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European Competitiveness Report 2012: Reaping the benefits of globalization

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Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions

Industrial Policy Communication Update:
A stronger European Industry for Growth and Economic Recovery

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EXECUTIVE SUMMARY

The 2012 edition of the European Competitiveness Report provides new empirical evidence for understanding the drivers of industrial competitiveness and the opportunities and constraints faced by European enterprises in the post-crisis recession.

The focus of this year report is on maximizing the benefits of globalization. It studies:

- **the development of global value chains and their impact on the value added of exports;**
- **energy efficiency as a determinant of export performance;**
- **the potential of FDI flows;**
- **the role of business networks; and**
- **the potential of European neighbourhood policies for reaping the benefits of globalisation**.

The 2012 report seeks to identify opportunities to make European industries more competitive by maximising the benefits of globalisation

These topics are important because many of the drivers of and the challenges to the recovery of industrial demand and employment are to be found outside Europe. The new industrial markets outside the EU are key to European competitiveness, particularly in the context of the recovery. More importantly, however, they are crucial for European industrial competitiveness in the long term. This is because the emerging industrialised economies are increasingly competing with Europe not only in traditional exports but also in knowledge-intensive industries. Fast-growing new industrial powers outside Europe present European firms with both challenges and opportunities. These have either not been fully studied or their implications for European industrial policies have remained ambiguous.

The single market and, especially, the expansion into markets outside the EU have made EU economies more open and more specialised. Demand from non-EU countries for EU exports is thus

The report starts by putting the stalled recovery into the context of Europe's external trade performance. It argues that even though trade plays an important role in the recovery from the crisis, exports alone will not lead the EU out of the current crisis. The opportunity to rely on foreign demand can be very important in the short term when domestic demand is particularly weak but in the long term sustainable growth will be generated through technical progress and productivity growth. It is in that sense that **the modernization of the industrial base** and the **removal of institutional impediments to entrepreneurship** can be seen as crucial for the European enterprises' competitive performance in and outside Europe.

The recession began when accumulated speculative bubbles in the US and certain EU Member States finally burst. These overpriced assets,

a powerful driver of recovery. The actual impact, however, differs from one EU country to another.

and the related distortions of allocative efficiency, are typical for long periods of stability such as 1993-2007. In countries affected by the bubble (e.g. Spain and UK), the subsequent crisis is followed by a long period of slow deleveraging that explains the difficult recovery. In these countries the bursting of the bubble and the deleveraging of firms and households is a process of painful adjustment. In countries without such internal imbalances (e.g. Germany and Sweden), the contraction in GDP is almost entirely due **to shrinking intra-EU exports** of goods and services and to **postponed investment** given the uncertain business conditions of the EU. Consequently, the recovery is expected to be faster in countries in the former group as uncertainty fades away. In the future **recovering exports to fast growing economies outside the EU will certainly contribute compensating for weaker domestic and EU demand in both groups of countries.**

Economies affected by the pre-crisis real estate bubble are undergoing painful adjustment and deleveraging. The resultant drop in internal demand cannot be fully offset by demand from outside the EU.

The analysis of export specialization trends of EU member states also sheds light on the impact on recovery of the different patterns of export specialization. In the last two decades the **EU member states increased their openness** in terms of share of exports relative to GDP. For EU-15 Member States the Single market explains only part of this increase in the early 1990s. After that the share of exports to the EU remains relatively stable: the export expansion is mainly outside the Single market. This expansion is accompanied **by increased specialization in exports of manufactures or services.** Traditional manufactures exporters like Germany or France specialize further in this direction. Meanwhile, UK, Denmark, Greece and Ireland display a notable increase in the export of services.

The study also looks at how competitiveness is fostered by the **institutional and regulatory environment**. It is argued that structural and institutional reforms may not offer quick-fix solutions but given the current fiscal constraints they appear plausibly as a key element of a cost-effective policy response for a way out of the crisis. In the longer term growth depends on the ability of an economy to adopt and develop new ideas. In turn, this ability depends crucially on having the right institutional and regulatory environment.

Outsourcing of production is important driver of cost optimisation and new market

A clue to maximizing the competitive gains from globalization is the understanding of the **value chain positioning and performance of EU industries.** This report studies trends in the internationalisation of production and the related challenges and opportunities for EU industrial policy. Thanks to globalisation and improved cross-border transport and technological progress, outsourcing production is now an important driver of cost optimisation and new market penetration. Different parts of firms' production processes are now located in different parts of the world, chosen according to the comparative advantages of the locations and their sales potential. The internationalisation of industrial value chains has resulted in a sharp **increase in trade in intermediate and semi-finished products**. The

penetration.

related challenges, risks and opportunities for industrial performance have significantly changed the way firms compete. Today, their positioning in the global value chain — i.e. their ***value-chain performance*** — is becoming a more important measure of competitiveness than the traditional emphasis on *export performance* measured through market shares and comparative advantages.

Hence EU industries' positioning and performance in the global value chain, measured through their domestic content of exports becomes as important guide to policy-making as the traditional measures based on export of finished goods.

How can EU industrial policy help European firms achieve the best position in global value chains? This question is especially important for small businesses (SMEs), which – for a number of well-documented reasons – cannot easily find their way to the world markets.

This report tries to inform policy-making by shedding light on how industrial value-chain competition develops, and what influences firms' decisions to outsource. It uses a **new way of measuring vertical specialisation** — the *import content of exports,* derived from the recently-launched World Input-Output Database (WIOD) — to analyse vertical specialisation patterns. According to the findings, the import share of EU 15, Japan and the US is about 10-15 %, while for the EU 12 it is significantly higher, rising to 34% during the boom period and brought down by the crisis to 30%.

The share of the domestic content of EU exports is slightly lower than that of US and Japan, but the difference reflects the higher reliance on foreign inputs of EU-12 exports.

The analysis of the foreign value of EU exports shows that **China's role is growing**. From 1995 to 2007 the share of imports from China in the EU exports expanded from below 1% to about 10% for EU 12 and from 5% to 15% for EU 15. In fact, from the mid-1990s, China's share in EU-15's exports grew faster than EU-12's share. Chinese manufacturers captured even larger shares (about 20%) of US and Japanese exports. During the crisis, only China managed to increase its share of exports from the EU, US and Japan. Imports from China increased in all major economies during the trade slump. The chapter in question shows that China's share in European, US and Japanese exports has grown mainly at the expense of domestic suppliers. The increased use of imports, including those from China, in European exports has made EU firms more competitive on the world markets.

China's share in EU exports is increasing, but less rapidly than its share in US and Japan's exports.

The chapter looks at **four sectors** which form the backbone of the EU's industrial base: chemicals, transport equipment, electrical and optical equipment and machinery. The share of trade in parts and components in each of these sectors offers new insights into the challenges of recovery. During the trade slump, trade in parts and components declined more sharply than trade in finished goods, probably because of some multiplier effect and inventory adjustment higher up the value chain. The three sectors other than chemicals depend largely on the supply of parts and components, which grew fast in the pre-crisis years and was severely interrupted by the trade slump. This could partly explain why recovery in these sectors is so difficult and is taking so long.

Finally the chapter uses survey data to analyse **determinants of the**

decision by firms to offshore as well as their choice of destinations. It finds that, other things being equal, larger companies or those with higher revenue per employee are more likely to offshore their production. Consequently, any industrial policy that helps companies grow would also improve their positioning in the global value chain.

Offshoring seems to be mainly cost-driven. Upstream quality gains may provide a viable alternative to cost-driven relocation.

The evidence shows that **offshoring might be primarily cost-driven**. First, more sophisticated products seem less likely to be offshored. Second, offshoring firms tend to spend less on R&D than non-offshoring firms, but are more likely to upgrade their products more often. This finding might mean that **in-house R&D and specialisation in knowledge-intensive products** is an alternative to offshoring to lower-cost locations. The report also considers whether relocation may be driven by excessive regulatory costs in the source country, but does not find empirical evidence in support of this hypothesis.

The findings of this chapter are **important for policy-making in three ways**. *First,* they provide useful input for an EU policy that would allow industry to reap the benefits of the global value chain. Pursuing policies that increase openness to trade helps local companies to become part of global value chains and thus become more productive. This is important since more than two thirds of EU imports consist of intermediate products which boost EU industry competitiveness and productivity.

Pro-active industrial policy may consider FDI promotion and support for the optimal positioning of the SMEs in the global value chains, as well as better-targeted instruments to encourage investment in intangibles and in process and marketing innovations

Second, off-shoring could help European industry maximise cost/quality gains with regard to finished goods. This would require a policy mix that increases the EU's share of exports of finished goods from its trading partners, especially the fast-growing new industrial powers.

Third, the chapter's insights are important since the EU aims to maximise the domestic value of its exports. Case studies show that most of the value is created at the beginning and end of the value chain. Industrial policies should therefore look at the knowledge-creating upstream parts of the value chains and at process and marketing innovations in the downstream parts of those chains.

This goes beyond the mere increase of market shares in goods and services. It includes targeted promotion of **foreign direct investment (FDI)**, support for the **optimal positioning of SMEs in the global value chains**, and new instruments to encourage **investment in intangibles and in process and marketing innovations.**

The report goes deeper into the **structure of the value-added of exports** to examine in particular how **energy efficiency contributes to external competitiveness.**

In addition to the domestic content of

Energy is an important component of production costs and competitiveness. The prices of energy commodities, particularly oil, have **risen sharply** in the last decade. Some of the causes are

exports, the reports studies their energy content and presents new empirical evidence on how energy efficiency contributes to export competitiveness.

structural — such as globalisation and the increasing demand from developing countries, limited fossil fuels resources and overall increasing exploration costs — and tend to lead to permanent energy price increases. The recurrent energy price hikes and volatility seen in the past were often due to **cyclical factors.** These included the considerable rigidity of energy demand in the short term, the failure to fully anticipate its fast growth (as evidenced by low levels of exploration investments and lack of spare capacity), or concerns related to geopolitical events.

Rising energy prices and volatility directly affect **businesses', production costs, their economic activity, external accounts and competitiveness**. The competitive losses are greater for countries or sectors that are less energy-efficient, more specialised in energy intensive products or more energy-dependent. These include countries that depend heavily on imported fossil fuels and where low-carbon (i.e. nuclear and renewable) sources account for only a small share of the energy mix.

Energy efficiency gains are seen in almost all Member States.

Global competition and the cross-border integration of production chains call for improved energy efficiency and offer new business and energy-saving opportunities. As a result, **energy efficiency improvements** can be observed in almost all countries over the period 1995-2009. In Europe, the EU-12 economies improved significantly their initial low levels of energy efficiency and the European Union as a whole consolidated its overall lead in terms of energy efficiency.

In general, over the period 1995-2009, EU countries were able to export more and at the same time **significantly reduce the energy embodied per unit of exports**, in particular the part of energy that is sourced domestically. The EU has a higher share of foreign-sourced energy in its total exports (34% for the EU-15 and 28% for the EU-12 in 2009) relative to Japan (33%) — a country that is also heavily dependent on imported fossil fuels. The figure for the US is much lower (around 18% in 2009). Emerging economies such as Brazil, Russia and especially China are becoming increasingly important sources of the energy embodied in exports of advanced economies.

The EU leads in reducing the domestic energy content of exports, outperforming the USA and Japan.

The **European economies have been leading** the world in reducing the domestic energy content of exports. For the EU-12 this was primarily due to a significant drop in the energy incorporated domestically in manufacturing exports. For the EU-15, the most important contribution came from the drop in the domestic energy content in service exports. This has helped mitigate the adverse effects on competitiveness and terms of trade arising from the increase in the relative price of energy.

An index decomposition analysis shows that, from 1995 to 2009, manufacturing in the European Union moderately increased its gross output while at the same time keeping its energy use fairly constant thanks to continuous technical improvement. Japan, like the EU, is a world leader in energy efficiency in manufacturing but did not improve

its technical efficiency over this period. Manufacturing output and technical efficiency both improved in the US, but less than in the EU.

The EU is also leading the internationalisation and cross-border flows of eco-investment and eco-innovations.

Manufacturing output increased and technical efficiency improved in almost all EU-27 Member States, but their individual performances vary significantly. The highest increases in manufacturing output were seen in the EU-12 countries and Ireland, and these were also the countries that tended to achieve the greatest improvements in technical efficiency. There was a shift towards less energy-intensive sectors in the EU-12 Member States, with only a few exceptions.

Eco-innovating firms are, on the whole, more successful than conventional innovators.

Looking at how eco-innovation affects competitiveness, the report finds that EU firms introducing new products with energy-saving features tend to be **more successful innovators**, particularly in the case of manufacturing firms. Controlling for other determinants of innovation success in the market, these eco-innovators sell more new products than conventional innovators, and this may give them an important competitive advantage.

