INNOVATION UNION SCOREBOARD 2010

The Innovation Union's performance scoreboard for Research and Innovation

1 February 2011

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

2010 INNOVATION UNION SCOREBOARD

1. EXECUTIVE SUMMARY

<u>A new depart</u>

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

The former list of 29 indicators in the EIS 2009 has been replaced with a new list of 25 indicators[2], which better capture the performance of national research and innovation systems considered as a whole. 19 of the previous 29 indicators have been carried over from last year's edition, of which 12 indicators have not been changed, 2 indicators have been merged, and 5 indicators have been partly changed by using broader or narrower definitions or different denominators. Taking into account the merging of 2 indicators, 18 indicators of the IUS 2010 are equivalent to those of the EIS 2009 and in addition 7 new indicators have been introduced. Annex E includes a comparative table with the two sets of indicators.

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

The IUS uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. International sources have been used wherever possible in order to improve comparability between countries. It is important to note that the data relates to actual performance in 2007 (4 indicators), 2008 (10 indicators) and 2009 (10 indicators). As a consequence the IUS 2010 may not fully capture the possible impact of the economic and financial crisis on innovation performance. Data for indicator 3.1.3 "High-growth innovative enterprises as a percentage of all enterprises" is not sufficiently available yet and therefore only 24 of the 25 indicators have been used in producing the composite innovation indicator.

The IUS 2010 includes innovation indicators and trend analyses for the EU27 Member States, as well as for Croatia, Iceland, the Former Yugoslav Republic of Macedonia, Norway, Serbia, Switzerland and Turkey. It also includes comparisons based on a more reduced set of indicators between the EU27, the US, Japan and the BRIC (Brazil, Russia, India and China) countries.

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

[2] See Annex C for the definition of indicators

FIGURE 1: EU MEMBER STATES' INNOVATION PERFORMANCE
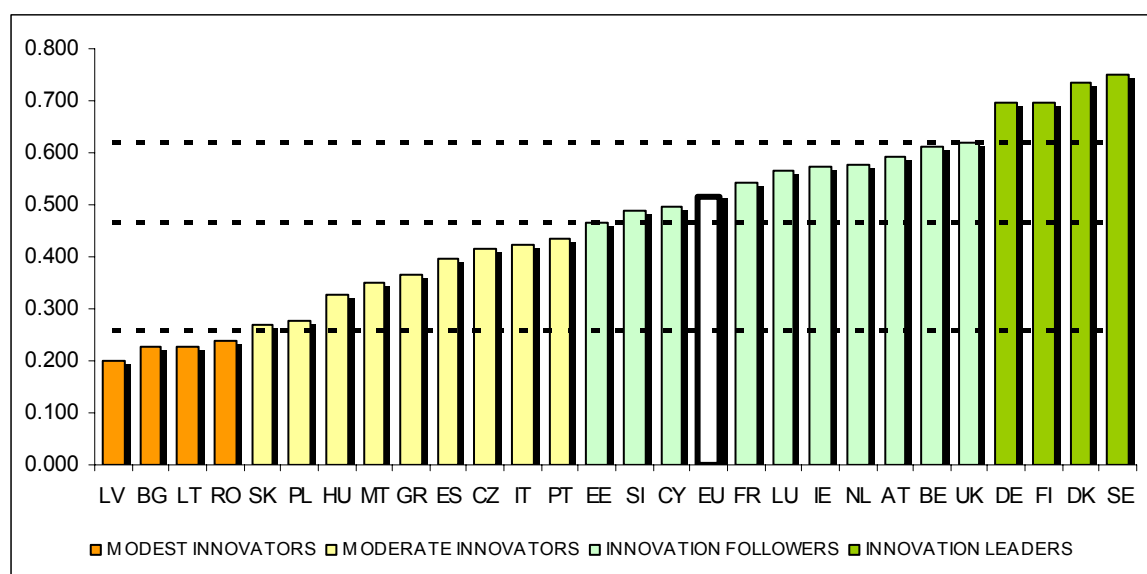
Note: Average performance is measured using a composite indicator building on data for 24 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2010 reflects performance in 2008/2009 due to a lag in data availability.

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.

Performance groups

The main findings of the IUS 2010 are:

Based on their average innovation performance across 24 indicators, the Member States fall into **four performance groups** (see thresholds in footnote of Figure 1): Innovation leaders, Innovation followers, Moderate innovators and Modest innovators (see section 3.1):

- Denmark, Finland, Germany, Sweden all show a performance well above that of the EU27. These countries are the **Innovation leaders**.

- Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27. These countries are the **Innovation followers**.

- The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27. These countries are **Moderate innovators**.

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

Bulgaria, Estonia, Malta, Romania, Portugal and Slovenia are the growth leaders with an average annual growth rate well above 5%. There continues to be **a steady convergence,** where less innovative Member States have – on average – been growing faster than the more innovative Member States. This convergence process however seems to be slowing down (see section 3.2 and Annex G). While the Moderate and Modest innovators clearly catch-up to the higher performance level of both the Innovation leaders and Innovation followers, there is no convergence between the different Member States within these 2 lower performance groups. Convergence between the Member States does take place within the Innovation leaders and in particular within the Innovation followers convergence. Between-group convergence thus seems to be stronger than within-group convergence.

What do innovation leaders have in common?

Countries at the top of the ranking for the composite innovation indicator share a number of strengths in their national research and innovation systems. While there is not one single way to reach top innovation performance, most innovation leaders perform very well in Business R&D expenditures and other innovation indicators related to firm activities. All of the innovation leaders have higher than average scores in the Public-private co-publications per million population indicator, what points in the direction of good linkages between the science base and businesses. All European top innovators also excel in the commercialisation of their technological knowledge, as demonstrated by their good performance on the indicator License and patent revenues from abroad.

Furthermore, the overall good performance of the innovation leaders reflects a balanced national research and innovation system. 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.

International comparison

Of the non-EU European countries, Switzerland is the overall innovation leader outperforming all Member States (section 4.1). Switzerland's growth performance is also above that of the EU27 and displays an exceptional performance in Intellectual assets and in most of the Economic effects indicators.

The **US and Japan are holding their lead** over the EU27 (Figure 2) (see section 4.2 for detail). This result is derived from a performance comparison based on a smaller set of 12 of the IUS indicators. The same comparison also shows that the **EU27 is holding its lead towards India and Russia,** but has been **losing part of its lead towards Brazil and China**.

A good part of the performance gap in favour of the US can be explained by higher scores in License and patent revenues from abroad, Public-private co-publications, Tertiary education and Business R&D expenditure Trends show that the US performance is improving faster notably as regards New doctorate degrees, License and patent revenues and International co-publications. However, the EU outperforms the US in indicators such as Public R&D expenditure and Knowledge-intensive services exports and its performance is growing faster in 6 indicators, including Public R&D expenditures and PCT patent applications in societal challenges.

The US innovation performance reflects an innovation system characterised by good levels of tertiary education, good linkages between the public science system and the private sector, strong private investment in R&D and a successful commercialisation of technological knowledge.

Less marked, but not decreasing either is the performance lead of Japan over the EU27. Japan's performance is clearly ahead in Business R&D expenditure and is growing faster than the EU in this field.

Compared to China and Brazil, the EU still has a clear innovation performance lead. Based on a common set of 12 indicators, this lead, however, is declining fast.

FIGURE 2: EU27 INNOVATION PERFORMANCE COMPARED TO MAIN COMPETITORS
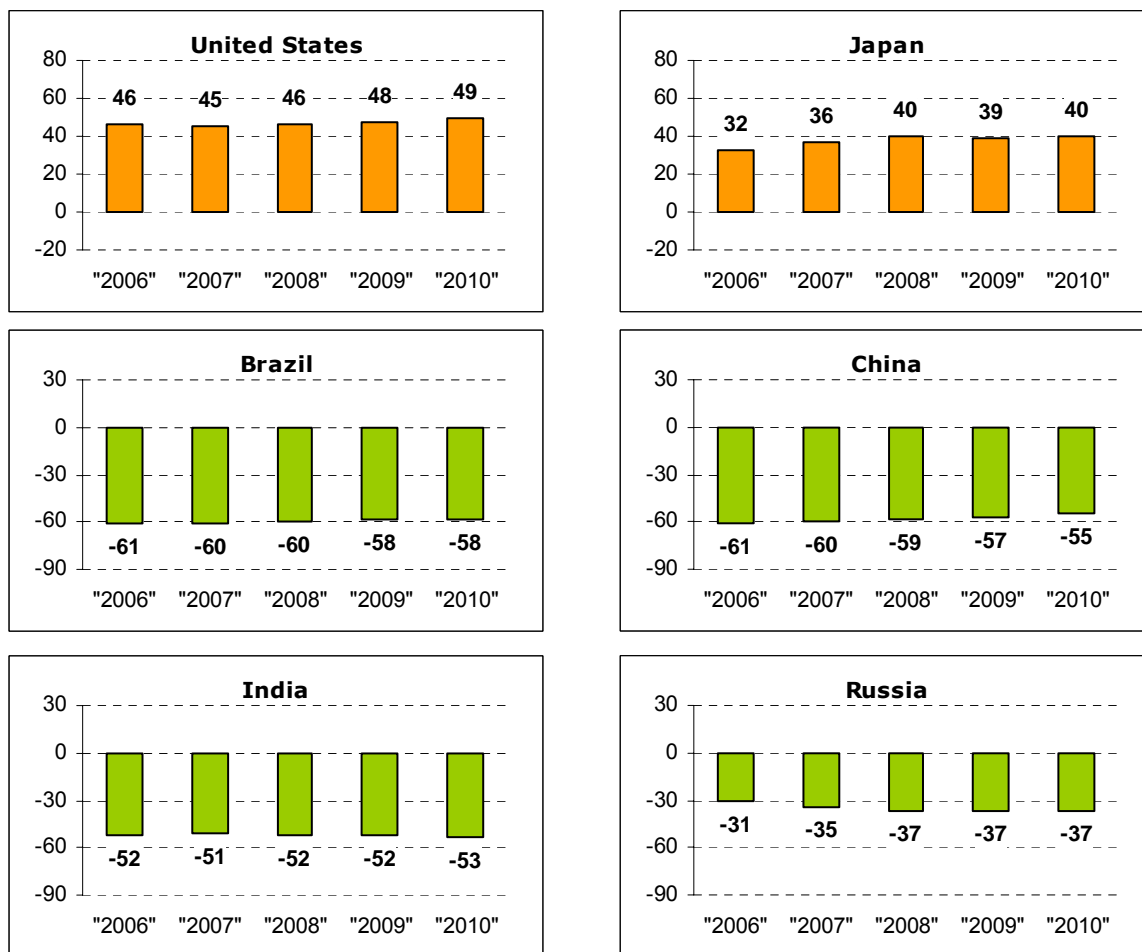
Performance is measured as 100*(X/EU)-1) where X refers to the value for the indicator for the country X and EU to the value for the indicator for the EU27. The values in the graphs should be interpreted as the relative performance compared to that of the EU27. E.g. the US in "2010" is performing 49% better than the EU27 and China is "2010" is performing 55% worse than the EU27.

Special theme: Public sector innovation

Public sector innovation is a subject which is attracting increasing policy attention. In preparation for the forthcoming European Public Sector Innovation Scoreboard the 2010 Innobarometer was dedicated to public sector innovation. The survey, conducted among 4000 European organisations in public administration, shows that innovation in public services is widespread (see section 5). Within Europe, two out of three organisations active in public administration introduced a new or significantly improved service in the last 3 years. Innovations improved the work of public administrations and the reported positive effects of innovation included improved user access to information, improved user satisfaction, more targeted services, faster delivery of services, simplified administration and improved working conditions or employee satisfaction.

˜The survey shows that single most important driver of innovation in the public sector was the introduction of new laws and regulations, with 48% of respondents at the EU level indicating that this was a very important factor. Also, the likelihood of service innovation increased linearly with the size of the institution.

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2. INTRODUCTION

The IUS 2010 largely follows the methodology of previous editions in distinguishing between 3 main types of indicators and 8 innovation dimensions, capturing in total 25 different indicators.

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

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

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

The indicators included in each of the dimensions are listed in Table 1 and definitions are presented in Annex C. The IUS 2010 Methodology report provides more detailed discussions for each of the indicators.

TABLE 1: INNOVATION UNION SCOREBOARD INDICATORS

Main type / innovation dimension / indicator	Data source	Reference year(s)
ENABLERS		
Human resources		
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Eurostat	2004 – 2008
1.1.2 Percentage population aged 30-34 having completed tertiary education	Eurostat	2005 – 2009
1.1.3 Percentage youth aged 20-24 having attained at least upper secondary level education	Eurostat	2005 – 2009
Open, excellent and attractive research systems		
1.2.1 International scientific co-publications per million population	Science Metrix / Scopus	2004 – 2008
1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	Science Metrix / Scopus	2003 – 2007
1.2.3 Non-EU doctorate students[3] as a % of all doctorate students	Eurostat	2003 – 2007

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

Main type / innovation dimension / indicator	Data source	Reference year(s)
Finance and support		
1.3.1 Public R&D expenditures as % of GDP	Eurostat	2005 - <u>2009</u>
1.3.2 Venture capital (early stage, expansion and replacement) as % of GDP	Eurostat	2005 - <u>2009</u>
FIRM ACTIVITIES		
Firm investments		
2.1.1 Business R&D expenditures as % of GDP	Eurostat	2005 - <u>2009</u>
2.1.2 Non-R&D innovation expenditures as % of turnover	Eurostat	2004, 2006, <u>2008</u>
Linkages & entrepreneurship		
2.2.1 SMEs innovating in-house as % of SMEs	Eurostat	2004, 2006, <u>2008</u>
2.2.2 Innovative SMEs collaborating with others as % of SMEs	Eurostat	2004, 2006, <u>2008</u>
2.2.3 Public-private co-publications per million population	CWTS / Thomson Reuters	2004 – <u>2008</u>
Intellectual assets		
2.3.1 PCT patents applications per billion GDP (in PPS€)	Eurostat	2003 – <u>2007</u>
2.3.2 PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	OECD / Eurostat	2003 – <u>2007</u>
2.3.3 Community trademarks per billion GDP (in PPS€)	OHIM / Eurostat	2005 – <u>2009</u>
2.3.4 Community designs per billion GDP (in PPS€)	OHIM / Eurostat	2005 – <u>2009</u>
OUTPUTS		
Innovators		
3.1.1 SMEs introducing product or process innovations as % of SMEs	Eurostat	2004, 2006, <u>2008</u>
3.1.2 SMEs introducing marketing or organisational innovations as % of SMEs	Eurostat	2004, 2006, <u>2008</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	2008, <u>2009</u>
3.2.2 Medium and high-tech product exports as % total product exports	UN / Eurostat	2005 – <u>2009</u>
3.2.3 Knowledge-intensive services exports as % total service exports	UN / Eurostat	2004 – <u>2008</u>
3.2.4 Sales of new to market and new to firm innovations as % of turnover	Eurostat	2004 – <u>2008</u>
3.2.5 License and patent revenues from abroad as % of GDP	Eurostat	2005 - <u>2009</u>

The IUS uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. International sources have been used wherever possible in order to improve comparability between countries. It is important to note that the data relates to actual performance in 2007 (4 indicators), 2008 (10 indicators) and 2009 (10 indicators). As a consequence the IUS 2010 does not capture the most recent changes in innovation performance or the impact of policies introduced in recent years which may take some time to impact on innovation performance. Nor does it fully capture the impact of the financial crisis on innovation performance.

3. INNOVATION UNION SCOREBOARD: FINDINGS FOR MEMBER STATES

3.1. Innovation performance

A summary picture of innovation performance is provided by the Summary Innovation Index, a composite indicator obtained by an appropriate aggregation of the 24 IUS indicators (see Section 7.1 for a brief explanation of the calculation methodology and the IUS 2010 Methodology report for a more detailed explanation). Figure 3 shows the performance results for 27 EU Member States.

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

- Denmark, Finland, Germany and Sweden all show a performance well above that of the EU27. These countries are the Innovation leaders.

- Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27. These countries are the Innovation followers.

- The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27. These countries are Moderate innovators.

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

FIGURE 3: EU MEMBER STATES' INNOVATION PERFORMANCE
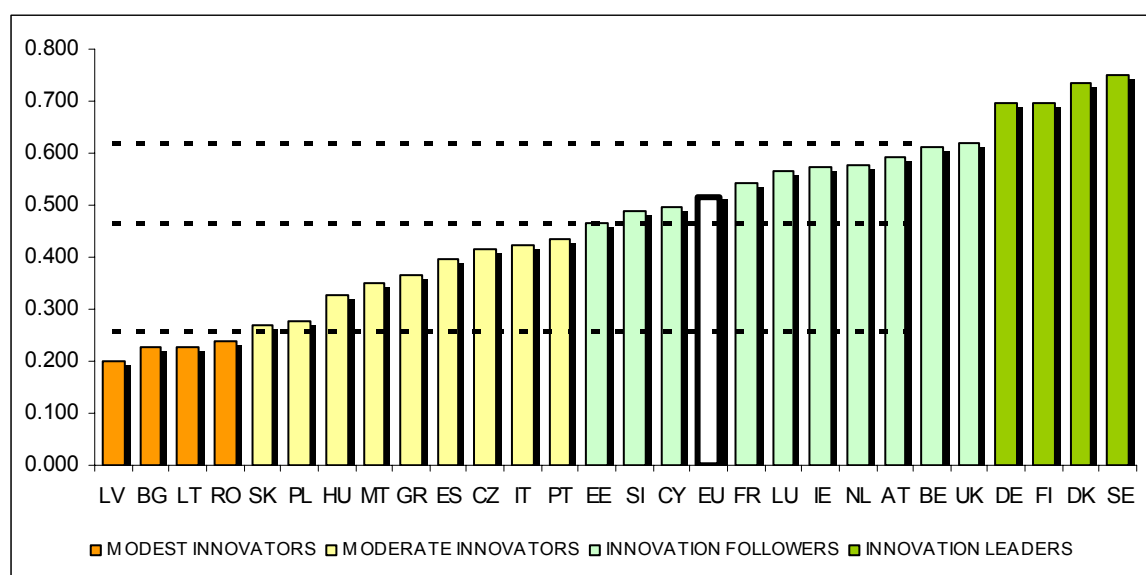
Note: Average performance is measured using a composite indicator building on data for 24 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2010 reflects performance in 2008/2009 due to a lag in data availability.

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

3.2. Growth performance

The growth in innovation performance has been calculated for each country and for the EU27 using data over a five-year period[4]. This calculation is based on absolute changes in the indicators.

All countries except Lithuania show an absolute improvement in the innovation performance over time (Figure 4). Portugal has experienced the fastest growth in performance. However, the growth performance patterns need to be seen in the overall context of changed indicators; for instance, Lithuania's[5] and Cyprus' past strong growth performance would have been maintained to a certain extend under last year's methodology, while countries like France have seen their growth performance increased due to the change of indicators.

Within the four identified country groups growth performance is very different and Table 2 identifies the growth leaders within each group. Within the Innovation leaders, Finland and Germany are the growth leaders. Estonia and Slovenia are the growth leaders of the Innovation followers. Of the Moderate innovators all countries have grown faster than the EU27. The growth leaders here are Malta and Portugal. Most of the Modest innovators have grown at a faster pace than the EU27, only Lithuania has experienced a below average growth. Bulgaria and Romania are the growth leaders of the Modest innovators.

FIGURE 4: CONVERGENCE IN INNOVATION PERFORMANCE
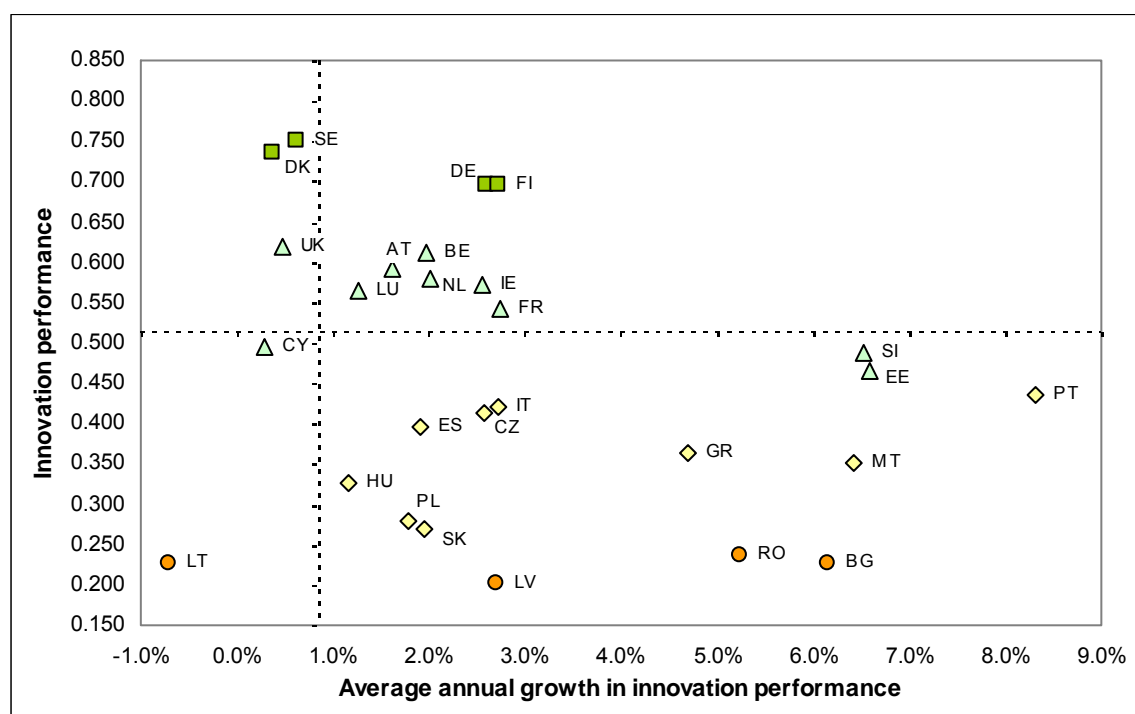
Colour coding matches the groups of countries identified in Section 3.1. Average annual growth rates as calculated over a five-year period. The dotted lines show EU27 performance and growth.

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[4] The methodology for calculating growth rates is briefly described in Section 7.2 and in more detail in the IUS 2010 Methodology report.

[5] The change in the growth trend of innovation performance for Lithuania with respect to the value reported in 2009 is due to a combination of factors, including the drop of indicators on Private credit and Broadband penetration, the redefinition of indicators on Tertiary education and Community designs, the redefinition of the indicator on TBP flows into the indicator "License and patent revenues from abroad" and data updates on indicators such as Innovative SMEs collaborating with others and Sales of new to market and new to firm innovations.

The average growth rates for the four country groups (Table 2) show that there is between group convergence the Innovation followers grow at a faster rate than the Innovation leaders and the Moderate innovators grow faster than the Innovation followers. The Modest innovators, however, grow at a slower rate than the Moderate innovators. The overall process of catching-up that follows from Figure 4 is also confirmed by the results for beta and sigma convergence (cf. Annex G). Less innovative countries tend to grow faster than more innovative countries and the spread in innovation performance is decreasing.

The average annual growth rate of the EU27 is 0.85% over a five year period. Growth is particularly strong in Open, excellent and attractive research systems and Intellectual assets (Figure 5). Performance has worsened in Finance and support, Firm investments and Innovators.

TABLE 2: INNOVATION GROWTH LEADERS

Group	Growth rate	Growth leaders	Moderate growers	Slow growers
Innovation leaders	1.6%	Finland (FI), Germany (DE)		Denmark (DK), Sweden (SE)
Innovation followers	2.6%	Estonia (EE), Slovenia (SI)	Austria (AT), Belgium (BE), France (FR), Ireland (IE), Luxembourg (LU), Netherlands (NL)	Cyprus (CY), United Kingdom (UK)
Moderate innovators	3.5%	Malta (MT), Portugal (PT)	Czech Republic (CZ), Greece (GR), Hungary (HU), Italy (IT), Poland (PL), Slovakia (SK), Spain (ES)	
Modest innovators	3.3%	Bulgaria (BG), Romania (RO)	Latvia (LV)	Lithuania (LT)

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

FIGURE 5: EU27 GROWTH PERFORMANCE
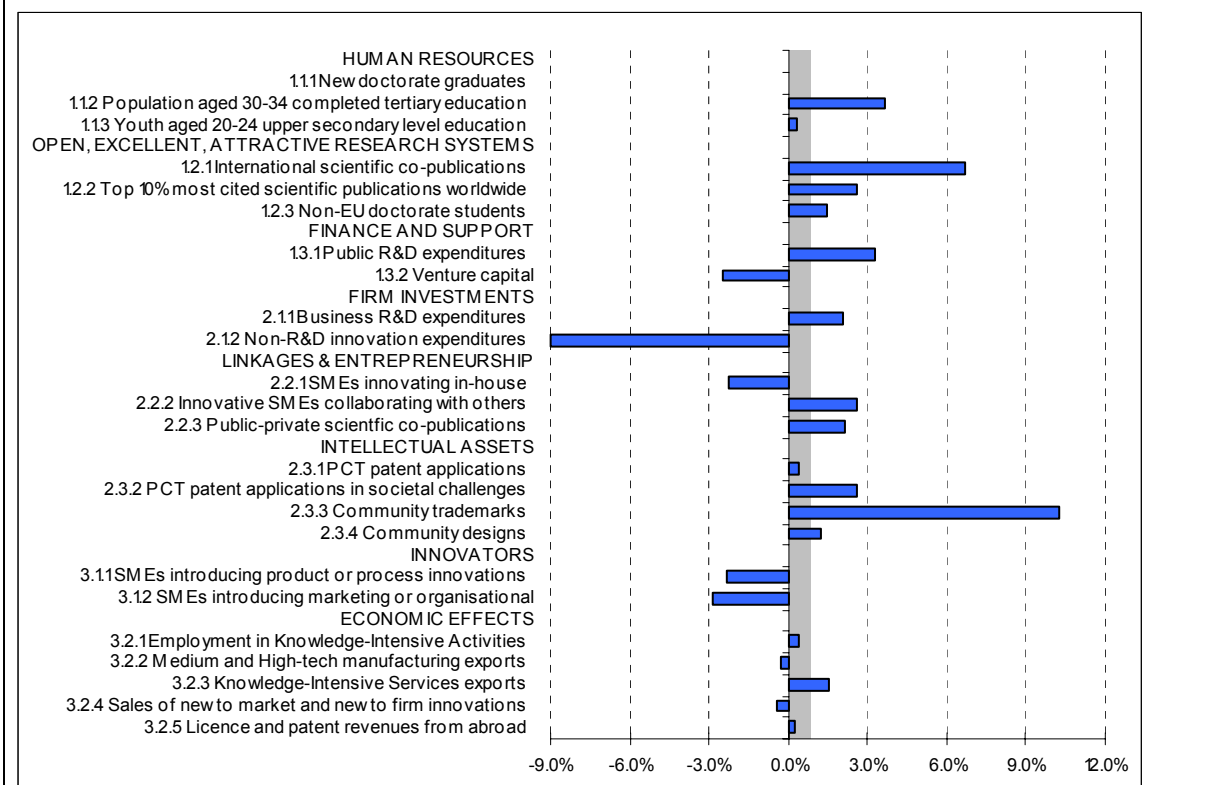
The shaded area gives the average growth rate for the EU27 for all indicators.

For the individual indicators we observe high growth for Population with completed tertiary education, International scientific co-publications and Community trademarks. A high negative growth rate is observed for Non-R&D innovation expenditure and, to a lesser extent, for Venture capital, SMEs innovating in-house, SMEs with product or process innovations and SMEs with marketing or organisational innovations. Of these 5 indicators with a strong negative growth 4 indicators are derived from the Community Innovation Survey.

The average EU growth rate is low compared to that of most Member States. Figure 2 reveals that only 5 Member States are growing at a lower pace and that 22 Member States are growing faster than the EU27. The statistical explanation for this is that of large numbers: where individual countries can obtain relatively high growth rates for single indicators, this is far less likely for the EU27 as it is the aggregate of 27 Member States, where high growth performance on a single indicator by some Member States is partially or completely offset by low or negative growth performance on the same indicator by other Member States[6].

3.3. Innovation dimensions

The performance of the four country groups across the different dimensions is shown in Figure 6. The Innovation leaders and the Innovation followers have the smallest variance in their performance across the 8 dimensions, suggesting that to achieve a high level of performance countries need to perform relatively well across all 8 dimensions.

FIGURE 6: COUNTRY GROUPS: INNOVATION PERFORMANCE PER DIMENSION
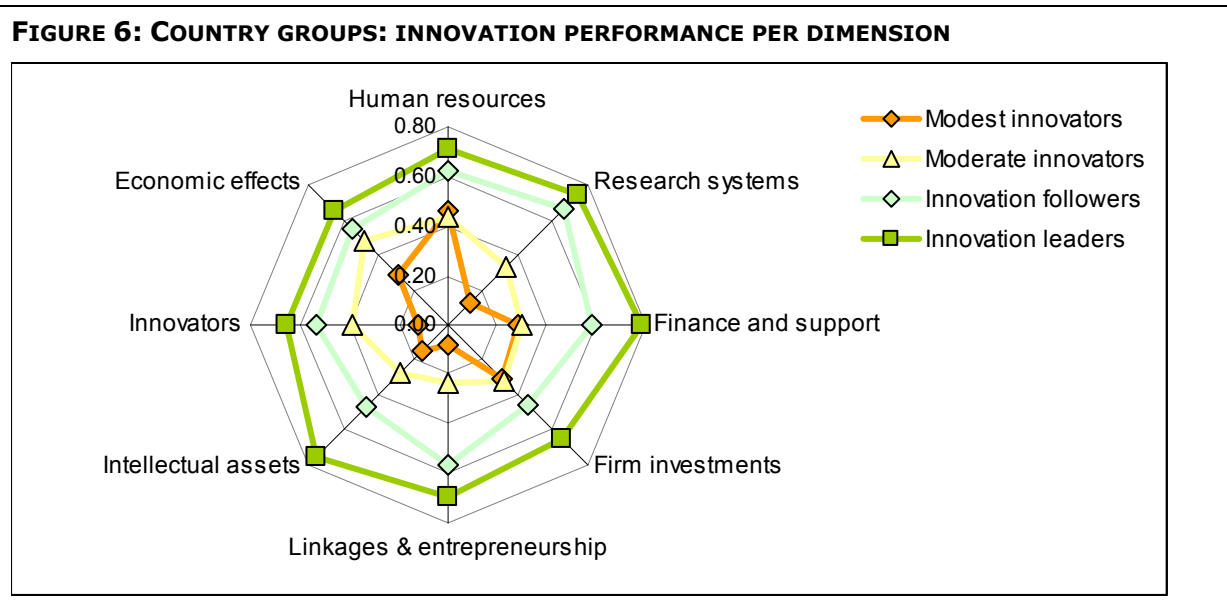
Country rankings for each innovation dimensions are shown in Figure 7. The Innovation leaders dominate performance in Firm investments and Intellectual assets and to a lesser extent in Human resources, Finance and support, Linkages & entrepreneurship and Economic effects. The Innovation followers perform relatively well in Open, excellent and attractive research systems (with the Netherlands leading overall) and Linkages & entrepreneurship. The Moderate innovators perform relatively well in Innovators and Economic effects (with Malta leading overall) and the Modest innovators perform

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[6] This is also confirmed by the fact that the average rate of dispersion in indicator growth rates for the EU27 (3.5%) is well below the average rate of dispersion for the Member States (8.8%).

relatively well in Human resources, Finance and support and Firm investments. Figure 5 also shows that variance in Member States' performance is smallest in Human resources, Firm investments and Economic effects and largest in Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship.

FIGURE 7: MEMBER STATES' INNOVATION PERFORMANCE PER DIMENSION

Human resources

Open, excellent and attractive research systems

Finance and support

Firm investments

Linkages & entrepreneurship

Intellectual assets

Innovators

Economic effects
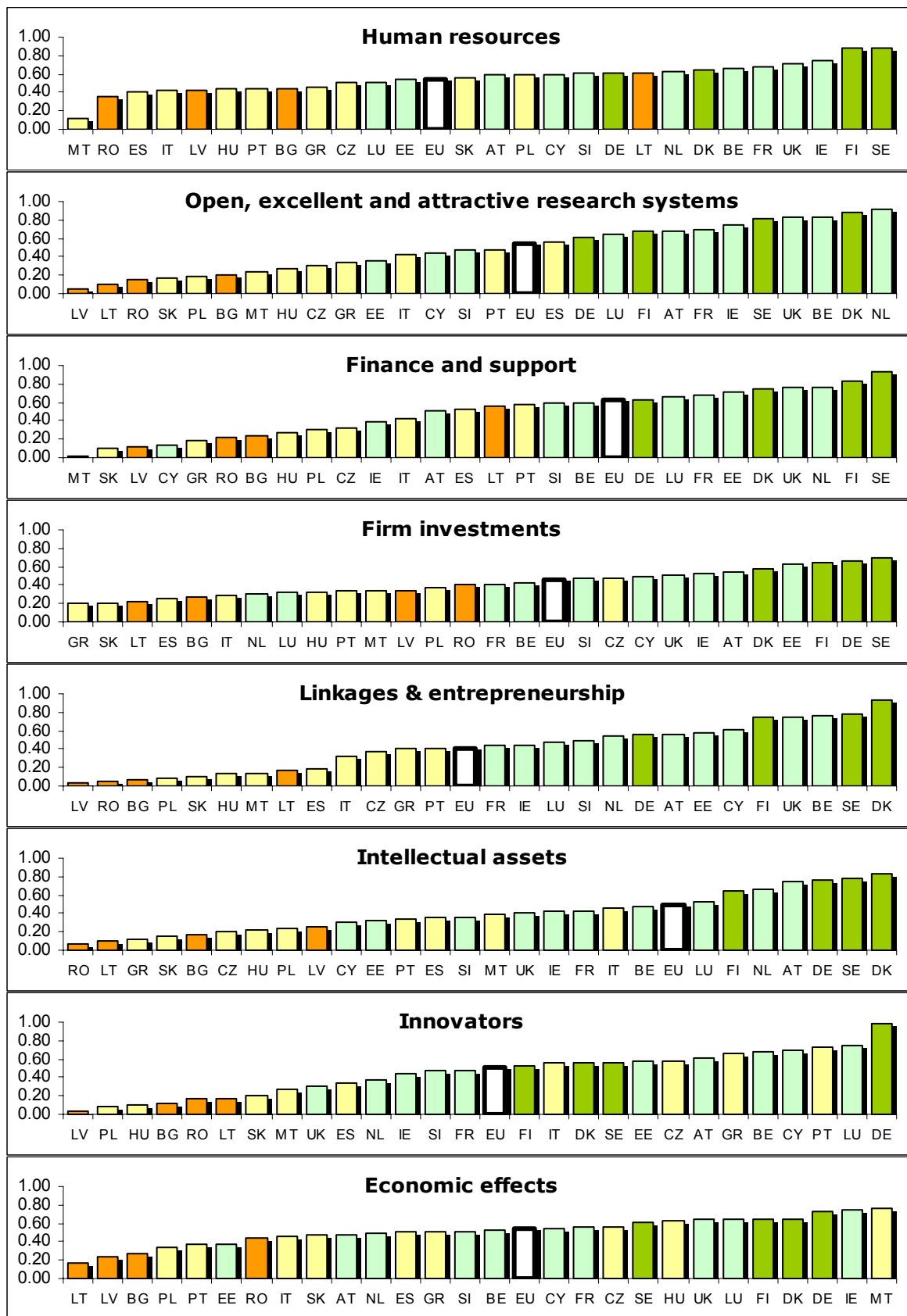
4. COMPARISON OF EU27 INNOVATION PERFORMANCE WITH KEY BENCHMARK COUNTRIES

This section will focus on a comparison with non-EU Member States, starting with a comparison with other European countries in section 4.1 and with the US, Japan and the BRIC (Brazil, China, India and Russia) countries in section 4.2. Section 4.3 will discuss a direct comparison between the US and Japan.

4.1. A comparison of the Member States with other European countries

Data is available for seven more non-EU European countries to perform a comparison with the Member States (Figure 8). Of these Switzerland belongs to the Innovation leaders, Iceland to the Innovation followers, Croatia and Norway to the Moderate innovators and the Former Yugoslav Republic of Macedonia, Serbia and Turkey to the Modest innovators.

Switzerland is the overall innovation leader, outperforming all Member States. Its growth performance is also above the EU-27, with 3.8% in the last five years. For Iceland and Norway, growth performance is close to 1.3%.

For Croatia Serbia and Turkey growth in innovation performance has been between 3.5% and 4%, well above the EU27 average in the same period. Only for the Former Yugoslav Republic of Macedonia growth performance is below that of the EU27.

