EUROPEAN INNOVATION SCOREBOARD 2008

COMPARATIVE ANALYSIS OF INNOVATION PERFORMANCE

January 2009

The EIS report and its Annexes, accompanying thematic papers and the indicators' database are available at http://www.proinno-europe.eu/metrics

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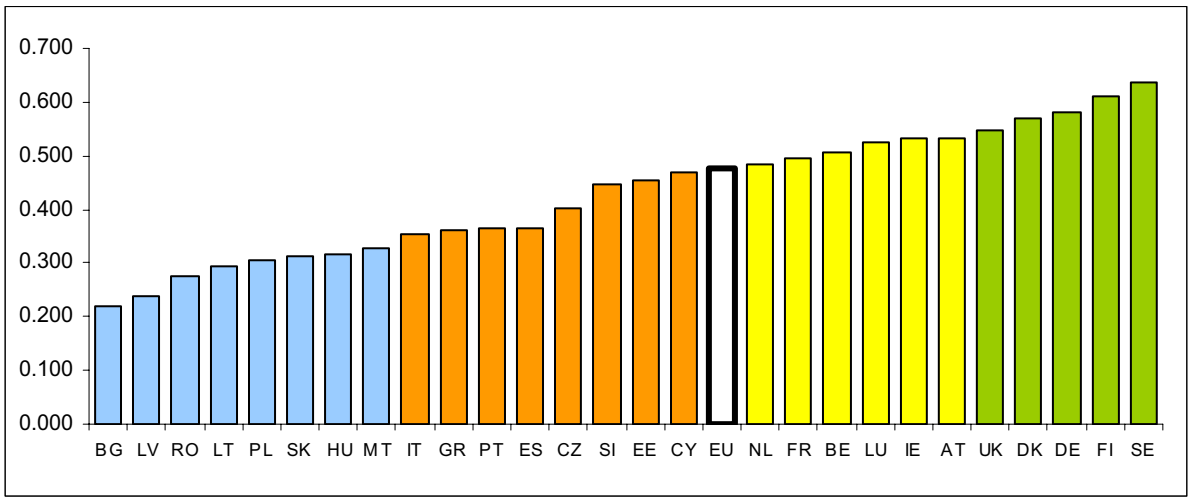
1. EXECUTIVE SUMMARY

This is the eighth edition of the European Innovation Scoreboard (EIS), which provides a comparative assessment of the innovation performance of EU Member States, under the EU Lisbon Strategy. The methodology for the 2008 EIS is revised compared to that of 2007 with a stronger focus on services, non-technological aspects, and outputs of innovation (Section 5.1). The analysis of trends over time is now based on changes in the absolute values of the indicators over a five year period, rather than the previous approach of measuring trends relative to the EU average.

Finland, Ireland, Cyprus and Bulgaria are the best improving EU countries within their peer groups (Section 3)

The EIS 2008 includes innovation indicators and trend analyses for the EU27 Member States as well as for Croatia, Turkey, Iceland, Norway and Switzerland. Based on their innovation performance across 29 indicators, EU Member States fall into the following four country groups:

Summary innovation performance EU Member States (2008 SII)



Note: The Summary Innovation Index (SII) is a composite of 29 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. The 2008 SII reflects performance in 2006/2007 due to a lag in data availability.

- Sweden, Finland, Germany, Denmark and the UK are the Innovation leaders, with innovation performance well above that of the EU average and all other countries. Of these countries, Germany is improving its performance fastest while Denmark is stagnating.
- Austria, Ireland, Luxembourg, Belgium, France and the Netherlands are the Innovation followers, with innovation performance below those of the innovation leaders but above that the EU average. Ireland's performance has been increasing fastest within this group, followed by Austria.
- Cyprus, Estonia, Slovenia, Czech Republic, Spain, Portugal, Greece and Italy are the Moderate innovators, with innovation performance below the EU average. The trend in Cyprus' innovation performance is well above the average for this group, followed by Portugal, while Spain and Italy are not improving their relative position.
- Malta, Hungary, Slovakia, Poland, Lithuania, Romania, Latvia and Bulgaria are the Catching-up countries with innovation performance well below the EU average. All of these countries have been catching up, with the exception of Lithuania. Bulgaria and Romania have been improving their performance the fastest.

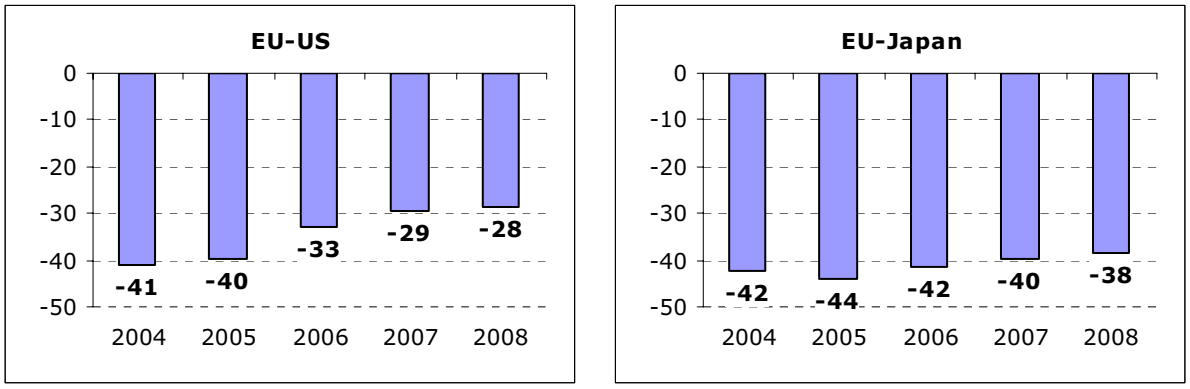
The EU is improving its performance, especially in human resources, broadband and venture capital (Section 3.4) …

The revised methodology allows a new analysis of the trends in innovation performance at EU level. This shows that the EU is making overall progress, with particularly strong increases in the numbers of graduates in science, engineering, social sciences and humanities, both at first degree and graduate level. Other areas of strong increase are in broadband and in venture capital investments, although the statistics do not yet capture the impact of the economic downturn in 2008.

… and decreasing the innovation gap with the US and Japan (Section 4) …

The 2008 EIS includes a separate analysis of the EU27 performance compared with the United States and Japan based on a set of comparable indicators. This shows that there has been a continued improvement in the EU's performance relative to the US and a recent improvement relative to Japan. Nevertheless, there remains a significant gap between the EU and these two other regions and there appears to be some slowing down in the catching up with the US in recent years.

EU INNOVATION GAP TOWARDS US AND JAPAN



Performance for each reference year is measured using, on average, data with a two-year lag (e.g. performance for 2008 is measured using data for 2006). The EU innovation gap is measured as the distance between the average performance of the EU and that of the US and Japan on 16 comparable indicators. An EU innovation gap of e.g. -40 means that the US or Japan is performing at a level of 140, or 40% above that of the EU.

The EU's catching up is due to the improvements in graduate numbers, broadband and venture capital, but also to strong relative improvements in public private linkages (as measured by joint scientific publications). The remaining gap with both the US and Japan is concentrated in four areas: international patenting (as measured under the patent cooperation treaty), public private linkages and numbers of researchers (despite the improvements in both these areas), and business R&D expenditures (where both EU and US values have stagnated, while Japan's have increased).

… while holding its ground against the emerging economies (Section 5.3)

The Global Innovation Scoreboard 2008 (GIS 2008) aims at comparing the innovation performance of the EU to that of the other major R&D spenders in the world: Argentina, Australia, Brazil, Canada, China, Hong Kong, India, Israel, Japan, New Zealand, Republic of Korea, Mexico, Russian Federation, Singapore, South Africa and the US. The analysis shows that the EU27 block has a higher overall performance than emerging economies such as China, India and Brazil and that several EU countries are among those that have most improved their relative ranking in the period between 1995 and 2005.

New analysis confirms the importance of non-R&D innovation (Section 5.2, 5.4)

R&D is not the only method of innovating. Other methods include technology adoption, incremental changes, imitation, and combining existing knowledge in new ways. An analysis of firms innovating without performing R&D based on the 2007 Innobarometer

survey shows that while these 'neglected innovators' tend to have lower innovative capabilities than R&D performing firms, the majority do invest in creative innovative activities and are just as likely to be fast growing firms. Despite this, these 'neglected innovators' are much less likely to receive public support for their innovations.

An important part of non-R&D innovation is creativity and design. As a contribution to the 2009 European Year of Creativity and Innovation, a Design, Creativity and Innovation scoreboard was constructed using a range of novel indicators. The analysis of this scoreboard shows that countries with a good creative climate tend to have higher levels of R&D and design activities and also strong overall innovation performance. These findings point to the need to consider design and other non-R&D activities as part of the broader approach to innovation policy as well as to the strong links between creativity and innovation.

2. INTRODUCTION

The European Innovation Scoreboard (EIS) has been published annually since 2001 to track and benchmark the relative innovation performance of EU Member States. For the EIS 2008 the methodology has been revised and the number of dimensions increased to 7 and grouped into 3 main blocks covering enablers, firm activities and outputs (Figure 1). The purpose of this revision is to have dimensions that bring together a set of related indicators to give a balanced assessment of the innovation performance in that dimension. The blocks and dimensions have been designed to accommodate the diversity of different innovation processes and models that occur in different national contexts.

FIGURE 1: DIMENSIONS OF INNOVATION PERFORMANCE CAPTURED IN THE EIS

- **ENABLERS** captures the main drivers of innovation that are external to the firm as:
  - **Human resources** – the availability of high-skilled and educated people.
  - **Finance and support** – the availability of finance for innovation projects and the support of governments for innovation activities.

- **FIRM ACTIVITIES** captures innovation efforts that firms undertake recognising the fundamental importance of firms' activities in the innovation process:
  - **Firm investments** – covers a range of different investments firms make in order to generate innovations.
  - **Linkages & entrepreneurship** – captures entrepreneurial efforts and collaboration efforts among innovating firms and also with the public sector.
  - **Throughputs** – captures the Intellectual Property Rights (IPR) generated as a throughput in the innovation process and Technology Balance of Payments flows.

- **OUTPUTS** captures the outputs of firm activities as:
  - **Innovators** – the number of firms that have introduced innovations onto the market or within their organisations, covering technological and non-technological innovations.
  - **Economic effects** – captures the economic success of innovation in employment, exports and sales due to innovation activities.

It is considered that the above described dimensions form the core of national innovation performance. In addition, there are wider socio-economic factors that influence innovation, such as the role of governments, markets, social factors and the demand and acceptance of innovation. These factors and their relationship with innovation performance have been explored in various EIS thematic papers. The indicators which are included in each of the dimensions are listed in Table 1 and full definitions are available in Annex C. The rationale for including these dimensions and indicators is discussed in detail in the Methodology Report. The new methodology also includes a revised method of calculating countries' average innovation performance allowing tracking the development of individual innovation performance over time. The new methodology only uses internationally comparable statistics that are regularly updated, and is therefore limited by the availability and timeliness of such data. It is intended to maintain the same methodology for the 2009 and 2010 editions of the European Innovation Scoreboard to allow direct comparability between reports, while at the same time exploring the potential of new statistical sources through the EIS thematic reports.

The EIS 2008 uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. It is important, as indicated in Table 1[1], to note that the data relates to actual performance in 2006 and 2007. As a consequence the 2008 EIS 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.

[1] Of the 29 indicators, 12 indicators capture in performance in 2007, 15 indicators capture performance in 2006 and 2 indicators capture performance in 2005.

TABLE 1: INDICATORS FOR THE EIS 2008-2010

	EIS dimension / indicator	Data source (reference year)[2]
ENABLERS		
	Human resources	
1.1.1	S&E and SSH graduates per 1000 population aged 20-29 (first stage of tertiary education)	Eurostat (2006)
1.1.2	S&E and SSH doctorate graduates per 1000 population aged 25-34 (second stage of tertiary education)	Eurostat (2006)
1.1.3	Population with tertiary education per 100 population aged 25-64	Eurostat (2007)
1.1.4	Participation in life-long learning per 100 population aged 25-64	Eurostat (2007)
1.1.5	Youth education attainment level	Eurostat (2007)
	Finance and support	
1.2.1	Public R&D expenditures (% of GDP)	Eurostat (2007)
1.2.2	Venture capital (% of GDP)	EVCA / Eurostat (2007)
1.2.3	Private credit (relative to GDP)	IMF (2007)
1.2.4	Broadband access by firms (% of firms)	Eurostat (2007)
FIRM ACTIVITIES		
	Firm investments	
2.1.1	Business R&D expenditures (% of GDP)	Eurostat (2007)
2.1.2	IT expenditures (% of GDP)	EITO / Eurostat (2006)
2.1.3	Non-R&D innovation expenditures (% of turnover)	Eurostat (2006)
	Linkages & entrepreneurship	
2.2.1	SMEs innovating in-house (% of SMEs)	Eurostat (2006)
2.2.2	Innovative SMEs collaborating with others (% of SMEs)	Eurostat (2006)
2.2.3	Firm renewal (SME entries plus exits) (% of SMEs)	Eurostat (2005)
2.2.4	Public-private co-publications per million population	Thomson Reuters / CWTS (2006)
	Throughputs	
2.3.1	EPO patents per million population	Eurostat (2005)
2.3.2	Community trademarks per million population	OHIM / Eurostat (2007)
2.3.3	Community designs per million population	OHIM / Eurostat (2007)
2.3.4	Technology Balance of Payments flows (% of GDP)	World Bank (2006)
OUTPUTS		
	Innovators	
3.1.1	SMEs introducing product or process innovations (% of SMEs)	Eurostat (2006)
3.1.2	SMEs introducing marketing or organisational innovations (% of SMEs)	Eurostat (2006)
3.1.3	Resource efficiency innovators, unweighted average of:	
	• Share of innovators where innovation has significantly reduced labour costs (% of firms)	Eurostat (2006)
	• Share of innovators where innovation has significantly reduced the use of materials and energy (% of firms)	Eurostat (2006)
	Economic effects	
3.2.1	Employment in medium-high & high-tech manufacturing (% of workforce)	Eurostat (2007)
3.2.2	Employment in knowledge-intensive services (% of workforce)	Eurostat (2007)
3.2.3	Medium and high-tech manufacturing exports (% of total exports)	Eurostat (2006)
3.2.4	Knowledge-intensive services exports (% of total services exports)	Eurostat (2006)
3.2.5	New-to-market sales (% of turnover)	Eurostat (2006)
3.2.6	New-to-firm sales (% of turnover)	Eurostat (2006)

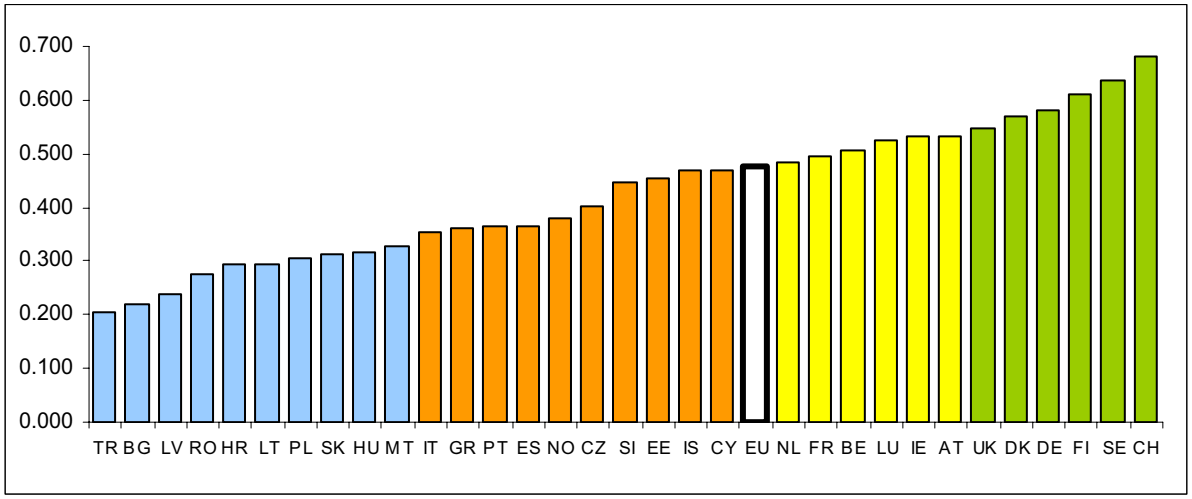
[2] Exceptions to the reference years are shown in Annex C. For some indicators weighted averages have been used, more details are available in Annex C.

3. EUROPEAN INNOVATION SCOREBOARD: 2008 FINDINGS

3.1. Innovation performance

The Summary Innovation Index (SII) gives an "at a glance" overview of aggregate national innovation performance and is calculated as a composite of the 29 EIS indicators (see Section 8.1 for the methodology for calculating composite indicators[3]). Figure 2 shows the results for the 2008 SII for European countries[4]. Compared to the EIS 2007, non-European countries are no longer directly included in the EIS[5]. These countries are included in the Global Innovation Scoreboard (Section 5.3) and for Japan and the US a more detailed comparison with the EU27 is discussed in Section 4.

FIGURE 2: INNOVATION PERFORMANCE (2008 SUMMARY INNOVATION INDEX)



Reference data for most of the underlying indicators are for 2006 and 2007.

Based on a statistical cluster analysis of SII scores over a five-year period and using the same names for the four country groups as in the EIS 2007 the countries can be divided into the following groups:

- Denmark, Finland, Germany, Sweden, Switzerland and the UK are the Innovation leaders, with innovation performance well above that of the EU27 and all other countries.
- Austria, Belgium, France, Ireland, Luxembourg and the Netherlands are the Innovation followers, with innovation performance below those of the innovation leaders but above that of the EU27.
- Cyprus, Estonia, Iceland, Slovenia, Czech Republic, Greece, Italy, Norway, Portugal and Spain are the Moderate innovators with innovation performance below the EU27, where the first 4 countries show a better performance than the last 6 countries.
- Bulgaria, Croatia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Turkey are the Catching-up countries. Although their innovation performance

[3] The SII has also been calculated retrospectively using the EIS 2008 methodology for the last five years to enable comparability of results; the SII time series is provided in Annex D.

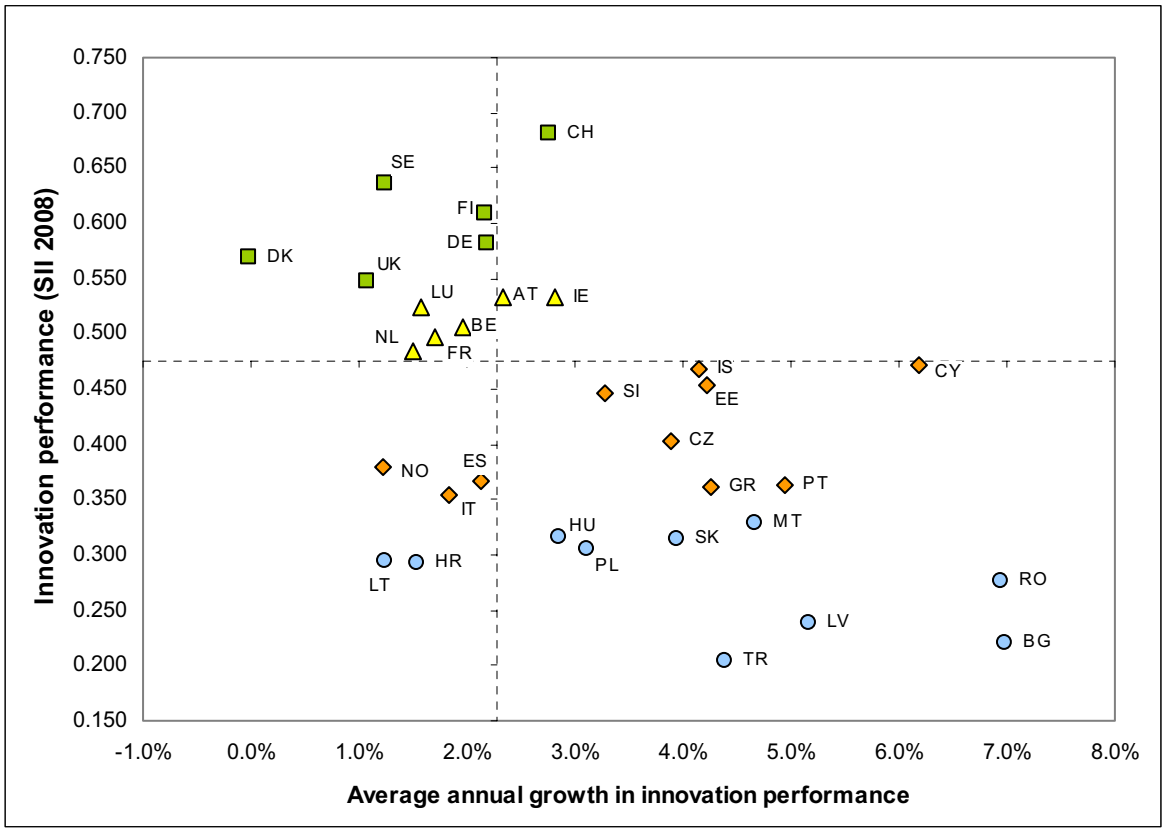
[4] All of the European countries shown have good data availability, i.e. for at least 70% of the indicators (i.e. for 22 of the 29 indicators).

[5] Non-European countries in the EIS 2007 included Australia, Canada, Israel, Japan and the United States (US).

is well below the EU average, this performance is increasing towards the EU average over time with the exception of Croatia and Lithuania (Figure 3).

For most countries group membership is the same as that identified in the EIS 2007[6]. Exceptions to this are Greece and Portugal which have moved from the Catching-up countries in the EIS 2007 to the group of Moderate innovators, a result which can both be explained from their strong growth in innovation performance and from the revised set of indicators used in calculating average innovation performance[7]. A further exception is Iceland which has dropped from the Innovation followers to the Moderate innovators following the revised method of calculating countries' average innovation performance[8].

FIGURE 3: CONVERGENCE IN INNOVATION PERFORMANCE



Colour coding matches the groups of countries identified in Section 3.1: green are the innovation leaders, yellow are the innovation followers, orange are the moderate innovators, blue are the catching-up countries. Average annual growth rates as calculated over a five-year period. The dotted lines show EU performance and growth.

[6] Within the Innovation leaders group it can also be noted that Switzerland is the leading country, compared to Sweden in the 2007 EIS report. This partly reflects the change in methodology but also the strong growth by Switzerland in areas such as economic effects and throughputs (see country profiles in Section 6).

[7] For Portugal performance is above average for the new indicators on S&E and SSH doctorate graduates, Private credit, Broadband access by firms and Resource efficiency innovators. Greece also benefits from above average performance on Broadband access by firms and Resource efficiency innovators but also from a very large increase for New-to-market sales from the 2004 results from the Community Innovation Survey used for the EIS 2007 and the 2006 results used for the EIS 2008.

[8] In determining the maximum and minimum scores in the normalisation process (cf. Step 6 in Section 8.1) small countries with populations of 1 million or less are no longer included.

3.2. Development in innovation performance

The development in innovation performance has been calculated for each country and for the EU27 as a block using data over a five-year period[9]. This calculation is based on absolute changes in the indicators, as opposed to previous EIS reports where trends were calculated relative to the EU average. All countries, with the exception of Denmark show an absolute improvement in the innovation performance over the period. Romania and Bulgaria have experienced the fastest growth in performance, albeit from a low starting point.

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, Switzerland is the growth leader and all other countries in this group show a rate of improvement that is below that of the EU27. For the Innovation followers we observe that only Ireland and Austria have managed to grow faster than the EU27. These countries are the growth leaders within the Innovation followers. Of the Moderate innovators seven countries have grown faster than the EU27, but three countries have shown a slower progress: Italy, Norway and Spain. The growths leaders here are Cyprus and Portugal. Of the Catching-up countries two countries have actually grown at a slower pace than the EU27: Lithuania and Croatia. Bulgaria and Romania are the growth leaders also showing the overall fastest rate of improvement in innovation performance.

The average growth rates for the four country groups (Table 2) show that there is between group convergence with the Moderate innovators and the Catching-up countries growing at a faster rate than the Innovation leaders and Innovation followers. This overall process of catching up, where countries with below average performance have faster growth rates than those with above average performance, can also be observed at the level of most individual countries. Notable exceptions include Cyprus which combines a close to average level of performance with a high growth rate; Italy, Spain, Norway, Lithuania and Croatia which combine below average levels of performance with below average growth rates; and Switzerland which is combining a high level of innovation performance and an above average rate of improvement.