The report provides new empirical confirmation of the effectiveness and efficiency of the EU's sustainable industrial policy and its importance for the overall competitiveness of European firms.

Overall, **EU firms are world leaders** in the increasing cross-border 'eco-investments' in clean and more energy-efficient technologies and products and services. For instance, EU firms account for almost two thirds of the FDI by multinational enterprises (MNEs) worldwide in renewable energy in the period 2007-2011. They are also global frontrunners in other eco-technologies (such as engines and turbines) used to provide environmental goods and services. However, **international competition is increasing**, including from MNEs based in the emerging economies. To remain competitive, EU firms need to focus on exploiting the business opportunities offered by global environmental and societal goals and challenges.

This year's report attaches primary importance to the potential of **Europe's foreign direct investment (FDI) policy** for fostering industrial competitiveness. It examines the EU's positioning as a source and destination of cross-border capital flows and the implications for the competitiveness of European firms.

FDI inflows bridge investment gaps and lead to spillovers and technology transfer

The European Union is a **major player in global FDI**, both inward and outward. This reflects both the potential of the Single Market and the ability of EU companies to successfully compete in EU and non-EU markets.

Outward FDI positions EU firms in the global value chain

In the most recent years, however, the EU's share of global inward FDI has **declined significantly**. The crisis meant a severe drop in intra-EU flows: European firms were less able and less willing to invest in the EU market. Consequently, FDI from non-EU countries became more important. Companies based in developed countries, mainly the US and Switzerland continued to dominate this picture, but FDI inflows from emerging economies also gained in importance. Analysing the structure of inward FDI in the EU, **relatively strong foreign presence** can be

The EU maintains its lead in inward and outward FDI

observed in some manufacturing industries, such as the **chemical industry and petroleum refining**.

but is losing its attractiveness as an FDI destination

EU firms are the most important direct investors in the world. However, since 2008 European multinationals have curtailed their FDI activities. In outward FDI there has been a **shift from intra-EU to extra-EU flows**. Low growth in the EU as a whole during the economic crisis may lead many European MNEs to seek investment opportunities in fast-growing emerging markets outside the EU. Nevertheless, extra-EU outflows continue to be highly geared towards developed markets, particularly to the US and EFTA countries. EU MNEs seem to be more globally competitive in manufacturing industries (e.g. chemicals, machinery and vehicles) than in service industries. The overall trends in the EU's outward FDI mostly reflect the EU-15 pattern. However, over the last decade, there have been several signs that the EU-12 is gradually catching up. Investments by EU-12 companies is concentrated within the EU and dominated by the service sector.

This is mainly due to a decline intra-EU flows. Inflows from outside the EU are dominated by advanced economies (the US, Switzerland, Norway) but emerging economies are gaining relative weight.

The crisis-induced decrease in inward FDI to the EU raises some important questions. What are the main factors influencing companies' decisions about investing in the European market? How can the European market be made more attractive? A number of factors can be distinguished:

The report finds that the major drivers of inflows have been the single market, the single currency and cost advantages in the case of west-east flows.

- institutional factors, including the legal and administrative system and international agreements;
- economic factors, such as market size or labour costs and skills;
- business facilitation, such as investment promotion;
- local factors at the level of individual firms

The importance of fiscal incentives is not confirmed empirically; the impact of unit labour costs and tax rates differs between countries.

The empirical analysis shows that the **driving forces behind inward FDI** in the EU are **cost advantages, the euro and EU membership**. The impact of unit labour costs and corporate taxes on bilateral FDI stocks differ from country to country. In particular, the rate of corporate taxes seems to be a key factor in the EU-12 countries, and in the case of greenfield investments in the EU-27. In addition, the analysis shows that rising unit labour costs in some EU-15 countries are a major factor in slowing the growth of inward FDI stocks, and it confirms the importance of having a well-educated workforce.

Since FDI can help boost the competitiveness of European firms the EU must

In general, countries seem to benefit from hosting multinational companies. Their presence can bring in finance, technology, skills, management techniques and good practices, and may ensure market access. The empirical analysis shows that **foreign affiliates do a lot to boost productivity** in EU manufacturing industries. The anaylsis shows that backward linkages (effects from foreign companies to local suppliers) are more important than horizontal spillovers for productivity growth. The empirical analysis of EU-10 countries suggests that the presence of foreign firms helps to create jobs in the local supply

design policies for attracting FDI and maximising its benefits.

industries. FDI spillovers via backward are greatest for innovative local firms and especially for those that do not export. This would lead to the conclusion that foreign firms act as catalysts encouraging domestic suppliers to introduce technological innovations. The review of the home country effects of outward FDI shows that the effects on productivity in the home country are mostly positive.

The empirical analyses provide a basis for some policy conclusions. It has been shown that the best way to promote internationalisation through outward FDI is not to provide subsidies and targeted support, but to **promote a competitive business environment**, which ensures that resources are reallocated to the best performing firms. It is also crucial to provide conditions which allow small firms and small MNEs to grow. To attract FDI into the EU it is essential to **improve cost competitiveness**, but a well functioning internal market and the single currency remain key factors. When it comes to promoting investment policy-makers in different Member States could usefully learn from one other about their most successful practices.

The analysis of the impact of FDI suggests that industrial policies should contribute to increase spillovers from MNEs on local enterprises, in particular through networks. Also crucial for maximising the benefits of inward FDI are policies that facilitate technology transfer between MNEs and local firms and that help companies in building their capabilities.

Globalisation changes the way firms compete, but also the way they cooperate. It also **shifts the pattern of their cooperation from clusters to networks**. Networks not only help firms reap the benefits of FDI, as described above, but are also a good way for firms to adapt to globalisation.

Globalisation is also changing the way firms cooperate.

This report looks at non-price and non-contractual interactions that are tending to grow among independent companies, such as the formation of clusters and networks. In the case of clusters — firms carrying out similar activities in the same geographical area — the linkages arise automatically from the interplay of market forces. In the case of networks, however, it is up to the firm to establish linkages with other companies without being formally absorbed into their organisational structure.

Clusters and networks offer additional benefits from inter-firm spillovers.

Clusters have long been an object of academic study and an instrument of industrial policy for regional and national authorities. Networks of firms, however, have been a more elusive topic — not very easy to identify and not attracting policy recommendations. But **globalisation and the new organisational structures** that firms are adopting in its wake have increased policy-makers' interest in networks and in their usefulness as a policy tool. The important question is to what extent networks can be used to enhance the performance of cluster-based policies and to support SMEs in the process of internationalisation.

Networks enable EU SMEs to reach critical mass, share information and enlarge their industrial scope

Networks spring from autonomous decisions of companies that decide it is in their best interest to be inside the network rather than outside it. Unlike clusters, **networks do not need to be concentrated** in a specific area. In fact, a group of companies that cooperate in a region may decide to set up closer links with other groups in more distant areas. There may be several reasons for these moves: a lack of critical mass in the original region; sharing information with other companies for the purpose of entering new markets; enlarging the firm's industrial scope. Such needs are felt more acutely by SMEs, for whom the cost of access to suitable information on international markets can be exorbitant.

Public authorities have an interest in helping firms create networks. In practice, in-kind instruments tend to be more effective.

Faced with globalisation, SMEs have an incentive to identify emerging activities that will give them a **new competitive advantage**. Cooperation within a network may be a sensible strategy for preventing the decay of their traditional specialisation. In Italy, for example, the Romagna Creative District is a network focusing on communication, art, design, architecture, theatre, music and literature. It aims to connect and share the resources of individuals and companies for the purpose of achieving new creative projects and spreading them across the Romagna Region. In Germany, the Eastern Ruhr Industry Network in another example of efforts to boost competitiveness in regions undergoing industrial change. In this case, the network brings together firms in traditional manufacturing sectors.

Public authorities may share with firms an interest in building **more effective and widespread networks**. In this case, alongside financial incentives, regional and national governments have at their disposal 'in-kind' instruments such as providing structures to collaborate. Which instruments to choose depends on the activities policy-makers want to encourage.

EU networks are useful complements to existing regional and national cluster programmes.

Generally speaking, the rationale for public policy intervention rests on externality or information asymmetry or on other market or regulatory failures. There is an argument for promoting clusters in terms of the **positive externalities** that an agglomeration of industries may well foster. The case for supporting networks is less straightforward and crucially depends on the activities that networks are engaged in. For example, accessing new markets and developing new products demand very precise information and close cooperation that could be best achieved through a common network. If there is going to be any kind of public involvement, policy-makers must show that it is more efficient to help the network than its individual members.

The removal of administrative barriers and the access to a common knowledge infrastructure and collaboration platform could boost network activities in new areas that are fundamental to growth. Europe-wide network programmes could be a useful complement to cluster-based programmes.

Finally the report looks at the potential of **neighbourhood policies** to contribute to growth and industrial competitiveness. The opportunities of cross-border investment and trade with our neighbours are in a way the low-hanging fruits that have not yet been used to their full potential.

The importance of each neighbouring country for the competitiveness of the EU and its Member States varies depending on the form of cooperation between the EU and the country in question, how deep and comprehensive the cooperation is, the size and structure of the economy of the neighbouring country, its level of development, trade and investment flows, any bilateral agreements, and migration between the country concerned and the EU. By examining each of these aspects, the chapter endeavours to shed light on the challenges and opportunities for EU competitiveness stemming from its neighbourhood in the context of globalisation, also reflecting the dynamics over time in terms of EU enlargement, the global economic crisis, evolving relations across borders, and internal developments in neighbouring states (such as the Arab Spring).

Several large economies dominate the EU neighbourhood in terms of population and GDP

A **few large economies dominate** the neighbourhood: Russia, Ukraine, Switzerland, Norway, and Egypt. Without these countries, the region surrounding the EU would be significantly less important in terms of GDP and have less than half its current population. Oil and gas production plays a central role in a small number of countries – Russia, Algeria, Azerbaijan, Libya, Norway – while most countries are service-based economies, in many cases also with a relatively large agricultural sector.

Most economies suffer from lack of competitiveness…

Most countries in the neighbourhood suffer from a **lack of competitiveness**, in many cases as a result of being relatively closed economies with weak business environments. Many of them also run high external imbalances – usually deficits, apart from the energy exporters listed above which all have persistent trade and current account surpluses.

Asymmetry in partnership

The EU is an important trading partner for all neighbouring countries. From the point of view of the EU though, they play rather a modest role as trading partners, for the reasons explained above. This **asymmetry in the relative importance of trading partners** has an impact in bilateral negotiations as any development affecting trade relations is likely to have much more impact on the non-EU trading partner than on the EU.

Opportunities of export-led growth largely missed

The type of extensive and successful export-led growth strategy witnessed in recent decades in other parts of the world, with the potential to diversify and upgrade exports and integrate economies into global trade networks, has so far had less success in the countries surrounding the EU. Most of them have not seen their market shares increase on the world market, most likely due to their relatively small shares of manufactured goods in their exports. In addition, several of the neighbouring countries are caught in a situation where rents from

natural resources prove detrimental to export diversification and structural upgrading.

EU is the most important investor in the neighbourhood

Outward FDI from the EU to its neighbours exceeds inward FDI from the neighbours. Around a fifth of all outward extra-EU FDI from Member States goes to the surrounding region, with the exception of 2009 and 2010 when the share was much higher. In the opposite direction, more or less a quarter of all inward FDI comes from the surrounding region, a share which however has dropped recently.

The Southern Mediterranean is an important destination for EU investments, in particular **Egypt, Tunisia and Morocco**. While in Egypt most FDI has gone into the petroleum industry, FDI flows into Morocco have been more diversified. Mainly for historical reasons and due to its geographical proximity, the EU is in fact the leading investor in the region.

Inward labour migration is an opportunity rather than a challenge for EU growth and competitiveness

Labour migration to EU Member States is high on the agenda of EU policymakers. Mediterranean neighbouring countries are a major source of EU immigration, the total number of first-generation emigrants from that region ranging from 10 million to 13 million, as for various reasons the EU is the main destination for migrants from the other side of the Mediterranean. Immigrants from the region represent 20 % of the 30 million immigrants in the EU and 6 % of total EU population. The flow of migrants from the region could rise, at least temporarily, against the backdrop of the Arab Spring. Migration is obviously linked to local unemployment, economic hardship and a lack of options. It can represent the only viable alternative to unemployment, and is a natural reaction to social and economic upheaval or internal political conflicts.