FIGURE 8: EUROPEAN COUNTRIES' INNOVATION PERFORMANCE

Note: Average performance is measured using a composite indicator building on data for 24 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2010 reflects performance in 2008/2009 due to a lag in data availability.
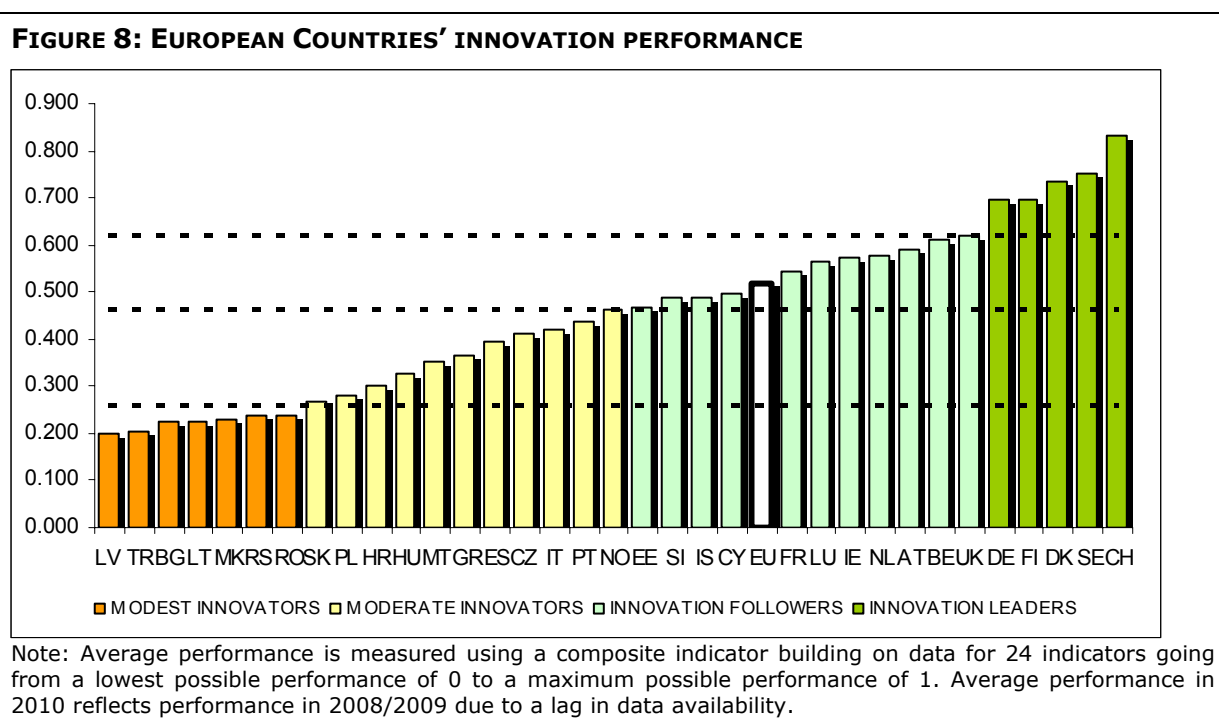
4.2. A comparison with the US, Japan and BRIC countries

For main competitors as the US, Japan and the BRIC countries (Brazil, China, India and Russia) data availability is more limited than for the non-EU Member States. Furthermore, the economic and/or population size of these countries outweighs those of the individual Member States and it is thus recommended to compare these countries with the aggregate of the Member States or the EU27.

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

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

TABLE 3: INDICATORS USED IN THE INTERNATIONAL COMPARISON

Main type / innovation dimension / indicator	Data source	Reference year	No data available for
ENABLERS			
Human resources			
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	OECD / Eurostat	2008	CN, IN
1.1.2 Percentage population **aged 25-64** having completed tertiary education	OECD / Eurostat / national sources	2008	
Open, excellent and attractive research systems			
1.2.1 International scientific co-publications per million population	Science Metrix / Scopus	2008	BR, IN, RU
1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	Science Metrix / Scopus	2007	
Finance and support			
1.3.1 Public R&D expenditures as % of GDP	OECD / Eurostat / national sources	2008	
FIRM ACTIVITIES			
Firm investments			
2.1.1 Business R&D expenditures as % of GDP	OECD / Eurostat / national sources	2008	
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	2007	
2.3.2 PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	OECD / Eurostat	2007	
OUTPUTS			
Innovators			
Economic effects			
3.2.2 Medium and high-tech product exports as % total product exports	UN / Eurostat	2008	
3.2.3 Knowledge-intensive services exports as % total service exports	UN / Eurostat	2008	
3.2.5 License and patent revenues from abroad as % of GDP	WorldBank / Eurostat	2008	

Figure 9 summarizes the development of the performance lead or gap between and each of these countries over a 5 year period. For both the US and Japan innovation performance is well above that of the EU27. Despite some yearly fluctuations, these performance leads have remained more or less stable.

The results in Figure 9 also show that the EU27 has a strong lead compared to each of the BRIC countries. The performance lead towards India has remained stable over the last 5 years and that towards Russia has slightly increased. China and Brazil are both catching-up towards the EU27 where the rate of relative improvement for Brazil is more modest than that for China.
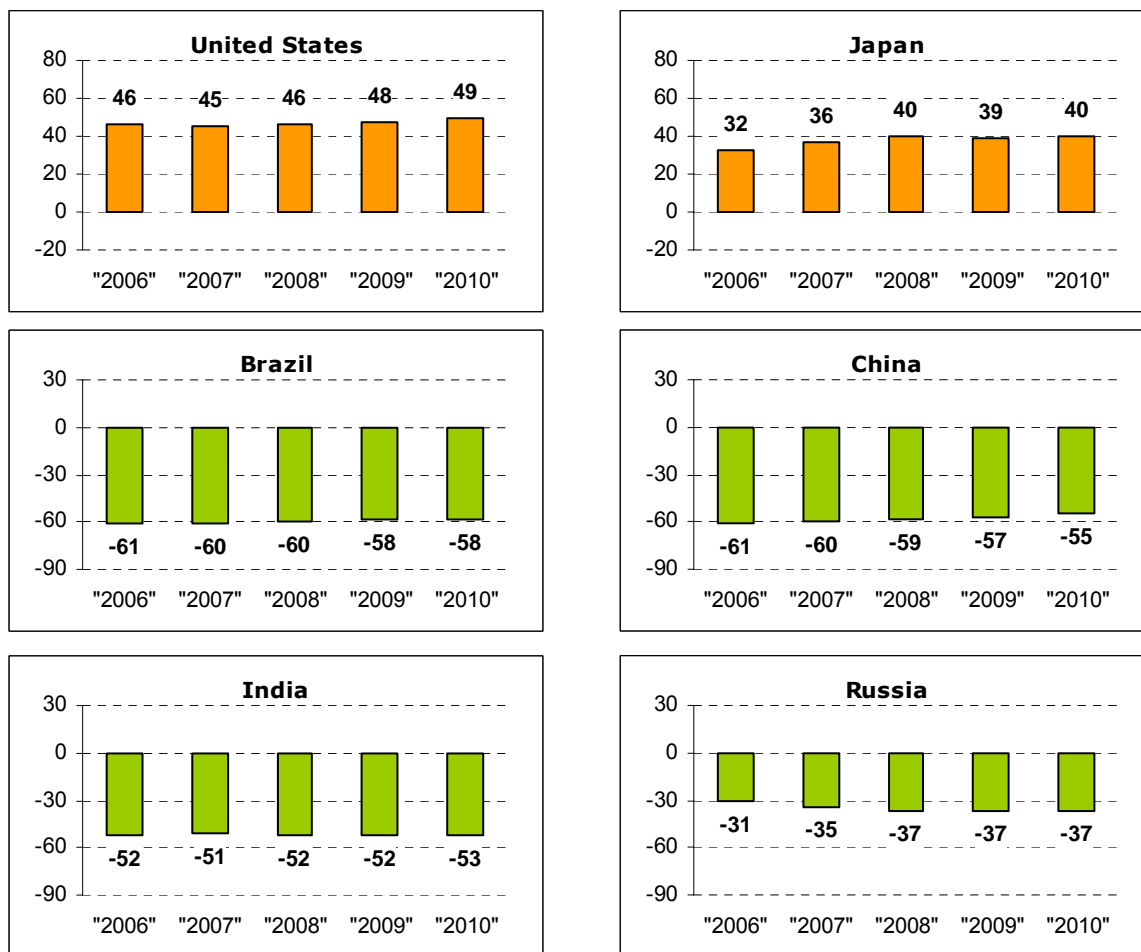
Performance is measured as 100*(X/EU)-1) where X refers to the value for the indicator for the country X and EU to the value for the indicator for the EU27. The values in the graphs should be interpreted as the relative performance compared to that of the EU27. E.g. the US in "2010" is performing 49% better than the EU27 and China is "2010" is performing 55% worse than the EU27.

The US is performing better than the EU27 in 10 indicators (Figure 10). In Public R&D expenditure and Knowledge-intensive services exports the EU27 is performing better. Overall there is a clear performance lead in favour of the US and this lead is very slowly increasing. The US has increased its lead in New doctorate degrees, International co-publications, Business R&D expenditure and License and patent revenues. The US lead to the EU27 has decreased in Tertiary education, Most cited publications, Public-private co-publications, PCT patents, PCT patents in societal challenges and Exports of medium-high and high-tech products. The EU27 has increased its lead to the US in Public R&D expenditure and Knowledge-intensive services exports.

FIGURE 10: EU27-US COMPARISON

Performance lead US

Indicator	Value
COUNTRY AVERAGE	**49**
New doctorate degrees	14
Tertiary education	69
International co-publications	46
Most cited publications	37
Public R&D expenditure	-13
Business R&D expenditure	61
Public-private co-publications	94
PCT patents	8
Societal challenges	45
Med/hi-tech product exports	25
Knowledge-int. serv. exports	-16
License and patent revenues	222

Change performance lead US

Indicator	Value
COUNTRY AVERAGE	**0.1%**
New doctorate degrees	7.5%
Tertiary education	-0.1%
International co-publications	5.4%
Most cited publications	-2.8%
Public R&D expenditures	-4.1%
Business R&D expenditures	12%
Public-private co-publications	-12%
PCT patents	-13%
Societal challenges	-5.6%
Med/hi-tech product exports	-2.1%
Knowledge-int. serv. exports	-12%
License and patent revenues	6.8%

Left: The indicators highlighted in orange reflect a performance gap for the EU27; those highlighted in green reflect a performance lead for the EU27. **Right**: Relative growth compared to that of the EU27. Orange coloured bars sow that the country is growing faster than the EU27; green coloured bars show that the country is growing slower than the EU27.

Japan is performing better than the EU27 in 7 indicators (Figure 11). In New doctorate degrees, International co-publications, Most cited publications, Public R&D expenditure and Knowledge-intensive services exports the EU27 is performing better. Overall there is a clear performance lead in favour of Japan and this innovation lead is increasing. Japan has increased its lead in Business R&D expenditure, PCT patents and License and patent revenues. The Japanese lead to the EU27 has decreased in Tertiary education, Public-private co-publications, PCT patents in societal challenges and Exports of medium-high and high-tech products. The EU27 has increased its lead in Most cited publications, Public R&D expenditure and Knowledge-intensive services exports and experienced a decline in its lead in New doctorate degrees and International co-publications.

FIGURE 11: EU27-JAPAN COMPARISON

Performance lead Japan

Indicator	Value
COUNTRY AVERAGE	**40**
New doctorate degrees	-36
Tertiary education	76
International co-publications	-29
Most cited publications	-33
Public R&D expenditure	-9
Business R&D expenditure	115
Public-private co-publications	56
PCT patents	108
Societal challenges	35
Med/hi-tech product exports	58
Knowledge-int. serv. exports	-31
License and patent revenues	168

Change performance lead Japan

Indicator	Value
COUNTRY AVERAGE	**0.8%**
New doctorate degrees	3.0%
Tertiary education	-0.2%
International co-publications	3.1%
Most cited publications	-19%
Public R&D expenditures	-4.6%
Business R&D expenditures	0.9%
Public-private co-publications	-2.6%
PCT patents	5.9%
Societal challenges	-19%
Med/hi-tech product exports	-1.4%
Knowledge-int. serv. exports	-1.1%
License and patent revenues	11.0%

Left: The indicators highlighted in orange reflect a performance gap for the EU27; those highlighted in green reflect a performance lead for the EU27. **Right**: Relative growth compared to that of the EU27. Orange coloured bars sow that the country is growing faster than the EU27; green coloured bars show that the country is growing slower than the EU27.

The EU27 is performing better than Brazil in most indicators (Figure 12). In Knowledge-intensive services exports Brazil is performing better. Overall there is a clear performance lead in favour of the EU27. But this lead is declining, as Brazil's innovation performance has grown at a faster rate than of the EU27. Brazil has been decreasing the performance gap in as many as 7 indicators (New doctorate degrees, Most cited publications, Public R&D expenditure, Business R&D expenditure, Public-private co-publications, PCT patents and License and patent revenues), and has been increasing its lead in Knowledge-intensive services exports. The EU27 has increased its lead in Tertiary education, PCT patents in societal challenges and Exports of medium-high and high-tech products.

FIGURE 12: EU27-BRAZIL COMPARISON
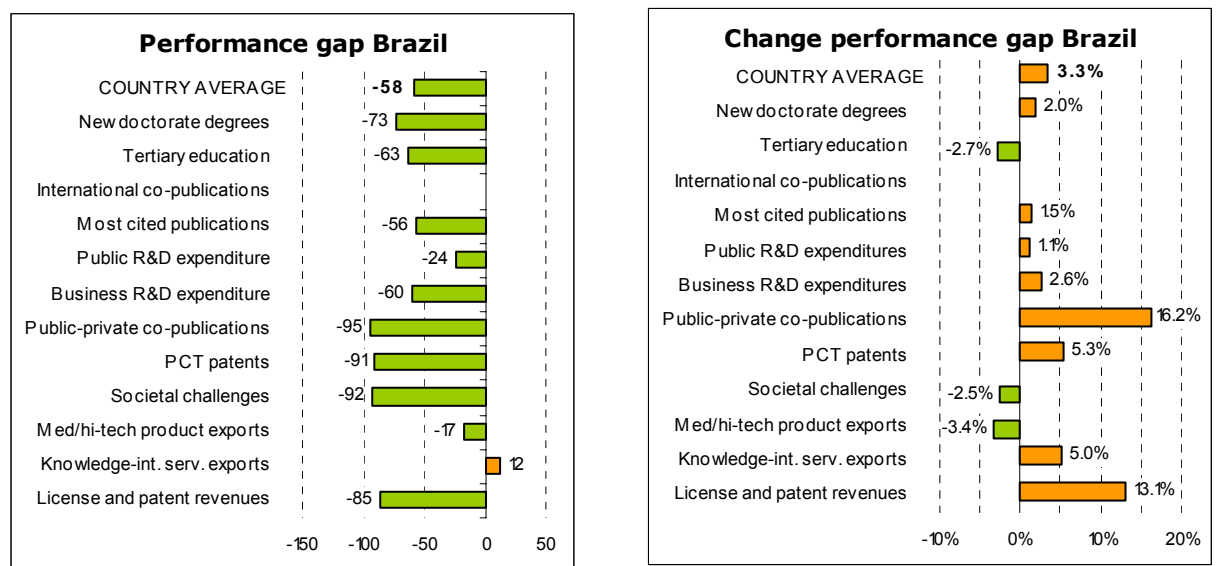
No data for International co-publications for Brazil. **Left**: The indicators highlighted in orange reflect a performance gap for the EU27; those highlighted in green reflect a performance lead for the EU27. **Right**: Relative growth compared to that of the EU27. Orange coloured bars sow that the country is growing faster than the EU27; green coloured bars show that the country is growing slower than the EU27.

The EU27 is performing better than China in most indicators (Figure 13). In Exports of medium and high-tech products China is performing better. Overall there is a clear performance lead in favour of the EU27. But this lead is declining, as China's innovation performance has grown at a faster rate than of the EU27. China has been decreasing the performance gap in as many as 8 indicators (Tertiary education, International co-publications), Business R&D expenditure, Public-private co-publications, PCT patents, PCT patents in societal challenges, Knowledge-intensive services exports and License and patent revenues) and has been increasing its lead in Exports of medium-high and high-tech products. The EU27 has increased its lead in Most cited publications and Public R&D expenditure.
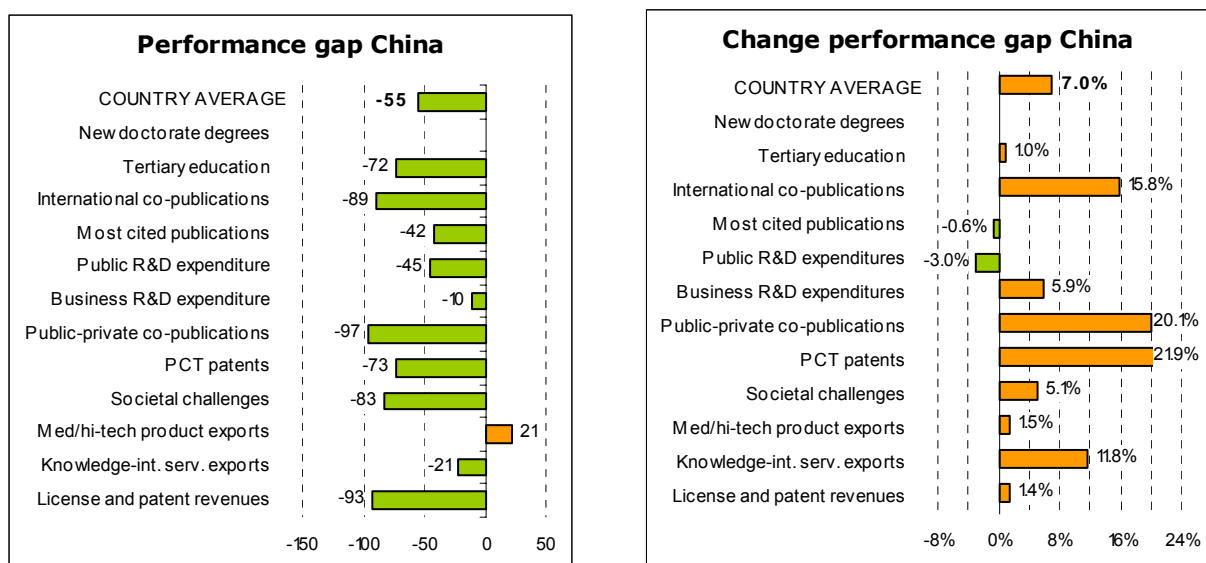
The EU27 is performing better than India in most indicators (Figure 14). In Knowledge-intensive services exports India is performing better. Overall there is a clear performance lead in favour of the EU27. But this lead is declining, as India's innovation performance has grown at a faster rate than of the EU27. India has been decreasing the performance gap in 4 indicators (Most cited publications, Business R&D expenditure, Public-private co-publications and License and patent revenues) and has experienced a decrease in its performance lead in Exports of medium-high and high-tech products and Knowledge-intensive services exports. The EU27 has increased its lead in Tertiary education, Public R&D expenditure, PCT patents and PCT patents in societal challenges.
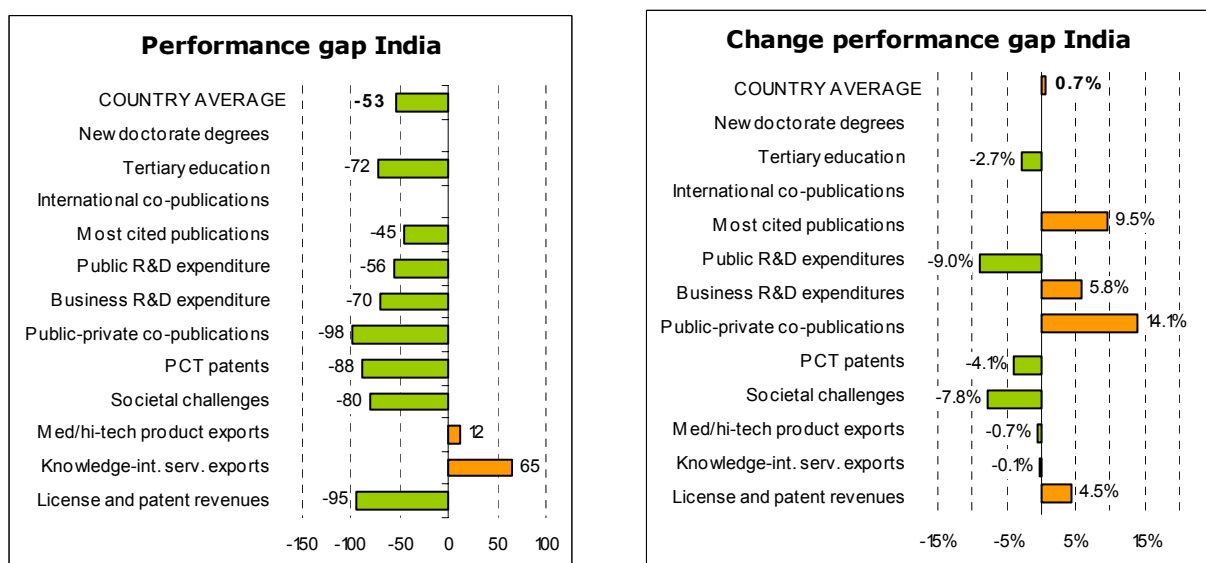
The EU27 is performing better than Russia in most indicators (Figure 15). In New doctorate degrees and Tertiary education Russia is performing better. Overall there is a clear performance lead in favour of the EU27 and this lead is increasing, as Russia's innovation performance has grown at a slower rate than of the EU27. Russia has been decreasing the performance gap in 2 indicators (PCT patents in societal challenges and Knowledge-intensive services exports) and seen a decrease in its lead in New doctorate degrees and Tertiary education. Only in Exports of medium-high and high-tech products has Russia increased its lead. The EU27 has increased its lead in the other 6 indicators for which data are available.

FIGURE 15: EU27-RUSSIA COMPARISON
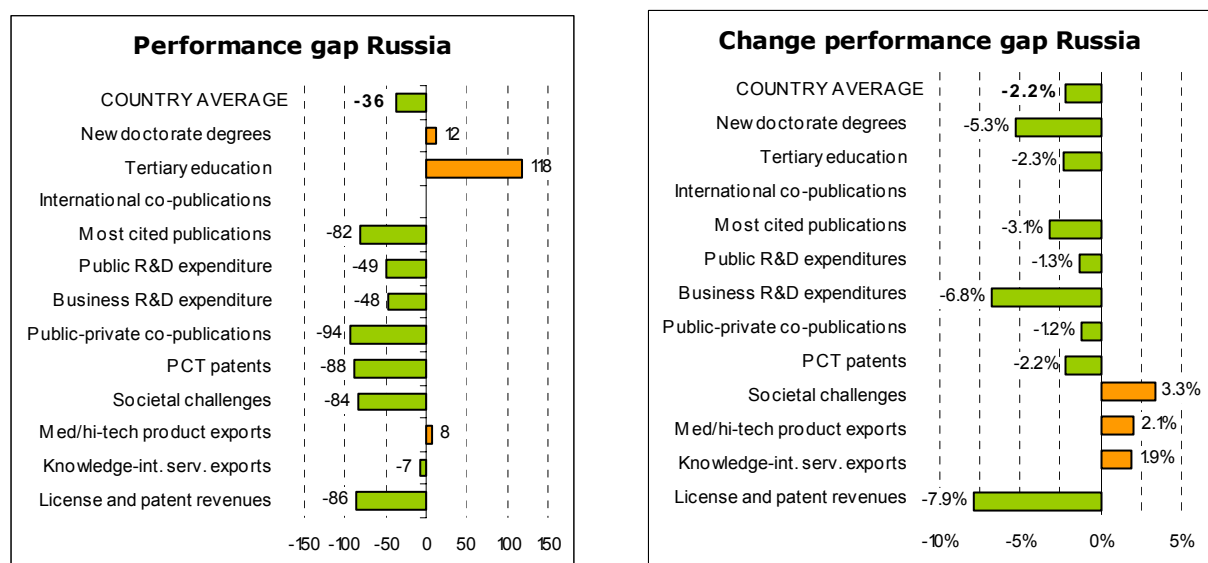
No data for International co-publications for Russia. **Left**: The indicators highlighted in orange reflect a performance gap for the EU27; those highlighted in green reflect a performance lead for the EU27. **Right**: Relative growth compared to that of the EU27. Orange coloured bars sow that the country is growing faster than the EU27; green coloured bars show that the country is growing slower than the EU27.

FIGURE 16: COMPARISON WITH KEY COMPETITORS
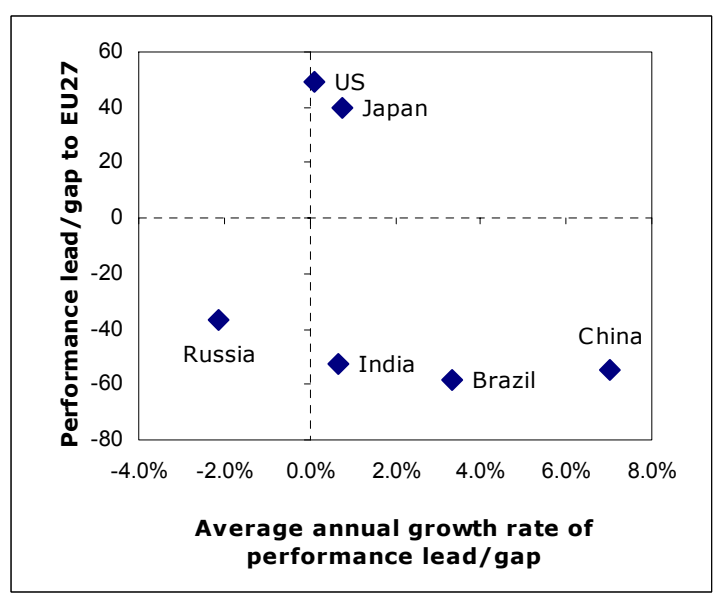
The dynamic performance of these key international competitors can also be grasped in a graph similar to that of the Member States (cf. Figure 4). Figure 16 shows the current performance lead or gap on the vertical axis and the change in this lead or gap on the vertical axis. From Figure 16 it becomes clear that Brazil and China are clearly catching-up to the EU27, that India's is only slowly catching-up, that Russia is faced with an increasing gap to the EU27 and the EU27 is neither catching-up to the US nor to Japan.

4.3. A comparison between the US and Japan

Both the US and Japan are the global innovation leaders. A direct comparison between these two countries shows that Japan is marginally lagging behind the US (Figure 17). The US is performing better in 7 indicators, in particular in New doctorate degrees, International scientific co-publications and Most cited publications. Japan is performing better in 5 indicators, in particular in PCT patent applications.

Overall there is a performance lead in favour of the US but this lead is decreasing, as Japan's innovation performance has grown at a faster rate than of the US. The US has increased its lead in New doctorate degrees, International co-publications and Public-private co-publications and has decreased its gap in Tertiary education, Public R&D expenditure and Business R&D expenditure. Japan has increased its lead in PCT patents and Exports of medium-high and high-tech products and has decreased its gap in Most cited publications, PCT patents in societal challenges, Knowledge-intensive services exports and License and patent revenues.

FIGURE 17: US-JAPAN COMPARISON
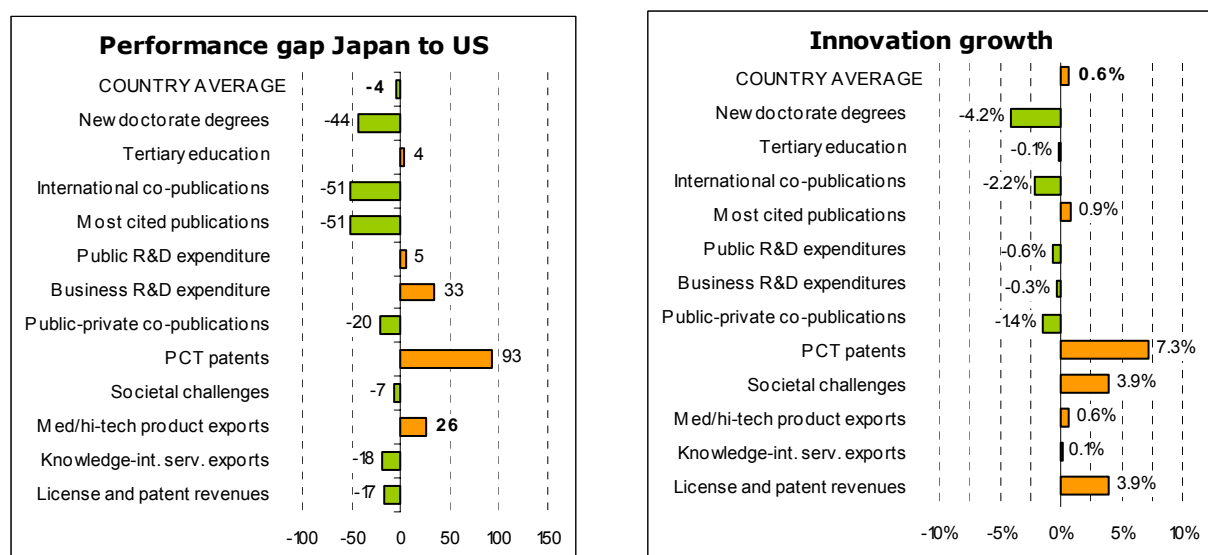
Left: Negative values (bars highlighted in green) indicate that US performance is higher than that of Japan; positive values (bars highlighted in orange) indicate that Japan's performance is better than that of the US.
Right: Relative growth of Japan compared to the US. Orange coloured bars sow that Japan is growing faster than the Us; green coloured bars show that the US is growing faster than Japan.

5. INNOVATION IN PUBLIC SERVICES

In its Innovation Union Communication of October 2010, the European Commission announced its intention to pilot a European Public Sector Innovation Scoreboard as a basis to start benchmarking public sector innovation. In preparation for this work, the 2010 Innobarometer was dedicated to public sector innovation. The survey among 4000 European organisations in public administration[7] shows that innovation in public services is widespread. Within Europe, two out of three organisations active in public administration introduced a new or significantly improved service in the last 3 years.

The main findings from the Innobarometer 2010 survey are:

- Innovation in the public administration

  o At EU level, two-thirds of public administration institutions introduced a new or significantly improved service in the last 3 years.

  o The likelihood of service innovation increased linearly with the size of the institutions. State institutions were just as likely as independent ones to introduce innovations.

- Developing innovations

  o The single most important driver of innovation in the public sector was the introduction of new laws and regulations, followed by new policy priorities and mandated implementations of an online service provision.

  o Three major sources of information supported innovation: ideas from staff, ideas from management and input from clients or users.

  o Domestic sources of information were the most important. The EU Commission was almost as important as a single source of information as other non-domestic organisations, events or enterprises in other EU countries altogether.

  o A top-down approach of innovation or innovation support has been prevalent in developing innovations. A bottom-up innovation culture was the least characteristic of the government sector.

  o In terms of barriers to public administration innovation, a lack of financial and human resources stood out as the most important barrier.

- Effects of innovations

  Innovations improved the work of public administrations and only rarely had negative effects reported. The positive effects of innovation included: improved user access to information due to service innovations; improved user satisfaction; more targeted services; a faster delivery of services; simplified administration; improved working conditions or employee satisfaction; and cost reductions resulting from innovations.

- Public procurement

  More than half of the organisations involved with tendering indicated that the procurements delivered or contributed to innovative service solutions. Cost-cutting without service innovation was a somewhat less frequent outcome, as were reduced environmental impacts through solutions purchased by public procurement.

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[7] Public administration includes NACE Rev. 2 industries 84.11 (General public administration activities) and 84.12 (Regulation of the activities of providing healthcare, education, cultural services and other social services, excluding social security).

6. COUNTRY PROFILES

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

BELGIUM

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	100
1.1.2 Population aged 30-34 completed tertiary education	130
1.1.3 Youth aged 20-24 upper secondary level education	106
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	390
1.2.2 Top 10% most cited scientific publications worldwide	122
1.2.3 Non-EU doctorate students	93
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	83
1.3.2 Venture capital	128
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	106
2.1.2 Non-R&D innovation expenditures	80
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	133
2.2.2 Innovative SMEs collaborating with others	199
2.2.3 Public-private scientfic co-publications	170
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	94
2.3.2 PCT patent applications in societal challenges	99
2.3.3 Community trademarks	111
2.3.4 Community designs	80
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	129
3.1.2 SMEs introducing marketing or organisational	113
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	105
3.2.2 Medium and High-tech manufacturing exports	105
3.2.3 Knowledge-Intensive Services exports	83
3.2.4 Sales of new to market and new to firm innovations	72
3.2.5 Licence and patent revenues from abroad	245

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

Belgium is one of the innovation followers with an above average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems and Linkages & entrepreneurship. Relative weaknesses are in Firm investments, Intellectual assets and Outputs.
High growth is observed for Venture capital and Community trademarks. A strong decline is observed for Non-R&D innovation expenditure, Community designs and Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

BELGIUM

Indicator	Value
AVERAGE COUNTRY GROWTH	2.0%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	6.2%
1.1.2 Population aged 30-34 completed tertiary education	1.8%
1.1.3 Youth aged 20-24 upper secondary level education	0.5%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	8.1%
1.2.2 Top 10% most cited scientific publications worldwide	3.8%
1.2.3 Non-EU doctorate students	-1.3%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	2.6%
1.3.2 Venture capital	24.5%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	1.4%
2.1.2 Non-R&D innovation expenditures	-14.1%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-1.6%
2.2.2 Innovative SMEs collaborating with others	7.5%
2.2.3 Public-private scientfic co-publications	3.4%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	4.4%
2.3.2 PCT patent applications in societal challenges	1.1%
2.3.3 Community trademarks	18.6%
2.3.4 Community designs	-7.9%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-1.6%
3.1.2 SMEs introducing marketing or organisational innovations	-0.7%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	-0.6%
3.2.2 Medium and High-tech manufacturing exports	0.1%
3.2.3 Knowledge-Intensive Services exports	-1.6%
3.2.4 Sales of new to market and new to firm innovations	-7.4%
3.2.5 Licence and patent revenues from abroad	6.8%

BULGARIA

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	36
1.1.2 Population aged 30-34 completed tertiary education	86
1.1.3 Youth aged 20-24 upper secondary level education	106
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	71
1.2.2 Top 10% most cited scientific publications worldwide	31
1.2.3 Non-EU doctorate students	20
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	48
1.3.2 Venture capital	27
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	13
2.1.2 Non-R&D innovation expenditures	134
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	56
2.2.2 Innovative SMEs collaborating with others	31
2.2.3 Public-private scientfic co-publications	6
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	10
2.3.2 PCT patent applications in societal challenges	6
2.3.3 Community trademarks	73
2.3.4 Community designs	37
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	61
3.1.2 SMEs introducing marketing or organisational	44
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	65
3.2.2 Medium and High-tech manufacturing exports	55
3.2.3 Knowledge-Intensive Services exports	43
3.2.4 Sales of new to market and new to firm innovations	107
3.2.5 Licence and patent revenues from abroad	10

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

Bulgaria is one of the modest innovators with a below average performance.

Relative strengths are in Human resources. Relative weaknesses are in Linkages & entrepreneurship, Intellectual assets and Innovators.

High growth is observed for Community trademarks and Community designs. A strong decline is observed for PCT patents in societal challenges. Growth performance in Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

BULGARIA

Indicator	Value
AVERAGE COUNTRY GROWTH	6.2%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	13.6%
1.1.2 Population aged 30-34 completed tertiary education	2.9%
1.1.3 Youth aged 20-24 upper secondary level education	2.3%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	5.3%
1.2.2 Top 10% most cited scientific publications worldwide	7.3%
1.2.3 Non-EU doctorate students	-4.0%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	0.0%
1.3.2 Venture capital	9.5%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	12.5%
2.1.2 Non-R&D innovation expenditures	9.9%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	3.1%
2.2.2 Innovative SMEs collaborating with others	2.7%
2.2.3 Public-private scientfic co-publications	20.5%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	-6.1%
2.3.2 PCT patent applications in societal challenges	-22.7%
2.3.3 Community trademarks	48.3%
2.3.4 Community designs	26.2%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	8.6%
3.1.2 SMEs introducing marketing or organisational innovations	5.1%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.8%
3.2.2 Medium and High-tech manufacturing exports	4.1%
3.2.3 Knowledge-Intensive Services exports	9.0%
3.2.4 Sales of new to market and new to firm innovations	3.2%
3.2.5 Licence and patent revenues from abroad	2.5%

CZECH REPUBLIC

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	100
1.1.2 Population aged 30-34 completed tertiary education	54
1.1.3 Youth aged 20-24 upper secondary level education	117
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	161
1.2.2 Top 10% most cited scientific publications worldwide	48
1.2.3 Non-EU doctorate students	16
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	81
1.3.2 Venture capital	10
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	74
2.1.2 Non-R&D innovation expenditures	146
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	98
2.2.2 Innovative SMEs collaborating with others	101
2.2.3 Public-private scientfic co-publications	68
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	25
2.3.2 PCT patent applications in societal challenges	22
2.3.3 Community trademarks	45
2.3.4 Community designs	47
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	102
3.1.2 SMEs introducing marketing or organisational	117
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	87
3.2.2 Medium and High-tech manufacturing exports	130
3.2.3 Knowledge-Intensive Services exports	72
3.2.4 Sales of new to market and new to firm innovations	141
3.2.5 Licence and patent revenues from abroad	23

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

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

High growth is observed for Community trademarks and Public-private co-publications. A strong decline is observed for Non-EU doctorate students. Growth performance in Human resources and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

CZECH REPUBLIC

Indicator	Value
AVERAGE COUNTRY GROWTH	2.6%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	8.8%
1.1.2 Population aged 30-34 completed tertiary education	7.7%
1.1.3 Youth aged 20-24 upper secondary level education	0.2%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	9.1%
1.2.2 Top 10% most cited scientific publications worldwide	5.5%
1.2.3 Non-EU doctorate students	-17.1%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	4.6%
1.3.2 Venture capital	-7.3%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	0.8%
2.1.2 Non-R&D innovation expenditures	-7.3%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-1.7%
2.2.2 Innovative SMEs collaborating with others	-3.4%
2.2.3 Public-private scientfic co-publications	15.4%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	7.1%
2.3.2 PCT patent applications in societal challenges	2.1%
2.3.3 Community trademarks	18.4%
2.3.4 Community designs	-0.4%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-0.5%
3.1.2 SMEs introducing marketing or organisational innovations	4.1%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.4%
3.2.2 Medium and High-tech manufacturing exports	1.0%
3.2.3 Knowledge-Intensive Services exports	4.2%
3.2.4 Sales of new to market and new to firm innovations	4.8%
3.2.5 Licence and patent revenues from abroad	11.9%

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

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 Finance and support, Innovators and Outputs.