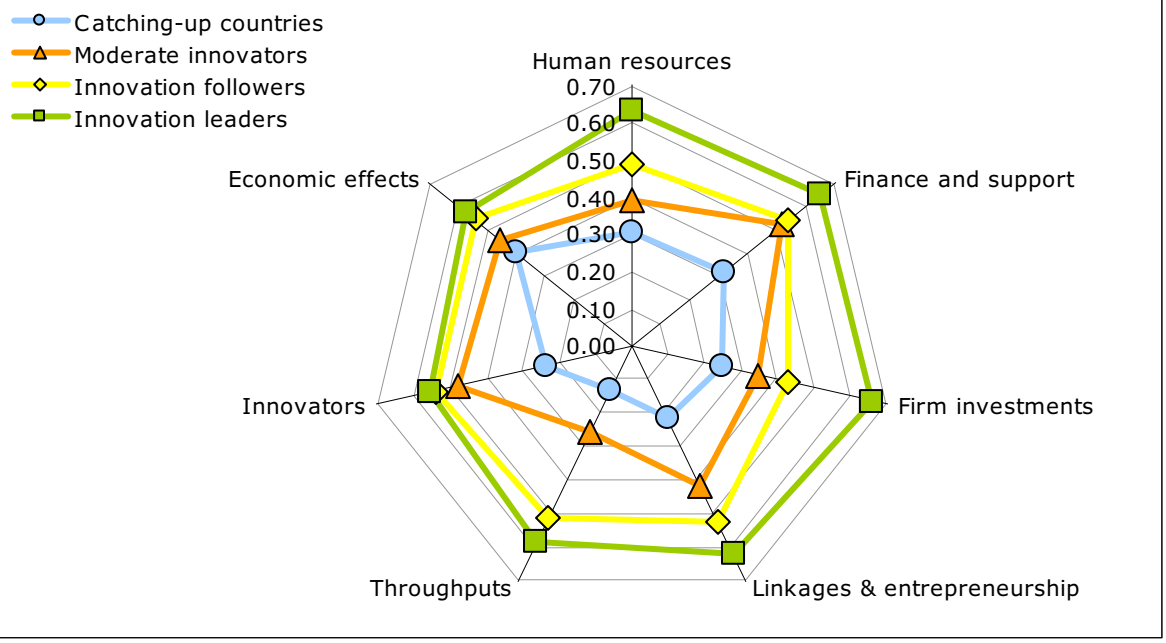
TABLE 2: INNOVATION GROWTH LEADERS

Group	Growth rate	Growth leaders	Moderate growers	Slow growers
Innovation leaders	1.6%	Switzerland (CH)	Germany (DE), Finland (FI)	Denmark (DK), Sweden (SE), United Kingdom (UK)
Innovation followers	2.0%	Ireland (IE), Austria (AT)	Belgium (BE)	France (FR), Luxembourg (LU), Netherlands (NL)
Moderate innovators	3.6%	Cyprus (CY), Portugal (PT)	Czech Republic (CZ), Estonia (EE), Greece (GR), Iceland (IS), Slovenia (SI)	Italy (IT), Norway (NO), Spain (ES)
Catching-up countries	4.1%	Bulgaria (BG), Romania (RO)	Latvia (LV), Hungary (HU), Malta (MT), Poland (PL), Slovakia (SK), Turkey (TR)	Croatia (HR), Lithuania (LT)

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

[9] The methodology for calculating growth rates is described in Section 8.2.

FIGURE 4: COUNTRY GROUPS: INNOVATION PERFORMANCE PER DIMENSION



3.3. Innovation dimensions

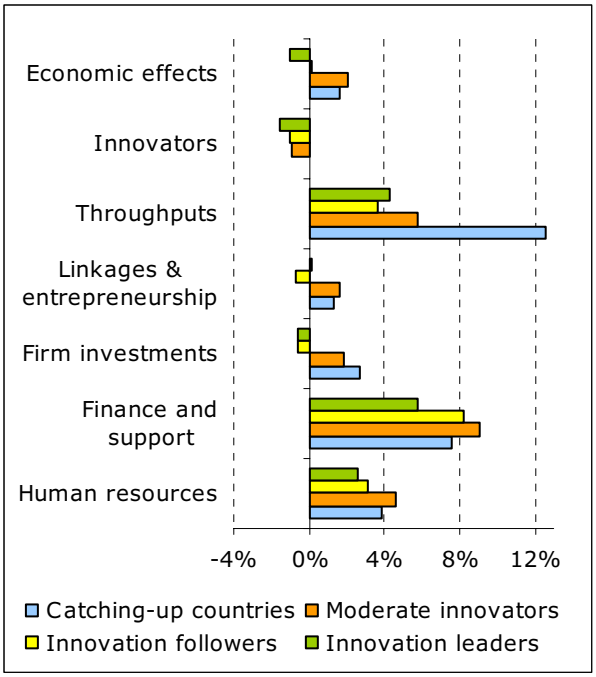
The performance of the four country groups across the different innovation dimensions is shown in Figure 4 (country profiles are provided in Section 6). The Innovation leaders and the Innovation followers have the smallest variance in their performance across the different dimensions[10]. This suggests that high levels of performance require countries to perform relatively well over all the dimensions of innovation. For the Innovation followers performance in Firm investments is a relative weakness.

For Moderate innovators and Catching-up countries the pattern of performance is less balanced across the dimensions. Moderate innovators, on average, show a relatively strong performance in Finance and support and a relatively weak performance in Throughputs. The Catching-up countries show a relatively strong performance in Economic effects and a relatively weak performance in Throughputs. The Catching-up countries do worse in all dimensions compared to the other country groups, only in Economic effects their performance comes close to that of the Moderate innovators.

[10] The variance across all 7 dimensions is 0.14% for the Innovation leaders, 0.14% for the Innovation followers, 0.65% for the Moderate innovators and 0.63% for the Catching-up countries.

Growth performance of the four country groups shows some similarities as well as differences (Figure 5). In all groups, the strongest drivers of growth are the Throughputs, Finance and support and Human resources dimensions. The Moderate innovators and Catching-up countries show improvements in Economic effects, Linkages & entrepreneurship and Firm investments, while the Innovation leaders and Innovation followers are on average stagnating or declining across these dimensions. All of the groups show some decline in the Innovators dimension. Figure 5 confirms that the overall convergence process as shown in Figure 3 also generally takes place within each innovation dimension.

FIGURE 5: COUNTRY GROUPS: GROWTH PERFORMANCE PER DIMENSION



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

Country rankings for each innovation dimension are shown in Figures 6 and 7. Within the different innovation dimensions, the Innovation leaders on average take the leading spots, in particular in the Enablers and Firm activities dimensions, followed by the Innovation followers (Figure 6). Growth performance is dominated by the Moderate innovators and Catching-up countries in all dimensions (Figure 7). Figures 6 and 7 combined lead to a number of interesting observations which will be discussed next.

Innovation leaders (Denmark, Finland, Germany, Sweden, Switzerland, UK)

All Innovation leaders perform well in Human resources. One exception is Germany, which, however, shows a better growth performance than the rest of this group. The low growth of the other countries may be due to their high performance level which means that there is less room for rapid improvements. Within Finance and support, the UK is the only Innovation leader showing a strong growth, in particular due to very rapid growth in Venture capital and Broadband access. In this dimension, Germany is showing a relatively weaker performance combined with low growth. All Innovation leaders combine a high performance level in Firm investments with either moderate rates of improvement (Finland, Germany, Switzerland) or moderate declines (Denmark, Sweden, UK). In Linkages & entrepreneurship all Innovation leaders show a strong performance, but only Finland, Germany and Switzerland have managed to improve their performance. Switzerland is the best performer in Throughputs and it also has the highest growth rate, closely followed by Finland and Sweden. Within the Innovators dimension, performance is most unequal, with Germany and Switzerland performing very strongly, Denmark, Finland and Sweden performing moderately and the UK performing relatively weak. Only Finland has managed to improve its performance in this dimension. Germany and Sweden are leading in Economic effects and are the only Innovation leaders who managed to improve their performance in this dimension. The UK shows a relatively weaker performance here with both the lowest performance level of the Innovation leaders and the sharpest decline.

Innovation followers (Austria, Belgium, France, Ireland, Luxembourg, Netherlands)

In Human resources Ireland is notable in combining a high performance level and a strong growth performance. Belgium and Luxembourg are among the slowest growers in Human resources across the EU, but still managed to marginally improve their performance. The Netherlands is performing relatively well in Finance and support but its growth is below average. Luxembourg is showing the fastest rate of improvement across the EU in this dimension, while Austria is among the slowest growers due in particular to a decline in Venture capital performance. Austria is performing strongly in Firm investments and Linkages & entrepreneurship, where it also shows a high rate of improvement relative to the other Innovation followers. Luxembourg recorded a strong decline in performance on Linkages & entrepreneurship. All Innovation followers do relatively well in Throughputs, in particular Luxembourg, which is also showing an above EU average growth performance. The other Innovation followers have experienced lower growth than the EU average. All Innovation followers perform above the EU average in the Innovators dimension except the Netherlands, but it is the only Innovation follower which has managed to improve its performance. Performance in Economic effects is quite similar, with Ireland showing the strongest performance, and Austria showing the highest rate of improvement.

Moderate innovators (Cyprus, Czech Republic, Estonia, Greece, Iceland, Italy, Norway, Portugal, Slovenia, Spain)

In Human resources Estonia, Norway and Slovenia show above EU average performance, and, except for Greece, Slovenia and Spain, all Moderate innovators show an above EU rate of improvement. In particular Cyprus, Italy and Portugal have managed to achieve high growth rates. In Finance and support it is Iceland which shows overall highest performance of all countries and the fastest rate of improvement[11]. Also Spain has managed to combine above average EU27 levels of performance and rates of improvement. In Firm investments four Moderate innovators perform above EU average and five countries have managed to improve their performance. In particular, Estonia is the country with the highest rate of improvement of any country as a result of strong improvements in Business R&D expenditures and Non-R&D innovation expenditures. Linkages & entrepreneurship shows four Moderate innovators performing above average, and of these Cyprus has the overall fastest rate of improvement of any country. Iceland, Norway and Spain show a decline in their performance in this dimension. In Throughputs all Moderate innovators perform below average. Seven of these countries have managed to improve their performance faster than the EU27 in this dimension, while the growth performance of Estonia, Italy and Spain, albeit positive, is among the weakest of all countries. Innovators is the dimension where the Moderate innovators perform relatively best, with Cyprus, Greece and Portugal among the best performing EU countries. However, in terms of growth, only Greece and Portugal have managed to improve their performance in this dimension. The Czech Republic performs above average in Economic effects while all other Moderate innovators perform below average. Growth performance of Cyprus and Greece is highest of all countries, and also Estonia, Portugal and Spain have grown faster than the EU27.

Catching-up countries (Bulgaria, Croatia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Turkey)

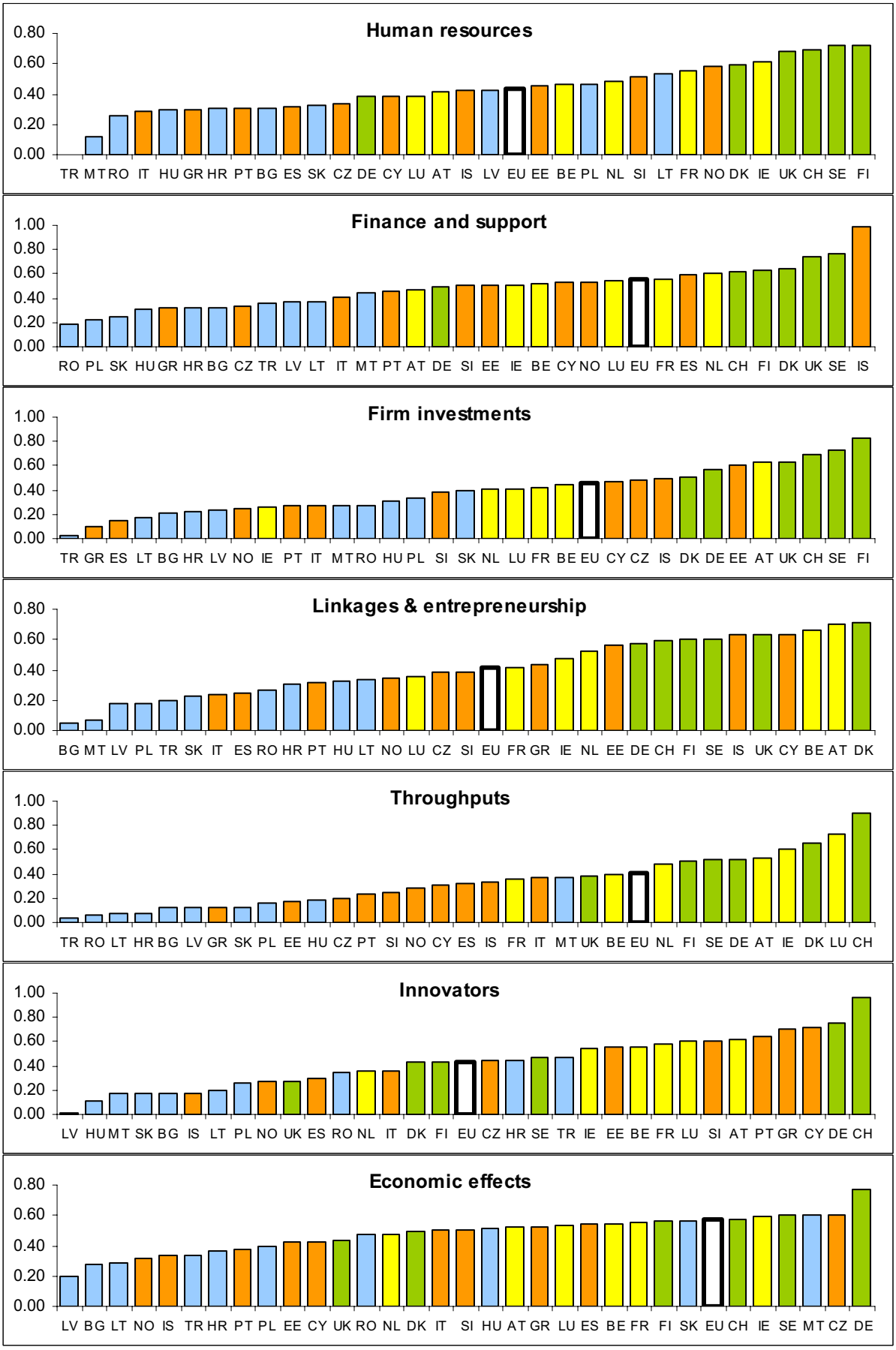
The Catching-up countries generally perform below EU average on Human resources, with the exception of Lithuania and Poland. Growth performance is average, with five

[11] Note that all data used in the EIS are from 2007 or before and thus do not capture the 2008 financial crisis.

countries growing at a rate below average and Croatia, Latvia, Poland, Romania and Slovakia managing to grow faster than the EU27. Performance in Finance and Support is below average for all Catching-up countries, but Bulgaria, Latvia, Lithuania, Romania and Slovakia have grown faster than average. Of the Catching-up countries Slovakia is the best performer in Firm investments, while Bulgaria, Latvia and Turkey are among the fastest growing countries and also Hungary, Lithuania, Malta, Poland and Romania have improved their performance. Slovakia is showing a strong decline in performance in this dimension due to declining Business R&D expenditures. In Linkages & entrepreneurship no Catching-up country is performing above the EU27 average but the majority countries have grown faster than the EU27 average with only Latvia and Lithuania experiencing a decline in their performance. Throughputs is the other dimension where all Catching-up countries perform below average but are also showing the strongest rates of improvement. Bulgaria, Latvia, Malta, Poland, Romania, Slovakia and Turkey are the fastest growing of all countries in this dimension. Performance in Innovators shows that Croatia and Turkey are performing above the EU27 average[12], but also that seven Catching-up countries have the lowest levels of performance. Only three Catching-up countries have managed to improve their performance, in particular Bulgaria, which is having one of the fastest rates of improvement. Malta is the only Catching-up country performing above EU average in Economic effects, but also Hungary and Slovakia are performing relatively well. Growth performance is more diverse, with a decline in growth for two countries, and at the same time, Hungary, Romania and Turkey among the overall fastest growing countries.

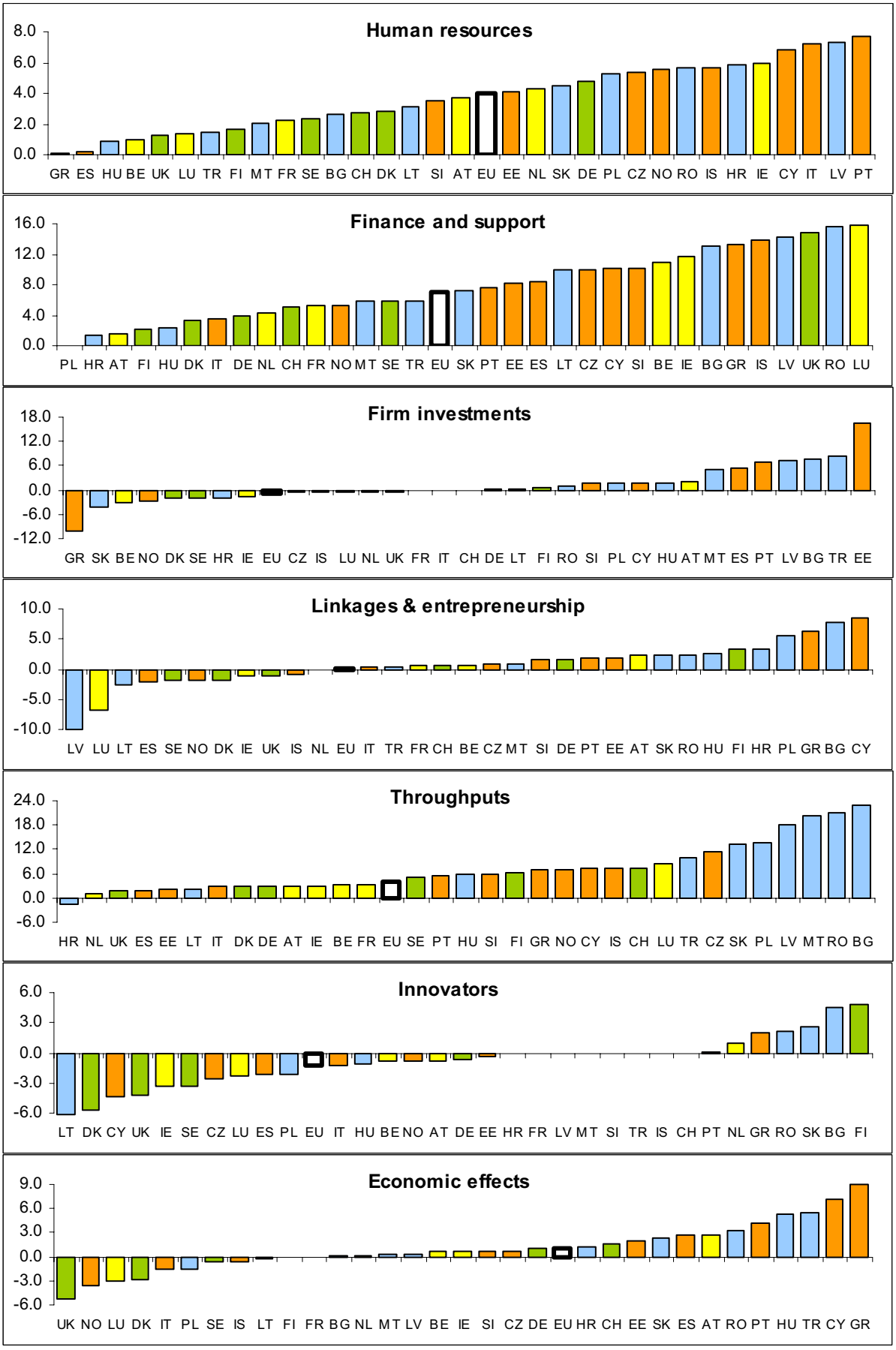
[12] However, it should be noted that data availability for Turkey and Croatia in this dimension is limited.

FIGURE 6: INNOVATION PERFORMANCE PER DIMENSION



Colour coding matches the groups of countries identified in Section 3.1: green are the Innovation leaders, yellow are the Innovation followers, orange are the Moderate innovators, blue are the Catching-up countries.

FIGURE 7: GROWTH PERFORMANCE PER DIMENSION

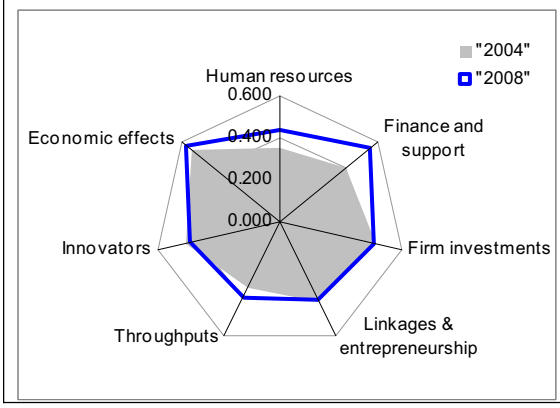


Colour coding matches the groups of countries identified in Section 3.1: green are the Innovation leaders, yellow are the Innovation followers, orange are the Moderate innovators, blue are the Catching-up countries.

3.4. EU27 performance

The revised methodology used in the 2008 EIS allows performance and absolute growth rates to be analysed for the EU27[13]. The analysis of the EU27 growth rate in innovation performance shows an average annual growth rate of 2.3% over a five year period. This improvement is particularly due to Human resources (4.0%), Finance and support (7.1%) and Throughputs (4.0%) where the EU27 has progressed most compared to 2004 (Figure 8). In Linkages & entrepreneurship (0.0%) and Economic effects (1.1%) improvement has been small and in Firm investments (-0.9%) and Innovators (-1.3%) performance has worsened slightly.

FIGURE 8: EU DRIVERS OF GROWTH



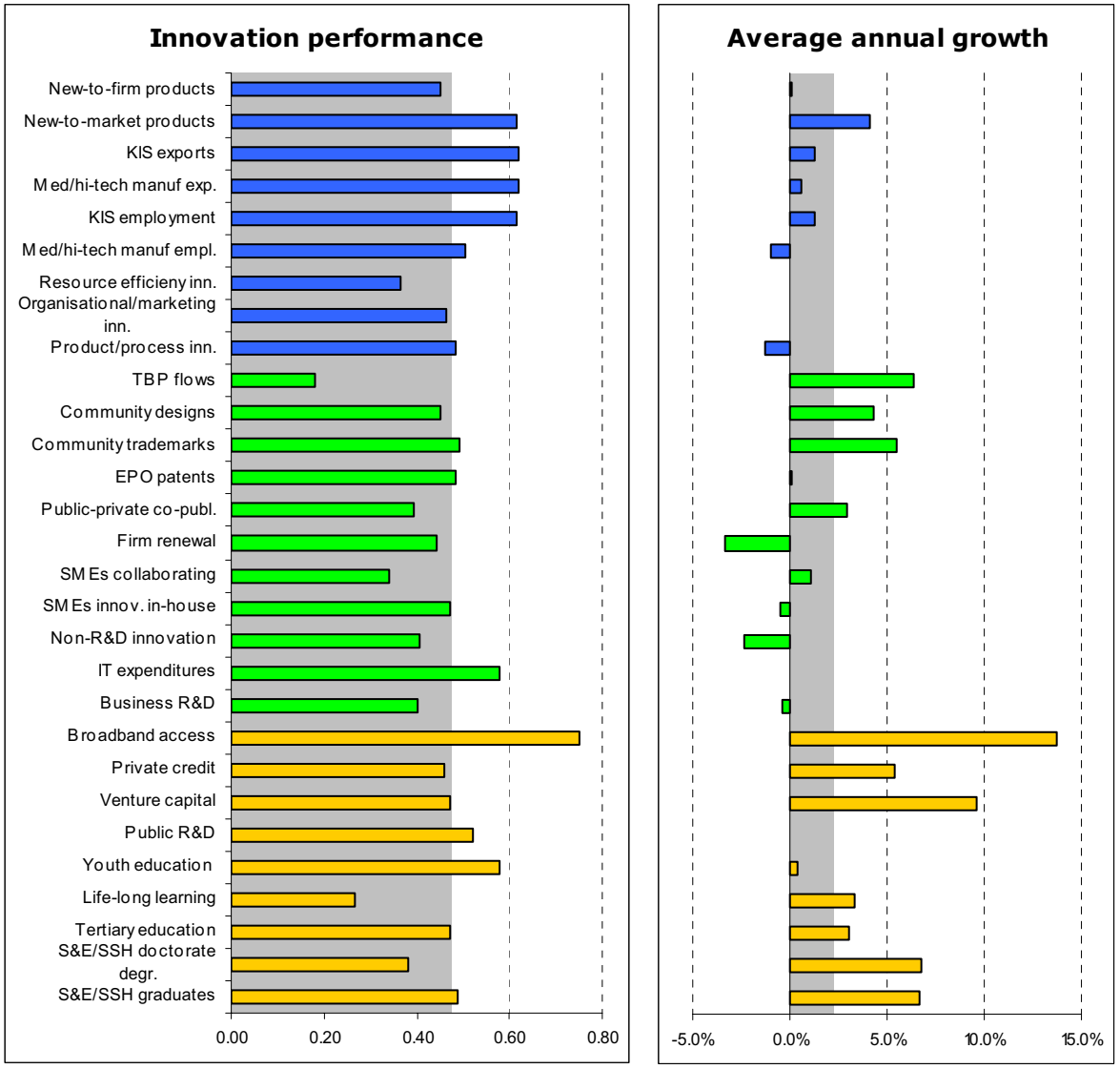
Within the individual indicators, the EU27 is showing relative strengths[14] in Youth education, Public R&D expenditures, Broadband access, IT expenditures, Knowledge-intensive services employment, Medium-high and high-tech manufacturing exports, Knowledge-intensive services exports and Sales of new-to-market products (Figure 9). The EU27 is showing relative weaknesses in S&E and SSH doctorate degrees, Life-long learning, Innovative SMEs collaborating with others, Technology Balance of Payments flows and Resource efficiency innovators.

The EU27 is showing a strong growth in the Enablers dimension, in particular in S&E and SSH graduates, S&E and SSH doctorate degrees, Venture capital, Private credit and Broadband access. Growth in Firm activities is strongest in Throughputs, in particular in Trademarks, Designs and Technology Balance of Payment (TBP) flows. Overall growth is weakest in Outputs, except for New-to-market product sales. Performance is declining for 7 indicators, in particular for Non-R&D innovation expenditures and Firm renewal.

[13] In previous EIS reports it was not possible to analyse performance and growth at EU level as calculations were all made relative to the EU average.

