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Innovation Union Competitiveness report 2011

4. Achieving economic competitiveness

Highlights

This chapter addresses the different factors conducive to improved competitiveness, in particular labour productivity and the role of high-tech industries and knowledge intensive services, as well as the role of high tech exports in the overall trade balance.

There remains a significant gap between the EU's innovation performance and that of the United States and Japan, as illustrated by the Innovation Union Scoreboard 2010. The EU's innovation performance relative to the United States has been smoothly improving while the performance gap relative to Japan is stable. Compared to China, the EU still has a clear innovation performance lead but it is declining, as China's performance has grown at a faster rate than of the EU.

One impact of the economic and financial crisis has been on EU labour productivity: in 2009 it fell back to the levels of 2000 and is now below the productivity levels of both the United States and Japan. Member States show very different situations. Luxembourg is leader in labour productivity, with almost twice the EU-19 average; the Netherlands, Ireland, Belgium and France have comparable levels as those of the United States.

A feature common to the bigger Member States like France, the United Kingdom and Germany, is the decrease in their share of high tech exports in total exports. This is directly linked to the emergence of the Asian economies which have the largest share of high-tech products in their exports, almost double that of the EU. However it should be noted that high-tech exports do not as such necessarily reflect the knowledge intensity of an economy. A distinction between different types of high-tech exports should be made in what concerns the value added and initial origin of the product.

The regions in Europe are very different and have specific innovation performances even within Member States. The most innovative regions are located in the most innovative Member States: Finland, Sweden, Denmark, Germany and the United Kingdom. But there are regions that are exceptions, since they perform well above the average national environment in what concerns innovation. Large differences in competitiveness among regions are observed in some Member States, e.g. Italy, Spain and Portugal.

4. Achieving economic competitiveness

4.1 Is Europe improving its innovation capacity?

The United States and Japan are holding their lead over the EU

The Innovation Union Scoreboard 2010 (IUS)[48] includes an analysis of EU performance compared with that of the United States and Japan based on a set of 12 comparable indicators. The figure III.4.1. shows that the EU's performance gap relative to the United States has been

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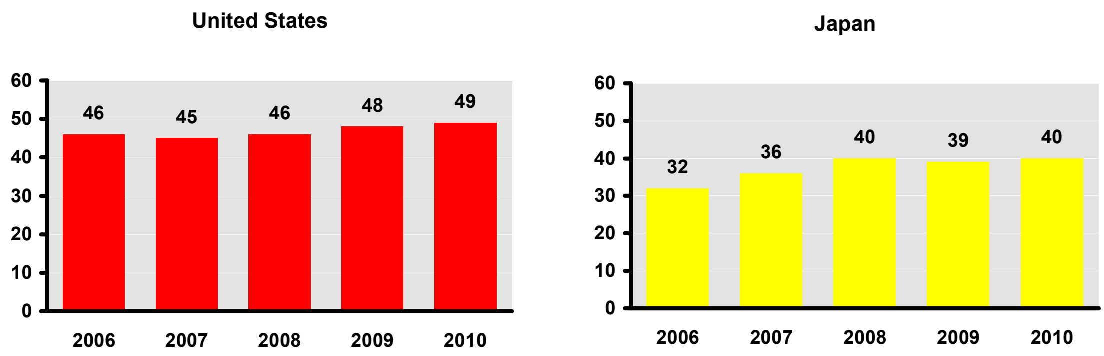
[48] The IUS report, its annexes and the indicators' database are available at http://www.proinno-europe.eu/metrics.

slightly increasing, while the performance gap relative to Japan is stable. The United States is performing better than the EU on 10 indicators (Figure III.4.2.). In Public R&D expenditure and knowledge-intensive services exports, the EU is performing better. Overall there is a clear performance lead in favour of the United States, although the EU is catching up on several indicators, including scientific excellence and technological performance.

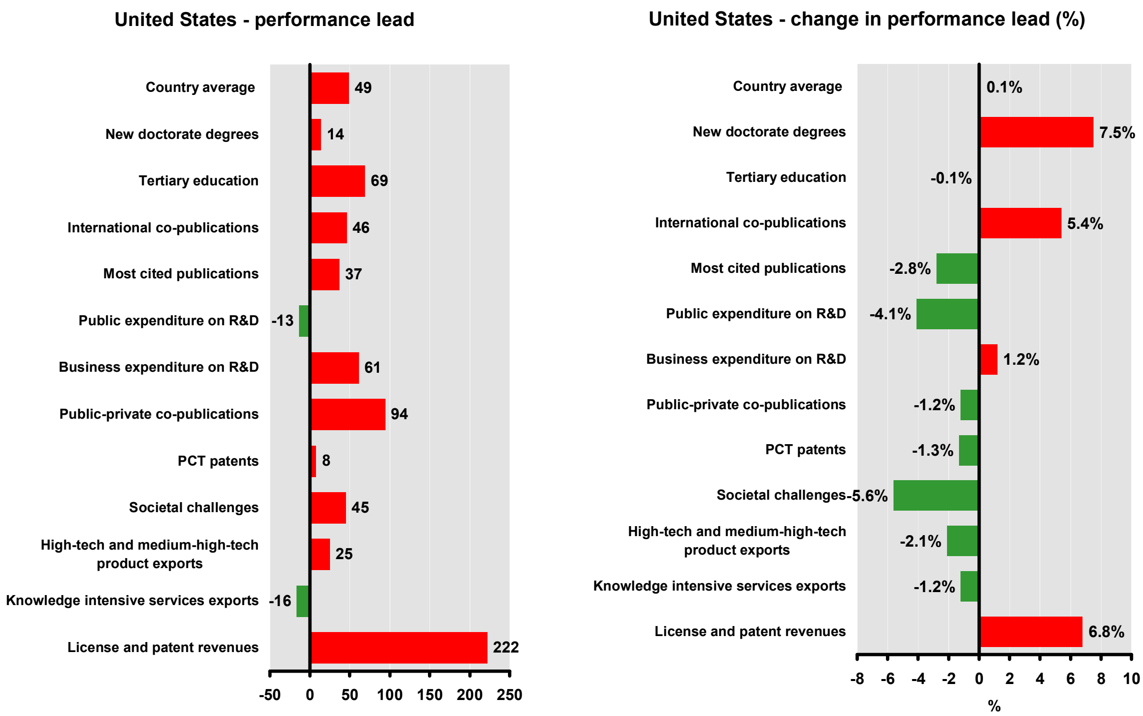
Figure III.4.1 EU innovation performance compared to main competitors [(1)]



Source: DG Research and Innovation, DG Enterprise — Innovation Union Competitiveness Report 2011
Data: Innovation Union Scoreboard 2010
Note: (1) Performance is measured as 100*(X / EU)-1where X refers to the value for the indicator for the country X and EU to the value for the indicator for the EU. The values in the graphs should be interpreted as the relative performance compared to that of the EU e.g. the United States in 2010 is performing 49% better than the EU.

Performance is measured as 100*(X/EU)-1) where X refers to the value for the indicator for the country X and EU to the value for the indicator for the EU. The values in the graphs should be interpreted as the relative performance compared to that of the EU. E.g. the US in '2010' is performing 49% better than the EU.

