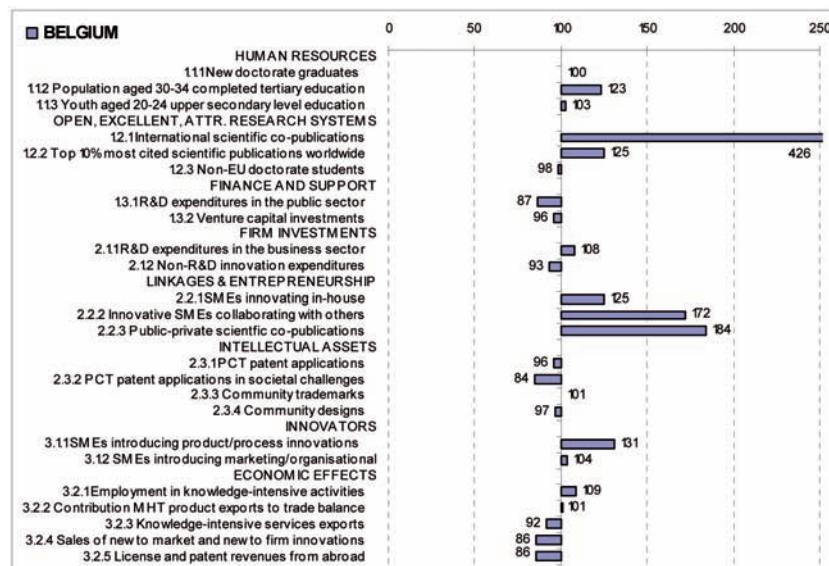


No data for International co-publications, Most cited publications and Knowledge-intensive services exports.

## 4. 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. 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.

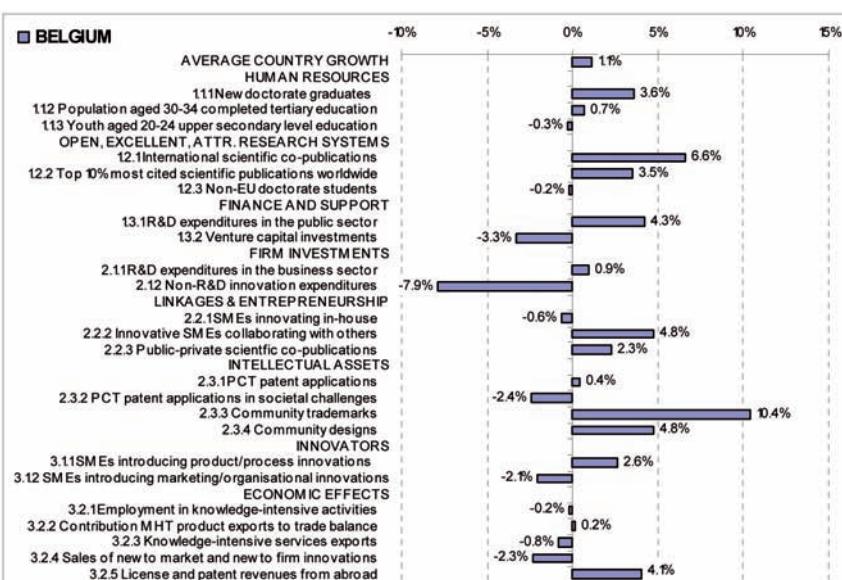
**Belgium** is one of the innovation followers with an above average performance. Relative strengths are in Open, excellent and attractive research systems, Linkages & entrepreneurship and Innovators. Relative weaknesses are in Finance and support and Intellectual assets.



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. Growth performance in Open, excellent and

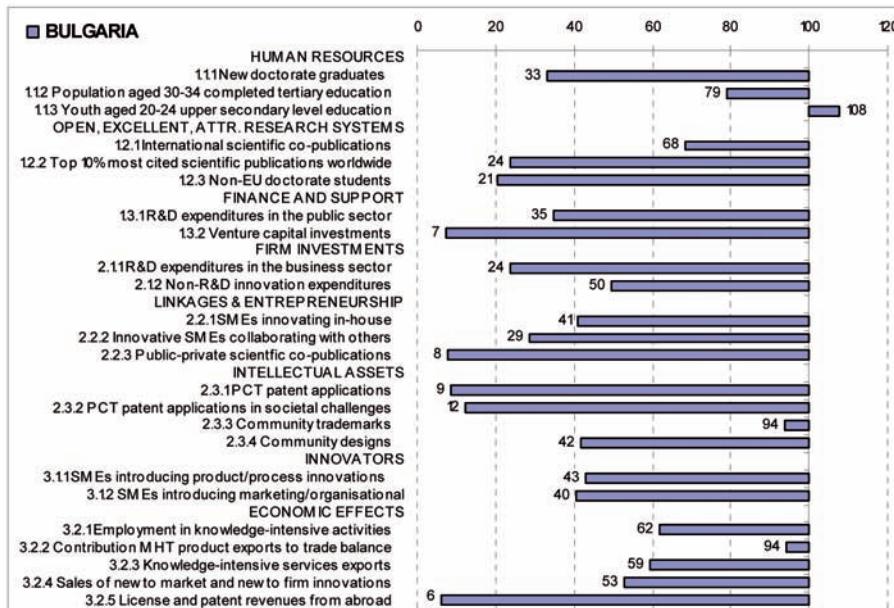
attractive research systems, Linkages & entrepreneurship and Intellectual assets is well above average and in Firm investments well below average.



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, Intellectual assets and Economics effects.

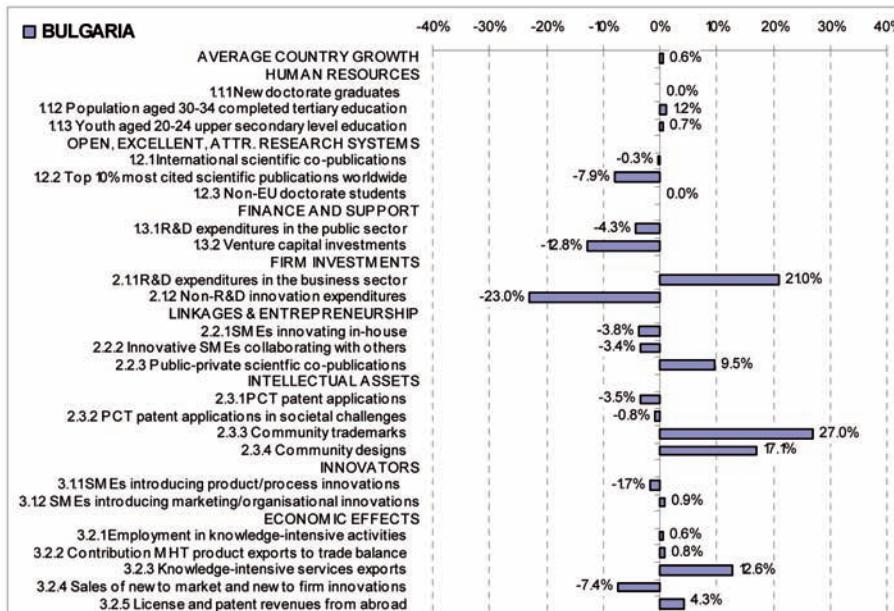
Relative weaknesses are in Open, excellent and attractive research systems, Finance and support, Firm investments, Linkages & entrepreneurship and Innovators.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Community trademarks and R&D expenditure in the business sector. A relatively strong decline is observed for Non-R&D innovation expenditures and Venture capital investments. Growth

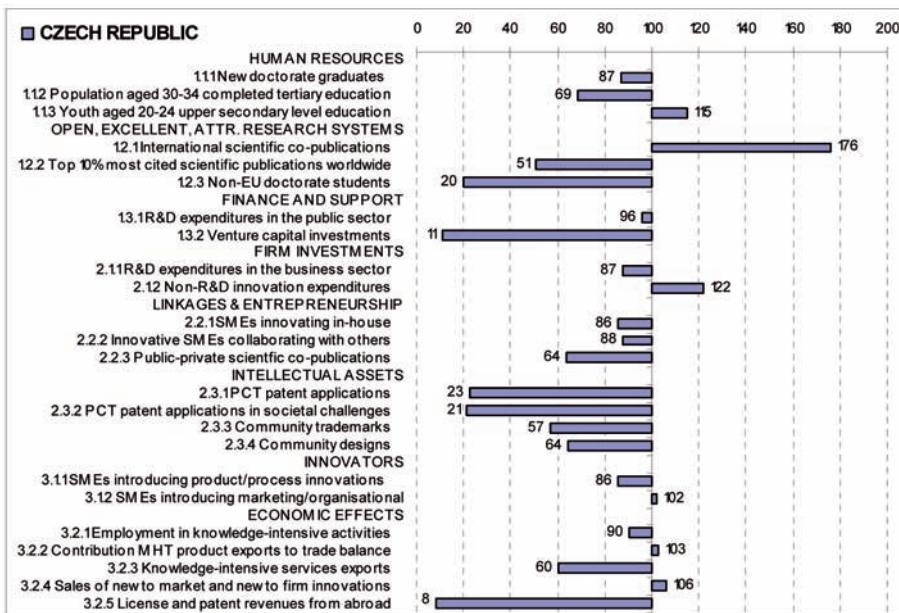
performance in intellectual assets is well above average and in Finance and support and Firm investments well below average.



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

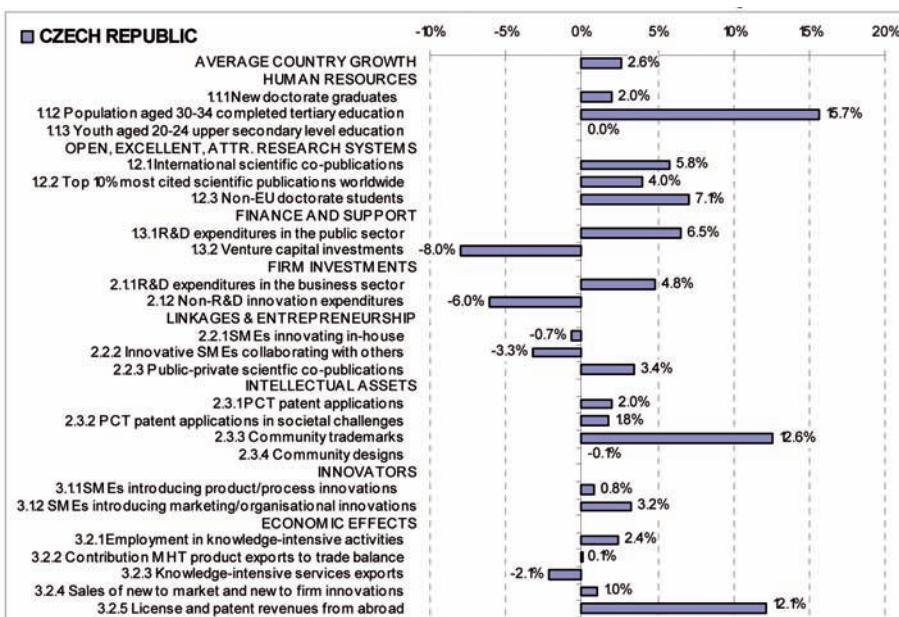
Economic effects. Relative weaknesses are in Open, excellent and attractive research systems and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

For Population with a tertiary degree growth has been highest for all Member States and high growth is also observed for Community trademarks. A strong decline is observed for Venture capital investments and Non-

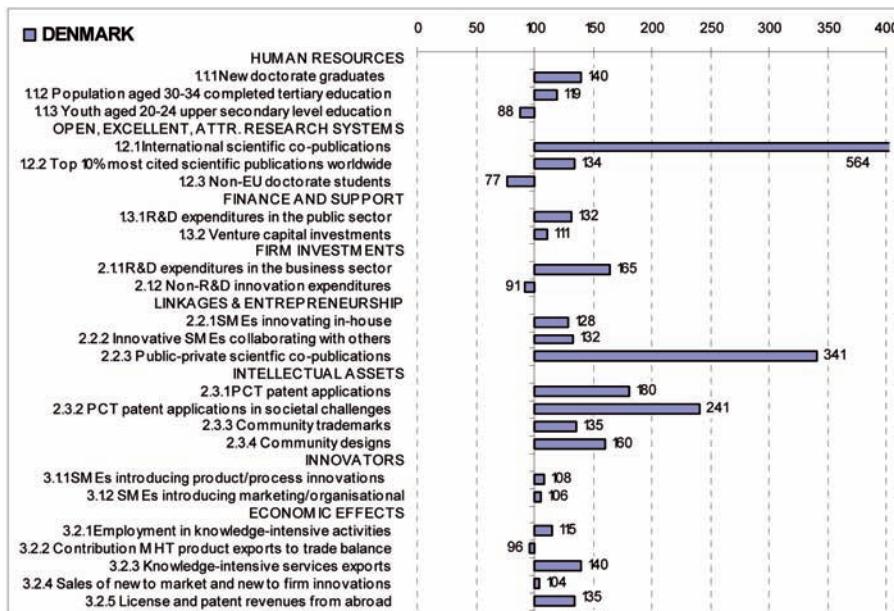
R&D innovation expenditure. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is above average and in Firm investments well below average.



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,

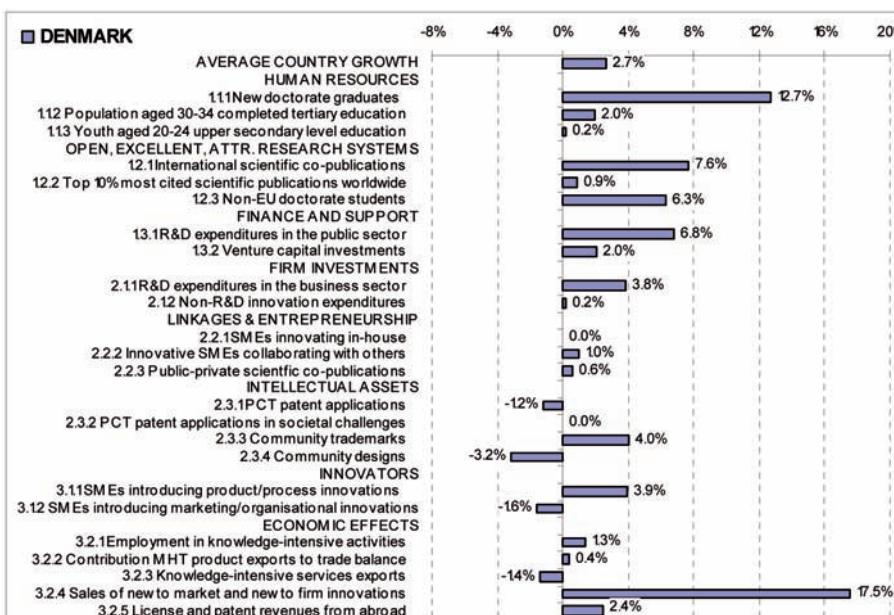
Linkages & entrepreneurship and Intellectual assets. Relative weaknesses are in Human resources and Firm investments.



Indicator values relative to the EU27 (EU27=100)

For sales of new-to-market and new-to-firm innovations growth has been highest for all Member States and growth was also high for New doctorate graduates. A relatively strong decline is observed for Communi-

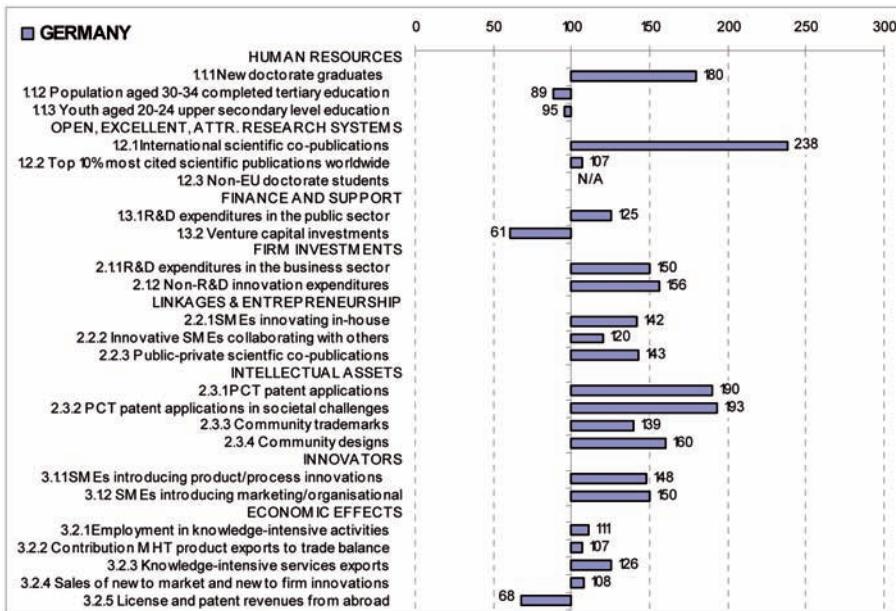
ty designs. Growth performance in Human resources, Open, excellent and attractive research systems, Linkages & entrepreneurship and Economic effects is well above average and in Innovators well below average.



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 Innovators and Intellectual assets. Relative

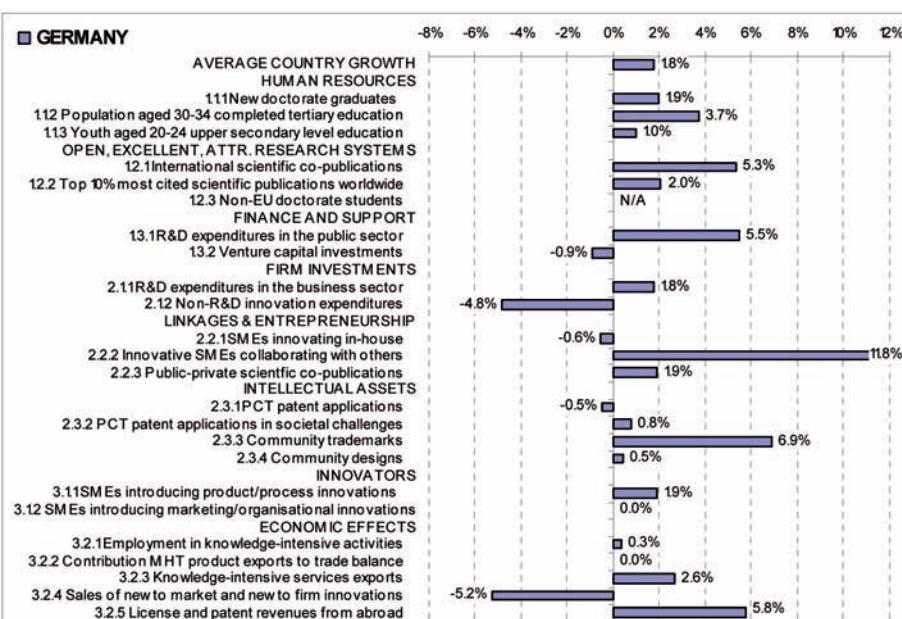
weaknesses are in Open, excellent and attractive research systems.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Innovative SMEs collaborating with others, Community trademarks and License and patent revenues from abroad. A strong decline is observed for Non-R&D innovation

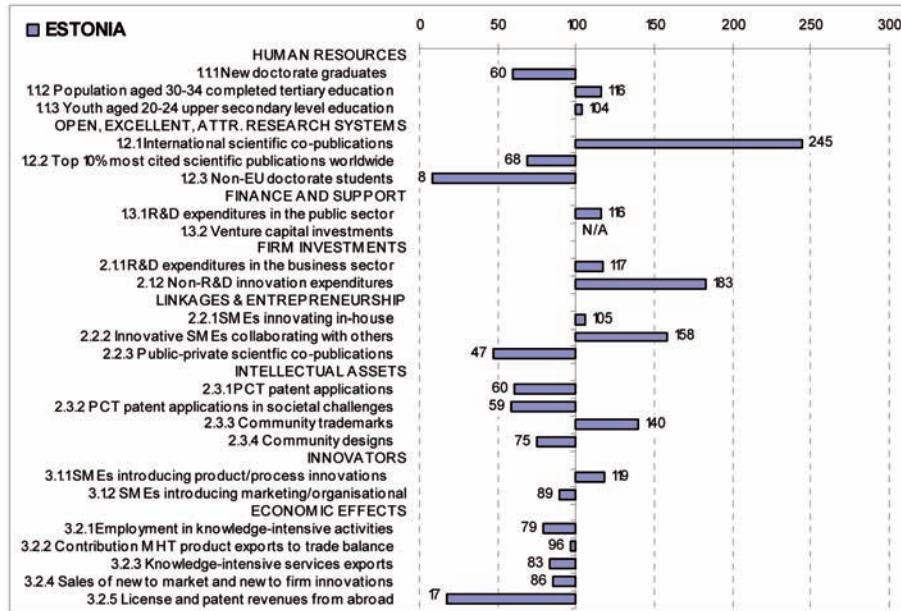
expenditure and Sales of new-to-market and new-to-firm innovations. Growth performance in Linkages & entrepreneurship is well above average and in Firm investments well below average.



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 Finance and support and Firm Investments.

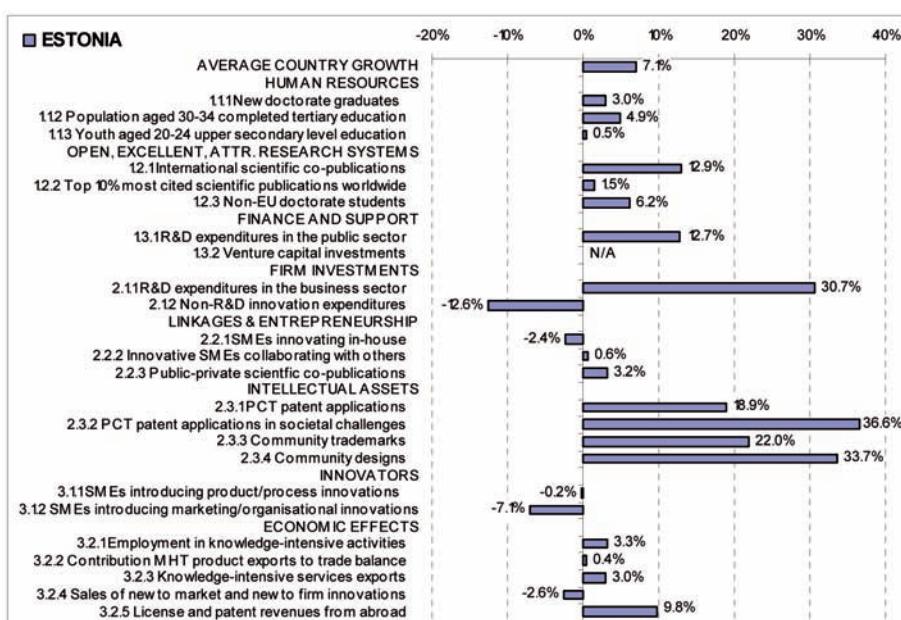
Relative weaknesses are in Open, excellent and attractive research systems and Economic effects.