[14] A relative strength means that the performance of the EU on that indicator is above the average performance of the EU on all indicators.

FIGURE 9: EU27 INNOVATION PERFORMANCE AND GROWTH PER INDICATOR



The shaded area gives the average performance for all indicators.

The shaded area gives the average growth rate for all indicators. Average annual growth rates as calculated over a five-year period.

The indicators reflecting Enablers are highlighted in yellow, those reflecting Firm activities in green and those reflecting Outputs in green.

4. EU INNOVATION GAP WITH THE US AND JAPAN

The US and Japan are not included in the main EIS analysis as for both countries data are missing for too many indicators. For the innovation gap comparison, we use a different set of 17 indicators of which 12 indicators are identical to those of the EIS (Table 3). The EIS indicators on S&E and SSH graduates have been replaced with the (EIS 2007) indicator on S&E graduates. Broadband access by firms is replaced by the share of broadband subscribers and the share of researchers[15] has been added as an additional indicator for Enablers[16]. For Firm activities, an additional indicator is PCT

[15] "Researchers are viewed as the central element of the research and development system. They are defined as professionals engaged in the conception and creation of new knowledge, products, processes, methods and systems and are directly involved in the management of projects" (OECD Science, Technology and Industry Scoreboard 2007).

[16] This indicator was also included in the 2006 Global Innovation Scoreboard.

patents[17] (to compensate for a possible home advantage in only using European Patent Office registrations) and trademarks is a weighted average of the EIS indicator on Community trademarks and an indicator from the World Development Indicators measuring national trademark applications by residents (also to compensate for a possible home advantage). For the US, data for knowledge-intensive services exports are not available. For Japan, data for venture capital are not available and data for the employment shares in medium-high and high-tech manufacturing and knowledge-intensive services are for 2003.

TABLE 3: EU27-US-JAPAN INDICATORS

	Data source	Reference year
ENABLERS		
* S&E graduates per 1000 population aged 20-29	Eurostat	2006
Population with tertiary education per 100 population aged 25-64	Eurostat	2006
* Researchers per 1000 population	OECD (MSTI database)	2006 (2005 for US)
Public R&D expenditures (% of GDP)	Eurostat	2006
Venture capital (% of GDP)	EVCA / Eurostat	2007 (no data for JP)
* Broadband subscribers per 1000 population	World Development Indicators (WorldBank)	2005
FIRM ACTIVITIES		
Business R&D expenditures (% of GDP)	Eurostat	2006
IT expenditures (% of GDP)	EITO / Eurostat	2006
Public-private co-publications per million population	Thomson Reuters / CWTS	2006
EPO patents per million population	Eurostat	2005
* PCT patents per million population	OECD	2005
* Trademarks per million population, average of: • Community trademarks per million population • Trademark applications (residents) per million population	 OHIM / Eurostat World Development Indicators (WorldBank)	 2007 2005
Technology Balance of Payments flows (% of GDP)	World Development Indicators (WorldBank)	2006
OUTPUTS		
Employment in medium-high & high-tech manufacturing (% of workforce)	Eurostat / OECD	2006 (2003 for JP)
Employment in knowledge-intensive services (% of workforce)	Eurostat / OECD	2006 (2003 for JP)
Medium and high-tech manufacturing exports (% of total exports)	Eurostat	2006
Knowledge-intensive services exports (% of total services exports)	Eurostat	2006 (no data for US)

The indicators highlighted with an * are not identical to but proxies for the EIS indicators.

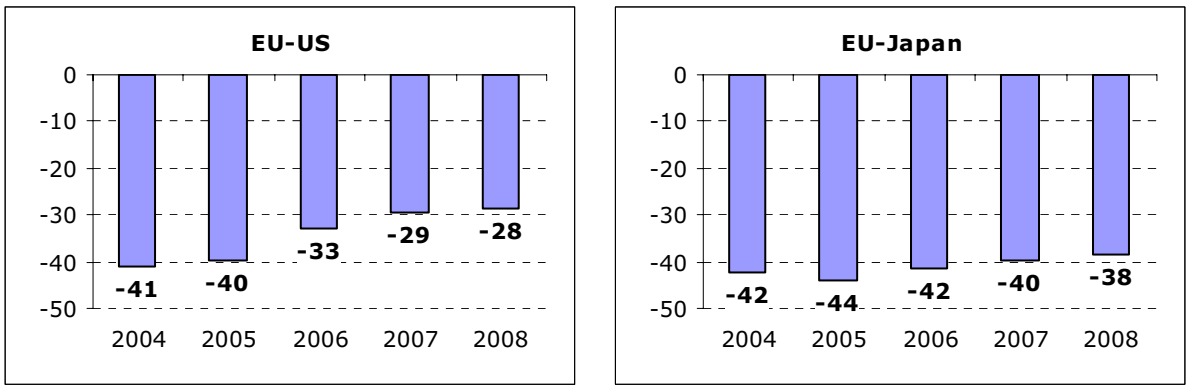
Figure 10 shows that the innovation performance of the US and Japan is well above that of the EU27. The EU-US gap has dropped significantly[18], in particular between 2005 and

[17] The Patent Cooperation Treaty (PCT) is an international treaty, administered by the World Intellectual Property Organization (WIPO), between more than 125 countries. The PCT makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing a single "international" patent application instead of filing several separate national or regional patent applications although the granting of patents remains under the control of the national or regional patent offices.

[18] Due to a different approach and a slightly different set of indicators, the results reported here are different from those reported in the EIS 2007 report. The EIS 2007 report concluded that the EU-US gap had dropped significantly between 2003 and 2006 but showed a very modest reduction only in 2007 and the EU-Japan gap had dropped significantly between 2004 and 2006 but only modestly in 2007.

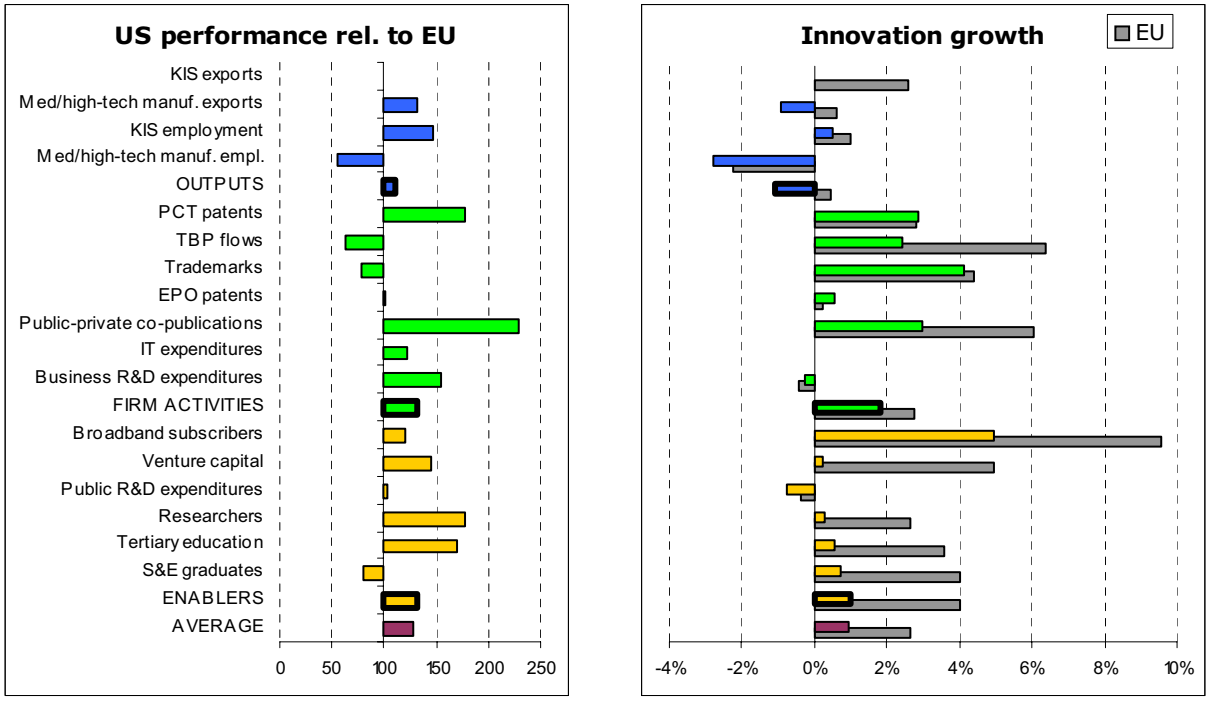
2006 although the relative progress of the EU appears to have slowed down since then. The EU-Japan gap at first increased but has been declining at a steady rate in the last 4 years.

FIGURE 10: EU INNOVATION GAP TOWARDS US AND JAPAN



Performance for each reference year is measured using, on average, data with a two-year lag (e.g. performance for 2008 is measured using data for 2006). The EU innovation gap is measured as the distance between the average performance of the EU and those of the US and Japan on 16 indicators. An EU innovation gap of e.g. -40 means that the US or Japan is performing at a level of 140, or 40% above that of the EU.

FIGURE 11: EU-US COMPARISON



US data for KIS exports are not available.

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

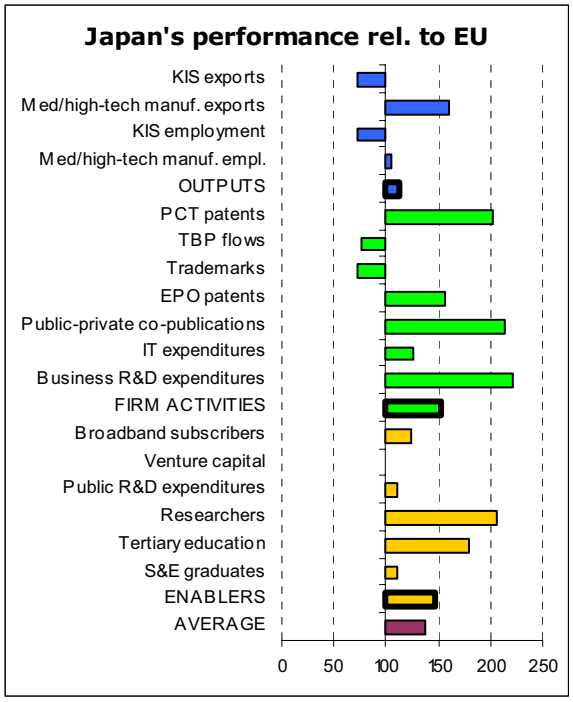
The indicators reflecting Enablers are highlighted in yellow, those reflecting Firm activities in green and those reflecting Outputs in green.

The US is performing better than the EU27 in 12 indicators, only in S&E graduates, Trademarks, Technology Balance of Payments flows and Medium-high and high-tech manufacturing employment is the EU27 performing better (Figure 11). Overall there is a clear performance gap in favour of the US, with the US showing a better performance in Enablers, Firm activities and Outputs. But the US innovation lead is declining, as its

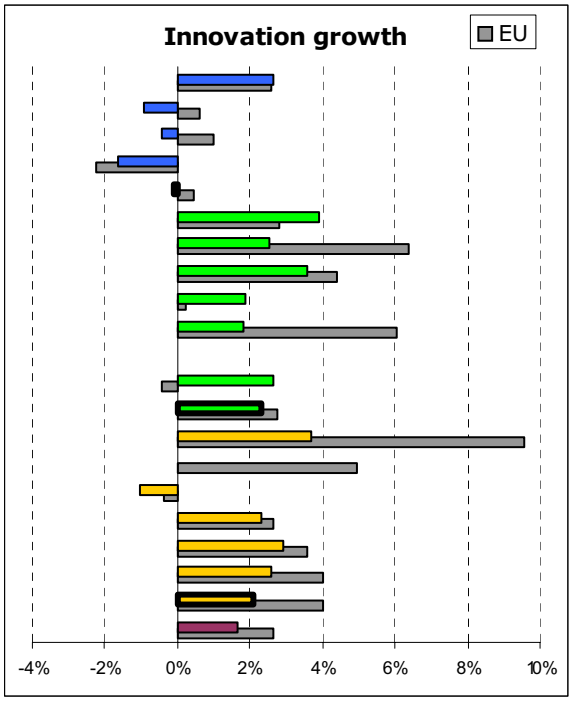
innovation performance has grown at an annual rate of 0.95% while the EU27 is growing at an annual rate of 2.65%[19]. It is striking that the EU outperforms the US in growth performance in all of the indicators except Business R&D, EPO patents and PCT patents. The EU27 is closing the performance gap with the US in Tertiary education, Researchers, Public R&D, Venture capital, Broadband subscribers, Public-private co-publications, Knowledge-intensive services employment and Medium-high and high-tech manufacturing exports. The EU27 is increasing its lead in S&E graduates, Trademarks, Technology Balance of Payments flows and Medium-high and high-tech manufacturing employment. The US is slightly improving its lead in Business R&D, EPO patents and PCT patents.

Japan is performing better than the EU27 in 12 indicators, only in Trademarks, Technology Balance of Payments flows, Knowledge-intensive services employment and Knowledge-intensive services exports is the EU27 performing better (Figure 12). Overall there is a clear performance gap in favour of Japan, with Japan showing a better performance in Enablers, Firm activities and Outputs. The Japanese innovation lead is however decreasing, as its innovation performance has grown at 1.65% while the EU27 is growing at an annual rate of 2.65%. The EU27 is closing the performance gap with Japan in S&E graduates, Tertiary education, Researchers, Public R&D, Broadband subscribers, Public-private co-publications and Medium-high and high-tech manufacturing exports. The EU27 is increasing its lead in Trademarks, Technology Balance of Payments flows and Knowledge-intensive services employment. Japan is improving its lead in Business R&D, EPO patents, PCT patents and Medium-high and high-tech manufacturing employment and Japan is marginally closing the gap in Knowledge-intensive services exports.

FIGURE 12: EU-JAPAN COMPARISON



JP data for Venture capital are not available.



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

The indicators reflecting Enablers are highlighted in yellow, those reflecting Firm activities in green and those reflecting Outputs in green.

[19] The growth rate for the EU27 is different from that reported in Section 3 (2.3%) at the set of indicators used for the EU-US and EU-Japan comparison is different from that used in the EIS.

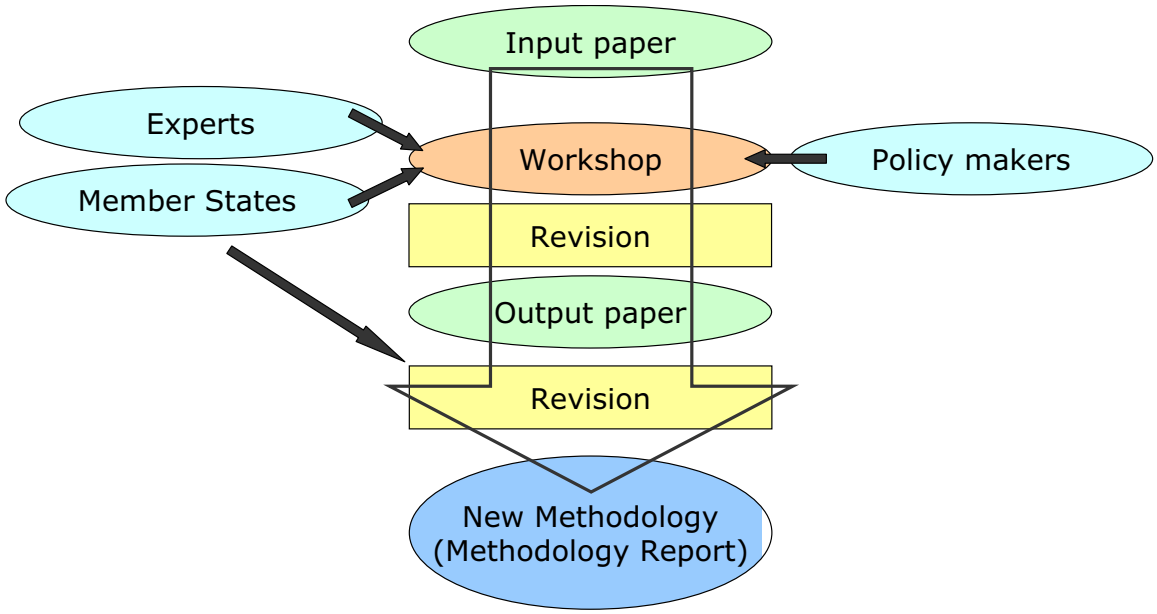
5. THEMATIC REPORTS

5.1. Methodology report[20]

The EIS 2008 Methodology Report explains in detail the new methodology that has been used for the EIS 2008 report and also intended for the 2009 and 2010 reports. The revision of the EIS methodology was a direct result of the challenges discussed in the EIS 2007 report to: 1) measure new forms of innovation; 2) assess overall innovation performance; 3) improve comparability at national, regional and international levels; and 4) measure progress and changes over time.

Over the years the EIS has received a number of criticisms such as the lack of an underlying rationale for the choice of innovation dimensions and indicators; for using composite indicators and ranking tables; for being biased to measuring innovation in high-tech industries; for the fact that several of its indicators are highly correlated; and for the underlying assumption that a higher score on an indicator implies a better innovation performance (a review of published criticisms of the EIS is provided in the 2008 methodology report).

FIGURE 13: EIS REVISION PROCESS



The revised methodology has not only tried to address the above challenges and criticisms, but the revision process has also actively involved the participation of many stakeholders, from academic researchers to policy makers and Member States' representatives (cf. Figure 13). Stakeholders were invited to participate in the June 16 EIS workshop "Improving the European Innovation Scoreboard methodology" in Brussels, discussing in detail the challenges for measuring innovation performance. The workshop input report prepared by UNU-MERIT presented a first draft of a revised list of innovation dimensions and indicators and report prepared by the Joint Research Centre (JRC) discussed a range of different composite indicator growth formulas measuring real progress over time. The workshop's discussions on dimensions and indicators resulted in

[20] "Rethinking the European Innovation Scoreboard: A New Methodology for 2008-2010", September 2008 (http://www.proinno-europe.eu/extranet/admin/uploaded_documents/EIS_2008_Methodology_Report.pdf).

a revised output report discussing an updated draft of a new set of innovation dimensions and indicators[21]. Further work on the feasibility of adopting the new dimensions and indicators and more discussions with some of the stakeholders has resulted in the final list of indicators as shown in Table 1.

During the revision process three principles were applied in considering possibilities for improvement: 1) Simplicity such that the number of indicators is limited as compared to other studies and will not undergo unnecessary manipulations; 2) Transparency such that all results can be easily recalculated, based on a careful and detailed explanation of the methodology for calculating the composite innovation indicators; and 3) a reasonable level of continuity with previous and future years such that the results between the new EIS 2008 will be directly comparable to those of the EIS 2009 and EIS 2010 and the results of the EIS 2000-2007.

The revised methodology is presented in the Methodology Report published in September 2008 and it presents a short rationale for including each indicator and concise definitions.

The new methodology also includes a revised method of calculating countries' average innovation performance allowing tracking the development of individual innovation performance over time. As with any benchmarking exercise, the inherent assumption is that innovation performance can be measured using the same set of indicators despite the fact that there are differences in countries' innovation systems. The new methodology only uses internationally comparable statistics that are regularly updated, and is therefore limited by the availability and timeliness of such data. It is intended to maintain the same methodology for the 2009 and 2010 editions of the European Innovation Scoreboard to allow direct comparability between reports, while at the same time exploring the potential of new statistical sources through the EIS thematic reports.

5.2. Neglected innovators[22]

R&D is not the only method of innovating. Other methods include technology adoption, incremental changes, imitation, and combining existing knowledge in new ways. With the possible exception of technology adoption, all of these methods require creative effort on the part of the firm's employees and consequently will develop the firm's in-house innovative capabilities. These capabilities are likely to lead to productivity improvements, improved competitiveness, and to new or improved products and processes that could have wider impacts on the economy. For these reasons, the activities of firms that innovate without performing R&D are of interest to policy.

The report on "Neglected indicators" uses a new data set to explore innovation activities that are not based on R&D. These activities can be used by both innovative firms that perform R&D and by innovative firms that do not perform R&D. The data are from the Innobarometer (IB) 2007 survey, which was partly designed to delve further into innovative activities that are not based on R&D – to look more closely at how 'neglected innovators' innovate.

The IB survey is based on a quota survey for all 27 EU member states. Results are available for 4,395 innovative firms, covering innovative activities over 2005 and 2006. Of these, 52.5% innovate without performing R&D (non-R&D innovators), 40.0% perform R&D in-house, and 7.5% contract out R&D to other firms or organizations. The share of non-R&D innovators is similar to the 50% share observed for the third European Community Innovation Survey (CIS) for the three year period of 1998 to 2000.

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[21] These reports are available at the workshop's website: http://www.eis.eu/workshop

[22] Arundel A., C. Bordoy and M. Kanerva, "Neglected innovators: How do innovative firms that do not perform R&D innovate? Results of an analysis of the Innobarometer 2007 survey No. 215", INNO Metrics Thematic Paper, March 2008.

Compared to firms that perform R&D in-house, a higher percentage of non-R&D innovators have less than 50 employees, are active in low technology service sectors, and are located in European countries with below average innovative performance. However, non-R&D innovators are found in all size categories, countries, and sectors. For example, 10% of non-R&D innovators have over 250 employees and one-third are located in the leading innovative countries of Germany and Scandinavia.

Non-R&D innovators, compared to R&D performers, are more likely to focus on process innovation and to source ideas from within the firm from production engineers and design staff. The higher prevalence of process innovation among non-R&D performers suggests that there are more options for developing process innovations without performing R&D. Non-R&D innovators spend less on innovation than R&D performers. This holds after controlling for the effect of firm size.

For product and process innovations, there is no statistically significant difference between non-R&D innovators and in-house R&D performers in the percentage of firms that report technology adoption with little or no modification in-house or who report modifying products or processes obtained from external sources. In all cases, approximately one-third of non-R&D innovators and firms that perform R&D use these two methods.

The main difference is in the percentage of innovative firms that develop products, processes, or organizational methods in-house or in collaboration with other external sources. Twice as many firms that perform R&D in-house collaborate on product or process innovations compared to non-R&D innovators (44% versus 22% for product innovations). However, non-R&D innovators are relatively more dependent than R&D performing firms on the diffusion of knowledge from other firms, particularly through knowledge embodied in acquired products and processes.

An important method of innovating without performing R&D (used equally by non-R&D and R&D performing innovative firms) is to customize or modify products and processes obtained from other firms. The information sources used by both groups for this type of innovative activity are similar, except that a higher percentage of R&D performers draw on the use of external experts such as consultants or universities.

In general, non-R&D innovators have lower innovative capabilities (i.e. abilities to develop more novel innovations) than R&D performing firms, with fewer non-R&D innovators capable of developing innovations in-house and a smaller percent reporting training or skill upgrading linked to innovation. However, a striking result is that these differences are minor: 71% of non-R&D innovators report developing either product or process innovations in-house (compared to 91% of R&D performers), 54% of staff time on innovation is for developing product and process innovations in-house (compared to 63% for R&D performers) and 70% report training or skills upgrading for innovation (compared to 79% of R&D performers).

The results show that a majority of non-R&D innovators invest in creative innovative activities. Many of these firms should therefore be able to benefit from policy support for their innovative activities. However, policy appears to fail this group of 'neglected' innovators. Only 33% of non-R&D innovators report using at least one of six types of innovation support programmes, that do not require R&D compared to 47% of R&D performers. These differences hold after controlling for the innovative capabilities of non-R&D and R&D innovators. In particular, firms that innovate primarily through customizing or modifying products or processes are significantly less likely than firms that develop innovations in-house to apply for or use innovation support programmes.

5.3. Global Innovation Scoreboard[23]

The new Global Innovation Scoreboard 2008 (GIS 2008) aims at comparing the innovation performance of the EU27 to that of the other major R&D spenders in the world: Argentina, Australia, Brazil, Canada, China, Hong Kong, India, Israel, Japan, New Zealand, Republic of Korea, Mexico, Russian Federation, Singapore, South Africa and the United States. The GIS 2008 methodology includes 9 indicators of innovation and technological capabilities (see Table 4). They are grouped in three main dimensions (pillars): Firm Activities and Outputs, Human Resources and Infrastructures and Absorptive Capacity.

Table 4: GIS pillars and indicators

Pillar	Indicator
Firm Activities and Outputs	Triadic patents per population (3 years average)
	Business R&D (BERD) as a % of GDP
Human Resources	S&T tertiary enrolment ratio
	Labour force with tertiary education (% total labour force)
	R&D personnel per population
	Scientific articles per population
Infrastructures and Absorptive Capacity	ICT expenditures per capita
	Broadband penetration per population
	Public R&D (HERD + GERD) as a % of GDP

For each pillar a "Dimension Composite Innovation Index" is calculated as a simple average of the indicators. The GIS is composed by each Dimension Composite Innovation Index. Since the innovation scoreboard should emphasize the innovative activities which take place in the business sector, the first pillar - "Firm Activities and Outputs" - accounts for 40 per cent of the total GIS score, while the other two pillars - "Human Resources and "Infrastructures and Absorptive Capacity" - account for 30 per cent each[24]. As in the EIS all variables are normalized on a scale from 0 to 1, and countries are ranked on an ordinary scale. The GIS 2008 is calculated relatively to two different years – 1995 and 2005 – to allow over time comparison of national innovative performance[25]. It should be noted that a more limited set of indicators is used compared to the main EIS, as well as a different time period. Therefore the results differ from those of the main EIS, particularly for countries that increased their performance over the period 1995 to 2002 and for countries that have relative strengths in the indicators used in the GIS.