Faced with the prospect of **ageing and potentially diminishing populations** exerting serious pressure on their welfare systems and potentially holding back their competitiveness, EU Member States have come to see immigration, not only from the immediate neighbourhood but from further afield as well, as a solution. The Europe 2020 strategy set out to promote a forward looking and comprehensive labour migration policy which would respond in a flexible way to the priorities and needs of labour markets. By matching shortages on EU labour markets with the excess labour supply outside the EU, Member States could sustain their international economic competitiveness, growth and prosperity.

Remittances go hand in hand with labour migration. Both have increased over the last decades, in many cases generating significant welfare gains in the countries to which remittances are sent. Moldova is an extreme case in point as it has the highest share of remittances to GDP (23 %), and remittances contribute to developments on the labour market there. Other countries with high shares of remittances to GDP are Lebanon and Egypt. However, the economic crisis and ensuing austerity packages implemented in many Member States have made it

more **difficult for immigrants to find gainful employment in the EU**, and while some of them have returned to their countries of origin, most immigrants have adjusted to the economic crisis by reducing their remittances.

The report is structured as follows. The introductory chapter ***"The External Sector in the Recession"*** sets the scene by studying the role of the external sector in the European industries' recovery and their sustainable competitiveness. Chapter 2 ***"EU Industry in the Global Value Chain"*** studies the internationalisation of production and the trends in the domestic value of European exports. Chapter 3 ***"Energy Content of Exports and Eco-Innovation"*** analyses competitiveness in the context of energy efficiency of exports. Chapter 4***"FDI Flows and EU industrial competitiveness"*** examines the positioning of the EU as a source and destination of cross-border capital flows and the related implications for the competitiveness of European enterprises. Chapter 5 ***"Clusters and Networks"*** studies the changes in the way firms cooperate and the room for policy support. The concluding chapter 6 ***"Competitiveness developments along the external borders of the EU"*** looks at the potential of neighbourhood policies to contribute to growth and competitiveness.

1. THE EXTERNAL SECTOR IN THE RECESSION

The EU is experiencing a large and long recession, both in depth and scope. The recession was preceded by a long period, from the mid-1990s to 2007, characterized by macroeconomic stability and sustained growth. Indeed, as in previous large recessions combined with a banking crisis, '[t]he crisis was preceded by a long period of rapid credit growth, low risk premiums, abundant availability of liquidity, strong leveraging, soaring asset prices and the development of bubbles in the real estate sector'. [1] Within the EU, some Member States became net lenders by a significant fraction of its GDP while other became large net borrowers. These developments distorted the financial position of many European countries feeding what today is referred to as external imbalances.[2]

This chapter is an overview of the consequences of the crisis with a particular emphasis on the external sector. When examining the performance of exports and imports, it tries to elucidate to what extent what it is observed, the external position of EU members, reflects a true gain or loss of competitiveness or is simply a reflection of the internal imbalances accumulated during the boom years, and in so doing highlights the challenges faced by EU economies.

1.1 The contraction of output

The current crisis is unprecedented in that it is deep and it has affected many economies around the world, particularly the US and the EU. Although the causes of the current global economic crisis are complex, the origins can be linked to growing mispriced assets, notably real estate, both in the US and some EU Member States. The recession was triggered by increasing doubts of the sustainability of these prices in the US, undermining the soundness of mortgage-backed assets and ultimately dragging the US financial sector into serious disruption towards the end of 2007. The disruption in the financial sector announced a sharp recession in the US in 2008 which hit global demand. In addition, the internationalisation of financial products linked to US real estate lending meant that the fall in the US real estate market affected financial sectors globally. Trouble in the US pricked the bubble in some EU countries leading to a serious recession on this side of the Atlantic. Between 2008 and 2009 the EU suffered a large contraction of economic activity: more than 5% of GDP with respect to the peak value for the Union as a whole, whereas and in some Member States the drop in GDP was well beyond this figure.

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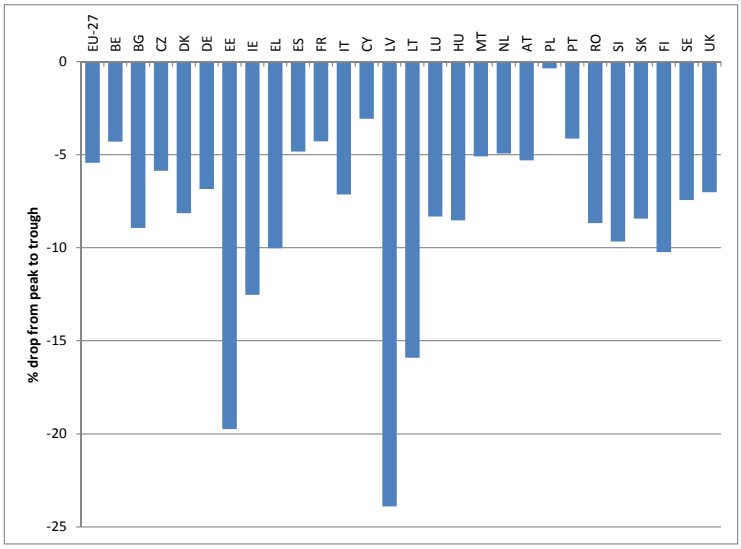
1 See European Commission (2009), Chapter 1 'Root causes of the crisis' and Chapter 2 'The crisis from a historical perspective'. See also European Commission (2010b), 'Surveillance of Intra-Euro-Area Competitiveness and Imbalances'. On the difficulties to deal with these imbalances ex ante, see Wolf (2012).

2 In 2012 the European Commission initiated a monitoring program called the Macroeconomic Imbalances Procedure (European Commission (2012)). See the Alert Mechanism Report COM(2012) 68 and the in-depth country reviews published as European Economy - Occasional Papers, DG Economic and Financial Affairs, European Commission.

Figure 1.1. The contraction of GDP in 2007-09 across Member States



Source: Eurostat, Annual National Accounts.

The recession is not only deep, it is also prolonged. Table 1.1 illustrates the duration of the recession. Some EU Member States like Greece have been in recession for more than two years in a row. Not all EU Member States have been equally affected. Figure 1.1 and Table 1.1 show how heterogeneous the experience has been across Member States: from Poland, virtually unaffected by the crisis, to the Baltic Republics, with cuts in activity reaching 25% and several consecutive quarters in recession.

Table 1.1. An overview of the recession: Real GDP in 2007-11; index, 2000=100

	2007				2008				2009				2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
27	115.3	115.9	116.6	117.2	117.8	117.5	116.8	114.7	111.8	111.4	111.8	112.1	112.6	113.7	114.3	114.5	115.4			
BE	113.7	113.9	114.6	115	115.9	116.3	115.7	113.3	111.3	111.5	112.8	113.4	113.4	114.6	115.1	115.7	116.8	117.1	117.1	117.1
BG	144.1	146.6	148.5	151.7	154	156.1	158.3	158.9	148.9	148.9	149.4	144.7	146.6	148.7	149.9	150.5	151.2	152	152.3	152.8
CZ	136.8	136.5	138.8	140.9	141.6	143.1	143.3	141	136.4	134.9	135.4	136.6	137.6	139	139.9	140.7	141.4	141.8	141.7	141.5
DK	111.5	110.9	111.8	112.9	111.4	113	111	108.3	105.9	103.9	103.8	104.1	104.4	105.6	106.9	106.3	106.6	107.1	106.9	106.8
DE	109.4	110.1	111	111.3	112.5	112.1	111.6	109.2	104.8	105.2	106	106.8	107.3	109.4	110.3	110.8	112.3	112.6	113.3	113.1
EE	166.1	166.8	168.6	167.3	164.2	165.7	164.1	150.3	142.8	137.1	135.3	137.2	136.8	140.5	142	145.6	149.6	152	153.4	153
IE	141.9	139.6	138.8	143.7	140.3	137.2	137.2	132.5	128.6	127.6	127	125.7	127.3	126.4	127.1	125.8	127.2	128.7	127.3	127
EL	132.5	133.3	134.4	134.5	134.6	135.3	135.7	134.6	133.1	131.7	130.9	131.8	129.3	127.6	125.6	122.1	122.3			
ES	125	126	127	127.8	128.4	128.4	127.4	126	124	122.7	122.3	122.2	122.4	122.7	122.8	123	123.5	123.7	123.7	123.4
FR	112.7	113.3	113.8	114.1	114.5	113.8	113.2	111.5	109.6	109.6	109.7	110.3	110.7	111.4	111.8	112.3	113.3	113.2	113.5	113.6
IT	108.8	109	109.4	108.8	109.3	108.7	107.4	105.5	101.8	101.6	102	101.8	103	103.5	103.9	104.1	104.2	104.5	104.3	103.6
CY	125.8	127.4	128.9	130.7	131.8	132.8	133.3	133.5	132.2	130.2	129.5	129.4	131.1	131.2	132.3	132.7	133	133.1	131.9	131.8
LV	175.2	178.9	180.5	181.6	180.3	180.1	169	166	150.1	148.4	138.2	139.8	141.4	141.5	142.7	144.3	145.9	148.8	151.1	152.8
LT	166.5	170.8	174.8	177.7	178.1	178.5	176.6	175.6	151.8	150.9	151.4	150.1	150.8	151.7	153.3	156.8	159.2	161.6	163.5	164.8
LU	131	133.5	134.2	135.4	136.5	136.9	135.2	129.5	128.2	125.5	128.3	127.6	129.1	131	130.7	132.4	132.6	131.9	133.3	133.6
HU	127.5	127.4	127.7	128.4	130.2	129.9	128.6	125.9	121.7	120.2	119.1	119.4	120.7	121.2	122.1	122.4	123.2	123.3	123.8	124.2
MT	111.4	111.2	112.5	113.7	115.4	117.3	117.9	116.1	111.9	113	113.9	115.5	115.2	115.5	116.2	118.2	118.4	118.9	119	118.3
NL	113.1	113.7	115.3	116.9	117.5	117	117	115.7	113.1	111.7	112.6	113.2	113.7	114.3	114.5	115.4	116.2	116.4	115.9	115.2
AT	115.8	116.4	116.4	117.4	118.8	118.9	117.6	115.5	113.6	112.6	113.4	114.6	114.5	115.3	117.1	118.5	119.4	120	120.1	120.1
PL	128.8	131	132.7	135.6	137.5	138.5	139.5	139	139.6	140.3	140.9	143	143.9	145.5	147.5	148.7	150.3	152.1	153.6	155.3
PT	108	108	107.9	109	109	108.7	108.2	107	104.5	104.9	105.5	105.4	106.3	106.6	106.8	106.4	105.7	105.4	104.7	103.4
RO	146.1	148.6	151.3	155	159.9	161.4	161.2	158.4	153.7	151.2	149.9	149	148.1	148.6	147.4	148.8	150.4	150.6	152.3	152.1
SI	132.9	134.6	137.3	137.8	140	141.3	141.8	136.4	128.9	128.1	128.5	128.3	128.5	129.9	130.5	131.3	130.9	130.7	130.2	129.3
SK	145.3	148.9	152.4	161.8	157.9	159.9	161.9	163.7	149.9	151.9	153.9	156	157.3	158.6	160.1	161.3	162.6	164	165.3	166.7
FI	123.3	124.9	125.7	127.1	126.5	126.6	126.2	123.1	115.4	114.1	115.7	115.2	116.2	120	119.6	121.9	122.2	122.1	123.4	123.5
SE	121.9	122.5	123.4	125.1	123.6	123.5	123.4	118.7	115.8	115.9	116	117.1	119.8	122.2	123.8	126.2	126.7	128.1	129.2	127.7
UK	120.3	121.7	123.2	124	124	122.5	120.1	117.3	115.5	115.3	115.5	116.4	116.9	118.2	119	118.4	118.7	118.6	119.3	118.9

Notes: Numbers are indexes relative to 2000 so that it can be appreciated how much the series has grown in the boom years, and compare it with the extent of the contraction. The shaded cells denote a decrease in value vis-à-vis the previous quarter.