Indicator values relative to the EU27 (EU27=100)

For R&D expenditures in the business sector, PCT patents and PCT patent applications Estonia experiences the fastest growth in societal challenges and Community designs where growth rates for the first three are the highest among all Member

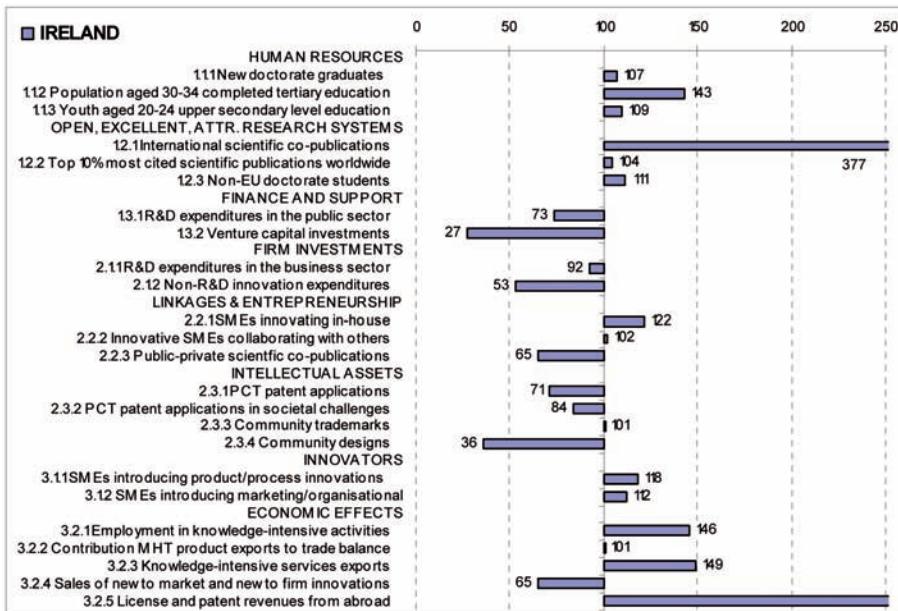
States. A relatively strong decline is observed for Non-R&D innovation expenditures. Growth performance in Finance and support and Intellectual assets is well above average and in Firm investments and Innovators well below average.



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 and Economic effects. Relative

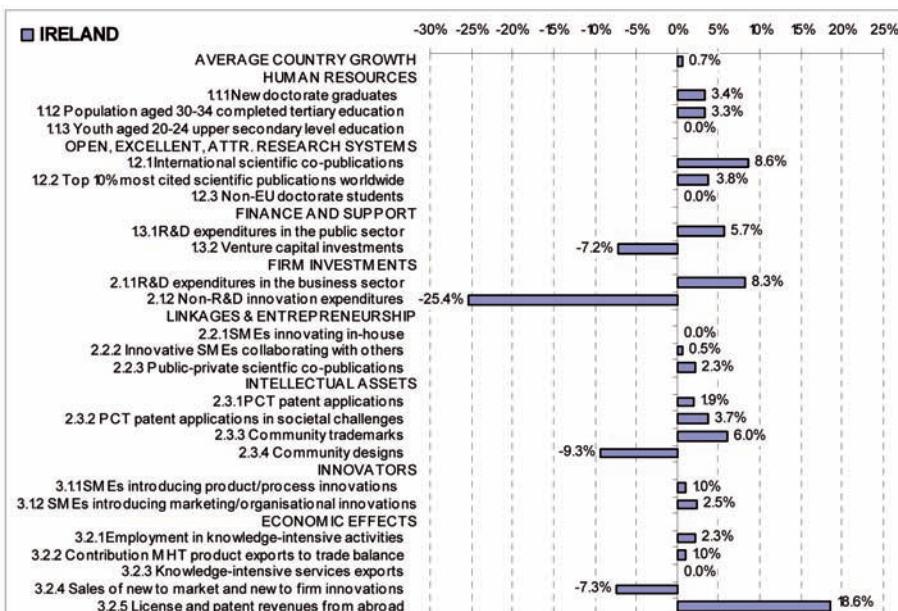
weaknesses are in Finance and support and Firm investments.



Indicator values relative to the EU27 (EU27=100)

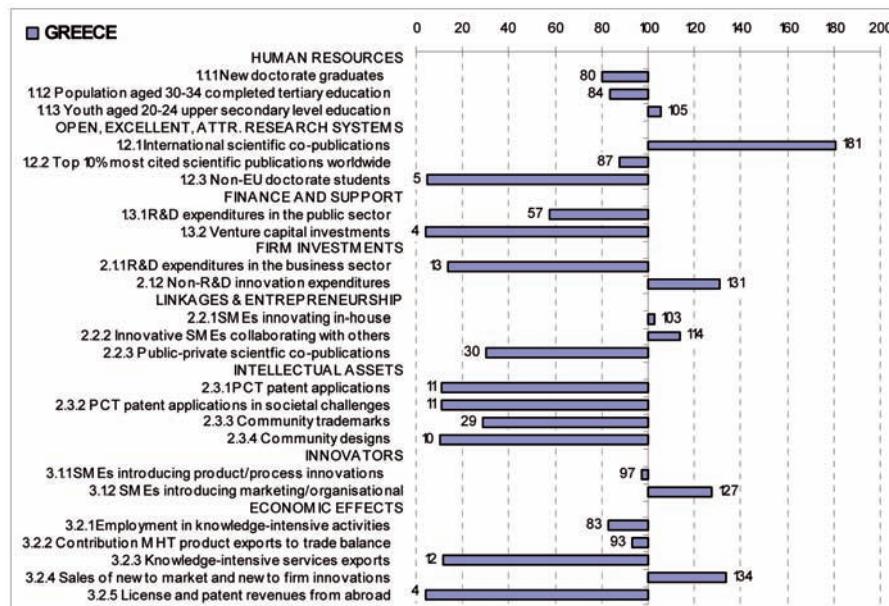
High growth is observed for License and patent revenues from abroad. A strong decline is observed for Non-R&D innovation expenditures.

Growth performance in Firm investments is well below average.



Annual average growth per indicator and average country growth

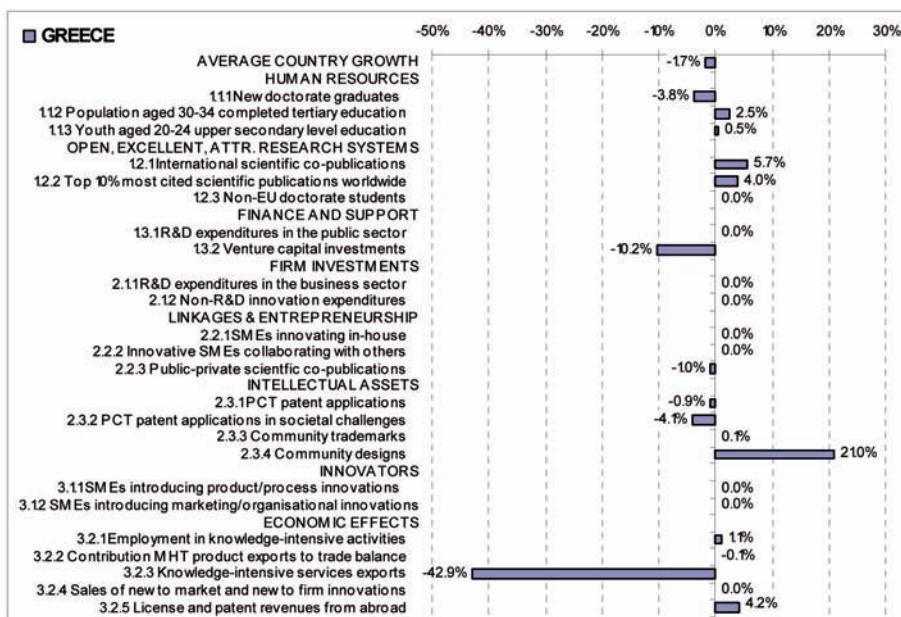
**Greece** is one of the moderate innovators with a below average performance. Relative strengths are in Innovators. Relative weaknesses are in Finance and support and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

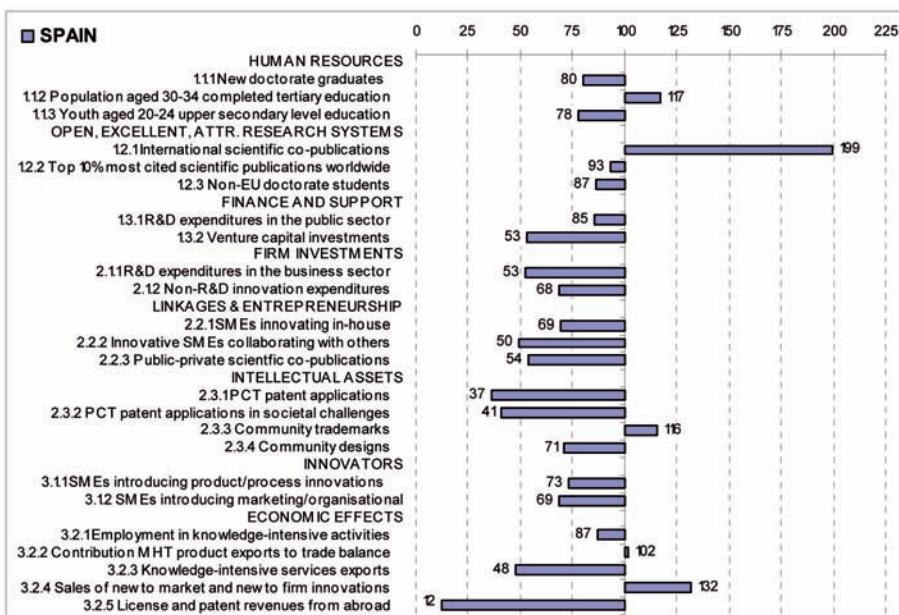
High growth is observed for Community designs. A relatively strong decline is observed for Venture capital investments and Knowledge-intensive services exports. Growth perfor-

mance in Open, excellent and attractive research systems and Intellectual assets is well above average and in Finance and support and Economic effects well below average.



Annual average growth per indicator and average country growth

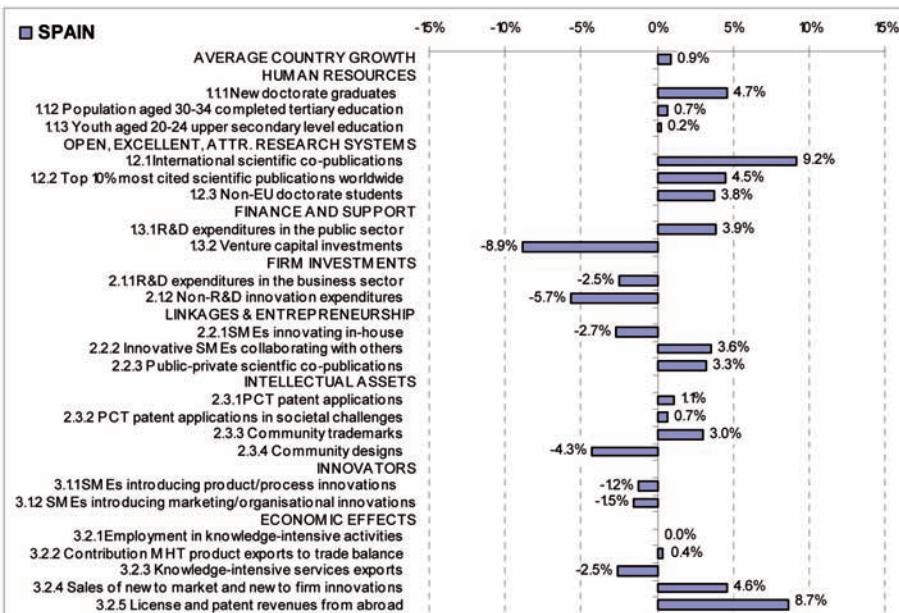
**Spain** is one of the moderate innovators with a below average performance. Relative strengths are in Open, excellent and attractive research systems (in particular international scientific co-publications)



Indicator values relative to the EU27 (EU27=100)

High growth is observed for International scientific co-publications. The strongest decline is observed for Venture capital investments. Growth performance

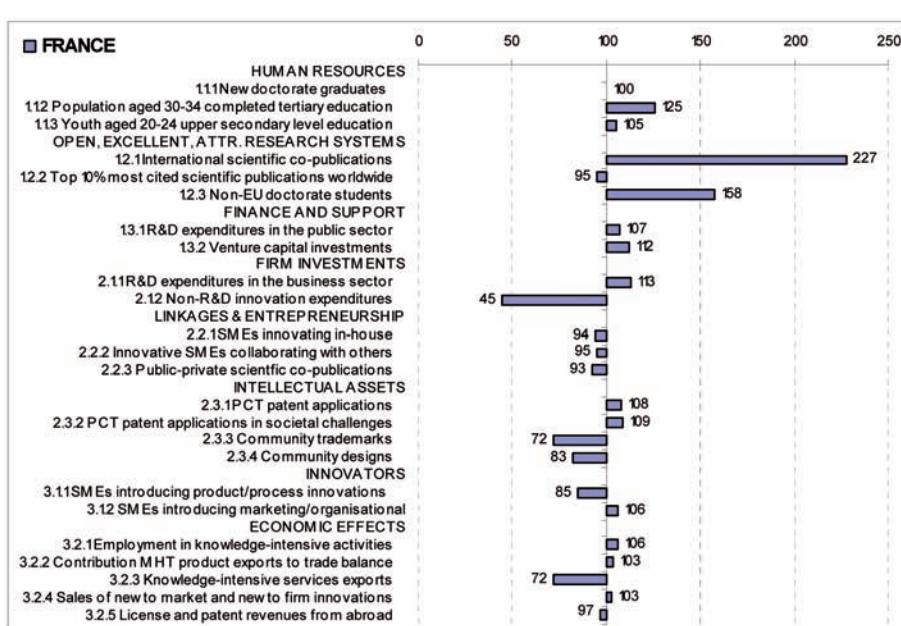
and Economic effects (except license and patent revenues from abroad). Relative weaknesses are in Firm investments and Linkages & entrepreneurship.



in Open, excellent and attractive research systems is well above average and in Finance and support and Firm investments well below average.

Annual average growth per indicator and average country growth

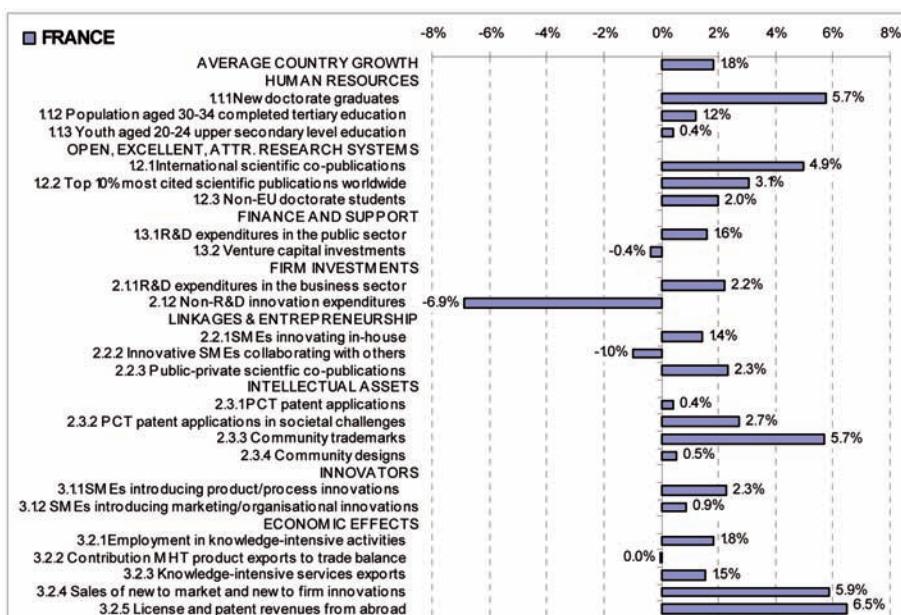
**France** is one of the innovation followers with an above average performance. Relative strengths are in Human resources. Relative weaknesses are in Firm investments.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for New doctorate graduates, Community trademarks and Sales of new to market and new to firm innovations. A relatively strong decline

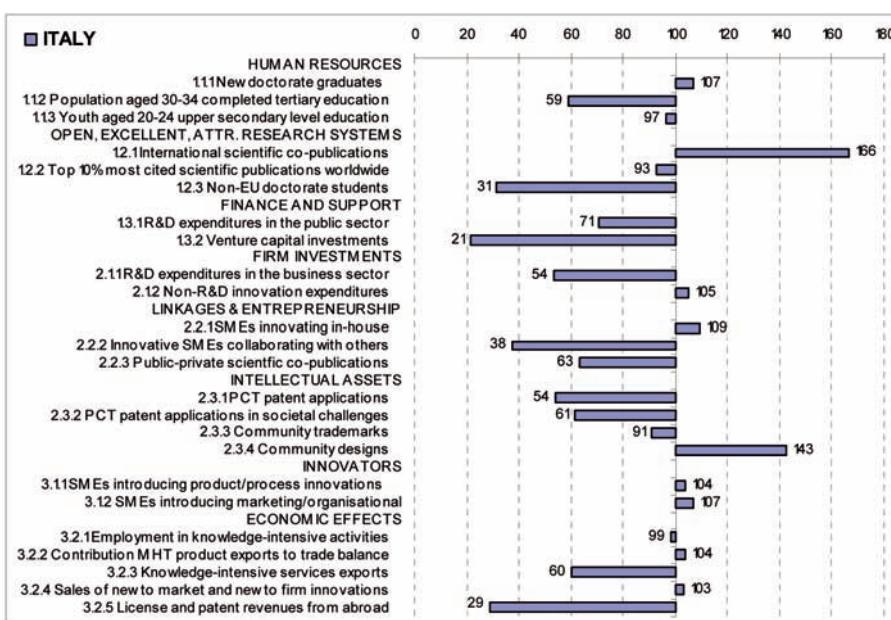
is observed for Non-R&D innovation expenditures. Growth performance in Economic effects is well above average and in Firm investments well below average.



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 Inno-

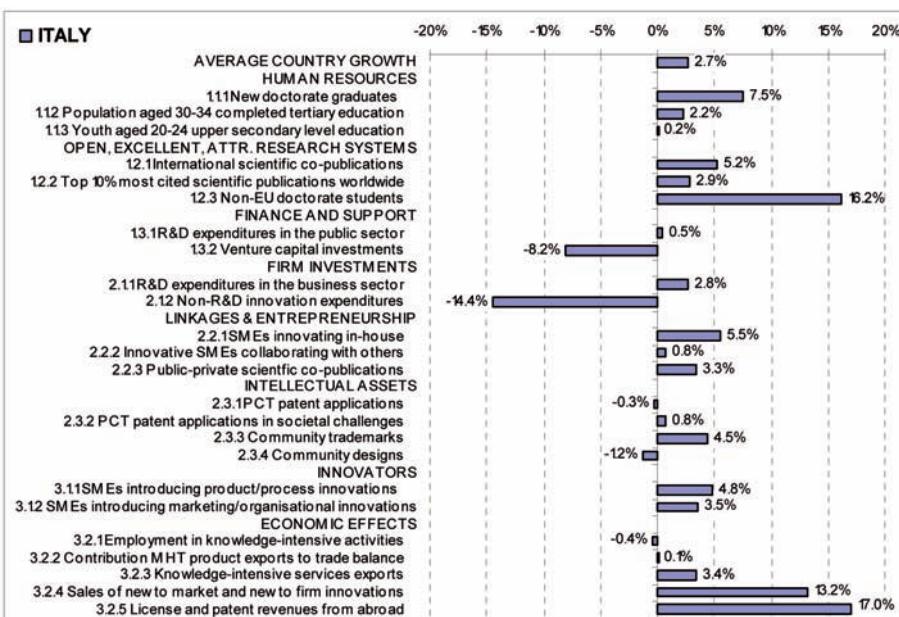
vators and Economic effects. Relative weaknesses are in Finance and support and Firm investments.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Sales of new-to-market and new-to-firm innovations and License and patent revenues from abroad. A strong decline is observed for Venture capital investments and Non-

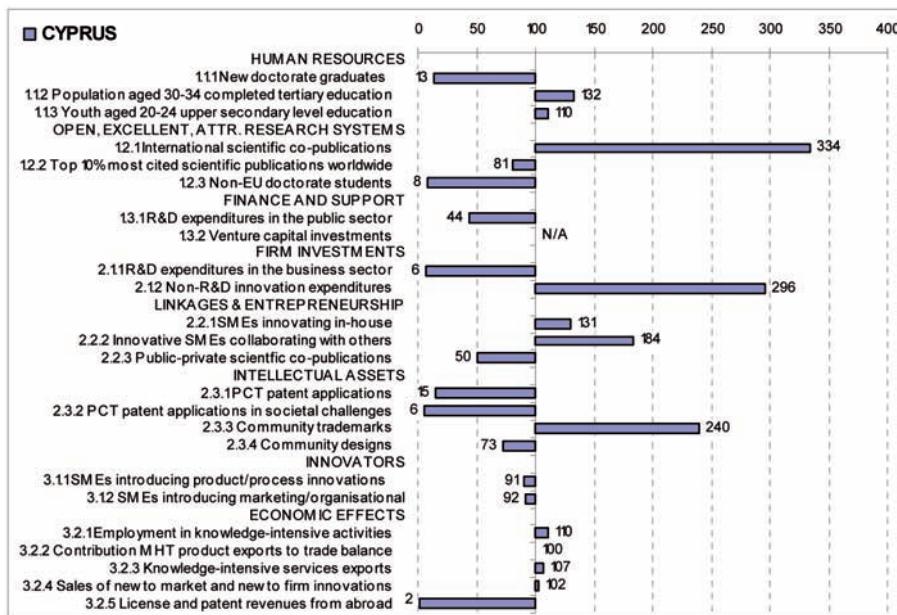
R&D innovation expenditure. Growth performance in Open, excellent and attractive research systems and Economic effects is well above average and in Firm investments well below average.



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

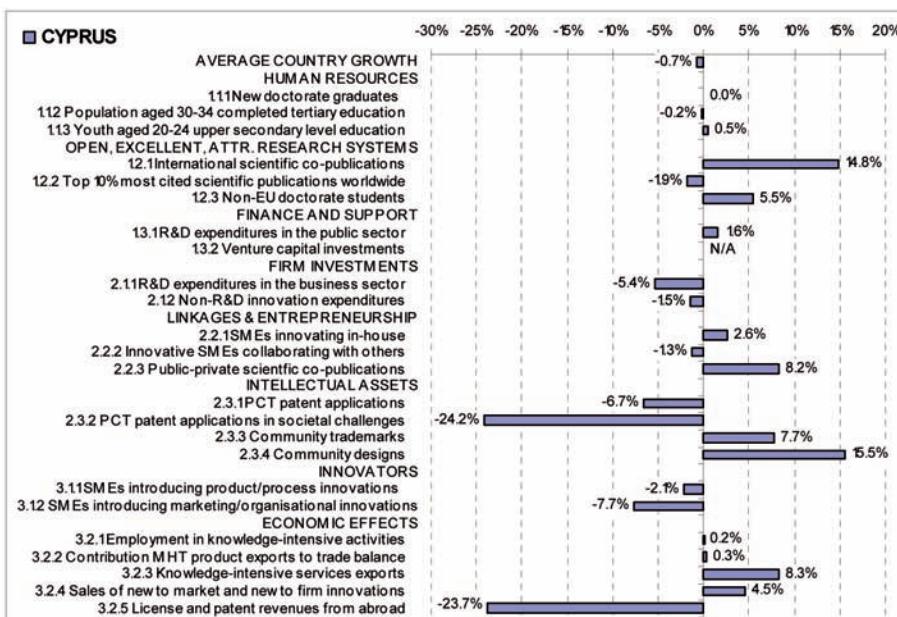
in Linkages & entrepreneurship. Relative weaknesses are in Finance and support.