In Table 5 we summarize the Global Innovation Performance of countries by showing their ranks for the GIS and each of the three pillars relatively to years 1995 and 2005. Concerning 2005, among the top ten, countries perform differently across the three pillars. Switzerland, Japan, Korea and Germany show excellent relative performance in Firm innovative activities. Finland, Israel and Canada are particularly strong in Human Resources. Finally, Sweden and Denmark result well-positioned regarding their Infrastructures and Absorptive Capacity. By comparing the 2005 GIS ranks to 1995 as a whole, it is worth-emphasizing how innovation performance and technological capabilities are phenomena *structural* in nature.

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[23] The Global Innovation Scoreboard has been prepared by the Italian National Research Council (CNR).

[24] Accordingly, the GIS scores are calculates as follows: (pillar_1 * 0.4) + (pillar_2 * 0.3) + (pillar_3 * 0.3).

[25] Given the inherent structural characteristic of the innovative performances of countries, a time span of 10 years has been chosen in order to assess their dynamics over a large period of time. For some countries and the EU27 block the GIS is not calculated relatively to 1995 due to a lack of data availability. Much of the data is not available on a comparative basis for years after 2005.

Table 5: GIS: ranks and ranks variations[26] for each pillar, 1995 and 2005

	GIS		Firm activities		Human Resources		Infrastructures and Absorptive Capacity	
Country	rank 2005	rank variation	rank 2005	rank variation	rank 2005	rank variation	rank 2005	rank variation
Sweden	1	0	4	-3	4	-2	1	1
Switzerland	2	0	2	0	5	-2	3	6
Finland	3	3	5	-1	1	3	2	12
Israel	4	1	3	4	3	-2	11	-7
Japan	5	-1	1	2	13	-3	9	-4
United States	6	-3	8	-2	6	-1	7	-6
Denmark	7	3	10	3	8	1	4	7
Korea, Rep.	8	4	7	5	7	10	14	-4
Canada	9	0	18	0	2	5	8	-1
Germany	10	-2	6	-1	17	-1	17	3
Netherlands	11	-4	9	1	20	-1	6	0
Singapore	12	7	15	6	10	11	10	2
France	13	-2	13	-4	18	-7	12	3
Austria	14	4	12	4	25	1	16	-8
Norway	15	2	20	-3	14	4	5	8
United Kingdom	16	-2	17	-3	12	2	13	9
Belgium	17	-4	14	-3	23	-11	18	3
Australia	18	-3	19	0	9	n/a	19	-3
Luxembourg	19	n/a	11	-3	21	19	n/a	n/a
EU-27	20	-3	16	-1	19	-4	21	-2
Hong Kong	21	n/a	32	2	n/a	n/a	15	-12
New Zealand	22	0	23	6	26	-18	20	3
Ireland	23	1	21	-1	16	7	23	1
Spain	24	6	28	0	15	10	24	4
Slovenia	25	-2	22	0	28	-4	25	-8
Italy	26	2	26	-3	32	-4	22	3
Czech Republic	27	4	24	0	29	0	28	6
Estonia	28	-2	33	4	27	0	27	-9
Russian Fed.	29	-2	27	-1	11	2	42	-3
Portugal	30	7	35	3	31	8	26	3
Greece	31	4	43	-8	24	8	35	-2
Lithuania	32	-3	41	5	30	-8	29	-3
Hungary	33	1	31	-1	38	-4	30	1
China	34	8	25	7	48	-3	31	9
Croatia	35	n/a	n/a	n/a	36	-5	43	0
Cyprus	36	5	42	2	37	0	33	5
Slovak Republic	37	-11	39	-12	34	-14	39	-12
Bulgaria	38	-5	47	-11	33	-3	37	-7
Malta	39	n/a	29	13	47	-1	n/a	n/a
Turkey	40	5	38	3	44	3	34	3
Poland	41	-3	45	-12	39	-1	36	-4
Brazil	42	5	34	11	46	2	32	10
Mexico	43	-2	40	3	35	0	44	-3
South Africa	44	n/a	30	1	45	-1	n/a	n/a
Argentina	45	-1	46	-7	40	3	41	-6
India	46	1	36	11	42	0	38	7
Latvia	47	-6	37	3	43	-7	40	-4
Romania	48	-12	44	-19	41	-8	45	-1

Countries rank in fact fairly stable over ten years[27]. The fastest improving countries are China, which climbs eight positions (+8), Portugal (+7), Singapore (+7), Spain (+6)[28],

[26] Rank variations are calculated using the scores for those countries for which both 1995 and 2005 data are available. Rank variations are thus not obscured by the entrance of countries in 2005 for which data were not available for 1995.

[27] GIS rank correlation relatively to 1995 and 2005 is equal to 0.94, while it is around 0.90 for the three pillars.

[28] Spain's growth performance on Human Resources (HR) is different from that in the EIS where Spain only shows a very modest improvement (cf. Figure 7 and Spain's country profile in Section 6). For this there are two explanations. First, the set of indicators used in the GIS is different from that in the EIS (cf. Table 1) where only one indicator – Labour force with tertiary education – is used in both. Second, where the GIS

Cyprus (+5), Turkey (+5) and Brazil (+5). Singapore bases its increase mainly on Firm Activities and Human Resources, and Spain and Portugal particularly on Human Resources. China shows its best performance relatively to Firm Activities and Infrastructures and Absorptive Capacity, while it looses 3 positions on Human Resources. Brazil shows strong increases in Firm activities and Infrastructures and Absorptive Capacity and a moderate increase in Human Resources. As far as the other BRIC countries are concerned, India improves one position and the Russian Federation looses 2 positions.

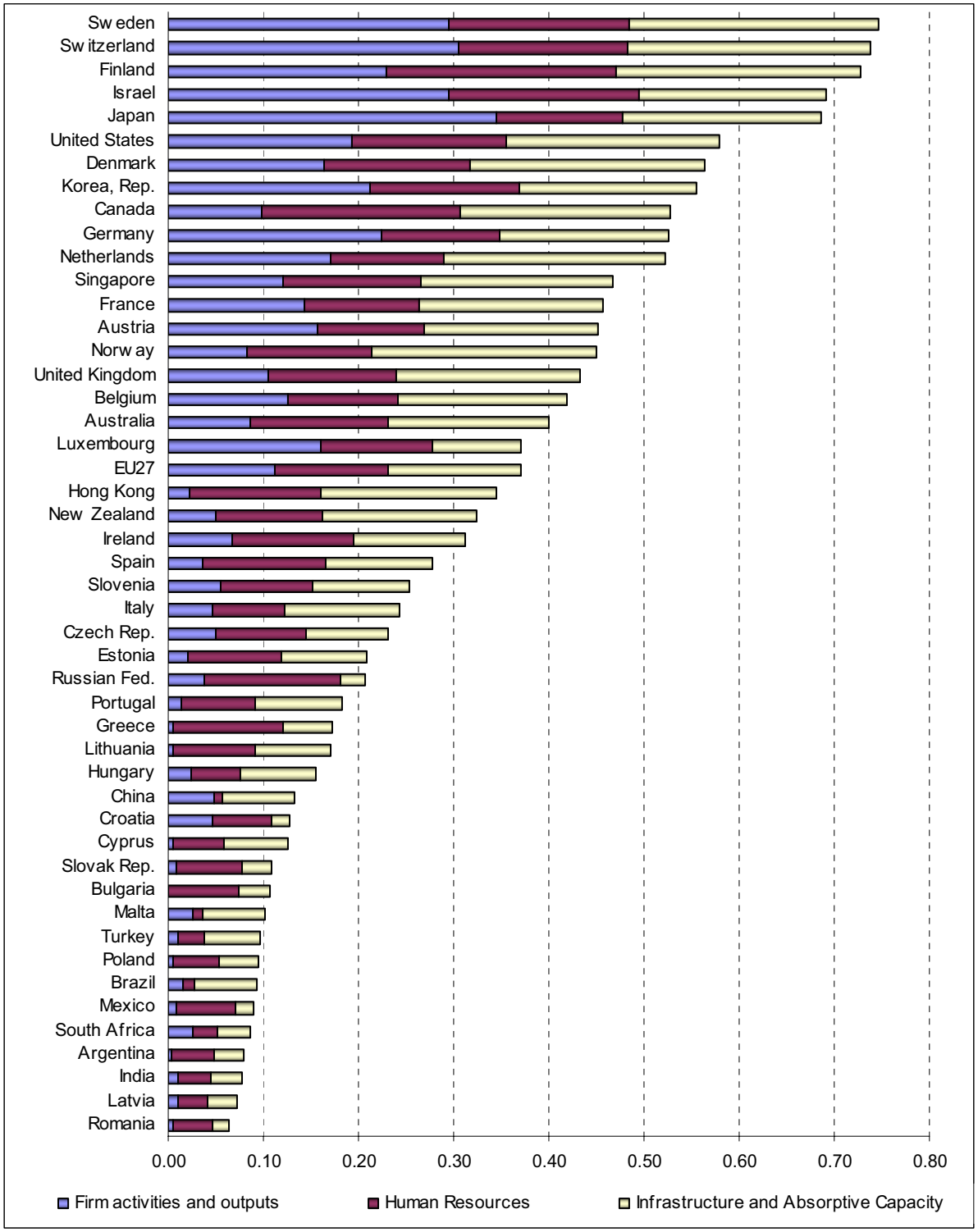
The EU27 reaches the twentieth position, showing a good performance particularly on Firm Activities. The "balanced" innovation performance of the EU27 emerges from Figure 14 where it is notable how the three pillars have the same relative importance. The Unites States show a composition similar to that of the EU27, while Japan's innovation performance is more based on business activities.

The 1995-2005 rank variations relative to the pillar Firm Activities and Outputs reflect the major dynamism of three BRIC countries, namely Brazil, China and India, concerning their business innovative performances as measured by patenting activity and business R&D expenditures. Among the top performers, some have been loosing ground relatively to the other countries, i.e. United States, Sweden, Norway, United Kingdom, Germany and France. On the opposite, some top performers have been increasing their position: Japan, Korea, Israel and Denmark. The 1995-2005 rank variations relative to the pillar Human Resources show that Luxembourg, Greece, Korea, Ireland, Singapore, Portugal and Spain are the best gainers. China looses some positions; India holds its position while Brazil and Russian Federation moderately improve. It is worth noting that among countries loosing positions there are advanced economies, e.g. the United States, Switzerland, Sweden, Japan, Italy, France, Belgium and Germany. The 1995-2005 rank variations relative to the pillar Infrastructures and Absorptive Capacity show that the more dynamic countries include three BRIC countries, Brazil, China and India, in addition to Czech Republic, Denmark, Finland, Luxembourg, Norway, Switzerland and United Kingdom.

Finally, Figure 14 reveals the relative contributions of the three pillars to the GIS 2005. The relative contribution of the innovative performance of the business sector - Firm Activities and Outputs – is particularly important for the first 15 countries with the exception of Canada, Norway and Australia. Also China shows a relative high score in innovative activities taking place in the business sector. Among the BRIC countries, Human Resources play an important role for the innovation performance of the Russian Federation and India, while Brazil and China show higher relative contributions from Infrastructure and Absorptive Capacity.

studies improvements between 1995 and 2005, the EIS looks at more recent improvements between 2003 and 2007. Evidence for three of the EIS HR indicators shows that Spain was enjoying higher growth rates between 1995 and 2005 for Population with Tertiary education (5.5% average annual growth vs. 3.7% for 2003-2007), Participation in life-long learning (1.9% vs. -0.5%) and Youth education attainment level (0.6% vs. -0.4%). Also for S&E graduates average annual growth between 1995 and 2005 was stronger than that between 2002 and 2006 (4.0% vs. -3.0%).

Figure 14: Global Innovation Performance – 2005



5.4. Creativity and design

Creativity and design are important features of a well-developed knowledge economy spurring innovation and having a favourable impact on people's well-being and business performance. The importance of creativity for innovation is reflected by the fact that 2009 will be the European Year of Creativity and Innovation: "The aim is to exploit and promote creative and innovative approaches and initiatives in different domains of human activity and at all levels. While education and culture will be at the centre of the Year, it feeds into many other policy areas, such as enterprise, information society, employment or regional policy"[29].

In preparation of a Commission Staff Working Document to be published in 2009, the European Innovation Scoreboard project was asked to prepare a statistical document aimed at measuring Member States' performance in design and creativity based on currently available quantitative indicators, to classify these indicators into meaningful blocks capturing relevant but distinct aspects of design and creativity, to analyse the links between design and creativity and innovation performance, and to suggest improvements for measuring creativity and design.

Following the EIS, this report adopts a 'scoreboard approach' using a large set of indicators to capture the different dimensions. It should be stressed that there is a general lack of quantitative indicators which directly measure creativity and design. Creativity is defined as the generation of new ideas, but the number of ideas is an unobserved statistical phenomenon. For design activities there is more statistical evidence, but the number of indicators directly measuring design activities is limited. We therefore have to rely on so-called proxy indicators, which only indirectly measure creativity and design, thereby creating possible errors in the scoreboard approach where countries' performance could be under- or overvalued based on the respective bias in these proxy indicators towards measuring 'true' performance. The quality of the educational system, the desire of people to express themselves (artistically) and the openness of a society towards different countries and cultures determine the Creative climate. A more favourable Creative climate will result in more ideas, more creativity, and more creativity is assumed to increase R&D and design activities, where R&D and design not only further develop these ideas but also shape them into commercially attractive new products and processes, thus increasing innovation.

The statistical results in this paper confirm that a favourable Creative climate has a positive effect on a country's creativity, even after controlling for differences in income levels, thus taking into account that wealthier countries are in a position to spend relatively more resources on their education system. Countries where people are eager to be involved in artistic and cultural activities also appear to be more creative. However, openness to other countries and cultures, e.g. reflected by larger shares of foreign students and employees, does not appear to have a positive impact on creativity.

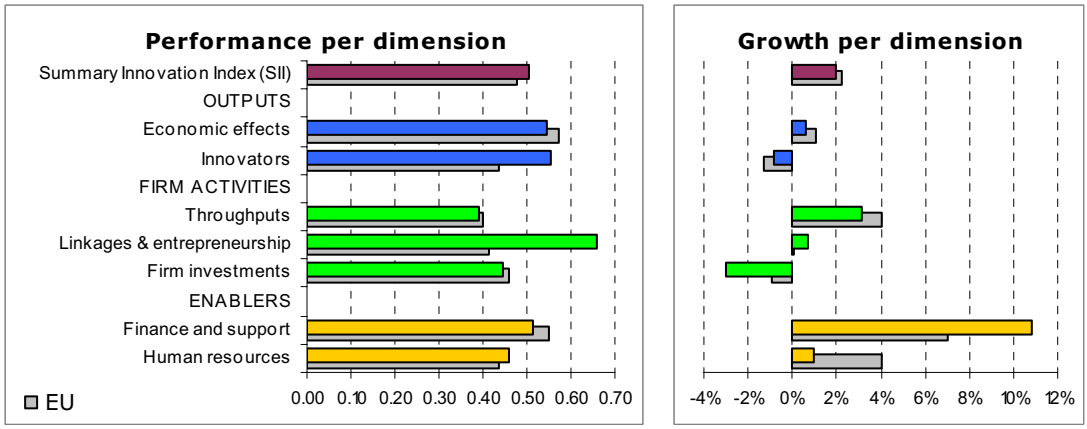
Higher levels of creativity result in increased levels of R&D and design activities. Apparently more ideas create a larger and more diversified pool of potential research projects, tempting firms to increase their R&D and design activities. The statistical results also show strong evidence for a positive link between increased R&D and design activities and overall innovation performance, although innovation is also dependent on a range of other framework conditions.

[29] http://create2009.europa.eu/

6. COUNTRY PROFILES

In this section for each country a more detailed country profile is shown highlighting for each country is 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) and detailed information on policy measures and governance is available at the INNO Policy TrendChart website (http://www.proinno-europe.eu/trendchart).

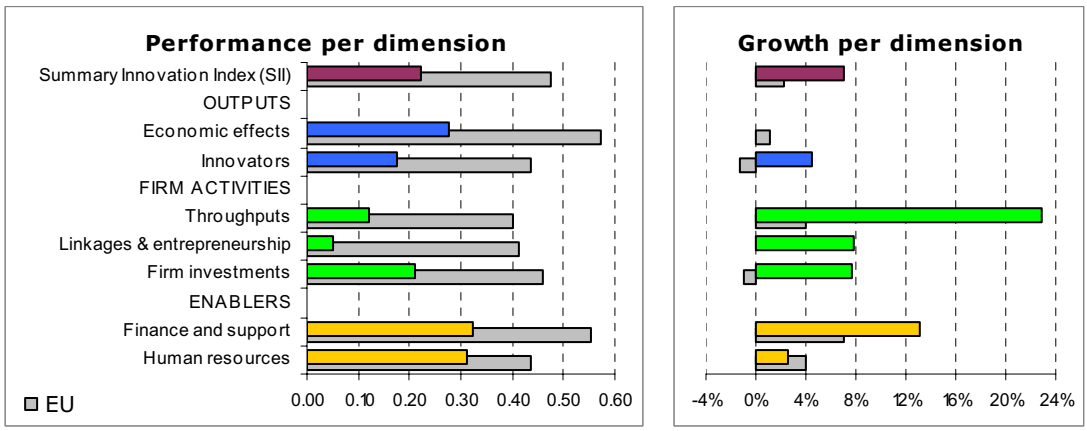
BELGIUM



For Belgium, one of the Innovation followers, innovation performance is above the EU27 average but the rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in Linkages & entrepreneurship, Innovators and Economic effects and relative weaknesses are in Firm investments and Throughputs.

Over the past 5 years, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Venture capital (23.1%) and Broadband access by firms (15.1%). Performance in Firm investments and Innovators has worsened, in particular due to a decrease in Non-R&D innovation expenditures (-8.5%).

BULGARIA

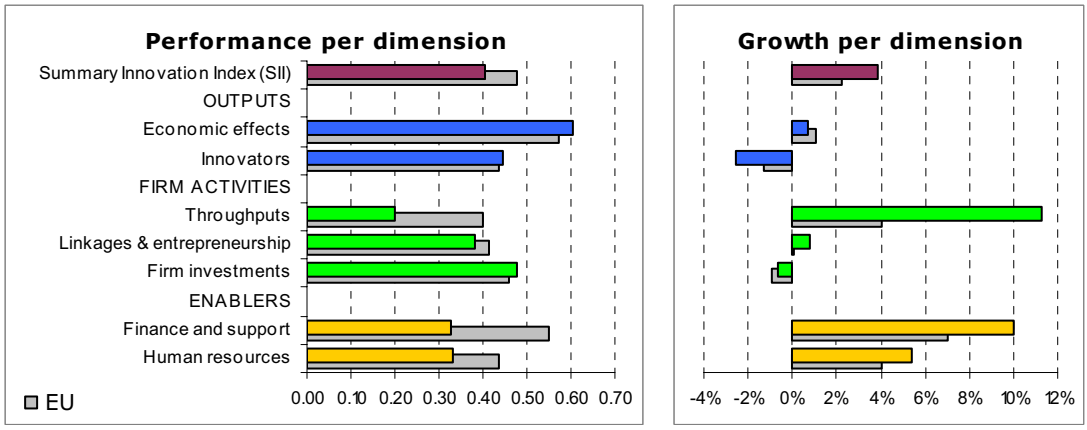


Bulgaria is one of the Catching-up countries with an innovation performance well below the EU27 average but the rate of improvement is one of the highest of all countries and it is a growth leader within the Catching-up countries. Relative strengths, compared to the country's average performance, are in Human resources, Finance and support and

Economic effects and relative weaknesses are in Linkages & entrepreneurship and Throughputs.

Over the past 5 years, Throughputs and Finance and support have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Private credit (25.2%), Broadband access by firms (21.5%), Community trademarks (67.6%) and Community designs (31.0%). Performance in Economic effects has hardly grown, in particular due to a decrease in New-to-market sales (-5.7%) and New-to-firm sales (-3.1%).

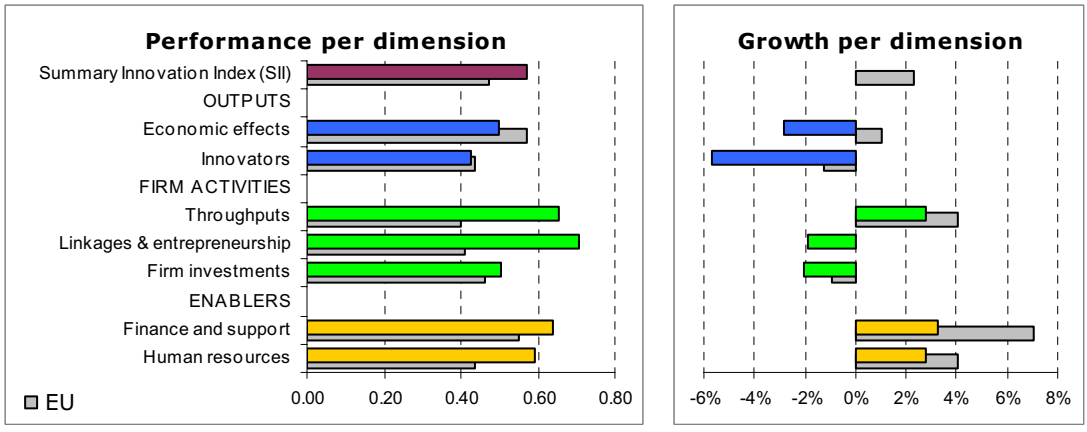
CZECH REPUBLIC



The Czech Republic is among the group of Moderate innovators with innovation performance below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Firm investments, Innovators and Economic effects and relative weaknesses are in Throughputs, Finance and support and Human resources.

Over the past 5 years, Throughputs, Human resources and Finance and support have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Community designs (26.0%), Technology Balance of Payments flows (13.1%), S&E and SSH graduates (14.1%), Private credit (11.8%) and Broadband access by firms (40.1%). Performance in Innovators has worsened, due to a decrease in SMEs introducing product or process innovations (-2.6%).

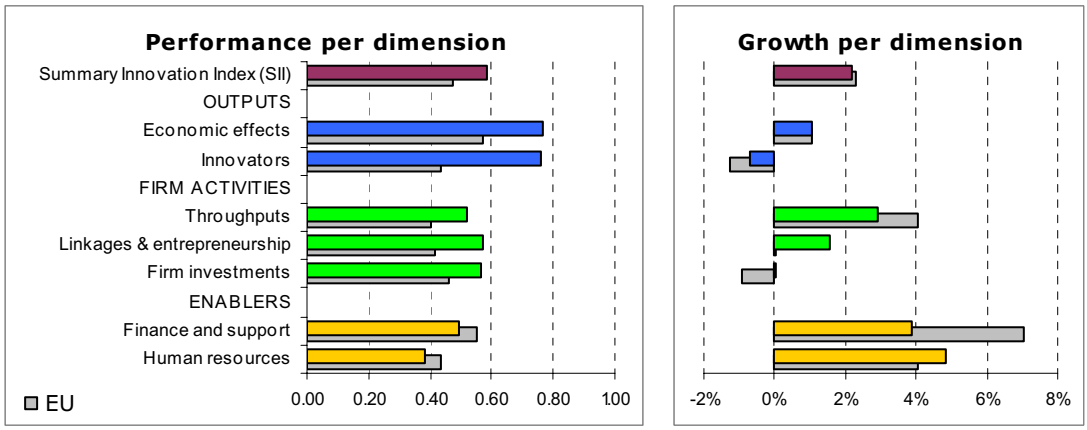
DENMARK



For Denmark, one of the Innovation leaders, innovation performance is well above the EU27 average but the rate of improvement is not only below that of the EU27 but virtually zero. Relative strengths, compared to the country's average performance, are in Human resources, Finance and support, Throughputs and Linkages & entrepreneurship and relative weaknesses are in Firm investments, Innovators and Economic effects.

Over the past 5 years, Human resources, Finance and support and Throughputs have been the main drivers of a stagnating innovation performance, in particular resulting from strong growth in Private credit (7.5%) and Community trademarks (5.4%). Performance in Firm investments, Linkages & entrepreneurship, Innovators and Economic effects has worsened, in particular due to decreases in Innovative SMEs collaborating with others (-8.0%), SMEs introducing product or process innovations (-5.7%), New-to-market sales (-7.7%) and New-to-firm sales (-8.5%).

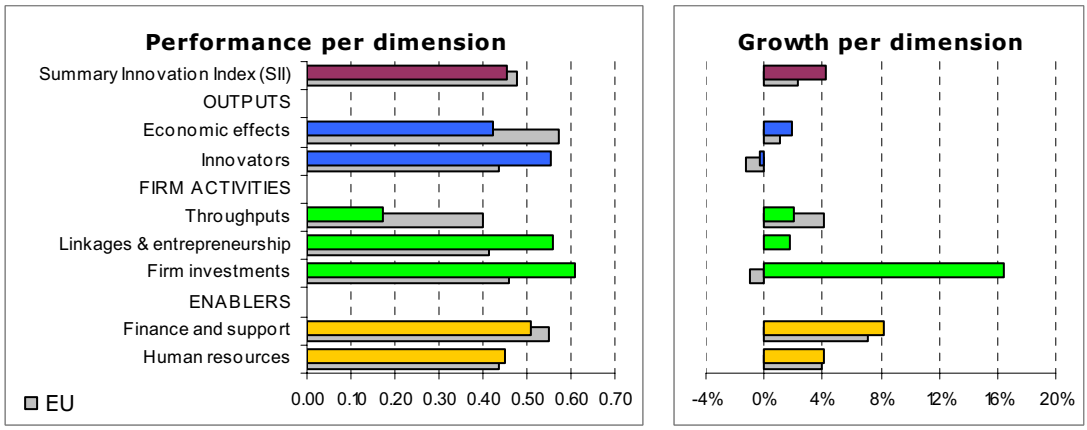
GERMANY



Germany is one of the Innovation leaders with innovation performance considerably above the EU27 average and the rate of improvement is about the same as that of the EU27. Relative strengths, compared to the country's average performance, are in Innovators and Economic effects and relative weaknesses are in Human resources, Finance and support and Throughputs.