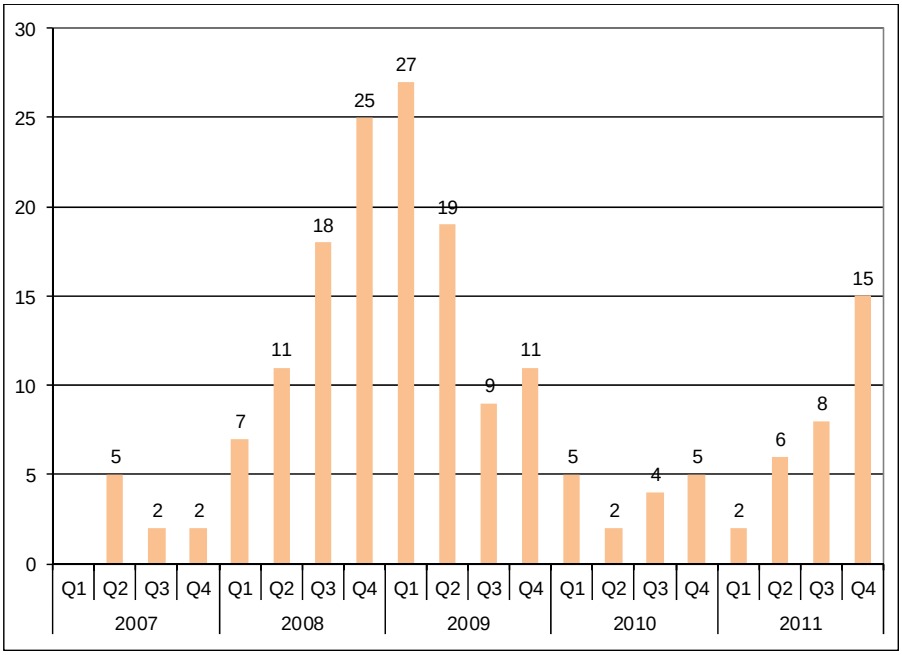
Source: Eurostat, Quarterly National Accounts and own calculations.

Table 1.1 also illustrates how many European economies are slipping into a second recession, this time due to the uncertainty surrounding the EU sovereign debt crisis which has weakened demand, along with the phasing out of fiscal stimulus measures in some EU countries and the US. Indeed, apart from countries that entered the recession with serious structural public deficits, notably Greece, in some Member States the low revenues caused by the sluggish economic activity add to the troubles of the financial system —notably its exposure to the real estate market— triggering a fresh sovereign debt crisis[3], which is likely to be at the origin of the slowdown or even the reversal of the recovery.

Figure 1.2 illustrates this reversal. Most EU countries grew for several quarters in a row in 2010 but in the course of 2011 it became obvious that an increasing number of them were experiencing again a contraction on a quarter-to-quarter basis. By the last quarter of the year 15 Member States reported a decrease in activity with respect to the previous quarter. In this respect, although the main stimulus measures in 2009-10 undoubtedly cushioned the negative impact of the crisis and supported growth along with the relaxation of monetary policy, EU economies have struggled to gain momentum as the stimulus measures were withdrawn.

[3] When a the crisis is large enough to drag down an exposed financial sector, efforts from the government to prevent a meltdown of the financial system increase the risk that private debt —e.g. mortgage backed assets in private banks balances— becomes public via the bail-out of the troubled banks. This risk is at the origin of the subsequent sovereign debt crisis. This is what happened in Ireland in 2011 and with Spain in 2012 and it is a classical feature of this type of recessions (see Reinhart and Rogoff (2011)).

Figure 1.2. Number of countries with decreasing GDP vis-à-vis the previous quarter

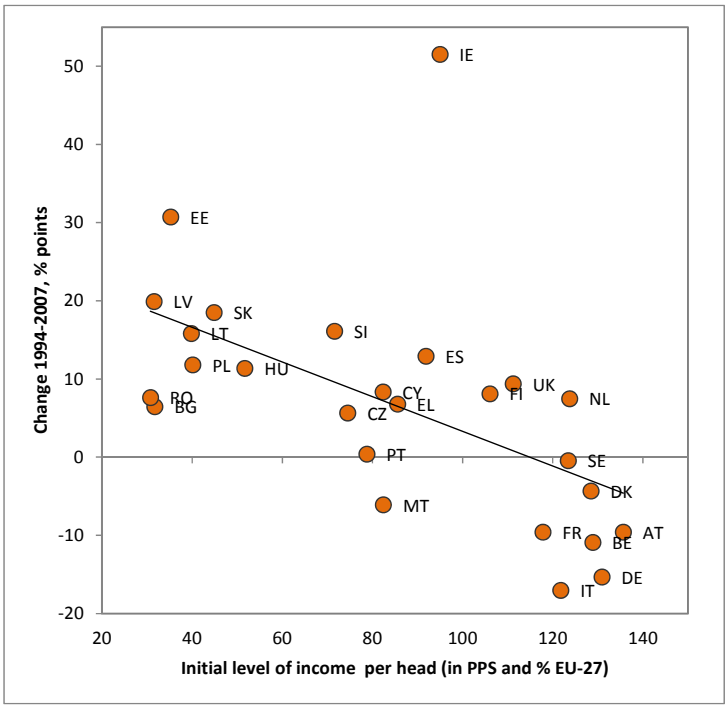


Source: Eurostat, Quarterly National Accounts.

EU Member States have been affected in a different way both in terms of the initial contraction and the subsequent (weak) recovery. Within the EU large capital flows accumulated substantial imbalances by the end of the boom period. As a consequence, at the end of this period the international financial position of some Member States was seriously distorted, either becoming large debtors or creditors. On this basis countries can be classified basically in four groups.[4] In the first group we find traditional net lenders, like Belgium or the Netherlands. In a second group we have Germany or Sweden that started the boom period being borrowers and became large net lenders. Countries in this group became net lenders because others, the third group, became large net borrowers. Within the former, however, we find different underlying reasons to become net borrowers. For example, in the case of Greece at the origin of its borrowing we find large and persistent public deficits financed with public debt mostly placed outside Greece, mostly to financial institutions in France or Germany. In the case of Spain or the UK the driving force were mispriced domestic assets, in particular houses, so it is private institutions leverage (banks and households) what we find behind the aggregate net borrowing. Some EU-12 Member States like the Baltic Republics suffered from bubbles probably associated with the large inflow of capital, otherwise typical of the rapid catch-up process in which they are immersed (see Figure 1.3); in these cases the causality is probably the reverse: the capital inflows generated the mispriced assets rather than the other way around. Finally, Portugal and Italy show a remarkably weak growth performance, mostly because of low productivity growth (see Table 1.3 below).

[4] See section 1.3 in the European Competitiveness Report 2011.

Figure 1.3. The catch-up process of the EU-12 countries 1994-2007. Changes in relative income (EU-27=100) and initial level of income



Note: Income is expressed relative to the EU-27=100. A negative value means that the country has lost income relative to the average. In other words, it denotes a growth rate below the average growth rate.
Source: AMECO database and own calculations.

Each of these groups was affected differently during the initial recession, and has different pattern and drivers of recovery. There is one aspect, however, in which most countries behave similarly: exports are recovering strongly for most countries, probably reflecting an independence of internal developments and the healthy condition of many non-EU economies. In countries affected by serious internal bubbles, the recession can be seen as a correction to come back to more realistic asset prices. In these economies, private agents like households and banks, are immersed in a deleverage process that is by definition slow and tough. Indeed, the excess investment in mispriced assets (e.g. houses), whose prices are only sluggishly returning to normal lower levels[5], has left many agents highly indebted with less assets to back their debt (e.g. a large mortgage for a house that is not worth the mortgage).

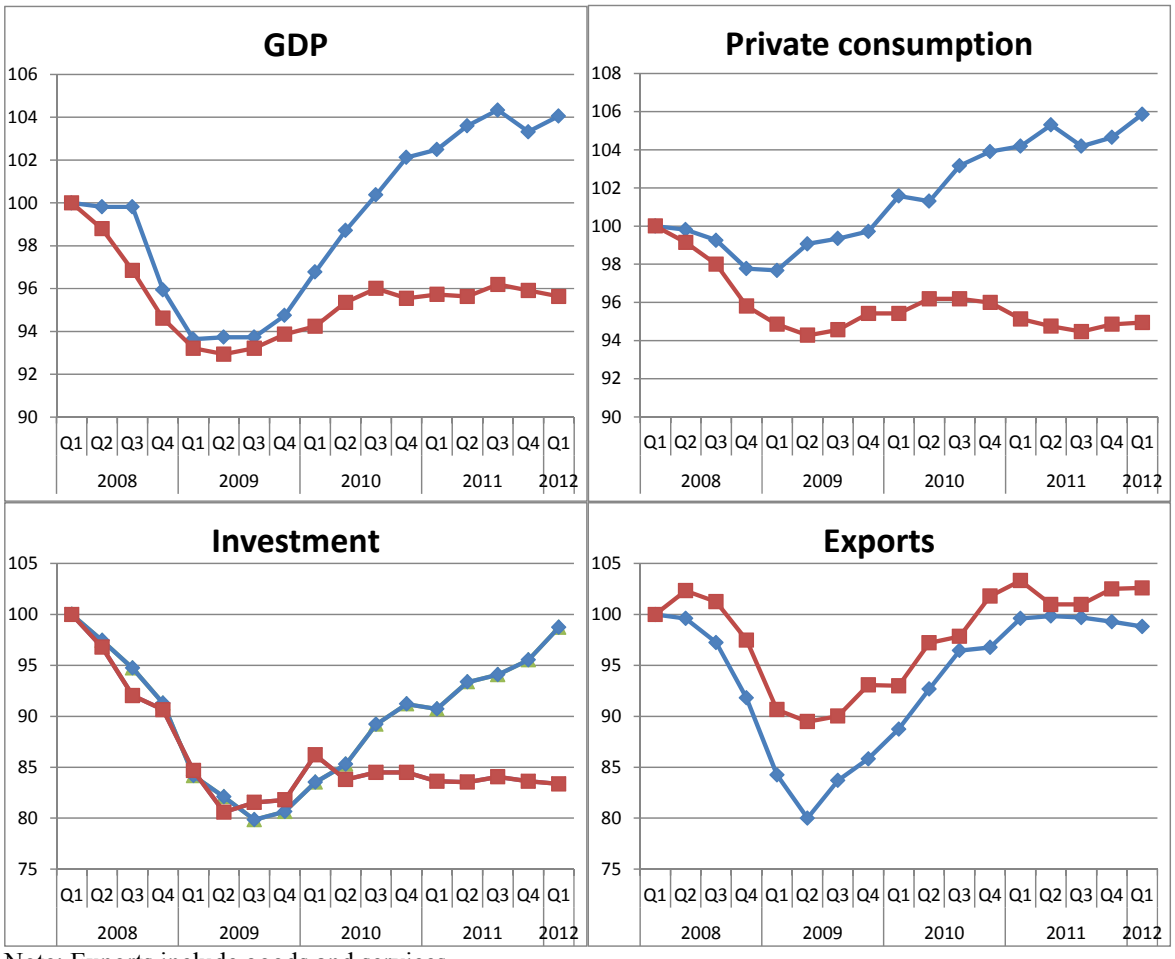
This argument can be illustrated comparing the UK, a net significant borrower, and Sweden, a net lender. Figure 1.4 shows how at the onset of the recession GDP reacted similarly in both countries. Underlying, however, were quite different reactions of the different components of aggregate demand. In both countries investment reacted similarly to the uncertain business conditions. However, the main driver in the Swedish recession was the external sector and

[5] There are several reasons why prices may take long to adjust. First, households tend to hold the property in the hope that the price will recover in the future and in order to minimize losses. Second, for analogous reasons, banks tend to refinance loans to developers in order to delay the realization of losses. Both strategies result in a low number of properties on sold in the market, and hence a low pressure on observed prices to go down.

uncertain business conditions as reflected by the drop in investment: in five quarters both investment and exports had contracted by 20%. In the case of the UK it was households' consumption that dragged down income: compared to a mild and brief contraction in Sweden, UK private consumption contracted more than double and has not recovered yet.[6]

There is one aspect that most EU Member States have in common with Sweden and the UK: the relatively strong recovery of exports. A glance at Table 1.7 in the appendix shows a heterogeneous behaviour across countries when comparing exports and income. This is a recall that the external sector can soften the impact of a recession and contribute to a recovery but cannot fully compensate for other internal factors that ultimately must lead the recovery. In particular, it is unlikely that a weak internal demand can be compensated by external demand in medium to large countries.

Figure 1.4. The recession: A comparison of Sweden (blue) and the UK (red); indexes, 2008Q1=100



Note: Exports include goods and services

[6] Details of the reaction of different components of aggregate demand can be found in Table 1.7 in the appendix. It may be noted that this chart would not look very different if UK and Sweden would be replaced, for example, by Spain and Germany, so it does not seem that belonging to the euro or not is making any significant difference as far as the recovery is concerned. The development of internal imbalances seems to have played a more important role.

Source: Eurostat, Quarterly National Accounts.

1.2 Employment and productivity

The evolution of employment and unemployment reflects the way the crisis is shared among all actors in the economy. In Table 1.2 we can see that at the EU level employment, compared to some Member States, has remained remarkably stable, with a contraction of 3% between mid-2008 and the end of 2010.[7] But this aggregate relative stability masks considerable heterogeneity at the Member State level. For instance, in countries such as Belgium or Germany the crisis has hardly affected the level of employment whereas in countries such as Spain employment was still contracting going into 2012, down 14% on the peak value in the last quarter of 2007.