High growth is observed for New doctorate graduates and Community trademarks. A strong decline is observed for Venture capital and SMEs introducing marketing or organizational innovations. Growth performance in Human resources, Open, excellent and attractive research systems, Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

GERMANY

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	186
1.1.2 Population aged 30-34 completed tertiary education	91
1.1.3 Youth aged 20-24 upper secondary level education	94
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	221
1.2.2 Top 10% most cited scientific publications worldwide	111
1.2.3 Non-EU doctorate students	N/A
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	120
1.3.2 Venture capital	51
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	154
2.1.2 Non-R&D innovation expenditures	124
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	152
2.2.2 Innovative SMEs collaborating with others	80
2.2.3 Public-private scientfic co-publications	137
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	193
2.3.2 PCT patent applications in societal challenges	156
2.3.3 Community trademarks	135
2.3.4 Community designs	166
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	157
3.1.2 SMEs introducing marketing or organisational	174
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	111
3.2.2 Medium and High-tech manufacturing exports	131
3.2.3 Knowledge-Intensive Services exports	118
3.2.4 Sales of new to market and new to firm innovations	131
3.2.5 Licence and patent revenues from abroad	191

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

Germany is one of the innovation leaders with an above average performance.
Relative strengths are in Intellectual assets, Innovators and Outputs. Relative weaknesses are in Human resources, Finance and support and Linkages & entrepreneurship.
High growth is observed for Community trademarks. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

GERMANY

Indicator	Growth
AVERAGE COUNTRY GROWTH	2.6%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	4.3%
1.1.2 Population aged 30-34 completed tertiary education	3.1%
1.1.3 Youth aged 20-24 upper secondary level education	0.8%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	6.3%
1.2.2 Top 10% most cited scientific publications worldwide	2.8%
1.2.3 Non-EU doctorate students	N/A
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	4.3%
1.3.2 Venture capital	1.6%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	2.8%
2.1.2 Non-R&D innovation expenditures	-4.8%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-0.1%
2.2.2 Innovative SMEs collaborating with others	1.0%
2.2.3 Public-private scientfic co-publications	2.7%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	0.6%
2.3.2 PCT patent applications in societal challenges	2.7%
2.3.3 Community trademarks	12.3%
2.3.4 Community designs	3.5%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-0.3%
3.1.2 SMEs introducing marketing or organisational innovations	3.5%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.6%
3.2.2 Medium and High-tech manufacturing exports	-1.7%
3.2.3 Knowledge-Intensive Services exports	3.1%
3.2.4 Sales of new to market and new to firm innovations	-0.3%
3.2.5 Licence and patent revenues from abroad	12.8%

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

Estonia is one of the innovation followers with a close to average performance.

Relative strengths are in Human resources, Firm investments and Linkages & entrepreneurship. Relative weaknesses are in Open, excellent and attractive research systems, Intellectual assets and Outputs.

High growth is observed for Community trademarks, Community designs and License and patent revenues from abroad. A relatively strong decline is observed for New doctorate students and SMEs introducing marketing or organizational innovations. Growth performance in Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth
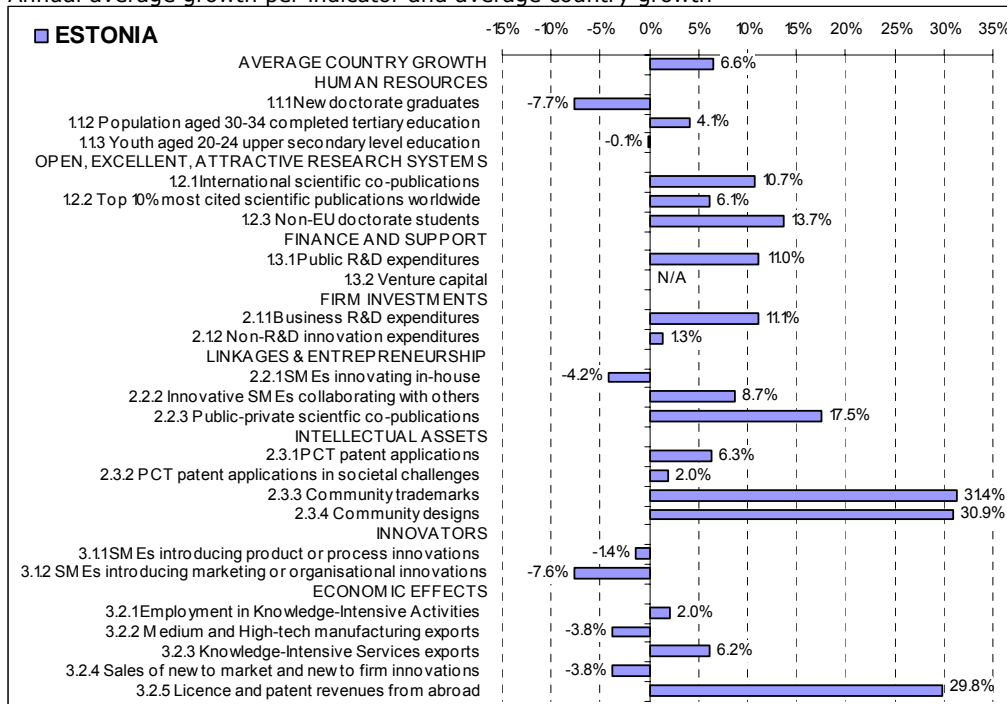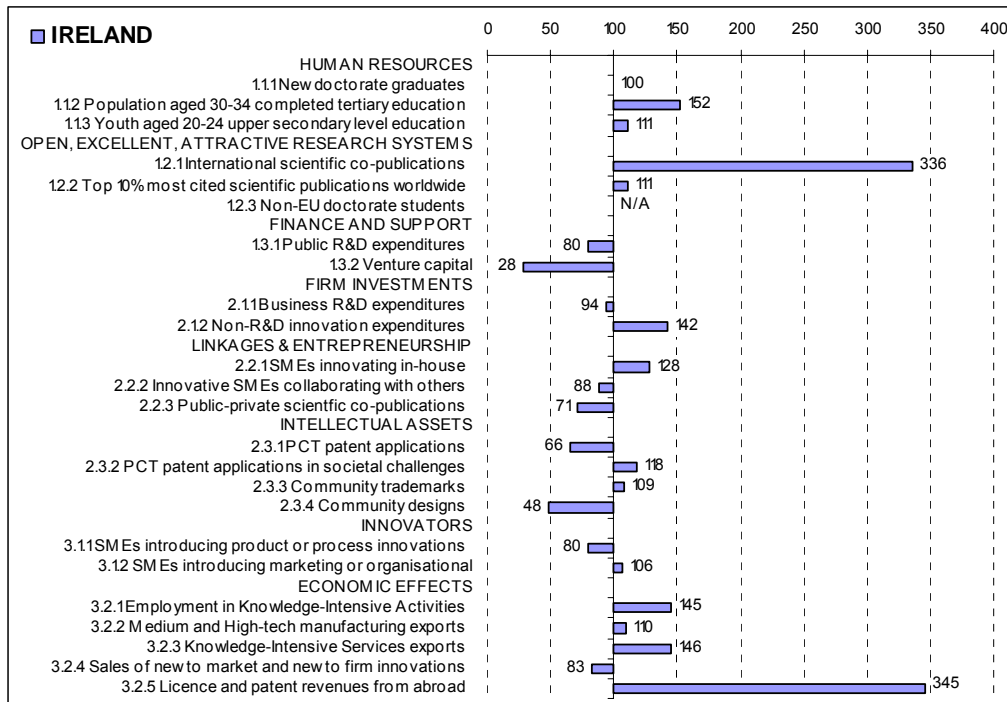
Indicator values relative to the EU27 (EU27=100).

Ireland is one of the innovation followers with an above average performance.

Relative strengths are in Human resources, Open, excellent and attractive research systems and Outputs. Relative weaknesses are in Finance and support, Linkages & entrepreneurship, Intellectual assets and Innovators.

High growth is observed for Community trademarks, Community designs and License and patent revenues from abroad. A strong decline is observed for SMEs introducing product or process innovations. Growth performance in Human resources, Open, excellent and attractive research systems, Intellectual assets and Outputs is above average. In the other dimensions it is below average.

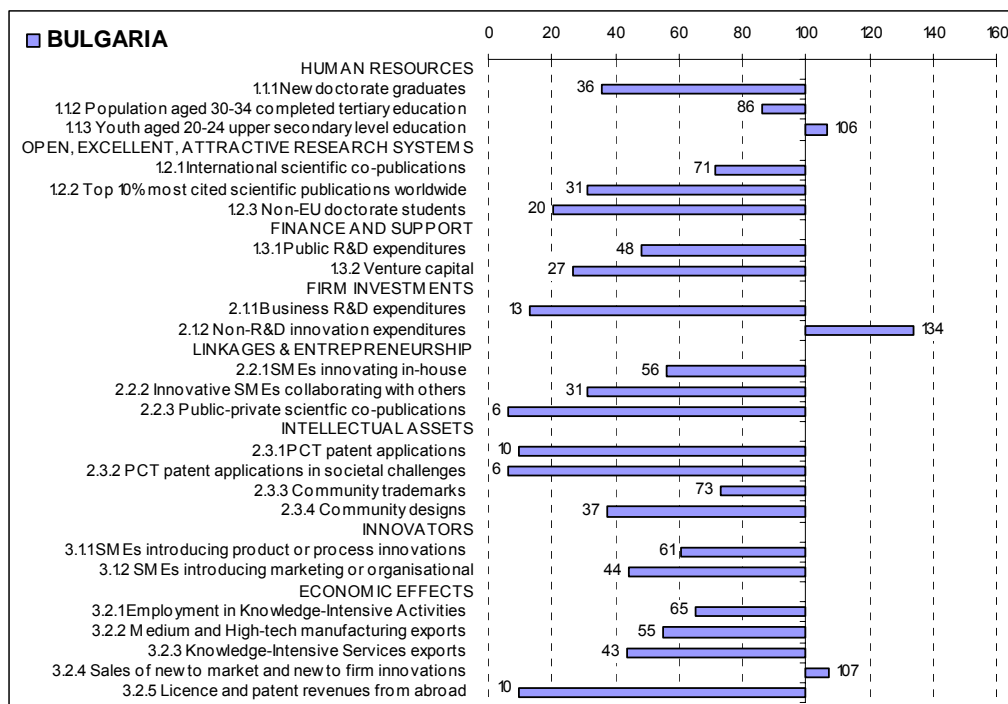Annual average growth per indicator and average country growth
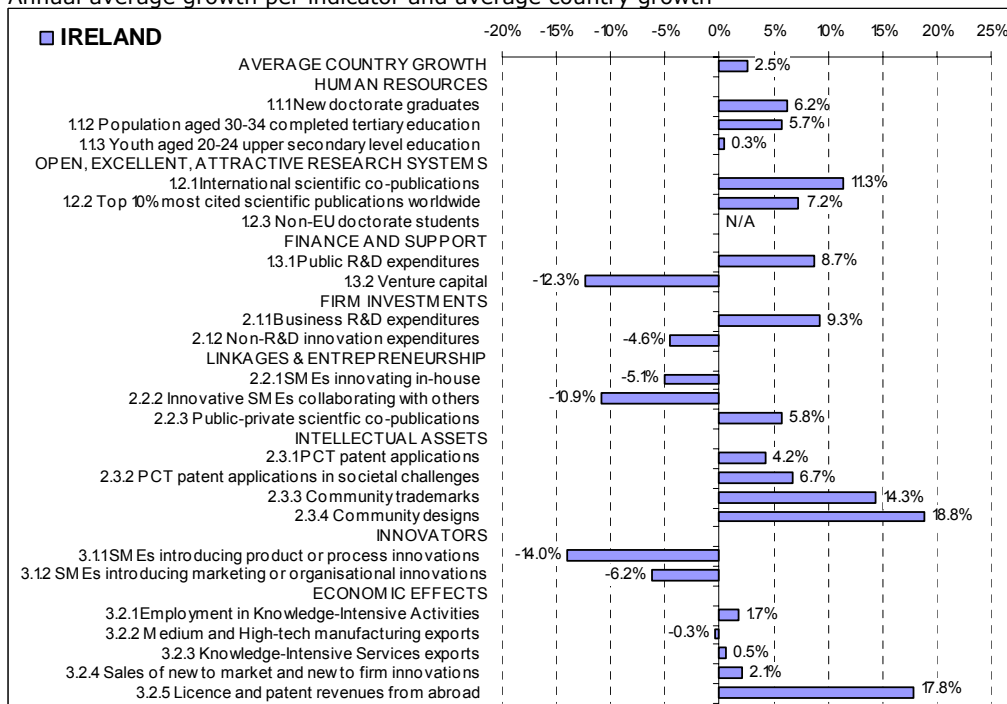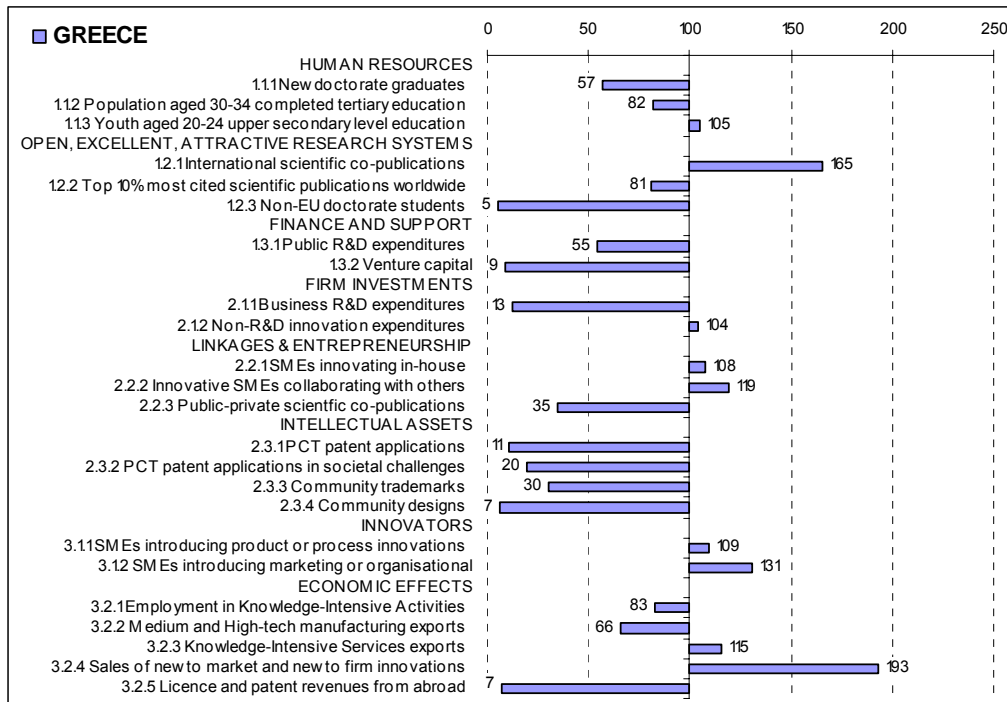
Indicator values relative to the EU27 (EU27=100).

Greece is one of the moderate innovators with a below average performance.
Relative strengths are in Human resources, Innovators and Outputs. Relative weaknesses are in Finance and support, Firm investments and Intellectual assets.
High growth is observed for Venture capital, Community designs and Sales of new products. A relatively strong decline is observed for Non-R&D innovation expenditure and License and patent revenues from abroad. Growth performance in Finance and support and Intellectual assets is above average. In the other dimensions it is below average.

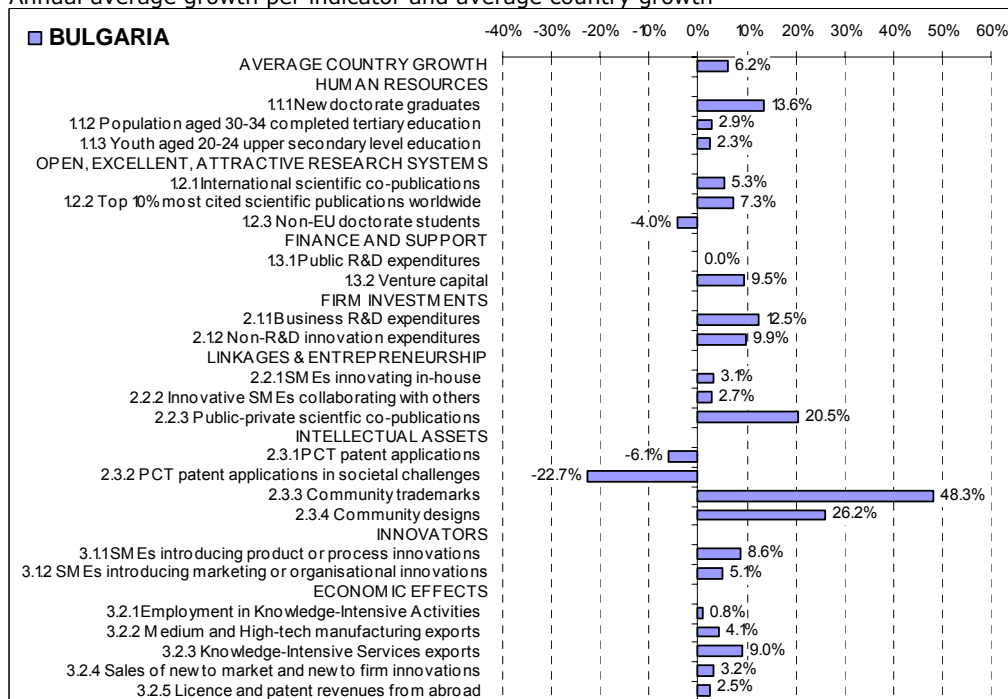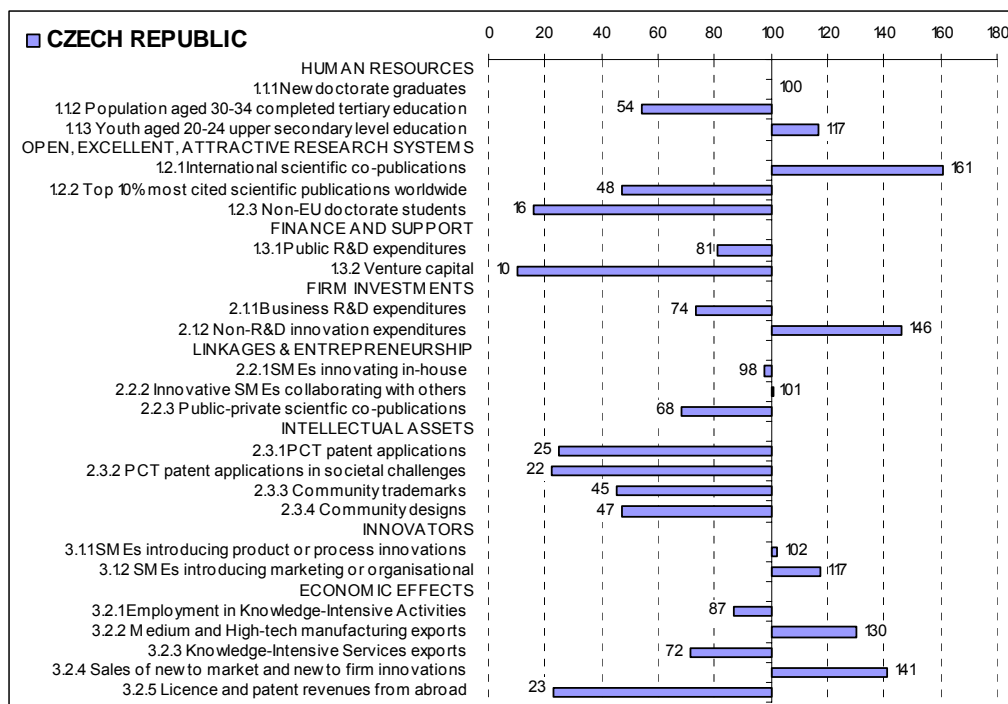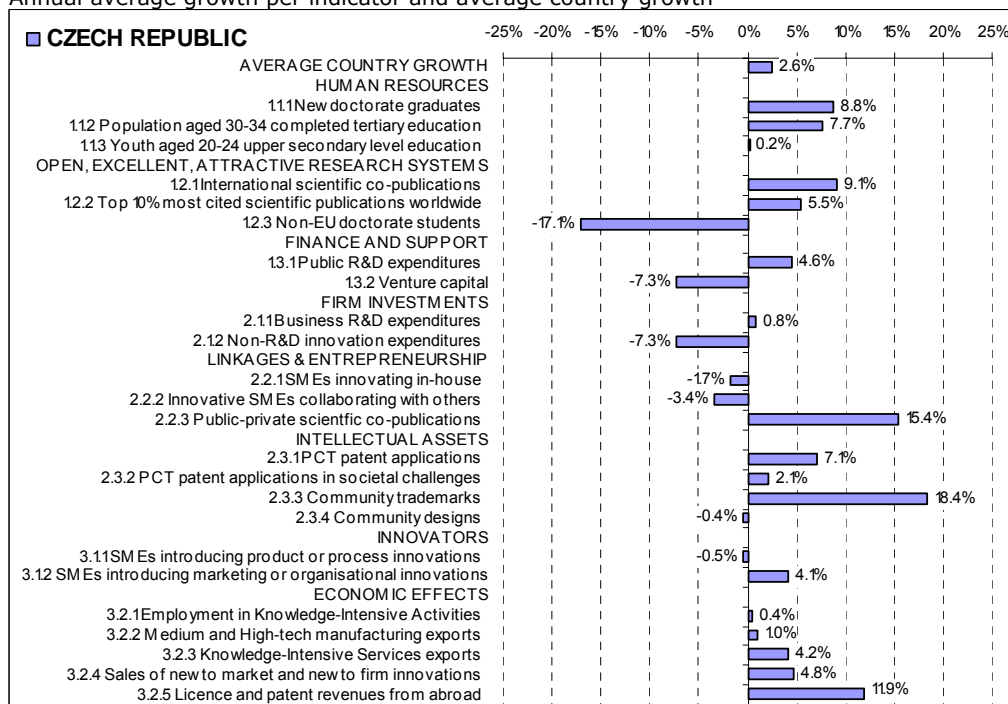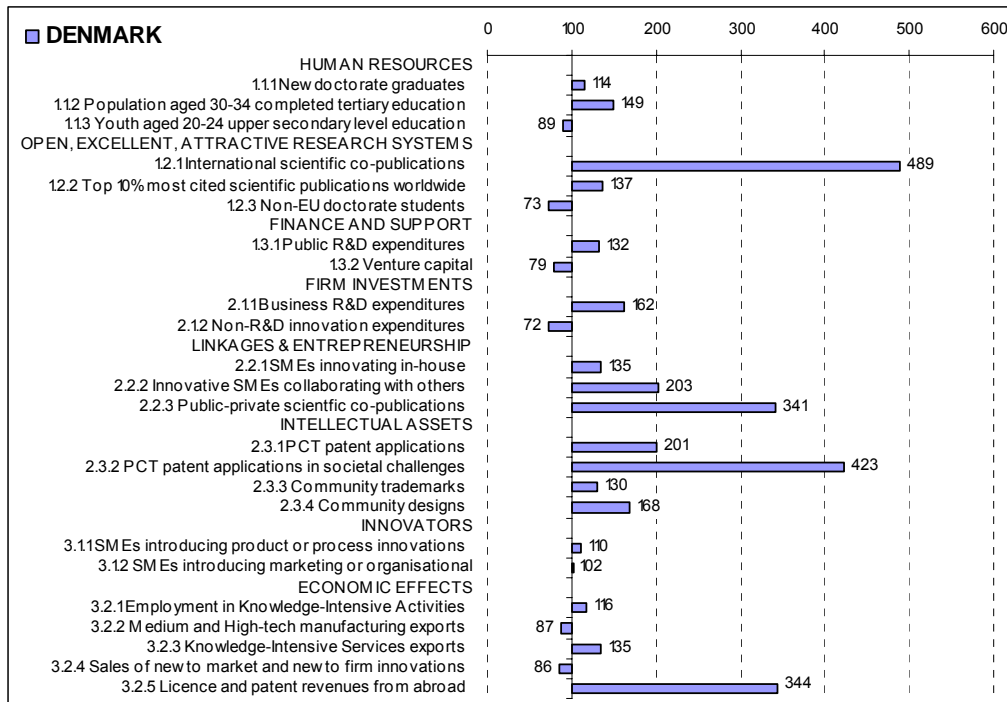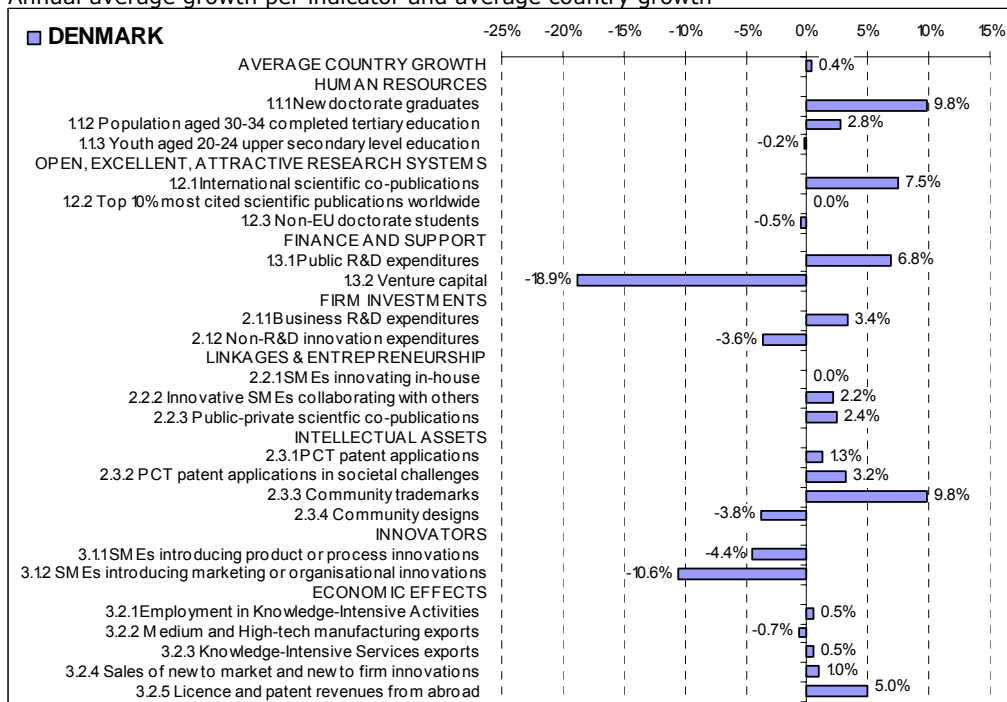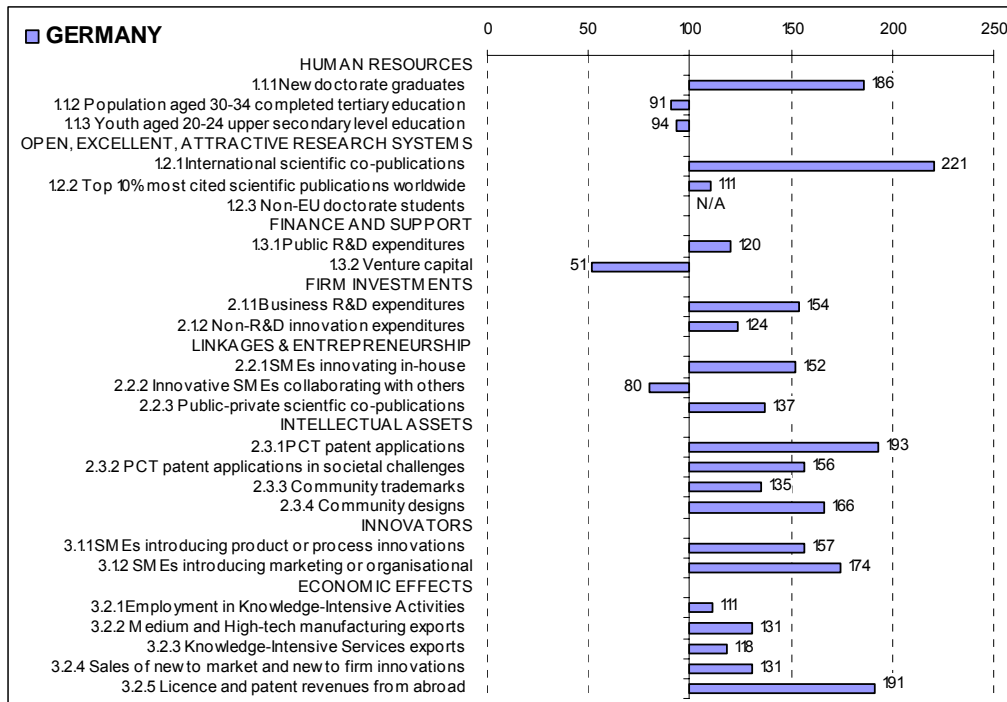Annual average growth per indicator and average country growth

SPAIN

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	64
1.1.2 Population aged 30-34 completed tertiary education	122
1.1.3 Youth aged 20-24 upper secondary level education	76
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	165
1.2.2 Top 10% most cited scientific publications worldwide	88
1.2.3 Non-EU doctorate students	86
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	89
1.3.2 Venture capital	65
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	58
2.1.2 Non-R&D innovation expenditures	64
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	73
2.2.2 Innovative SMEs collaborating with others	48
2.2.3 Public-private scientfic co-publications	44
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	32
2.3.2 PCT patent applications in societal challenges	47
2.3.3 Community trademarks	114
2.3.4 Community designs	71
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	80
3.1.2 SMEs introducing marketing or organisational	78
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	87
3.2.2 Medium and High-tech manufacturing exports	104
3.2.3 Knowledge-Intensive Services exports	N/A
3.2.4 Sales of new to market and new to firm innovations	120
3.2.5 Licence and patent revenues from abroad	33

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

Spain is one of the moderate innovators with a below average performance.

Relative strengths are in the indicator on international scientific publications and in the dimensions Finance and support and Outputs (except on License and patent revenues from abroad). Relative weaknesses are in Firm investments, Linkages & entrepreneurship, Intellectual assets and Innovators.

High growth is observed for International co-publications, Non-R&D innovation expenditure, PCT patent applications in societal challenges and Licence and patent revenues from abroad). The strongest decline is observed for Venture capital. Growth performance in Open, excellent and attractive research systems is above average. Growth in all indicators related to Intellectual assets is also above average except for Community designs. In the dimensions Linkages and entrepreneurship, Innovators and Outputs, growth in the individual indicators presents no clear overall trend.

Annual average growth per indicator and average country growth

SPAIN

Indicator	Value
AVERAGE COUNTRY GROWTH	1.9%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	-4.9%
1.1.2 Population aged 30-34 completed tertiary education	0.5%
1.1.3 Youth aged 20-24 upper secondary level education	-0.8%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	10.2%
1.2.2 Top 10% most cited scientific publications worldwide	7.0%
1.2.3 Non-EU doctorate students	4.6%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	6.5%
1.3.2 Venture capital	-12.2%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	4.7%
2.1.2 Non-R&D innovation expenditures	11.5%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-4.5%
2.2.2 Innovative SMEs collaborating with others	-1.6%
2.2.3 Public-private scientfic co-publications	5.3%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	6.7%
2.3.2 PCT patent applications in societal challenges	12.4%
2.3.3 Community trademarks	1.6%
2.3.4 Community designs	-7.7%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-3.8%
3.1.2 SMEs introducing marketing or organisational innovations	0.7%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.5%
3.2.2 Medium and High-tech manufacturing exports	-1.9%
3.2.3 Knowledge-Intensive Services exports	N/A
3.2.4 Sales of new to market and new to firm innovations	3.6%
3.2.5 Licence and patent revenues from abroad	9.9%

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

France is one of the innovation followers with an above average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems, Finance and support and Outputs. Relative weaknesses are in Firm investments, Linkages & entrepreneurship, Intellectual assets and Innovators.
High growth is observed for Non-R&D innovation expenditure, Community trademarks and License and patent revenues from abroad. Growth performance in Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

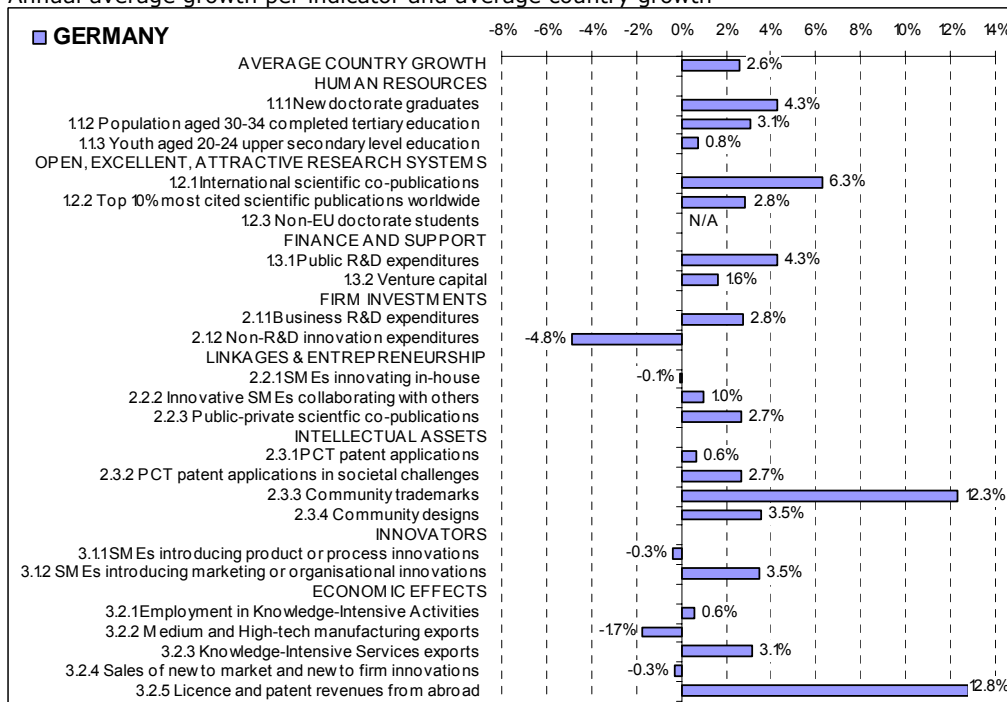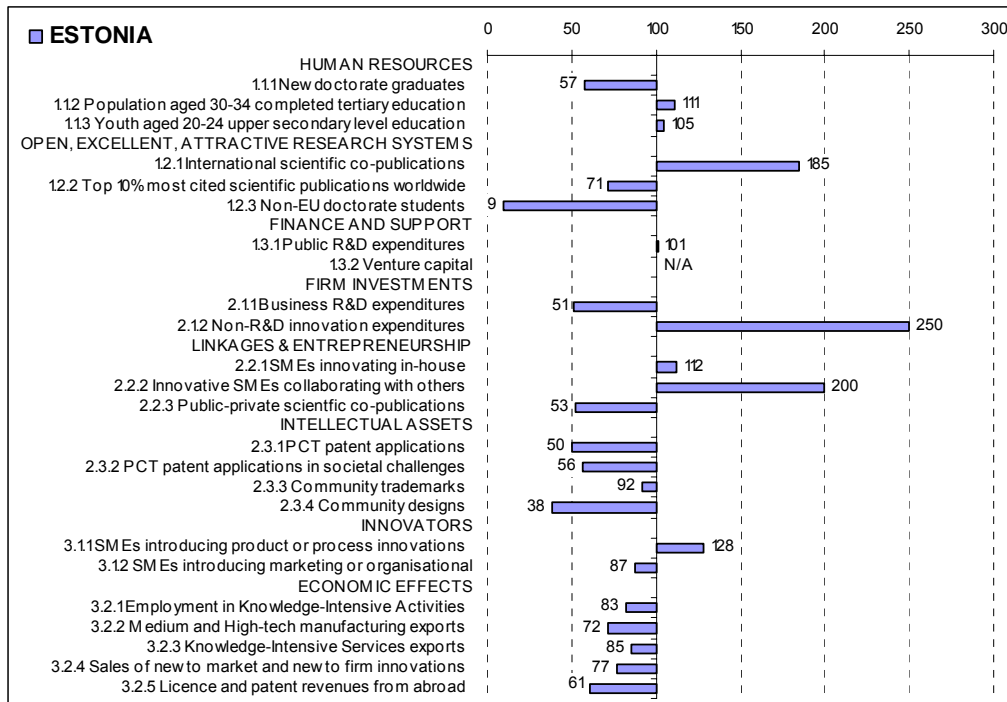Annual average growth per indicator and average country growth

ITALY

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	114
1.1.2 Population aged 30-34 completed tertiary education	59
1.1.3 Youth aged 20-24 upper secondary level education	97
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	156
1.2.2 Top 10% most cited scientific publications worldwide	89
1.2.3 Non-EU doctorate students	21
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	77
1.3.2 Venture capital	44
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	52
2.1.2 Non-R&D innovation expenditures	86
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	112
2.2.2 Innovative SMEs collaborating with others	54
2.2.3 Public-private scientfic co-publications	57
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	53
2.3.2 PCT patent applications in societal challenges	56
2.3.3 Community trademarks	94
2.3.4 Community designs	144
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	108
3.1.2 SMEs introducing marketing or organisational	104
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	102
3.2.2 Medium and High-tech manufacturing exports	108
3.2.3 Knowledge-Intensive Services exports	72
3.2.4 Sales of new to market and new to firm innovations	89
3.2.5 Licence and patent revenues from abroad	24