Over the past 5 years, Human resources, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH graduates (12.1%), Life-long learning (6.8%), Broadband access (17.5%) and Community trademarks (6.1%). Performance in Innovators has slightly worsened, due to a decrease in SMEs introducing product or process innovations (-0.7%).

ESTONIA

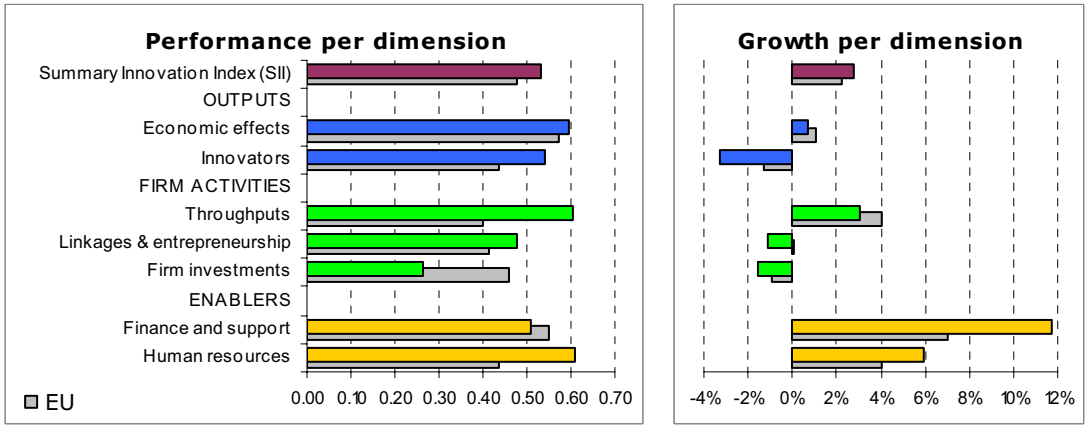


For Estonia, one of the Moderate innovators, innovation performance is just below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support, Firm investments, Linkages & entrepreneurship and Innovators and relative weaknesses are in Throughputs.

Over the past 5 years, Finance and support and Firm investments have been the main drivers of the improvement in innovation performance, in particular as a result from

strong growth in Private credit (16.8%), Business R&D expenditures (20.0%), Non-R&D innovation expenditures (29.3%) and Community trademarks (17.6%). Performance in Innovators has remained stable.

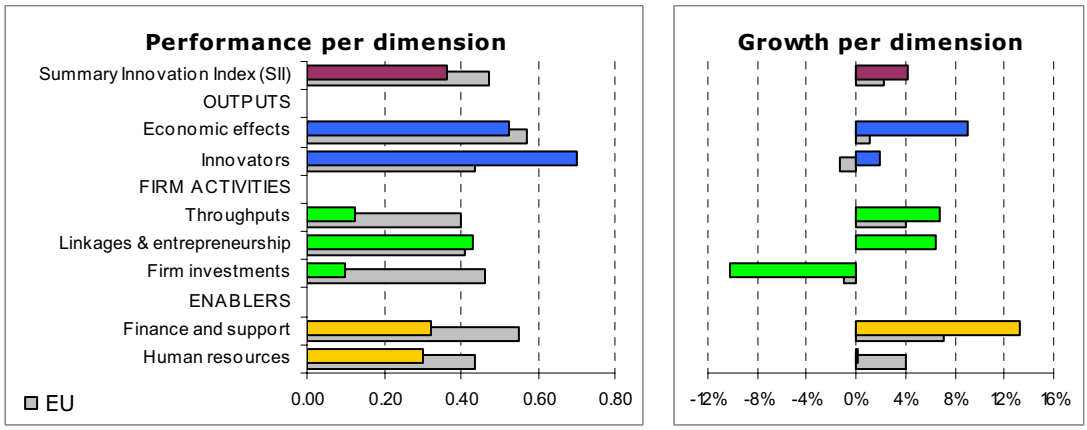
IRELAND



Ireland is in the group of Innovation followers, with an innovation performance above the EU27 average. It is a growth leader within this group of countries with a rate of improvement just above that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources, Throughputs and Economic effects and relative weaknesses are in Firm investments and Linkages & entrepreneurship.

Over the past 5 years, Human resources and Finance and support have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH doctorate graduates (12.8%), Private credit (14.6%) and Broadband access by firms (37.5%). Performance in Firm investments, Linkages & entrepreneurship and Innovators has worsened, in particular due to a decrease in Non-R&D innovation expenditures (-5.7%), Innovative SMEs collaborating with others (-7.0%) and SMEs introducing product or process innovations (-3.3%).

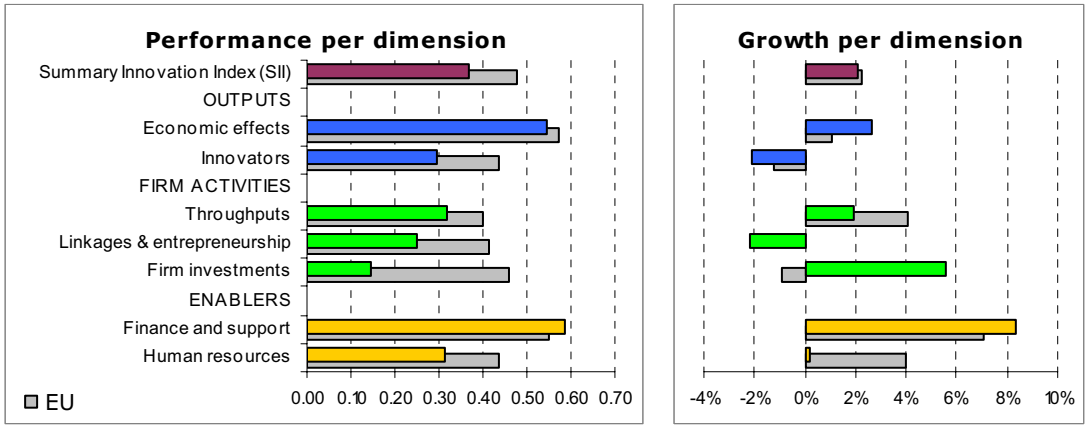
GREECE



For Greece, one of the Moderate innovators, innovation performance is below the EU27 average and the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Linkages & entrepreneurship, Innovators and Economic effects and relative weaknesses are in Throughputs and Firm investments.

Over the past 5 years, Finance and support and Economic effects have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Broadband access by firms (51.6%) and New–to-market sales (32.8%). Performance in Firm investments has worsened, due to a decrease in Business R&D expenditures (-4.5%) and Non-R&D innovation expenditures (-22.7%).

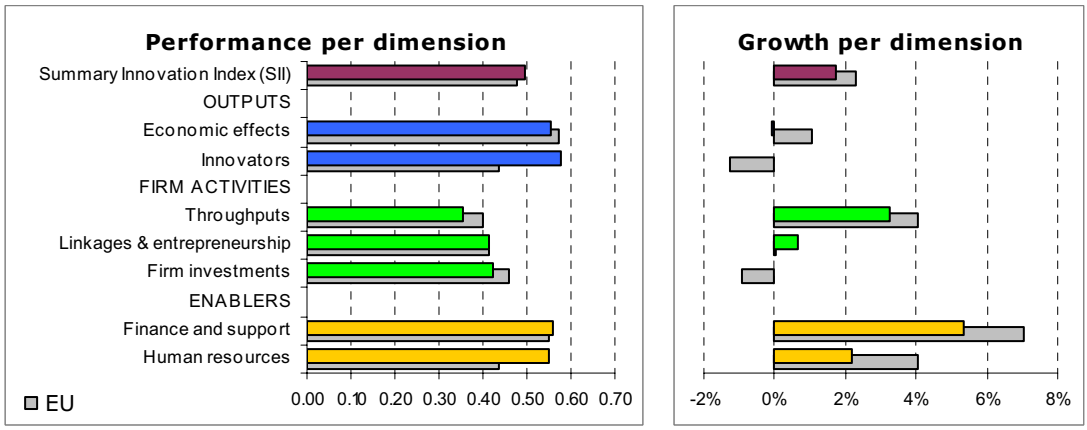
SPAIN



For Spain, one of the Moderate innovators, innovation performance is below the EU27 average and the rate of improvement is just below that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support and Economic effects and relative weaknesses are in Firm investments and Linkages & entrepreneurship.

Over the past 5 years, Finance and support and Firm investments have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Private credit (12.7%), Broadband access by firms (15.3%) and Non-R&D innovation expenditures (13.4%). Performance in Linkages & entrepreneurship and Innovators has worsened, in particular due to a decrease in the Firm renewal rate (-6.0%). The growth in performance in Human resources is significantly below the EU average.

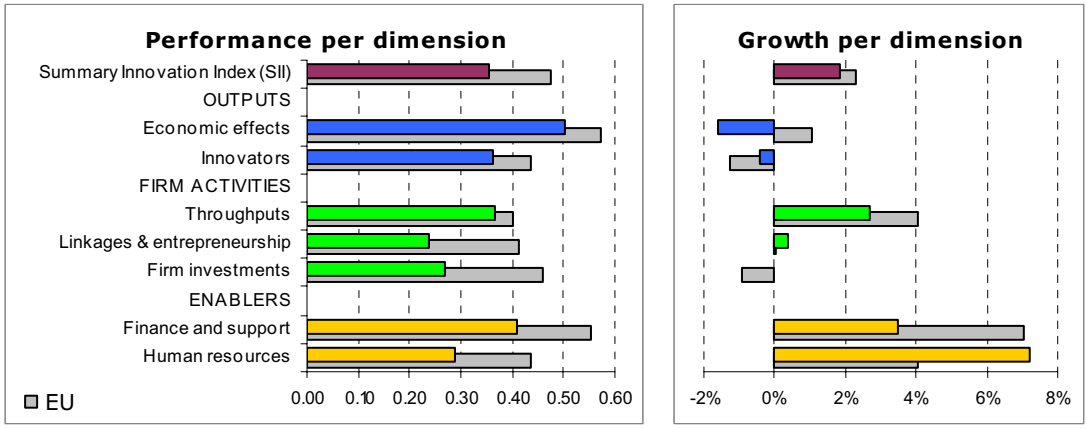
FRANCE



France is in the Innovation followers group of countries with an innovation performance above the EU27 average but the rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in the Enablers (Human resources, Finance and support), and Outputs (Innovators and Economic effects) and relative weaknesses are in Firm activities (Firm investments, Linkages & entrepreneurship and Throughputs).

Over the past 5 years, Human resources, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from growth in S&E and SSH doctorate graduates (5.1%), Broadband access by firms (16.1%) and Community designs (4.9%). Performance in Economic effects has not improved, in particular due to a decrease in Medium-high & high-tech manufacturing exports (-0.7%).

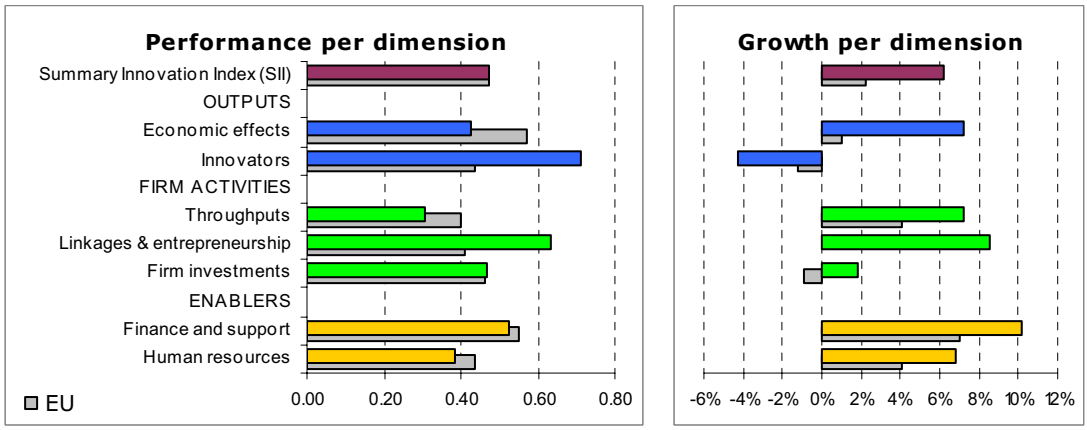
ITALY



For Italy, one of the Moderate innovators, innovation performance is below the EU27 average and the rate of improvement is also below that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support and Economic effects and relative weaknesses are in Human resources, Firm investments and Linkages & entrepreneurship.

Over the past 5 years, strong growth has come from Human resources, and Finance and support and Throughputs have also been the drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH graduates (8.8%), S&E and SSH doctorate graduates (22.7%), Broadband access by firms (18.6%) and Community trademarks (4.7%). Performance in Firm investments has not improved and performance in Innovators and Economic effects has worsened, in particular due to a decrease in New-to-market sales (-7.8%) and New-to-firm sales (-5.3%).

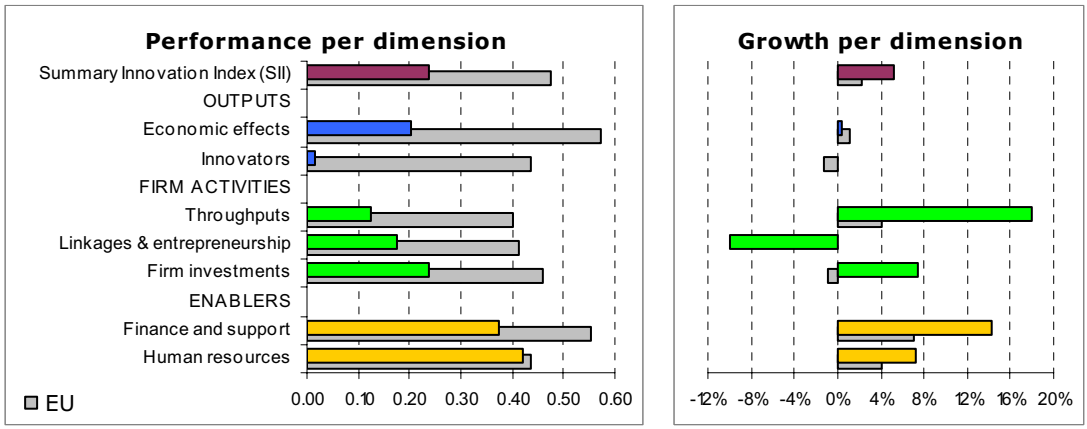
CYPRUS



Cyprus is a growth leader among the group of Moderate innovator countries, with an innovation performance just below the EU27 average and a rapid rate of improvement. Relative strengths, compared to the country's average performance, are in Finance and support, Linkages & entrepreneurship and Innovators and relative weaknesses are in Human resources and Throughputs.

Over the past 5 years there has been strong growth in Finance and support, Linkages & entrepreneurship, Human resources, Throughputs and Economic effects have also been main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH doctorate graduates (18.0%), Broadband access by firms (18.5%), Innovative SMEs collaborating with others (12.3%), Public-private co-publications (11.0%), Community trademarks (12.1%), Community designs (30.5%), New-to-market sales (29.1%) and New-to-firm sales (17.7%). Performance in Innovators has worsened (-4.3%).

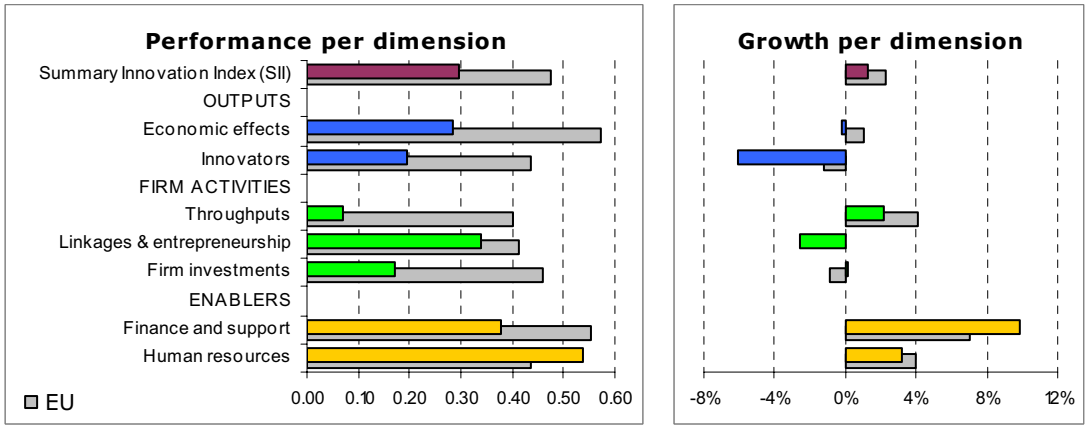
LATVIA



For Latvia, one of the Catching-up countries, innovation performance is well below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources and Finance and support and relative weaknesses are in Linkages & entrepreneurship, Throughputs and Innovators.

Over the past 5 years, Human resources, Finance and support, Firm investments and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH doctorate graduates (25.7%), Private credit (23.4%), Business R&D expenditures (12.7%), Community trademarks (29.4%) and Community designs (19.2%). Performance in Linkages & entrepreneurship has worsened, in particular due to a decrease in the Firm renewal rate (-18.6%) and Public-private co-publications (-8.1%).

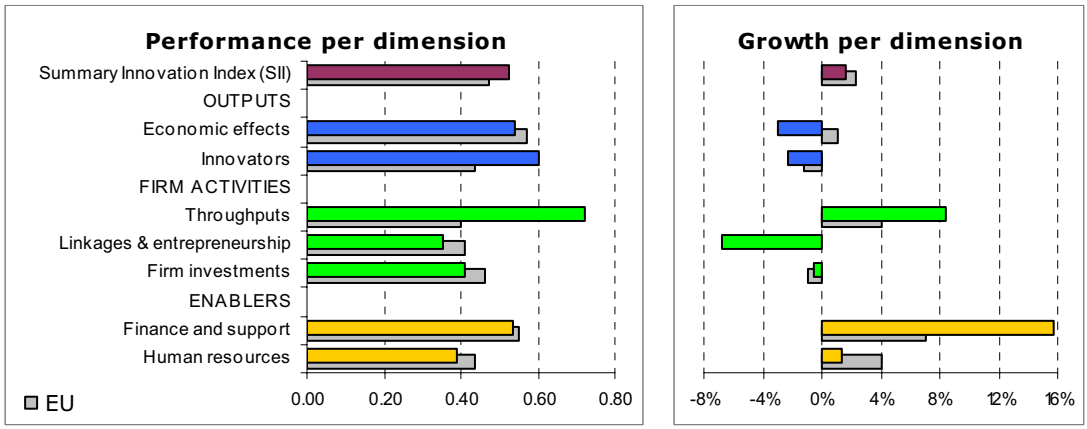
LITHUANIA



Lithuania is among the group of Catching-up countries, with an innovation performance well below the EU27 average. However, unlike most other countries in this group its rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources, Finance and support and Linkages & entrepreneurship and relative weaknesses are in Firm investments, Throughputs and Innovators.

Over the past 5 years, Finance and support, Human resources and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH graduates (10.8%), Private credit (27.9%) and Community trademarks (19.4%). Performance in Linkages & entrepreneurship and Innovators has worsened, in particular due to a decrease in Innovative SMEs collaborating with others (-8.7%) and SMEs introducing product or process innovations (-6.1%).

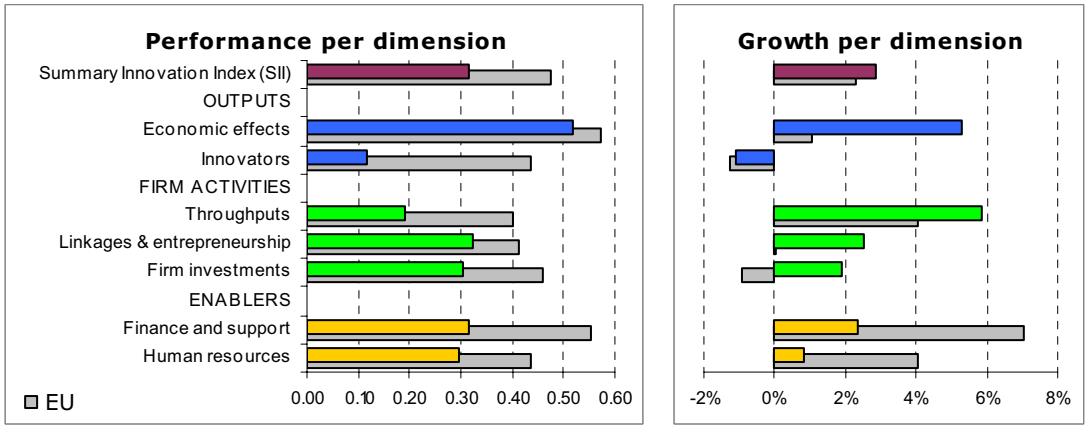
LUXEMBOURG



For Luxembourg, one of the Innovation followers, innovation performance is above the EU27 average but the rate of improvement is slightly below that of the EU27. Relative strengths, compared to the country's average performance, are in Throughputs and Innovators and relative weaknesses are in Human resources, Firm investments and Linkages & entrepreneurship.

Over the past 5 years, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Private credit (16.8%), Broadband access by firms (20.0%) and Community designs (13.5%). Performance in Firm investments, Linkages & entrepreneurship, Innovators and Economic effects has worsened, in particular due to a decrease in Public-private co-publications (-14.3%), Employment in medium-high & high-tech manufacturing (-6.4%) and New-to-firm sales (-8.0%).

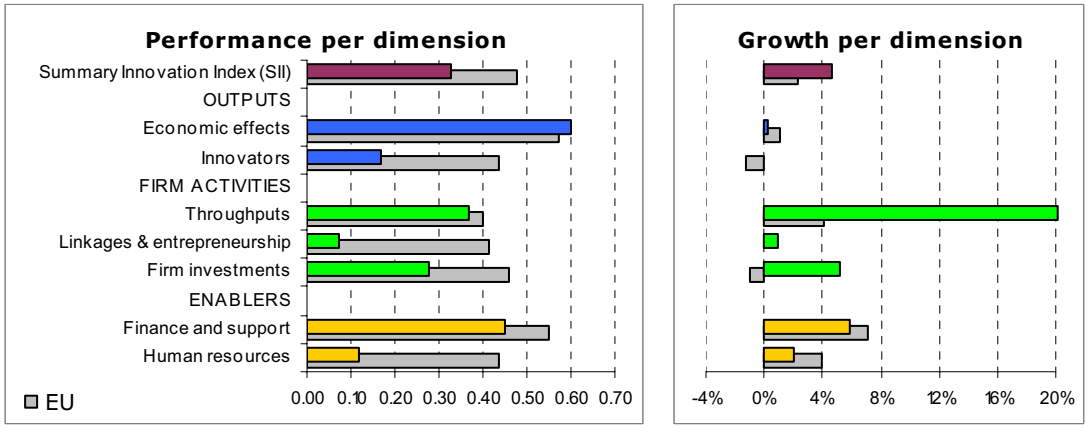
HUNGARY



Hungary is in the group of Catching-up countries with innovation performance well below the EU27 average but a rate of improvement above that of the EU27. Relative strengths, compared to the country's average performance, are in Economic effects and relative weaknesses are in Throughputs and Innovators.

Over the past 5 years, Throughputs and Economic effects have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Community trademarks (10.9%), Community designs (8.9%), Knowledge-intensive services exports (9.6%) and New-to-market sales (17.0%). Performance in Innovators has worsened.

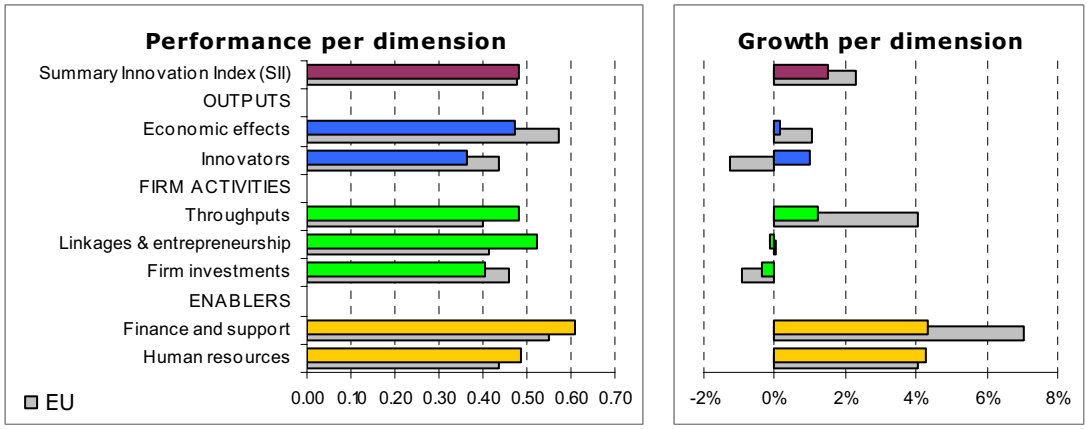
MALTA



For Malta, one of the Catching-up countries, innovation performance is below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support and Economic effects and relative weaknesses are in Human resources, Linkages & entrepreneurship and Innovators.

Over the past 5 years, Throughputs has been the main driver of the improvement in innovation performance, in particular as a result from strong growth in Community designs (32.4%) and Technology Balance of Payments flows (37.5%). Performance in Economic effects has hardly grown, in particular due to a stronger decrease in New-to-firm sales (-18.4%) than the increase in New-to-market sales (16.3%)[30].