Figure III.4.2 EU innovation performance compared to the United States

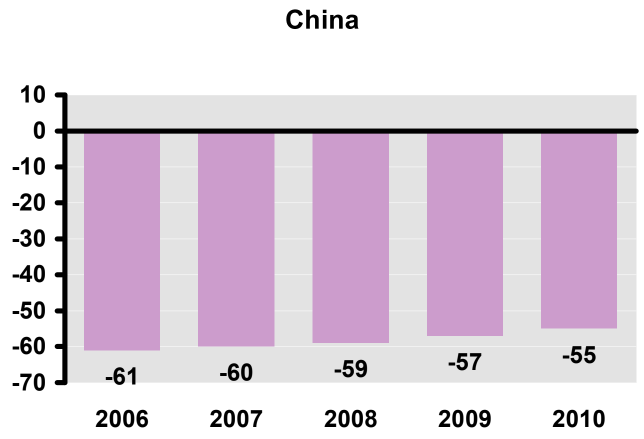


Source: DG Research and Innovation, DG Enterprise — Innovation Union Competitiveness Report 2011
Data: Innovation Union Scoreboard 2010
Note: (1) **Left:** The indicators highlighted in red reflect a performance gap for the EU; those highlighted in green reflect a performance lead for the EU.
Right: Relative growth compared to that of the EU. Red coloured bars show that the United States is growing faster than the EU; green coloured bars show that the United States is growing slower than the EU.

Though holding its lead over China, the EU is losing ground

Compared to China, the EU still has a clear innovation performance lead. Using the same set of 12 indicators used for comparison with the United States and Japan (Figure III.4.3.), the EU is performing better than China in most indicators. However, the EU's lead is declining, as China's innovation performance has grown at a faster rate than that of the EU. The EU has increased its lead in most-cited publications and public R&D expenditure.

Figure III.4.3 EU innovation performance compared to China



Innovation Union Competitiveness Report 2011
Source: DG Research and Innovation, DG Enterprise
Data: Innovation Union Scoreboard 2010

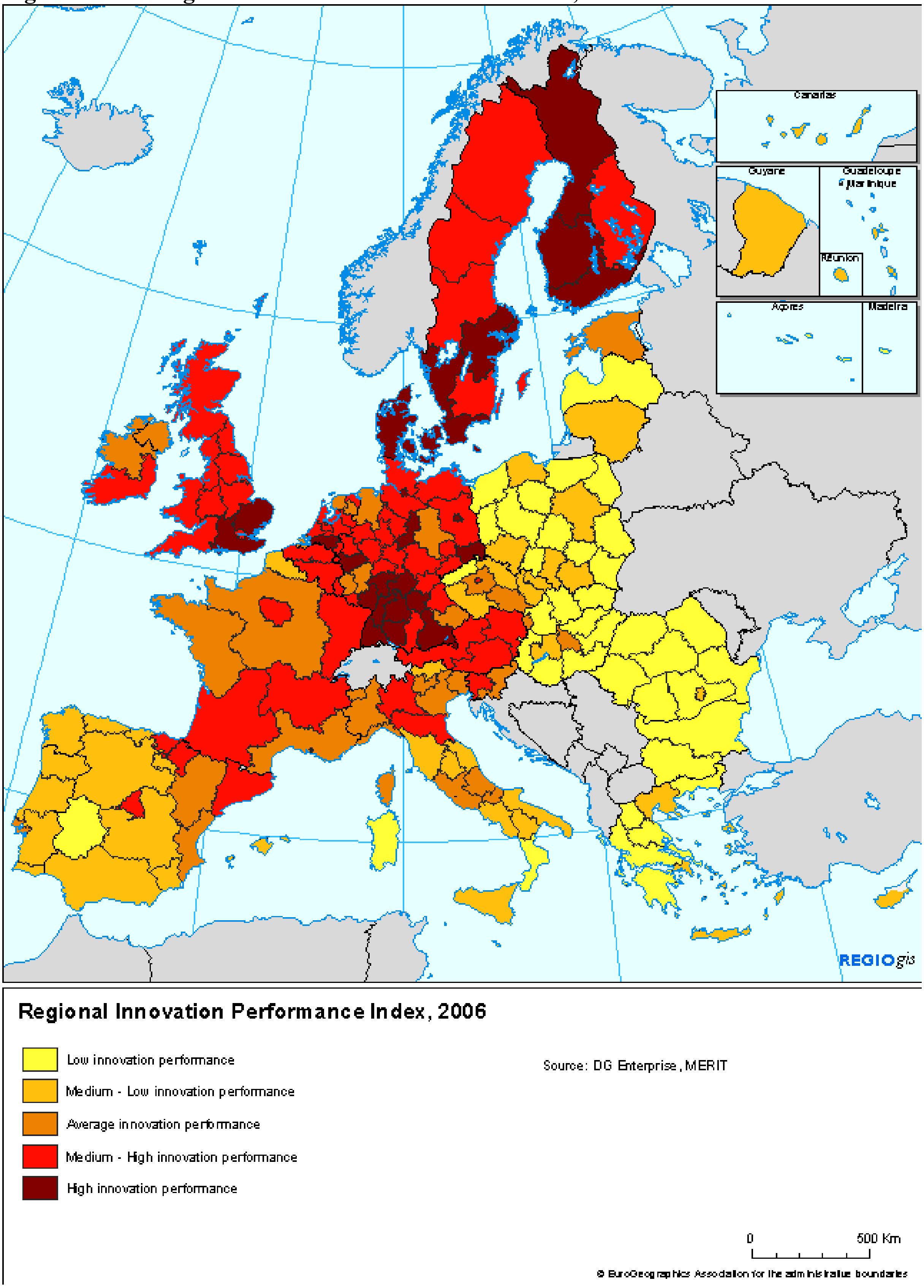
The Regional Innovation Performance Index (RIPI) confirms that the innovative capacity of the EU is concentrated in the most developed countries

In this chapter we have been analysing different factors conducive to improved competitiveness, such as labour productivity and the role of high-tech industries and knowledge-intensive services. European regions are very different and have specific innovation performances, even inside a single country. Governments are engaged in designing policies which are relevant and adequate at the local level[49], for which it is necessary to know the main determinants of potential growth and why different regions present different performances. The map below shows the innovation capacity of 201 regions of the EU given by the Regional Innovation Performance Index. This figuration has been calculated using a composite indicator based on 16 of the 29 indicators used in the EIS 2009.[50]

The most innovative regions are located in the most innovative countries, as is the case for Finland, Sweden, Denmark, Germany and the United Kingdom. But there are exceptions — regions that perform well above the average environment, such as Lombardy and Emilia-Romagna in Italy, the Basque Country, Navarre, Madrid and Catalonia in Spain, West Slovenia, the capital city regions of Hungary and Slovakia, and Prague.

[49] See the Report "Investing in Europe's Future, Fifth Report on Economic, Social and Territorial Cohesion", DG Regional Policy, November 2010
[50] EIS: European Innovation Scoreboard, DG ENTR, 2009.