Institutional differences and the accumulation (or not) of internal and external imbalances are key to understanding the labour market performance across Member States. In particular, Member States affected by an oversized construction sector are among those most affected by large contractions of employment (see Figure 1.7 below) and large increases in unemployment. The reason is that in these countries the construction sector has to be downsized so the changes in employment are permanent – labour hoarding only makes sense to preserve firm-specific human capital when the downturn is perceived to be temporary.

[7] A more detailed description of recent trends and development can be found in the European Commission's Labor Market Review (available at: http://ec.europa.eu/economy_finance/publications/european_economy/labour_market_en.htm).

Table 1.2. An overview of the recession: Employment in 2007-11; index, 2000Q2=100

	2007				2008				2009				2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
27	106.7	108.4	109.5	109.2	108.7	109.7	110.5	109.6	107.6	107.9	107.9	107.3	106.0	107.2	107.8	107.3	106.6	107.7	108.0	107.4
BE	105.4	105.4	106.3	107.8	107.8	107.1	108.2	108.2	107.2	106.9	106.9	107.9	108.2	107.6	108.7	110.4	108.0	110.1	108.8	110.0
BG	109.4	113.3	115.2	115.0	114.3	117.0	118.6	116.8	113.4	114.6	114.0	110.2	104.8	107.0	108.0	105.1	100.5	102.2	105.0	102.8
CZ	104.0	105.0	105.6	106.1	105.9	106.9	107.1	107.5	105.5	105.3	105.0	105.0	102.9	104.1	104.8	104.8	103.8	104.7	105.1	104.7
DK	102.2	102.8	102.6	101.7	102.5	104.4	105.1	104.5	101.9	101.5	101.7	99.1	98.0	98.7	99.0	98.1	97.3	98.3	98.8	97.8
DE	102.0	103.6	105.0	105.3	103.9	104.3	106.5	106.7	104.4	104.7	104.7	106.6	104.8	105.5	106.2	106.8	106.6	108.2	109.0	109.6
EE	112.8	114.6	115.4	113.6	114.1	114.7	115.6	114.0	106.8	104.5	104.1	101.2	96.3	97.2	101.8	104.0	103.2	105.1	109.9	107.5
IE	124.5	125.7	128.5	127.7	127.5	125.9	126.4	122.2	117.4	115.7	114.7	112.7	110.7	110.8	110.5	108.7	107.5	108.2	107.6	107.7
EL	109.3	110.7	111.3	110.7	110.5	112.3	112.5	111.6	109.9	111.0	111.3	109.7	108.4	108.6	107.9	105.3	102.7	101.9	100.1	96.5
ES	129.9	132.0	132.8	132.6	132.1	132.2	131.7	128.5	123.5	122.6	122.1	120.6	119.0	119.5	120.0	119.0	117.4	118.4	117.5	115.1
FR	108.8	110.4	111.5	110.9	111.1	112.0	112.6	111.6	110.6	111.2	111.4	110.0	110.1	111.2	111.7	110.5	110.3	111.4	111.7	110.6
IT	109.2	111.1	111.7	111.2	110.5	112.4	112.1	111.4	109.5	110.7	109.9	109.3	108.5	109.7	108.8	109.4	109.1	110.2	109.5	109.4
CY	126.1	128.7	129.1	130.7	128.7	130.1	129.6	130.7	127.7	129.9	129.3	129.5	128.4	131.2	130.5	130.7	128.3	129.1	126.3	125.6
LV	113.7	115.9	118.2	120.5	118.9	118.6	117.8	113.6	109.2	104.3	101.6	99.2	97.3	99.4	102.2	101.3	100.7	102.8	104.8	105.2
LT	107.2	109.8	110.9	108.0	107.2	108.2	109.0	107.0	101.9	100.8	100.9	98.1	94.3	94.2	96.2	97.3	95.1	97.7	97.8	98.0
LU	112.5	111.2	113.8	113.0	109.9	115.5	112.8	110.5	117.7	120.5	120.1	119.3	120.8	120.9	122.1	122.3	125.3	122.2	124.2	122.8
HU	102.5	103.5	103.6	102.6	100.9	101.5	102.9	101.8	98.8	99.6	99.2	99.2	97.5	99.1	100.2	99.8	97.9	99.9	101.1	100.9
MT	107.1	110.2	110.0	109.6	109.8	111.7	113.7	111.8	111.7	111.8	112.1	111.7	112.6	113.6	115.0	114.1	116.6	116.4	117.9	116.2
NL	105.4	106.9	107.7	107.6	107.4	108.4	109.0	109.1	108.7	108.3	108.2	107.5	104.7	105.4	105.7	105.7	105.0	105.3	105.6	105.9
AT	105.8	107.9	109.4	107.7	107.4	109.6	110.4	109.4	107.4	108.8	109.8	108.9	107.3	108.7	110.6	110.5	108.6	110.5	112.1	111.1
PL	103.3	105.4	107.3	108.0	108.0	109.2	111.3	111.3	109.4	110.3	111.5	110.7	108.5	111.3	112.7	111.9	110.6	112.5	113.3	112.7
PT	102.1	102.4	103.3	103.3	103.4	104.2	103.5	103.1	101.7	101.2	99.8	99.8	99.5	99.3	98.9	98.6	97.5	97.8	97.2	94.9
RO	88.0	91.7	93.2	89.2	88.9	92.0	93.2	89.8	88.4	91.2	92.8	88.3	87.6	92.4	92.5	88.8	89.1	90.2	90.5	88.7
SI	106.7	110.4	111.8	109.7	109.1	111.0	114.5	112.3	107.8	109.3	110.8	109.7	108.0	108.2	107.8	107.5	103.7	105.0	105.8	104.6
SK	111.7	112.2	113.5	115.0	114.6	115.2	118.5	118.1	114.5	114.0	113.4	111.6	109.4	110.8	111.8	112.1	111.7	112.8	113.3	112.5
FI	101.4	106.1	106.7	104.3	103.8	108.1	107.9	105.3	102.7	104.8	104.0	101.1	100.0	104.2	104.4	101.7	100.7	105.0	105.1	102.6
SE	107.4	110.0	112.4	110.0	109.3	111.6	113.0	109.9	107.8	109.1	109.5	107.3	106.8	109.8	111.7	110.0	109.7	112.4	113.8	111.4
UK	105.3	105.8	106.7	107.2	106.9	107.0	107.1	106.8	105.7	104.7	105.1	105.1	104.0	104.5	105.7	105.3	105.1	105.1	105.3	105.4

Notes: The numbers are indexes relative to 2000 illustrating the degree of growth in the boom years, and to compare it with the amplitude of the contraction. The shaded cells denote a decrease in value vis-à-vis the previous quarter.

Source: Eurostat, Labour Force Survey (LFS) quarterly data.

From the institutional point of view, differences can also be linked to distortions induced by labour market regulations. For instance, unemployment rose much less steeply in the US than in the EU Members States badly hit by the crisis, where labour regulations are more stringent and tend to result in wage rigidities in a way or another. And it is not only the degree of stringency but also the distorting nature of certain institutions. For instance, within the EU, the Spanish labour market stands out for its dual nature, with overprotected stable contracts on one side and workers on fragile temporary contracts on the other side. This explains the overreaction of unemployment because adjustment tends to be in terms of employment (reduction of temporary workers) rather than wages (influenced by the stable workers).[8]

On the positive side, as this is a demand-driven recession, it is likely that after the recovery, in the medium to long term, the labour market will recover its trend previous to the crisis (see Table 1.3). Currently some Member States are undergoing a large restructuring to bring down some oversized sectors, notably the construction sector. But large structural (sectoral) readjustments in the longer-term are not likely to follow unlike what happened in the 1980's when entire industrial sectors, notably heavy industries, underwent a severe restructuring. The exception to this rule is probably Ireland and Spain where the bubble grew out of attracting a considerable number of foreign workers (see table 1.3) and increasing notably the

[8] For the dual labour market see chapter 3 in Employment in Europe 2010 (European Commission (2010a)). For a comparative analysis between France and Spain see Bentolila et al. (2011).

activity rate. In these countries the labour market is likely to slow down for some years to come.

Table 1.3. Real GDP, productivity, and components, changes 1998-2007

	1998-2007			1998-2007			
	Real GDP per head	Real GDP	Population	Real GDP per hour	Average hours	Employment rate	Activity rate
European Union	21.4	25.3	3.2	..	..	..	..
Belgium	17.9	22.8	4.1	12.7	-1.3	1.8	4.1
Bulgaria	76.4	63.6	-7.2	51.9	0.6	3.7	11.3
Czech Republic	46.1	46.5	0.3	51.3	-4.3	1.0	-0.1
Denmark	15.3	18.7	3.0	10.3	2.6	1.1	0.7
Germany	15.5	15.8	0.3	16.9	-5.2	0.7	3.5
Estonia	89.8	82.9	-3.6	..	..	4.9	6.7
Ireland	44.0	69.3	17.5	27.3	-4.6	3.1	14.9
Greece	38.6	43.2	3.3	28.4	-2.1	3.2	6.9
Spain	23.2	39.1	13.0	4.8	-4.2	8.6	12.9
France	14.4	21.5	6.2	16.2	-6.2	2.7	2.2
Italy	10.0	14.8	4.3	4.9	-4.4	5.9	3.5
Cyprus	22.2	41.1	15.4	14.8	-2.7	1.2	8.1
Latvia	109.9	98.2	-5.6	..	..	9.6	9.5
Lithuania	85.6	76.5	-4.9	63.7	4.7	10.2	-1.7
Luxembourg	38.9	57.0	13.0	17.7	12.8	-1.5	6.3
Hungary	40.1	37.2	-2.1	36.4	-5.3	1.1	7.3
Malta	17.0	24.2	6.2	15.6	-3.2	0.0	4.7
Netherlands	19.7	24.8	4.3	16.4	-2.4	0.7	4.6
Austria	20.5	25.4	4.1	18.7	-3.4	0.0	5.1
Poland	44.5	43.9	-0.4	47.7	-1.8	0.6	-0.9
Portugal	11.8	17.0	4.7	14.7	-4.4	-3.3	5.4
Romania	60.0	53.2	-4.3	..	..	..	..
Slovenia	45.7	48.4	1.8	..	..	2.8	4.8
Slovakia	54.1	54.2	0.1	51.6	-5.1	1.7	5.4
Finland	33.5	37.1	2.6	24.7	-2.9	5.2	4.8
Sweden	30.2	34.5	3.4	25.6	-2.7	2.1	4.3
United Kingdom	27.0	32.4	4.3	25.9	-3.6	0.9	3.7

Note: Changes in real GDP per head are decomposed in two ways. The first is to disentangle changes in GDP from changes in population. The second decomposition examines the individual effect of changes in productivity, the number of hours, the employment rate and the activity rate.
Source: AMECO database and own calculations.