NETHERLANDS

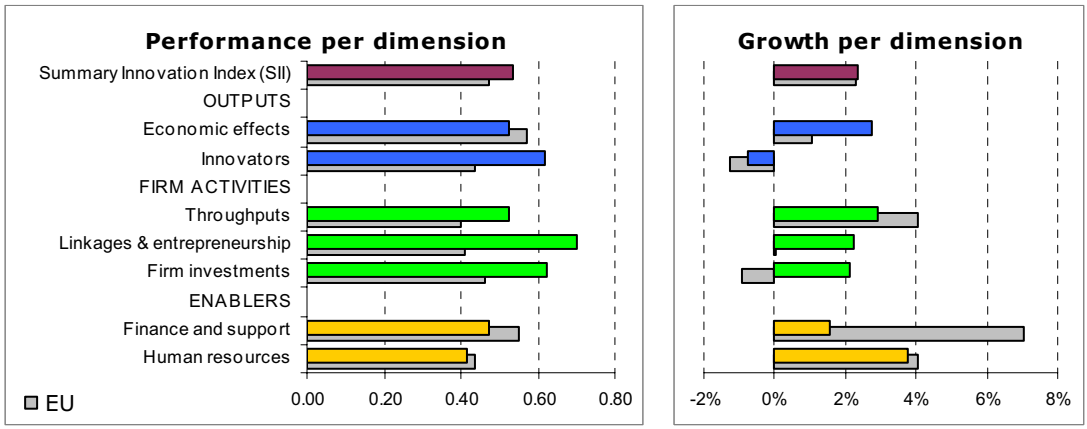


Netherlands is one of the Innovation followers. Its innovation performance is just above the EU27 average but the rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support and Linkages & entrepreneurship while relative weaknesses are in Firm investments and Innovators.

Over the past 5 years, Human resources and Finance and support have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH graduates (11.3%), S&E and SSH doctorate graduates (6.8%) and Broadband access by firms (23.8%). Performance in Firm investments and Linkages & entrepreneurship has worsened, in particular due to a decrease in Non-R&D innovation expenditures (-1.5%) and the Firm renewal rate (-4.4%).

[30] The drop in sales new-to-firm products between the results for 2004 from CIS-4 and CIS-2006 is due to a change in the Maltese questionnaire such that the simple resale of new goods purchased from other enterprises is no longer considered as a product innovation.

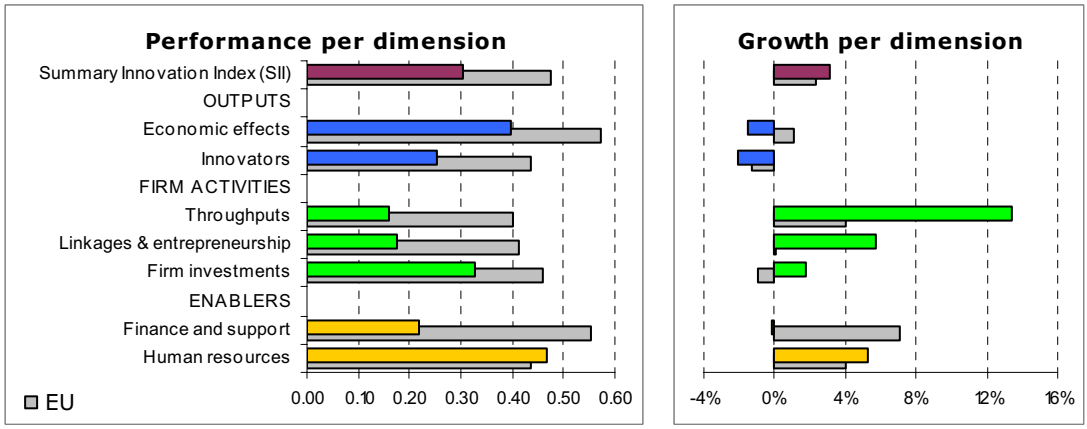
AUSTRIA



For Austria, among the group of Innovation followers, innovation performance is above the EU27 average. Within this group it is a growth leader with a rate of improvement just above that of the EU27. Relative strengths, compared to the country's average performance, are in Linkages & entrepreneurship and Innovators and relative weaknesses are in Human resources and Finance and support.

Over the past 5 years, Human resources has been the main driver of the improvement in innovation performance, in particular as a result from growth in S&E and SSH graduates (7.9%) and Life-long learning (10.5%). But also Firm investments, Linkages & entrepreneurship, Throughputs and Economic effects have shown a steady and substantial improvement. Performance in Innovators however has slightly worsened.

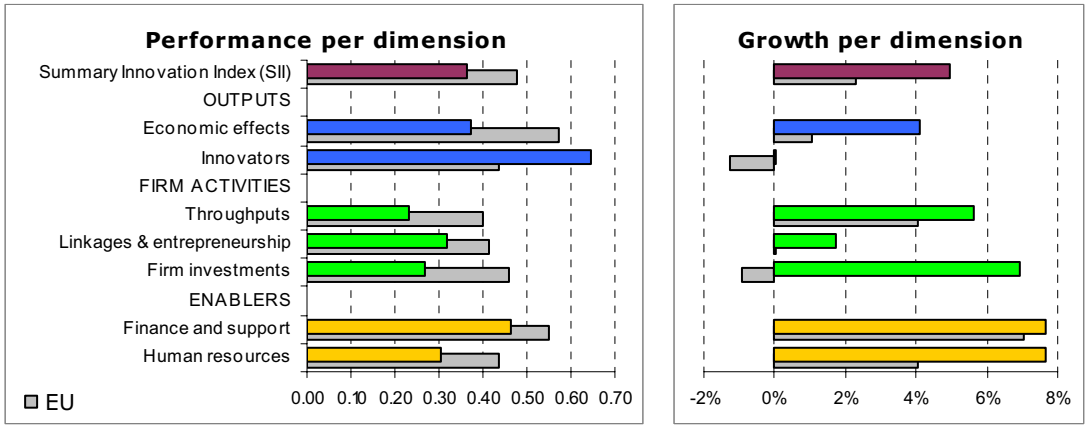
POLAND



Poland is among the group of Catching-up countries, with an innovation performance considerably below the EU27 average but an above average rate of improvement. Relative strengths, compared to the country's average performance, are in Human resources, Firm investments and Economic effects and relative weaknesses are in Finance and support, Linkages & entrepreneurship and Throughputs.

Over the past 5 years, Throughputs have been a strong driver of improved performance and Human resources and Linkages and entrepreneurship have also been drivers of improvement, in particular as a result from strong growth in S&E and SSH doctorate graduates (12.2%), Public-private co-publications (20.6%), EPO patents (9.0%), Community trademarks (11.1%) and Community designs (27.3%). Performance in Innovators and Economic effects has worsened, in particular due to a decrease in New-to-market sales (-13.4%).

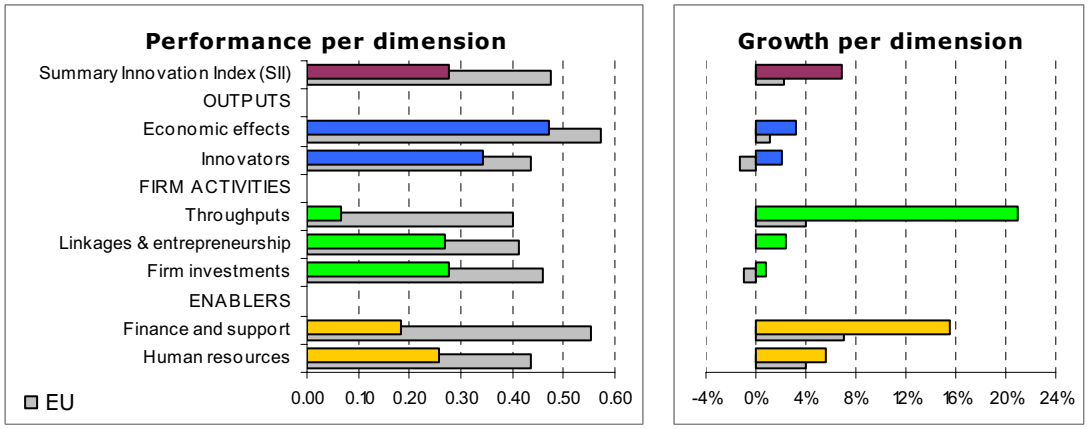
PORTUGAL



For Portugal, one of the Moderate innovators, innovation performance is below the EU27 average but the rate of improvement is more than twice that of the EU27 making it a growth leader within its group of countries. Relative strengths, compared to the country's average performance, are in Finance and support and Innovators while relative weaknesses are in Human resources, Firm investments, Linkages & entrepreneurship and Throughputs.

Over the past 5 years, Human resources, Finance and support, Firm investments and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH graduates (9.8%), S&E and SSH doctorate graduates (19.2%), Broadband access by firms (25.1%), Business R&D expenditures (26.3%), EPO patents (8.4%) and Community trademarks (12.1%). Performance in the other dimensions has increased at a slower pace, except in Innovators where there has been almost no improvement.

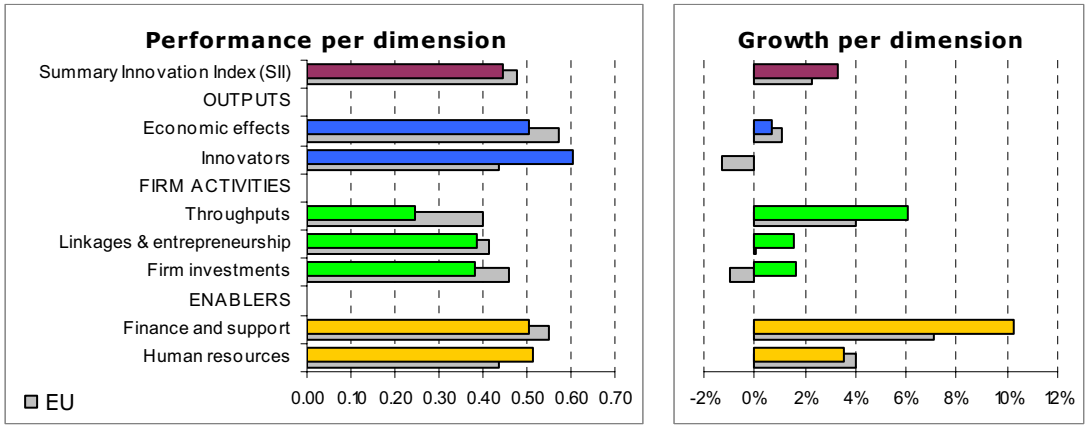
ROMANIA



Romania is one of the growth leaders among the Catching-up countries, with an innovation performance well below the EU27 average but a rate of improvement that is one of the highest of all countries. Relative strengths, compared to the country's average performance, are in Innovators and Economic effects and relative weaknesses are in Finance and support and Throughputs.

Over the past 5 years, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Public R&D expenditures (18.0%), Private credit (17.4%), Broadband access by firms (24.3%), Community trademarks (36.0%) and Community designs (44.3%). Performance in Firm investments and Innovators has increased at a lower pace.

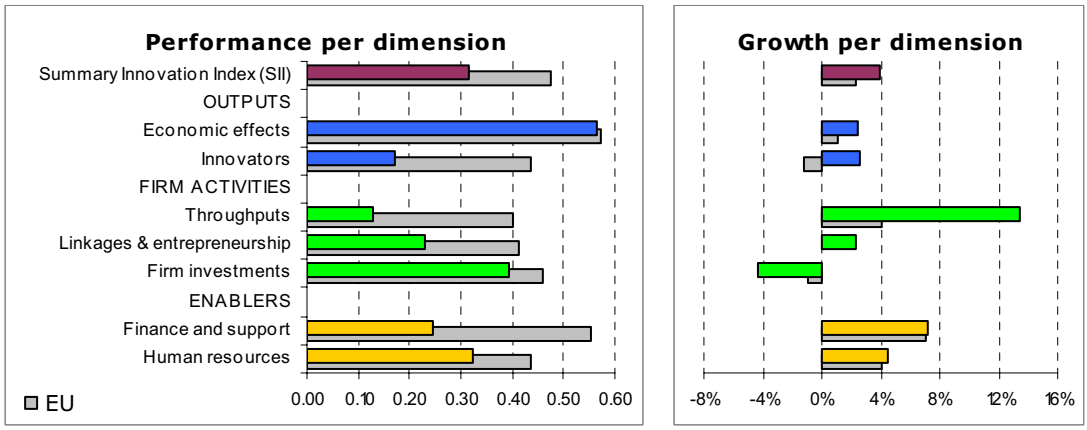
SLOVENIA



For Slovenia, one of the Moderate innovators, innovation performance is just below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources, Finance and support and Innovators and relative weaknesses are in Throughputs.

Over the past 5 years, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Private credit (17.3%), Community trademarks (7.5%) and Community designs (8.6%). Performance in Firm investments, Linkages & entrepreneurship and Economic effects has increased at a lower pace.

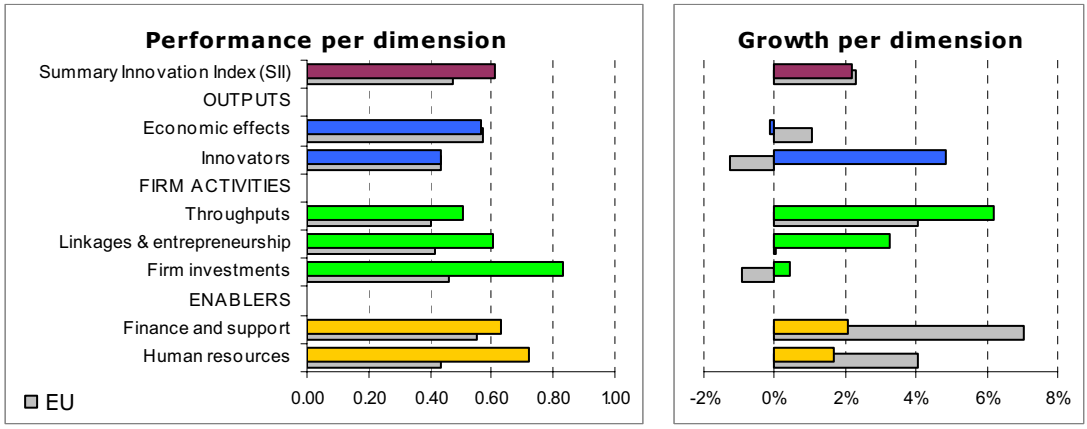
SLOVAKIA



For Slovakia, one of the Catching-up countries, innovation performance is well below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Firm investments and Economic effects and relative weaknesses are in Finance and support, Linkages & entrepreneurship, Throughputs and Innovators.

Over the past 5 years, Human resources, Finance and support and notably Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH graduates (8.7%), Broadband access by firms (32.0%), EPO patents (12.5%), Community trademarks (27.4%) and Community designs (14.4%). Performance in Firm investments has worsened, in particular due to a decrease in Business R&D expenditures (-13.4%).

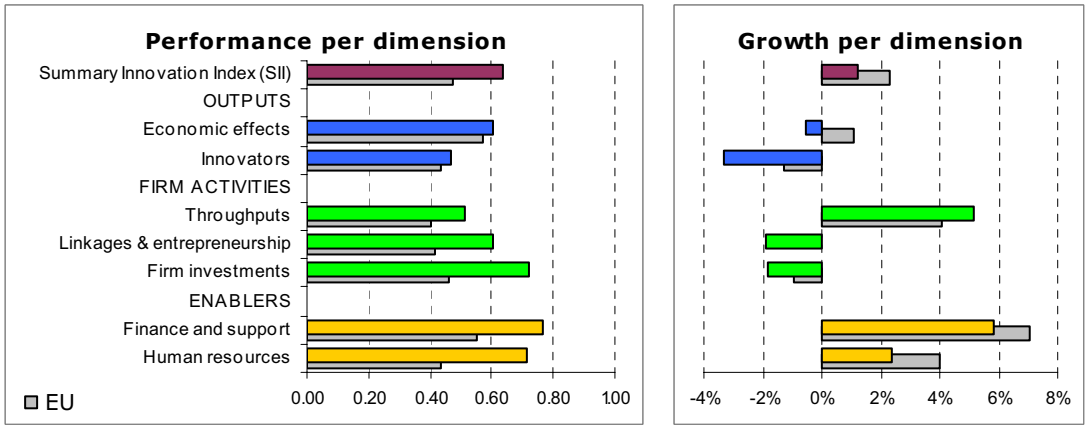
FINLAND



For Finland, one of the Innovation leaders, innovation performance is well above the EU27 average but the rate of improvement is slightly below that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources and Firm investments and relative weaknesses are in Throughputs and Innovators.

Over the past 5 years, Linkages & entrepreneurship, Throughputs and Innovators have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Innovative SMEs collaborating with others (12.4%) and Technology Balance of Payments flows (17.0%). Performance in Economic effects has worsened, in particular due to a decrease Knowledge-intensive services exports (-3.4%) and New-to-firm sales (-1.5%).

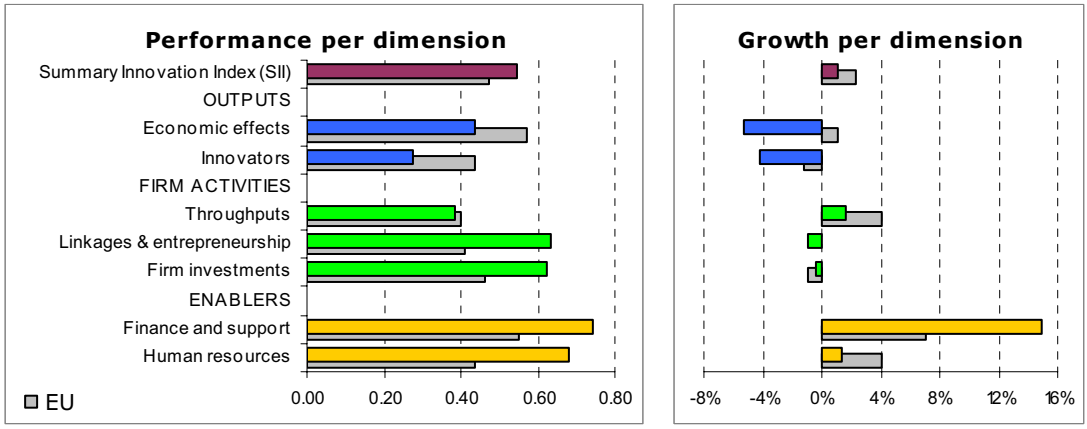
SWEDEN



Sweden is one of the Innovation leaders and the best performing EU Member State, although its rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources, Finance and support and Firm investments and relative weaknesses are in Throughputs and Innovators.

Over the past 5 years, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from relatively strong growth in Venture capital (9.1%), Broadband access by firms (8.8%), Community trademarks (7.8%) and Technology Balance of Payments flows (10.1%). Performance in Firm investments, Linkages & entrepreneurship, Innovators and Economic effects has worsened, in particular due to a decrease in Innovative SMEs collaborating with others (-4.5%) and the Firm renewal rate (-6.1%).

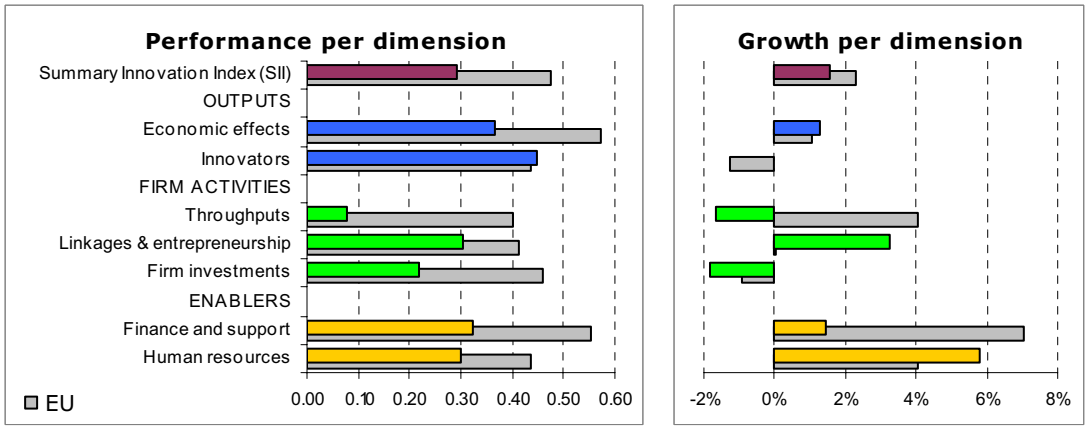
UNITED KINGDOM



For the UK, one of the Innovation leaders, innovation performance is above the EU27 average but the rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources, Finance and support, Firm investments and Linkages & entrepreneurship and relative weaknesses are in Throughputs, Innovators and Economic effects.

Over the past 5 years, Finance and support has been the main driver of the improvement in innovation performance, in particular as a result from strong growth in Venture capital (22.9%) and Broadband access by firms (30.4%). Performance in Firm investments, Linkages & entrepreneurship, Innovators and Economic effects has worsened, in particular due to a decrease in Knowledge-intensive services exports (-4.7%), New-to-market sales (-12.7%) and New-to-firm sales (-10.7%).

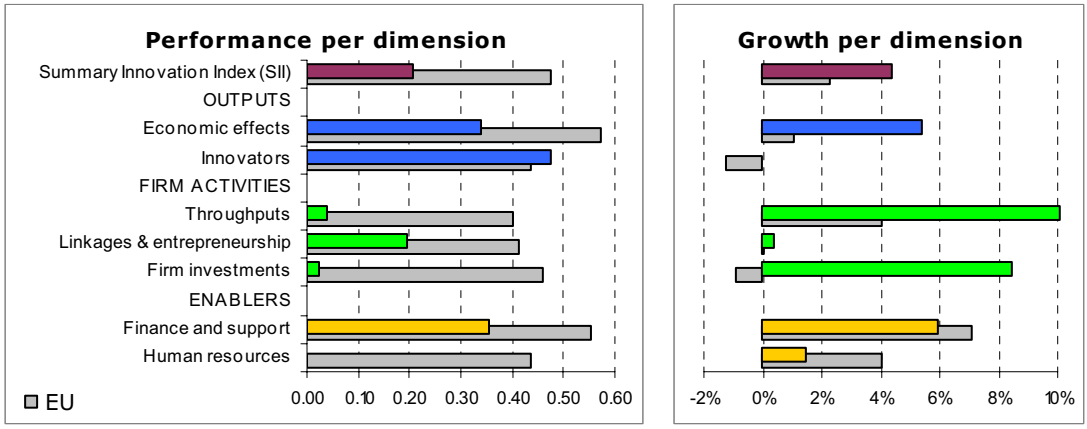
CROATIA



For Croatia, one of the Catching-up countries, innovation performance is well below the EU27 average and unlike most other Catching-up countries its rate of improvement is below that of the EU27. Relative strengths, compared to the country's average performance, are in Innovators and Economic effects and relative weaknesses are in Firm investments and Throughputs.

Over the past 5 years, Human resources and Linkages & entrepreneurship have been the main drivers of the improvement in innovation performance, in particular as a result from Life-long learning (12.7%) and Public-private co-publications (10.1%). Performance in Firm investments and Throughputs has worsened, in particular due to a decrease in Business R&D expenditures (-3.6%) and Technology Balance of Payments flows (-7.4%).

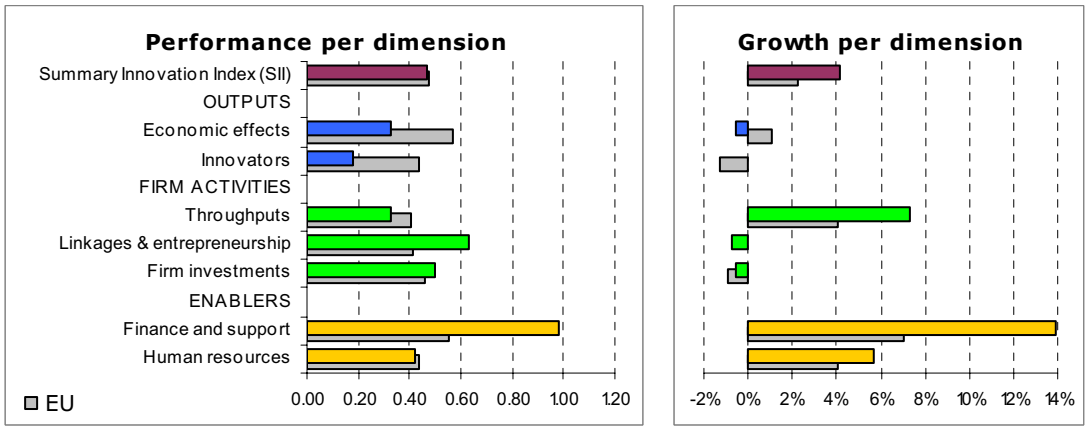
TURKEY



For Turkey, one of the Catching-up countries, innovation performance is well below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support, Innovators and Economic effects and relative weaknesses are in Human resources (where the country's relative performance is close to zero meaning that it is at the lowest end of the range of countries included in the EIS), Firm investments and Throughputs.

Over the past 5 years, Finance and support, Firm investments, Throughputs and Economic effects have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Private credit (18.9%), Business R&D expenditures (17.5%), Technology Balance of Payments flows (19.8%) and Knowledge-intensive services exports (31.9%). Performance in the other dimensions has increased at a lower pace.