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 PCT patent applications in societal challenges and License and patent revenues

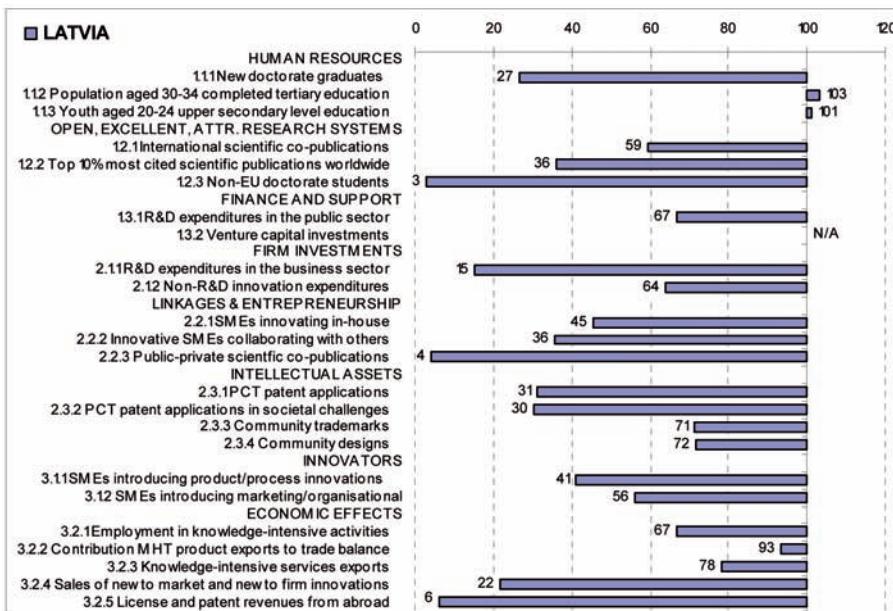
from abroad. Growth performance in Open, excellent and attractive research systems and Linkages & entrepreneurship is above average and in Innovators well below average.



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 and Finance and support. Relative

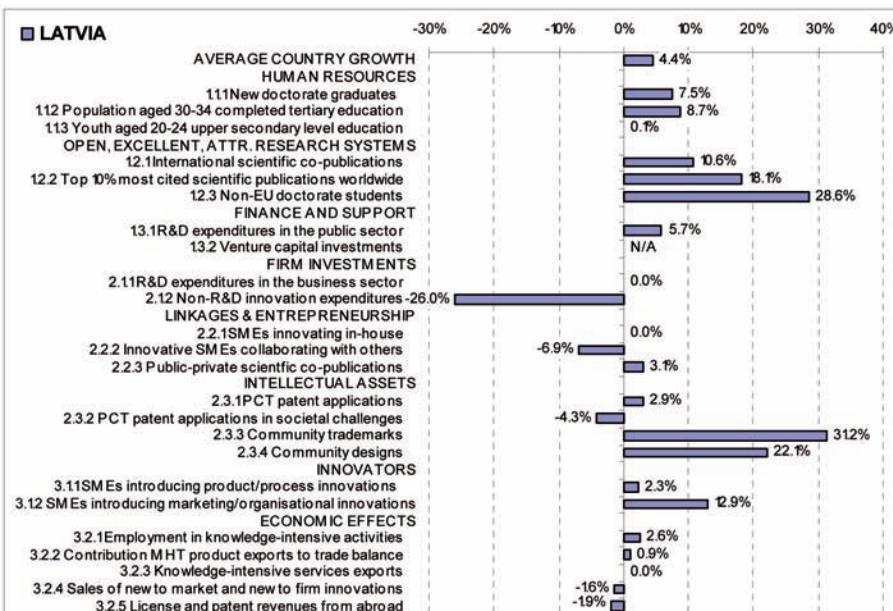
weaknesses are in Open, excellent and attractive research systems, Firm investments and Linkages & entrepreneurship.



Indicator values relative to the EU27 (EU27=100)

For Non-EU doctorate students, Community trademarks and SMEs introducing marketing or organisational innovation growth rates for Latvia are the highest among all Member States. High growth is also observed for Community designs. A strong decline is observed for

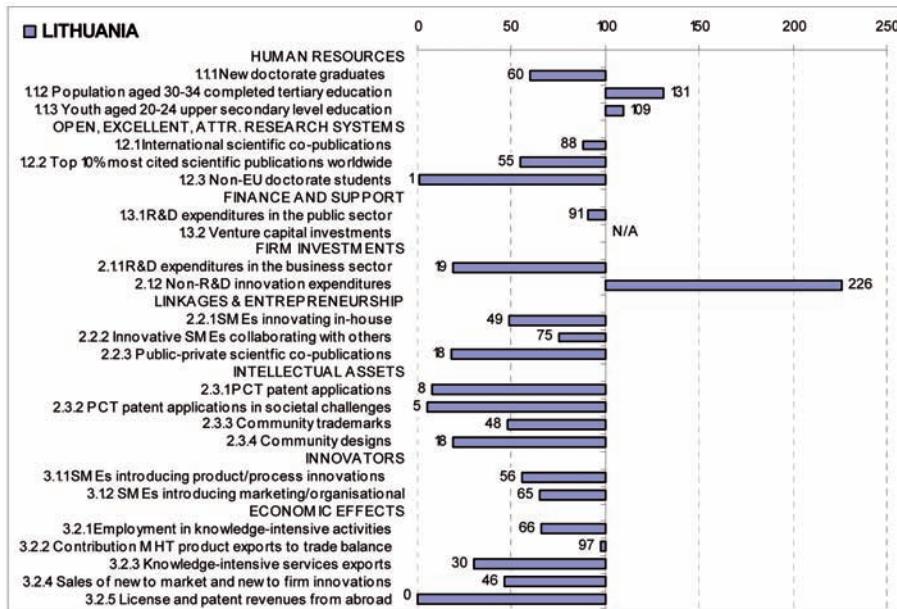
Non-R&D innovation expenditures. Growth performance in Open, excellent and attractive research systems, Intellectual assets and Innovators is well above average and in Firm investments well below average.



Annual average growth per indicator and average country growth

**Lithuania** is one of the moderate innovators with a below average performance. Relative strengths are in Human resources and Finance and support.

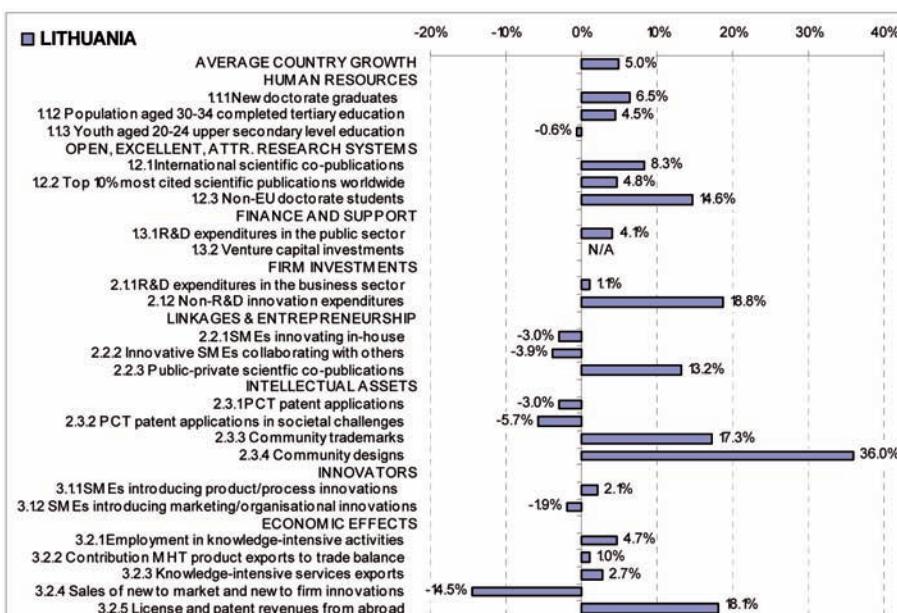
Relative weaknesses are in Open, excellent and attractive research systems and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

For Community designs and Employment in knowledge-intensive activities growth rates are the highest among all Member States. High growth is also observed for Non-R&D innovation expenditures, Community trademarks and License and patent

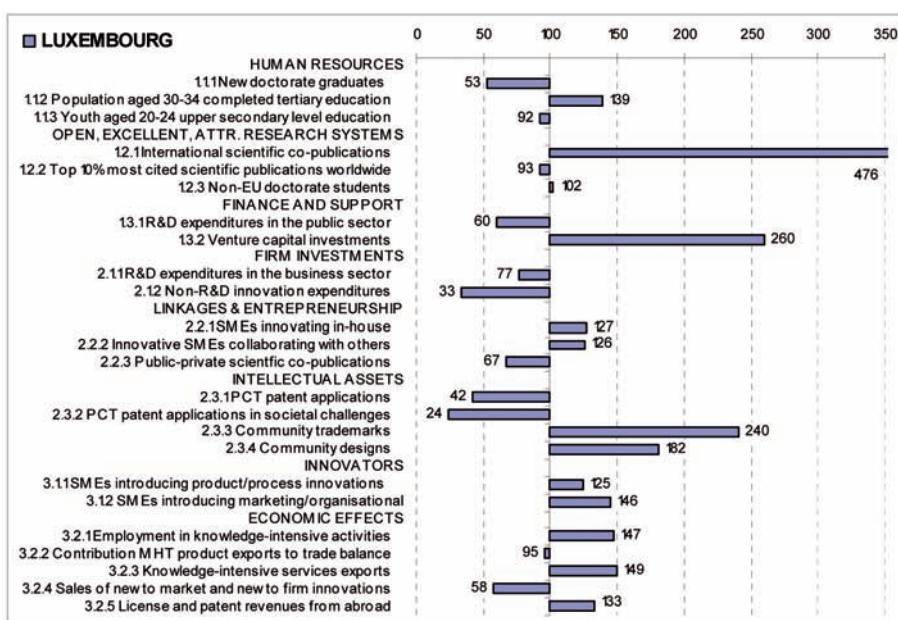
revenues from abroad. A strong decline is observed for Sales of new-to-market and new-to-firm innovations. Growth performance in Firm investments and Intellectual assets is well above average and in Innovators and Economic effects well below average.



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

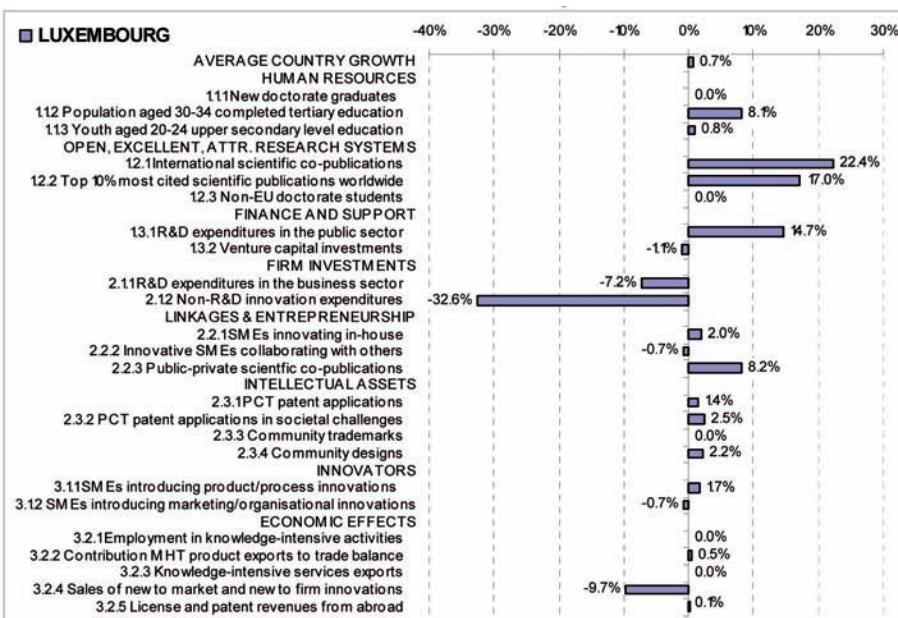
Innovators and Open, excellent and attractive research systems. Relative weaknesses are in Firm investments.



Indicator values relative to the EU27 (EU27=100)

Luxembourg has experienced the highest growth rates for International scientific co-publications and R&D expenditures of all Member States. Also Most cited publications have grown fast. A strong decline

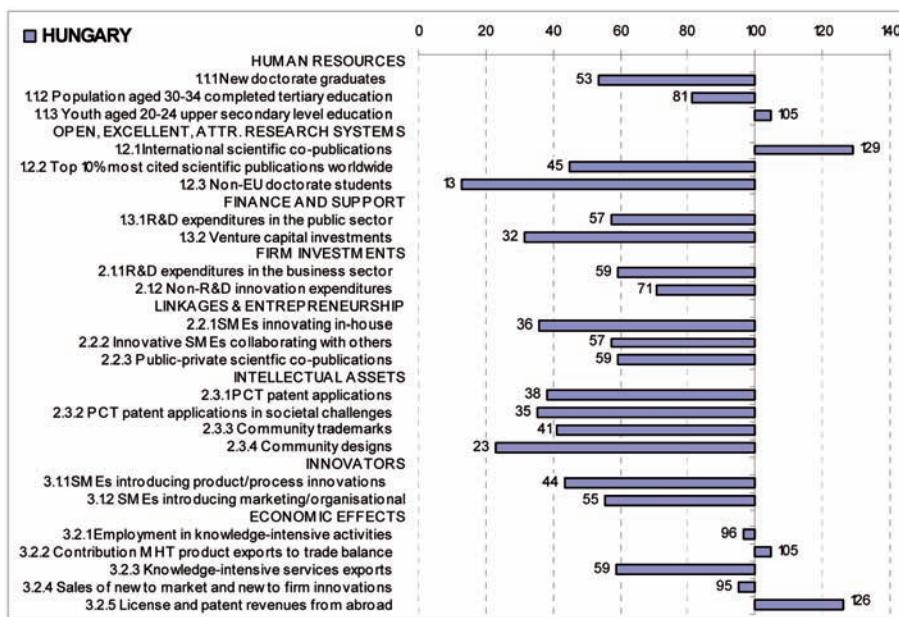
is observed for Non-R&D innovation expenditure. Growth performance in Open, excellent and attractive research systems is well above average and in Firm investments well below average.



Annual average growth per indicator and average country growth

**Hungary** is one of the moderate innovators with a below average performance. Relative strengths are

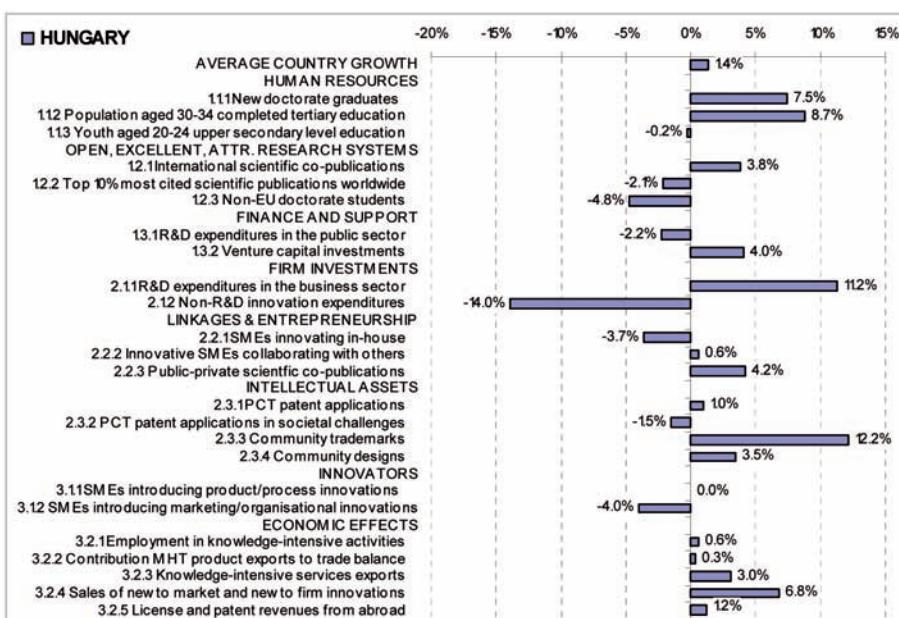
in Human resources and Economic effects. Relative weaknesses are in Innovators.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for R&D expenditures in the business sector and Community trademarks. Growth in Venture capital investments has been the highest of all Member States. A strong decline is observed

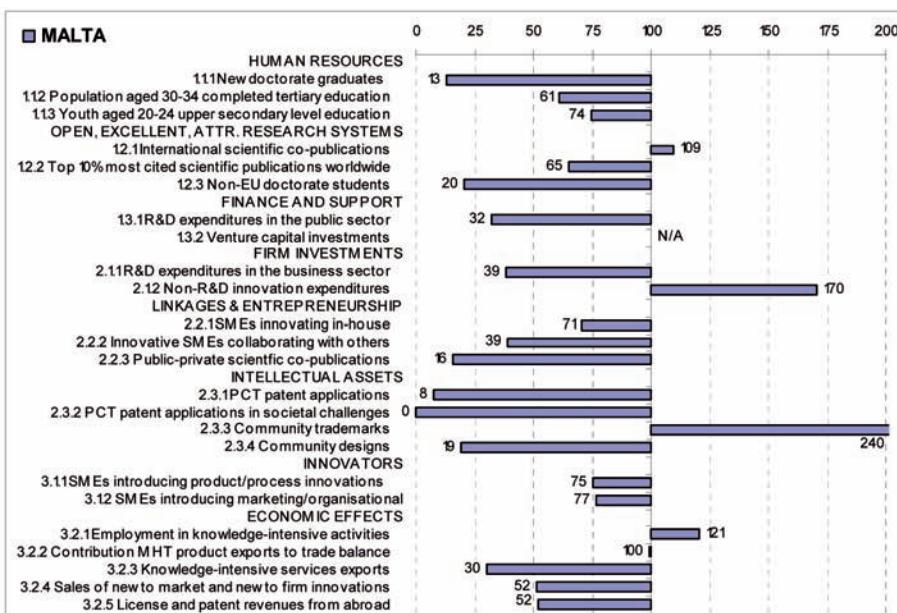
for Non-R&D innovation expenditures. Growth performance in Human resources, Intellectual assets and Economic effects is above average and in Firm investments and Innovators well below average.



Annual average growth per indicator and average country growth

**Malta** is one of the moderate innovators with a below average performance. Relative strengths are

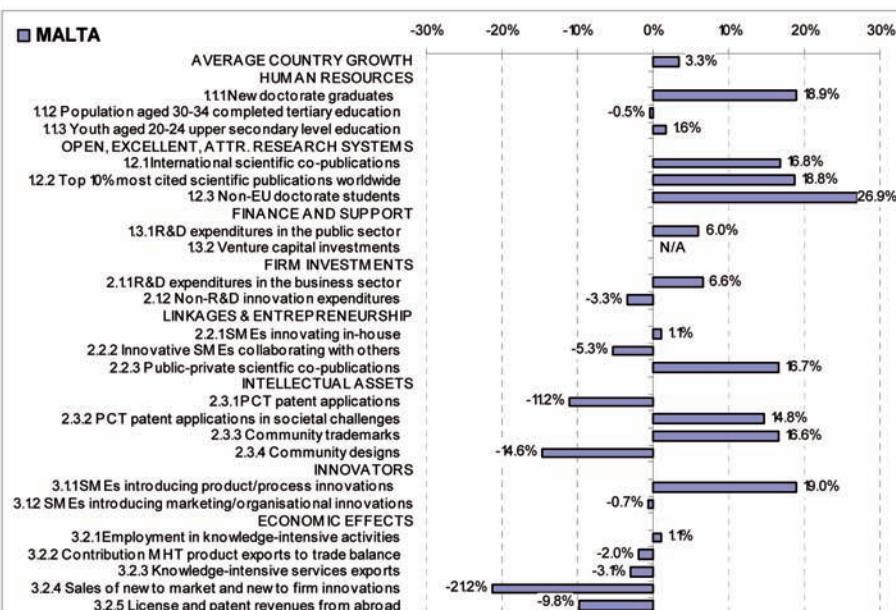
in Economic effects. Relative weaknesses are in Human resources and Finance and support.



Indicator values relative to the EU27 (EU27=100)

Malta has experienced the fastest growth of all Member States for Most cited publications, Public-private co-publications and SMEs introducing product or process innovations. High growth is also observed for New doctorate graduates. A strong decline is observed for PCT patent applications, Com-

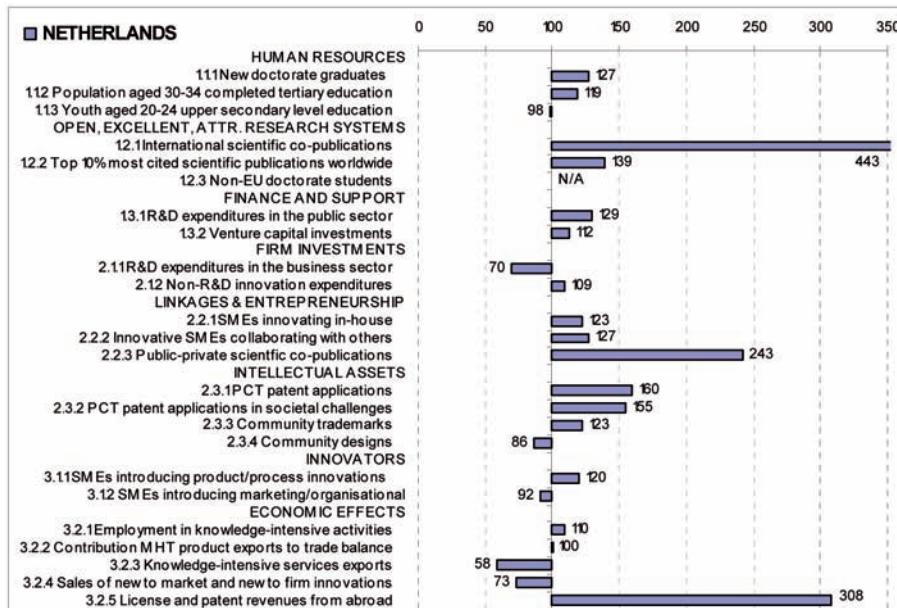
munity designs, Sales of new-to-market and new-to-firm innovations and License and patent revenues from abroad. Growth performance in Open, excellent and attractive research systems is well above average and in Firm investments and in Economic effects well below average.