1.3 The sectoral perspective

In the short-run, however, some industries, notably those producing consumer durables and equipment goods, are bond to suffer still a long period of weak demand. Indeed, the sectoral dimension of the crisis does not reveal exceptional patterns with the exception of the construction sector in countries affected by a real estate bubble. Indeed, if in absolute terms this crisis is exceptional for its size, in relative terms the pattern of the downturn across sectors is the usual one in which durable consumption and equipment goods have suffered the largest contractions in activity. On their side, services and non-durable consumption goods have been less affected, both in terms of value added and employment, because there are smaller items (relative to the household's budget) and basic needs that cannot be postponed as durable goods can be. This pattern is reflected in Figure 1.7 where it is clear that industry,

and in particular manufacturing, is bearing a disproportionate share of the burden of the crisis across all EU Member States. [9]

As mentioned, the one remarkable supply-side feature of this crisis is the oversizing of the construction sectors in countries affected by a real estate bubble**.** Table 1.5 shows that in the boom period 2000-08 construction was almost the only economic sector that experienced substantial growth, and it did so in those countries that were most affected by the bubble. The only exception is Ireland and Denmark. In the case of Denmark, the difficulty to attract workers limited the growth of the sector.[10]

Table 1.4. The sectoral structure of European economies, share of value added in GVA, 2008

		EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY
A	Agriculture, forestry and fishing	1.7	0.7	7.2	2.3	1	0.9	3	1.6	3	2.5	1.8	2	2.3
B-E	Industry (except construction)	19.7	17.9	21.8	31.2	19.5	25.9	19.8	23.5	12.7	17	13.6	20.4	9.3
C	Manufacturing	15.8	15	:	24.3	12.8	22.2	15.4	21.2	9.1	13.9	11.3	17.6	6.9
F	Construction	6.9	5.8	9.3	6.8	6	4.2	9.9	7.2	6	13.6	6.6	6.4	13.2
G-I	Trade, transport, accomodation	19.4	20.7	20.8	20.2	19.7	16	22.7	15.4	29.5	23.1	18.4	20.3	24.1
J	Information and communication	4.6	4.2	6	5.1	4.3	3.9	4.7	2.4	3.7	4.1	5	4.4	4
K	Financial and insurance activities	5.2	5.3	6.4	4	6.1	3.8	4.3	10.3	4.4	5.4	3.6	5.3	7.8
L	Real estate activities	10.4	9.5	9	6.6	9.9	12	10.2	9	12.2	6.8	13.7	12.8	9.9
M-N	Professional, scientific and technic	10.2	12.9	4.6	7.2	7.7	11.7	8.3	9.5	5.8	7.3	12.5	8.6	6
O-Q	Public administration, defence, ed	18.3	21.1	12.4	14.4	22.5	17.1	14.7	18.4	18.2	16.7	21.4	16.5	19.6
R-U	Arts, entertainment and recreation	3.4	2	2.6	2.2	3.3	4.5	2.5	2.6	4.5	3.4	3.3	3.3	3.7

		LV	LT	HU	MT	NL	AT	PL	PT	SI	SK	FI	SE	UK
A	Agriculture, forestry and fishing	3	3.6	4	1.5	1.7	1.6	3.7	2.4	2.4	4.1	2.7	1.7	0.7
B-E	Industry (except construction)	15.1	21.5	25.5	17.5	19.5	22.7	24.1	17.3	25.3	28.7	24.6	21.5	15.4
C	Manufacturing	10.8	17.6	21.6	15.5	12.8	19	17.7	13.7	21.3	22.4	21.5	17.1	10.2
F	Construction	10.1	11.2	4.9	4.8	5.9	7.1	7.7	7.3	8.4	10	7.3	5.2	7.6
G-I	Trade, transport, accomodation	26.9	28.2	18.7	22.9	19.3	22.4	25	23	20.9	22.5	17.2	18.2	18.7
J	Information and communication	4.2	3.4	5.2	5.4	5	3.3	4.1	3.8	4	4	4.8	5.3	6.2
K	Financial and insurance activities	4.9	3.3	4.1	4.5	5.7	5.4	5.3	7.7	4.7	3.3	2.8	3.9	8.9
L	Real estate activities	8.4	6.9	8.3	6.2	8	9	6.1	8.3	7.3	6	10.8	9.3	8.4
M-N	Professional, scientific and technic	7.6	5.7	8.2	7.4	12.3	8.9	6.9	6.6	8.9	7.1	7.5	9	11.9
O-Q	Public administration, defence, ed	16.5	14.6	18	18.6	20.3	16.9	13.9	21	15.5	12.1	19.2	23	18.9
R-U	Arts, entertainment and recreation	3.3	1.7	3	11.2	2.4	2.7	3.4	2.7	2.6	2.2	2.9	2.9	3.2

Note: The shading emphasizes sectors with higher weight in overall economic activity within the country.
Source: Eurostat, National Accounts aggregates and employment by branch (NACE Rev.2).

9 In bad times households tend to postpone the purchase of durable goods, typically large and expensive items such as cars and some electric appliances that do not need replacing in the short-term. Analogously, liquidity- and/or credit-constrained firms tend to postpone investment decisions when business conditions are uncertain. This is a well-documented empirical regularity in normal business cycles but also in recessions: see Hall (2005, table 2.4) for a summary of the behaviour of sectors in recessions in the US in 1948-2001.

10 As a matter of fact, in most countries the construction sector grew labour-intensively with productivity dropping significantly. In that sense Denmark was an exception and productivity in fact grew. See the discussion in chapter 1 in European Competitiveness Report 2011.

Table 1.5. Changes in the sectoral structure of European economies, changes in share of value added in GVA, 2000-08

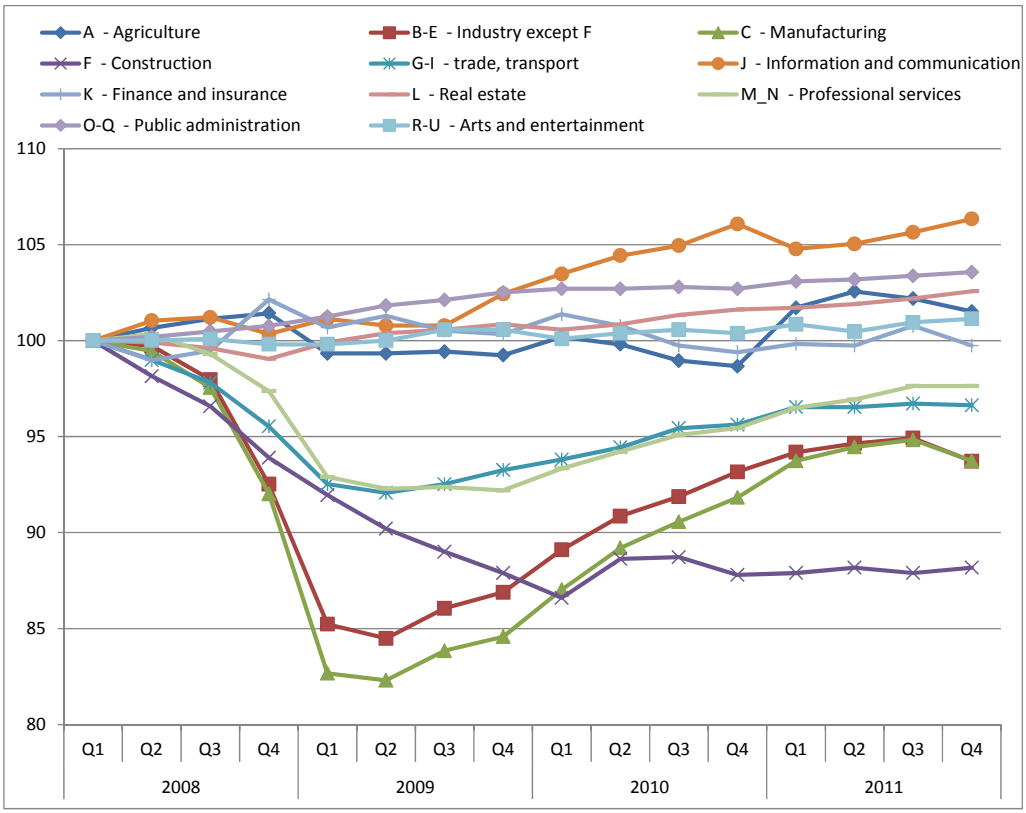
NACE		EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY
A	Agriculture, forestry and fishing	-0.6	-0.6	-5.4	-1.3	-1.5	-0.2	-1.8	-1.8	-3.6	-1.7	-0.7	-0.8	-1.5
B-E	Industry	-2.3	-4.0	0.6	0.3	-1.6	0.7	-1.8	-10.3	-1.3	-3.8	-4.2	-2.2	-2.9
C	Manufacturing	-2.7	-3.7		-1.6	-2.6	-0.1	-1.6	-11.1	-1.8	-4.0	-3.9	-2.5	-2.8
F	Construction	0.9	0.6	4.2	0.2	0.5	-1.1	4.0	0.0	-1.2	3.3	1.6	1.3	4.4
G-I	Trade, transport, accomodation	-0.3	1.5	-0.1	-2.6	-0.5	-0.1	-1.7	0.6	2.3	-0.5	0.2	-1.6	-2.8
J	Information and communication	-0.1	0.3	2.9	0.8	0.1	-0.3	-0.3	-0.9	-0.1	-0.4	0.1	0.1	-0.6
K	Financial and insurance activities	0.4	-0.8	4.0	1.2	1.4	-0.6	0.3	2.9	-1.2	0.8	-0.9	0.5	0.4
L	Real estate activities	0.7	0.0	-4.2	0.0	0.0	1.1	-2.6	2.0	0.8	0.6	2.0	1.9	0.4
M-N	Professional and scientific activities	0.5	1.9	0.5	1.5	1.2	0.8	3.5	3.0	1.5	1.1	1.2	-0.1	0.8
O-Q	Public administration, education, etc.	0.5	1.3	-3.5	0.3	0.5	-0.3	0.5	4.5	1.7	0.7	0.5	0.9	1.6
R-U	Arts, entertainment and recreation	0.0	0.0	1.2	-0.5	-0.1	0.0	0.1	0.0	1.0	-0.3	0.1	0.0	0.1
		LV	LT	HU	MT	NL	AT	PL	PT	SI	SK	FI	SE	UK
A	Agriculture, forestry and fishing	-1.5	-2.7	-1.9	-0.8	-0.8	-0.3	-1.2	-1.2	-1.0	-0.4	-0.8	-0.3	-0.3
B-E	Industry	-3.5	-2.2	-1.6	-6.8	0.4	-1.0	0.8	-3.0	-2.8	-0.2	-3.4	-2.7	-4.9
C	Manufacturing	-3.6	-1.2	-1.3	-6.2	-1.8	-1.1	0.5	-3.4	-3.1	-1.5	-4.1	-4.2	-5.0
F	Construction	3.3	5.2	-0.4	0.2	0.2	-0.6	-0.1	-0.9	1.7	2.8	1.0	0.9	1.1
G-I	Trade, transport, accomodation	-1.1	1.6	2.0	-4.8	-2.0	-0.5	-0.8	-0.1	2.1	-0.3	0.0	1.1	-1.9
J	Information and communication	-1.6	-1.3	0.4	0.7	0.2	0.0	0.7	0.2	0.1	0.5	0.1	0.1	-0.2
K	Financial and insurance activities	1.8	1.3	0.4	-2.0	-0.4	-0.2	0.3	2.1	-0.2	1.1	-1.6	-0.6	3.7
L	Real estate activities	0.4	0.0	-0.6	0.6	-0.2	0.7	-0.5	0.5	-0.6	-2.1	1.0	-1.0	0.3
M-N	Professional and scientific activities	2.2	1.8	1.5	2.2	1.0	2.1	0.5	0.8	1.8	0.9	2.2	1.2	0.5
O-Q	Public administration, education, etc.	-0.5	-3.1	0.2	2.4	1.7	-0.1	0.6	1.2	-0.6	-2.3	1.1	0.9	1.7
R-U	Arts, entertainment and recreation	0.4	-0.7	-0.2	8.3	-0.1	0.0	-0.1	0.5	-0.7	0.1	0.3	0.3	-0.1

Note: Figures are the difference in the share of the sector in gross value added between 2008 and 2000. The shading emphasizes sectors with larges changes, either shrinking (red) or expanding (blue) relative to other sectors within the country.

Source: Eurostat, National Accounts aggregates and employment by branch (NACE Rev.2).

These patterns are obvious at the EU-27 level (Figure 1.5). During the crisis it is industry, and in particular manufacturing, that has taken the brunt of the contraction, although presumably to recover afterwards. Construction, on the contrary, is undergoing a severe adjustment process in some Member States so that its contraction will probably be more persistent. The disruption of economic activity and, in particular, of manufacturing, has an obvious impact not only on trade and transport but also on professional services, much of whose output goes into the industry.

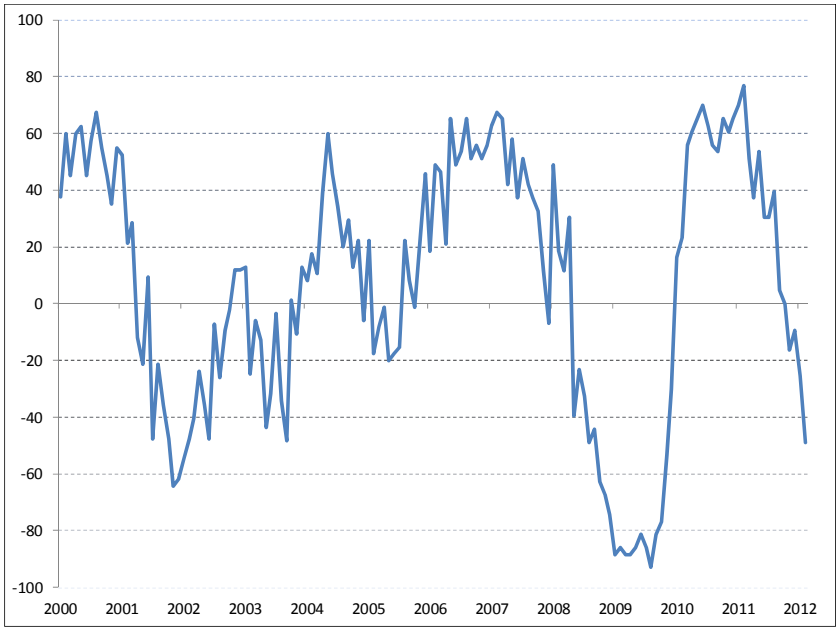
Figure 1.5. The sectoral profile of the contraction in the EU-27: Real value added per sector; index, 2008Q1=100



Source: Eurostat, Quarterly National Accounts by 10 branches.