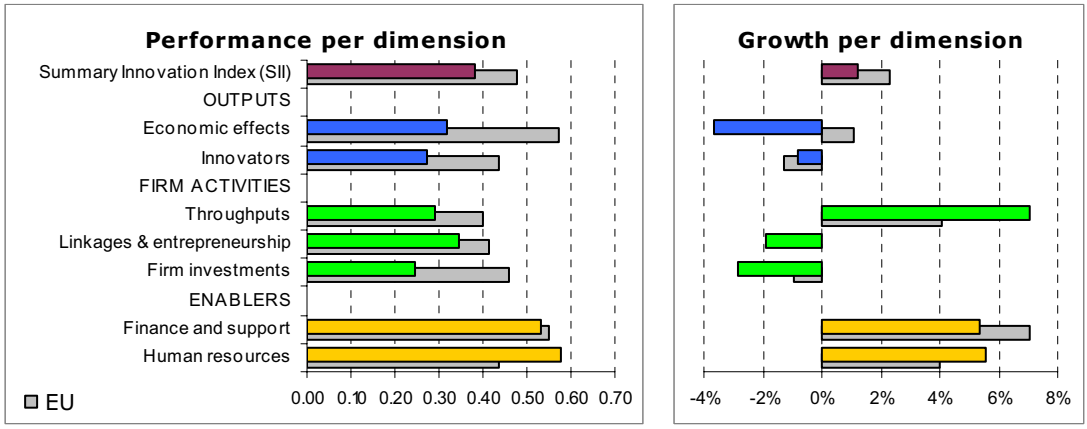
ICELAND



Iceland is among the Moderate innovators, with an innovation performance just below the EU27 average but the rate of improvement is above that of the EU27. Relative strengths, compared to the country's average performance, are in Finance and support and Linkages & entrepreneurship and relative weaknesses are in Throughputs, Innovators and Economic effects.

Over the past 5 years, Human resources, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from growth in S&E and SSH doctorate graduates (24.8%), Private credit (25.1%), Broadband access by firms (18.9%), Community trademarks (17.6%) and Technology Balance of Payments flows (15.7%). Performance in Firm investments, Linkages & entrepreneurship and Economic effects has worsened, in particular due to a decrease in Employment in medium-high & high-tech manufacturing (-7.8%) and Knowledge-intensive services exports (-6.0%).

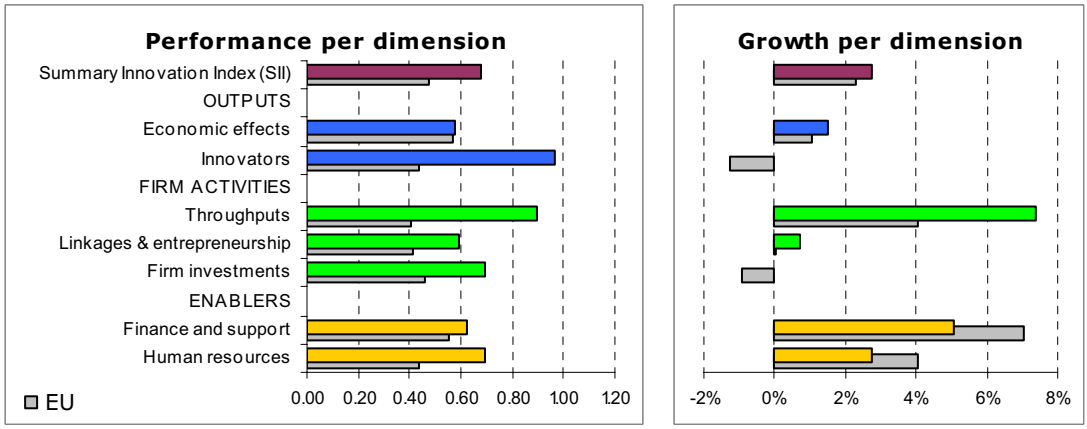
NORWAY



For Norway, one of the Moderate innovators, innovation performance is below the EU27 average and the rate of improvement is also below that of the EU27. Relative strengths, compared to the country's average performance, are in Human resources and Finance and support and relative weaknesses are in Firm investments, Throughputs and Innovators.

Over the past 5 years, Human resources, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH doctorate graduates (20.6%), Broadband access by firms (16.0%), Community trademarks (10.1%) and Technology Balance of Payments flows (10.8%). Performance in Firm investments, Linkages & entrepreneurship and Economic effects has worsened, in particular due to a decrease in Business R&D expenditures (-4.7%), Medium-high and high-tech manufacturing exports (-7.2%) and New-to-firm sales (-11.0%).

SWITZERLAND



Switzerland has the highest overall level of innovation performance and its rate of improvement is also above that of the EU27. Relative strengths, compared to the country's average performance, are in Throughputs and Innovators and relative weaknesses are in Linkages & entrepreneurship and Economic effects.

Over the past 5 years, Human resources, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in S&E and SSH doctorate graduates (8.2%), Venture capital (18.1%), Community trademarks (8.8%), Community designs (9.3%) and Technology Balance of Payments flows (10.8%). Performance in Firm investments has not improved.

7. FORWARD LOOK

The final section of this EIS 2008 report will briefly highlight some of the work foreseen for the EIS 2009. Following the recommendations for continuity from the Methodology Report, the same methodology and set of innovation dimensions and indicators is planned for the EIS 2009. This will enable direct comparisons with the EIS 2008 results.

A number of thematic papers will be prepared. A first of these will study the long term mechanisms that are at the root of innovation performance analysing data from three waves of the Community Innovation Survey and will analyse the relevance and nature of innovation activities, outcomes and performance at the sectoral level over the long term period.

Following an increasing request for an update of the 2006 Regional Innovation Scoreboard (RIS), a thematic paper will be prepared applying the EIS methodology at the regional level. The RIS 2009 will use as many indicators as possible from the EIS 2008, including the indicators using data from the Community Innovation Survey (CIS). However, not all EU27 Member States are able to deliver regional data from their CIS, so it is expected that not all EU27 regions will be included in the RIS 2009. The RIS 2009 will benchmark regions' innovation performance, their change in innovation performance and will also identify relative strengths and weaknesses in regions' innovation performance.

Finally, a new Innobarometer (IB) survey is foreseen. The IB 2009 will explore how companies' innovation activities have changed and if companies have changed their innovation strategies in various areas. The IB 2009 will also survey future trends in strategy, innovation activities and investments an input into EIS thematic papers.

8. TECHNICAL ANNEX

8.1. Calculating composite indexes

For each of the 7 innovation dimensions average performance will be summarized by calculating a composite innovation index. For each of the 3 blocks of dimensions average performance will be summarized by calculating a weighted composite index using the composite innovation indexes for those dimensions belonging to a specific block. Overall innovation performance will be summarized in the Summary Innovation Index. The methodology of calculating these composite innovation indexes will now be explained in detail.

Step 1: Transforming data

Most of the EIS indicators are fractional indicators with values between 0% and 100%. Some EIS indicators are unbound indicators, where values are not limited to an upper threshold. These indicators can be highly volatile and have skewed data distributions (where most countries show low performance levels and a few countries show exceptionally high performance levels). For these indicators – Public-private co-publications, EPO patents, Community trademarks and Community designs, all measured per million population – data will be transformed using a square root transformation.

Step 2: Identifying outliers

Positive outliers are identified as those relative scores which are higher than the EU27 mean plus 3 times the standard deviation[31]. Negative outliers are identified as those relative scores which are smaller than the EU27 mean minus 3 times the standard deviation. These outliers are not included in determining the Maximum and Minimum scores in the normalisation process (cf. Step 5).

Step 3: Setting reference years

For each indicator a reference year is identified based on data availability for all core EIS countries, i.e. those countries for which data availability is at least 75%. For most indicators this reference year will be lagging 1 or 2 years behind the year to which the EIS refers. Thus for the EIS 2008 the reference year will be 2006 or 2007 for most indicators (cf. Table 1).

Step 4: Sorting data over time

Reference year data are then used for "2008", etc. If data for a year-in-between is not available we substitute with the value for the previous year (except for indicators using CIS data where we use the average of 2004 and 2006 to impute for 2005). If data are not available at the beginning of the time series, we replace missing values with the latest available year. The following examples will clarify this step and will show how 'missing' data are imputed:

Example 1 (latest year missing)					
	"2008"	"2007"	"2006"	"2005"	"2004"
Available relative to EU score	Missing	150	120	110	105
Use most recent year	**150**	150	120	110	105
Example 2 (year-in-between missing)					
	"2008"	"2007"	"2006"	"2005"	"2004"
Available relative to EU score	150	Missing	120	110	105
Substitute with previous year	150	**120**	120	110	105

[31] This approach follows the well-adopted Chauvenet's Criterion in statistical theory, but we use a range of 3 standard deviations around the mean instead of the usual range of 2 standard deviations.

Example 3 (beginning-of-period missing)					
	"2008"	"2007"	"2006"	"2005"	"2004"
Available relative to EU score	150	130	120	Missing	Missing
Substitute with latest available year	150	130	120	**120**	**120**

If real data will become available for the EIS 2009 or EIS 2010 for any of these 'missing' data, then the 'imputed' values will be replaced by the real data. This might cause some marginal deviations between the composite index scores between the EIS 2008, 2009 and 2010 reports.

Step 5: Extrapolating data

For all indicators and countries we extrapolate data for 2009 and 2010 by assuming the same percentage increase between "2008" and "2007", where for all fractional indicators extrapolated data can never be above 100. The rationale for this extrapolation is to take account of further increases in indicator values beyond the maximum or below the minimum values found within the observed 5 year time period. This way we can fix the Maximum and Minimum scores (cf. Step 6) for the EIS 2009 and EIS 2010 to ensure full comparability of SII scores between the EIS 2008 report and future EIS reports.

Step 6: Determining Maximum and Minimum scores

The Maximum score is the highest relative score found for the whole time period (including the two extrapolated years) within the group of core EIS countries (i.e. those countries for which data availability is at least 75%) excluding positive outliers and 'small' countries with populations of 1 million or less (i.e. Cyprus, Iceland, Luxembourg and Malta) as these small countries are 1) responsible for some of the observed outliers (cf. Step 2) and 2) due to their small size cannot be taken as representative for most of the other (larger) countries. Similarly, the Minimum score is the lowest relative score found for the whole time period within the group of core EIS countries excluding negative outliers and 'small' countries.

Step 7: 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 8: Calculating composite innovation indexes

For each year and for each innovation dimension (Human resources, Finance and support, Firm investments, Linkages & entrepreneurship, Throughputs, Innovators, Economic effects) a dimension composite innovation index (DCII) is calculated as the unweighted average of the re-scaled scores for all indicators within the respective dimension.

For each year and for each block of dimensions (Enablers, Firm activities, Outputs) a block composite innovation index (BCII) is calculated as the unweighted average of the re-scaled scores for all indicators within the respective block.

For each year the Summary Innovation Index (SII) is calculated as the unweighted average of the re-scaled scores for all indicators. The SII will only be calculated if data are available for at least 70% of the indicators.

8.2. Calculating growth rates

As an input to the EIS workshop in June 2008, the Joint Research Centre prepared a report presenting possible alternatives to calculating growth rates[32]. For the calculation of the average annual growth rate in innovation performance we have adopted a generalized approach:

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[33] to calculate the <u>average yearly growth rate</u> 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 EIS innovation indicators used for calculating growth rates and where all indicators receive the same weight w_i (i.e. 1/27 if data for all 27 indicators are available)[34].

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 <u>average annual growth rate</u> in innovation performance as the geometric average of all yearly growth rates:

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

where $t \in [2004, 2008]$ and each average yearly growth rate receives the same weight w_t.

The average annual growth rate in innovation performance is different from that used in the EIS 2007 report as it does not measure the change in the SII but the average change in the 29 innovation indicators.

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[32] Tarantola, S., (2008), "European Innovation Scoreboard: strategies to measure country progress over time", Joint Research Centre, mimeo.

[33] 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.

[34] It should be noted that the following two indicators are not included in the calculation of growth rates as data are missing for too many countries: Share of SMEs introducing marketing or organisational innovations and Resource efficiency innovators.

ANNEXES

Annex A: European Innovation Scoreboard 2008 – Current performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	HU
ENABLERS																	
Human resources																	
1.1.1S&E and SSH graduates	40.3	33.1	31.5	25.8	46.8	25.9	38.2	62.1	25.3	27.3	62.0	32.1	19.9	56.4	60.3	--	30.2
1.1.2 S&E and SSH doctorate graduates	1.11	0.94	0.36	0.86	0.93	1.56	0.57	1.11	0.58	0.67	1.13	0.89	0.22	0.24	0.61	--	0.42
1.1.3 Tertiary education	23.5	32.1	22.4	13.7	32.2	24.3	33.3	32.2	22.0	29.0	26.8	13.6	33.1	22.6	28.9	26.5	18.0
1.1.4 Life-long learning	9.7	7.2	1.3	5.7	29.2	7.8	7.0	7.6	2.1	10.4	7.4	6.2	8.4	7.1	5.3	7.0	3.6
1.1.5 Youth education	78.1	82.6	83.3	91.8	70.8	72.5	80.9	86.7	82.1	61.1	82.4	76.3	85.8	80.2	89.0	70.9	84.0
Finance and support																	
1.2.1Public R&D expenditures	0.65	0.57	0.33	0.55	0.88	0.76	0.58	0.44	0.41	0.55	0.74	0.52	0.31	0.42	0.58	0.27	0.46
1.2.2 Venture capital	0.107	0.152	--	0.007	0.088	0.049	--	0.057	0.008	0.123	0.099	0.050	--	--	--	--	0.026
1.2.3 Private credit	1.31	0.92	0.67	0.47	2.02	1.17	0.94	2.47	0.91	1.83	1.23	1.06	2.06	0.93	0.61	1.92	0.62
1.2.4 Broadband access by firms	77.0	86.0	61.0	77.0	80.0	80.0	78.0	68.0	72.0	90.0	89.0	76.0	69.0	57.0	53.0	81.0	70.0
FIRM ACTIVITIES																	
Firm investments																	
2.1.1Business R&D expenditures	1.17	1.30	0.15	0.98	1.65	1.77	0.54	0.88	0.15	0.66	1.31	0.55	0.10	0.21	0.23	1.36	0.49
2.1.2 IT expenditures	2.7	2.8	2.0	3.2	3.2	2.9	2.9	1.5	1.2	1.4	3.1	1.7	--	2.3	1.8	--	2.5
2.1.3 Non-R&D innovation expenditures	1.03	0.73	0.79	0.88	0.51	1.07	3.36	0.96	0.74	0.49	0.33	1.10	2.12	--	0.64	0.90	0.72
Linkages & entrepreneurship																	
2.2.1SMEs innovating in-house	30.0	40.8	15.1	28.0	40.8	46.3	37.1	38.8	32.7	24.6	28.3	28.1	37.5	--	17.7	--	13.2
2.2.2 Innovative SMEs collaborating with others	9.5	16.7	3.8	11.7	14.9	9.0	18.1	11.7	13.3	5.0	11.5	4.3	26.2	5.6	10.3	15.1	6.5
2.2.3 Firm renewal (SMEs entries +exits)	5.1	--	--	4.7	--	--	5.9	--	--	4.1	--	2.3	--	4.0	9.0	3.5	8.7
2.2.4 Public-private co-publications	31.4	49.4	0.5	12.6	108.7	45.9	14.5	14.0	8.7	10.6	27.9	17.2	9.1	0.4	0.0	4.2	16.9
Throughputs																	
2.3.1EPO patents	105.7	129.1	1.4	7.3	174.6	275.0	5.6	64.1	6.5	29.3	119.2	76.1	17.0	5.7	1.3	194.9	7.8
2.3.2 Community trademarks	124.6	121.4	32.8	47.1	212.1	187.7	81.4	172.5	41.9	163.8	94.4	120.0	282.8	23.7	20.4	1220.0	26.0
2.3.3 Community designs	121.8	116.2	19.2	67.7	280.4	222.6	17.9	132.7	7.0	104.5	107.5	184.2	31.2	21.0	2.6	1018.6	18.3
2.3.4 Technology Balance of Payments flows	1.07	0.66	0.25	0.39	--	0.47	0.22	9.92	0.15	0.28	0.42	0.16	0.42	0.16	0.08	1.31	1.49
OUTPUTS																	
Innovators																	
3.1.1SMEs introducing product or process innovations	33.7	45.4	17.8	32.0	35.7	52.8	45.8	43.8	37.3	29.5	29.9	33.0	37.9	14.4	19.7	44.7	16.8
3.1.2 SMEs introducing marketing or organisational innovations	40.0	45.3	15.7	36.2	45.4	68.1	48.4	40.9	51.3	29.5	41.3	37.5	50.9	--	28.5	60.2	26.4
3.1.3 Resource efficiency innovators	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3.1.3a Reduced labour costs	18.0	16.6	15.9	18.2	11.5	15.1	14.3	19.3	26.2	12.9	34.9	18.1	29.2	6.2	10.7	12.9	6.2
3.1.3b Reduced use of materials and energy	9.6	8.8	13.2	14.2	7.3	9.5	7.8	10.2	20.7	8.5	15.9	4.4	19.9	5.4	8.5	6.8	7.2
Economic effects																	
3.2.1Employment in medium-high & high-tech manufacturing	6.69	6.31	5.13	10.85	6.03	10.72	3.90	5.26	2.38	4.47	6.35	7.59	0.90	1.88	2.44	1.08	8.82
3.2.2 Employment in knowledge-intensive services	14.51	15.54	8.35	10.92	15.37	15.58	11.01	16.05	11.06	14.22	15.76	15.57	15.80	10.57	8.19	23.94	11.35
3.2.3 Medium-tech and high-tech manufacturing exports	48.1	48.7	21.2	61.3	41.2	65.5	36.2	51.8	28.3	52.3	58.9	51.1	45.9	23.8	33.1	32.7	69.3
3.2.4 Knowledge-intensive services exports	48.7	43.9	18.2	35.5	67.2	53.8	38.5	70.5	51.8	--	--	--	35.4	37.6	13.8	82.4	25.6
3.2.5 New-to-market sales	8.60	6.16	6.70	9.93	3.79	9.12	4.43	7.19	16.60	7.37	6.16	4.53	5.29	2.10	6.04	5.91	7.82
3.2.6 New-to-firm sales	6.28	7.39	3.59	4.72	4.05	10.11	9.27	5.43	9.04	8.48	5.56	4.52	7.04	1.25	6.39	6.54	2.70

Annex A: European Innovation Scoreboard 2008 – Current performance

	EU27	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	HR	TR	IS	NO	CH
ENABLERS																	
Human resources																	
1.1.1S&E and SSH graduates	40.3	31.8	36.0	21.6	52.9	30.6	40.9	41.0	24.4	38.3	29.7	52.0	21.9	12.6	45.3	29.4	48.5
1.1.2 S&E and SSH doctorate graduates	1.11	0.03	0.87	1.72	0.86	2.75	0.48	0.96	0.89	2.17	2.25	1.61	0.47	0.12	0.12	0.94	2.33
1.1.3 Tertiary education	23.5	12.5	30.8	17.6	18.7	13.7	12.0	22.2	14.4	36.4	31.3	31.9	16.2	9.7	29.5	34.4	31.3
1.1.4 Life-long learning	9.7	6.0	16.6	12.8	5.1	4.4	1.3	14.8	3.9	23.4	32.0	26.6	2.9	1.5	27.9	18.0	22.5
1.1.5 Youth education	78.1	54.7	76.2	84.1	91.6	53.4	77.4	91.5	91.3	86.5	87.2	78.1	94.6	46.4	49.3	93.3	78.1
Finance and support																	
1.2.1Public R&D expenditures	0.65	0.21	0.67	0.75	0.38	0.46	0.31	0.60	0.27	0.94	0.99	0.64	0.55	0.37	1.26	0.77	0.69
1.2.2 Venture capital	0.107	--	0.107	0.037	0.017	0.060	0.067	--	0.007	0.163	0.287	0.483	--	--	--	0.117	0.141
1.2.3 Private credit	1.31	1.19	1.95	1.29	0.40	1.69	0.26	0.81	0.42	0.84	1.24	1.90	0.72	0.29	3.20	0.87	1.78
1.2.4 Broadband access by firms	77.0	89.0	87.0	72.0	53.0	76.0	37.0	79.0	76.0	91.0	87.0	78.0	--	80.0	95.0	85.0	85.0
FIRM ACTIVITIES																	
Firm investments																	
2.1.1Business R&D expenditures	1.17	0.39	1.03	1.81	0.18	0.61	0.22	0.94	0.18	2.51	2.64	1.08	0.38	0.21	1.43	0.81	2.14
2.1.2 IT expenditures	2.7	--	3.3	2.8	2.6	1.8	2.1	2.2	2.5	3.2	3.8	3.5	--	--	--	2.4	3.7
2.1.3 Non-R&D innovation expenditures	1.03	1.10	0.29	--	1.03	0.95	1.08	1.12	1.51	--	0.66	--	0.85	0.16	--	0.17	0.92
Linkages & entrepreneurship																	
2.2.1SMEs innovating in-house	30.0	--	27.3	41.1	17.2	34.1	17.9	--	17.9	40.9	41.8	--	24.4	28.2	--	25.9	34.4
2.2.2 Innovative SMEs collaborating with others	9.5	5.7	12.5	18.0	9.3	6.7	2.9	15.1	7.2	27.5	16.6	10.7	9.6	5.3	14.0	9.8	12.1
2.2.3 Firm renewal (SMEs entries +exits)	5.1	--	6.3	--	--	4.1	8.7	2.2	4.8	0.7	2.3	10.3	--	--	--	2.9	3.8
2.2.4 Public-private co-publications	31.4	0.0	83.7	58.0	1.3	4.0	3.1	28.2	4.5	83.1	116.1	54.7	11.9	0.3	94.4	38.5	193.1
Throughputs																	
2.3.1EPO patents	105.7	21.6	173.3	183.1	3.0	7.4	0.7	32.2	5.8	267.6	184.8	91.4	5.0	1.0	52.6	95.5	411.1
2.3.2 Community trademarks	124.6	127.1	195.8	237.1	33.2	118.5	13.5	68.7	20.6	137.3	201.9	153.1	4.5	1.9	324.8	51.2	350.3
2.3.3 Community designs	121.8	46.7	135.3	284.6	45.5	55.8	3.0	50.5	18.0	116.8	161.9	87.1	2.9	4.5	20.2	67.1	372.7
2.3.4 Technology Balance of Payments flows	1.07	2.77	1.21	0.50	0.40	0.22	0.22	0.46	0.43	1.61	1.45	0.99	0.52	0.12	0.03	0.39	5.48
OUTPUTS																	
Innovators																	
3.1.1SMEs introducing product or process innovations	33.7	14.4	32.9	47.8	20.4	38.7	19.4	31.7	21.4	44.7	40.7	25.1	28.3	29.5	--	29.8	52.9
3.1.2 SMEs introducing marketing or organisational innovations	40.0	31.8	29.0	54.9	29.1	53.4	35.4	--	21.5	--	--	30.3	38.1	50.3	--	34.7	--
3.1.3 Resource efficiency innovators	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3.1.3a Reduced labour costs	18.0	11.8	16.6	11.9	13.8	22.4	18.3	28.4	8.0	10.7	17.0	--	19.9	18.0	13.8	10.0	--
3.1.3b Reduced use of materials and energy	9.6	7.7	10.5	9.7	11.6	15.0	14.8	17.2	10.8	5.2	7.1	--	15.1	10.2	5.7	4.3	--
Economic effects																	
3.2.1Employment in medium-high & high-tech manufacturing	6.69	6.16	3.15	6.66	5.50	3.45	5.66	9.09	9.89	7.03	6.20	5.40	4.70	3.60	1.70	4.21	7.19
3.2.2 Employment in knowledge-intensive services	14.51	15.22	17.97	14.15	10.33	9.65	5.26	10.89	9.86	16.49	18.45	18.64	9.71	5.53	17.15	16.05	19.85
3.2.3 Medium-tech and high-tech manufacturing exports	48.1	74.5	48.3	53.2	48.9	38.7	37.5	54.2	57.2	51.5	54.8	58.2	39.5	38.0	15.7	11.4	63.0
3.2.4 Knowledge-intensive services exports	48.7	23.0	39.9	31.3	27.9	27.5	46.6	20.7	20.8	26.7	49.7	8.9	14.8	12.9	20.7	54.8	32.4
3.2.5 New-to-market sales	8.60	24.79	6.02	6.56	4.56	7.17	4.85	5.83	7.79	10.84	8.29	3.70	4.58	4.65	4.88	1.61	4.90
3.2.6 New-to-firm sales	6.28	3.85	4.87	7.08	5.55	6.12	13.69	7.50	8.95	4.83	5.10	4.81	8.45	11.17	7.81	3.17	5.80