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 re-

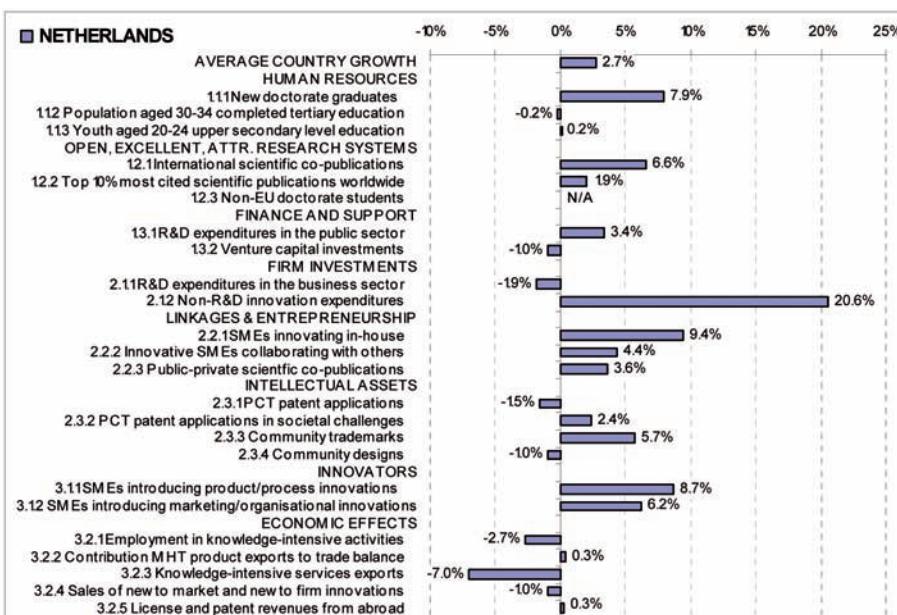
search systems and for Linkages & entrepreneurship. Relative weaknesses are in Firm investments.



Indicator values relative to the EU27 (EU27=100)

The Netherlands has experienced the fastest growth Non-R&D innovation expenditures and SMEs innovating in-house of all Member States. A strong decline is observed for Knowledge-intensive services

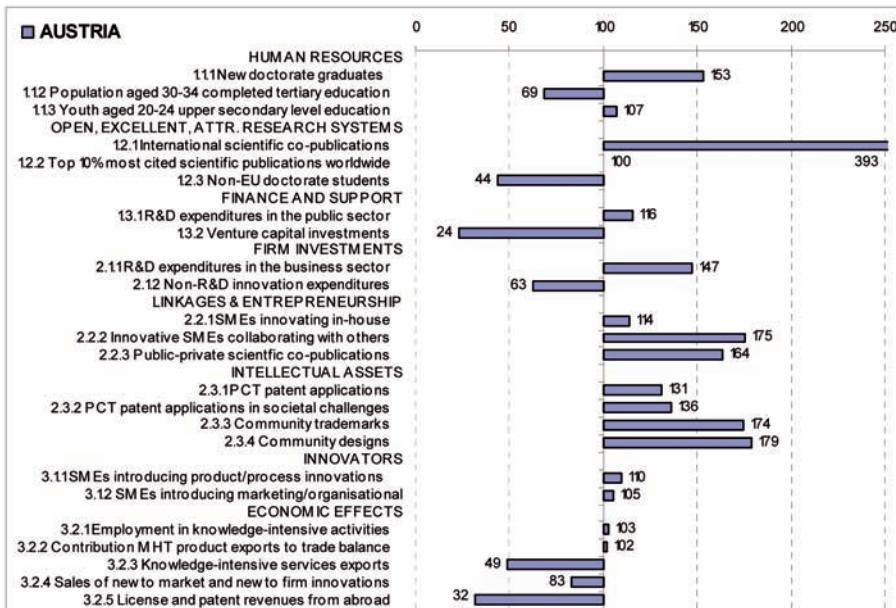
exports. Growth performance in Firm investments and Innovators is well above average and in Economic effects below average.



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 Linkages & entrepreneurship and Intellectual

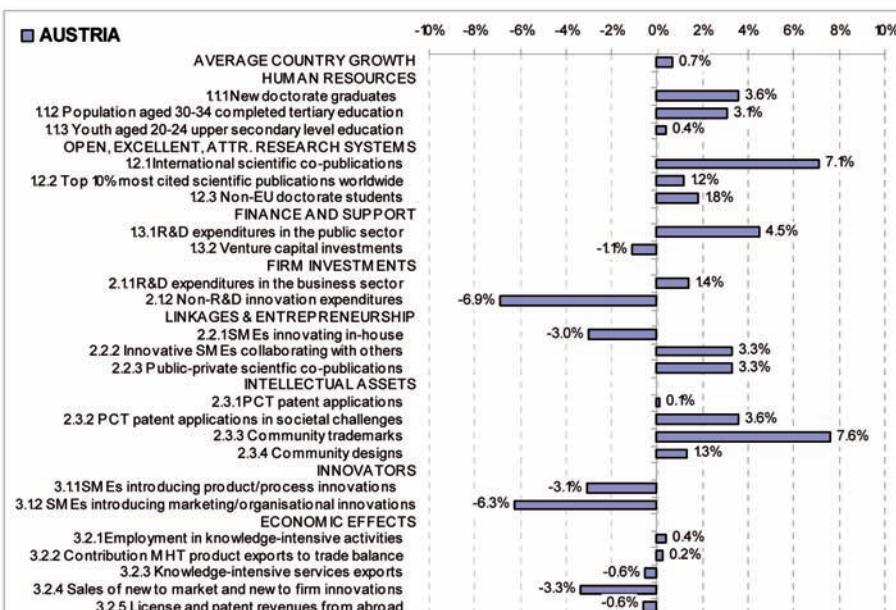
assets. Relative weaknesses are in Finance and support, Firm investments and Economic effects.



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 Non-R&D innovation expenditures and SMEs introducing marketing or organisational in-

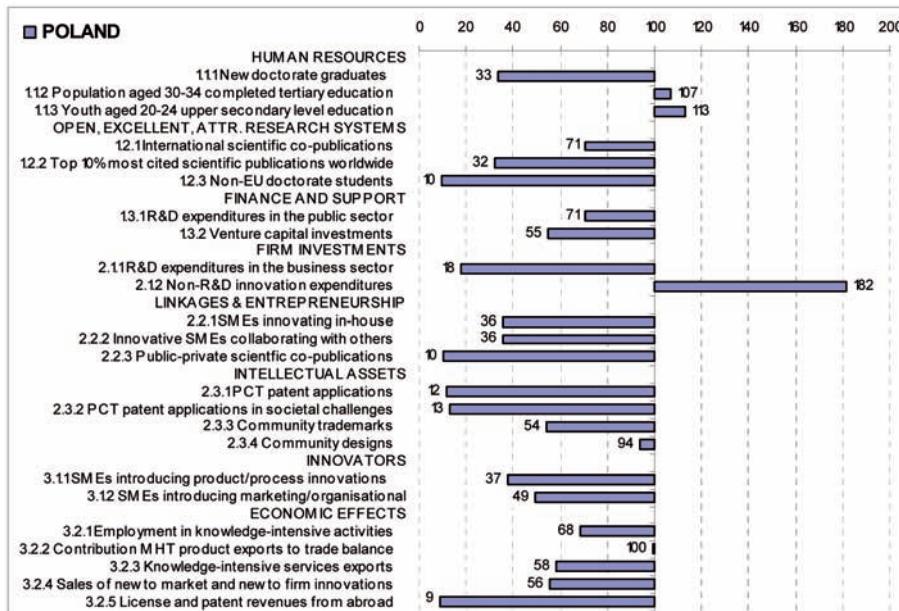
novations. Growth performance in Open, excellent and attractive research systems, Linkages & entrepreneurship and Intellectual assets is well above average and in Firm investments and Innovators well below average.



Annual average growth per indicator and average country growth

**Poland** is one of the modest innovators with a below average performance. Relative strengths are in Human resources. Relative weaknesses are in

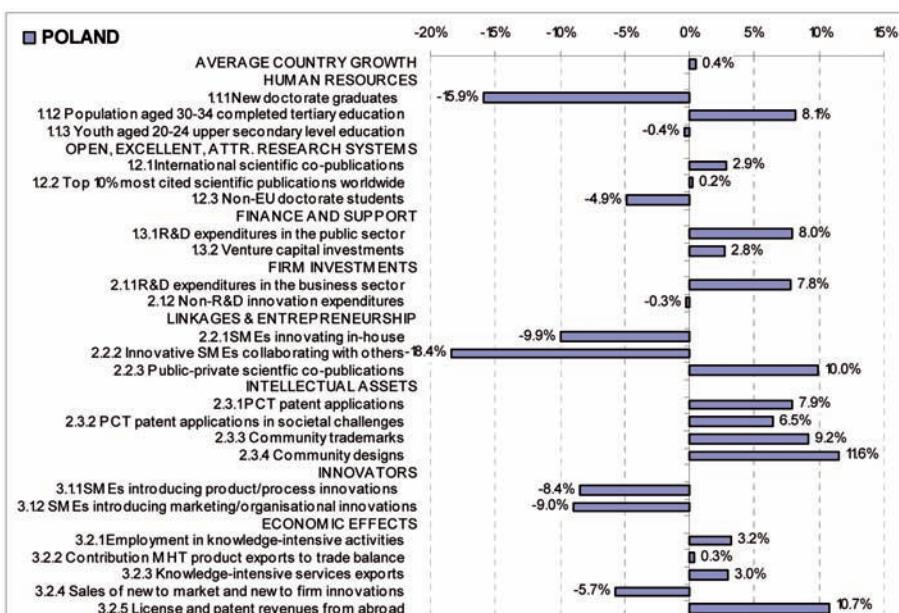
Linkages & entrepreneurship and Innovators.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Public-private co-publications, Community designs and License and patent revenues from abroad. A relatively strong decline is observed for New doctorate graduates and Innovative SMEs col-

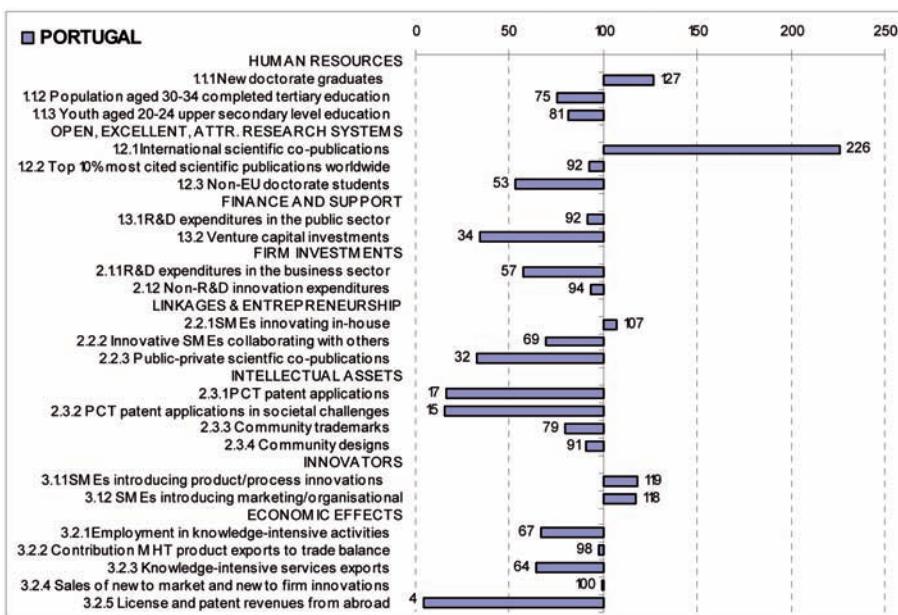
laborating with others. Growth performance in Finance and support, Intellectual assets and Economic effects is well above average and in Human resources, Linkages & entrepreneurship and Innovators well below average.



Annual average growth per indicator and average country growth

**Portugal** is one of the moderate innovators with a below average performance. Relative strengths

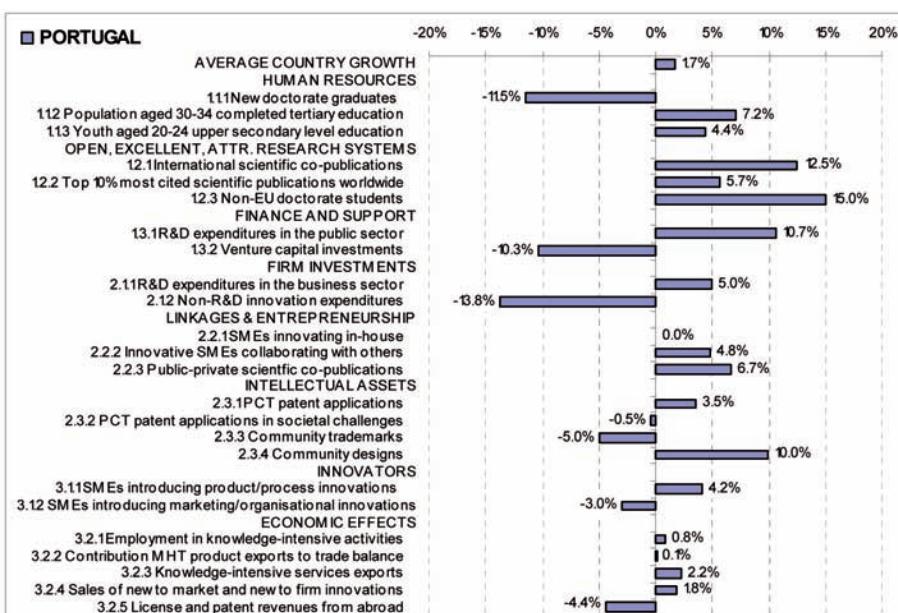
are in Innovators. Relative weaknesses are in Firm investments.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for International scientific co-publications, R&D expenditure in the public sector and Community designs. For Youth with upper secondary level education growth was highest of all Member States. A strong decline is observed for New doctorate

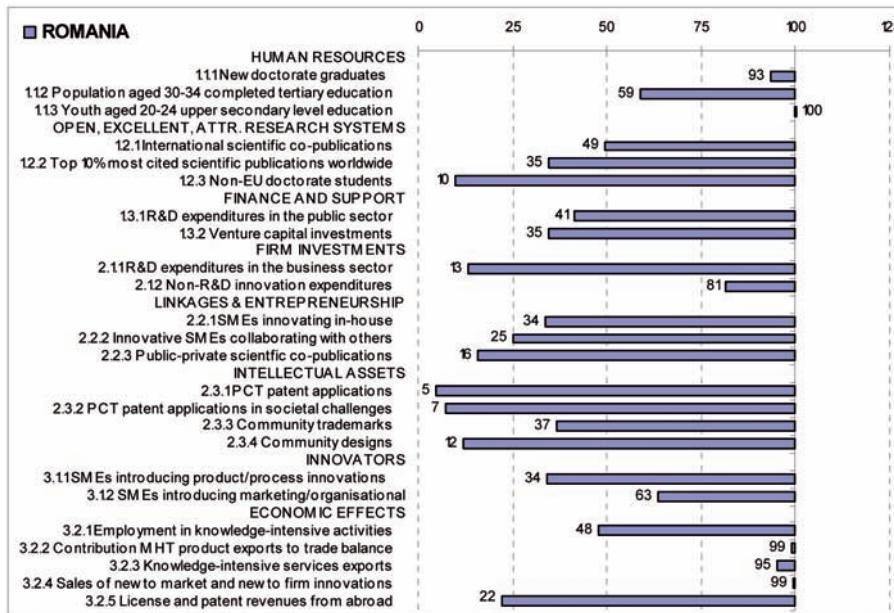
graduates, Venture capital investments and Non-R&D innovation expenditures. Growth performance in Open, excellent and attractive research systems and Linkages & entrepreneurship is well above average and in Firm investments and Innovators well below average.



Annual average growth per indicator and average country growth

**Romania** is one of the modest innovators with a below average performance. Relative strengths are

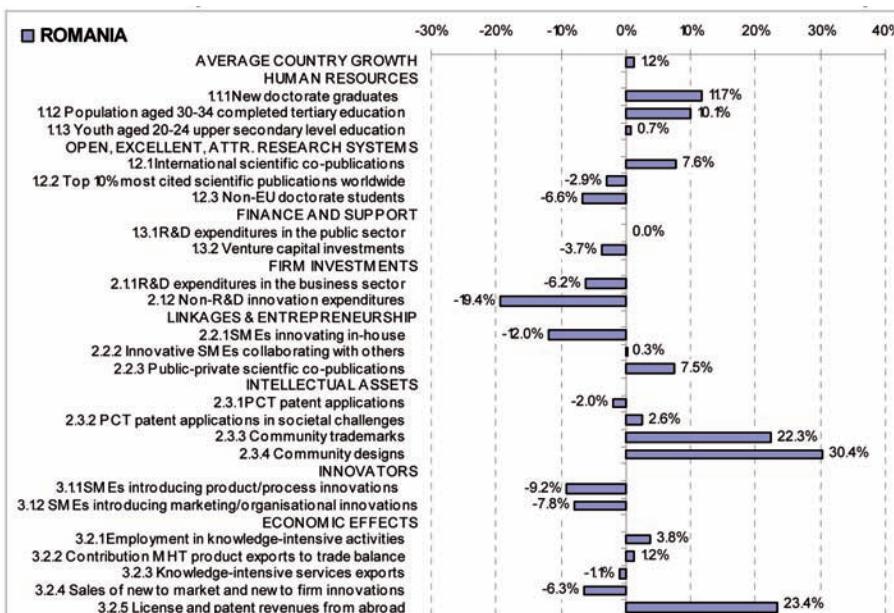
in Human resources and Economic effects. Relative weaknesses are in Linkages & entrepreneurship.



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 for License and patent revenues was the highest for all Member States. A strong decline is observed for Non-R&D innovation

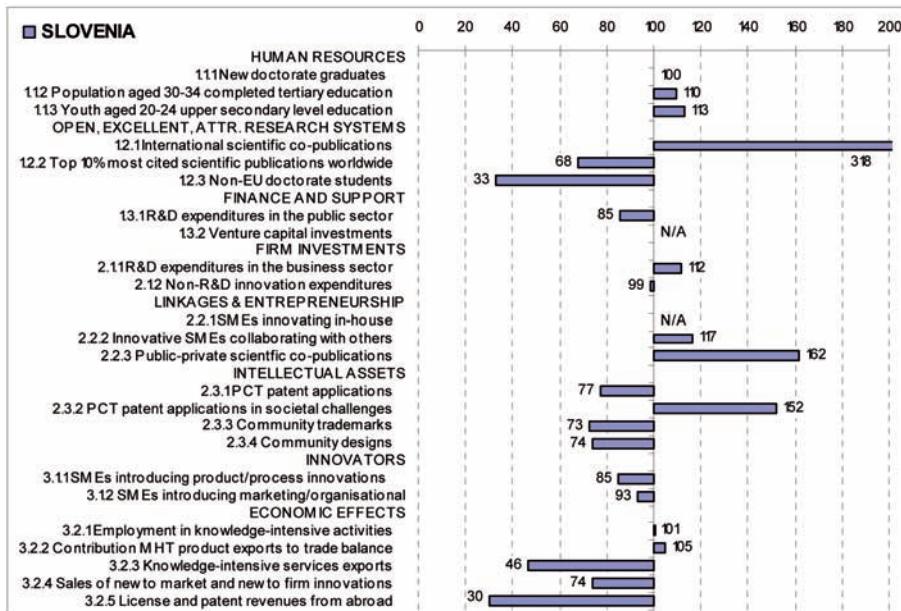
expenditures and SMEs innovating in-house. Growth performance in Intellectual assets is well above average and in Firm investments and Innovators well below average.



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.

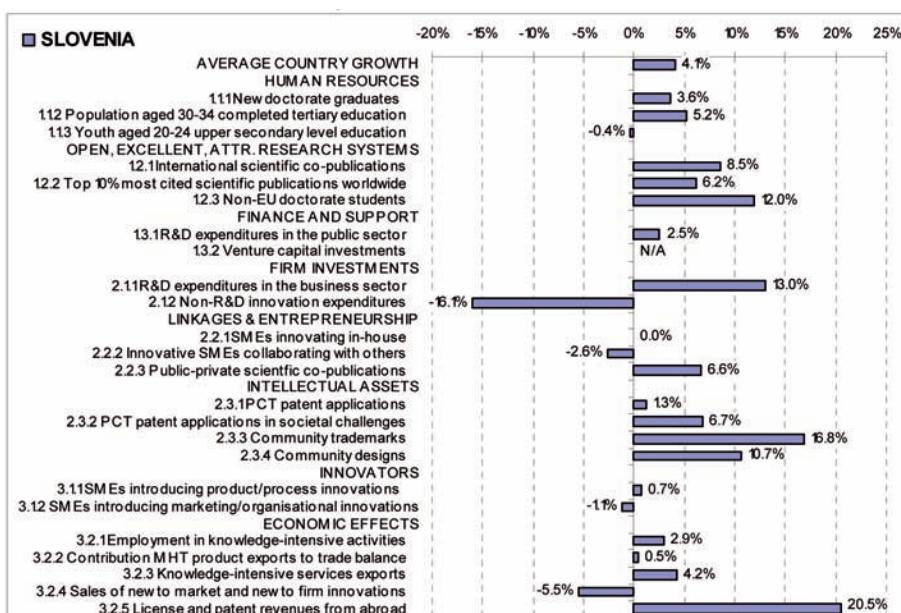
Relative weaknesses are in Open, excellent and attractive research systems and Firm investments.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for R&D expenditures in the business sector, Community trademarks and License and patent revenues from abroad. A strong decline is observed for Non-R&D innovation expenditure.

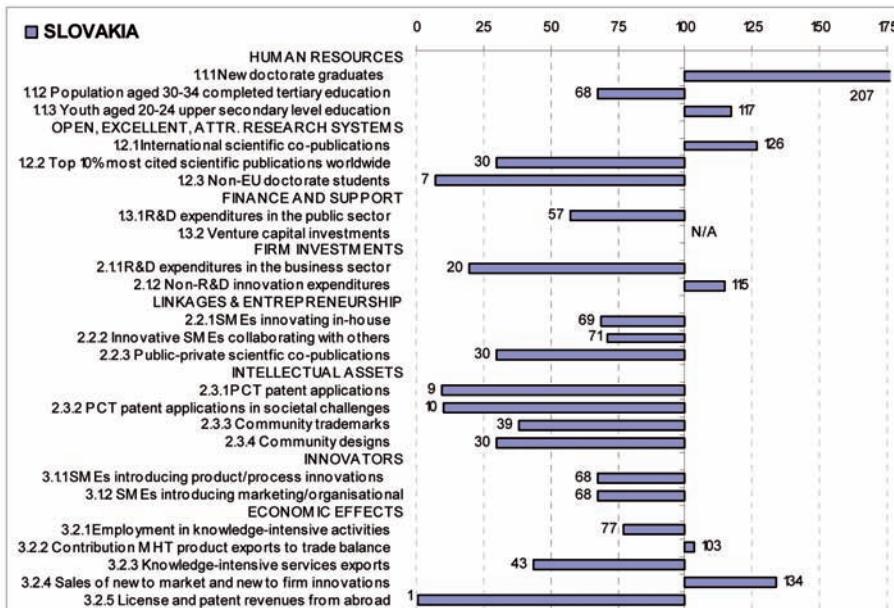
Growth performance in Open, excellent and attractive research systems and Intellectual assets is well above average and in Firm investments well below average.