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

Italy is one of the moderate innovators with a below average performance.
Relative strengths are in Intellectual assets, Innovators and Outputs. Relative weaknesses are in Firm investments and Linkages & entrepreneurship.
High growth is observed for New doctorate graduates, Non-EU doctoral students and 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 above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

ITALY

Indicator	Value
AVERAGE COUNTRY GROWTH	2.7%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	12.5%
1.1.2 Population aged 30-34 completed tertiary education	2.8%
1.1.3 Youth aged 20-24 upper secondary level education	0.9%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	7.4%
1.2.2 Top 10% most cited scientific publications worldwide	3.8%
1.2.3 Non-EU doctorate students	14.2%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	2.8%
1.3.2 Venture capital	2.5%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	4.3%
2.1.2 Non-R&D innovation expenditures	-13.7%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	5.0%
2.2.2 Innovative SMEs collaborating with others	8.4%
2.2.3 Public-private scientfic co-publications	0.6%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	3.8%
2.3.2 PCT patent applications in societal challenges	3.9%
2.3.3 Community trademarks	10.5%
2.3.4 Community designs	-2.3%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	1.5%
3.1.2 SMEs introducing marketing or organisational innovations	2.0%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.0%
3.2.2 Medium and High-tech manufacturing exports	0.1%
3.2.3 Knowledge-Intensive Services exports	3.1%
3.2.4 Sales of new to market and new to firm innovations	-0.2%
3.2.5 Licence and patent revenues from abroad	-5.1%

CYPRUS

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	14
1.1.2 Population aged 30-34 completed tertiary education	138
1.1.3 Youth aged 20-24 upper secondary level education	111
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	254
1.2.2 Top 10% most cited scientific publications worldwide	86
1.2.3 Non-EU doctorate students	7
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	40
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	8
2.1.2 Non-R&D innovation expenditures	244
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	137
2.2.2 Innovative SMEs collaborating with others	191
2.2.3 Public-private scientfic co-publications	23
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	13
2.3.2 PCT patent applications in societal challenges	8
2.3.3 Community trademarks	246
2.3.4 Community designs	7
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	124
3.1.2 SMEs introducing marketing or organisational	121
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	108
3.2.2 Medium and High-tech manufacturing exports	90
3.2.3 Knowledge-Intensive Services exports	102
3.2.4 Sales of new to market and new to firm innovations	121
3.2.5 Licence and patent revenues from abroad	25

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

Cyprus is one of the innovation followers with a close to average performance.
Relative strengths are in Innovators and Outputs. Relative weaknesses are in Open, excellent and attractive research systems and Intellectual assets.
High growth is observed for Public-private co-publications, Community trademarks and Sales of new products. A strong decline is observed for PCT patent applications in societal challenges and Community designs. Growth performance in Human resources, Open, excellent and attractive research systems and Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

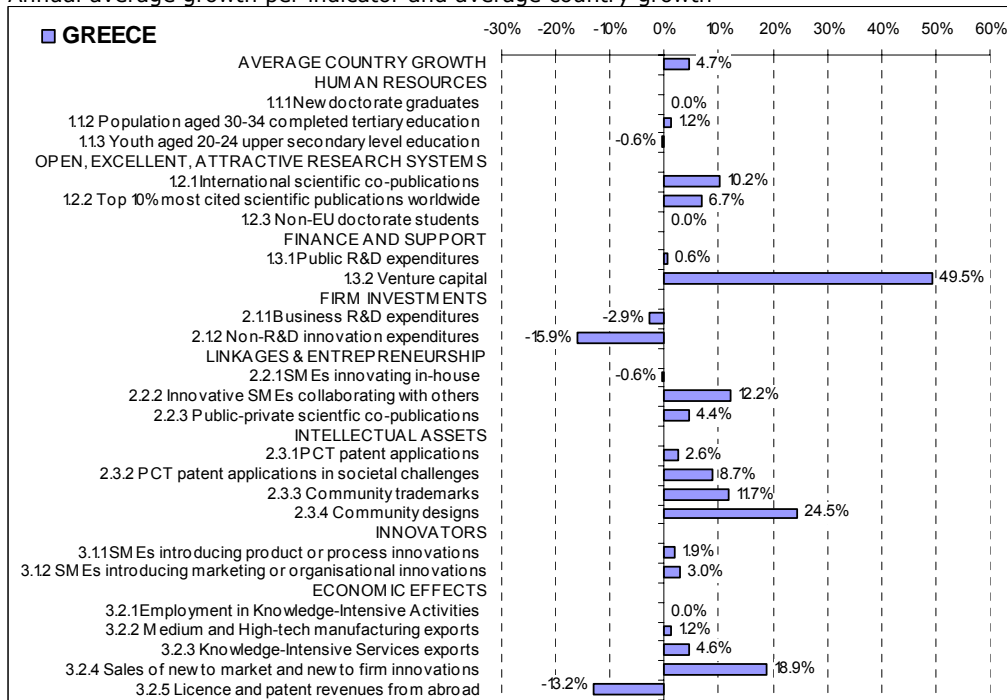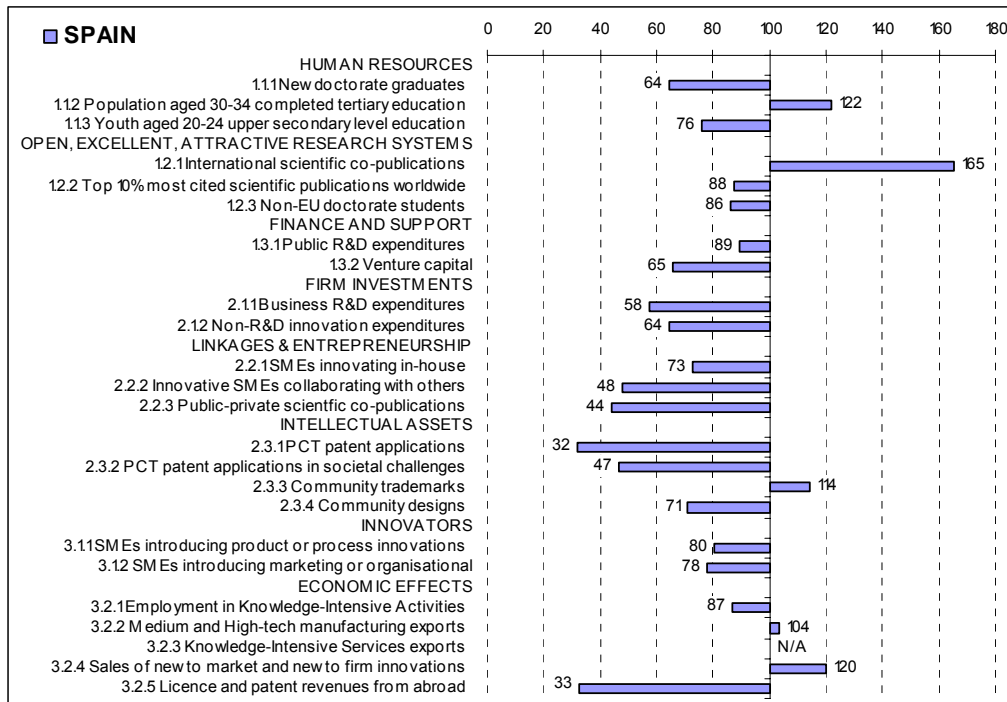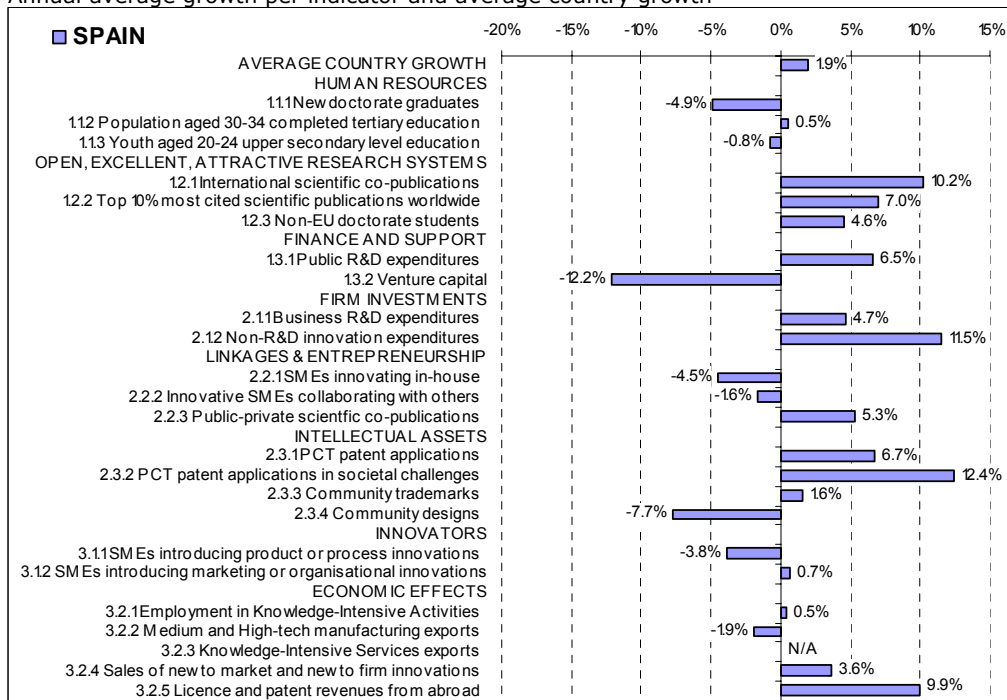Annual average growth per indicator and average country growth

CYPRUS

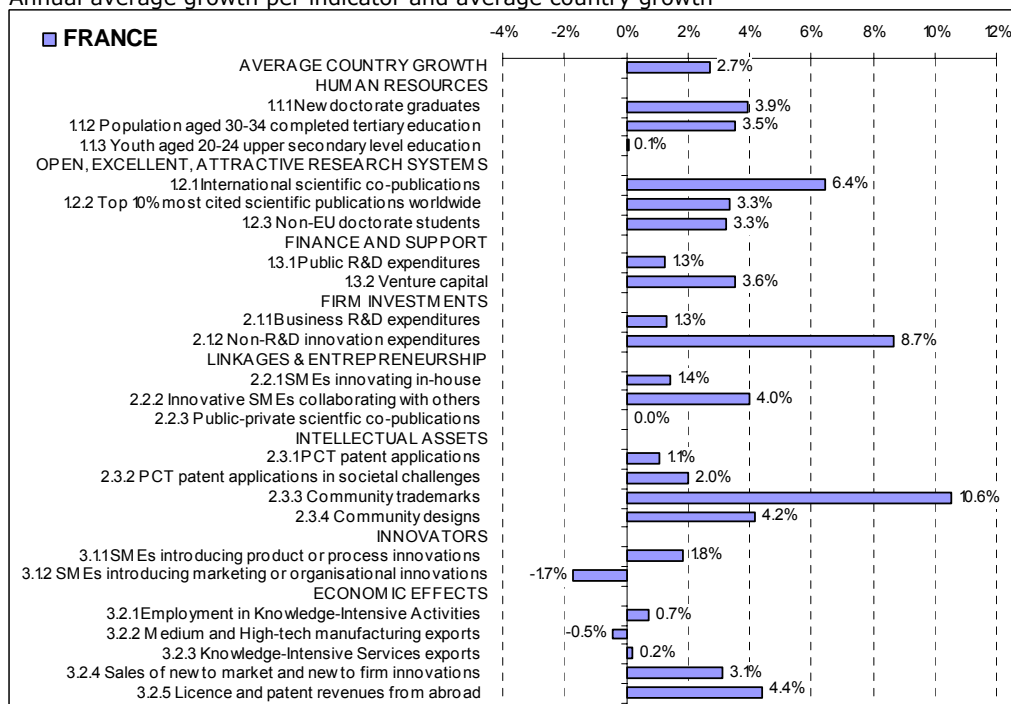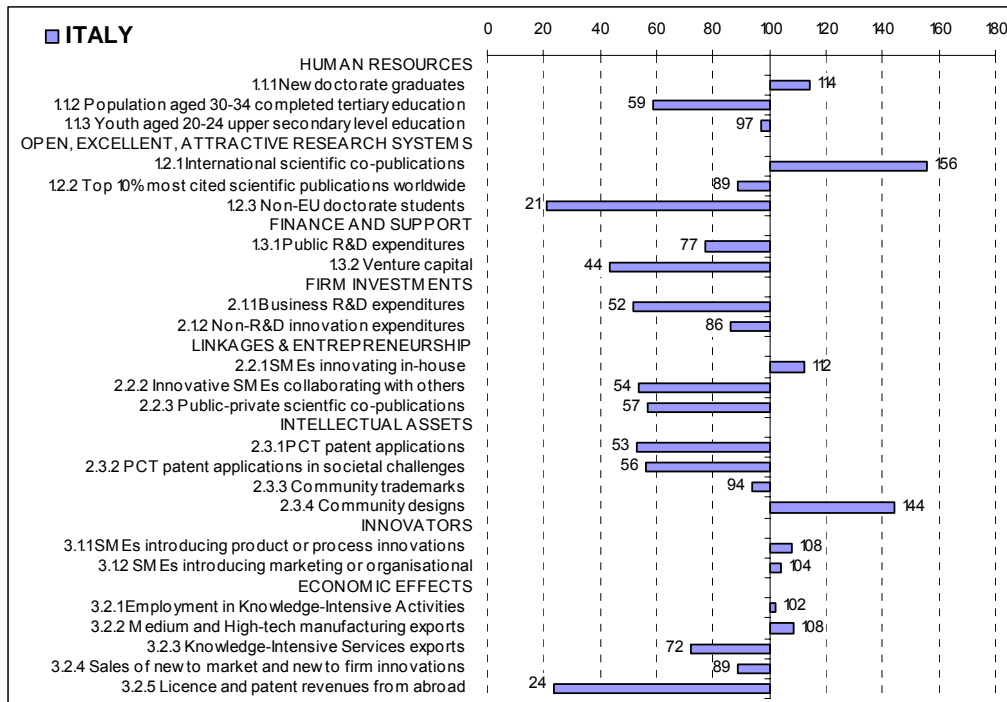| Indicator	Value
AVERAGE COUNTRY GROWTH	0.3%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	0.0%
1.1.2 Population aged 30-34 completed tertiary education	2.3%
1.1.3 Youth aged 20-24 upper secondary level education	2.1%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	18.4%
1.2.2 Top 10% most cited scientific publications worldwide	3.2%
1.2.3 Non-EU doctorate students	1.8%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	0.9%
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	2.7%
2.1.2 Non-R&D innovation expenditures	-9.8%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	5.3%
2.2.2 Innovative SMEs collaborating with others	6.6%
2.2.3 Public-private scientfic co-publications	26.1%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	-15.7%
2.3.2 PCT patent applications in societal challenges	-29.3%
2.3.3 Community trademarks	24.8%
2.3.4 Community designs	-23.2%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-1.7%
3.1.2 SMEs introducing marketing or organisational innovations	-3.9%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	-1.3%
3.2.2 Medium and High-tech manufacturing exports	-5.6%
3.2.3 Knowledge-Intensive Services exports	9.6%
3.2.4 Sales of new to market and new to firm innovations	27.1%
3.2.5 Licence and patent revenues from abroad	-11.2%

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

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, Linkages & entrepreneurship and Innovators.
High growth is observed for PCT patent applications in societal challenges and Community trademarks. A strong decline is observed for Most cited publications, Innovative SMEs collaborating with others and License and patent revenues from abroad. Growth performance in Finance and support and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth
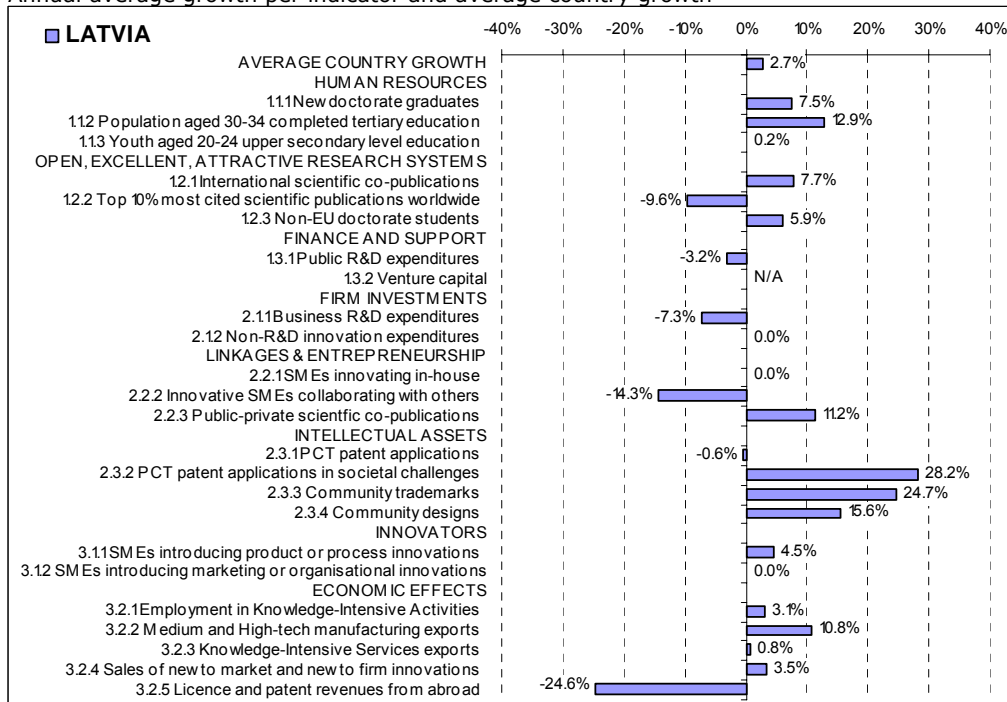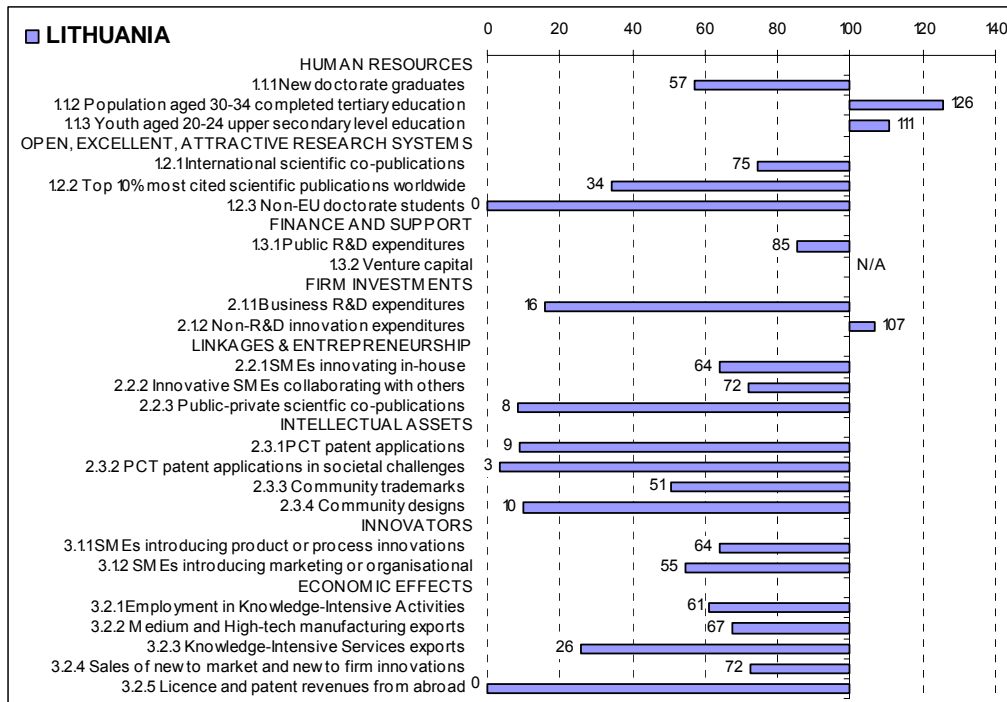
Indicator values relative to the EU27 (EU27=100).

Lithuania is one of the modest innovators with a below average performance.

Relative strengths are in Human resources and Finance and support. Relative weaknesses are in Open, excellent and attractive research systems, Intellectual assets, Innovators and Outputs.

High growth is observed for Public–private co-publications, PCT patent applications and Community trademarks. A strong decline is observed for Non-EU doctorate students and Community designs. Growth performance in Human resources and Intellectual assets is above average. In the other dimensions it is below average.

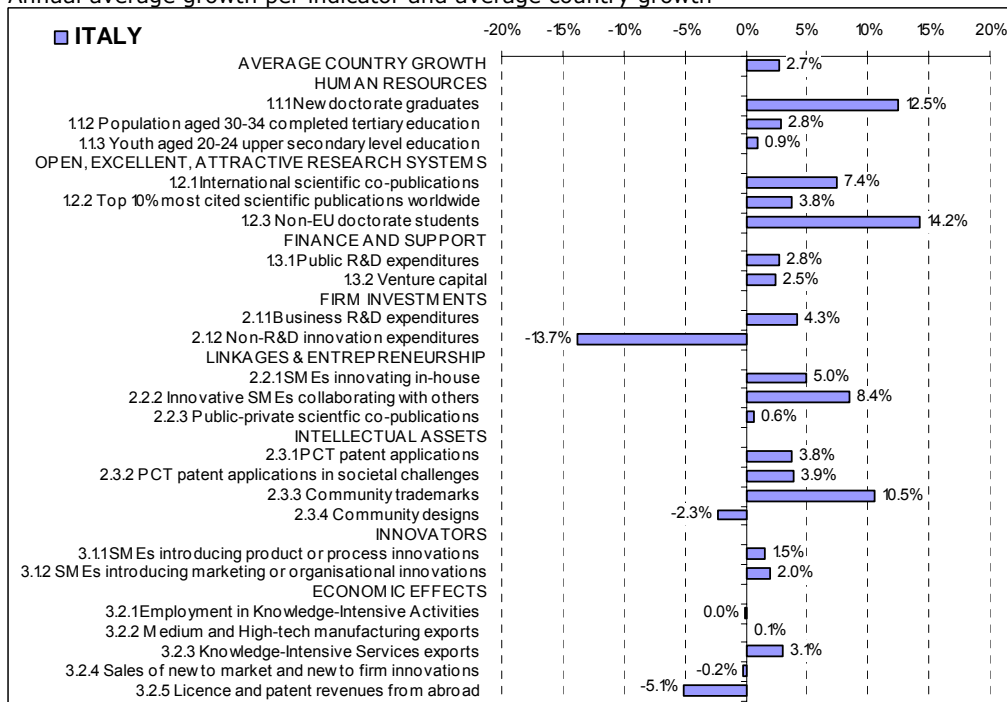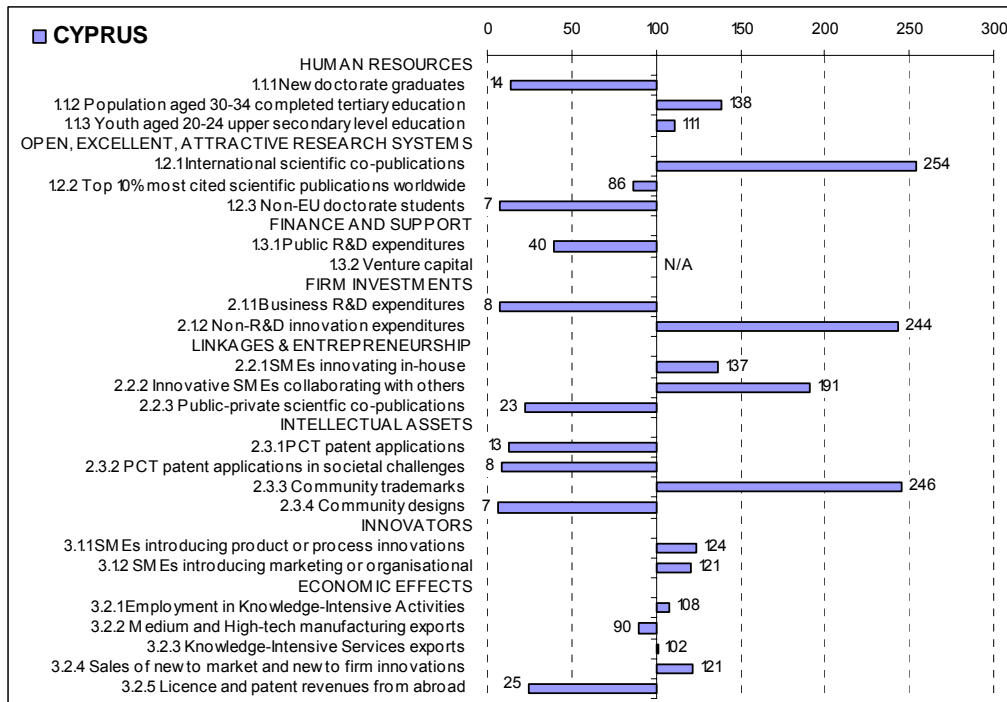Annual average growth per indicator and average country growth

□ **LUXEMBOURG**

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	7
1.1.2 Population aged 30-34 completed tertiary education	144
1.1.3 Youth aged 20-24 upper secondary level education	98
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	284
1.2.2 Top 10% most cited scientific publications worldwide	99
1.2.3 Non-EU doctorate students	N/A
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	59
1.3.2 Venture capital	448
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	99
2.1.2 Non-R&D innovation expenditures	35
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	123
2.2.2 Innovative SMEs collaborating with others	110
2.2.3 Public-private scientfic co-publications	69
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	29
2.3.2 PCT patent applications in societal challenges	30
2.3.3 Community trademarks	432
2.3.4 Community designs	133
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	121
3.1.2 SMEs introducing marketing or organisational	136
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	191
3.2.2 Medium and High-tech manufacturing exports	74
3.2.3 Knowledge-Intensive Services exports	163
3.2.4 Sales of new to market and new to firm innovations	67
3.2.5 Licence and patent revenues from abroad	262

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

Luxembourg is one of the innovation followers with an above average performance.
Relative strengths are in Open, excellent and attractive research systems, Innovators and Outputs. Relative weaknesses are in Firm investments and Linkages & entrepreneurship.
High growth is observed for International co-publications, Most cited publications, PCT patent applications in societal challenges, Community trademarks. A strong decline is observed for Non-R&D innovation expenditure, Community designs and Sales of new products. Growth performance in Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

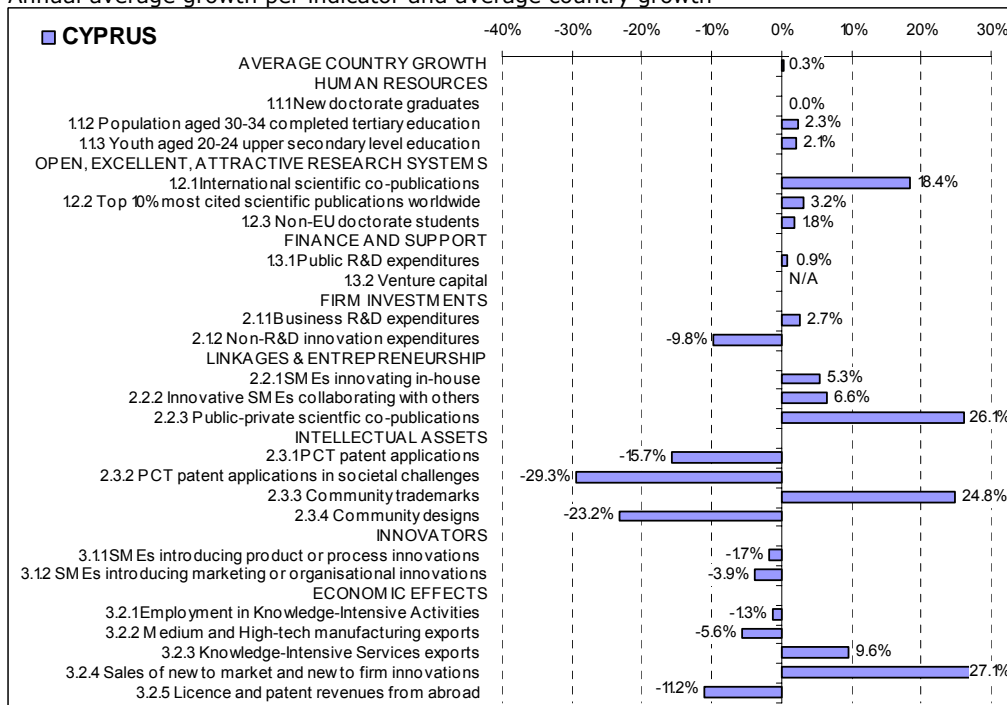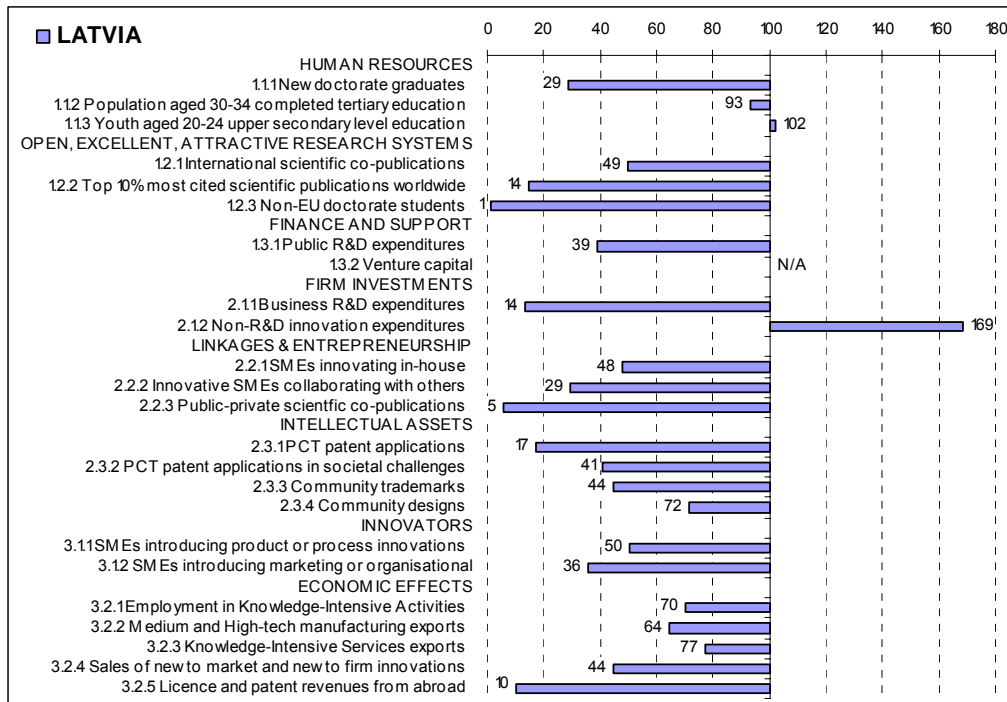Annual average growth per indicator and average country growth

□ **LUXEMBOURG**

Indicator	Value
AVERAGE COUNTRY GROWTH	1.3%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	0.0%
1.1.2 Population aged 30-34 completed tertiary education	0.0%
1.1.3 Youth aged 20-24 upper secondary level education	0.0%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	24.8%
1.2.2 Top 10% most cited scientific publications worldwide	21.7%
1.2.3 Non-EU doctorate students	N/A
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	20.3%
1.3.2 Venture capital	2.3%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	-2.1%
2.1.2 Non-R&D innovation expenditures	-15.1%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	0.0%
2.2.2 Innovative SMEs collaborating with others	-4.4%
2.2.3 Public-private scientfic co-publications	3.0%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	-0.4%
2.3.2 PCT patent applications in societal challenges	17.1%
2.3.3 Community trademarks	20.6%
2.3.4 Community designs	-18.8%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-4.1%
3.1.2 SMEs introducing marketing or organisational innovations	-4.2%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	1.7%
3.2.2 Medium and High-tech manufacturing exports	1.5%
3.2.3 Knowledge-Intensive Services exports	1.2%
3.2.4 Sales of new to market and new to firm innovations	-13.1%
3.2.5 Licence and patent revenues from abroad	-8.0%

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

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

High growth is observed for Community trademarks and Sales of new products. A strong decline is observed for Venture capital and Community designs. Growth performance in Intellectual assets and Outputs is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth
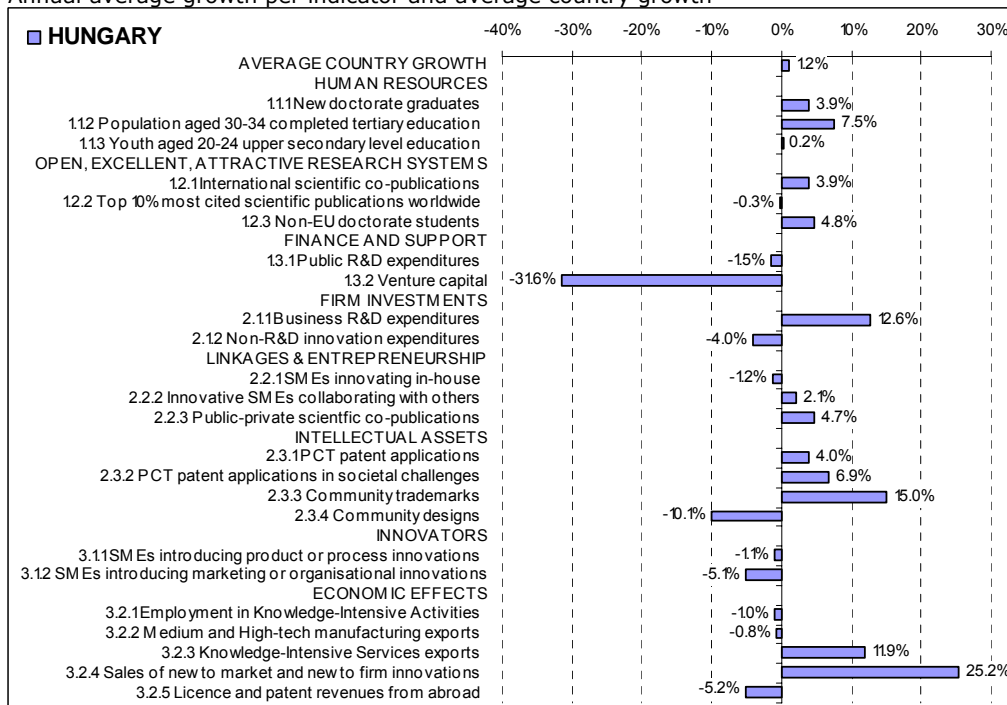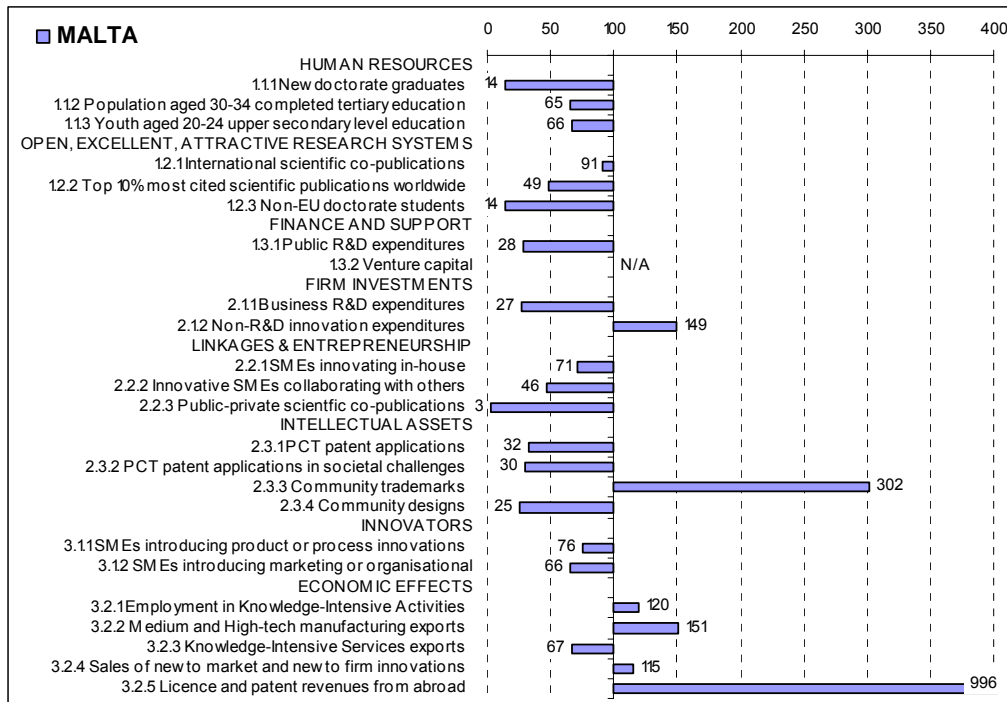
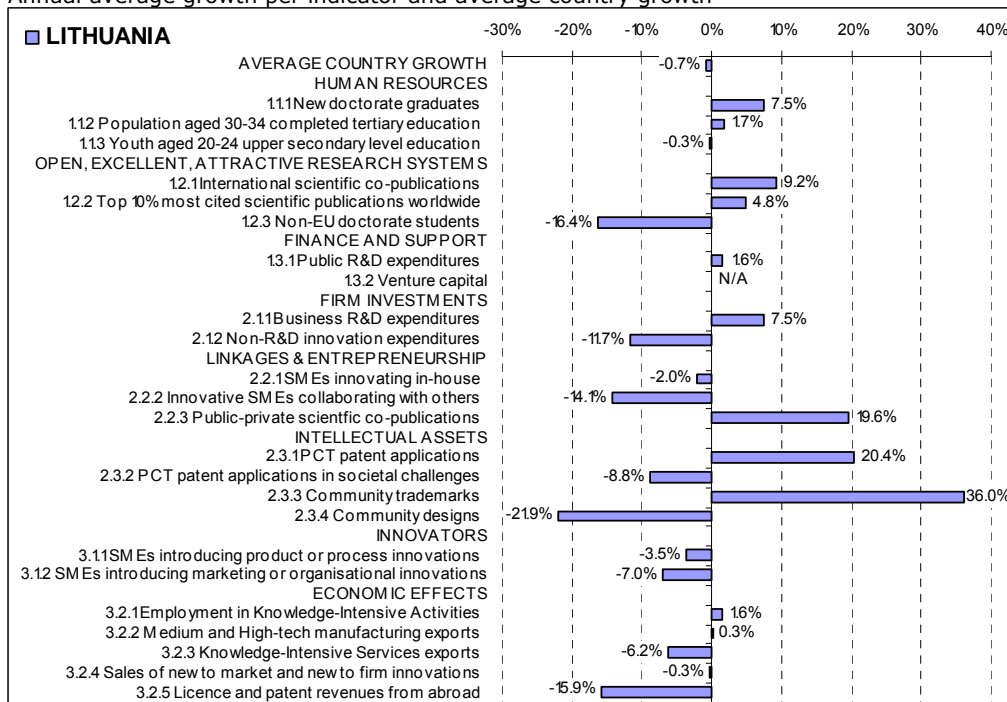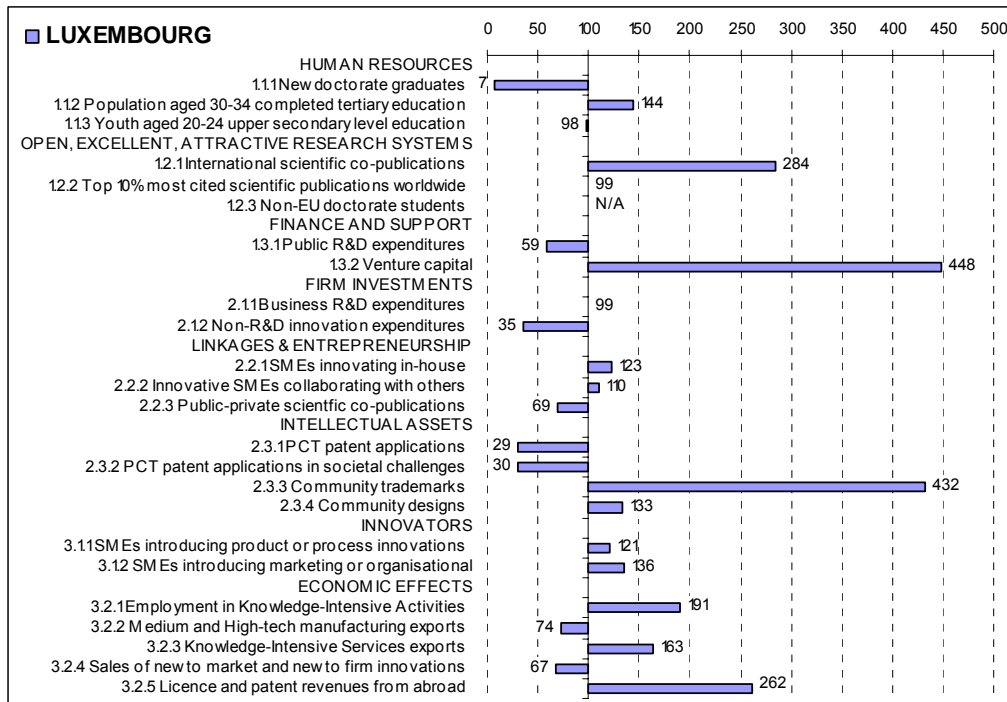Indicator values relative to the EU27 (EU27=100).