Annex B: European Innovation Scoreboard 2008 – Growth performance

	EU27	BE	BG	CZ	DK	DE	EE	IE	GR	ES	FR	IT	CY	LV	LT	LU	HU
Average annual growth rate	2.3	2.0	7.0	3.9	0.0	2.2	4.2	2.8	4.3	2.1	1.7	1.8	6.2	5.2	1.2	1.6	2.9
ENABLERS	5.4	5.3	6.4	7.4	3.0	4.4	5.6	8.5	5.8	3.7	3.6	5.5	8.1	9.9	5.6	8.3	1.5
Human resources	4.0	1.0	2.6	5.4	2.8	4.8	4.1	6.0	0.1	0.2	2.2	7.2	6.8	7.3	3.2	1.4	0.8
1.1.1 S&E and SSH graduates	6.7	0.3	-1.4	14.1	5.3	12.1	5.6	5.7	4.6	-1.2	1.4	8.8	2.9	8.2	10.8	--	7.1
1.1.2 S&E and SSH doctorate graduates	6.7	5.6	11.2	7.0	3.8	5.0	12.4	12.8	-3.1	-0.7	5.1	22.7	18.0	25.7	1.1	--	-1.1
1.1.3 Tertiary education	3.1	3.3	1.5	3.6	0.2	0.3	2.3	4.7	4.3	3.7	3.2	4.5	3.0	5.5	5.6	2.9	4.4
1.1.4 Life-long learning	3.4	-4.3	0.0	2.8	4.8	6.8	1.1	6.5	-5.2	-0.2	1.0	-0.4	9.2	-2.3	-2.6	1.9	-5.4
1.1.5 Youth education	0.4	0.4	2.2	-0.1	0.0	0.3	-0.2	0.5	0.1	-0.4	0.3	1.8	1.9	1.6	1.4	-0.6	-0.2
Finance and support	7.1	10.8	13.2	10.0	3.3	3.9	8.2	11.7	13.3	8.3	5.3	3.5	10.2	14.2	9.9	15.8	2.3
1.2.1 Public R&D expenditures	0.0	0.9	-4.7	3.5	3.1	-0.3	4.8	3.7	1.3	3.5	-1.0	0.0	6.6	13.8	2.3	10.7	-1.1
1.2.2 Venture capital	9.6	23.1	--	-9.6	-1.1	0.3	--	-4.7	-1.6	2.4	0.3	-8.2	--	--	--	--	-8.3
1.2.3 Private credit	5.4	5.6	25.2	11.8	7.5	-0.9	16.8	14.6	9.1	12.7	6.8	5.3	5.9	23.4	27.9	16.8	9.9
1.2.4 Broadband access by firms	13.7	15.1	21.5	40.1	3.8	17.5	3.5	37.5	51.6	15.3	16.1	18.6	18.5	6.1	1.5	20.0	9.9
FIRM ACTIVITIES	1.2	0.5	13.6	4.1	-0.4	1.6	5.7	0.4	1.3	1.4	1.5	1.1	6.5	5.6	-0.1	1.1	3.5
Firm investments	-0.9	-3.0	7.7	-0.6	-2.1	0.0	16.5	-1.6	-10.2	5.5	0.0	0.0	1.8	7.4	0.1	-0.5	1.9
2.1.1 Business R&D expenditures	-0.4	-0.2	10.7	6.6	-1.9	0.1	20.0	2.7	-4.5	3.7	-0.9	1.4	9.3	12.7	13.2	-1.9	9.6
2.1.2 IT expenditures	0.0	0.0	7.5	3.4	-0.8	0.0	1.8	-1.6	-2.0	0.0	0.8	-1.4	--	2.3	4.7	--	1.0
2.1.3 Non-R&D innovation expenditures	-2.4	-8.5	5.0	-11.0	-3.6	0.0	29.3	-5.7	-22.7	13.4	0.0	0.0	-5.1	--	-15.4	0.9	-4.5
Linkages & entrepreneurship	0.0	0.7	7.8	0.8	-1.9	1.6	1.8	-1.1	6.4	-2.2	0.7	0.4	8.6	-9.9	-2.6	-6.8	2.5
2.2.1 SMEs innovating in-house	-0.5	-1.2	0.0	-3.1	0.0	0.1	-2.1	-5.1	-0.6	-1.8	0.0	0.0	2.7	--	-4.2	--	0.1
2.2.2 Innovative SMEs collaborating with others	1.0	0.1	5.0	-2.5	-8.0	1.0	3.1	-7.0	12.2	-3.0	0.0	-0.3	12.3	-2.2	-8.7	0.6	-0.2
2.2.3 Firm renewal (SMEs entries + exits)	-3.3	--	--	1.5	--	--	-9.4	--	--	-6.0	--	-1.7	--	-18.6	2.8	-6.0	2.7
2.2.4 Public-private co-publications	3.0	3.3	19.4	7.8	2.6	3.7	17.3	9.5	8.0	2.4	2.1	3.4	11.0	-8.1	0.1	-14.3	7.7
Throughputs	4.0	3.1	23.0	11.3	2.8	2.9	2.0	3.0	6.8	1.9	3.2	2.7	7.3	17.9	2.2	8.4	5.9
2.3.1 EPO patents	0.1	1.4	-4.4	0.6	0.6	0.5	-2.9	0.1	0.1	4.0	0.1	1.1	-3.5	13.7	2.1	1.7	-2.5
2.3.2 Community trademarks	5.5	5.1	67.6	7.1	5.4	6.1	17.6	3.4	6.8	3.2	3.8	4.7	12.1	29.4	19.4	10.2	10.9
2.3.3 Community designs	4.3	1.4	31.0	26.0	2.4	4.0	-0.9	6.9	26.2	3.9	4.9	3.2	30.5	19.2	-10.9	13.5	8.9
2.3.4 Technology Balance of Payments flows	6.4	4.8	8.9	13.1	--	1.0	-4.4	1.8	-3.4	-3.2	4.2	1.8	-6.2	10.3	0.4	8.4	6.7
OUTPUTS	0.6	0.3	0.5	0.2	-2.6	0.6	1.3	0.1	6.1	1.4	-0.1	-1.2	4.3	0.2	-0.8	-2.2	3.4
Innovators	-1.3	-0.8	4.5	-2.6	-5.7	-0.7	-0.3	-3.3	1.9	-2.1	0.0	-0.4	-4.3	0.0	-6.1	-2.3	-1.1
3.1.1 SMEs introducing product or process innovations	-1.3	-0.8	4.5	-2.6	-5.7	-0.7	-0.3	-3.3	1.9	-2.1	0.0	-1.3	-4.3	0.0	-6.1	-2.3	-1.1
3.1.2 SMEs introducing marketing or organisational innovations																	
3.1.3 Resource efficiency innovators																	
3.1.3a Reduced labour costs																	
3.1.3b Reduced use of materials and energy																	
Economic effects	1.1	0.6	0.0	0.7	-2.9	1.0	2.0	0.7	9.0	2.6	-0.1	-1.6	7.2	0.3	-0.2	-3.0	5.3
3.2.1 Employment in medium-high & high-tech manufacturing	-0.9	-0.4	2.4	5.6	-0.4	-0.8	3.9	-4.4	3.9	-3.1	-0.1	0.5	-7.9	0.4	-5.3	-6.4	1.6
3.2.2 Employment in knowledge-intensive services	1.2	-0.5	3.4	1.8	0.0	1.5	-2.8	1.2	1.6	4.0	0.3	4.9	3.2	6.7	6.3	1.4	1.4
3.2.3 Medium-tech and high-tech manufacturing exports	0.6	-0.9	-0.9	1.4	-0.9	-0.6	1.4	-2.9	2.8	-0.1	-0.7	0.1	2.0	12.7	-2.2	-2.5	1.2
3.2.4 Knowledge-intensive services exports	1.3	1.3	4.6	1.9	0.7	1.2	3.8	-0.4	5.8	--	--	--	3.2	1.9	-11.7	0.4	9.6
3.2.5 New-to-market sales	4.1	6.6	-5.7	6.7	-7.7	4.8	0.4	6.3	32.8	17.7	0.0	-7.8	29.1	-12.3	8.4	-2.1	17.0
3.2.6 New-to-firm sales	0.1	-2.5	-3.1	-11.9	-8.5	0.2	5.2	4.8	9.9	-4.0	0.0	-5.3	17.7	-5.6	4.7	-8.0	1.9

For indicators 3.1.2 and 3.1.3 growth rates could not be calculated (cf. Section 8.2).

Annex B: European Innovation Scoreboard 2008 – Growth performance

	EU27	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	HR	TR	IS	NO	CH
Average annual growth rate	2.3	4.7	1.5	2.3	3.1	4.9	6.9	3.3	3.9	2.2	1.2	1.1	1.5	4.4	4.2	1.2	2.8
ENABLERS	5.4	3.4	4.3	2.8	2.8	7.7	9.9	6.0	5.7	1.8	3.9	7.1	4.6	3.1	8.7	5.5	3.8
Human resources	4.0	2.0	4.3	3.7	5.2	7.7	5.7	3.6	4.5	1.7	2.4	1.3	5.8	1.5	5.7	5.5	2.7
1.1.1 S&E and SSH graduates	6.7	7.9	11.3	7.9	5.9	9.8	16.8	6.6	8.7	1.5	7.4	0.8	7.6	3.0	7.4	4.8	3.9
1.1.2 S&E and SSH doctorate graduates	6.7	-16.8	6.8	2.5	12.2	19.2	2.1	2.6	7.7	2.8	2.8	5.0	7.8	-2.4	24.8	20.6	8.2
1.1.3 Tertiary education	3.1	8.0	3.1	-1.6	7.7	6.9	5.1	5.8	5.7	2.6	1.4	1.2	0.5	-0.1	0.8	2.4	3.9
1.1.4 Life-long learning	3.4	8.7	0.3	10.5	0.5	0.6	4.3	2.7	1.3	1.1	0.2	-0.2	12.7	5.7	-1.4	1.3	-2.3
1.1.5 Youth education	0.4	4.9	0.4	0.0	0.4	2.8	0.8	0.2	-0.8	0.3	0.4	-0.2	1.0	1.2	-0.9	-0.1	0.2
Finance and support	7.1	5.8	4.3	1.6	-0.1	7.7	15.5	10.2	7.2	2.1	5.9	14.9	1.4	5.9	13.9	5.3	5.1
1.2.1 Public R&D expenditures	0.0	3.9	-2.8	1.0	-0.6	3.6	18.0	7.5	0.9	-1.3	0.5	1.6	-4.8	0.0	-0.8	1.3	0.0
1.2.2 Venture capital	9.6	--	-8.3	-8.2	-21.8	-1.0	3.5	--	-8.5	-5.2	9.1	22.9	--	--	--	1.8	18.1
1.2.3 Private credit	5.4	4.1	7.2	3.6	9.2	4.8	17.4	17.3	8.1	6.6	5.2	6.9	8.1	18.9	25.1	3.0	3.2
1.2.4 Broadband access by firms	13.7	9.5	23.8	10.7	17.3	25.1	24.3	6.2	32.0	8.8	8.8	30.4	--	0.0	18.9	16.0	0.0
FIRM ACTIVITIES	1.2	11.2	0.3	2.5	7.5	4.5	8.3	3.3	4.3	3.8	0.6	0.3	-0.1	6.4	3.8	1.0	2.9
Firm investments	-0.9	5.2	-0.4	2.1	1.8	6.9	0.8	1.6	-4.3	0.5	-1.8	-0.3	-1.8	8.4	-0.5	-2.8	0.0
2.1.1 Business R&D expenditures	-0.4	2.7	0.5	4.3	4.7	26.3	0.0	3.8	-13.4	0.9	-1.5	-0.7	-3.6	17.5	-0.5	-4.7	0.0
2.1.2 IT expenditures	0.0	--	0.0	0.0	8.2	0.0	7.0	1.2	4.5	0.0	0.0	0.0	--	--	--	-3.8	0.0
2.1.3 Non-R&D innovation expenditures	-2.4	7.6	-1.5	--	-6.9	-3.2	-4.2	0.0	-3.2	--	-3.9	--	0.0	0.0	--	0.0	0.0
Linkages & entrepreneurship	0.0	0.9	-0.1	2.3	5.7	1.7	2.4	1.5	2.3	3.2	-1.9	-1.0	3.3	0.4	-0.8	-1.9	0.7
2.2.1 SMEs innovating in-house	-0.5	--	1.0	-0.8	-3.0	0.5	2.6	--	2.8	4.8	0.0	--	0.0	0.0	--	-2.0	0.0
2.2.2 Innovative SMEs collaborating with others	1.0	1.9	0.5	0.0	0.8	-2.4	0.6	9.5	1.4	12.4	-4.5	-3.9	0.0	0.0	0.0	-3.6	0.0
2.2.3 Firm renewal (SMEs entries +exits)	-3.3	--	-4.4	--	--	-10.4	-0.1	-6.7	-5.1	-6.7	-6.1	-0.4	--	--	--	0.0	2.0
2.2.4 Public-private co-publications	3.0	0.0	2.5	7.7	20.6	22.0	6.4	2.4	10.5	3.4	3.4	1.3	10.1	1.2	-1.5	-2.0	0.9
Throughputs	4.0	20.1	1.2	2.9	13.4	5.7	21.0	6.0	13.4	6.2	5.1	1.6	-1.6	10.1	7.3	7.0	7.4
2.3.1 EPO patents	0.1	5.6	-4.0	2.7	9.0	8.4	5.2	3.7	12.5	0.2	-2.9	-0.3	0.1	4.6	-4.3	2.5	0.9
2.3.2 Community trademarks	5.5	8.3	5.5	5.2	11.1	12.1	36.0	7.5	27.4	6.6	7.8	4.5	3.7	8.2	17.6	10.1	8.8
2.3.3 Community designs	4.3	32.4	0.0	7.1	27.3	7.7	44.3	8.6	14.4	1.8	6.1	2.4	-2.6	8.2	1.7	4.9	9.3
2.3.4 Technology Balance of Payments flows	6.4	37.5	3.7	-3.1	7.5	-4.8	3.8	4.4	0.7	17.0	10.1	-0.1	-7.4	19.8	15.7	10.8	10.8
OUTPUTS	0.6	0.2	0.2	1.7	-1.3	2.7	2.4	0.5	1.9	0.5	-0.8	-4.5	0.8	3.6	-0.5	-2.6	1.3
Innovators	-1.3	0.0	1.0	-0.8	-2.1	0.1	2.1	0.0	2.6	4.8	-3.3	-4.2	0.0	0.0	--	-0.8	0.0
3.1.1 SMEs introducing product or process innovations	-1.3	0.0	1.0	-0.8	-2.1	0.1	2.1	0.0	2.6	4.8	-3.3	-4.2	0.0	0.0	--	-0.8	0.0
3.1.2 SMEs introducing marketing or organisational innovations																	
3.1.3 Resource efficiency innovators																	
3.1.3a Reduced labour costs																	
3.1.3b Reduced use of materials and energy																	
Economic effects	1.1	0.3	0.2	2.7	-1.6	4.1	3.3	0.7	2.4	-0.1	-0.6	-5.2	1.3	5.4	-0.5	-3.7	1.5
3.2.1 Employment in medium-high & high-tech manufacturing	-0.9	0.0	-6.0	1.8	2.9	1.7	1.6	0.3	5.4	0.7	-3.1	-3.5	2.6	-0.2	-7.8	-1.8	0.4
3.2.2 Employment in knowledge-intensive services	1.2	4.3	-0.6	0.6	2.7	4.9	8.4	1.9	3.6	1.2	1.6	0.8	3.7	1.1	1.3	1.2	0.4
3.2.3 Medium-tech and high-tech manufacturing exports	0.6	2.7	-1.0	1.2	2.0	-1.8	8.3	0.9	4.3	-0.5	-0.8	0.0	-0.2	3.1	10.2	-7.2	0.5
3.2.4 Knowledge-intensive services exports	1.3	0.0	-4.0	0.0	-3.2	5.4	2.3	5.2	5.3	-3.4	-0.9	-4.7	1.6	31.9	-6.0	4.2	7.9
3.2.5 New-to-market sales	4.1	16.3	10.6	5.8	-13.4	13.0	-9.2	-5.7	-11.6	2.8	0.0	-12.7	0.0	0.0	0.0	-6.5	0.0
3.2.6 New-to-firm sales	0.1	-18.4	2.9	7.1	0.7	2.1	9.6	2.1	8.7	-1.5	0.0	-10.7	0.0	0.0	0.0	-11.0	0.0

For indicators 3.1.2 and 3.1.3 growth rates could not be calculated (cf. Section 8.2).

Annex C: European Innovation Scoreboard 2008 – Definitions of indicators[35]

	Indicators	Numerator	Denominator	Reference year	Source
1.1.1	S&E and SSH graduates per 1000 population aged 20-29 (first stage of tertiary education)	Number of S&E (science and engineering) and SSH (social sciences and humanities) graduates at first stage of tertiary education (ISCED 5)	Population between 20 and 29 years	2006 (2005 for GR, TR; no data for LU)	Eurostat
1.1.2	S&E and SSH doctorate graduates per 1000 population aged 25-34 (second stage of tertiary education)	Number of S&E (science and engineering) and SSH (social sciences and humanities) graduates at second stage of tertiary education (ISCED 6)	Population between 25 and 34 years	2006 (2005 for GR, IT, IS; no data for LU)	Eurostat
1.1.3	Population with tertiary education per 100 population aged 25-64	Number of persons in age class with some form of post-secondary education (ISCED 5 and 6)	Population between 25 and 64 years	2007 (2006 for IS)	Eurostat
1.1.4	Participation in life-long learning per 100 population aged 25-64	Number of persons involved in life-long learning. Life-long learning is defined as participation in any type of education or training course during the four weeks prior to the survey	Population between 25 and 64 years	2007 (2006 for SE, UK, IS, CH)	Eurostat
1.1.5	Youth education attainment level	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	2007 (2006 for IS, NO, CH)	Eurostat
1.2.1	Public R&D expenditures (% of GDP)	All R&D expenditures in the government sector (GOVERD) and the higher education sector (HERD). Both GOVERD and HERD according to the Frascati-manual definitions	Gross Domestic Product	2007 (2006 for PL, UK, TR, CH; 2005 for IT, IS)	Eurostat
1.2.2	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. VC includes Early stage (seed + start-up) and Expansion and replacement (expansion and replacement capital) capital	Gross Domestic product	2007 (2005 for SK; no data for BG, EE, CY, LV, LT, LU, HU, MT, SI, TR, IS) Two-year averages are used (cf. EIS 2008 Methodology Report)	EVCA / Eurostat
1.2.3	Private credit (relative to GDP)	Claims on the private sector by commercial banks and other financial institutions that accept transferable deposits such as demand deposits (line 22d of IMF International Financial Statistics)	Gross Domestic Product (line 99b of IMF International Financial Statistics)	2007 (2006 for RO, IS)	IMF
1.2.4	Broadband access by firms (% of firms)	Number of enterprises (excluding the financial sector) with 10 or more employees with broadband access	Total number of enterprises (excluding the financial sector) with 10 or more employees	2007 (2006 for IS; 2005 for CH)	Eurostat
2.1.1	Business R&D expenditures (% of GDP)	All R&D expenditures in the business sector (BERD), according to the Frascati-manual definitions	Gross Domestic Product	2007 (2006 for PL, UK, TR; 2005 for IS; 2004 for CH)	Eurostat

[35] A discussion of the choice of indicators and sources is provided in the 2008 EIS methodology report.

	Indicators	Numerator	Denominator	Reference year	Source
2.1.2	IT expenditures (% of GDP)	Total expenditures on IT. IT expenditures capture hardware, software and other services. The data cover the total market, including expenditure of the public and private sector (enterprises, as well as those of individuals and households)	Gross Domestic Product	2006 (no data for CY, LU, MT, TR, IS)	EITO / Eurostat
2.1.3	Non-R&D innovation expenditures (% of turnover)	Sum of total innovation expenditure for enterprises, in national currency and current prices excluding intramural and extramural R&D expenditures	Total turnover for all enterprises	2006 (2005 for CH; 2004 for DE, GR, FR, IT; no data for LV, AT, FI, UK, IS)	Eurostat
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	2006 (2005 for CH; 2004 for DK, GR, FR, IT, SE, NO; no data for LV, LU, MT, SI, UK, IS)	Eurostat
2.2.2	Innovative SMEs collaborating with others (% of SMEs)	Sum of SMEs with innovation co-operation activities. Firms with co-operation activities are those 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	2006 (2005 for CH; 2004 for GR, FR, IS, NO)	Eurostat
2.2.3	Firm renewal (SMEs entries + exits) (% of SMEs)	Sum of the number of births and deaths of SMEs. Only SMEs with at least 5 employees and who are active in NACE classes C, D, E, G51, I, J and K are included	Total number of SMEs	2005 (2004 for CZ, IT, LU, HU, NL, PT, SK, FI, CH; 2003 for SI; 2002 for LT; 2001 for NO; no data for BE, BG, DK, DE, IE, GR, FR, CY, MT, AT, PL, TR, IS)	Eurostat
2.2.4	Public-private co-publications per million population	Number of public-private co-authored publications. "Public-private co-publications" are defined as all research-related papers (document types: 'research articles', 'research reviews', notes' and 'letters') published in the Web of Science database.	Total population	2006 Two-year averages are used (cf. EIS 2008 Methodology Report)	Thomson Reuters / CWTS
2.3.1	EPO patents per million population	Number of patents applied for at the European Patent Office (EPO), by year of filing. The national distribution of the patent applications is assigned according to the address of the inventor	Total population	2005	Eurostat
2.3.2	Community trademarks per million population	Number of new community trademarks. A trademark is a distinctive sign, identifying certain goods or services as those produced or provided by a specific person or enterprise	Total population	2007	OHIM / Eurostat
2.3.3	Community designs per million population	Number of new community designs. A registered Community design is an exclusive right for the outward appearance of a product or part of it, resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation	Total population	2007	OHIM / Eurostat

	Indicators	Numerator	Denominator	Reference year	Source
2.3.4	Technology Balance of Payments flows (% of GDP)	Royalty and license fees, receipts (Balance of Payments, current US$) plus Royalty and license fees, payments (Balance of Payments, current US$)	Gross Domestic Product (current US$)	2006 (2005 for AT; 2004 for TR; 2003 for SK; no data for DK)	World Bank
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	2006 (2005 for CH; 2004 for GR, FR, MT, NO; no data for IS)	Eurostat
3.1.2	SMEs introducing marketing or organisational innovations (% of SMEs)	Number of SMEs who introduced a new marketing innovation and/or organisational innovation to one of their markets	Total number of SMEs	2006 (2004 for BE, GR, ES, FR, IT, SK, NO; no data for LV, SI, FI, SE, IS, CH)	Eurostat
3.1.3	Resource efficiency innovators, unweighted average of the following 2 indicators:				
	• Reduced labour costs (% of firms)	Number of innovating firms who replied that their product or process innovation had a highly important effect on reducing labour costs per unit of output	Total number of innovating firms	2006 (2004 for BE, DE, IE, GR, FR, IT, SI, IS, NO; no data for UK, CH)	Eurostat
	• Reduced use of materials and energy (% of firms)	Number of innovating firms who replied that their product or process innovation had a highly important effect on reducing materials and energy per unit of output	Total number of innovating firms	2006 (2004 for BE, DE, IE, GR, FR, IT, SI, SE, IS, NO; no data for UK, CH)	Eurostat
3.2.1	Employment in medium-high & high-tech manufacturing (% of workforce)	Number of employed persons in the medium-high and high-tech manufacturing sectors	Total workforce	2007 (2006 for HR, IS)	Eurostat
3.2.2	Employment in knowledge-intensive services (% of workforce)	Number of employed persons in the knowledge-intensive services sectors	Total workforce	2007 (2006 for HR, IS)	Eurostat
3.2.3	Medium and high-tech manufacturing exports (% of total exports)	Value of medium and high-tech exports	Value of total exports	2006 (2005 for TR)	Eurostat
3.2.4	Knowledge-intensive services exports (% 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, 254, 260, 263, 272, 274, 278, 279, 280 and 284	Total services exports as measured by credits in EBOPS 200	2006 (2005 for IE, FI; no data for ES, FR, IT)	Eurostat
3.2.5	New-to-market sales (% of turnover)	Sum of total turnover of new or significantly improved products for all enterprises	Total turnover for all enterprises	2006 (2005 for CH; 2004 for GR, FR, SE, IS, NO)	Eurostat
3.2.6	New-to-firm sales (% of turnover)	Sum of total turnover of new or significantly improved products to the firm but not to the market for all enterprises	Total turnover for all enterprises	2006 (2005 for CH; 2004 for GR, FR, SE, IS, NO)	Eurostat

Annex D: European Innovation Scoreboard 2008 – SII time series

	2004	2005	2006	2007	2008
EU27	0.429	0.431	0.447	0.466	0.475
BE	0.467	0.477	0.486	0.498	0.507
BG	0.172	0.174	0.178	0.206	0.221
CZ	0.344	0.346	0.368	0.392	0.404
DK	0.566	0.572	0.605	0.602	0.570
DE	0.538	0.543	0.548	0.569	0.581
EE	0.413	0.409	0.421	0.443	0.454
IE	0.486	0.504	0.513	0.528	0.533
GR	0.271	0.279	0.295	0.332	0.361
ES	0.329	0.344	0.352	0.359	0.366
FR	0.460	0.461	0.465	0.495	0.497
IT	0.314	0.320	0.343	0.361	0.354
CY	0.370	0.363	0.381	0.433	0.471
LV	0.194	0.204	0.215	0.239	0.239
LT	0.264	0.273	0.287	0.294	0.294
LU	0.486	0.486	0.513	0.497	0.524
HU	0.266	0.273	0.287	0.305	0.316
MT	0.274	0.280	0.292	0.315	0.329
NL	0.450	0.447	0.458	0.474	0.484
AT	0.480	0.494	0.509	0.523	0.534
PL	0.264	0.272	0.282	0.293	0.305
PT	0.290	0.317	0.337	0.340	0.364
RO	0.209	0.205	0.223	0.249	0.277
SI	0.388	0.393	0.412	0.429	0.446
SK	0.257	0.273	0.298	0.299	0.314
FI	0.551	0.546	0.541	0.585	0.610
SE	0.607	0.610	0.637	0.630	0.637
UK	0.522	0.534	0.550	0.556	0.547
HR	0.278	0.286	0.282	0.289	0.293
TR	0.192	0.196	0.202	0.206	0.205
IS	0.381	0.389	0.415	0.452	0.467
NO	0.358	0.370	0.371	0.375	0.380
CH	0.612	0.615	0.632	0.661	0.681

Annex E: European Innovation Scoreboard 2008 – Country abbreviations

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