Figure III.4.4. Regional Innovation Performance Index, 2006



Source: DG Research and Innovation
Data: DG REGIO

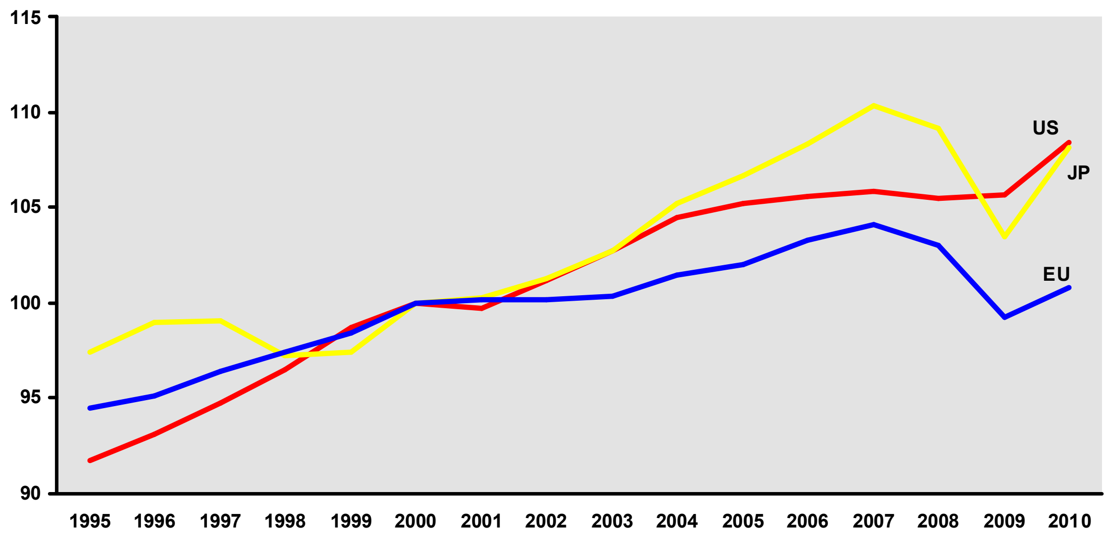
4.2. Is Europe improving its productivity and competitiveness?

In 2009, EU total-factor productivity slowed down to the levels of 2000 and fell well below the productivity level of the United States and Japan

Since the year 2000, four countries show a negative total-factor productivity growth[51]: Italy, Spain, Portugal and Luxembourg, with stronger decreases for Italy and Luxembourg. The other countries have a good position for the last year available, but have registered different evolutions since 2000: Austria, Belgium, Ireland, Denmark, Germany, Finland, Sweden and the United Kingdom increased their productivity up to 2008, showing an abrupt fall for this year, and recovering over 2009–2010 (for values as in 2006). The Netherlands were stable for four years from 2000–2003, growing until 2008 and decreasing afterwards. Two exceptional situations were represented by France and Greece. France, though following a similar trend, experienced only a slight increase in the period 2000–2008 followed by a fall to values above those registered in 2000, and Greece had stronger increases over the same period, and smaller decreases in 2008.

It is interesting to note that the productivity of the United States progressed more than France, Italy or Germany in the period 1995–2000. Japan is evidencing a more limited progress for the same period.

Figure III.4.5 Total factor productivity (total economy), 1995-2010 (2000 = 100)



Source: DG Research and Innovation
Data: DG ECFIN

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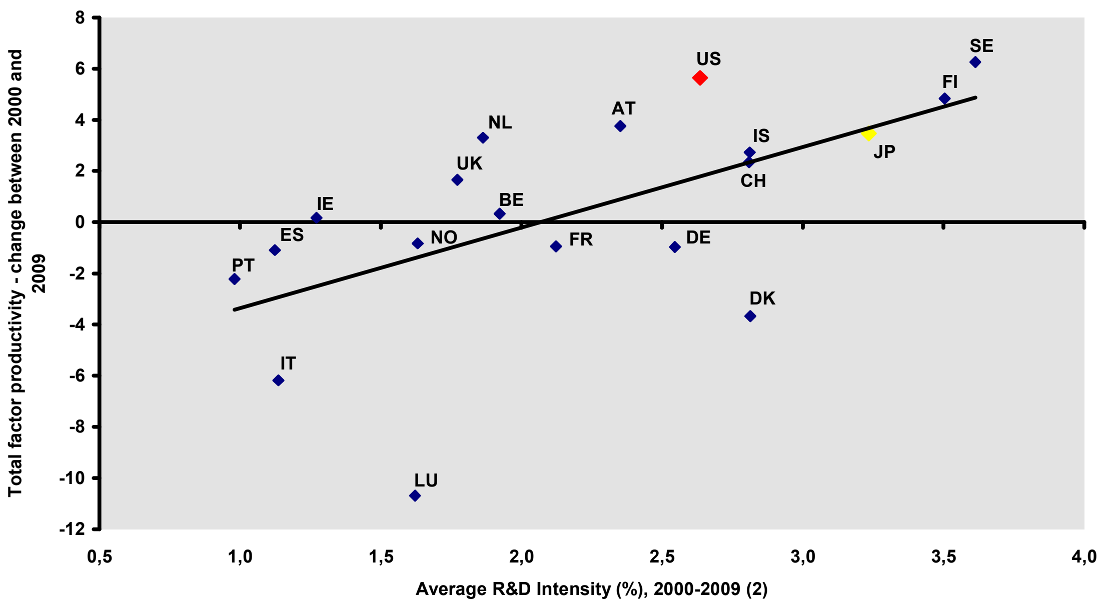
This report has at several places suggested a link between R&D investment and innovation performance, and between total factor productivity of a country and its level of R&D investment. The figure below seems to indicate a correlation between the change of the total

[51] Total Factor Productivity (TFP) is the portion of output not explained by the amount of inputs used in production. As such, its level is determined by how efficiently and intensely the inputs are utilised in production.

factor productivity, over the period 2000-2009 and the average level of R&D intensity for the corresponding period.[52] The countries that have achieved higher levels of R&D intensity and are leaders in innovation performance, also achieved higher levels of productivity. This is the case for Finland and Sweden, but also for Japan and the United States. It is interesting to note that the positioning of the different countries is in line with the country grouping model constructed in the part New Perspectives, chapter 1. based on the knowledge capacity and economic structure of each country.

Figure III.4.6 R&D Intensity (average) and total factor productivity (1) (evolution), 2000-2009



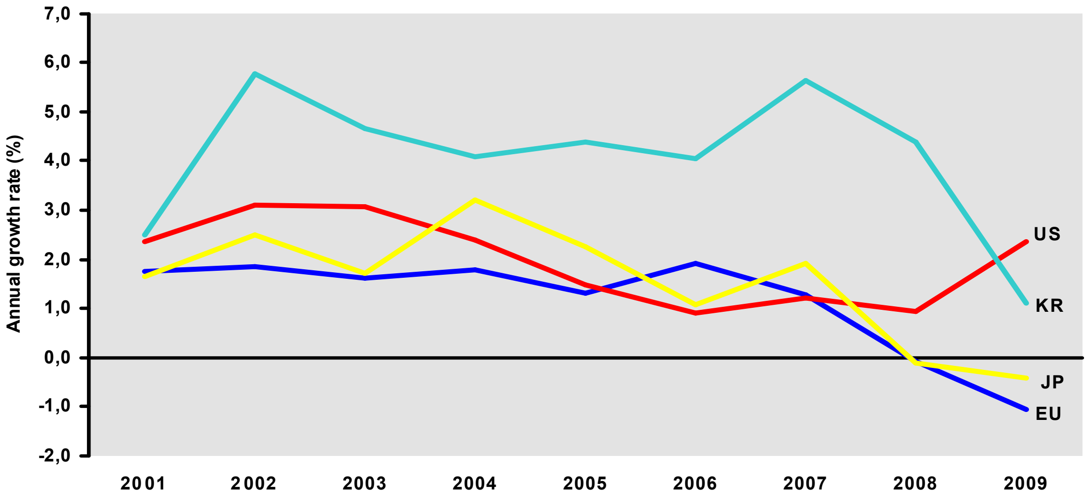
Source: DG Research and Innovation — Innovation Union Competitiveness Report 2011
Data: Eurostat, DG ECFIN
Notes: (1) Total factor productivity, total economy, 2000=100.
(2) JP: 2000-2007; IS, CH, US: 2000-2008; NO: 2001-2009; NL: 2003-2009; FR: 2004-2009; SE: 2005-2009; DK: 2007-2009.
(3) EL, LU, IS, CH: R&D Intensity is not available for every year. The R&D Intensity average is the average of the available values.