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. Relative weaknesses are in

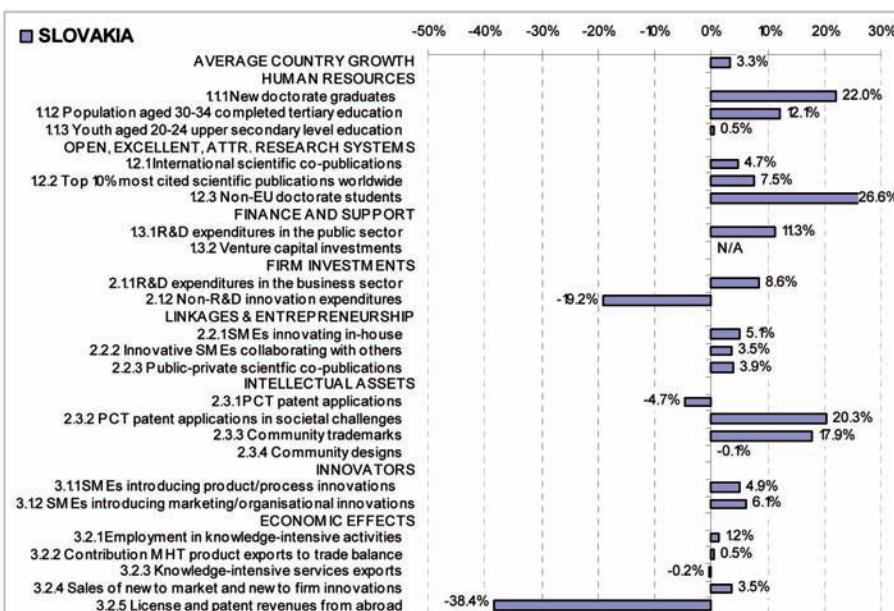
Open, excellent and attractive research systems and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for New doctorate graduates – the highest growth of all Member States -, PCT patents in societal challenges and Community trademarks. A strong decline is observed for Non-R&D innovation

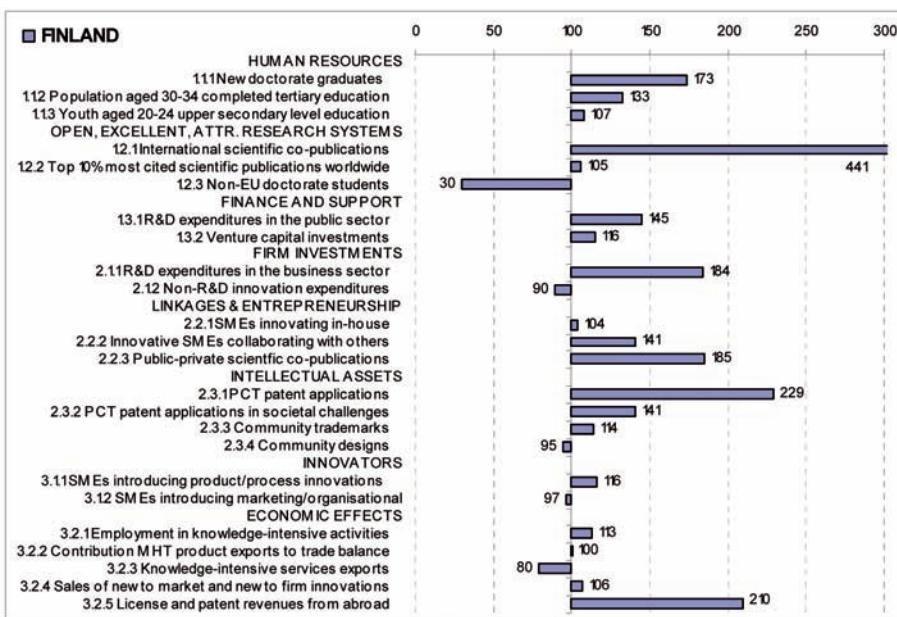
expenditure and License and patent revenues from abroad. Growth performance in Human resources, Finance and support and Intellectual assets is above average and in Firm investments well below average.



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

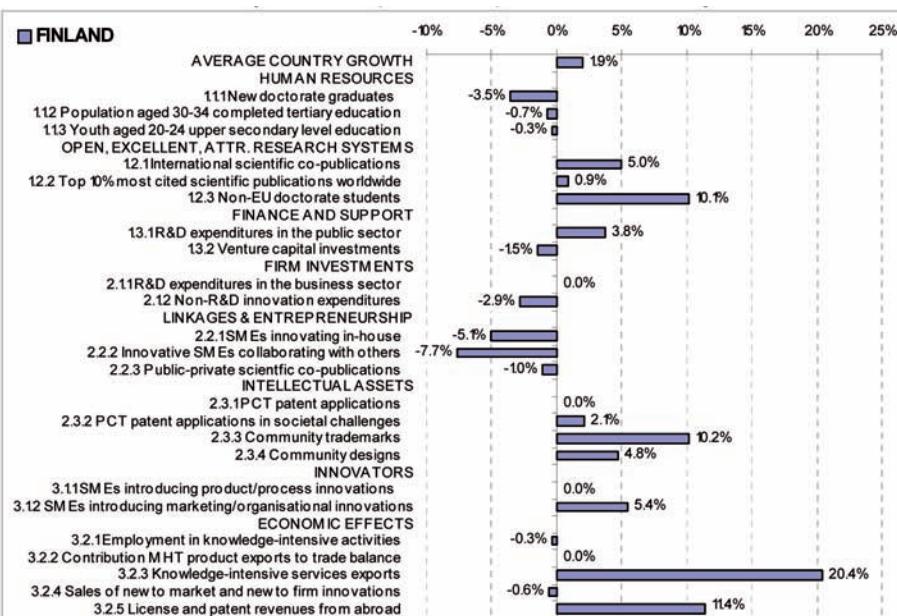
resources and Finance and support. Relative weaknesses are in Open, excellent and attractive research systems.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Community trademarks, Knowledge-intensive services exports and License and patent revenues from abroad. Growth for Knowledge-intensive services was the highest off all Member States. A relatively strong decline

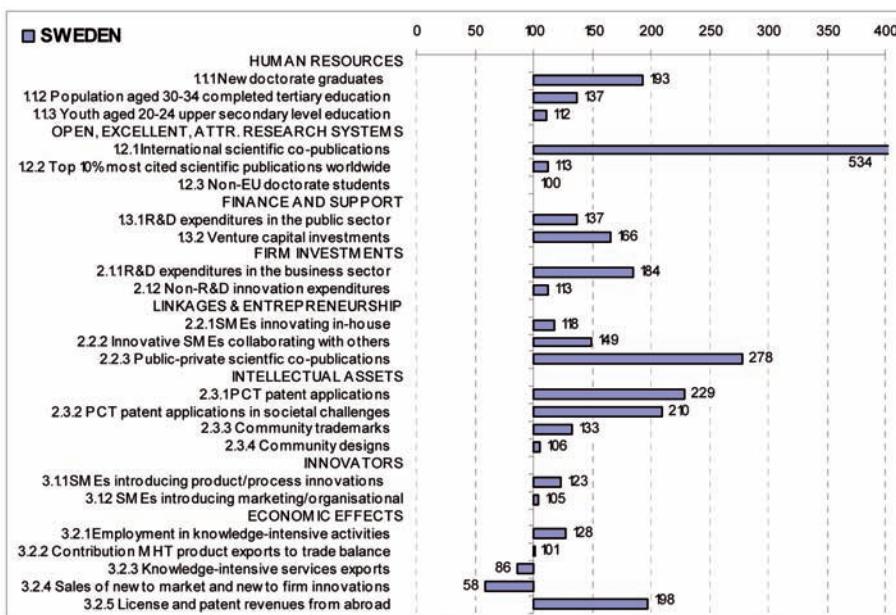
is observed for Innovative SMEs collaborating with others SMEs innovating in-house. Growth performance in Intellectual assets and Innovators is well above average and in Firm investments and Linkages & entrepreneurship well below average.



Annual average growth per indicator and average country growth

**Sweden** is one of the innovation leaders with an above average performance. Relative strengths are

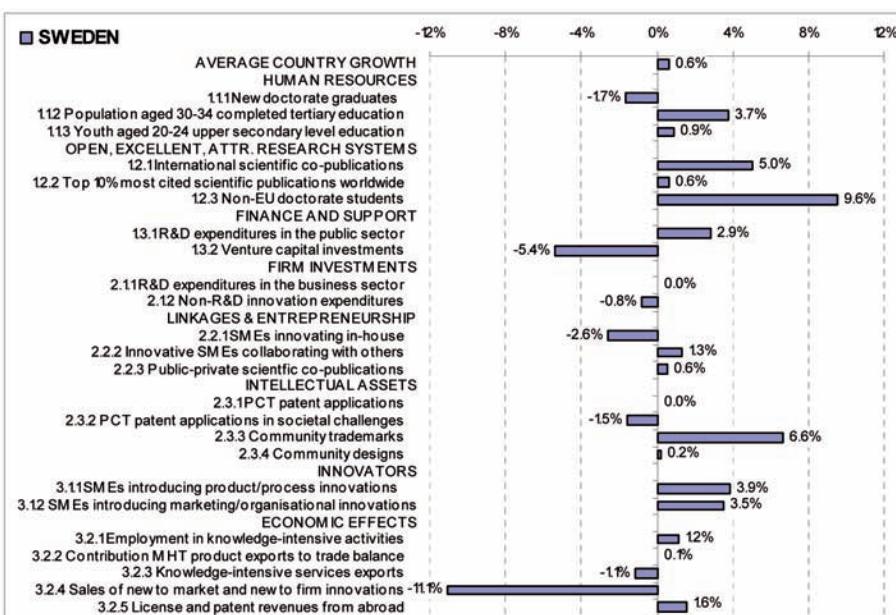
in Human resources. Relative weaknesses are in Firm investments and Economic effects.



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 Sales of new-to-market and new-to-firm innovations. Growth performance in Open, excellent and attractive research systems and

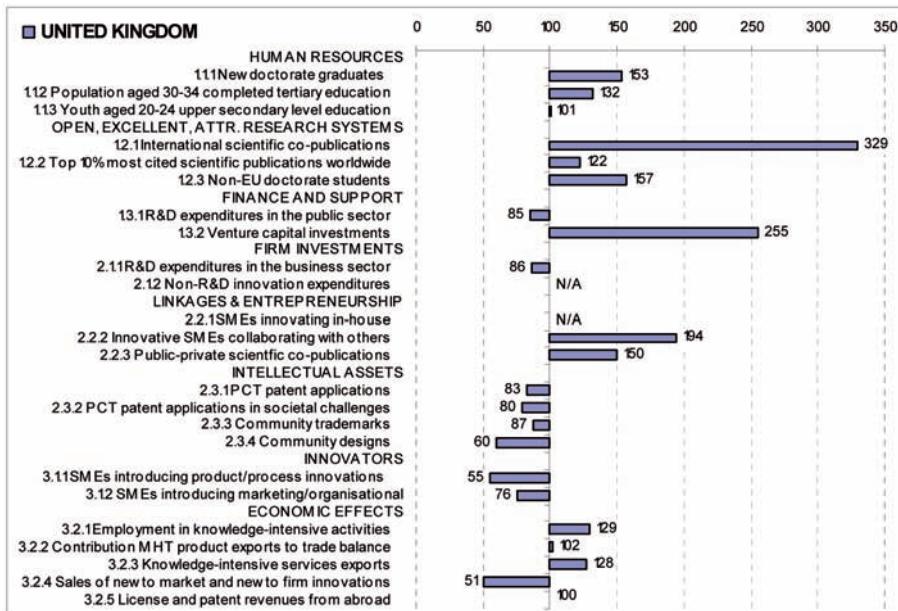
Innovators is well above average and in Finance and support and Economic effects well below average.



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 Linkages & entrepreneurship.

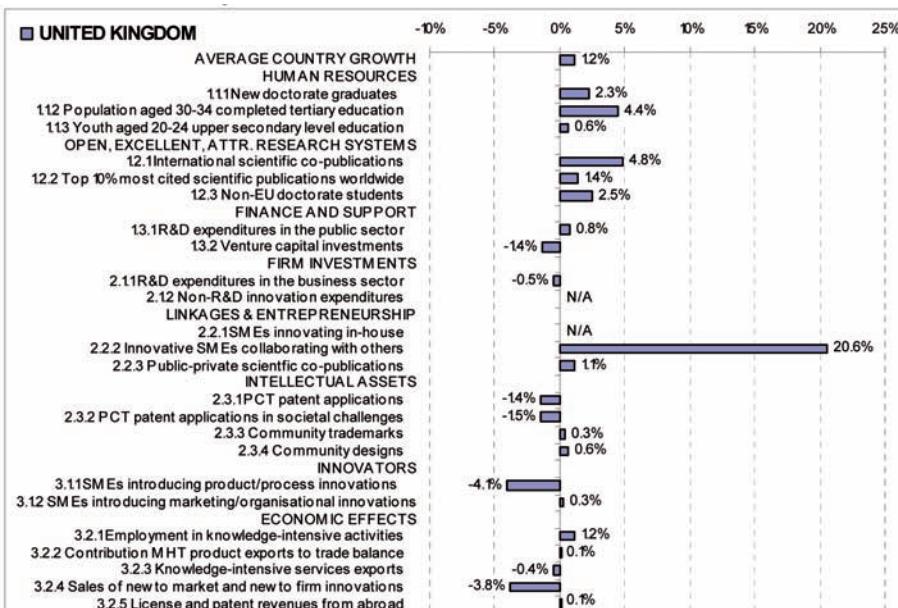
Relative weaknesses are in Innovators.



Indicator values relative to the EU27 (EU27=100)

The highest growth of all Member States is observed for Innovative SMEs collaborating with others. A relatively strong decline is observed for SMEs introducing product or process innovations and Sales of new-to-

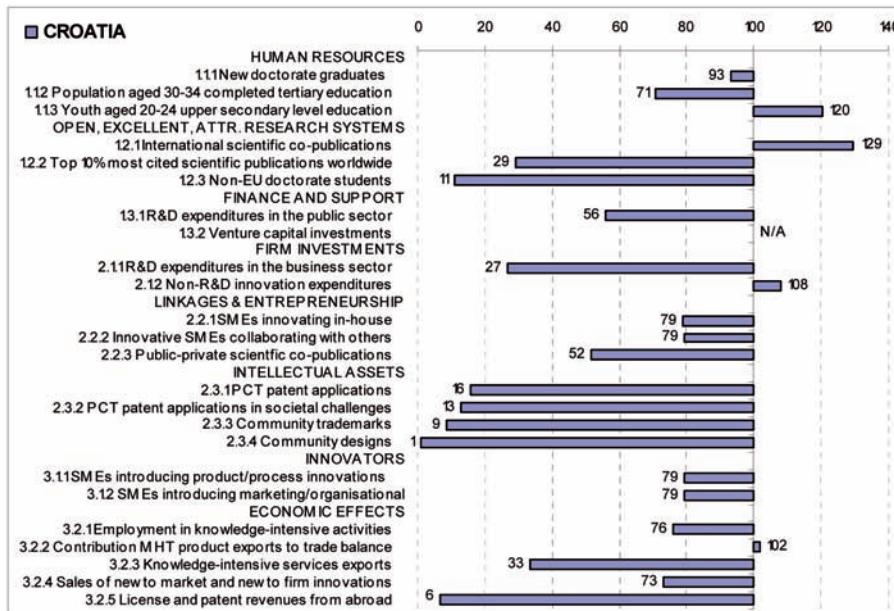
market and new-to-firm innovations. Growth performance in Linkages & entrepreneurship is well above average and in Economic effects below average.



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 and Economic effects. Relative

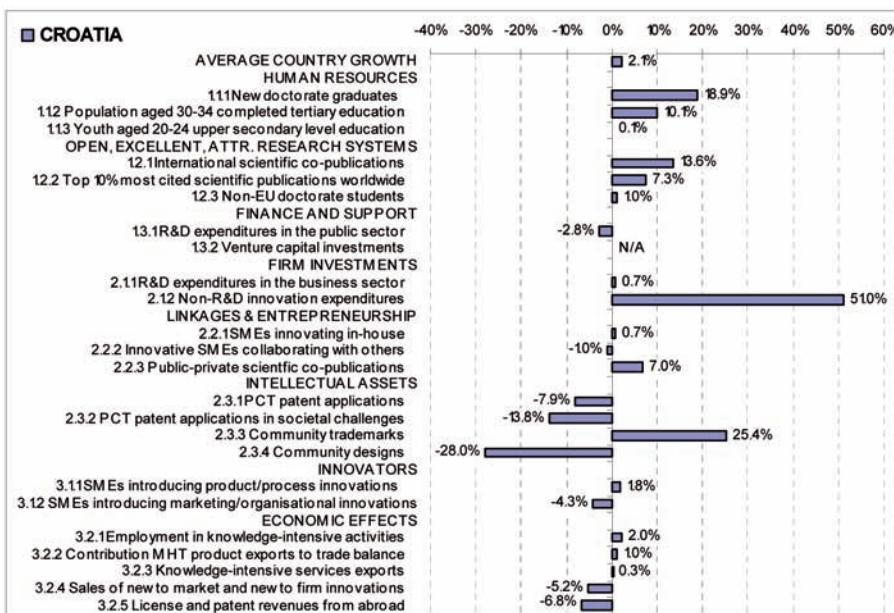
weaknesses are in Open, excellent and attractive research systems and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Non-R&D innovation expenditures, Community trademarks and Knowledge-intensive services exports. A strong decline is observed for PCT patent applications in societal challenges and

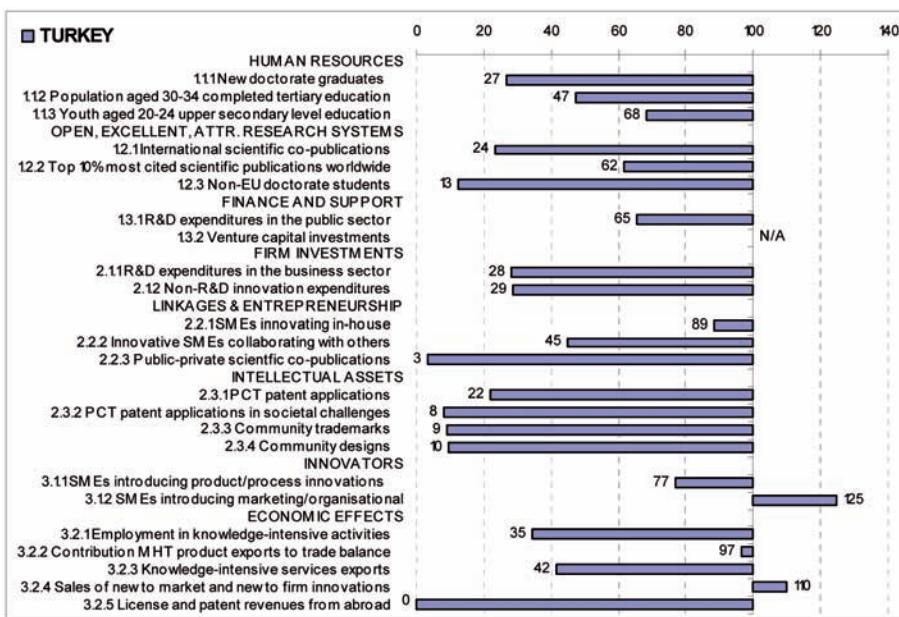
Community designs. Growth performance in Firm investments is well above average and in Intellectual assets and Innovators below average.



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

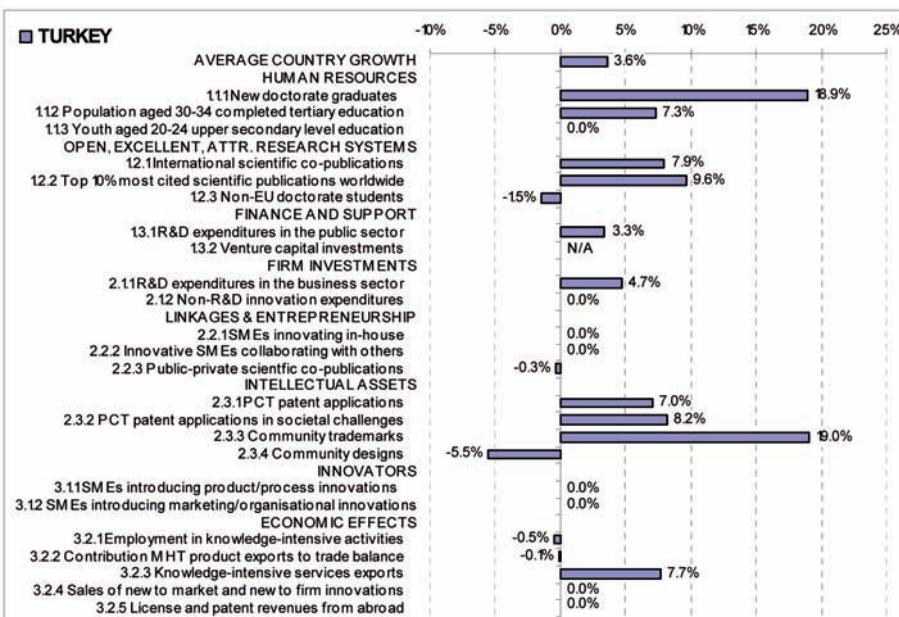
Innovators and Economic effects. Relative weaknesses are in Human resources and Firm investments.



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 Community designs. Growth performance in Human

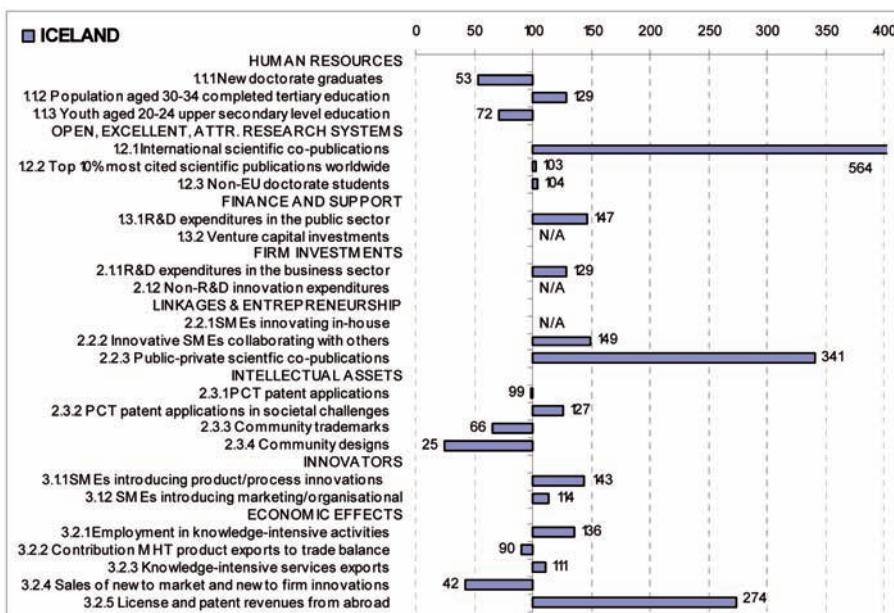
resources, Open, excellent and attractive research systems and Intellectual assets is well above average and in Linkages & entrepreneurship below average.