Malta is one of the moderate innovators with a below average performance.

Relative strengths are in Open, excellent and attractive research systems and Intellectual assets. Relative weaknesses are Human resources, Open, excellent and attractive research systems, Finance and support, Linkages & entrepreneurship and Innovators.

High growth is observed for Community trademarks and License and patent revenues from abroad. A strong decline is observed for Public-private co-publications. Growth performance in Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth
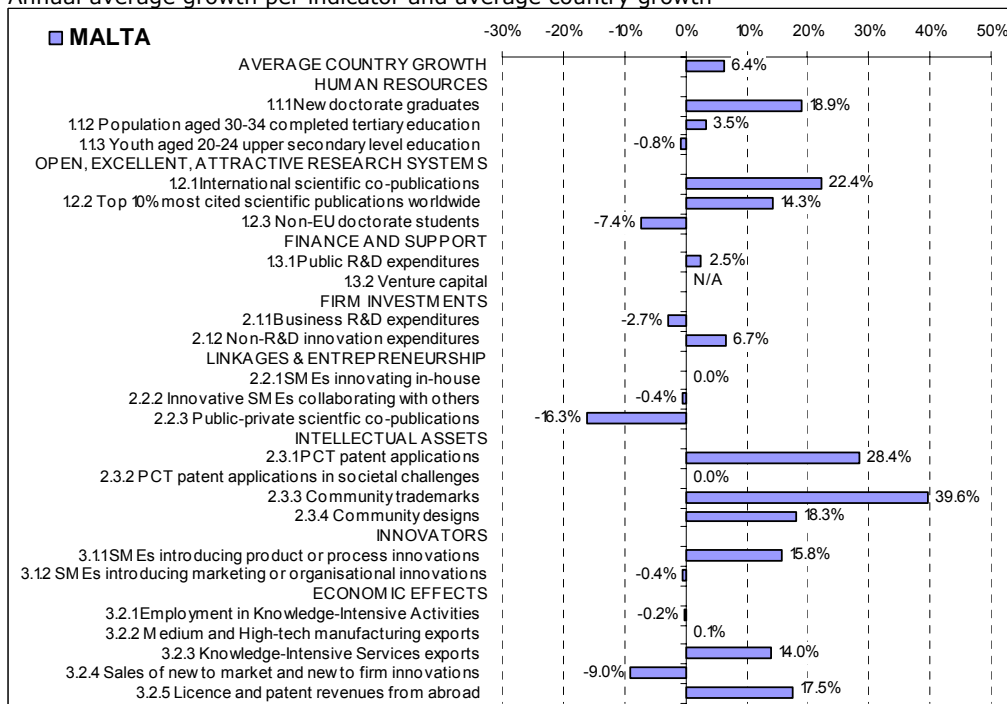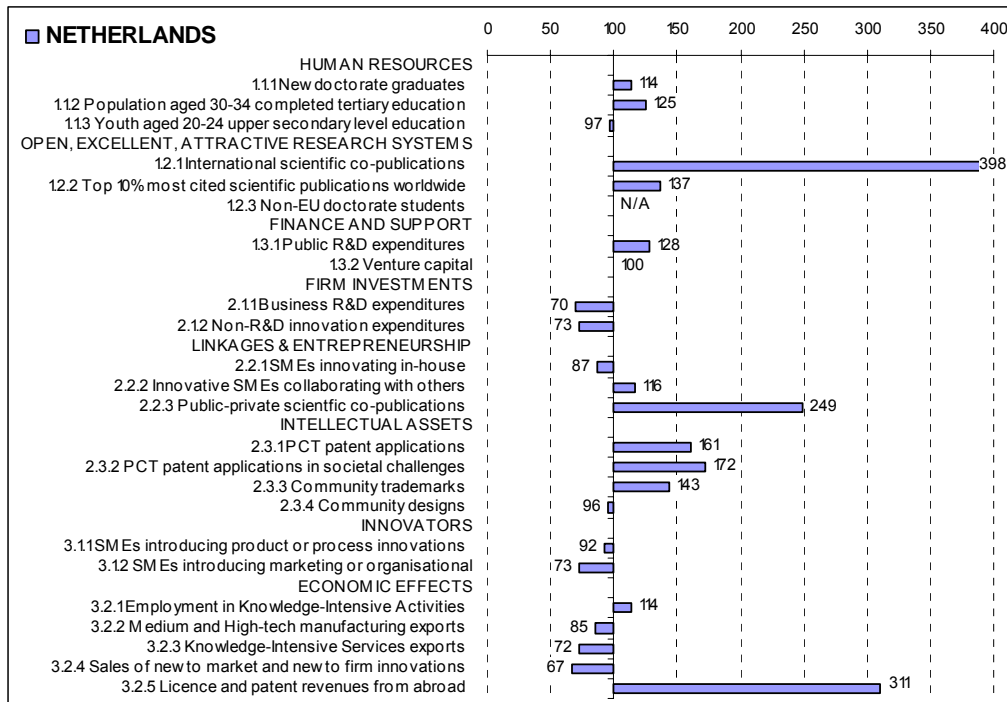
Indicator values relative to the EU27 (EU27=100).

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

High growth is observed for Non-R&D innovation expenditure, PCT patent applications in societal challenges and Community trademarks. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

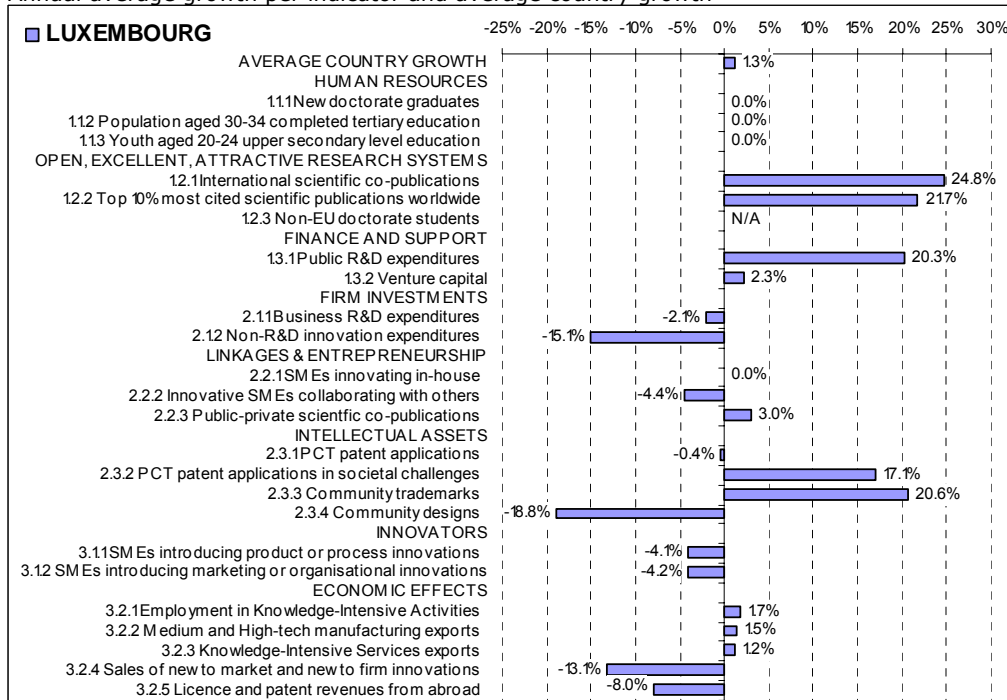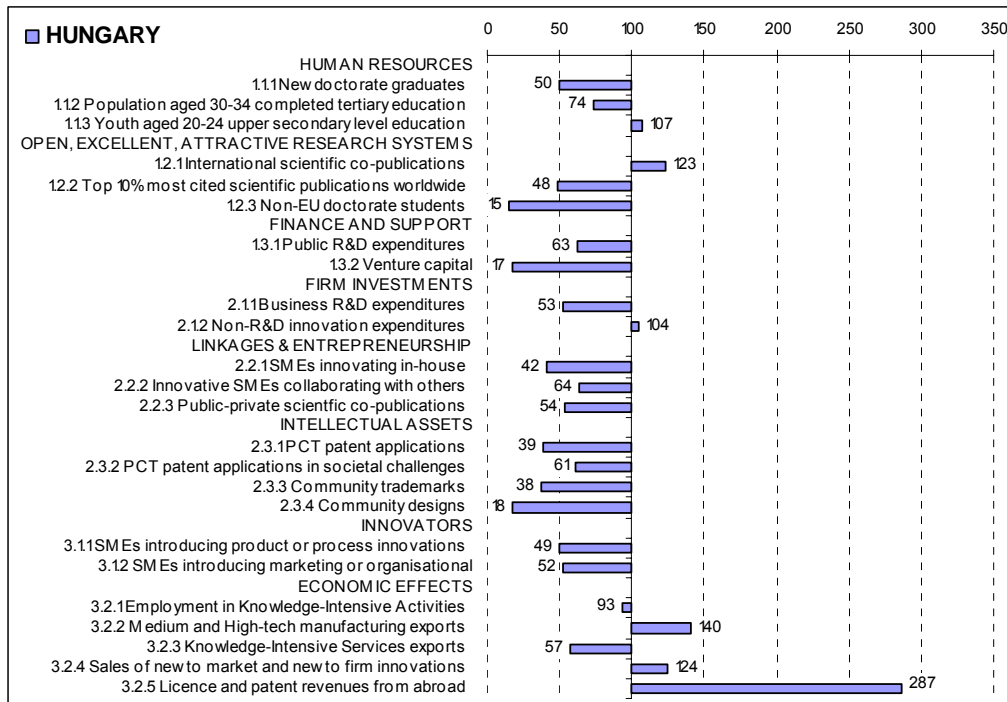Annual average growth per indicator and average country growth

AUSTRIA

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	143
1.1.2 Population aged 30-34 completed tertiary education	73
1.1.3 Youth aged 20-24 upper secondary level education	109
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	352
1.2.2 Top 10% most cited scientific publications worldwide	108
1.2.3 Non-EU doctorate students	44
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	108
1.3.2 Venture capital	26
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	155
2.1.2 Non-R&D innovation expenditures	66
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	113
2.2.2 Innovative SMEs collaborating with others	132
2.2.3 Public-private scientfic co-publications	156
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	126
2.3.2 PCT patent applications in societal challenges	111
2.3.3 Community trademarks	177
2.3.4 Community designs	193
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	116
3.1.2 SMEs introducing marketing or organisational	109
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	108
3.2.2 Medium and High-tech manufacturing exports	110
3.2.3 Knowledge-Intensive Services exports	63
3.2.4 Sales of new to market and new to firm innovations	85
3.2.5 Licence and patent revenues from abroad	90

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

Austria is one of the innovation followers with an above average performance.
Relative strengths are in Open, excellent and attractive research systems, Linkages & entrepreneurship and Intellectual assets. Relative weaknesses are in Outputs.
High growth is observed for Community trademarks and License and patent revenues from abroad. A strong decline is observed for Venture capital. Growth performance in Open, excellent and attractive research systems, Intellectual assets and Outputs is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

AUSTRIA

Indicator	Value
AVERAGE COUNTRY GROWTH	1.6%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	-2.4%
1.1.2 Population aged 30-34 completed tertiary education	3.5%
1.1.3 Youth aged 20-24 upper secondary level education	0.0%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	9.0%
1.2.2 Top 10% most cited scientific publications worldwide	2.4%
1.2.3 Non-EU doctorate students	0.8%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	2.3%
1.3.2 Venture capital	-14.0%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	3.2%
2.1.2 Non-R&D innovation expenditures	0.0%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-5.1%
2.2.2 Innovative SMEs collaborating with others	-5.0%
2.2.3 Public-private scientfic co-publications	7.7%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	3.5%
2.3.2 PCT patent applications in societal challenges	7.6%
2.3.3 Community trademarks	15.1%
2.3.4 Community designs	10.7%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-5.4%
3.1.2 SMEs introducing marketing or organisational innovations	-5.3%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.7%
3.2.2 Medium and High-tech manufacturing exports	-0.3%
3.2.3 Knowledge-Intensive Services exports	2.5%
3.2.4 Sales of new to market and new to firm innovations	1.5%
3.2.5 Licence and patent revenues from abroad	10.6%

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

Poland is one of the moderate innovators with a below average performance.

Relative strengths are in Human resources and Outputs. Relative weaknesses are in Open, excellent and attractive research systems, Linkages & entrepreneurship, Intellectual assets and Outputs.

High growth is observed for PCT patent applications in societal challenges, Community designs and License and patent revenues from abroad. A relatively strong decline is observed for SMEs innovating in-house and Innovative SMEs collaborating with others. Growth performance in Intellectual assets and Outputs is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

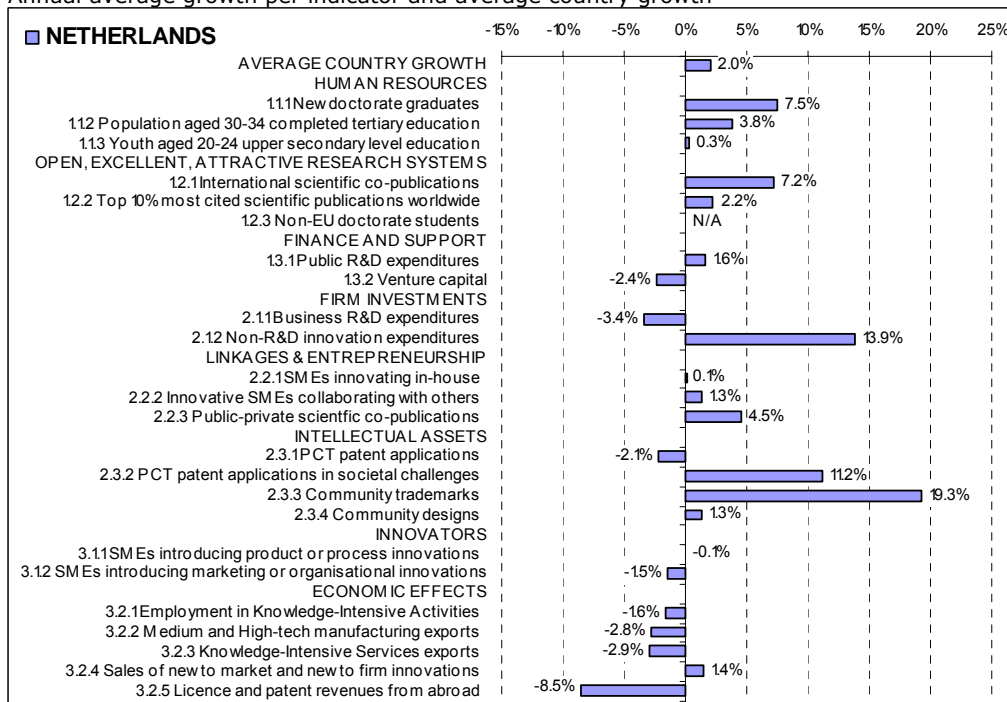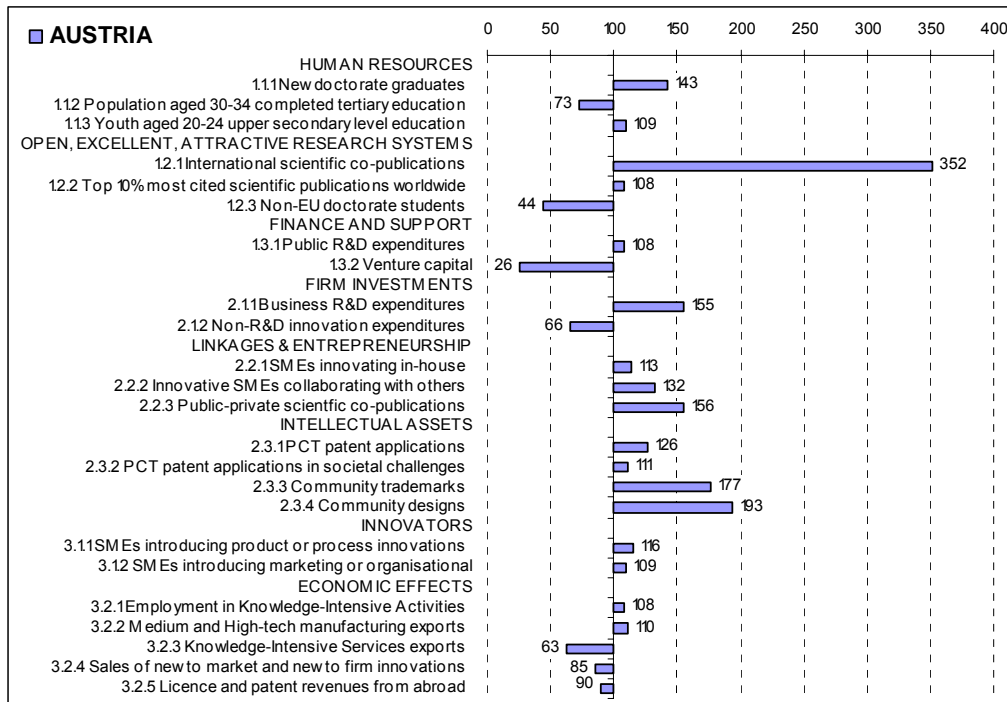Indicator values relative to the EU27 (EU27=100).

Portugal is one of the moderate innovators with a below average performance.
Relative strengths are in Open, excellent and attractive research systems, Finance and support and Innovators. Relative weaknesses are in Firm investments, Intellectual assets and Outputs.
Positive growth is observed for most indicators, and in particular for Business R&D expenditure, PCT patent applications in societal challenges and Community designs. A substantial decline can be observed for Venture capital and Non-R&D innovation expenditure over the 5 year reference period, although Venture capital has almost doubled in 2009 with respect to 2008. Growth performance in Open, excellent and attractive research systems, Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

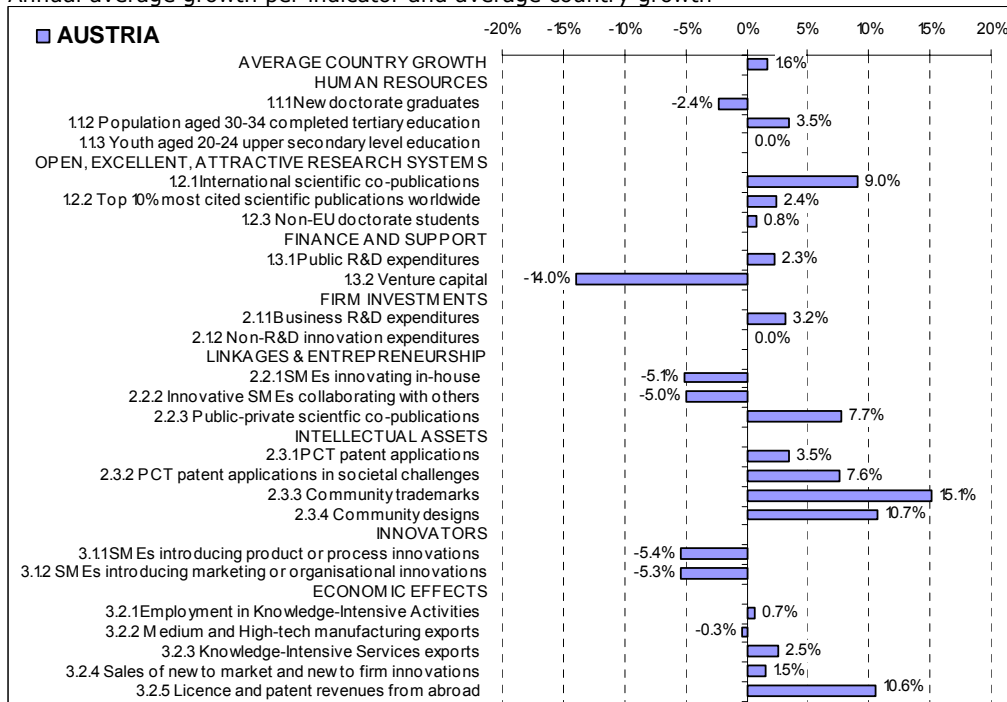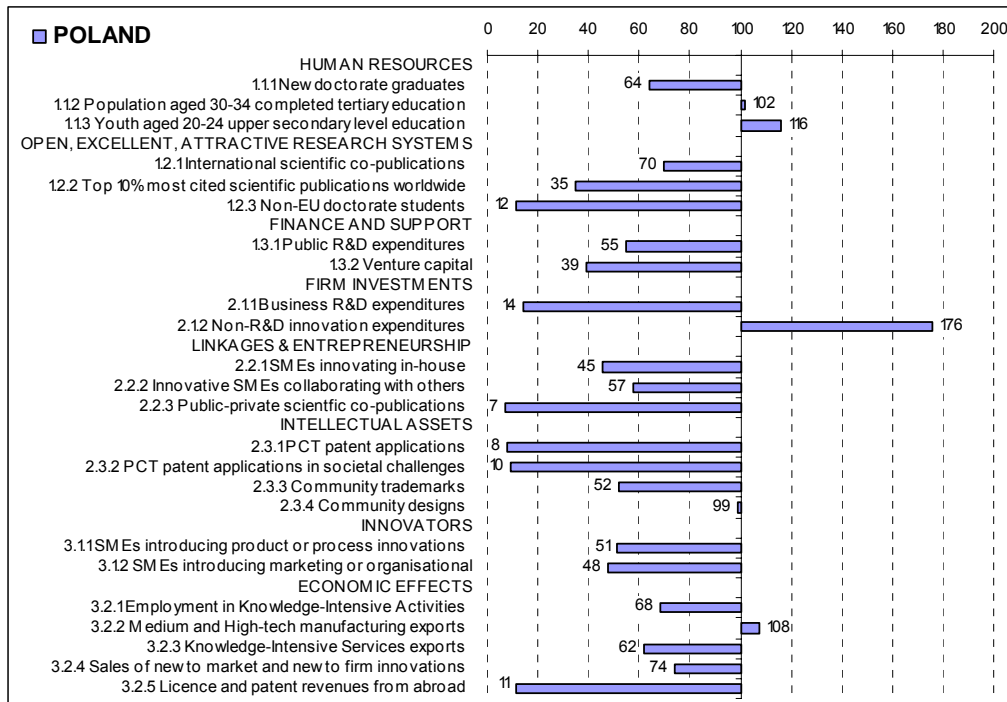Annual average growth per indicator and average country growth

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

Romania is one of the modest innovators with a below average performance.
Relative strengths are in Finance and support and Outputs. Relative weaknesses are in Open, excellent and attractive research systems, Linkages & entrepreneurship, Intellectual assets and Innovators.
High growth is observed for Public R&D expenditure, Community trademarks and Community designs. A strong decline is observed for Non-EU doctorate students. Growth performance in Finance and support and Intellectual assets is above average. In the other dimensions it is below average.

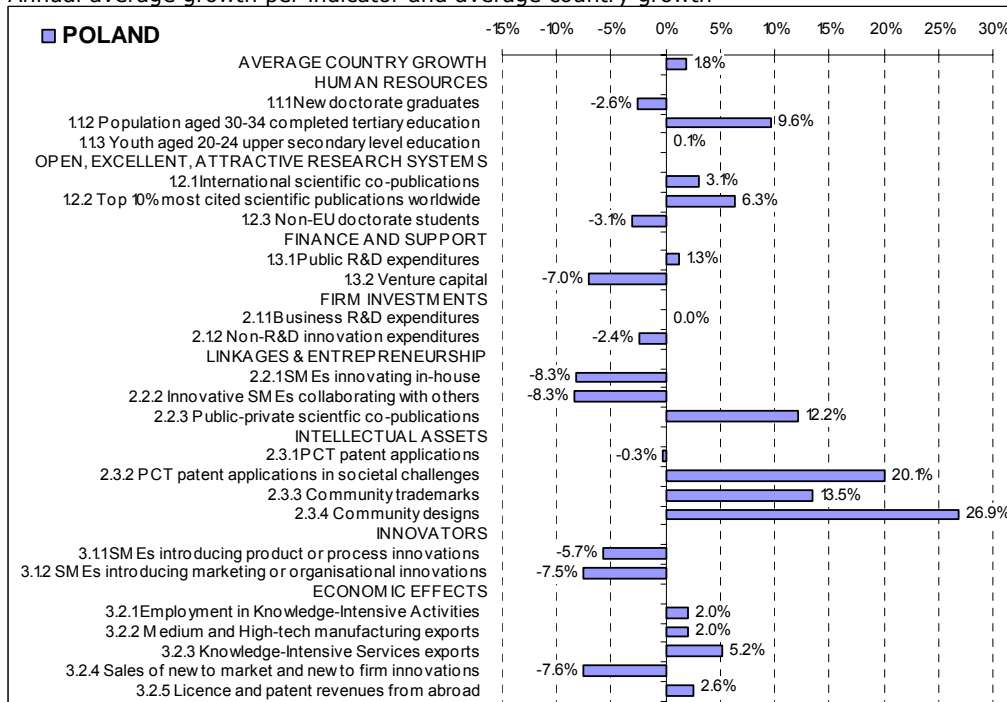Annual average growth per indicator and average country growth

SLOVENIA

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	93
1.1.2 Population aged 30-34 completed tertiary education	98
1.1.3 Youth aged 20-24 upper secondary level education	114
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	282
1.2.2 Top 10% most cited scientific publications worldwide	64
1.2.3 Non-EU doctorate students	24
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	88
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	96
2.1.2 Non-R&D innovation expenditures	111
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	N/A
2.2.2 Innovative SMEs collaborating with others	128
2.2.3 Public-private scientfic co-publications	141
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	64
2.3.2 PCT patent applications in societal challenges	101
2.3.3 Community trademarks	70
2.3.4 Community designs	52
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	91
3.1.2 SMEs introducing marketing or organisational	101
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	99
3.2.2 Medium and High-tech manufacturing exports	123
3.2.3 Knowledge-Intensive Services exports	55
3.2.4 Sales of new to market and new to firm innovations	123
3.2.5 Licence and patent revenues from abroad	36

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

Slovenia is one of the innovation followers with a below average performance.
Relative strengths are in Human resources and Outputs. Relative weaknesses are in Firm investments and Intellectual assets.
High growth is observed for Community trademarks, Community designs 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, Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

SLOVENIA

Indicator	Value
AVERAGE COUNTRY GROWTH	6.5%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	2.0%
1.1.2 Population aged 30-34 completed tertiary education	6.5%
1.1.3 Youth aged 20-24 upper secondary level education	-0.3%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	13.7%
1.2.2 Top 10% most cited scientific publications worldwide	10.4%
1.2.3 Non-EU doctorate students	8.7%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	2.8%
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	2.9%
2.1.2 Non-R&D innovation expenditures	-8.4%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	0.0%
2.2.2 Innovative SMEs collaborating with others	7.8%
2.2.3 Public-private scientfic co-publications	10.4%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	3.7%
2.3.2 PCT patent applications in societal challenges	-0.3%
2.3.3 Community trademarks	46.2%
2.3.4 Community designs	18.6%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-0.5%
3.1.2 SMEs introducing marketing or organisational innovations	0.0%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	1.8%
3.2.2 Medium and High-tech manufacturing exports	1.6%
3.2.3 Knowledge-Intensive Services exports	8.3%
3.2.4 Sales of new to market and new to firm innovations	3.4%
3.2.5 Licence and patent revenues from abroad	13.9%

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

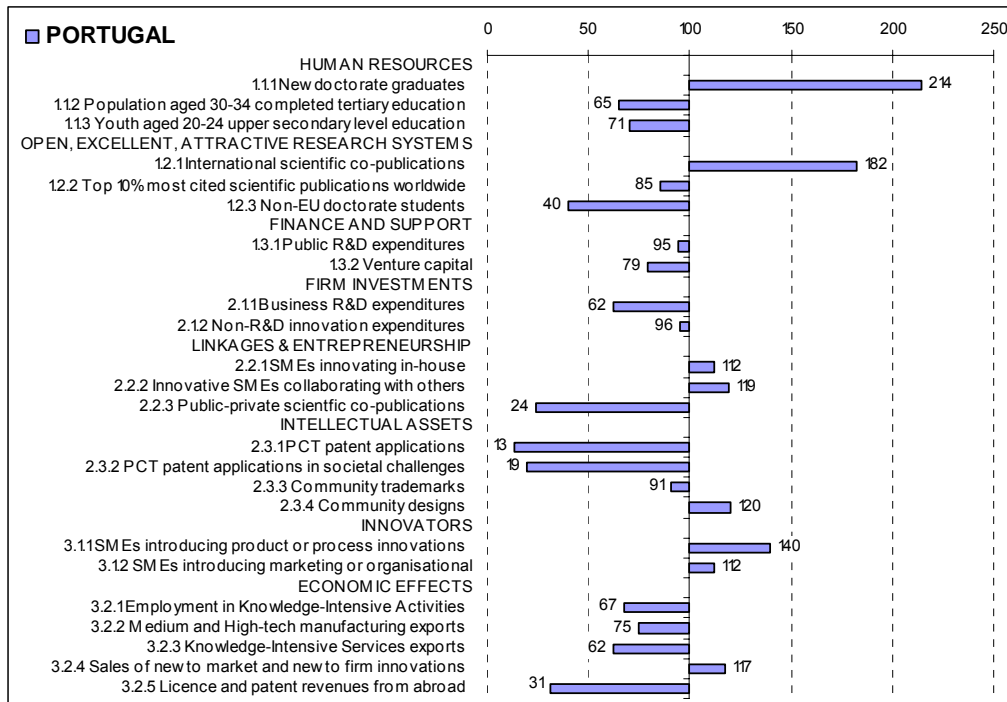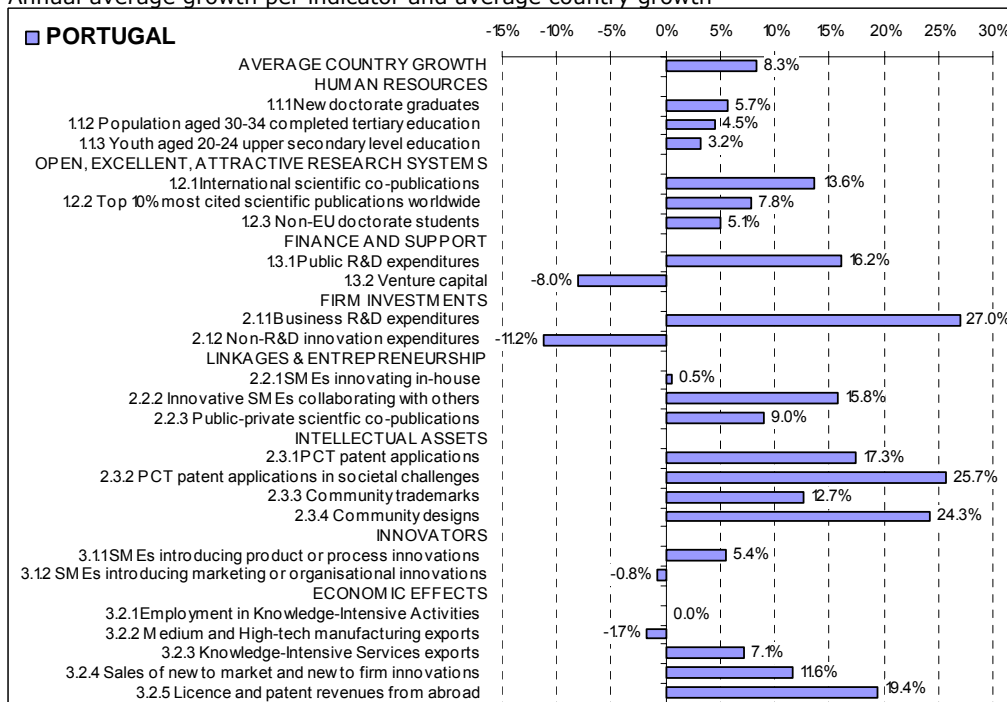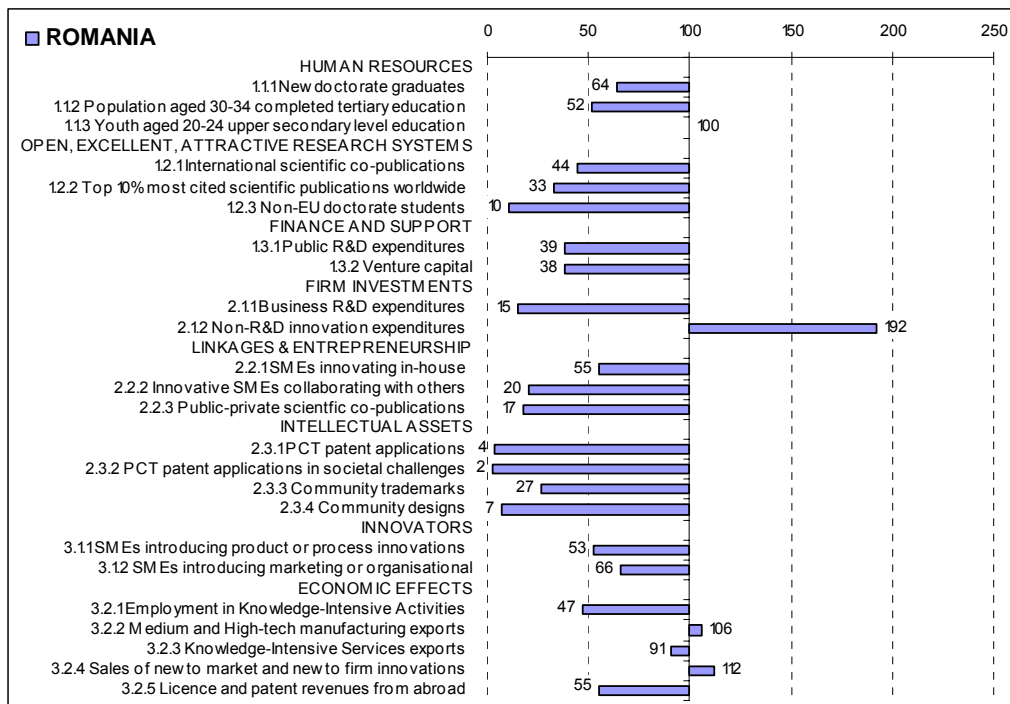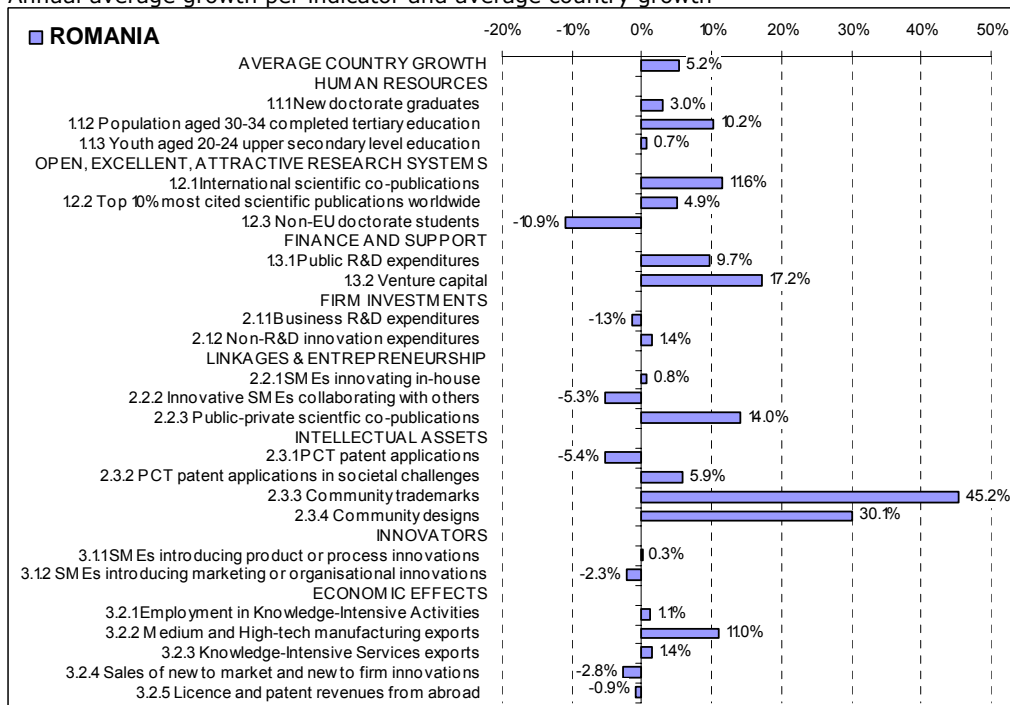**Slovakia** is one of the moderate innovators with a below average performance.