Finally, the double-dip pattern shown in Table 1.1 above at the aggregate is also reflected at the sectoral level. Figure 1.6 shows the number of sectors that report at any given month a contraction with respect to the previous month. By the beginning of 2012 the index was –40% meaning that only 30% of sectors reported an increase in activity while 70% were contracting (and hence 30 – 70 = –40).

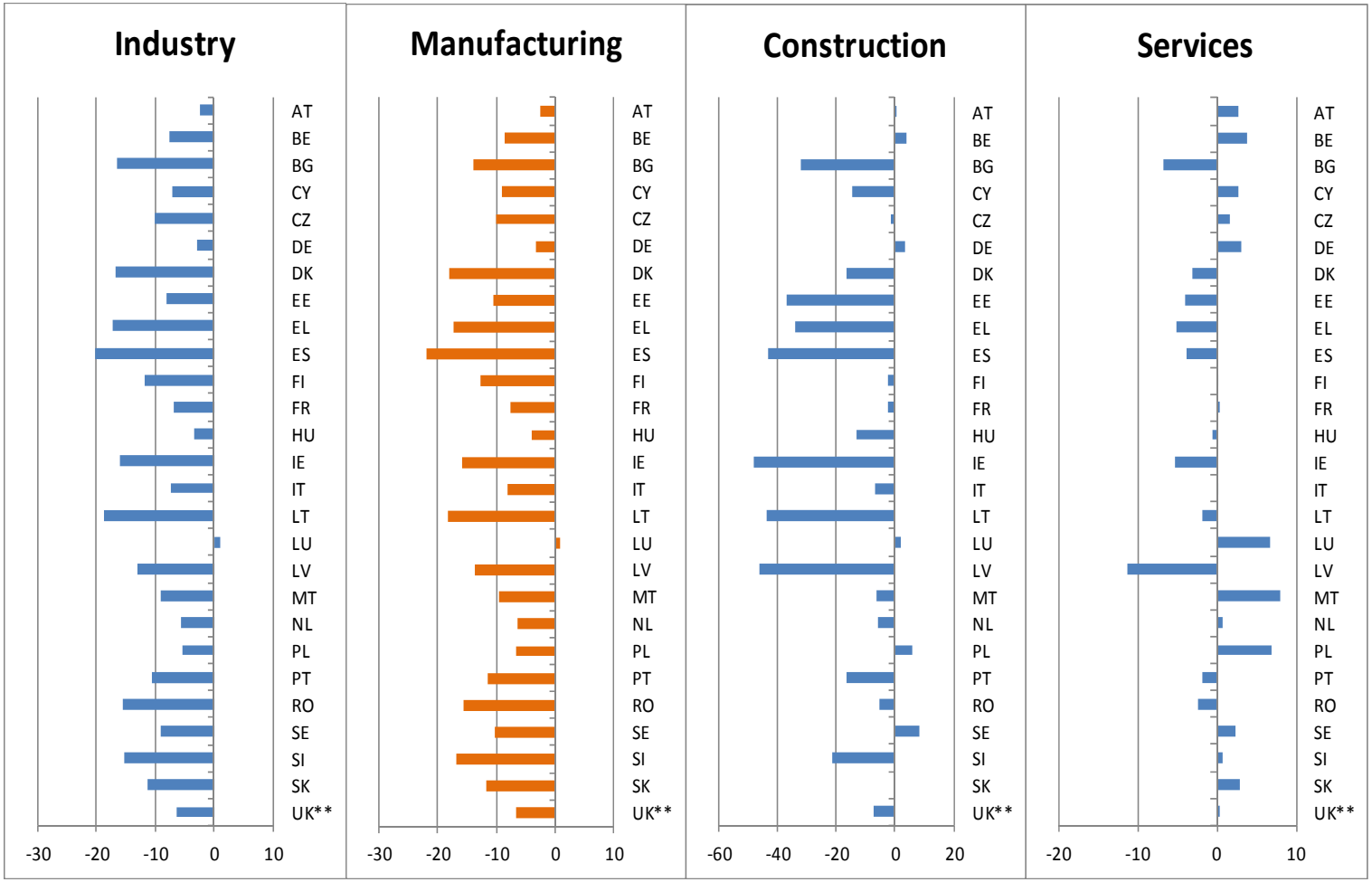
Figure 1.6. A qualitative-quantitative assessment of the relapse. The diffusion index



Note: The diffusion index is defined as the difference between the percentage of manufacturing industries that are expanding and of those that are declining. The index ranges from -100 to 100. 'Expanding' and 'declining' mean positive and negative growth rates respectively. The total number of industries used in the calculations is 93 (defined in terms of the 3-digit level of NACE Rev. 2). For more details see the European Union Industrial Structure 2011.

Source: Short-term Industrial Outlook, April 2012, DG Enterprise and Industry, European Commission.

Figure 1.7. Changes in employment per Member State by economic activity, percentage change 2008-11*



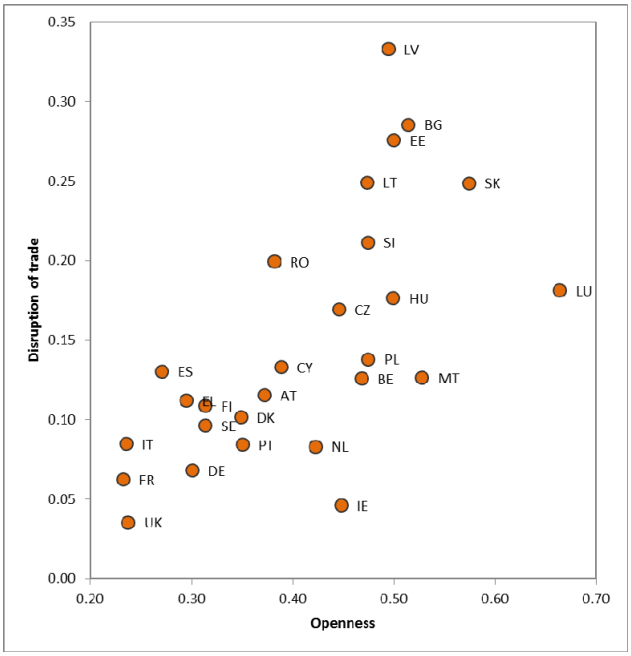
* Data for 2011 not available for three countries: UK uses 2009 while Ireland and France use 2010.

Note: Each category corresponds to the NACE rev. 1.1 sections: Agriculture, A and B; Industry, C, D and E; Construction, F; Services, from G to P; Manufacturing, D.
Source: AMECO database, Commission services.

1.4 The disruption of trade

This crisis has been described as unprecedented because of its simultaneous depth and scope. In turn, the scope is reflecting an increasingly interconnected world. Below it is shown that European economies are particularly open and integrated.

Figure 1.8. Openness and the disruption of trade by the crisis, 2008-09



Note: The disruption of trade index is the reduction in the share of imports in aggregate demand m with positive sign and corrected by the corresponding contraction of GDP y, that is, $-[(m' - m) - (y' - y)]$. Openness is exports as a percentage of GDP.

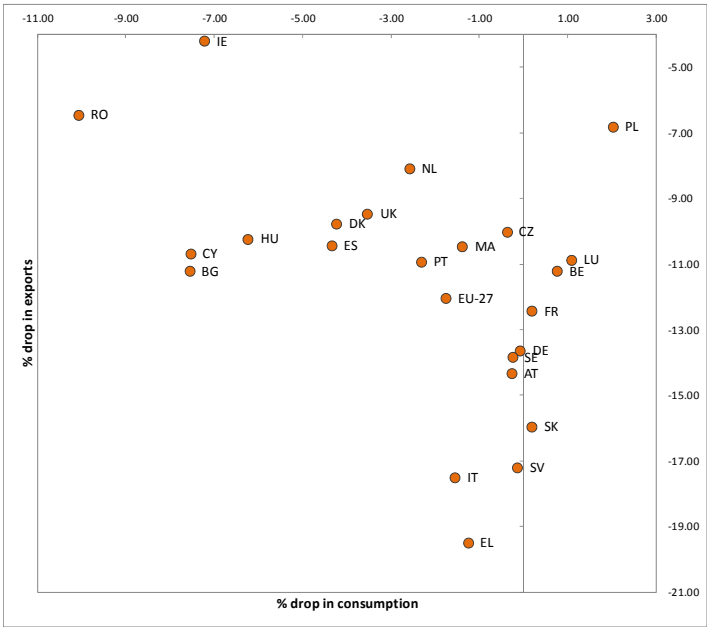
Source: AMECO database and own calculations.

In this recession many EU Member States were not directly affected by internal imbalances.[11] These countries were affected by two transmission mechanisms. One is exposure to private or public debt in troubled economies. The other is trade linkages and the corresponding uncertainty about business conditions that spreads across borders because our interconnectedness. Figure 1.9 relates the initial drop in consumption with the drop in exports at the onset of the crisis. Countries far away from the vertical axis like Denmark, Spain, Romania or the UK are countries with internal imbalances where consumption dropped simultaneously to exports and investment. Countries close to the axis like Germany, Sweden or France can be interpreted to be affected only indirectly through trade linkages and general

[11] The Alert Mechanism Report COM(2012) 68 monitors internal imbalances looking at changes in deflated house prices, private sector credit flow, private sector debt, general government debt and a 3 year average of unemployment rate. This chapter is primarily concerned with private sector debt and in particular with households' leverage.

uncertainty to the first group of countries and the overall uncertainty about business conditions.[12]

Figure 1.9. The initial drop in consumption compared to the drop in exports, 2008-09



Note: The Baltic States are not represented in the chart for the sake of readability; their figures are beyond the lower limits of both axes.

Source: AMECO database, Commission services.

Openness is an important part of the explanation of the diffusion of the crisis. However, it could also become a component of the recovery. EU countries not affected by internal imbalances may act as a locomotive for growth in the rest of the UE at least in the short-term. Strong growth in other regions of the world in particular emerging economies in Asia and South America, which are growing more rapidly and have been much less affected by the crisis, may as well boost external demand for EU countries, depending on their trade orientation. That may explain the positive evolution of exports in 2010-11, strongly growing in all EU Member States with the sole exception of Greece and Finland.[13] However, this effect is not sufficient to compensate for the unfavourable evolution of domestic demand. Therefore while exports are indeed recovering swiftly and vigorously, income recovery remains elusive in many Member States.

12 Table 1.7 in the appendix to this chapter details the reaction of the different components of GDP as well as net exports for all EU Member States.

13 See Table 1.7 in the appendix and the Short-term Industrial Outlook, July 2012, DG Enterprise and Industry, European Commission.

Box 1.1. External demand, long-term growth and competitiveness

In times of recession, when internal demand is weak, it makes all sense to rely on external demand to accelerate the recovery. Indeed, there is some consensus in the economics profession that **short-term** increases in aggregate **demand** — including increases in external demand, the demand for exports of an economy — can increase the domestic product in the short-term even beyond the obvious increase in income due to increasing sales abroad. Indeed, via some chain or multiplier effect, the increase in income may be even larger than the demand stimulus.[14] In that sense, strong growth in other regions can be excellent news for mature economies in the short term and for export-led catching-up economies in the medium term.

In the **long-term**, however, and for advanced economies without natural resource endowments, only **technical change** can sustain growth of income per head. From this longer-term perspective, the connection between trade and growth has less to do with the mere exchange of goods and services and more with competitive pressures as well as the exchange of ideas that comes along with trade. Empirical evidence is elusive but points in that direction: openness increases the exposure to foreign technology, equipment goods, management techniques, and so on. Competitive pressures provide the incentives to adopt these technologies and help the market select the most productive firms.[15] Openness often comes hand in hand with mobility of persons: engineers visiting providers, students completing their curricula abroad, migrants that leave and eventually return with new ideas.[16] If the institutional setting is the right one,[17] technologies are adopted, new businesses are started that introduce new processes and commodities, and so on.

This distinction between the short and the long term is important. External demand can help recover in the short-term when internal demand is comparatively weak. In the long-term, however, through **openness** and **structural reforms** that change the ability and incentives to adopt and develop new technologies.

1.5 Trends in the external sector. Openness

14 Incidentally, the belief that the multiplier is larger than unity constitutes the ground on which fiscal stimulus are justified. If the government narrows to increase public expenditure, and income increases more than proportionally, there is room to boost demand in the short-term and, at the same time, increase revenues enough to pay back the debt. This is the classical so-called Keynesian approach to fighting recessions.