Annual average growth per indicator and average country growth

**Iceland** is one of the innovation followers with a below average performance. Relative strengths are

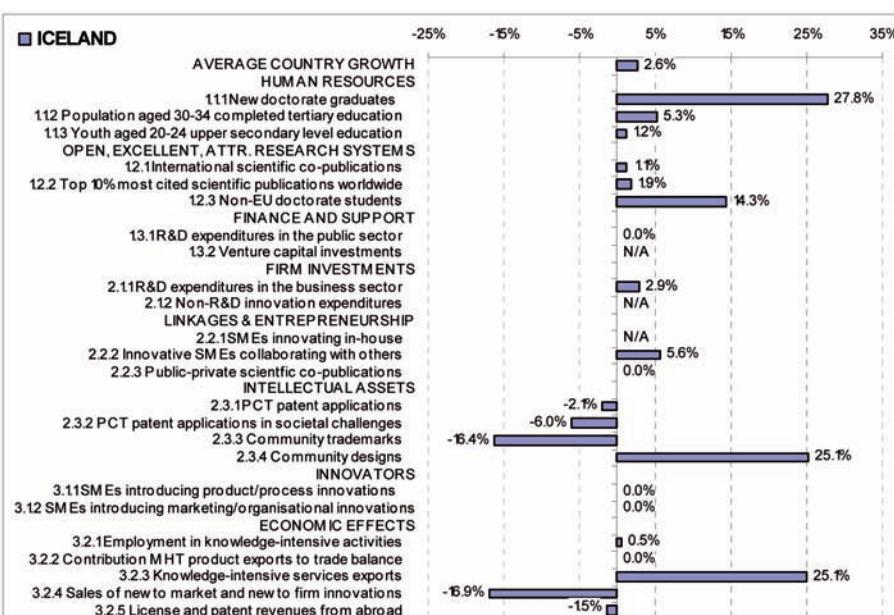
in Finance and support. Relative weaknesses are in Human resources and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for New doctorate students and Community designs. A strong decline is observed for Community trademarks and Sales of new-

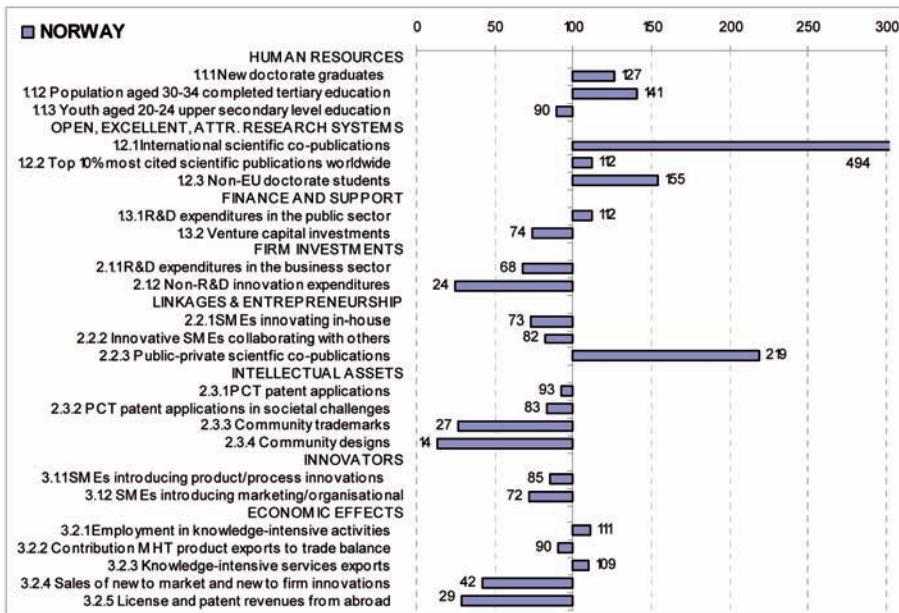
to-market and new-to-firm innovations. Growth performance in Human resources is well above average and in Economic effects well below average.



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 and Open, excellent and

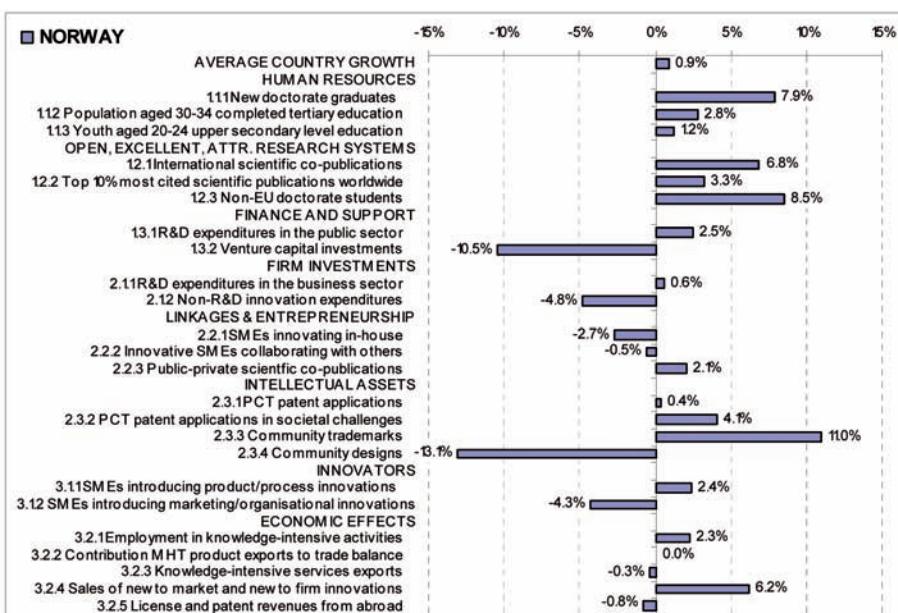
attractive research systems. Relative weaknesses are in Firm investments and Economic effects.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Community trademarks. A strong decline is observed for Venture capital investments and Community designs. Growth performance in Human resources and Open, excellent

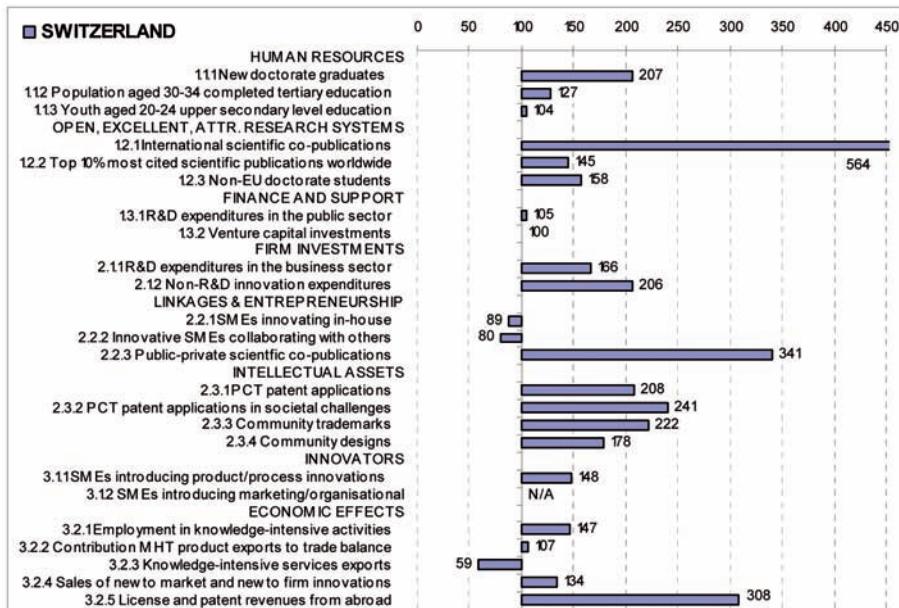
and attractive research systems is well above average and in Finance and support, Firm investments and Innovators well below average.



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

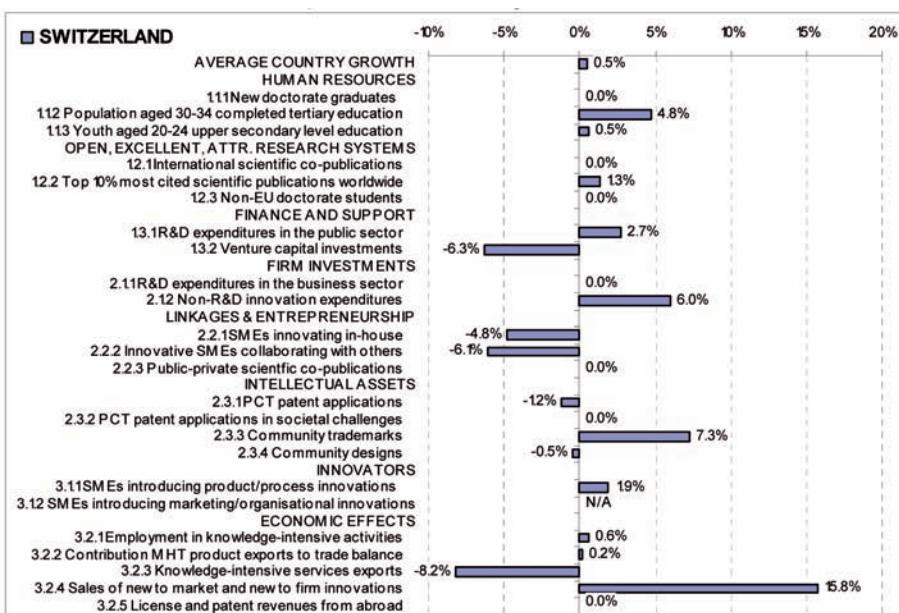
systems, Intellectual assets and Innovators. Relative weaknesses are in Finance and support and Linkages & entrepreneurship.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for Sales of new-to-market and new-to-firm innovations. A relatively strong decline is observed for Venture capital investments, SMEs innovating in-house and Innovative SMEs

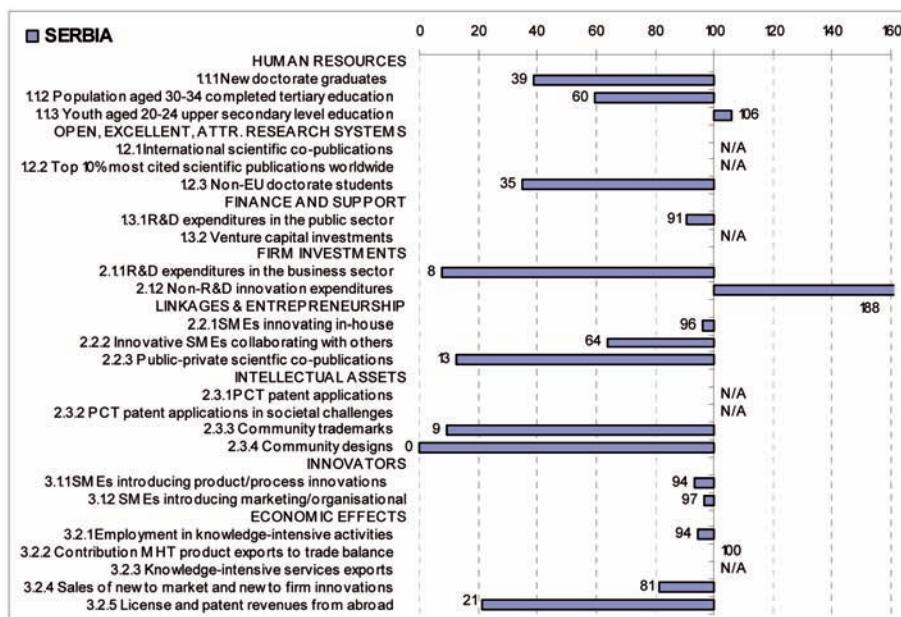
collaborating with others. Growth performance in Firm investments and Economic effects is well above average and in Finance and support and Linkages & entrepreneurship well below average.



Annual average growth per indicator and average country growth

**Serbia** is one of the moderate innovators with a below average performance. Relative strengths are

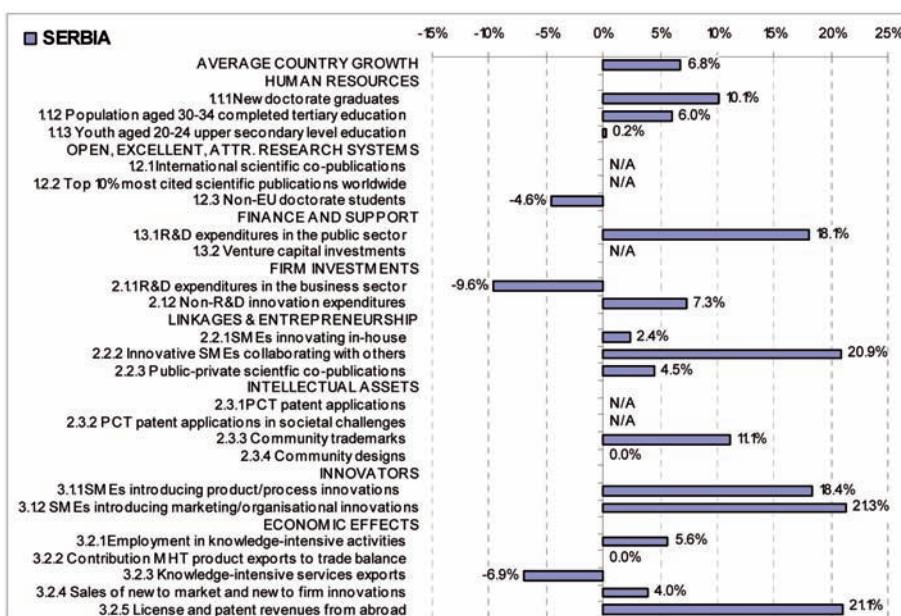
in Finance and support and Innovators. Relative weaknesses are in Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for R&D expenditure in the public sector, Innovative SMEs collaborating with others, SMEs introducing product or process innovations, SMEs introducing marketing or organisational innovations and License and patent revenues from abroad. A

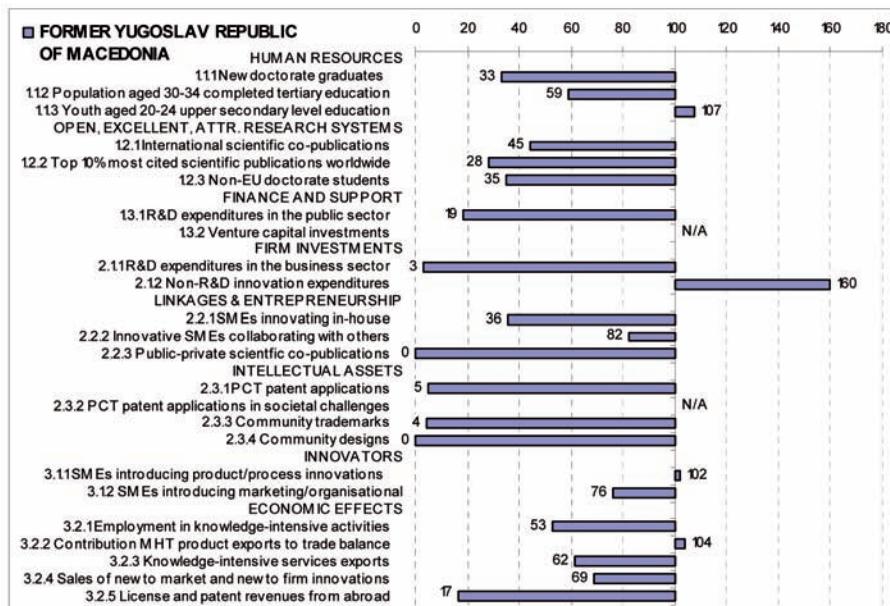
strong decline is observed for R&D expenditures in the business sector and Knowledge-intensive services exports. Growth performance in Finance and support and Innovators is well above average and in Open, excellent and attractive research systems below average.



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 Innovators

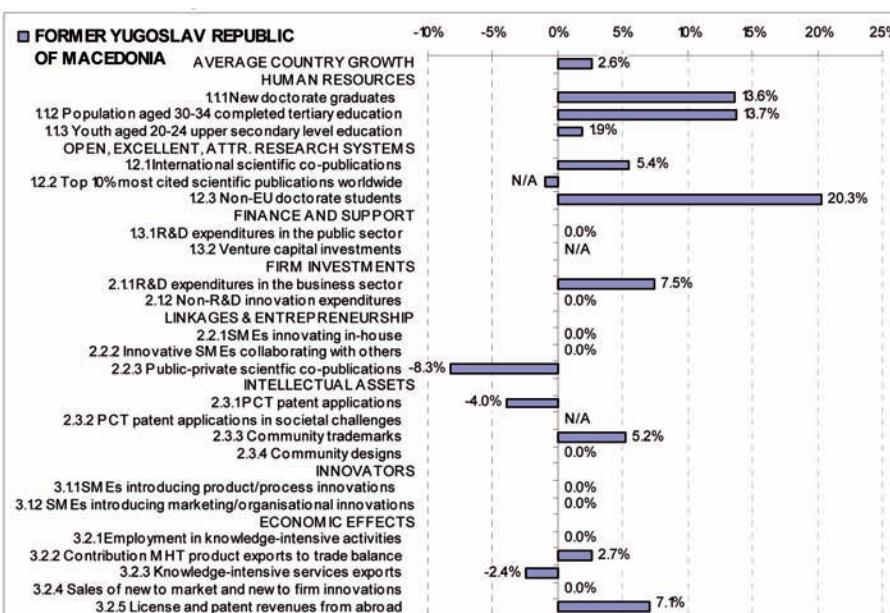
and Economic effects. Relative weaknesses are in Finance and support, Linkages & entrepreneurship and Intellectual assets.



Indicator values relative to the EU27 (EU27=100)

High growth is observed for New doctorate graduates and Population aged 30-34 with completed tertiary education. A strong decline is observed for Public-private scientific co-publications.

Growth performance in Human resources and Open, excellent and attractive research systems is well above average and in Linkages & entrepreneurship well below average.



Annual average growth per indicator and average country growth

## 5. Innovation at the regional level

### 5.1. Regional Innovation Scoreboard

The IUS report is accompanied by the comparable analysis at the regional level: the Regional Innovation Scoreboard (RIS). The RIS 2012 provides a comparative assessment of innovation performance across NUTS 1 and NUTS 2 regions of the European Union, Croatia, Norway and Switzerland<sup>8</sup>. The RIS 2012 replicates the methodology used at national level in the Innovation Union Scoreboard (IUS), using 12 of the 24 indicators used in the IUS for 190 regions across Europe.

#### Four regional performance groups

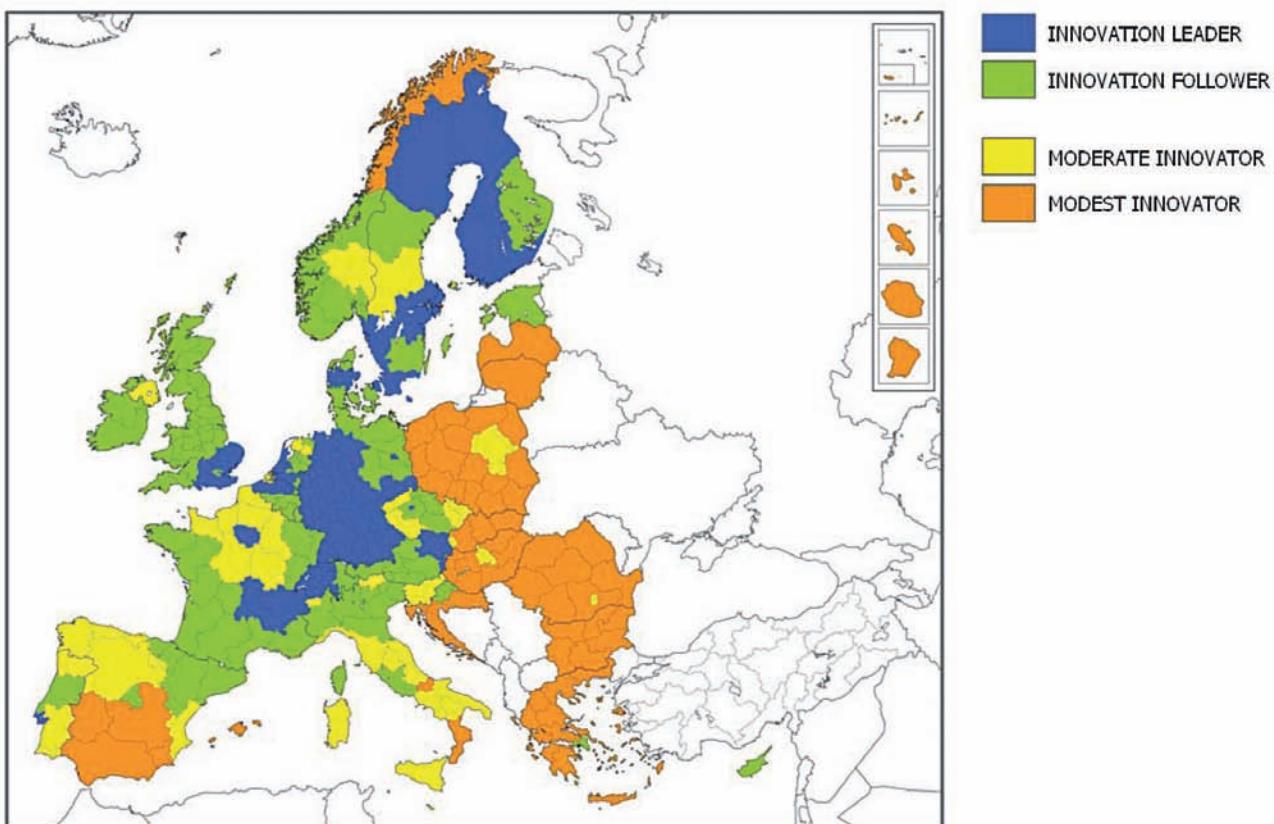
The main results of the grouping analysis are summarised in Figure 23, which shows four regional performance groups similar to those identified in

the Innovation Union Scoreboard, ranging from Innovation leaders to Modest innovators.

#### **There is considerable diversity in regional innovation performances**

The results show that most European countries have regions at different levels of performance (Figure 23). In France and Portugal we observe at least one region in each of the 4 broader performance groups. Czech Republic, Finland, Italy, Netherlands, Norway, Spain, Sweden and the UK have at least one region in 3 different performance groups. This regional diversity in innovation performance also calls for regional innovation support programmes better tailored to meet the needs of individual regions.

Figure 23: Regional performance groups



The EU Member States Cyprus, Estonia, Latvia, Lithuania, Luxembourg and Malta are not included in the RIS analysis. Group membership shown is that of the IUS. Map created with Region Map Generator.