Europe has a lower labour productivity growth than the United States

Though labour productivity is considered to be only indirectly connected to innovation, and even more distant to research investments, it is a way of measuring the outputs of the research and innovation systems.

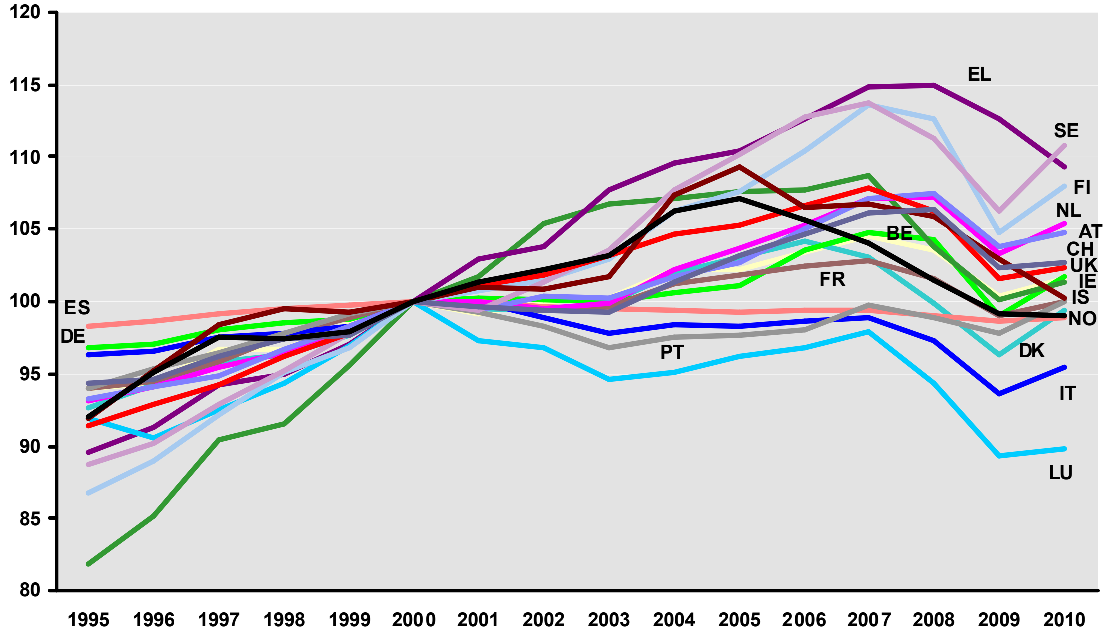
[52] Naturally, other co-evolving factors can explain this correlation, given the complexity of productivity growth.

Figure III.4.7 Labour Productivity - annual real growth rate [1], 2000-2009



Source: DG Research and Innovation | Innovation Union Competitiveness Report 2011
Data: Eurostat, OECD
Note: (1) Derived from GDP per hour worked in PPS€ at constant prices (base year 2000).

Figure III.4.8 Total facor productivity (total economy) by country, 1995-2010 (2000 = 100)



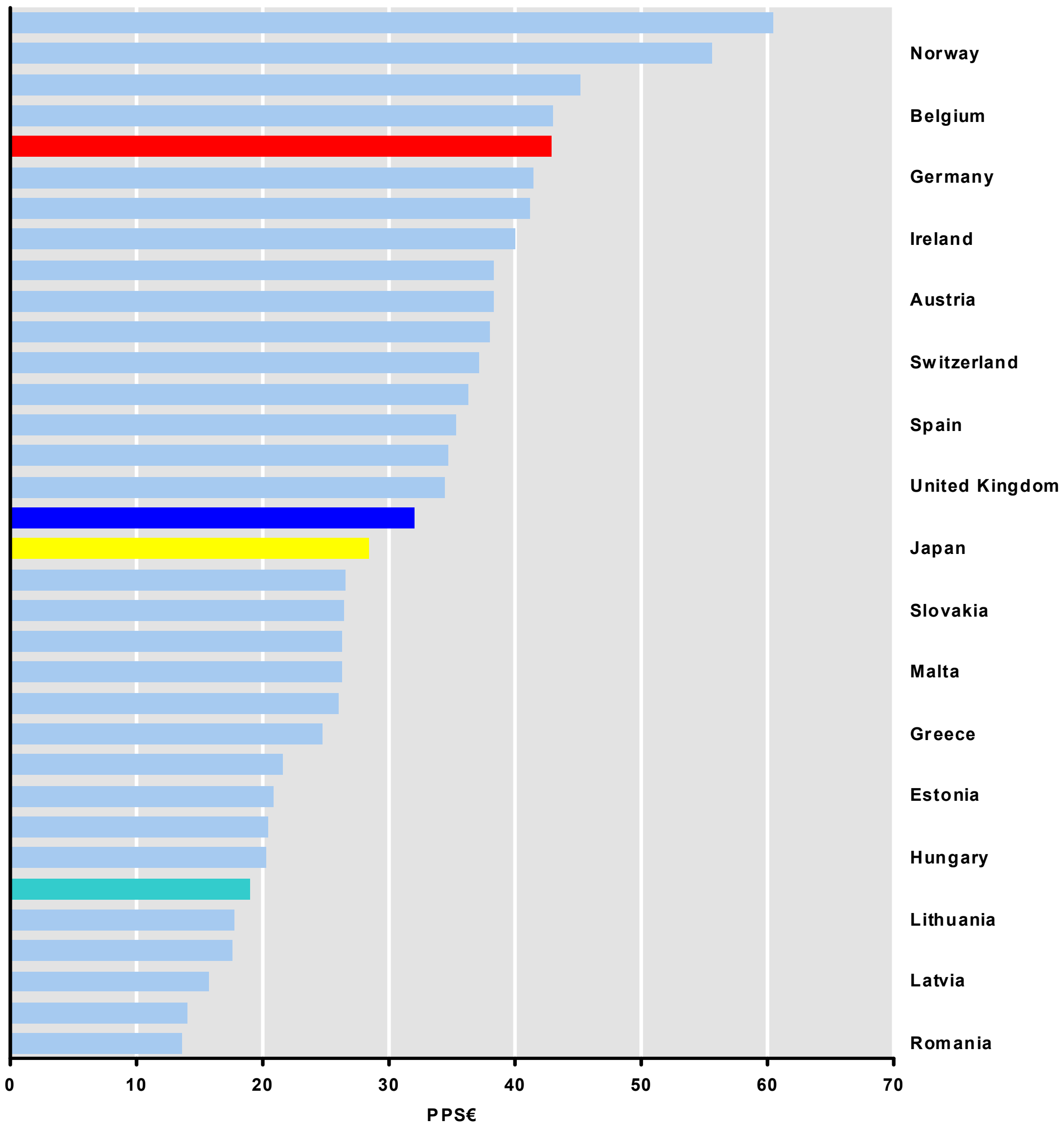
Source: DG Research and Innovation
Data: DG ECFIN

Innovation Union Competitiveness Report 2011

Luxembourg is the leader in labour productivity, almost reaching the double value of EU-19 average; Norway, the Netherlands, and Belgium have equivalent levels similar to those registered by the United States

Figure III.4.9. presents the estimated values for hourly labour productivity for 2010 for EU19 countries and the United States, Japan, South Korea: only Luxembourg, Norway, the Netherlands and Belgium surpass the US labour productivity; the EU19 average is clearly below the labour productivity of the nited States but above that of Japan and South Korea.