Relative strengths are in Human resources and Outputs. Relative weaknesses are in Open, excellent and attractive research systems, Finance and support, Firm investments, Linkages & entrepreneurship, Intellectual assets and Innovators.

High growth is observed for Public-private co-publications, Community trademarks and Community designs. A strong decline is observed for Non-EU doctorate students and Non-R&D innovation expenditure. Growth performance in Human resources, Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth
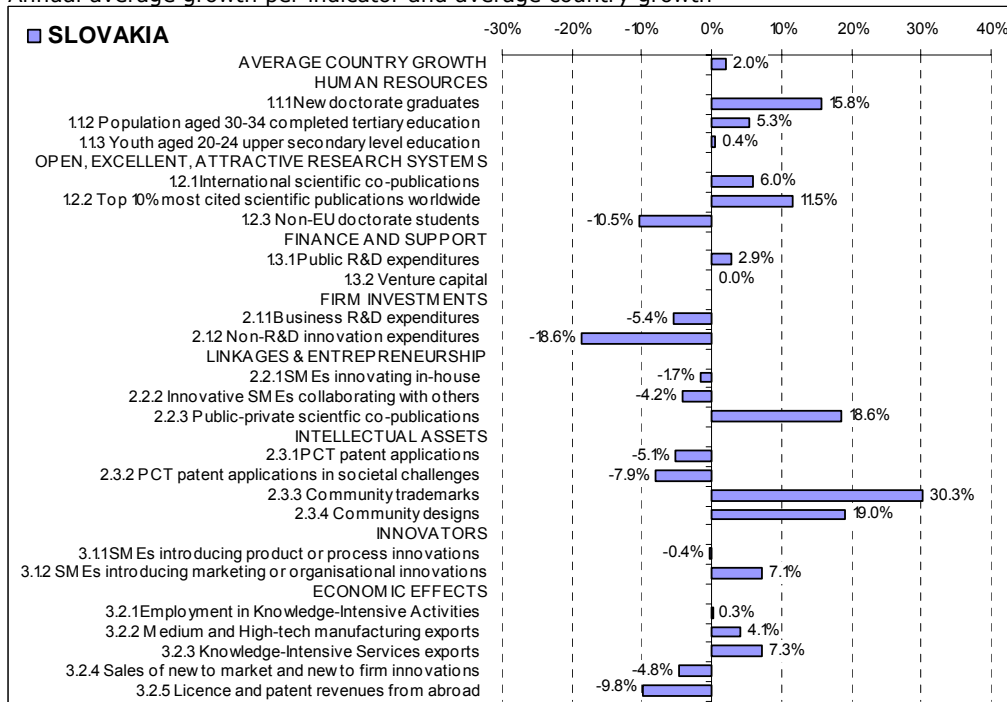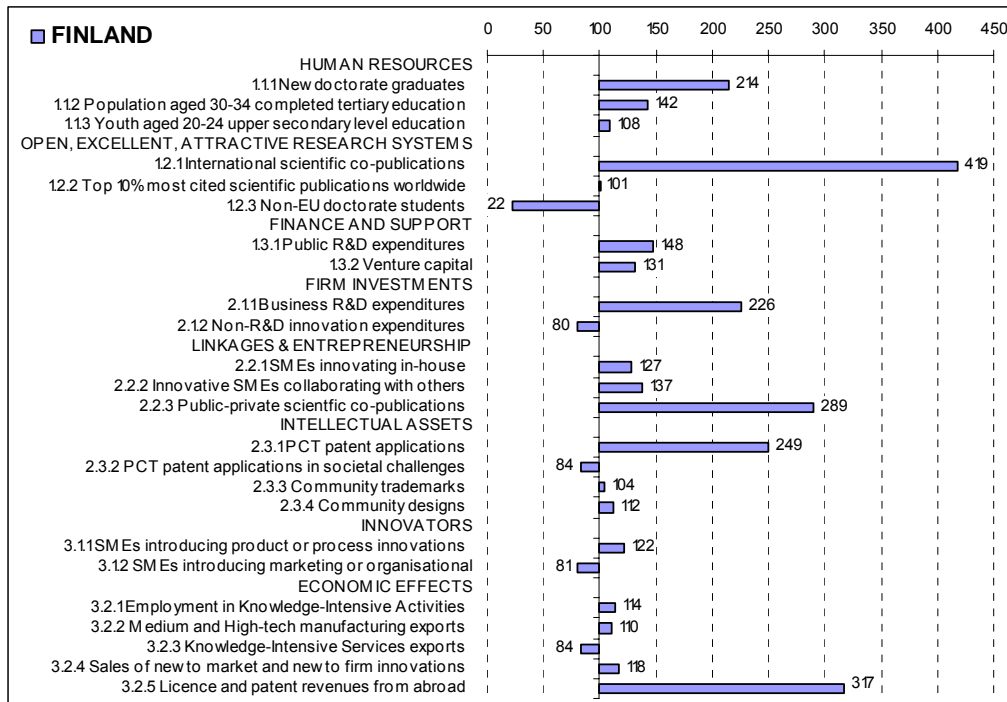
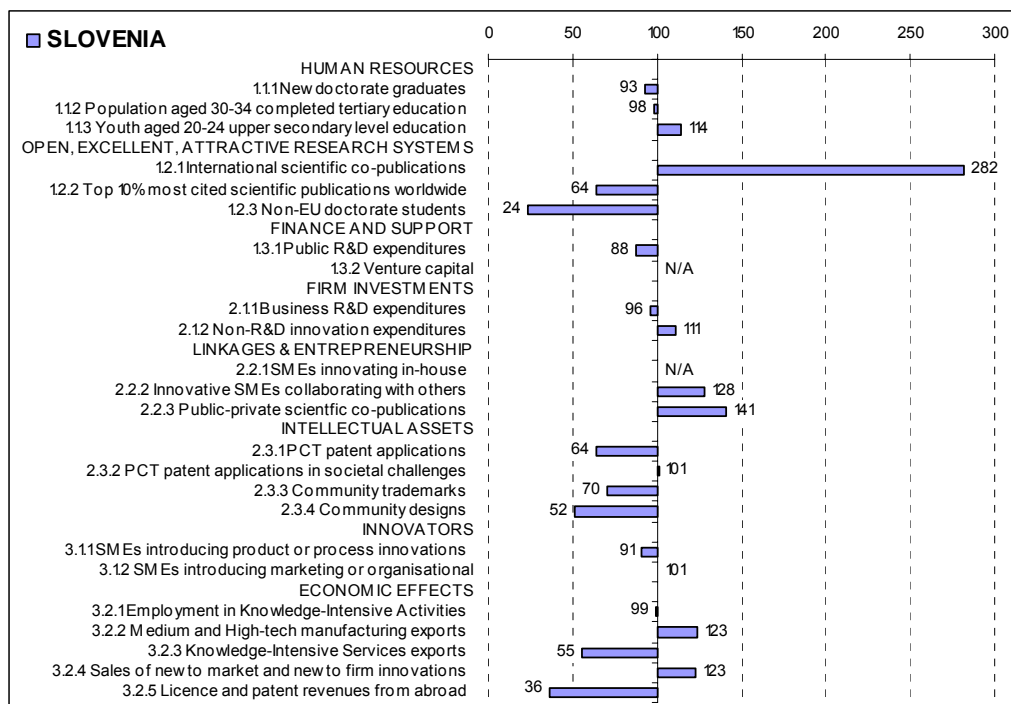Indicator values relative to the EU27 (EU27=100).

Finland is one of the innovation leaders with an above average performance.
Relative strengths are in Human resources, Finance and support and Linkages & entrepreneurship. Relative weaknesses are in Intellectual assets, Innovators and Outputs.
High growth is observed for Venture capital and Knowledge-intensive services exports. A strong decline is observed for PCT patent applications in societal challenges. Growth performance in Finance and support and Intellectual assets is above average. In the other dimensions it is below average.

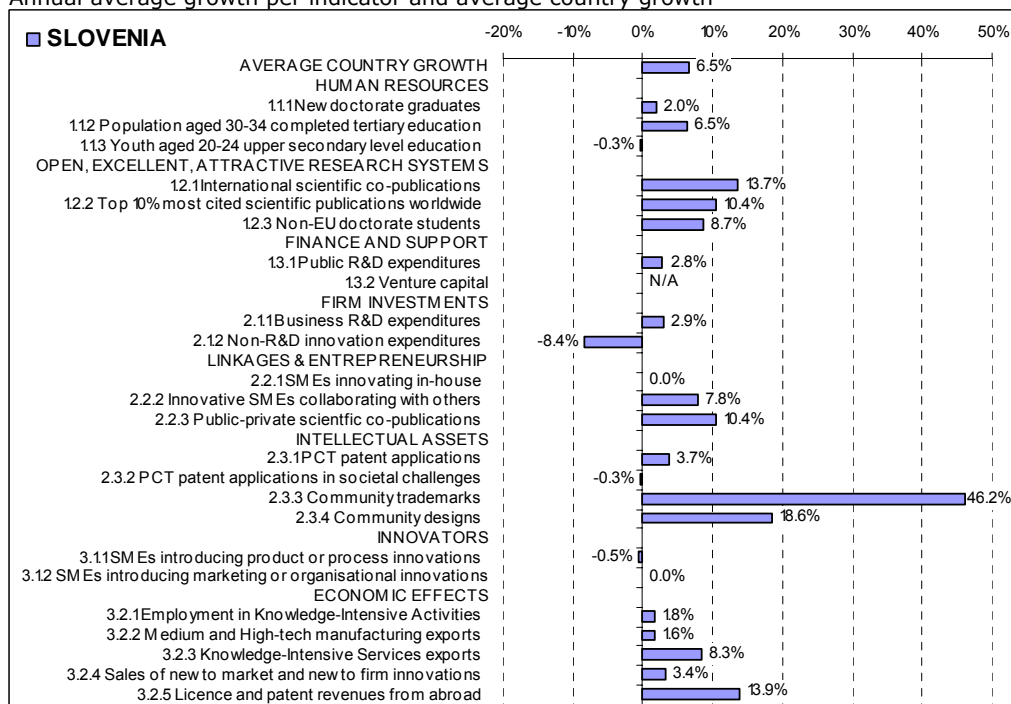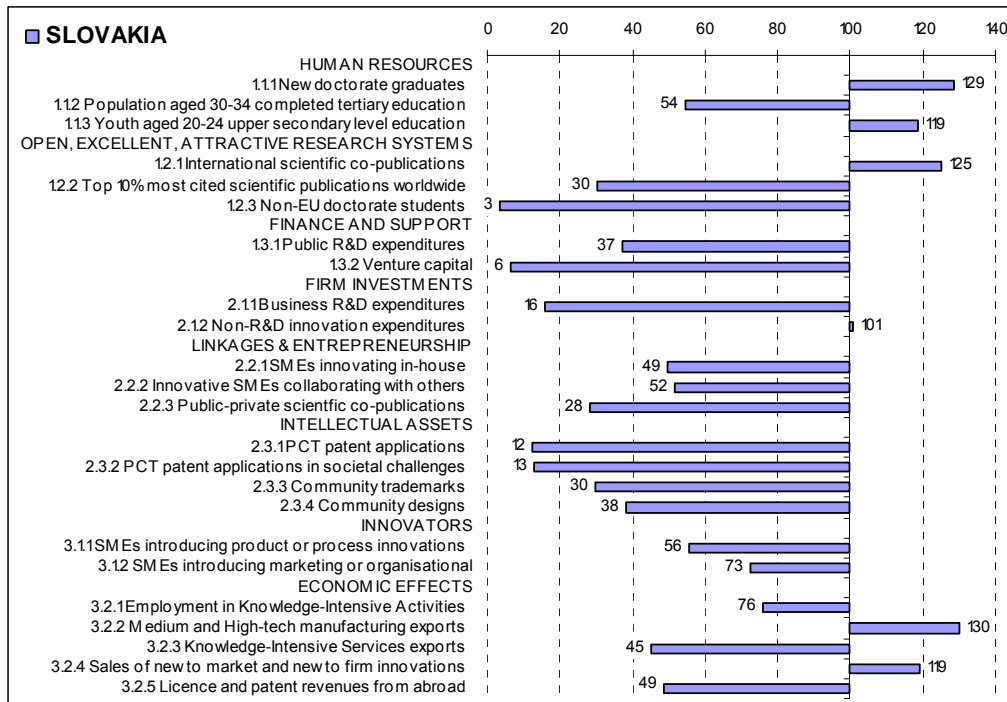Annual average growth per indicator and average country growth

SWEDEN

	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	229
1.1.2 Population aged 30-34 completed tertiary education	136
1.1.3 Youth aged 20-24 upper secondary level education	110
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	491
1.2.2 Top 10% most cited scientific publications worldwide	111
1.2.3 Non-EU doctorate students	76
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	141
1.3.2 Venture capital	206
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	203
2.1.2 Non-R&D innovation expenditures	104
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	122
2.2.2 Innovative SMEs collaborating with others	148
2.2.3 Public-private scientfic co-publications	324
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	276
2.3.2 PCT patent applications in societal challenges	312
2.3.3 Community trademarks	129
2.3.4 Community designs	108
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	119
3.1.2 SMEs introducing marketing or organisational	94
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	120
3.2.2 Medium and High-tech manufacturing exports	110
3.2.3 Knowledge-Intensive Services exports	84
3.2.4 Sales of new to market and new to firm innovations	69
3.2.5 Licence and patent revenues from abroad	550

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

Sweden is one of the innovation leaders with an above average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems and Finance and support. Relative weaknesses are in Firm investments, Innovators and Outputs.
High growth is observed for Community trademarks. A strong decline is observed for Sales of new products. Growth performance in Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

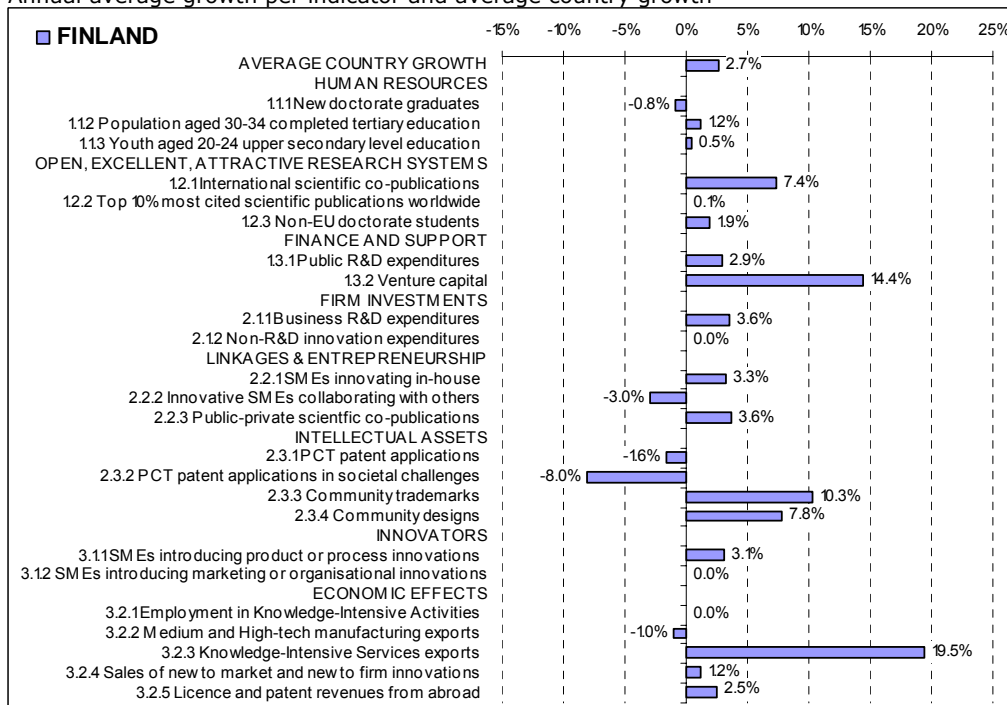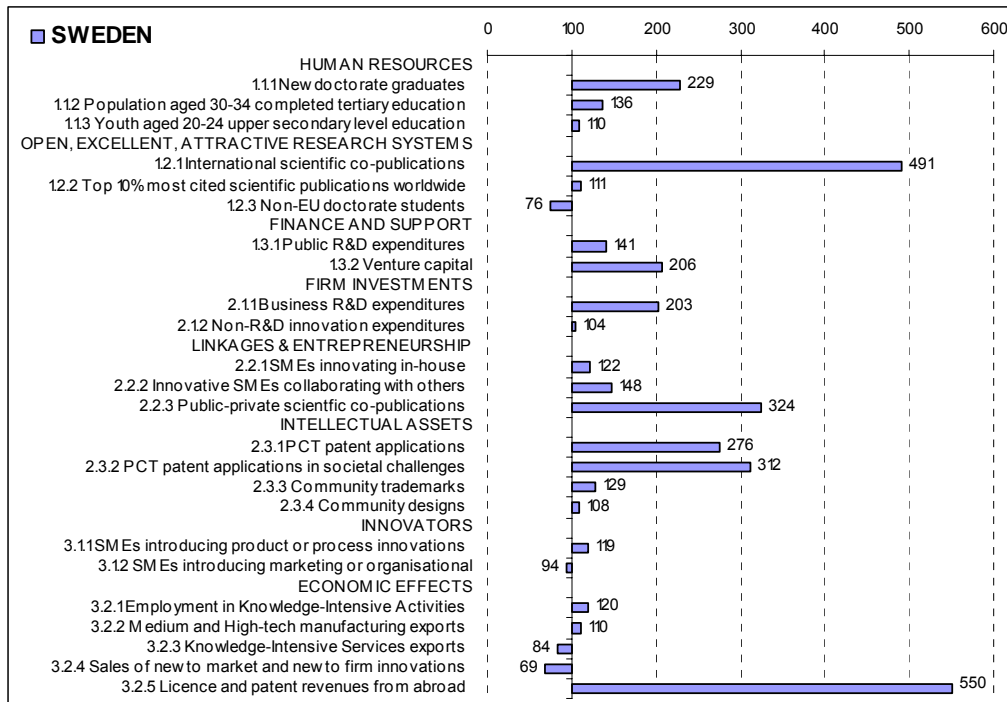Annual average growth per indicator and average country growth

SWEDEN

	Value
AVERAGE COUNTRY GROWTH	0.6%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	-0.8%
1.1.2 Population aged 30-34 completed tertiary education	3.9%
1.1.3 Youth aged 20-24 upper secondary level education	-0.3%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	5.6%
1.2.2 Top 10% most cited scientific publications worldwide	1.3%
1.2.3 Non-EU doctorate students	3.6%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	2.5%
1.3.2 Venture capital	-3.4%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	-0.5%
2.1.2 Non-R&D innovation expenditures	-1.0%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-3.0%
2.2.2 Innovative SMEs collaborating with others	-4.7%
2.2.3 Public-private scientfic co-publications	1.3%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	4.8%
2.3.2 PCT patent applications in societal challenges	5.4%
2.3.3 Community trademarks	13.4%
2.3.4 Community designs	1.6%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	-3.3%
3.1.2 SMEs introducing marketing or organisational innovations	0.0%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.7%
3.2.2 Medium and High-tech manufacturing exports	-1.4%
3.2.3 Knowledge-Intensive Services exports	-4.9%
3.2.4 Sales of new to market and new to firm innovations	-9.0%
3.2.5 Licence and patent revenues from abroad	5.7%

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

The **United Kingdom** is one of the innovation followers with an above average performance.

Relative strengths are in Human resources and Open, excellent and attractive research systems. Relative weaknesses are in Intellectual assets and Innovators.

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

Annual average growth per indicator and average country growth
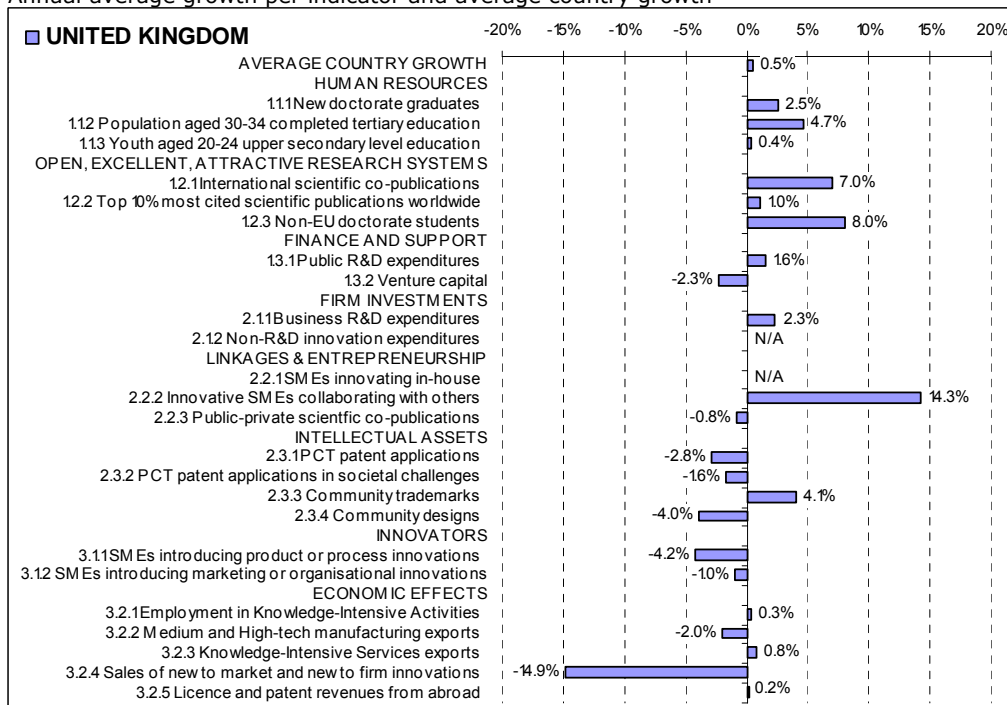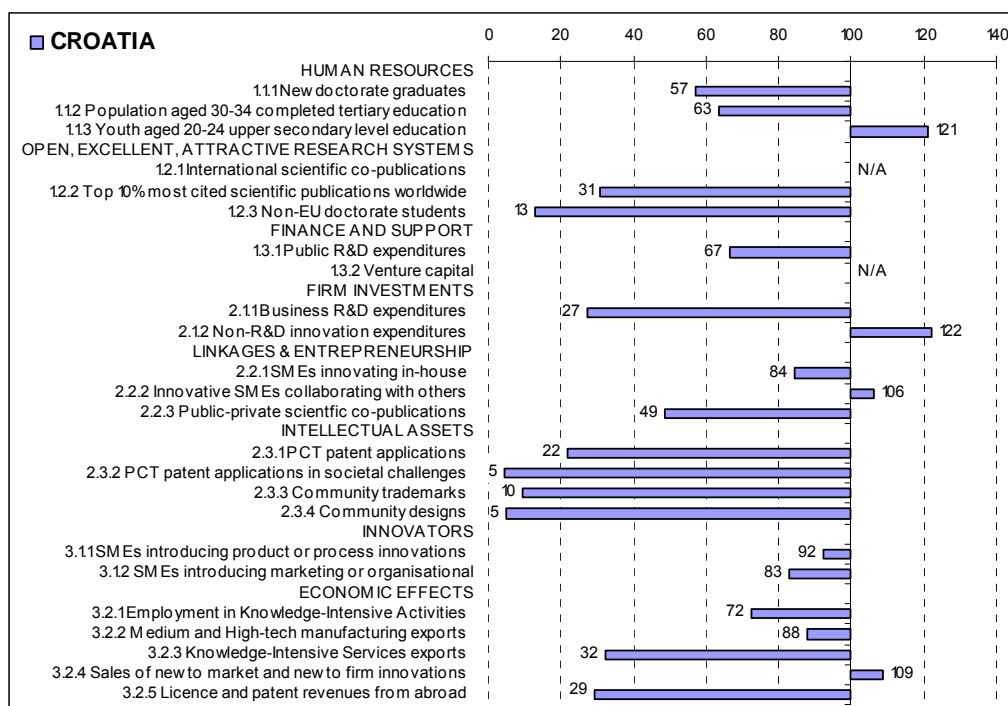
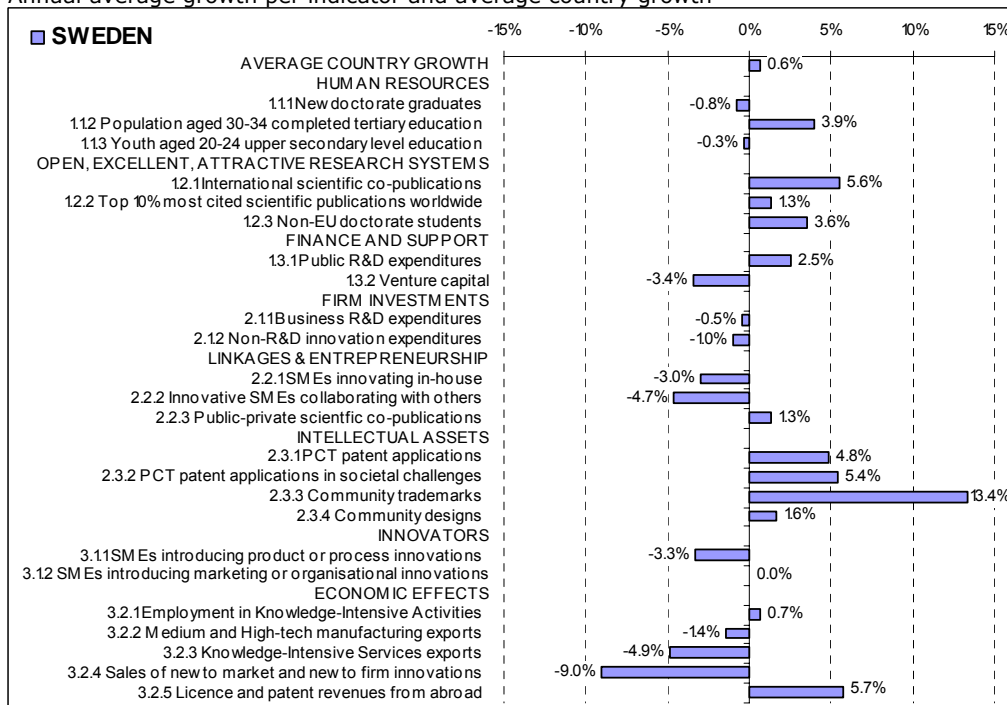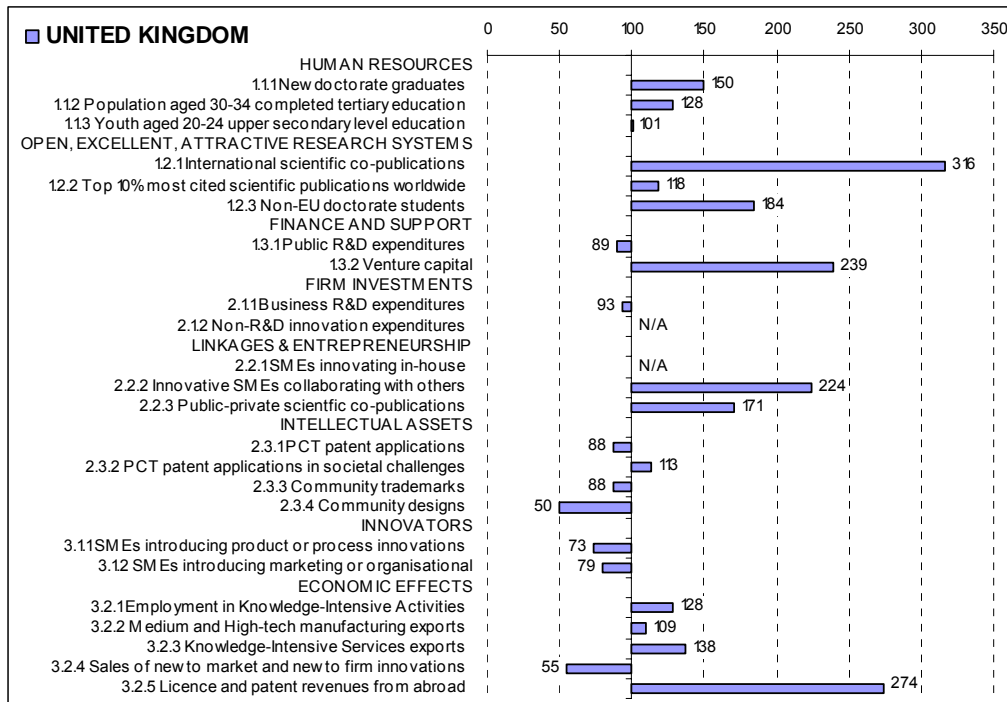Indicator values relative to the EU27 (EU27=100).

Croatia is one of the moderate innovators with a below average performance.
Relative strengths are in Human resources, Innovators and Outputs. Relative weaknesses are in Open, excellent and attractive research systems and Intellectual assets.
High growth is observed for Non-R&D innovation expenditure, Public-private co-publications and Community designs. A strong decline is observed for PCT patent applications and License and patent revenues from abroad. Growth performance in Firm investments, Linkages & entrepreneurship and Intellectual assets is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

TURKEY

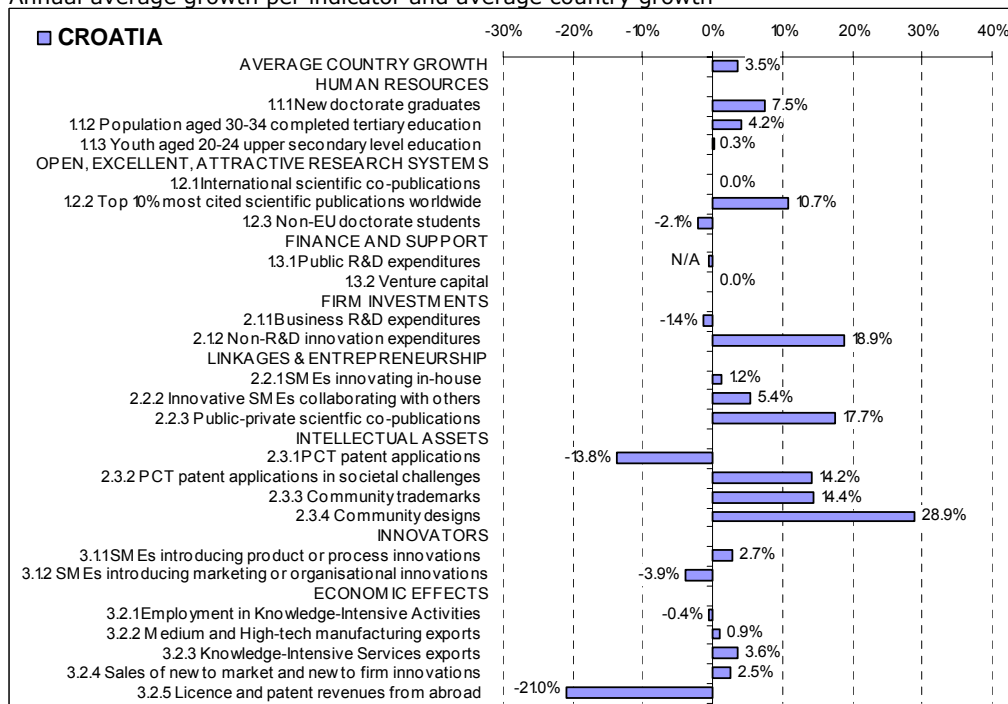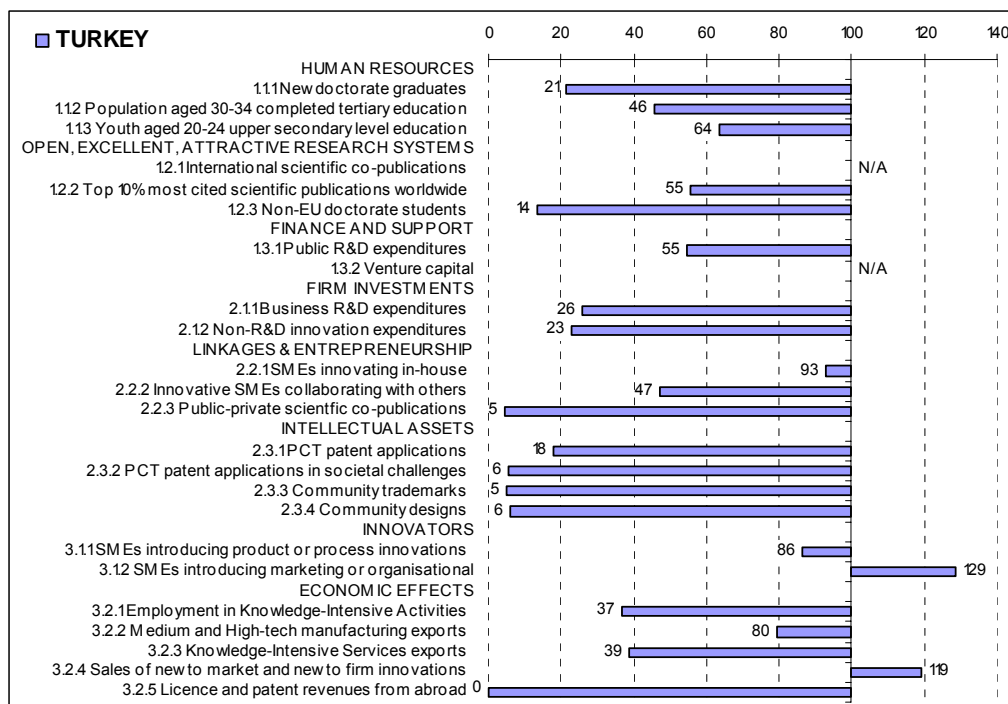| Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	21
1.1.2 Population aged 30-34 completed tertiary education	46
1.1.3 Youth aged 20-24 upper secondary level education	64
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	N/A
1.2.2 Top 10% most cited scientific publications worldwide	55
1.2.3 Non-EU doctorate students	14
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	55
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	26
2.1.2 Non-R&D innovation expenditures	23
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	93
2.2.2 Innovative SMEs collaborating with others	47
2.2.3 Public-private scientfic co-publications	5
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	18
2.3.2 PCT patent applications in societal challenges	6
2.3.3 Community trademarks	5
2.3.4 Community designs	6
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	86
3.1.2 SMEs introducing marketing or organisational	129
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	37
3.2.2 Medium and High-tech manufacturing exports	80
3.2.3 Knowledge-Intensive Services exports	39
3.2.4 Sales of new to market and new to firm innovations	119
3.2.5 Licence and patent revenues from abroad	0

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

Turkey is one of the modest innovators with a below average performance.
Relative strengths are in Open, excellent and attractive research systems and Innovators. Relative weaknesses are in Human resources, Firm investments and Intellectual assets.
High growth is observed for Business R&D expenditure and PCT patent applications. A strong decline is observed for PCT patent applications in societal challenges. Growth performance in Human resources, Open, excellent and attractive research systems, Firm investment, and Intellectual assets is above average. In the other dimensions it is below average.