<sup>8</sup> The RIS 2012 report and the RIS 2012 Methodology reports are available at:  
[http://ec.europa.eu/enterprise/policies/innovation/policy/regional-innovation/index\\_en.htm](http://ec.europa.eu/enterprise/policies/innovation/policy/regional-innovation/index_en.htm)

### **The most innovative regions are typically in the most innovative countries**

Most of the regional innovation leaders and innovation followers are located in the country leaders and followers identified as such in the Innovation Union Scoreboard. The results do highlight several regions in weaker performing countries being much more innovative such as Praha, an innovation leader, in the Czech Republic (a moderate innovator); Attiki, an innovation follower, where Greece is a moderate innovator; Lisboa, an innovation leader, in Portugal (a moderate innovator); Bucuresti – Ilfov, a moderate innovator, in Romania (a modest innovator); East of England and South East (UKJ) are innovation leaders within the UK (an innovation follower); and Sjeverozapadna Hrvatska (Zagreb), an innovation follower, in Croatia (a moderate innovator).

### **Regions have different strengths and weaknesses**

Three groups of regions can be identified based on their relative performance on Enablers, Firm activities and Outputs. The majority of innovation leaders and high performing innovation followers are characterised by a balanced performance structure whereas the majority of the moderate and modest innovators are characterised by an imbalanced performance structure. Regions wishing to improve their innovation performance should thus pursue a more balanced performance structure.

### **Regional research and innovation potential through EU funding**

A complementary analysis in the RIS 2012 has studied the relationship between use of two main EU funding instruments and innovation performance: the Framework Programmes for Research and Technological Development (FP6 and FP7) and the Structural Funds (SF).

There are remarkable differences in the use of EU funds across EU regions. There are four typologies of regions absorbing and leveraging EU funds:

- Framework Programme leading absorbers with low use of Structural Funds for business innovation and medium-to-high participation in Framework Programmes;

- Structural Funds leading users with high use of Structural Funds for business innovation and low participation in Framework Programmes;
- Full users/absorbers with medium use of Structural Funds for business innovation and low participation in Framework Programmes;
- Low users/absorbers with low use of Structural Funds for business innovation and low participation in Framework Programmes.

The majority of European regions are low users/absorbers (63%), followed by full users/absorbers (17%), FP leading absorbers (15%) and SF leading users (6%).

The results suggest that Structural Funds and Framework Programmes are complementary types of funding targeting a rather specific, but comparatively different set of regions. Whereas capital regions in the EU15 are largely FP leading absorbers or low users/absorbers in both periods, there is not much differentiation between capital regions and all other regions in the EU12.

The results show a relatively even distribution of shares of high, medium and low innovators in low absorber/user regions and full absorber/user regions. A majority of FP leading absorbers in FP6 were innovation leaders or innovation followers in 2007 and 2011. In contrast, a majority of all SF leading user regions in the period 2000-06 were also modest innovators in 2007 and 2011. The results show a lack of common characteristics/patterns linking innovation performance and the use of EU funds in regions across time.

## 5.2. Regional innovation and socio-economic performance

There is an alleged positive relationship between innovation and socio-economic performance. The exploratory report "Regional innovation and socio-economic performance" shows that, on average, more innovative regions enjoy higher levels of development (as measured by GDP per capita), higher levels of labour productivity, higher employment rates, and (to a lesser extent) lower energy usage. There is also evidence to suggest that more innovative regions also have lower proportions of early school leavers. These findings reinforce existing knowledge on the benefits of formulating policies encouraging innovation.

Another policy-relevant finding emerges from splitting regions into high and low income. On average, high income regions have a weaker degree of association between innovation performance and all the socio-economic performance measures than low income regions. This suggests that low income regions gain proportionately more from innovation (perhaps due to the benefits of being able to harvest so-called "low hanging fruit") than high income

regions. Policies stimulating innovation in low income regions are expected to encourage these regions to "catch-up" with higher-income regions.

When the analysis is changed to looking at growth rates most of the previously-identified associations are not significant. This could indicate that the levels analysis was merely identifying spurious or related correlations, but given the short time periods over which growth rates could be calculated it is not possible to be certain about this. To establish any conclusive evidence on cause-and-effect relationships, longer time series are needed. It is also remarkable that there is not a wider availability for key regional indicators on energy and the environment (or income distribution). While targets are largely set at EU and national levels, it is equally important to understand and investigate the wide degree of heterogeneity at sub-national level.

## 5.3. Regional research cooperation patterns of SMEs

In particular for SMEs research collaboration with public partners is important: according to the 2010 Community Innovation Survey about 7% of innovative SMEs acknowledge collaboration with universities or higher education institutions, where 4% collaborate with government research institutes or public sector research institutes. The exploratory report "Research cooperation patterns of European SMEs" describes general patterns within 'public-private co-publications' (PPCs) focusing on the spatial distribution of SMEs public sector collaboration partners within and across regional and national borders and reveals interconnected spatial proximity structures at different geographical scales.

Almost 90% of SME-produced research publications were co-produced with public sector partners. There are large and structural disparities EU27 regions in terms of connectivity to public sector research partners with. Collaboration shares differ by country and appear to partially depend on the number of innovative SMEs within a country. Europe's smallest countries – Malta and Cyprus - have shares of 95% or more. The share within the two largest countries – Germany and the UK

- is less than 80%. SMEs clearly prefer domestic public partners, which constitute 57% of all public partnerships. Public partners in other EU27 countries account for 27%, while the remainder of the public partners are based outside the EU27 (but often still within Europe).

A geographical breakdown of PPCs shows the following breakdown by geographic zone: intra-regional 'local' partners account for 31% of all co-publication partners; domestic partners in other regions represent 33%, those within other EU27 countries represent 20%, while partners outside the non-EU27 contribute 17%. These results show that defining geographical proximity in terms of NUTS2 regions might misrepresent in what appears to be an increasingly geographically dispersed and 'networked' reality among research active SMEs, where companies seem to operate at a large scale across regional and national boundaries. Regional public-private research collaborations are in all likelihood, an almost undistinguishable part of domestic or even international R&D networks.

# 6. Technical annex

## 6.1. 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 across all countries plus 2 times the standard deviation. Negative outliers are identified as those relative scores which are smaller than the mean across all countries 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 which 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 2013 the reference year will be 2010 or 2011 for most indicators (cf. Table 1).

### **Step 3: Imputing for missing values**

Reference year data are then used for "2012", etc. If data for a year-in-between is not available we substitute with the value for the previous year. 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 (the indicator will be left empty).

### **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 indicators skewness is above 1 and data have been transformed using a square root transformation: Non-EU doctorate students, Venture capital investments, Public-private co-publications, PCT patent applications, PCT patent applications in societal challenges and License and patent revenues from abroad. A square root transformation simply means taking using the square root of the indicator value instead of the original value.

### **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.

<b>Example 1 (latest year missing)</b>	"2012"	"2011"	"2010"	"2009"	"2008"
Available relative to EU27 score	N/A	150	120	110	105
Use most recent year	<b>150</b>	150	120	110	105
<b>Example 2 (year-in-between missing)</b>	"2012"	"2011"	"2010"	"2009"	"2008"
Available relative to EU27 score	150	N/A	120	110	105
Substitute with previous year	150	<b>120</b>	120	110	105
<b>Example 3 (beginning-of-period missing)</b>	"2012"	"2011"	"2010"	"2009"	"2008"
Available relative to EU27 score	150	130	120	N/A	N/A
Substitute with latest available year	150	130	120	<b>120</b>	<b>120</b>

## 6.2. Calculating growth rates

For the calculation of the average annual growth rate in innovation performance we have adopted a generalized approach<sup>9</sup>:

**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  $t-1$  as obtained after Step 5 in the previous section.

**Step 2:** We aggregate these indicator growth rates between year  $t$  and year  $t-1$  using a geometric average<sup>10</sup> to calculate the average yearly growth rate  $\tau_c^t$ :

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

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  $\tau_c^t$  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:

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

where  $t \in [2007, 2011]$  and each average yearly growth rate receives the same weight  $w_t$ .

## 6.3. International benchmarking

The methodology for calculating average innovation performance for the EU27 and its major global competitors is similar to that used for calculating average innovation performance for the EU Member States:

1. Calculate normalised scores for all indicators as follows:  $Y_i = ((X_i - \text{smallest } X \text{ for all countries}) / (\text{largest } X \text{ for all countries} - \text{smallest } X \text{ for all countries}))$  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  $CI_i^* - 100$

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.

<sup>9</sup> 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/1111111111921/1/report%231.pdf>

<sup>10</sup> 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.

## Annex A: Definitions of indicators

	<b>Indicator</b>	<b>Definition numerator</b>	<b>Definition denominator</b>	<b>Interpretation</b>	<b>Source</b>
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
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 buys, 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.	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)

	<b>Indicator</b>	<b>Definition numerator</b>	<b>Definition denominator</b>	<b>Interpretation</b>	<b>Source</b>
2.2.1	SMEs innovating in-house (% of SMEs) <sup>11</sup>	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)
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 Parities	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 Environment-related technologies and Health. Patents in Environment-related technologies include those in General Environmental Management (air, water, waste), Energy generation from renewable and non-fossil sources, Combustion technologies with mitigation potential (e.g. using fossil fuels, biomass, waste, etc.), Technologies specific to climate change mitigation, Technologies with potential or indirect contribution to emissions mitigation, Emissions abatement and fuel efficiency in transportation and Energy efficiency in buildings and lighting. Patents in health-related technologies include those in Medical technology (IPC codes (8th edition) A61B, C, D, F, G, H, J, L, M, N, H05G) and Pharmaceuticals (IPC codes A61K excluding A61K8)	Gross Domestic Product in Purchasing Power Parities	This indicator measures PCT applications in health technology and environment-related technologies and is relevant as increased numbers of patent applications in health technology and environment-related technologies will be necessary to meet the societal needs of an ageing European society and sustainable growth.	OECD / Eurostat
2.3.3	Community trademarks per billion GDP (in PPP€)	Number of new community trademarks applications	Gross Domestic Product in Purchasing Power Parities	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. <i>Comment: two-year averages have been used</i>	OHIM <sup>12</sup> / Eurostat

<sup>11</sup> 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](http://www.proinno-europe.eu/sites/default/files/page/11/12/IUS_2010_Methodology_report.pdf)).

<sup>12</sup> Office for Harmonization in the Internal Market (<http://oami.europa.eu/>)

	<b>Indicator</b>	<b>Definition numerator</b>	<b>Definition denominator</b>	<b>Interpretation</b>	<b>Source</b>
2.3.4	Community designs per billion GDP (in PPPE)	Number of new community designs applications	Gross Domestic Product in Purchasing Power Parities	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. <i>Comment: two-year averages have been used</i>	Eurostat (Community Innovation Survey)
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	--	--	--	--
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	Contribution of medium and high-tech products exports to the trade balance	The contribution to the trade balance is calculated as follows: $\frac{(X_{MHT} - M_{MHT}) - (X-M)(X_{MHT} + M_{MHT})}{(X+M)}$ where $(X_{MHT} - M_{MHT})$ is the observed trade balance for medium and high-tech products and $(X-M)(X_{MHT} + M_{MHT})/(X+M)$ is the theoretical trade balance (where X denotes exports and M denotes imports of resp. MHT products and all products). MHT 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 manufacturing trade balance reveals an economy's structural strengths and weaknesses in terms of technological intensity. It indicates whether an industry performs relatively better (or worse) than total manufacturing and can be interpreted as an indicator of revealed comparative advantage that is based on countries' trade specialisation.  A positive value indicates a structural surplus, while a negative value indicates a structural deficit. The indicator is expressed as a percentage of total trade in order to eliminate business cycle variations.	UN / Eurostat
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. 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 B: Current performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT
<b>ENABLERS</b>																		
<b>Human resources</b>																		
1.1.1 New doctorate graduates	1.5	1.5	0.5	1.3	2.1	2.7	0.9	1.6	1.2	1.2	1.5	1.6	0.2	0.4	0.9	0.8	0.8	0.2
1.1.2 Population completed tertiary education	34.6	42.6	27.3	23.8	41.2	30.7	40.3	49.4	28.9	40.6	43.4	20.3	45.8	35.7	45.4	48.2	28.1	21.1
1.1.3 Youth with upper secondary level education	79.5	81.6	85.5	91.7	70.0	75.8	82.6	86.9	83.6	61.7	83.8	76.9	87.7	80.4	86.9	73.3	83.3	59.2
<b>Open, excellent and attractive research systems</b>																		
1.2.1 International scientific co-publications	300	1280	205	529	1692	715	734	1131	544	599	683	500	1004	178	265	1428	387	328
1.2.2 Scientific publications among top 10% most cited	10.90	13.59	2.61	5.51	14.60	11.64	7.45	11.38	9.52	10.19	10.33	10.11	8.85	3.95	5.95	10.11	4.91	7.06
1.2.3 Non-EU doctorate students	20.02	19.69	4.13	4.00	15.43	N/A	1.55	22.25	1.00	17.33	31.56	6.24	1.64	0.60	0.24	20.39	2.61	4.05
<b>Finance and support</b>																		
1.3.1 R&D expenditure in the public sector	0.75	0.65	0.26	0.72	0.99	0.94	0.87	0.55	0.43	0.64	0.80	0.53	0.33	0.50	0.68	0.45	0.43	0.24
1.3.2 Venture capital investments	0.094	0.090	0.007	0.010	0.104	0.057	N/A	0.026	0.004	0.050	0.105	0.020	N/A	N/A	N/A	0.243	0.030	N/A
<b>FIRM ACTIVITIES</b>																		
<b>Firm investments</b>																		
2.1.1 R&D expenditure in the business sector	1.27	1.37	0.30	1.11	2.09	1.90	1.49	1.17	0.17	0.67	1.43	0.68	0.08	0.19	0.24	0.98	0.75	0.49
2.1.2 Non-R&D innovation expenditure	0.56	0.53	0.28	0.69	0.51	0.88	1.03	0.30	0.74	0.39	0.25	0.59	1.66	0.36	1.27	0.19	0.40	0.96
<b>Linkages &amp; entrepreneurship</b>																		
2.2.1 SMEs innovating in-house	31.83	39.80	12.98	27.21	40.81	45.25	33.57	38.76	32.70	22.06	29.95	34.79	41.55	14.44	15.67	40.54	11.40	22.49
2.2.2 Innovative SMEs collaborating with others	11.69	20.15	3.33	10.26	15.46	14.01	18.52	11.93	13.31	5.81	11.09	4.41	21.49	4.19	8.76	14.69	6.68	4.56
2.2.3 Public-private co-publications	52.8	97.1	4.1	33.7	179.9	75.5	25.0	34.4	15.8	28.7	49.0	33.4	26.6	2.2	9.6	35.5	31.2	8.4
<b>Intellectual Assets</b>																		
2.3.1 PCT patent applications	3.90	3.73	0.34	0.89	7.04	7.42	2.35	2.76	0.42	1.43	4.20	2.10	0.60	1.21	0.31	1.62	1.48	0.29
2.3.2 PCT patent applications in societal challenges	0.96	0.81	0.12	0.20	2.30	1.85	0.56	0.80	0.10	0.39	1.04	0.59	0.05	0.29	0.05	0.23	0.34	0.00
2.3.3 Community trademarks	5.86	5.89	5.49	3.34	7.93	8.17	8.18	5.92	1.70	6.78	4.21	5.32	14.08	4.18	2.83	14.08	2.41	14.08
2.3.4 Community designs	4.80	4.65	2.01	3.08	7.67	7.70	3.62	1.75	0.48	3.40	3.96	6.84	3.48	3.43	0.89	8.72	1.11	0.93
<b>OUTPUTS</b>																		
<b>Innovators</b>																		
3.1.1 SMEs introducing product or process innovations	38.44	50.34	16.59	33.01	41.60	57.00	45.56	45.50	37.31	28.09	32.68	39.80	34.80	15.78	21.39	47.90	16.76	28.96
3.1.2 SMEs introducing marketing/organisational innovations	40.30	41.73	16.31	41.12	42.64	60.55	35.99	45.04	51.29	27.74	42.80	43.04	36.99	22.68	26.39	58.67	22.36	30.96
3.1.3 Fast-growing innovative firms																		
<b>Economic effects</b>																		
3.2.1 Employment in knowledge-intensive activities	13.60	14.80	8.40	12.30	15.60	15.10	10.70	19.80	11.30	11.80	14.40	13.40	15.00	9.10	9.00	20.00	13.10	16.40
3.2.2 Contribution MHT product exports to trade balance	1.28	2.37	-4.78	3.82	-2.77	8.54	-2.70	2.57	-5.69	3.05	4.65	4.96	1.72	-5.42	-1.27	-3.35	5.84	0.92
3.2.3 Know ledge-intensive services exports	45.14	41.32	26.84	27.26	63.33	56.70	37.40	67.43	5.38	21.61	32.58	27.19	48.48	35.32	13.69	67.43	26.55	13.63
3.2.4 Sales of new to market and new to firm innovations	14.37	12.36	7.58	15.25	14.96	15.50	12.31	9.32	19.23	18.97	14.73	14.86	14.70	3.14	6.64	8.27	13.68	7.41
3.2.5 License and patent revenues from abroad	0.58	0.50	0.03	0.05	0.79	0.40	0.10	1.80	0.02	0.07	0.57	0.17	0.01	0.04	0.00	0.78	0.74	0.30

## Annex B: Current performance

	EU27	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	HR	TR	IS	NO	CH	RS	MK
<b>ENABLERS</b>																		
<b>Human resources</b>																		
1.1.1 New doctorate graduates	1.5	1.9	2.3	0.5	1.9	1.4	1.5	3.1	2.6	2.9	2.3	1.4	0.4	0.8	1.9	3.1	0.6	0.5
1.1.2 Population completed tertiary education	34.6	41.1	23.8	36.9	26.1	20.4	37.9	23.4	46.0	47.5	45.8	24.5	16.3	44.6	48.8	44.0	20.6	20.4
1.1.3 Youth with upper secondary level education	79.5	78.2	85.4	90.0	64.4	79.6	90.1	93.3	85.4	88.7	80.1	95.6	54.3	56.9	71.2	83.0	84.0	85.3
<b>Open, excellent and attractive research systems</b>																		
1.2.1 International scientific co-publications	300	1330	1180	213	678	148	955	379	1323	1604	989	388	71	1692	1483	1692	N/A	134
1.2.2 Scientific publications among top 10% most cited	10.90	15.13	10.92	3.52	10.04	3.77	7.39	3.27	11.48	12.28	13.28	3.20	6.73	11.19	12.17	15.84	N/A	3.08
1.2.3 Non-EU doctorate students	20.02	N/A	8.78	1.91	10.59	1.98	6.54	1.39	5.91	19.99	31.42	2.21	2.52	20.77	30.93	31.56	7.05	7.04
<b>Finance and support</b>																		
1.3.1 R&D expenditure in the public sector	0.75	0.97	0.87	0.53	0.69	0.31	0.64	0.43	1.09	1.03	0.64	0.42	0.49	1.10	0.84	0.79	0.68	0.14
1.3.2 Venture capital investments	0.094	0.105	0.022	0.051	0.032	0.033	N/A	N/A	0.108	0.156	0.239	N/A	N/A	N/A	0.069	0.094	N/A	N/A
<b>FIRM ACTIVITIES</b>																		
<b>Firm investments</b>																		
2.1.1 R&D expenditure in the business sector	1.27	0.89	1.87	0.23	0.73	0.17	1.42	0.25	2.34	2.34	1.09	0.34	0.36	1.64	0.86	2.11	0.10	0.04
2.1.2 Non-R&D innovation expenditure	0.56	0.61	0.35	1.02	0.53	0.46	0.56	0.65	0.51	0.64	N/A	0.61	0.16	N/A	0.14	1.16	1.06	0.90
<b>Linkages &amp; entrepreneurship</b>																		
2.2.1 SMEs innovating in-house	31.83	39.10	36.35	11.34	34.10	10.75	N/A	21.84	33.18	37.68	N/A	25.08	28.18	N/A	23.22	28.20	30.59	11.30
2.2.2 Innovative SMEs collaborating with others	11.69	14.87	20.52	4.15	8.09	2.93	13.63	8.29	16.50	17.47	22.68	9.26	5.28	17.44	9.56	9.40	7.49	9.60
2.2.3 Public-private co-publications	52.8	128.2	86.4	5.3	17.0	8.3	85.4	15.7	97.9	147.0	79.5	27.4	1.7	179.9	115.9	179.9	6.7	0.0
<b>Intellectual Assets</b>																		
2.3.1 PCT patent applications	3.90	6.24	5.11	0.45	0.65	0.18	3.01	0.37	8.93	8.93	3.23	0.62	0.87	3.86	3.61	8.12	N/A	0.18
2.3.2 PCT patent applications in societal challenges	0.96	1.48	1.30	0.12	0.15	0.07	1.46	0.10	1.35	2.01	0.76	0.12	0.08	1.21	0.80	2.30	N/A	N/A
2.3.3 Community trademarks	5.86	7.18	10.22	3.16	4.64	2.14	4.25	2.26	6.68	7.81	5.12	0.52	0.54	3.89	1.59	12.98	0.55	0.26
2.3.4 Community designs	4.80	4.12	8.59	4.51	4.36	0.57	3.56	1.44	4.56	5.09	2.86	0.04	0.47	1.19	0.66	8.56	0.01	0.00
<b>OUTPUTS</b>																		
<b>Innovators</b>																		
3.1.1 SMEs introducing product or process innovations	38.44	46.02	42.20	14.36	45.57	13.17	32.61	26.02	44.75	47.38	21.26	30.40	29.52	55.13	32.79	57.00	36.00	39.20
3.1.2 SMEs introducing marketing/organisational innovations	40.30	36.91	42.33	19.95	47.38	25.54	37.65	27.25	38.89	42.15	30.64	31.91	50.31	45.90	29.13	N/A	39.06	30.80
3.1.3 Fast-growing innovative firms																		
<b>Economic effects</b>																		
3.2.1 Employment in knowledge-intensive activities	13.60	14.90	14.00	9.30	9.10	6.50	13.70	10.50	15.30	17.40	17.60	10.30	4.70	18.50	15.10	20.00	12.84	7.20
3.2.2 Contribution MHT product exports to trade balance	1.28	1.68	3.18	0.88	-1.20	0.38	6.05	4.35	1.69	2.02	3.13	2.98	-2.22	-8.87	8.44	N/A	5.42	
3.2.3 Knowledge-intensive services exports	45.14	26.31	22.21	26.14	28.99	43.03	20.91	19.63	35.93	38.70	57.59	14.99	18.76	50.32	49.40	26.51	45.20	27.85
3.2.4 Sales of new to market and new to firm innovations	14.37	10.45	11.92	8.00	14.30	14.28	10.65	19.23	15.29	8.37	7.31	10.54	15.82	6.07	6.09	19.23	11.71	9.90
3.2.5 License and patent revenues from abroad	0.58	1.80	0.19	0.05	0.03	0.13	0.17	0.00	1.22	1.16	0.58	0.04	0.00	1.60	0.17	1.80	0.12	0.10