Figure III.4.9 Labour Productivity - GDP per hour worked in PPS€, 2010 (1)



Source: DG Research and Innovation — Innovation Union Competitiveness Report 2011
Data: Eurostat, OECD
Note: (1) CH: 2008; EU, BE, CZ, ES, FR, LU, MT, SI, UK, NO, US, JP, KR, IL: 2009.

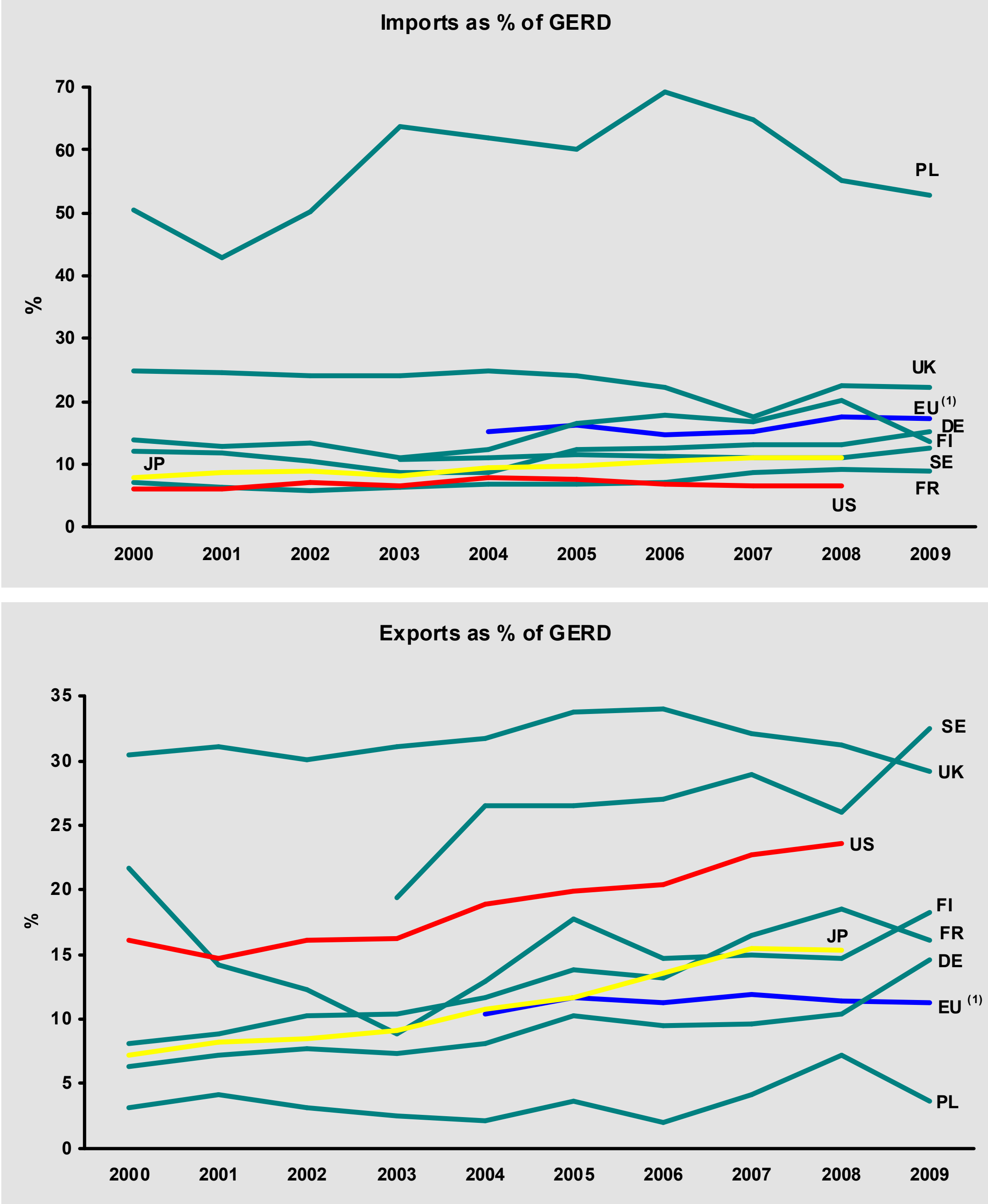
International trade in technologies can be measured by the international transactions in royalties and licence fees as a % of GERD. A high and growing export of royalties and license fees is an indication of a competitive technology and innovation capacity. However, it could also indicate a domestic incapacity to absorb new technologies produced in the country. The import of technologies indicates, on the other hand, a domestic demand and absorptive capacity, reinforcing the knowledge intensity of the country. It could be related to an economic catching-up strategy, backed up by the absorption of knowledge produced elsewhere. However, it is also a sign of a weaker capacity of domestic knowledge production, since knowledge-intensive economies tend to have a positive trade balance of technologies.

The EU is a net importer of technology, but several Member States register a trade surplus

The graph below on export of patents and licences illustrates the higher degree of international competitive-technology production of the United States and Japan when compared to the EU. In 2008, the export of royalties and licence fees of the EU amounted to 10.4% of GERD, compared to 23.0% the United States and 15.4% for Japan. Inside the EU, the United Kingdom and Sweden have high levels of technology exports . Germany and Finland experienced growing technology export over the period 2000-2009.

Comparing export with import, it can be seen that the EU has a trade deficit in royalties and licences, while the United States and Japan strongly expand their export while maintaining a lower and more stable level of import. The United Kingdom, Sweden, France and Finland have a trade surplus, while Poland hashigher import than export.

Figure III.4.10 International transactions in royalties and licence fees



Source: DG Research and Innovation
Data: Eurostat
Note: (1) Extra-EU-27.

Innovation Union Competitiveness Report 2011

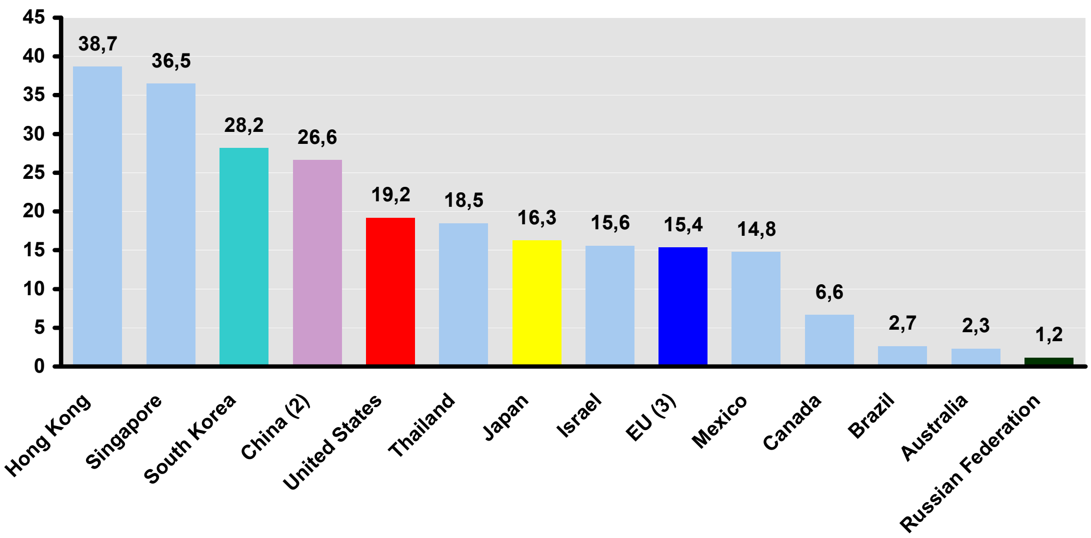
The emerging Asian economies have the world's largest share of high-tech products in their exports — almost double that of the EU

Countries commercialise the results of research and technological developments in international markets. The share of high-tech products and knowledge-intensive services exported is a way of measuring the performance and innovativeness of a country's products, technologies and processes.