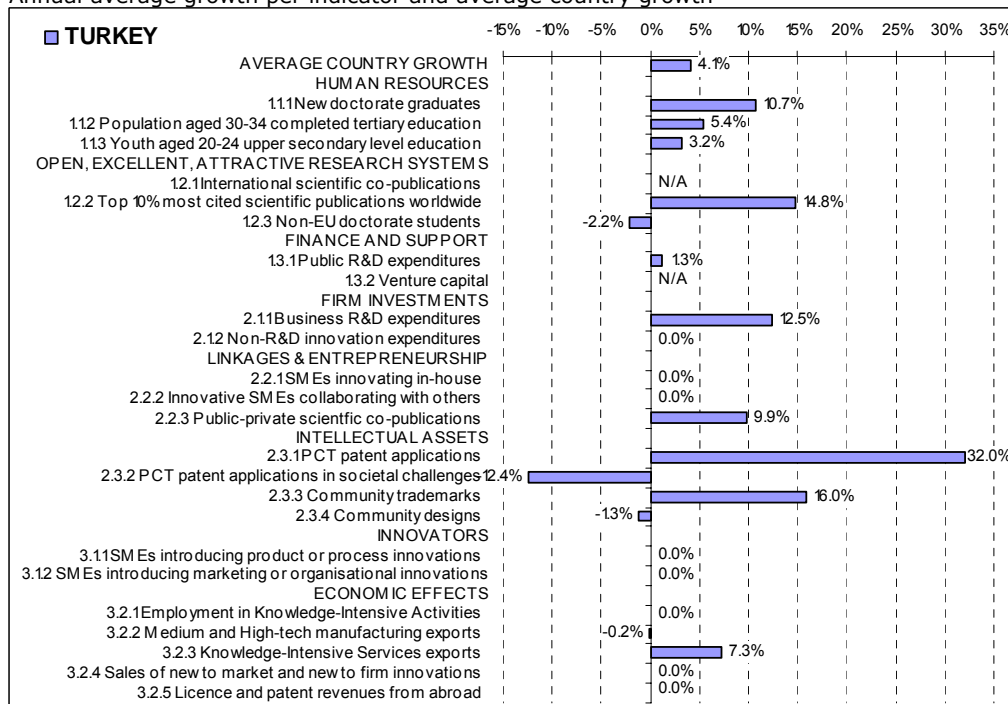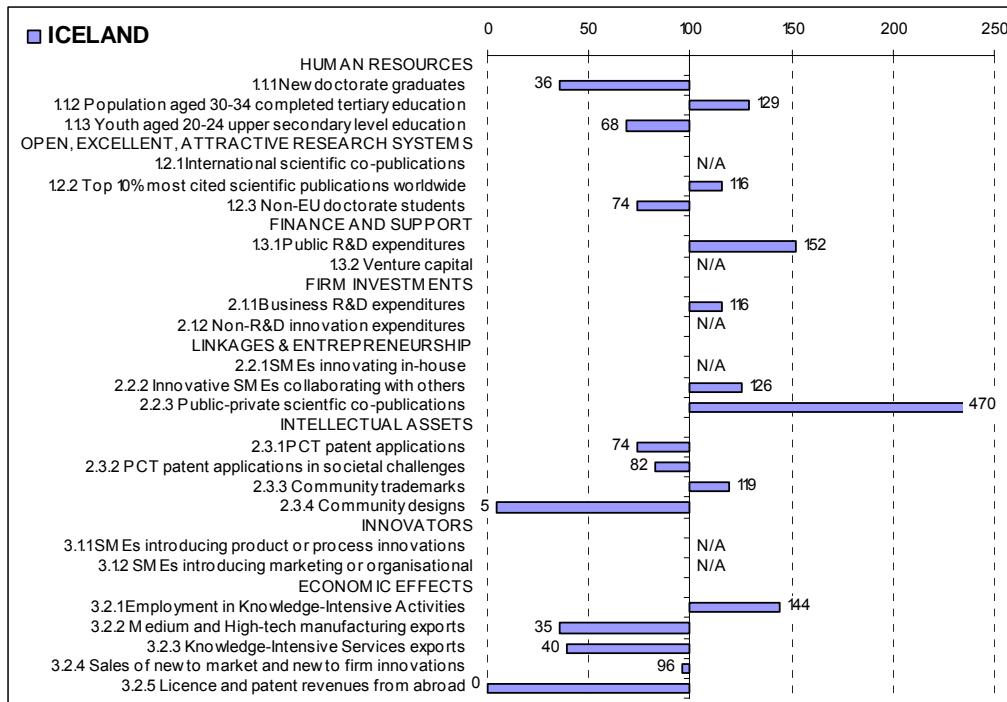Annual average growth per indicator and average country growth

TURKEY

Indicator	Growth
AVERAGE COUNTRY GROWTH	4.1%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	10.7%
1.1.2 Population aged 30-34 completed tertiary education	5.4%
1.1.3 Youth aged 20-24 upper secondary level education	3.2%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	N/A
1.2.2 Top 10% most cited scientific publications worldwide	14.8%
1.2.3 Non-EU doctorate students	-2.2%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	1.3%
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	12.5%
2.1.2 Non-R&D innovation expenditures	0.0%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	0.0%
2.2.2 Innovative SMEs collaborating with others	0.0%
2.2.3 Public-private scientfic co-publications	9.9%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	32.0%
2.3.2 PCT patent applications in societal challenges	-12.4%
2.3.3 Community trademarks	16.0%
2.3.4 Community designs	-1.3%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	0.0%
3.1.2 SMEs introducing marketing or organisational innovations	0.0%
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.0%
3.2.2 Medium and High-tech manufacturing exports	-0.2%
3.2.3 Knowledge-Intensive Services exports	7.3%
3.2.4 Sales of new to market and new to firm innovations	0.0%
3.2.5 Licence and patent revenues from abroad	0.0%

ICELAND

Indicator	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	36
1.1.2 Population aged 30-34 completed tertiary education	129
1.1.3 Youth aged 20-24 upper secondary level education	68
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	N/A
1.2.2 Top 10% most cited scientific publications worldwide	116
1.2.3 Non-EU doctorate students	74
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	152
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	116
2.1.2 Non-R&D innovation expenditures	N/A
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	N/A
2.2.2 Innovative SMEs collaborating with others	126
2.2.3 Public-private scientfic co-publications	470
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	74
2.3.2 PCT patent applications in societal challenges	82
2.3.3 Community trademarks	119
2.3.4 Community designs	5
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	N/A
3.1.2 SMEs introducing marketing or organisational	N/A
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	144
3.2.2 Medium and High-tech manufacturing exports	35
3.2.3 Knowledge-Intensive Services exports	40
3.2.4 Sales of new to market and new to firm innovations	96
3.2.5 Licence and patent revenues from abroad	0

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

Iceland is one of the innovation followers with a below average performance.

Relative strengths are in Open, excellent and attractive research systems, Finance and support, Firm investments and Linkages & entrepreneurship. Relative weaknesses are in Intellectual assets and Outputs.

High growth is observed for New doctorate students and Community trademarks. A strong decline is observed for PCT patent applications and Knowledge-intensive services exports. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

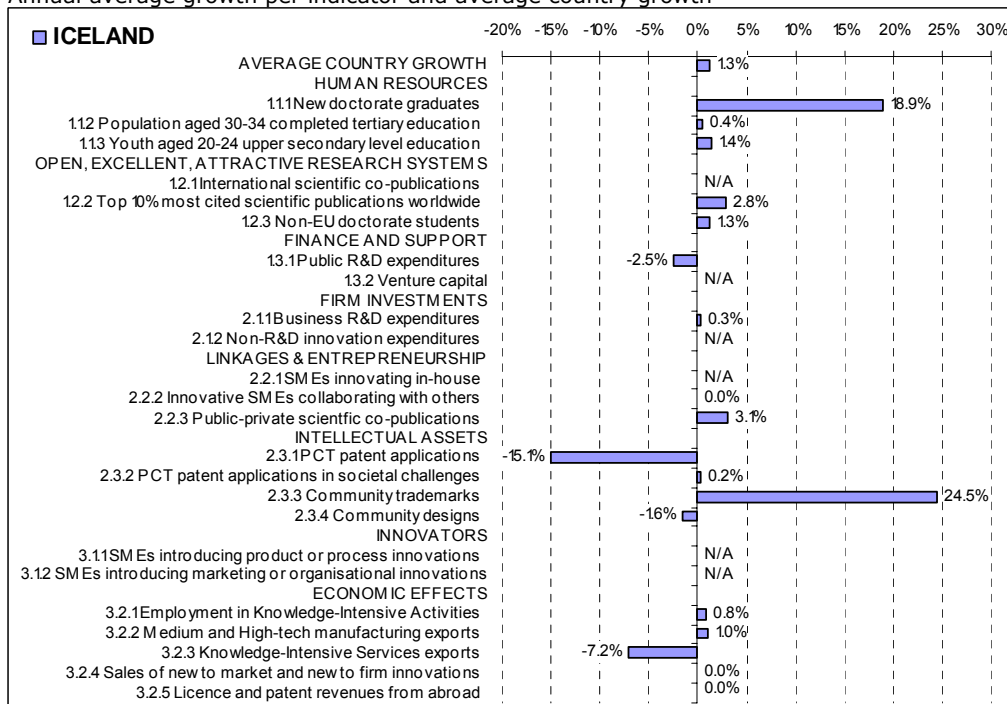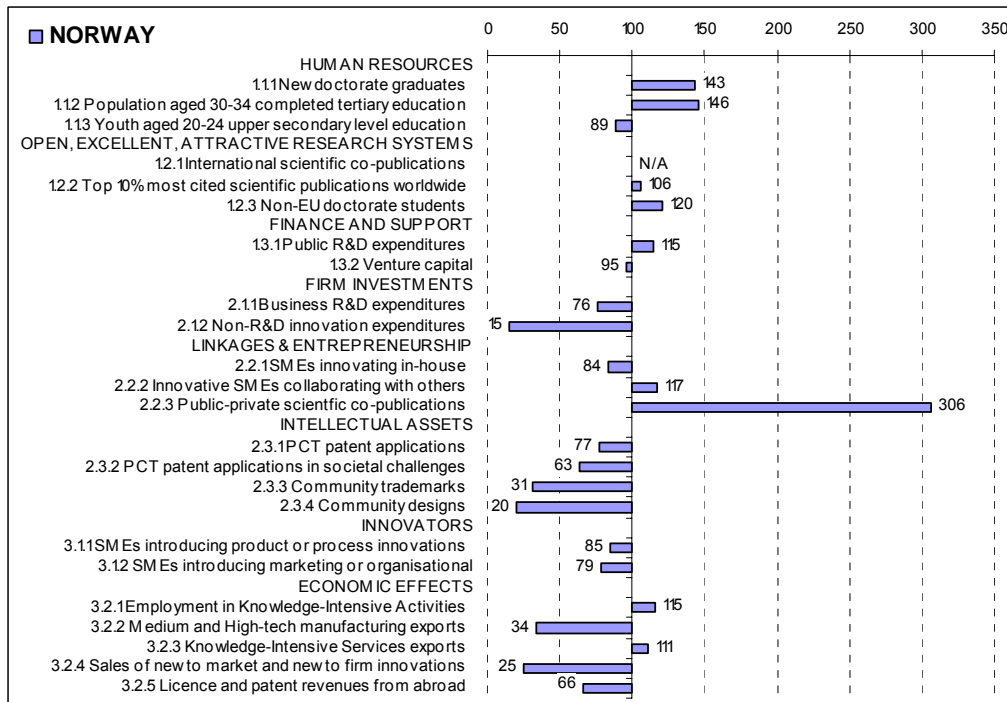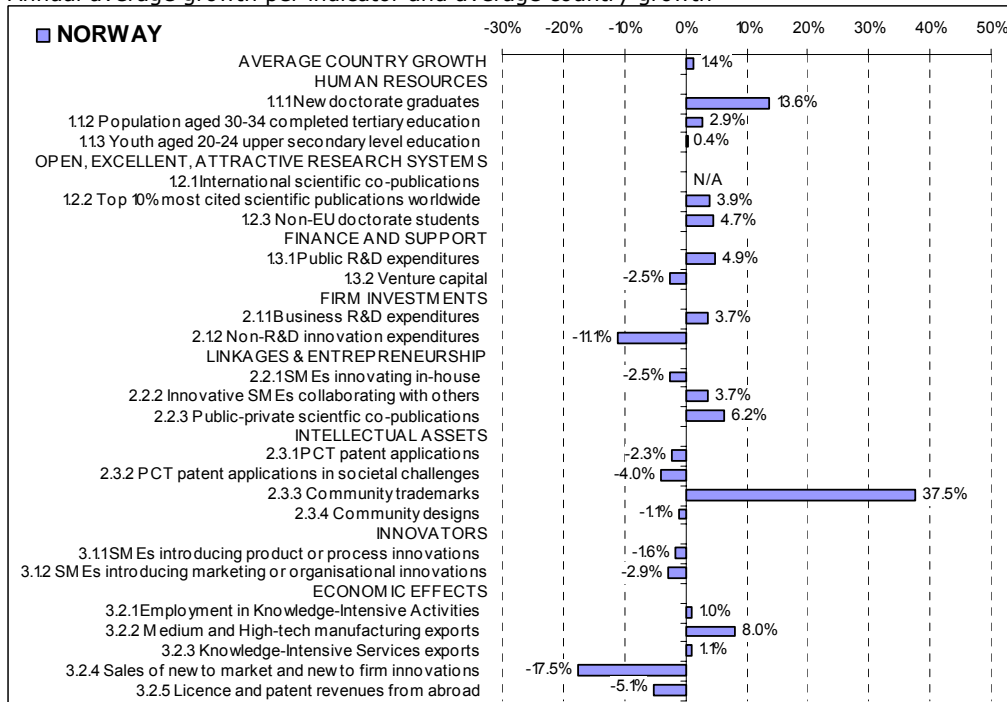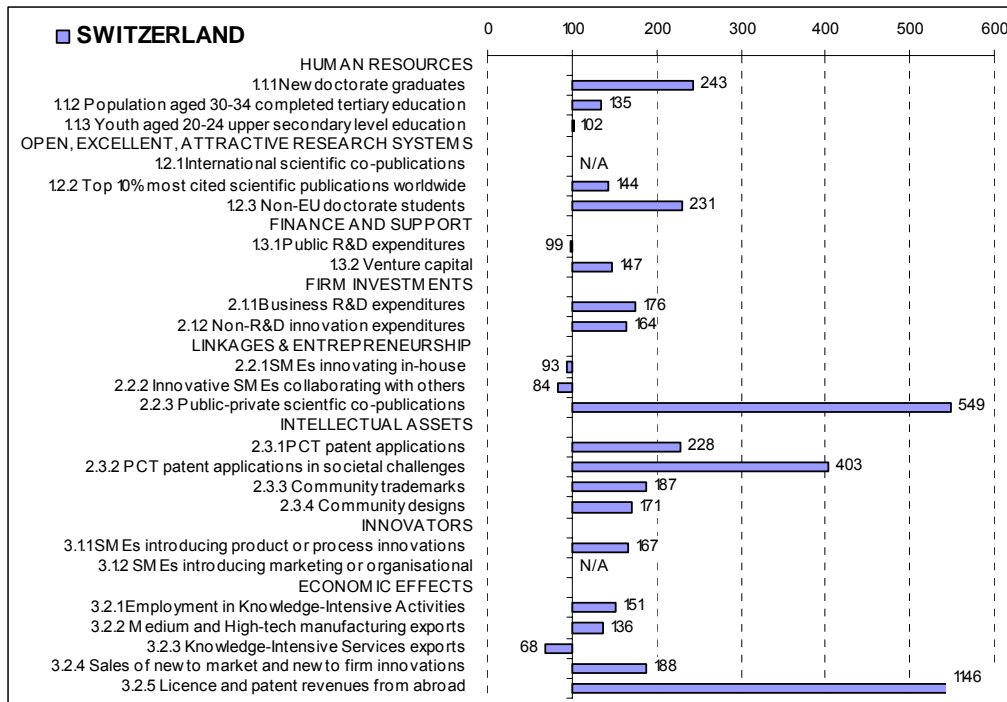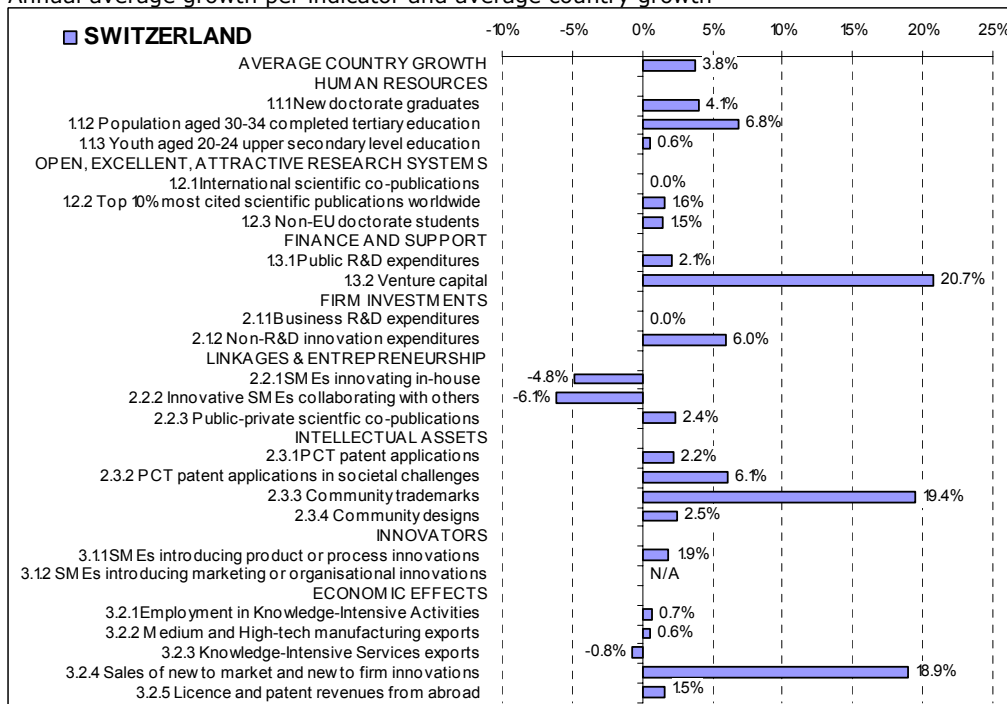Annual average growth per indicator and average country growth

ICELAND

Indicator	Value
AVERAGE COUNTRY GROWTH	1.3%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	18.9%
1.1.2 Population aged 30-34 completed tertiary education	0.4%
1.1.3 Youth aged 20-24 upper secondary level education	1.4%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	N/A
1.2.2 Top 10% most cited scientific publications worldwide	2.8%
1.2.3 Non-EU doctorate students	1.3%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	-2.5%
1.3.2 Venture capital	N/A
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	0.3%
2.1.2 Non-R&D innovation expenditures	N/A
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	N/A
2.2.2 Innovative SMEs collaborating with others	0.0%
2.2.3 Public-private scientfic co-publications	3.1%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	-15.1%
2.3.2 PCT patent applications in societal challenges	0.2%
2.3.3 Community trademarks	24.5%
2.3.4 Community designs	-1.6%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	N/A
3.1.2 SMEs introducing marketing or organisational innovations	N/A
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.8%
3.2.2 Medium and High-tech manufacturing exports	1.0%
3.2.3 Knowledge-Intensive Services exports	-7.2%
3.2.4 Sales of new to market and new to firm innovations	0.0%
3.2.5 Licence and patent revenues from abroad	0.0%

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

Norway is one of the moderate innovators with a below average performance.

Relative strengths are in Human resources, Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship. Relative weaknesses are in Firm investments, Intellectual assets, Innovators and Outputs.

High growth is observed for New doctorate graduates and Community trademarks. A strong decline is observed for Non-R&D innovation expenditure and Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems and Intellectual assets is above average. In the other dimensions it is below average.

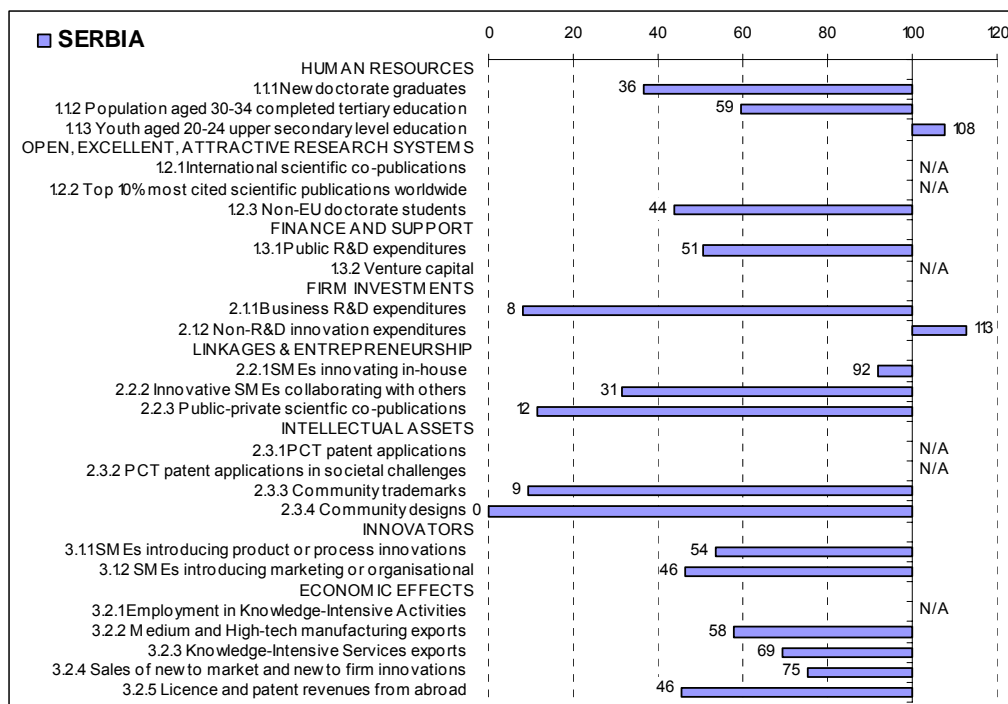Annual average growth per indicator and average country growth

SWITZERLAND

	Value
HUMAN RESOURCES	
1.1.1 New doctorate graduates	243
1.1.2 Population aged 30-34 completed tertiary education	135
1.1.3 Youth aged 20-24 upper secondary level education	102
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	N/A
1.2.2 Top 10% most cited scientific publications worldwide	144
1.2.3 Non-EU doctorate students	231
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	99
1.3.2 Venture capital	147
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	176
2.1.2 Non-R&D innovation expenditures	164
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	93
2.2.2 Innovative SMEs collaborating with others	84
2.2.3 Public-private scientfic co-publications	549
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	228
2.3.2 PCT patent applications in societal challenges	403
2.3.3 Community trademarks	187
2.3.4 Community designs	171
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	167
3.1.2 SMEs introducing marketing or organisational	N/A
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	151
3.2.2 Medium and High-tech manufacturing exports	136
3.2.3 Knowledge-Intensive Services exports	68
3.2.4 Sales of new to market and new to firm innovations	188
3.2.5 Licence and patent revenues from abroad	1146

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

Switzerland is one of the innovation leaders with an above average performance.
Relative strengths are in Open, excellent and attractive research systems, Intellectual assets, Innovators and Outputs. Relative weaknesses are in Finance and support and Linkages & entrepreneurship.
High growth is observed for Venture capital, Community trademarks and Sales of new products. A relatively strong decline is observed for SMEs innovating in-house and Innovative SMEs collaborating with others. Growth performance in Finance and support, Intellectual assets and Outputs is above average. In the other dimensions it is below average.

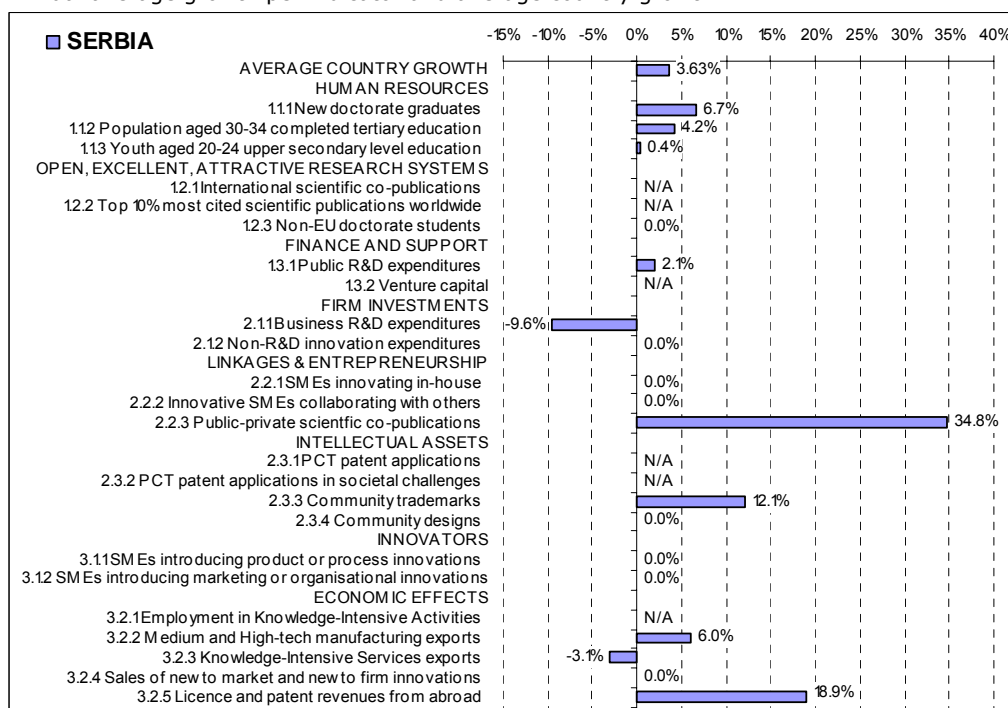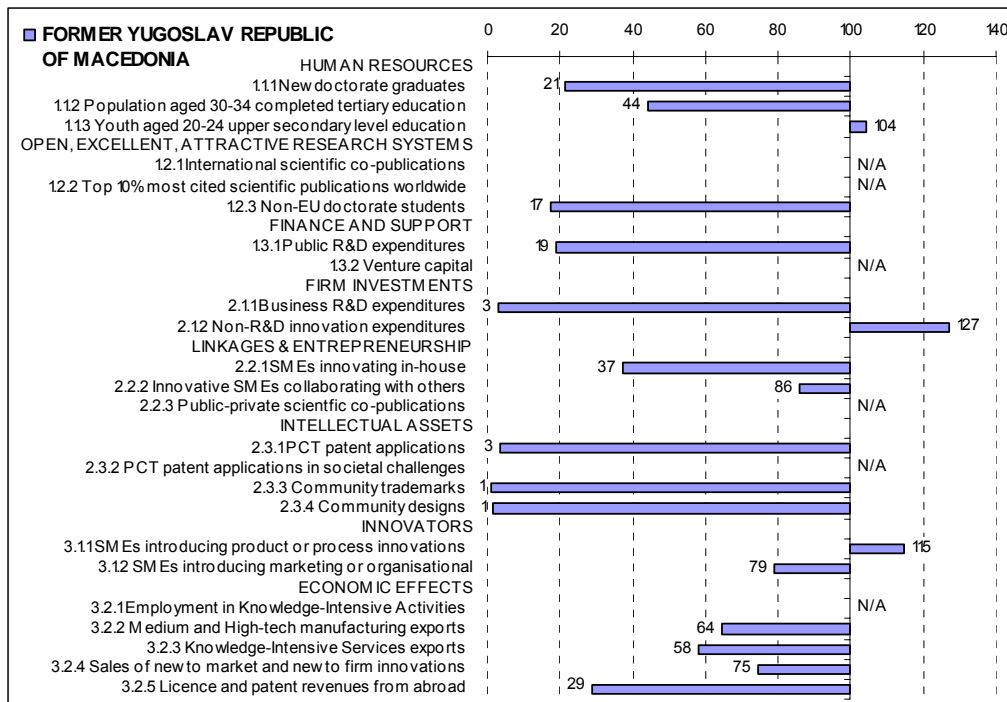Annual average growth per indicator and average country growth

SWITZERLAND

	Value
AVERAGE COUNTRY GROWTH	3.8%
HUMAN RESOURCES	
1.1.1 New doctorate graduates	4.1%
1.1.2 Population aged 30-34 completed tertiary education	6.8%
1.1.3 Youth aged 20-24 upper secondary level education	0.6%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS	
1.2.1 International scientific co-publications	0.0%
1.2.2 Top 10% most cited scientific publications worldwide	1.6%
1.2.3 Non-EU doctorate students	1.5%
FINANCE AND SUPPORT	
1.3.1 Public R&D expenditures	2.1%
1.3.2 Venture capital	20.7%
FIRM INVESTMENTS	
2.1.1 Business R&D expenditures	0.0%
2.1.2 Non-R&D innovation expenditures	6.0%
LINKAGES & ENTREPRENEURSHIP	
2.2.1 SMEs innovating in-house	-4.8%
2.2.2 Innovative SMEs collaborating with others	-6.1%
2.2.3 Public-private scientfic co-publications	2.4%
INTELLECTUAL ASSETS	
2.3.1 PCT patent applications	2.2%
2.3.2 PCT patent applications in societal challenges	6.1%
2.3.3 Community trademarks	19.4%
2.3.4 Community designs	2.5%
INNOVATORS	
3.1.1 SMEs introducing product or process innovations	1.9%
3.1.2 SMEs introducing marketing or organisational innovations	N/A
ECONOMIC EFFECTS	
3.2.1 Employment in Knowledge-Intensive Activities	0.7%
3.2.2 Medium and High-tech manufacturing exports	0.6%
3.2.3 Knowledge-Intensive Services exports	-0.8%
3.2.4 Sales of new to market and new to firm innovations	18.9%
3.2.5 Licence and patent revenues from abroad	1.5%

| | SERBIA | | 0 | 20 | 40 | 60 | 80 | 100 | 120 |

HUMAN RESOURCES
1.1.1 New doctorate graduates — 36
1.1.2 Population aged 30-34 completed tertiary education — 59
1.1.3 Youth aged 20-24 upper secondary level education — 108
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS
1.2.1 International scientific co-publications — N/A
1.2.2 Top 10% most cited scientific publications worldwide — N/A
1.2.3 Non-EU doctorate students — 44
FINANCE AND SUPPORT
1.3.1 Public R&D expenditures — 51
1.3.2 Venture capital — N/A
FIRM INVESTMENTS
2.1.1 Business R&D expenditures — 8
2.1.2 Non-R&D innovation expenditures — 113
LINKAGES & ENTREPRENEURSHIP
2.2.1 SMEs innovating in-house — 92
2.2.2 Innovative SMEs collaborating with others — 31
2.2.3 Public-private scientfic co-publications — 12
INTELLECTUAL ASSETS
2.3.1 PCT patent applications — N/A
2.3.2 PCT patent applications in societal challenges — N/A
2.3.3 Community trademarks — 9
2.3.4 Community designs — 0
INNOVATORS
3.1.1 SMEs introducing product or process innovations — 54
3.1.2 SMEs introducing marketing or organisational — 46
ECONOMIC EFFECTS
3.2.1 Employment in Knowledge-Intensive Activities — N/A
3.2.2 Medium and High-tech manufacturing exports — 58
3.2.3 Knowledge-Intensive Services exports — 69
3.2.4 Sales of new to market and new to firm innovations — 75
3.2.5 Licence and patent revenues from abroad — 46

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

Serbia is one of the modest innovators with a below average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems and Outputs. Relative weaknesses are in Intellectual assets and Innovators.
High growth is observed for Public-private co-publications, Community trademarks and License and patent revenues from abroad. A strong decline is observed for Business R&D expenditure, Community designs and Sales of new products. Growth performance in Linkages & entrepreneurship, Intellectual assets and Outputs is above average. In the other dimensions it is below average.

Annual average growth per indicator and average country growth

| | SERBIA | -15% | -10% | -5% | 0% | 5% | 10% | 15% | 20% | 25% | 30% | 35% | 40% |

AVERAGE COUNTRY GROWTH — 3.63%
HUMAN RESOURCES
1.1.1 New doctorate graduates — 6.7%
1.1.2 Population aged 30-34 completed tertiary education — 4.2%
1.1.3 Youth aged 20-24 upper secondary level education — 0.4%
OPEN, EXCELLENT, ATTRACTIVE RESEARCH SYSTEMS
1.2.1 International scientific co-publications — N/A
1.2.2 Top 10% most cited scientific publications worldwide — N/A
1.2.3 Non-EU doctorate students — 0.0%
FINANCE AND SUPPORT
1.3.1 Public R&D expenditures — 2.1%
1.3.2 Venture capital — N/A
FIRM INVESTMENTS
2.1.1 Business R&D expenditures — -9.6%
2.1.2 Non-R&D innovation expenditures — 0.0%
LINKAGES & ENTREPRENEURSHIP
2.2.1 SMEs innovating in-house — 0.0%
2.2.2 Innovative SMEs collaborating with others — 0.0%
2.2.3 Public-private scientfic co-publications — 34.8%
INTELLECTUAL ASSETS
2.3.1 PCT patent applications — N/A
2.3.2 PCT patent applications in societal challenges — N/A
2.3.3 Community trademarks — 12.1%
2.3.4 Community designs — 0.0%
INNOVATORS
3.1.1 SMEs introducing product or process innovations — 0.0%
3.1.2 SMEs introducing marketing or organisational innovations — 0.0%
ECONOMIC EFFECTS
3.2.1 Employment in Knowledge-Intensive Activities — N/A
3.2.2 Medium and High-tech manufacturing exports — 6.0%
3.2.3 Knowledge-Intensive Services exports — -3.1%
3.2.4 Sales of new to market and new to firm innovations — 0.0%
3.2.5 Licence and patent revenues from abroad — 18.9%

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

The **Former Yugoslav Republic of Macedonia** is one of the modest innovators with a below average performance.

Relative strengths are in Innovators Relative weaknesses are in Open, excellent and attractive research systems, Finance and support and Intellectual assets.

High growth is observed for New doctorate graduates, Knowledge-intensive services exports and License and patent revenues from abroad. A strong decline is observed for PCT patent applications and Community trademarks. Growth performance in Human resources, Firm investments and Outputs is above average, Growth performance in Finance and support and Intellectual assets is below average.

Annual average growth per indicator and average country growth
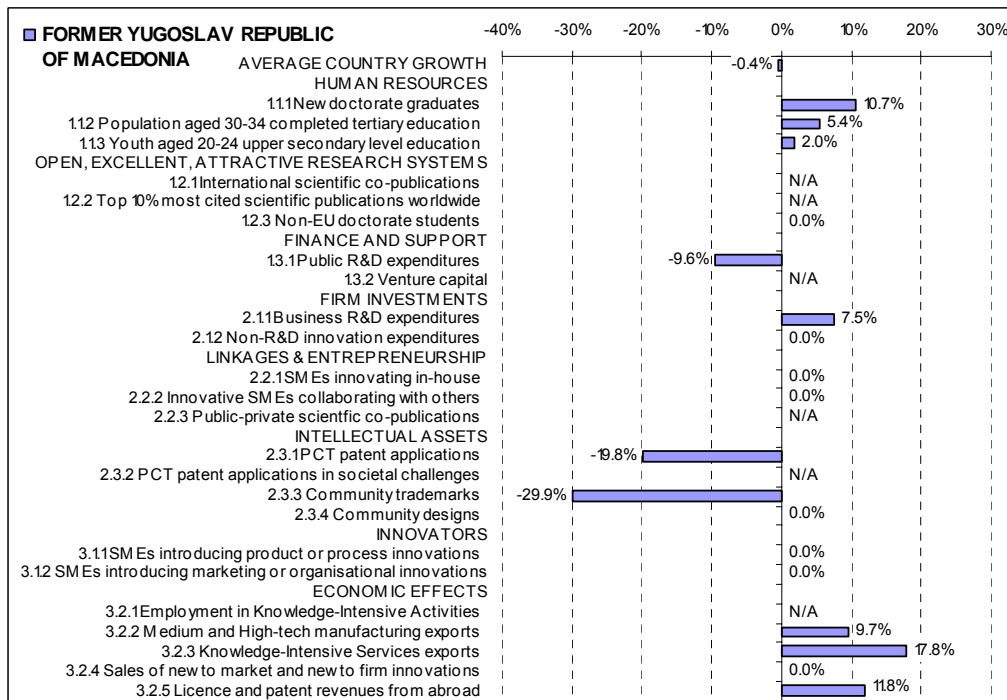
7. TECHNICAL ANNEX

7.1. Calculating composite scores

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

Step 1: Identifying and replacing outliers

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

Step 2: Setting reference years

For each indicator a reference year is identified based on data availability for all countries (for all countries data availability is at least 75%). For most indicators this reference year will be lagging 1 or 2 years behind the year to which the IUS refers. Thus for the IUS 2010 the reference year will be 2008 or 2009 for most indicators (cf. Table 1).