## Annex C: Growth performance

	EU27	BE	BG	CZ	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT
<b>ENABLERS</b>																	
<b>Human resources</b>																	
1.1.1 New doctorate graduates	0.0%	3.6%	0.0%	2.0%	12.7%	1.9%	3.0%	3.4%	-3.8%	4.7%	5.7%	0.0%	7.5%	6.5%	0.0%	7.5%	18.9%
1.1.2 Population completed tertiary education	3.6%	0.7%	1.2%	15.7%	2.0%	3.7%	4.9%	3.3%	2.5%	0.7%	1.2%	-0.2%	8.7%	4.5%	8.1%	8.7%	-0.5%
1.1.3 Youth with upper secondary level education	0.4%	-0.3%	0.7%	0.0%	0.2%	1.0%	0.5%	0.0%	0.5%	0.2%	0.4%	0.2%	0.5%	0.1%	-0.6%	0.8%	-0.2%
<b>Open, excellent and attractive research systems</b>																	
1.2.1 International scientific co-publications	4.0%	6.6%	-0.3%	5.8%	7.6%	5.3%	12.9%	8.6%	5.7%	9.2%	4.9%	5.2%	14.8%	10.6%	8.3%	22.4%	3.8%
1.2.2 Scientific publications among top 10% most cited	1.8%	3.5%	-7.9%	4.0%	0.9%	2.0%	1.5%	3.8%	4.0%	4.5%	3.1%	2.9%	-1.9%	18.1%	4.8%	17.0%	-2.1%
1.2.3 Non-EU doctorate students	4.1%	-0.2%	0.0%	7.1%	6.3%	N/A	6.2%	0.0%	0.0%	3.8%	2.0%	16.2%	5.5%	28.6%	14.6%	0.0%	-4.8%
<b>Finance and support</b>																	
1.3.1 R&D expenditure in the public sector	3.2%	4.3%	-4.3%	6.5%	6.8%	5.5%	12.7%	5.7%	0.0%	3.9%	1.6%	0.5%	1.6%	5.7%	4.1%	14.7%	-2.2%
1.3.2 Venture capital investments	-3.1%	-3.3%	-12.8%	-8.0%	2.0%	-0.9%	N/A	-7.2%	-10.2%	-8.9%	-0.4%	-8.2%	N/A	N/A	N/A	-1.1%	4.0%
<b>FIRM ACTIVITIES</b>																	
<b>Firm investments</b>																	
2.1.1 R&D expenditure in the business sector	1.9%	0.9%	21.0%	4.8%	3.8%	1.8%	30.7%	8.3%	0.0%	-2.5%	2.2%	2.8%	-5.4%	0.0%	1.1%	-7.2%	11.2%
2.1.2 Non-R&D innovation expenditure	-5.2%	-7.9%	-23.0%	-6.0%	0.2%	-4.8%	-12.6%	-25.4%	0.0%	-5.7%	-6.9%	-14.4%	-1.5%	-26.0%	18.8%	-32.6%	-14.0%
<b>Linkages &amp; entrepreneurship</b>																	
2.2.1 SMEs innovating in-house	0.4%	-0.6%	-3.8%	-0.7%	0.0%	-0.6%	-2.4%	0.0%	0.0%	-2.7%	1.4%	5.5%	2.6%	0.0%	-3.0%	2.0%	-3.7%
2.2.2 Innovative SMEs collaborating with others	7.9%	4.8%	-3.4%	-3.3%	1.0%	11.8%	0.6%	0.5%	0.0%	3.6%	-1.0%	0.8%	-1.3%	-6.9%	-3.9%	-0.7%	0.6%
2.2.3 Public-private co-publications	2.2%	2.3%	9.5%	3.4%	0.6%	1.9%	3.2%	2.3%	2.3%	-1.0%	3.3%	3.3%	3.3%	8.2%	3.1%	13.2%	8.2%
<b>Intellectual Assets</b>																	
2.3.1 PCT patent applications	-0.6%	0.4%	-3.5%	2.0%	-1.2%	-0.5%	18.9%	1.9%	-0.9%	1.1%	0.4%	-0.3%	-6.7%	2.9%	-3.0%	1.4%	1.0%
2.3.2 PCT patent applications in societal challenges	0.4%	-2.4%	-0.8%	1.8%	0.0%	0.8%	36.6%	3.7%	-4.1%	0.7%	2.7%	0.8%	-24.2%	-4.3%	-5.7%	2.5%	-1.5%
2.3.3 Community trademarks	5.2%	10.4%	27.0%	12.6%	4.0%	6.9%	22.0%	6.0%	0.1%	3.0%	5.7%	4.5%	7.7%	31.2%	17.3%	0.0%	12.2%
2.3.4 Community designs	0.3%	4.8%	17.1%	-0.1%	-3.2%	0.5%	33.7%	-9.3%	21.0%	-4.3%	0.5%	-1.2%	15.5%	22.1%	36.0%	2.2%	3.5%
<b>OUTPUTS</b>																	
<b>Innovators</b>																	
3.1.1 SMEs introducing product or process innovations	3.6%	2.6%	-1.7%	0.8%	3.9%	1.9%	-0.2%	1.0%	0.0%	-1.2%	2.3%	4.8%	-2.1%	2.3%	2.1%	1.7%	0.0%
3.1.2 SMEs introducing marketing/organisational innovations	-0.1%	-2.1%	0.9%	3.2%	-1.6%	0.0%	-7.1%	2.5%	0.0%	-1.5%	0.9%	3.5%	-7.7%	12.9%	-1.9%	-0.7%	-0.7%
3.1.3 Fast-growing innovative firms																	
<b>Economic effects</b>																	
3.2.1 Employment in knowledge-intensive activities	0.7%	-0.2%	0.6%	2.4%	1.3%	0.3%	3.3%	2.3%	1.1%	0.0%	1.8%	-0.4%	0.2%	2.6%	4.7%	0.0%	0.6%
3.2.2 Contribution MHT product exports to trade balance	0.3%	0.2%	0.8%	0.1%	0.4%	0.0%	1.0%	-0.1%	0.4%	0.0%	0.1%	0.3%	0.9%	1.0%	0.5%	0.3%	-2.0%
3.2.3 Knowledge-intensive services exports	0.4%	-0.8%	12.6%	-2.1%	-1.4%	2.6%	3.0%	0.0%	-42.9%	-2.5%	1.5%	3.4%	8.3%	0.0%	2.7%	0.0%	-3.1%
3.2.4 Sales of new to market and new to firm innovations	1.9%	-2.3%	-7.4%	1.0%	17.5%	-5.2%	-2.6%	-7.3%	0.0%	4.6%	5.9%	13.2%	4.5%	-1.6%	-14.5%	-9.7%	6.8%
3.2.5 License and patent revenues from abroad	6.1%	4.1%	4.3%	12.1%	2.4%	5.8%	9.8%	18.6%	4.2%	8.7%	6.5%	17.0%	-23.7%	-1.9%	18.1%	0.1%	1.2%

## Annex C: Growth performance

	EU27	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	HR	TR	IS	NO	CH	RS	MK
<b>ENABLERS</b>																		
<b>Human resources</b>																		
1.1.1 New doctorate graduates	0.0%	7.9%	3.6%	-15.9%	-11.5%	11.7%	3.6%	22.0%	-3.5%	-1.7%	2.3%	4.4%	10.1%	7.3%	5.3%	2.8%	4.8%	0.0% 10.1% 13.6%
1.1.2 Population completed tertiary education	3.6%	-0.2%	3.1%	8.1%	7.2%	10.1%	5.2%	12.1%	-0.7%	3.7%	4.4%	10.1%	7.3%	5.3%	2.8%	4.8%	6.0%	13.7%
1.1.3 Youth with upper secondary level education	0.4%	0.2%	0.4%	-0.4%	4.4%	0.7%	-0.4%	0.5%	-0.3%	0.9%	0.6%	0.1%	0.0%	1.2%	1.2%	0.5%	0.2%	1.9%
<b>Open, excellent and attractive research systems</b>																		
1.2.1 International scientific co-publications	4.0%	6.6%	7.1%	2.9%	12.5%	7.6%	8.5%	4.7%	5.0%	5.0%	4.8%	13.6%	7.9%	1.1%	6.8%	0.0%	N/A	5.4%
1.2.2 Scientific publications among top 10% most cited	1.8%	1.9%	1.2%	0.2%	5.7%	-2.9%	6.2%	7.5%	0.9%	0.6%	1.4%	7.3%	9.6%	1.9%	3.3%	1.3%	N/A	-1.0%
1.2.3 Non-EU doctorate students	4.1%	N/A	1.8%	-4.9%	15.0%	-6.6%	12.0%	26.6%	10.1%	9.6%	2.5%	1.0%	-1.5%	14.3%	8.5%	0.0%	-4.6%	20.3%
<b>Finance and support</b>																		
1.3.1 R&D expenditure in the public sector	3.2%	3.4%	4.5%	8.0%	10.7%	0.0%	2.5%	11.3%	3.8%	2.9%	0.8%	-2.8%	3.3%	0.0%	2.5%	2.7%	18.1%	0.0%
1.3.2 Venture capital investments	-3.1%	-1.0%	-1.1%	2.8%	-10.3%	-3.7%	N/A	N/A	-1.5%	-5.4%	-1.4%	N/A	N/A	N/A	-10.5%	-6.3%	N/A	N/A
<b>FIRM ACTIVITIES</b>																		
<b>Firm investments</b>																		
2.1.1 R&D expenditure in the business sector	1.9%	-1.9%	1.4%	7.8%	5.0%	-6.2%	13.0%	8.6%	0.0%	0.0%	-0.5%	0.7%	4.7%	2.9%	0.6%	0.0%	-9.6%	7.5%
2.1.2 Non-R&D innovation expenditure	-5.2%	20.6%	-6.9%	-0.3%	-13.8%	-19.4%	-16.1%	-19.2%	-2.9%	-0.8%	N/A	51.0%	0.0%	N/A	-4.8%	6.0%	7.3%	0.0%
<b>Linkages &amp; entrepreneurship</b>																		
2.2.1 SMEs innovating in-house	0.4%	9.4%	-3.0%	-9.9%	0.0%	-12.0%	N/A	5.1%	-5.1%	-2.6%	N/A	0.7%	0.0%	N/A	-2.7%	-4.8%	2.4%	0.0%
2.2.2 Innovative SMEs collaborating with others	7.9%	4.4%	3.3%	-18.4%	4.8%	0.3%	-2.6%	3.5%	-7.7%	1.3%	20.6%	-1.0%	0.0%	5.6%	-0.5%	-6.1%	20.9%	0.0%
2.2.3 Public-private co-publications	2.2%	3.6%	3.3%	10.0%	6.7%	7.5%	6.6%	3.9%	-1.0%	0.6%	1.1%	7.0%	-0.3%	0.0%	2.1%	0.0%	4.5%	-8.3%
<b>Intellectual Assets</b>																		
2.3.1 PCT patient applications	-0.6%	-1.5%	0.1%	7.9%	3.5%	-2.0%	1.3%	-4.7%	0.0%	0.0%	-1.4%	-7.9%	7.0%	-2.1%	0.4%	-1.2%	N/A	-4.0%
2.3.2 PCT patient applications in societal challenges	0.4%	2.4%	3.6%	6.5%	-0.5%	2.6%	6.7%	20.3%	2.1%	-1.5%	-1.5%	-13.8%	8.2%	-6.0%	4.1%	0.0%	N/A	N/A
2.3.3 Community trademarks	5.2%	5.7%	7.6%	9.2%	-5.0%	22.3%	16.8%	17.9%	10.2%	6.6%	0.3%	25.4%	19.0%	-16.4%	11.0%	7.3%	11.1%	5.2%
2.3.4 Community designs	0.3%	-1.0%	1.3%	11.6%	10.0%	30.4%	10.7%	-0.1%	4.8%	0.2%	0.6%	-28.0%	-5.5%	25.1%	-13.1%	-0.5%	0.0%	0.0%
<b>OUTPUTS</b>																		
<b>Innovators</b>																		
3.1.1 SMEs introducing product or process innovations	3.6%	8.7%	-3.1%	-8.4%	4.2%	-9.2%	0.7%	4.9%	0.0%	3.9%	-4.1%	1.8%	0.0%	0.0%	2.4%	1.9%	18.4%	0.0%
3.1.2 SMEs introducing marketing/organisational innovations	-0.1%	6.2%	-6.3%	-9.0%	-3.0%	-7.8%	-1.1%	6.1%	5.4%	3.5%	0.3%	-4.3%	0.0%	0.0%	-4.3%	N/A	21.3%	0.0%
3.1.3 Fast-growing innovative firms																		
<b>Economic effects</b>																		
3.2.1 Employment in knowledge-intensive activities	0.7%	-2.7%	0.4%	3.2%	0.8%	3.8%	2.9%	1.2%	-0.3%	1.2%	2.0%	-0.5%	0.5%	2.3%	0.6%	5.6%	0.0%	
3.2.2 Contribution MHT product exports to trade balance	0.3%	0.3%	0.2%	0.3%	0.1%	1.2%	0.5%	0.5%	0.0%	0.1%	1.0%	-0.1%	0.0%	0.0%	0.2%	N/A	2.7%	
3.2.3 Knowledge-intensive services exports	0.4%	-7.0%	-0.6%	3.0%	2.2%	-1.1%	4.2%	-0.2%	20.4%	-1.1%	-0.4%	0.3%	7.7%	25.1%	-0.3%	-8.2%	-6.9%	-2.4%
3.2.4 Sales of new to market and new to firm innovations	1.9%	-1.0%	-3.3%	-5.7%	1.8%	-6.3%	-5.5%	3.5%	-0.6%	-11.1%	-3.8%	-5.2%	0.0%	-16.9%	6.2%	15.8%	4.0%	0.0%
3.2.5 License and patent revenues from abroad	6.1%	0.3%	-0.6%	10.7%	-4.4%	23.4%	20.5%	-38.4%	11.4%	1.6%	0.1%	-6.8%	0.0%	-15%	-0.8%	0.0%	21.1%	7.1%

## Annex D: Country abbreviations

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

## Annex E: Summary Innovation Index (SII) time series

	2008	2009	2010	2011	2012	Growth rate
EU27	0.504	0.516	0.532	0.531	0.544	1.62%
BE	0.594	0.596	0.606	0.612	0.624	1.15%
BG	0.187	0.198	0.231	0.234	0.188	0.60%
CZ	0.365	0.371	0.408	0.413	0.402	2.57%
DK	0.643	0.660	0.698	0.696	0.718	2.67%
DE	0.677	0.694	0.710	0.705	0.720	1.75%
EE	0.415	0.458	0.460	0.484	0.500	7.09%
IE	0.549	0.567	0.544	0.587	0.597	0.66%
EL	0.364	0.338	0.362	0.334	0.340	-1.66%
ES	0.388	0.394	0.390	0.393	0.407	0.87%
FR	0.519	0.531	0.558	0.560	0.568	1.84%
IT	0.397	0.410	0.432	0.432	0.445	2.71%
CY	0.493	0.465	0.494	0.513	0.505	-0.69%
LV	0.188	0.206	0.216	0.225	0.225	4.39%
LT	0.244	0.248	0.255	0.271	0.280	4.95%
LU	0.585	0.615	0.595	0.581	0.626	0.71%
HU	0.301	0.301	0.329	0.335	0.323	1.35%
MT	0.301	0.322	0.338	0.300	0.284	3.31%
NL	0.577	0.585	0.588	0.594	0.648	2.70%
AT	0.582	0.596	0.571	0.584	0.602	0.68%
PL	0.268	0.278	0.273	0.283	0.270	0.45%
PT	0.378	0.400	0.427	0.425	0.406	1.67%
RO	0.234	0.250	0.233	0.252	0.221	1.24%
SI	0.448	0.473	0.489	0.517	0.508	4.09%
SK	0.285	0.295	0.281	0.291	0.337	3.29%
FI	0.657	0.673	0.675	0.681	0.681	1.94%
SE	0.725	0.731	0.733	0.735	0.747	0.65%
UK	0.579	0.588	0.623	0.621	0.622	1.18%
HR	0.275	0.286	0.308	0.317	0.302	2.13%
TR	0.188	0.195	0.201	0.209	0.214	3.56%
IS	0.593	0.609	0.588	0.612	0.622	2.64%
NO	0.449	0.458	0.478	0.470	0.485	0.89%
CH	0.805	0.816	0.826	0.827	0.835	0.50%
RS	0.255	0.248	0.290	0.279	0.365	6.80%
MK	0.191	0.216	0.219	0.220	0.238	2.61%

## Annex F: Performance scores per dimension

	<b>Human resources</b>	<b>Research systems</b>	<b>Finance and support</b>	<b>Firm investments</b>	<b>Linkages &amp; entrepreneurship</b>	<b>Intellectual assets</b>	<b>Innovators</b>	<b>Economic effects</b>
EU27	0.557	0.478	0.585	0.406	0.532	0.555	0.571	0.603
BE	0.644	0.737	0.527	0.417	0.809	0.534	0.722	0.585
BG	0.429	0.094	0.085	0.111	0.088	0.231	0.064	0.245
CZ	0.537	0.227	0.343	0.409	0.429	0.275	0.518	0.486
DK	0.605	0.800	0.729	0.569	0.831	0.828	0.632	0.671
DE	0.626	0.553	0.610	0.637	0.731	0.814	1.000	0.728
EE	0.565	0.289	0.760	0.594	0.604	0.483	0.606	0.409
IE	0.758	0.682	0.320	0.305	0.566	0.425	0.702	0.791
EL	0.506	0.294	0.151	0.220	0.485	0.122	0.676	0.347
ES	0.433	0.493	0.436	0.223	0.297	0.399	0.318	0.507
FR	0.669	0.664	0.631	0.347	0.498	0.516	0.532	0.611
IT	0.420	0.354	0.289	0.287	0.404	0.519	0.616	0.535
CY	0.577	0.378	0.198	0.479	0.731	0.427	0.494	0.543
LV	0.451	0.083	0.375	0.111	0.103	0.330	0.123	0.220
LT	0.645	0.144	0.563	0.396	0.229	0.128	0.227	0.214
LU	0.549	0.692	0.636	0.231	0.630	0.666	0.876	0.652
HU	0.452	0.169	0.271	0.244	0.217	0.250	0.131	0.590
MT	0.129	0.224	0.104	0.356	0.220	0.293	0.363	0.419
NL	0.648	0.864	0.720	0.339	0.753	0.649	0.621	0.603
AT	0.597	0.538	0.474	0.473	0.769	0.796	0.636	0.476
PL	0.550	0.094	0.383	0.319	0.094	0.271	0.078	0.324
PT	0.404	0.435	0.414	0.279	0.416	0.312	0.728	0.378
RO	0.421	0.087	0.218	0.137	0.083	0.101	0.124	0.433
SI	0.671	0.385	0.521	0.437	0.623	0.506	0.476	0.479
SK	0.746	0.116	0.302	0.210	0.301	0.155	0.289	0.470
FI	0.827	0.550	0.788	0.621	0.689	0.690	0.628	0.663
SE	0.900	0.775	0.829	0.659	0.802	0.767	0.693	0.612
UK	0.749	0.795	0.730	0.459	0.832	0.452	0.271	0.626
HR	0.586	0.125	0.292	0.218	0.379	0.107	0.389	0.350
TR	0.070	0.147	0.365	0.089	0.245	0.121	0.577	0.272
IS	0.385	0.776	1.000	0.697	0.871	0.436	0.821	0.552
NO	0.660	0.864	0.585	0.189	0.503	0.339	0.387	0.377
CH	0.846	1.000	0.606	0.767	0.613	0.963	1.000	0.848
MK	0.367	0.121	0.000	0.241	0.125	0.012	0.478	0.385
RS	0.367	0.223	0.563	0.302	0.336	0.017	0.530	0.494

## Annex G: Gender data

1.1.1 Doctorate graduates			1.1.2 Tertiary education			1.1.3 Youth education			3.2.1 K1A employment		
	All	Males	Females	All	Males	Females	All	Males	Females	All	Males
EU	1.5	1.6	1.4	EU	34.6	30.8	38.5	EU	79.5	76.7	82.4
BE	1.5	1.8	1.3	BE	42.6	37.1	48.1	BE	81.6	78.3	84.9
BG	0.5	0.5	0.5	BG	27.3	21.3	34.0	BG	85.5	86.2	84.8
CZ	1.3	1.6	1.1	CZ	23.8	21.6	26.1	CZ	91.7	90.6	92.8
DK	2.1	2.3	1.9	DK	41.2	34.7	48.0	DK	70.0	63.6	76.6
DE	2.7	2.9	2.4	DE	30.7	29.9	31.6	DE	75.8	73.5	78.1
EE	0.9	0.8	1.0	EE	40.3	30.5	50.2	EE	82.6	79.3	86.1
IE	1.6	1.7	1.5	IE	49.4	42.8	55.8	IE	86.9	84.7	89.0
GR	1.2	1.3	1.0	GR	28.9	26.2	31.7	GR	83.6	79.8	87.4
ES	1.2	1.2	1.1	ES	40.6	36.3	45.0	ES	61.7	54.5	69.2
FR	1.5	1.7	1.3	FR	43.4	39.1	47.6	FR	83.8	81.7	85.9
IT	1.6	1.5	1.6	IT	20.3	15.9	24.7	IT	76.9	73.5	80.5
CY	0.2	0.3	0.2	CY	45.8	39.7	52.0	CY	87.7	84.6	90.4
LV	0.4	0.3	0.5	LV	35.7	24.8	46.9	LV	80.4	76.1	84.9
LT	0.9	0.7	1.0	LT	45.4	37.6	53.3	LT	86.9	83.0	91.0
LU	0.8	0.9	0.7	LU	48.2	49.1	47.4	LU	73.3	68.9	77.7
HU	0.8	0.9	0.8	HU	28.1	23.2	33.4	HU	83.3	82.0	84.5
MT	0.2	0.3	0.1	MT	21.1	20.1	22.1	MT	59.2	52.9	66.5
NL	1.9	2.2	1.6	NL	41.1	37.3	44.8	NL	78.2	74.6	81.9
AT	2.3	2.6	2.0	AT	23.8	23.1	24.5	AT	85.4	84.0	86.8
PL	0.5	0.5	0.5	PL	36.9	30.3	43.5	PL	90.0	87.4	92.8
PT	1.9	1.4	2.3	PT	26.1	21.7	30.5	PT	64.4	58.0	71.0
RO	1.4	1.4	1.4	RO	20.4	19.7	21.0	RO	79.6	77.9	81.3
SI	1.5	1.6	1.5	SI	37.9	29.4	47.3	SI	90.1	86.8	94.1
SK	3.1	3.1	3.1	SK	23.4	19.6	27.4	SK	93.3	92.6	94.0
FI	2.6	2.3	2.8	FI	46.0	37.1	55.0	FI	85.4	83.6	87.3
SE	2.9	3.0	2.9	SE	47.5	40.6	54.6	SE	88.7	87.4	90.0
UK	2.3	2.5	2.1	UK	45.8	43.0	48.6	UK	80.1	78.4	81.8
HR	1.4	1.3	1.4	HR	24.5	19.4	30.0	HR	95.6	94.8	96.5
TR	0.4	0.4	0.3	TR	16.3	18.3	14.3	TR	52.6	57.8	48.0
IS	0.8	0.8	0.7	IS	44.6	36.1	53.1	IS	56.9	55.4	58.4
NO	1.9	2.1	1.7	NO	48.8	41.5	56.4	NO	71.2	65.4	77.2
CH	3.7	4.3	3.1	CH	44.0	46.8	41.2	CH	83.0	82.6	83.4
MK	0.5	0.5	0.5	MK	20.4	18.5	22.4	MK	85.3	87.4	83.1
RS	--	--	--	RS	--	--	--	RS	--	--	--

**European Commission**

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