The figure below shows in what degree high-tech products are relevant to the total exports. Hong Kong, Singapore, South Korea and China have the highest shares of high-tech products in their export. This is the confirmation of a coming trend observed since 2000, when China had less than 18 % of high-tech exports in all its exports. While China has been continuously growing, there has been a marked decrease in the EU, Japan and the United States. During the same period the EU was reduced to a share of 15.4 % and Japan and the United States to 16.3 % and 19.2 % respectively. In 2006, the EU had a share around 17 % of high-tech exports in total exports.

To better interpret high-tech exports as an indicator for a knowledge-based economy, a distinction should ideally be made between different types of high-tech exports, namely in what concerns the value added and the initial origin of the product. This is particularly clear for the ICT products, where computer assembly is counted. Countries with a low-cost labour force such as China have had a competitive advantage and have consequently taken over the manufacturing part of the value chain for many such products. The consequence is that high-tech exports do not necessarily reflect the knowledge intensity of an economy. The examples of Ireland and Malta, which are specialised in ICT exports, further illustrate this analytical effect, because their R&D intensities are quite low, although their export industries are highly focused on the manufacturing of ICT products for multinational enterprises.[53]

Figure III.4.11 High-Tech exports as % of total national exports, 2008 (1)



Source: DG Research and Innovation

Innovation Union Competitiveness Report 2011

Data: Eurostat

Notes: (1) KR: 2007.

(2) China: Hong Kong is not included.

(3) EU: Intra-EU exports are not included.

53 See also 'Made in China' tells us little about global trade, by Pascal Lamy, FT Published: January 2011.

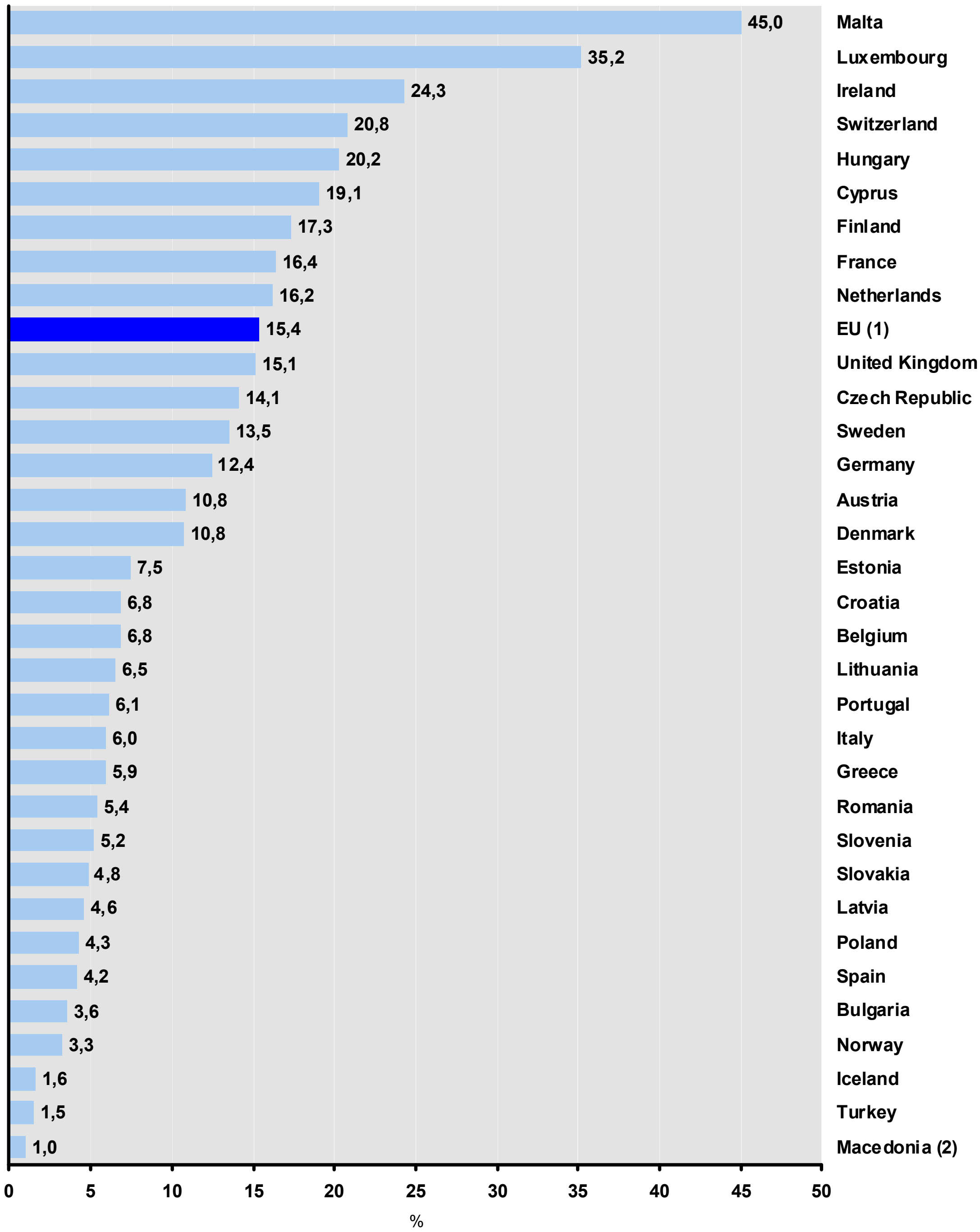
Technology-driven industries increasingly dominate EU imports from China

In 2007, the share in EU imports from China of these industries was already higher than in intra-EU imports, while high-skill industries recorded rapidly rising shares between 2000 and 2007, providing evidence for China's technological upgrade. Moreover, China (as well as India and even Russia) has been successful in price competition in high-skill industries and gained market shares in the EU. In a longer-term perspective, this 'industrial upgrading' is the most serious challenge to the EU in maintaining its competitive advantages in high-value-added products and services.

The bigger Member States, like France, the United Kingdom and Germany are decreasing their share of high-tech exports in total exports

Focusing on the situation of EU-27 at country level, the tendency is to increase the share of high-tech exports in total exports, namely for the bigger and more advanced countries, like the United Kingdom, France and Germany, with values around the EU average or below.