Step 3: Imputing for missing values

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

Example 1 (latest year missing)	"2010"	"2009"	"2008"	"2007"	"2006"
Available relative to EU27 score	N/A	150	120	110	105
Use most recent year	**150**	150	120	110	105
Example 2 (year-in-between missing)	"2010"	"2009"	"2008"	"2007"	"2006"
Available relative to EU27 score	150	N/A	120	110	105
Substitute with previous year	150	**120**	120	110	105
Example 3 (beginning-of-period missing)	"2010"	"2009"	"2008"	"2007"	"2006"
Available relative to EU27 score	150	130	120	N/A	N/A
Substitute with latest available year	150	130	120	**120**	**120**

Step 4: Determining Maximum and Minimum scores

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

Step 5: Transforming data if data are highly skewed

Most of the indicators are fractional indicators with values between 0% and 100%. Some indicators are unbound indicators, where values are not limited to an upper threshold. These indicators can be highly volatile and can have skewed data distributions (where most countries show low performance levels and a few countries show exceptionally high performance levels). For the following indicators skewness is above 1 and data have been transformed using a square

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[8] This approach follows the well-adopted Chauvenet's Criterion in statistical theory.

root transformation: Non-EU doctorate students, Venture capital, PCT patents in societal challenges and License and patent revenues from abroad.

Step 6: Calculating re-scaled scores

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

Step 7: Calculating composite innovation indexes

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

7.2. Calculating growth rates

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

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

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

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

where I is the set of innovation indicators used for calculating growth rates and where all indicators receive the same weight w_i (i.e. 1/24 if data for all 24 indicators are available).

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

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

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

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

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[9] Cf. Tarantola, S., (2008), "European Innovation Scoreboard: strategies to measure country progress over time", Joint Research Centre, mimeo.
[10] A geometric mean is an average of a set of data that is different from the arithmetic average. The geometric mean is of two data points X and Y is the square root of (X*Y), the geometric mean of X, Y and Z is the cube root of (X*Y*Z), and so forth.

ANNEXES

Annex A: Current performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	HU	MT
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	1.4	1.4	0.5	1.4	1.6	2.6	0.8	1.4	0.8	0.9	1.4	1.6	0.2	0.4	0.8	0.1	0.7	0.2
1.1.2 Population completed tertiary education	32.3	42.0	27.9	17.5	48.1	29.4	35.9	49.0	26.5	39.4	43.3	19.0	44.7	30.1	40.6	46.6	23.9	21.1
1.1.3 Youth with upper secondary level education	78.6	83.3	83.7	91.9	70.1	73.7	82.3	87.0	82.2	59.9	83.6	76.3	87.4	80.5	86.9	76.8	84.0	52.1
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	266	1038	190	428	1301	587	491	895	439	440	576	414	675	132	199	757	328	241
1.2.2 Scientific publications among top 10% most cited	0.11	0.13	0.03	0.05	0.15	0.12	0.08	0.12	0.09	0.10	0.10	0.10	0.09	0.02	0.04	0.11	0.05	0.05
1.2.3 Non-EU doctorate students	19.45	18.18	3.97	3.14	14.14	N/A	1.82	N/A	1.00	16.78	31.22	4.15	1.42	0.28	0.03	N/A	2.95	2.78
Finance and support																		
1.3.1 Public R&D expenditure	0.75	0.62	0.36	0.61	0.99	0.90	0.76	0.60	0.41	0.67	0.81	0.58	0.30	0.29	0.64	0.44	0.47	0.21
1.3.2 Venture capital	0.110	0.141	0.030	0.011	0.087	0.057	N/A	0.031	0.010	0.072	0.115	0.048	N/A	N/A	N/A	0.493	0.019	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 Business R&D expenditure	1.25	1.32	0.16	0.92	2.02	1.92	0.64	1.17	0.16	0.72	1.37	0.65	0.10	0.17	0.20	1.24	0.66	0.34
2.1.2 Non-R&D innovation expenditure	0.71	0.57	0.95	1.04	0.51	0.88	1.77	1.01	0.74	0.46	0.47	0.61	1.73	1.20	0.76	0.25	0.74	1.06
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	30.31	40.24	17.09	29.58	40.81	46.03	33.97	38.76	32.70	22.06	29.95	34.09	41.55	14.44	19.39	37.39	12.60	21.56
2.2.2 Innovative SMEs collaborating with others	11.16	22.23	3.50	11.28	22.68	8.95	22.29	9.82	13.31	5.34	13.52	5.98	21.31	3.29	8.03	12.33	7.15	5.19
2.2.3 Public-private co-publications	36.2	61.5	2.3	24.7	123.2	49.5	19.0	25.8	12.5	15.9	31.8	20.7	8.3	2.0	3.0	24.9	19.6	1.2
Intellectual Assets																		
2.3.1 PCT patent applications	4.00	3.74	0.38	0.99	8.02	7.72	1.99	2.63	0.44	1.28	3.86	2.12	0.51	0.69	0.35	1.18	1.54	1.30
2.3.2 PCT patent applications in societal challenges	0.64	0.64	0.04	0.14	2.73	1.01	0.36	0.76	0.13	0.30	0.54	0.36	0.05	0.26	0.02	0.19	0.39	0.19
2.3.3 Community trademarks	5.41	6.00	3.97	2.44	7.06	7.30	4.95	5.89	1.63	6.17	4.03	5.08	13.31	2.40	2.74	23.36	2.03	16.32
2.3.4 Community designs	4.75	3.79	1.78	2.26	7.97	7.89	1.82	2.30	0.31	3.37	3.82	6.85	0.32	3.41	0.48	6.31	0.85	1.18
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	34.18	44.01	20.72	34.86	37.63	53.61	43.92	27.34	37.31	27.50	32.09	36.91	42.24	17.22	21.93	41.49	16.82	25.94
3.1.2 SMEs introducing marketing/organisational innovations	39.09	44.08	17.35	45.87	40.02	68.18	34.10	41.55	51.29	30.35	38.51	40.62	47.34	13.95	21.39	53.02	20.52	25.63
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	13.03	13.62	8.49	11.28	15.18	14.46	10.76	18.90	10.81	11.34	13.48	13.32	14.09	9.15	7.93	24.88	12.13	15.63
3.2.2 Medium and high-tech product exports	47.36	49.84	26.12	61.58	41.31	62.13	34.00	52.06	31.14	49.11	58.27	51.32	42.66	30.46	31.90	34.85	66.43	71.35
3.2.3 Knowledge-intensive services exports	49.43	40.84	21.47	35.46	66.85	58.50	42.00	72.02	57.01	N/A	33.89	35.60	50.28	38.11	12.68	80.53	28.08	33.01
3.2.4 Sales of new to market and new to firm innovations	13.26	9.50	14.20	18.67	11.44	17.38	10.23	11.01	25.65	15.91	13.25	11.79	16.07	5.88	9.59	8.87	16.44	15.22
3.2.5 Licence and patent revenues from abroad	0.21	0.53	0.02	0.05	0.74	0.41	0.13	0.74	0.01	0.07	0.34	0.05	0.05	0.02	0.00	0.56	0.62	2.14

Annex A: Current performance

	EU27	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	HR	TR	IS	NO	CH	RS	MK
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	1.4	1.6	2.0	0.9	3.0	0.9	1.3	1.8	3.0	3.2	2.1	0.8	0.3	0.5	2.0	3.4	0.5	0.3
1.1.2 Population completed tertiary education	32.3	40.5	23.5	32.8	21.1	16.8	31.6	17.6	45.9	43.9	41.5	20.5	14.7	41.8	47.0	43.5	19.2	14.3
1.1.3 Youth with upper secondary level education	78.6	76.6	86.0	91.3	55.5	78.3	89.4	93.3	85.1	86.4	79.3	95.1	50.0	53.6	69.7	80.2	84.7	81.9
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	266	1059	936	186	485	118	750	333	1113	1306	841	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2 Scientific publications among top 10% most cited	0.11	0.15	0.12	0.04	0.09	0.04	0.07	0.03	0.11	0.12	0.13	0.03	0.06	0.13	0.12	0.16	N/A	N/A
1.2.3 Non-EU doctorate students	19.45	N/A	8.47	2.27	7.81	2.01	4.64	0.65	4.25	14.74	35.85	2.55	2.64	14.43	23.43	45.01	8.50	3.36
Finance and support																		
1.3.1 Public R&D expenditure	0.75	0.96	0.81	0.41	0.71	0.29	0.66	0.28	1.11	1.06	0.67	0.50	0.41	1.14	0.86	0.74	0.38	0.14
1.3.2 Venture capital	0.110	0.110	0.029	0.043	0.087	0.042	N/A	0.007	0.145	0.227	0.263	N/A	N/A	N/A	0.105	0.162	N/A	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 Business R&D expenditure	1.25	0.88	1.94	0.18	0.78	0.19	1.20	0.20	2.83	2.54	1.16	0.34	0.32	1.45	0.95	2.20	0.10	0.04
2.1.2 Non-R&D innovation expenditure	0.71	0.52	0.47	1.25	0.68	1.36	0.79	0.72	0.57	0.74	N/A	0.86	0.16	N/A	0.10	1.16	0.80	0.90
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	30.31	26.27	34.37	13.76	34.10	16.66	N/A	14.98	38.60	37.02	N/A	25.60	28.18	N/A	25.42	28.20	27.83	11.30
2.2.2 Innovative SMEs collaborating with others	11.16	12.97	14.71	6.40	13.31	2.27	14.24	5.76	15.30	16.51	24.98	11.88	5.28	14.05	13.06	9.40	3.50	9.60
2.2.3 Public-private co-publications	36.2	90.0	56.3	2.5	8.7	6.3	51.0	10.3	104.7	117.3	61.7	17.7	1.7	170.0	110.6	198.5	4.2	N/A
Intellectual Assets																		
2.3.1 PCT patent applications	4.00	6.44	5.05	0.31	0.53	0.15	2.56	0.49	9.96	11.02	3.51	0.88	0.71	2.96	3.08	9.13	N/A	0.13
2.3.2 PCT patent applications in societal challenges	0.64	1.11	0.71	0.06	0.13	0.01	0.65	0.08	0.54	2.01	0.73	0.03	0.04	0.53	0.41	2.60	N/A	N/A
2.3.3 Community trademarks	5.41	7.74	9.56	2.82	4.92	1.44	3.80	1.60	5.63	6.99	4.74	0.52	0.28	6.43	1.70	10.12	0.50	0.06
2.3.4 Community designs	4.75	4.56	9.19	4.71	5.70	0.34	2.45	1.82	5.34	5.15	2.35	0.23	0.29	0.22	0.94	8.12	0.00	0.06
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	34.18	31.58	39.55	17.55	47.73	18.03	31.02	19.04	41.83	40.59	25.10	31.48	29.52	N/A	28.91	57.00	18.32	39.20
3.1.2 SMEs introducing marketing/organisational innovations	39.09	28.62	42.78	18.65	43.84	25.80	39.37	28.34	31.49	36.73	31.06	32.46	50.31	N/A	30.80	N/A	18.05	30.80
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	13.03	14.82	14.04	8.87	8.76	6.16	12.88	9.93	14.86	15.58	16.69	9.43	4.76	18.75	15.02	19.65	N/A	N/A
3.2.2 Medium and high-tech product exports	47.36	40.46	52.30	51.06	35.40	50.14	58.45	61.49	52.31	52.17	51.85	41.63	37.70	16.70	15.94	64.43	27.39	30.45
3.2.3 Knowledge-intensive services exports	49.43	35.56	30.90	30.60	30.89	44.91	27.23	22.44	41.33	41.63	67.97	16.05	19.19	19.55	55.01	33.65	34.35	28.66
3.2.4 Sales of new to market and new to firm innovations	13.26	8.85	11.24	9.84	15.57	14.87	16.31	15.79	15.60	9.16	7.31	14.41	15.82	12.69	3.33	24.90	10.01	9.90
3.2.5 Licence and patent revenues from abroad	0.21	0.67	0.19	0.02	0.07	0.12	0.08	0.10	0.68	1.18	0.59	0.06	0.00	0.00	0.14	2.46	0.10	0.06

Annex B: Growth performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	HU	MT
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	0.0%	6.2%	13.6%	8.8%	9.8%	4.3%	-7.7%	6.2%	0.0%	-4.9%	3.9%	12.5%	0.0%	7.5%	7.5%	0.0%	3.9%	18.9%
1.1.2 Population completed tertiary education	3.6%	1.8%	2.9%	7.7%	2.8%	3.1%	4.1%	5.7%	1.2%	0.5%	3.5%	2.8%	2.3%	12.9%	1.7%	0.0%	7.5%	3.5%
1.1.3 Youth with upper secondary level education	0.4%	0.5%	2.3%	0.2%	-0.2%	0.8%	-0.1%	0.3%	-0.6%	-0.8%	0.1%	0.9%	2.1%	0.2%	-0.3%	0.0%	0.2%	-0.8%
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	6.7%	8.1%	5.3%	9.1%	7.5%	6.3%	10.7%	11.3%	10.2%	10.2%	6.4%	7.4%	18.4%	7.7%	9.2%	24.8%	3.9%	22.4%
1.2.2 Scientific publications among top 10% most cited	2.6%	3.8%	7.3%	5.5%	0.0%	2.8%	6.1%	7.2%	6.7%	7.0%	3.3%	3.8%	3.2%	-9.6%	4.8%	21.7%	-0.3%	14.3%
1.2.3 Non-EU doctorate students	1.5%	-1.3%	-4.0%	-17.1%	-0.5%	N/A	13.7%	N/A	0.0%	4.6%	3.3%	14.2%	1.8%	5.9%	-16.4%	N/A	4.8%	-7.4%
Finance and support																		
1.3.1 Public R&D expenditure	3.2%	2.6%	0.0%	4.6%	6.8%	4.3%	11.0%	8.7%	0.6%	6.5%	1.3%	2.8%	0.9%	-3.2%	1.6%	20.3%	-1.5%	2.5%
1.3.2 Venture capital	-2.5%	24.5%	9.5%	-7.3%	-18.9%	1.6%	N/A	-12.3%	49.5%	-12.2%	3.6%	2.5%	N/A	N/A	N/A	2.3%	-31.6%	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 Business R&D expenditure	2.1%	1.4%	12.5%	0.8%	3.4%	2.8%	11.1%	9.3%	-2.9%	4.7%	1.3%	4.3%	2.7%	-7.3%	7.5%	-2.1%	12.6%	-2.7%
2.1.2 Non-R&D innovation expenditure	-9.0%	-14.1%	9.9%	-7.3%	-3.6%	-4.8%	1.3%	-4.6%	-15.9%	11.5%	8.7%	-13.7%	-9.8%	0.0%	-11.7%	-15.1%	-4.0%	6.7%
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	-2.3%	-1.6%	3.1%	-1.7%	0.0%	-0.1%	-4.2%	-5.1%	-0.6%	-4.5%	1.4%	5.0%	5.3%	0.0%	-2.0%	0.0%	-1.2%	0.0%
2.2.2 Innovative SMEs collaborating with others	2.6%	7.5%	2.7%	-3.4%	2.2%	1.0%	8.7%	-10.9%	12.2%	-1.6%	4.0%	8.4%	6.6%	-14.3%	-14.1%	-4.4%	2.1%	-0.4%
2.2.3 Public-private co-publications	2.2%	3.4%	20.5%	15.4%	2.4%	2.7%	17.5%	5.8%	4.4%	5.3%	0.0%	0.6%	26.1%	11.2%	19.6%	3.0%	4.7%	-16.3%
Intellectual Assets																		
2.3.1 PCT patent applications	0.4%	4.4%	-6.1%	7.1%	1.3%	0.6%	6.3%	4.2%	2.6%	6.7%	1.1%	3.8%	-15.7%	-0.6%	20.4%	-0.4%	4.0%	28.4%
2.3.2 PCT patent applications in societal challenges	2.6%	1.1%	-22.7%	2.1%	3.2%	2.7%	2.0%	6.7%	8.7%	12.4%	2.0%	3.9%	-29.3%	28.2%	-8.8%	17.1%	6.9%	0.0%
2.3.3 Community trademarks	10.2%	18.6%	48.3%	18.4%	9.8%	12.3%	31.4%	14.3%	11.7%	1.6%	10.6%	10.5%	24.8%	24.7%	36.0%	20.6%	15.0%	39.6%
2.3.4 Community designs	1.2%	-7.9%	26.2%	-0.4%	-3.8%	3.5%	30.9%	18.8%	24.5%	-7.7%	4.2%	-2.3%	-23.2%	15.6%	-21.9%	-18.8%	-10.1%	18.3%
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	-2.3%	-1.6%	8.6%	-0.5%	-4.4%	-0.3%	-1.4%	-14.0%	1.9%	-3.8%	1.8%	1.5%	-1.7%	4.5%	-3.5%	-4.1%	-1.1%	15.8%
3.1.2 SMEs introducing marketing/organisational innovations	-2.9%	-0.7%	5.1%	4.1%	-10.6%	3.5%	-7.6%	-6.2%	3.0%	0.7%	-1.7%	2.0%	-3.9%	0.0%	-7.0%	-4.2%	-5.1%	-0.4%
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	0.4%	-0.6%	0.8%	0.4%	0.5%	0.6%	2.0%	1.7%	0.0%	0.5%	0.7%	0.0%	-1.3%	3.1%	1.6%	1.7%	-1.0%	-0.2%
3.2.2 Medium and high-tech product exports	-0.3%	0.1%	4.1%	1.0%	-0.7%	-1.7%	-3.8%	-0.3%	1.2%	-1.9%	-0.5%	0.1%	-5.6%	10.8%	0.3%	1.5%	-0.8%	0.1%
3.2.3 Knowledge-intensive services exports	1.5%	-1.6%	9.0%	4.2%	0.5%	3.1%	6.2%	0.5%	4.6%	N/A	0.2%	3.1%	9.6%	0.8%	-6.2%	1.2%	11.9%	14.0%
3.2.4 Sales of new to market and new to firm innovations	-0.4%	-7.4%	3.2%	4.8%	1.0%	-0.3%	-3.8%	2.1%	18.9%	3.6%	3.1%	-0.2%	27.1%	3.5%	-0.3%	-13.1%	25.2%	-9.0%
3.2.5 Licence and patent revenues from abroad	0.2%	6.8%	2.5%	11.9%	5.0%	12.8%	29.8%	17.8%	-13.2%	9.9%	4.4%	-5.1%	-11.2%	-24.6%	-15.9%	-8.0%	-5.2%	17.5%

Annex B: Growth performance

	EU27	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	HR	TR	IS	NO	CH	RS	MK
ENABLERS																		
Human resources																		
1.1.1 New doctorate graduates	0.0%	7.5%	-2.4%	-2.6%	5.7%	3.0%	2.0%	15.8%	-0.8%	-0.8%	2.5%	7.5%	10.7%	18.9%	13.6%	4.1%	6.7%	10.7%
1.1.2 Population completed tertiary education	3.6%	3.8%	3.5%	9.6%	4.5%	10.2%	6.5%	5.3%	1.2%	3.9%	4.7%	4.2%	5.4%	0.4%	2.9%	6.8%	4.2%	5.4%
1.1.3 Youth with upper secondary level education	0.4%	0.3%	0.0%	0.1%	3.2%	0.7%	-0.3%	0.4%	0.5%	-0.3%	0.4%	0.3%	3.2%	1.4%	0.4%	0.6%	0.4%	2.0%
Open, excellent and attractive research systems																		
1.2.1 International scientific co-publications	6.7%	7.2%	9.0%	3.1%	13.6%	11.6%	13.7%	6.0%	7.4%	5.6%	7.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.2.2 Scientific publications among top 10% most cited	2.6%	2.2%	2.4%	6.3%	7.8%	4.9%	10.4%	11.5%	0.1%	1.3%	1.0%	10.7%	14.8%	2.8%	3.9%	1.6%	N/A	N/A
1.2.3 Non-EU doctorate student	1.5%	N/A	0.8%	-3.1%	5.1%	-10.9%	8.7%	-10.5%	1.9%	3.6%	8.0%	-2.1%	-2.2%	1.3%	4.7%	1.5%	0.0%	0.0%
Finance and support																		
1.3.1 Public R&D expenditure	3.2%	1.6%	2.3%	1.3%	16.2%	9.7%	2.8%	2.9%	2.9%	2.5%	1.6%	-0.5%	1.3%	-2.5%	4.9%	2.1%	2.1%	-9.6%
1.3.2 Venture capital	-2.5%	-2.4%	-14.0%	-7.0%	-8.0%	17.2%	N/A	0.0%	14.4%	-3.4%	-2.3%	N/A	N/A	N/A	-2.5%	20.7%	N/A	N/A
FIRM ACTIVITIES																		
Firm investments																		
2.1.1 Business R&D expenditure	2.1%	-3.4%	3.2%	0.0%	27.0%	-1.3%	2.9%	-5.4%	3.6%	-0.5%	2.3%	-1.4%	12.5%	0.3%	3.7%	0.0%	-9.6%	7.5%
2.1.2 Non-R&D innovation expenditure	-9.0%	13.9%	0.0%	-2.4%	-11.2%	1.4%	-8.4%	-18.6%	0.0%	-1.0%	N/A	18.9%	0.0%	N/A	-11.1%	6.0%	0.0%	0.0%
Linkages & entrepreneurship																		
2.2.1 SMEs innovating in-house	-2.3%	0.1%	-5.1%	-8.3%	0.5%	0.8%	N/A	-1.7%	3.3%	-3.0%	N/A	1.2%	0.0%	N/A	-2.5%	-4.8%	0.0%	0.0%
2.2.2 Innovative SMEs collaborating with others	2.6%	1.3%	-5.0%	-8.3%	15.8%	-5.3%	7.8%	-4.2%	-3.0%	-4.7%	14.3%	5.4%	0.0%	0.0%	3.7%	-6.1%	0.0%	0.0%
2.2.3 Public-private co-publications	2.2%	4.5%	7.7%	12.2%	9.0%	14.0%	10.4%	18.6%	3.6%	1.3%	-0.8%	17.7%	9.9%	3.1%	6.2%	2.4%	34.8%	N/A
Intellectual Assets																		
2.3.1 PCT patent applications	0.4%	-2.1%	3.5%	-0.3%	17.3%	-5.4%	3.7%	-5.1%	-1.6%	4.8%	-2.8%	-13.8%	32.0%	-15.1%	-2.3%	2.2%	N/A	-19.8%
2.3.2 PCT patent applications in societal challenges	2.6%	11.2%	7.6%	20.1%	25.7%	5.9%	-0.3%	-7.9%	-8.0%	5.4%	-1.6%	14.2%	-12.4%	0.2%	-4.0%	6.1%	N/A	N/A
2.3.3 Community trademarks	10.2%	19.3%	15.1%	13.5%	12.7%	45.2%	46.2%	30.3%	10.3%	13.4%	4.1%	14.4%	16.0%	24.5%	37.5%	19.4%	12.1%	-29.9%
2.3.4 Community designs	1.2%	1.3%	10.7%	26.9%	24.3%	30.1%	18.6%	19.0%	7.8%	1.6%	-4.0%	28.9%	-1.3%	-1.6%	-1.1%	2.5%	0.0%	0.0%
OUTPUTS																		
Innovators																		
3.1.1 SMEs introducing product or process innovations	-2.3%	-0.1%	-5.4%	-5.7%	5.4%	0.3%	-0.5%	-0.4%	3.1%	-3.3%	-4.2%	2.7%	0.0%	N/A	-1.6%	1.9%	0.0%	0.0%
3.1.2 SMEs introducing marketing/organisational innovations	-2.9%	-1.5%	-5.3%	-7.5%	-0.8%	-2.3%	0.0%	7.1%	0.0%	0.0%	-1.0%	-3.9%	0.0%	N/A	-2.9%	N/A	0.0%	0.0%
Economic effects																		
3.2.1 Employment in knowledge-intensive activities	0.4%	-1.6%	0.7%	2.0%	0.0%	1.1%	1.8%	0.3%	0.0%	0.7%	0.3%	-0.4%	0.0%	0.8%	1.0%	0.7%	N/A	N/A
3.2.2 Medium and high-tech product exports	-0.3%	-2.8%	-0.3%	2.0%	-1.7%	11.0%	1.6%	4.1%	-1.0%	-1.4%	-2.0%	0.9%	-0.2%	1.0%	8.0%	0.6%	6.0%	9.7%
3.2.3 Knowledge-intensive services exports	1.5%	-2.9%	2.5%	5.2%	7.1%	1.4%	8.3%	7.3%	19.5%	-4.9%	0.8%	3.6%	7.3%	-7.2%	1.1%	-0.8%	-3.1%	17.8%
3.2.4 Sales of new to market and new to firm innovations	-0.4%	1.4%	1.5%	-7.6%	11.6%	-2.8%	3.4%	-4.8%	1.2%	-9.0%	-14.9%	2.5%	0.0%	0.0%	-17.5%	18.9%	0.0%	0.0%
3.2.5 Licence and patent revenues from abroad	0.2%	-8.5%	10.6%	2.6%	19.4%	-0.9%	13.9%	-9.8%	2.5%	5.7%	0.2%	-21.0%	0.0%	0.0%	-5.1%	1.5%	18.9%	11.8%

Annex C: Definitions of indicators

	Indicators	Numerator	Denominator	Source
1.1.1	New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Number doctorate graduates (ISCED 6)	Population between 25 and 34 years	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	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	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	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	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	Eurostat
1.3.1	Public R&D expenditures (% of GDP)	All R&D expenditures in the government sector (GOVERD) and the higher education sector (HERD) *Comment: since data on GERD public funding from abroad (non-domestic) are not available for all countries, data on GERD by sectors of performance, i.e. data on the cost of R&D executed in the public sector (regardless of the source of these funds) are used as a proxy instead of data on the funds invested in R&D by the public sector (regardless of where they have been spent)*	Gross Domestic Product	Eurostat
1.3.2	Venture capital (% of GDP)	Venture capital investment is defined as private equity being raised for investment in companies. Management buyouts, management buyins, and venture purchase of quoted shares are excluded. Venture capital includes early stage (seed + start-up) and expansion and replacement capital *Comment: For this indicator two-year averages have been used*	Gross Domestic product	Eurostat
2.1.1	Business R&D expenditures (% of GDP)	All R&D expenditures in the business sector (BERD) *Comment: since data on abroad (non-domestic) business funding of GERD are not available for all countries, data on GERD by sectors of performance, i.e. data on the cost of R&D executed in firms (regardless of the source of these funds) are used as a proxy instead of data on the funds invested in R&D by firms (regardless of where they have been spent)*	Gross Domestic Product	Eurostat

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	Indicators	Numerator	Denominator	Source
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	Eurostat (Community Innovation Survey)
2.2.1	SMEs innovating in-house (% of SMEs)	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	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	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	CWTS / Thomson Reuters
2.3.1	PCT patent applications per billion GDP (in PPP€)	Number of patent applications filed under the PCT, at international phase, designating the European Patent Office (EPO). Patent counts are based on the priority date, the inventor's country of residence and fractional counts.	Gross Domestic Product in Purchasing Power Parity Euros	OECD / Eurostat
2.3.2	PCT patent applications in societal challenges per billion GDP (in PPP€)	Number of PCT patent applications in Climate change mitigation and Health. Patents in Climate change mitigation equal those in Renewable energy, Electric and hybrid vehicles and Energy efficiency in buildings and lighting. Patents in health-related technologies include those in Medical technology (IPC codes (8th edition) A61[B, C, D, F, G, H, J, L, M, N], H05G) and Pharmaceuticals (IPC codes A61K excluding A61K8)	Gross Domestic Product in Purchasing Power Parity Euros	OECD / Eurostat
2.3.3	Community trademarks per billion GDP (in PPP€)	Number of new community trademarks applications	Gross Domestic Product in Purchasing Power Parity Euros	OHIM / Eurostat
2.3.4	Community designs per billion GDP (in PPP€)	Number of new community designs applications	Gross Domestic Product in Purchasing Power Parity Euros	OHIM / Eurostat
3.1.1	SMEs introducing product or process innovations (% of SMEs)	Number of SMEs who introduced a new product or a new process to one of their markets	Total number of SMEs	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	Eurostat (Community Innovation Survey)
3.1.3	High-growth innovative firms	*Definition not yet available*	*Definition not yet available*	
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	Eurostat

	Indicators	Numerator	Denominator	Source
3.2.2	Medium and high-tech product as % of total product exports	Value of medium and high-tech exports. These exports include exports of the following SITC Rev.3 products: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891	Value of total exports	UN Comtrade
3.2.3	Knowledge-intensive services exports as % of total services exports	Exports of knowledge-intensive services are measured by the sum of credits in EBOPS (Extended Balance of Payments Services Classification) 207, 208, 211, 212, 218, 228, 229, 245, 253, 260, 263, 272, 274, 278, 279, 280 and 284	Total services exports as measured by credits in EBOPS 200	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	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	Eurostat

Annex D: Country abbreviations

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

Annex E: A comparison of the indicators in the EIS 2009 and IUS 2010

EIS 2009	IUS 2010	COMMENT
ENABLERS	**ENABLERS**	
Human resources	**Human resources**	
1.1.1 S&E and SSH graduates (1st stage) per 1000 population aged 20-29	---	EIS 2009 indicator no longer used
1.1.2 S&E and SSH doctorate graduates (2nd stage) per 1000 population aged 25-34	1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Broader definition than that used in the EIS 2009
1.1.3 Population with tertiary education per 100 population *aged 25-64*	1.1.2 Percentage population *aged 30-34* having completed tertiary education	Age group more narrowly defined than in EIS 2009
1.1.4 Participation in life-long learning per 100 population aged 25-64	---	EIS 2009 indicator no longer used
1.1.5 Youth education attainment level	1.1.3 Percentage youth aged 20-24 having attained at least upper secondary level education	Different names but identical
---	**Open, excellent and attractive research systems**	
---	1.2.1 International scientific co-publications per million population	New indicator
---	1.2.2 Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	New indicator
---	1.2.3 Non-EU doctorate students as % of total doctorate students of the country	New indicator
Finance and support	**Finance and support**	
1.2.1 Public R&D expenditures as % of GDP	1.3.1 Public R&D expenditures as % of GDP	Identical to EIS 2009
1.2.2 Venture capital as % of GDP	1.3.2 Venture capital (early stage, expansion and replacement) as % of GDP	Identical to EIS 2009
1.2.3 Private credit as a % of GDP	---	EIS 2009 indicator no longer used
1.2.4 Broadband access by firms	---	EIS 2009 indicator no longer used
FIRM ACTIVITIES	**FIRM ACTIVITIES**	
Firm investments	**Firm investments**	
2.1.1 Business R&D expenditures as % of GDP	2.1.1 Business R&D expenditures as % of GDP	Identical to EIS 2009
2.1.2 IT expenditures as a % of GDP	---	EIS 2009 indicator no longer used
2.1.3 Non-R&D innovation expenditures as % of turnover	2.1.2 Non-R&D innovation expenditures as % of turnover	Identical to EIS 2009
	Linkages & entrepreneurship	
2.2.1 SMEs innovating in-house as % of SMEs	2.2.1 SMEs innovating in-house as % of SMEs	Identical to EIS 2009
2.2.2 Innovative SMEs collaborating with others as % of SMEs	2.2.2 Innovative SMEs collaborating with others as % of SMEs	Identical to EIS 2009
2.2.3 Firm renewal rate (SMEs entries and exits as a % of all SMEs)	---	EIS 2009 indicator no longer used

EIS 2009	IUS 2010	COMMENT
2.2.4 Public-private co-publications per million population	2.2.3 Public-private co-publications per million population	Identical to EIS 2009
Throughputs	**Intellectual Assets**	
2.3.1 EPO patent applications million population	---	EIS 2009 indicator no longer used
---	2.3.1 PCT patents applications per billion GDP (in PPS€)	New indicator
---	2.3.2 PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	New indicator
2.3.2 Community trademarks *per million population*	2.3.3 Community trademarks *per billion GDP (in PPS€)*	Different denominator
2.3.3 Community designs *per million population*	2.3.4 Community designs *per billion GDP (in PPS€)*	Different denominator
2.3.4 Technology Balance of Payments flows as % of GDP	---	Receipts captured in IUS 2010 indicator 3.2.5
OUTPUTS	**OUTPUTS**	
Innovators	**Innovators**	
3.1.1SMEs introducing product or process innovations as % of SMEs	3.1.1 SMEs introducing product or process innovations as % of SMEs	Identical to EIS 2009
3.1.2 SMEs introducing marketing or organisational innovations as % of SMEs	3.1.2 SMEs introducing marketing or organisational innovations as % of SMEs	Identical to EIS 2009
3.1.3 Resource efficiency innovators as % of all firms	---	EIS 2009 indicator no longer used
---	3.1.3 High-growth innovative enterprises	New indicator
Economic effects	**Economic effects**	
3.2.1 Employment in medium-high & high-tech manufacturing as % of workforce	---	EIS 2009 indicator no longer used
3.2.2 Employment in knowledge-intensive services as % of workforce	---	EIS 2009 indicator no longer used
---	3.2.1 Employment in knowledge-intensive activities (manufacturing and services) as % of workforce	New indicator
3.2.3 Medium and high-tech manufacturing exports as % of total product exports	3.2.2 Medium and high-tech product exports as % of total product exports	Identical to EIS 2009
3.2.4 Knowledge-intensive services exports as % of total services exports	3.2.3 Knowledge-intensive services exports as % of total services exports	Identical to EIS 2009
3.2.5 Sales of new to market innovations as % of turnover	3.2.4 Sales of new to market and new to firm innovations as % of turnover	Combines EIS 2009 indicators 3.2.5 and 3.2.6
3.2.6 Sales of new to firm innovations as % of turnover		
---	3.2.5 Licence and patent revenues from abroad as % of GDP	Part of EIS indicator 2.3.4 on TBP flows

Annex F: Summary Innovation Index (SII) time series

	2006	2007	2008	2009	2010		GROWTH RATE
EU27	0.505	0.518	0.517	0.515	0.516		0.85%
BE	0.578	0.592	0.597	0.595	0.611		1.97%
BG	0.159	0.166	0.192	0.197	0.226		6.15%
CZ	0.379	0.395	0.369	0.376	0.414		2.57%
DK	0.734	0.737	0.682	0.702	0.736		0.36%
DE	0.639	0.657	0.670	0.689	0.696		2.60%
EE	0.388	0.391	0.423	0.463	0.466		6.59%
IE	0.553	0.570	0.553	0.561	0.573		2.55%
GR	0.322	0.322	0.351	0.365	0.364		4.70%
ES	0.379	0.384	0.397	0.397	0.395		1.91%
FR	0.493	0.504	0.512	0.517	0.543		2.74%
IT	0.380	0.397	0.395	0.398	0.421		2.71%
CY	0.411	0.428	0.482	0.464	0.495		0.28%
LV	0.163	0.176	0.199	0.195	0.201		2.71%
LT	0.244	0.259	0.230	0.241	0.227		-0.70%
LU	0.576	0.571	0.593	0.593	0.565		1.27%
HU	0.298	0.296	0.307	0.304	0.327		1.15%
MT	0.276	0.306	0.328	0.340	0.351		6.42%
NL	0.545	0.559	0.574	0.587	0.578		2.02%
AT	0.562	0.581	0.602	0.605	0.591		1.62%
PL	0.273	0.280	0.269	0.285	0.278		1.79%
PT	0.320	0.341	0.380	0.401	0.436		8.31%
RO	0.195	0.219	0.241	0.256	0.237		5.23%
SI	0.404	0.426	0.450	0.473	0.487		6.52%
SK	0.265	0.277	0.273	0.285	0.269		1.96%
FI	0.638	0.644	0.673	0.696	0.696		2.72%
SE	0.758	0.757	0.760	0.759	0.750		0.62%
UK	0.600	0.611	0.589	0.591	0.618		0.47%
HR	0.258	0.251	0.263	0.273	0.301		3.55%
TR	0.180	0.184	0.191	0.199	0.202		4.06%
IS	0.482	0.500	0.532	0.540	0.487		1.26%
NO	0.430	0.436	0.444	0.454	0.463		1.35%
CH	0.745	0.779	0.805	0.814	0.831		3.78%
US	0.658	0.668	0.682	0.696	0.672		0.00%
JP	0.616	0.640	0.646	0.646	0.641		0.00%
RS	0.219	0.218	0.225	0.231	0.237		3.63%
MK	0.192	0.196	0.212	0.218	0.228		-0.36%

Annex G: Sigma and Beta convergence
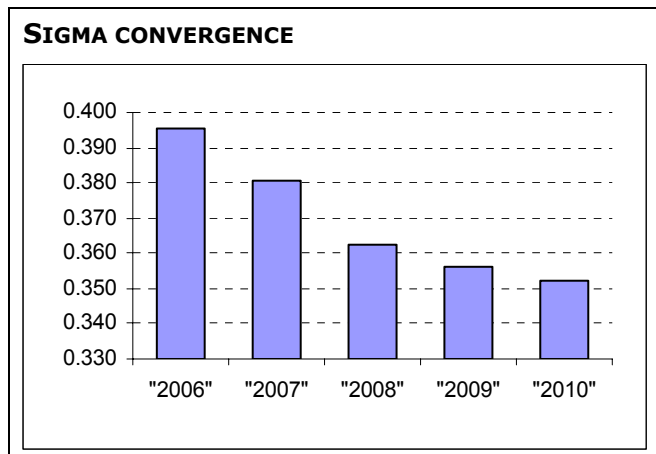
SIGMA CONVERGENCE

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

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

Beta-convergence applies if a less innovative country tends to grow faster than a more innovative country (cf. Figure 4 where beta-convergence should emerge from the apparent downward sloping regression line between the level and growth of performance). Beta-convergence can be measured by the partial correlation between growth in innovation performance over time and its initial level: when this correlation is negative, there is beta-convergence. The correlation between "2006" innovation performance and innovation growth is -0.421 indicating the existence of beta-convergence.

Further analytical analysis shows that convergence is the dominant phenomenon within 2 of the 4 performance groups, only within the Moderate innovators and Modest innovators countries' performance diverges. Between the performance groups there is evidence of convergence of the 2 lower performance groups to that of the Innovation leaders and Innovation followers. Between group convergence thus seems to be stronger than within group convergence.