Figure III.4.12 High-Tech exports as % of total national exports, 2008



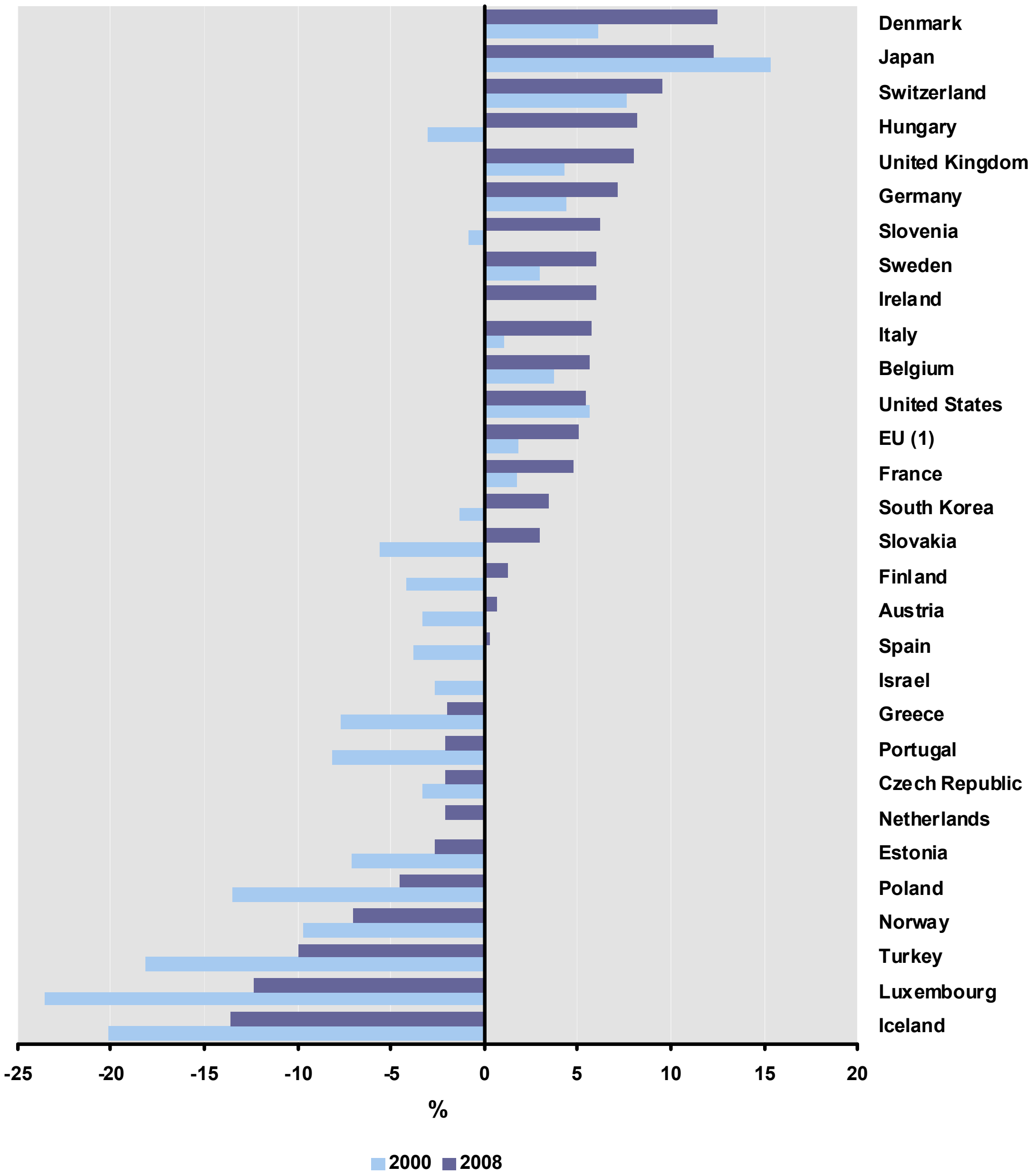
Source: DG Research and Innovation — Innovation Union Competitiveness Report 2011
Data: Eurostat
Notes: (1) EU: Intra-EU exports are not included.
(2) The former Yugoslav Republic of Macedonia.

Source: DG Research — STC Key Figures Report 2010 / 11
Data: Eurostat

Almost all EU Member States have increased the knowledge-intensity in their manufacturing export as share of the trade balance

It is hard to measure the quality of these goods, or the quality of the innovation incorporated in them, using trade statistics. An indicator that can address this aspect is constructed on the contribution of innovative-related trade in manufacture goods to the balance of trade of goods, as shown in the figure reporting on high- and medium-high-tech manufacturing goods for the trade balance (2000 versus 2008). It is another way of expressing the degree of knowledge specialisation in international competition, of a country. It includes the aspects related to imports and re-exports of goods, after value added, that are not visible in the data. Considering this indicator, a positive evolution of the knowledge intensity of the trade balance is visible for almost all countries. In 2008, Greece continued to show a negative value. Most of the Member States showed significant increases between 2000 and 2008. Very positive change can be observed for Poland and Portugal, with a negative situation in 2000.

Figure III.4.13 Contribution of high-tech and medium-high-tech manufactured goods to the trade balance, 2000 and 2008



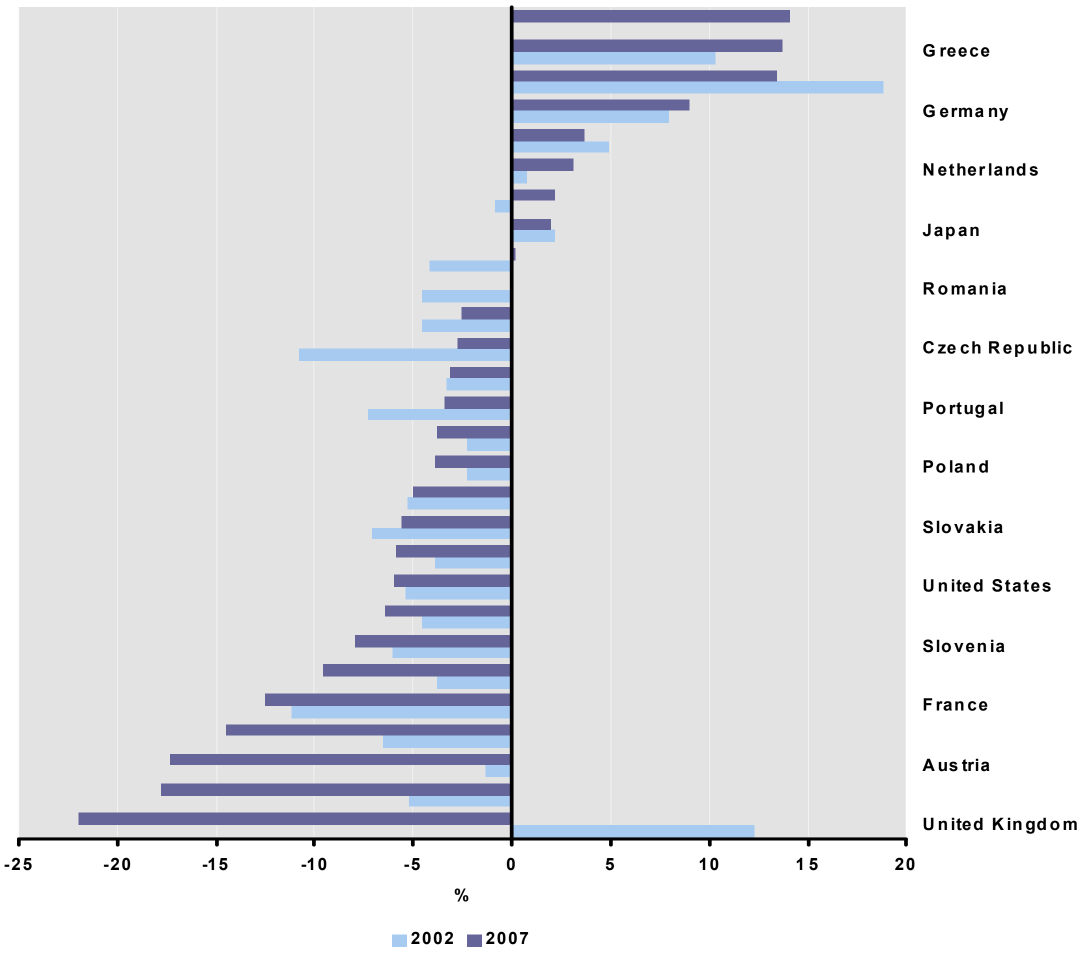
Source: DG Research and Innovation
Data: OECD
Note: (1) EU does not include BG, CY, LV, LT, MT, RO.

Innovation Union Competitiveness Report 2011

In some Member States the contribution of knowledge-intensive services to trade balance is growing

The growing importance of services sectors in most European countries is a fact that is discussed and presented in different parts in this chapter. Unlike manufacturing goods, for which data show more consistent results, performance of services sectors are affected by various factors such as fiscal measures (for the financial services, for example) or geographical situation (peripheral countries), and the coverage does not encompass all the Member States[54]. Nevertheless, it is relevant to analyse the service sectors from the perspective of innovation, and how they changed between 2002 and 2007. Focusing on the contribution of knowledge-intensive services in the trade balance, it is clear that countries such as Denmark and Greece experienced a strongly positive evolution. Ireland still had a very relatively high contribution of knowledge-intensive services to its trade balance, but this contribution decreased over the period 2002–2007. From a lower level, Germany, the Netherlands and Latvia had a positive evolution, while Hungary, the Czech Republic and Portugal reduced the gap. Conversely, Sweden, Poland, Bulgaria and Malta increased the knowledge-intensive service trade deficit over the same period.

Figure III.4.14 Contribution of Knowledge-Intensive Services (KIS) to the trade balance, 2002 and 2007



Source: DG Research and Innovation
Data: OECD

Innovation Union Competitiveness Report 2011

[54] To improve the quality of data available on services, at EU and Member States level, the European Commission will launch specific studies.

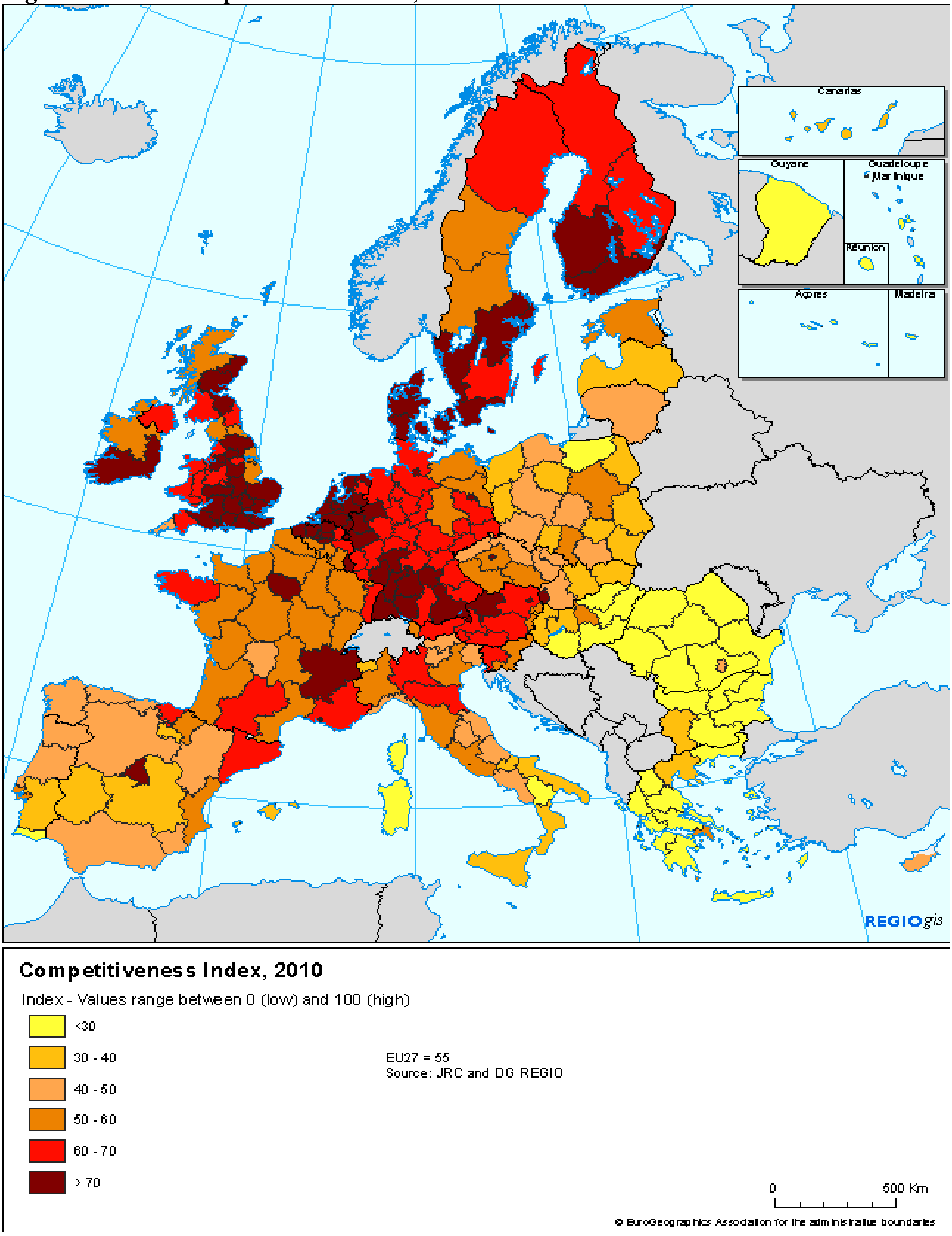
There is a strong regional dimension of competitiveness, not captured by national level measures

The European Commission has created a new regional competitiveness index for all NUTS2 regions. [55] This index allows the performance of a region to be assessed in relation to all the other EU regions. The set of 69 indicators used in this index are divided in three pillars: 1) the basic group, with the key drivers for all types of economies; 2) the efficiency group, with the key aspects for a developing region; 3) the innovation group, with the key drivers for the advanced economies. These three sets are assigned different weights, based in the GDP per head of a region. It is a dynamic way of assessing the progress of an individual region, as it identifies the more urgent needs at different stages of development. As an example, a less developed region might benefit more by improving institutions and education, when compared with a more advanced one, which might need to invest more in innovation to stay competitive.

The economic and financial crisis impacted differently on the indicators used to measure innovation and competitiveness. In the map below, the overall competitiveness resides in the Nordic regions, the Netherlands, in Southern Germany and South-East England. Large differences in competitiveness among regions are observed in some Member States as Italy, Spain and Portugal. These results give evidence to the strong regional dimension of competitiveness, not captured by national level measures. In the less knowledge-intensive economies of the EU, the most competitive regions tend to be isolated and mainly surrounded by less competitive regions. Most of these Member States have a high concentration of factors of competitiveness around the capital city region, with still very limited spillovers to neighbouring regions. At the contrary, in the most knowledge-intensive economies of the EU, there is a more even distribution of the competitiveness factors.

[55] See the Report "Investing in Europe's Future, Fifth Report on Economic, Social and Territorial Cohesion", DG Regional Policy, November 2010

Figure III.4.15. Competitiveness index, 2010



Source: DG Research and Innovation
Data: DG REGIO