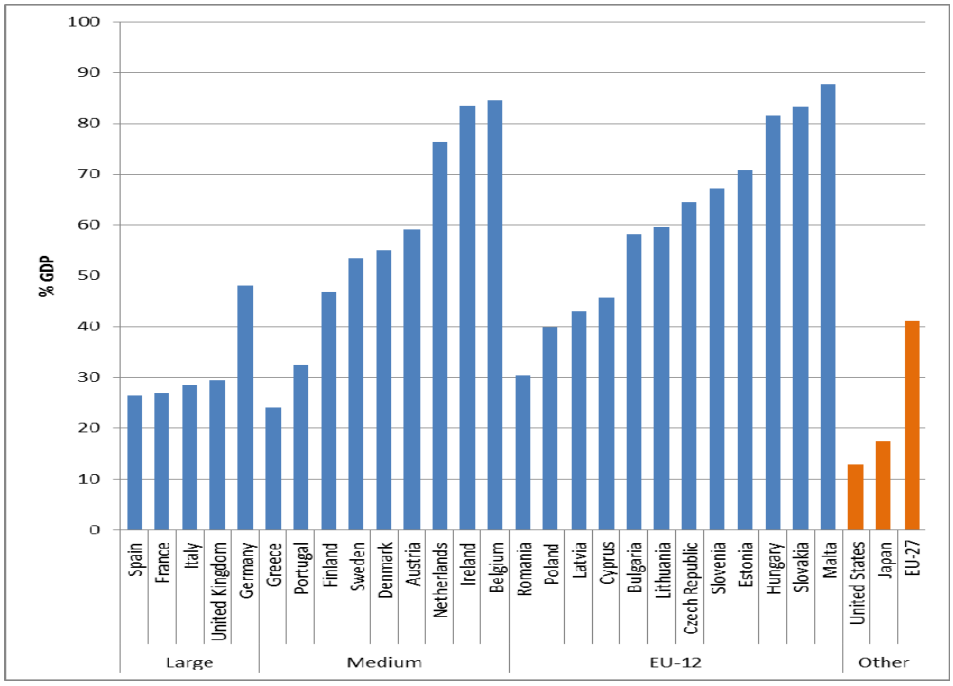
15 This is an old idea recently partially formalized in Melitz (2003). Although the paper focuses on the (static) gains from trade liberalization, it is easy to see how these competitive pressures will also provide incentives to adopt and develop new technologies sustaining (dynamic) long-run growth. For an overview of this literature see Bustos (2010), Lileeva and Trefler (2010) or Constantini and Melitz (2008) among others.

16 See, for example, Legrain (2008) for a description of the development of the electronics industry in Taiwan and its connection with Taiwanese migrants in the US.

17 See the 12 pillars of competitiveness mentioned in the Global Competitiveness Report 2012, World Economic Forum.

The external sector in Europe is characterized by a notable degree of openness. As measured by the value of exports relative to GDP, the EU is considerable more open than the other two economies with which it compares: the US and Japan.

Figure 1.10. Exports of goods and services (including intra-EU trade) as a percentage of GDP, 2008



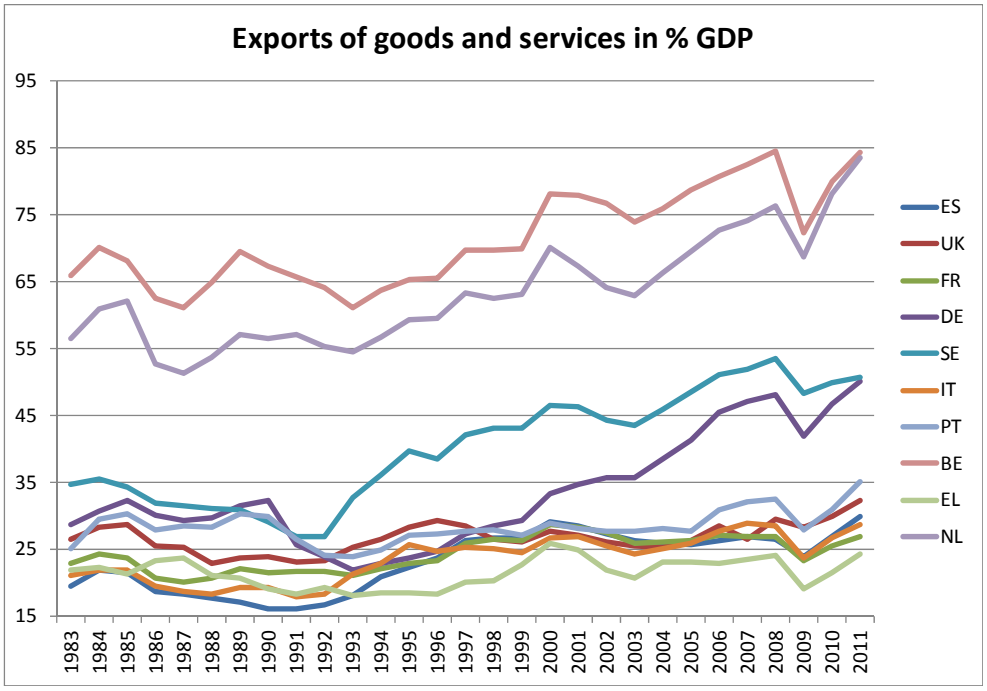
Note: The criteria to classify countries is by population. Luxembourg (175%) excluded for the sake of readability of the chart.

Source: AMECO database, Commission services.

In this already open landscape, four countries stand out. Among the medium- and small-sized countries of the EU-15, Belgium, the Netherlands and Ireland are very open economies. In the case of Belgium and Netherlands, historical reasons as well as a small size and a geographical location may explain much of this openness. The case of Ireland, despite its peripheral location, can be explained again on its small size and on recent trends that have to do with the English language and a tax regime favourable to the establishment of many foreign services and manufacturing corporations for their operations in Europe. The take-off of Ireland as a hub for many multinational corporations is likely explained by these reforms and, in any case, is reflected in an already large 48% in 1983 to an outstanding 80% before the crisis in 2008.

The fourth country in question is Germany and constitutes a notable case. Among the big countries it has a degree of international integration which is quite high. As Figure 1.11 and Figure 1.12 show, this is a relatively recent phenomenon that took-off in the early 1990s. But the underlying drivers of these changes are not clear. Below the case of Germany is examined in some depth.

Figure 1.11. Exports of goods and services as a percentage GDP, recent evolution, selected countries



Source: AMECO database, Commission services.

Most EU Member States display an increasing trend in the value of exports relative to GDP due to the increasing globalization of EU economies as well as European economic integration itself. After the impulse of the Single European Act, this is mostly reflecting increasing integration in world markets.[18]

But this trend has been particularly pronounced in four countries within EU-15 Member States. Belgium and the Netherlands have been already signalled as particular cases. Sweden, on its side, is probably regaining its place in the international scene after a period of poor performance during and after the crisis of the 1970s. The case of Germany, however, is less easy to explain and is the only one that affects a large country; the largest economy of the EU indeed. As illustrated in Figure 1.12, larger countries have smaller external sectors (as a percentage of GDP) because more trade occurs within its borders.[19] For example, and to support the assertion above, Sweden has now the degree of openness expected for a country of its size.

Germany, on the contrary, was on the average in 1995 (see again figure 1.12) with total exports being 24% of GDP. Yet, in 2007 and given its size it should still be around 25, and nonetheless its exports represent currently up to 47% of GDP.

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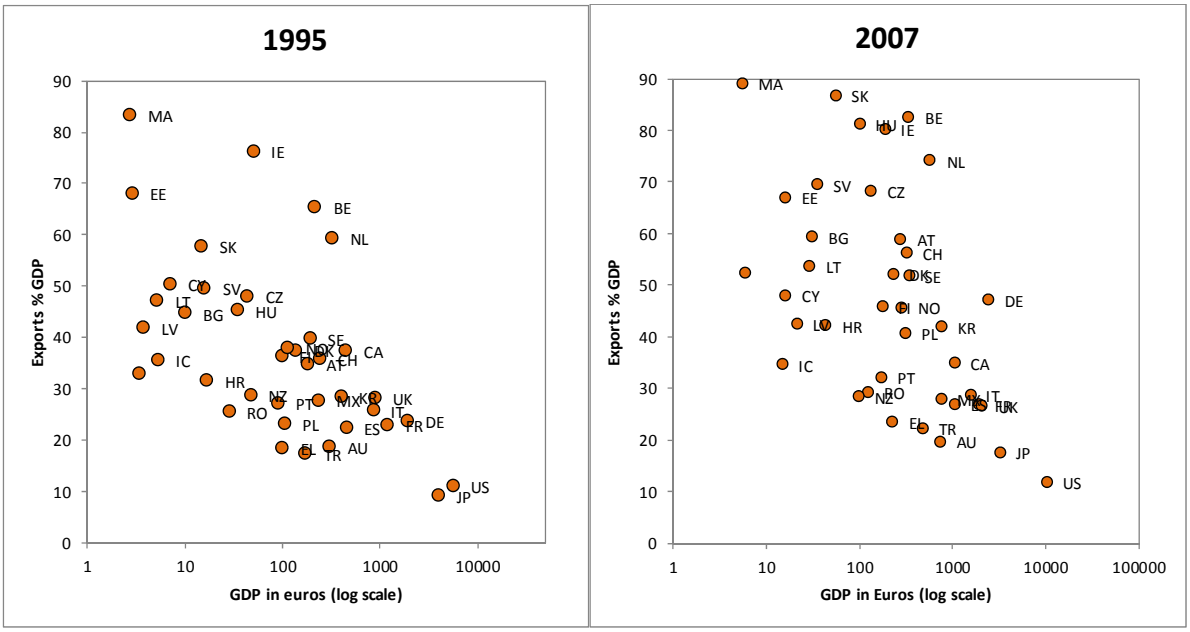
[18] In the case of goods, the share of EU exports over total exports of all Member States has been quite stable in the last 20 years. See the discussion in section 1.6 below.

[19] The larger an economy, the larger the variety of goods, and hence the less need for trade. In the limit the planet has zero trade with the rest of the universe, at least so far; this point was famously made in Krugman (1978).

Figure 1.12. Changes 1995-2007 in openness relative to the size of the economy



Source: AMECO database, Commission services.

One possible explanation lies in the internationalization of the value chain. As a large manufacturer, Germany has close ties with some of its neighbours such as the Czech Republic, Slovakia and Hungary. However, evidence remains elusive: trade in intermediate goods, commodities used to produce other commodities, has not grown faster than general trade. The share of exports of intermediate goods to total exports has remained remarkably stable over this period (Table 1.6).[20] It grows in absolute terms hand in hand with the general level of openness. The so-called internationalization of the value chain seems to be an absolute, not a relative, phenomenon.

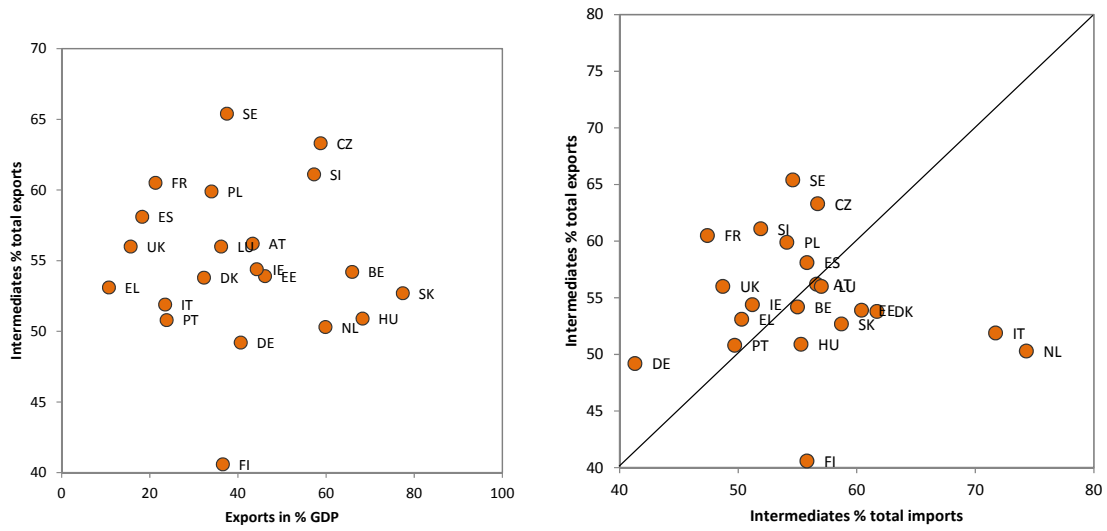
[20] Actually the share is stable not only for Germany but for the EU as a whole as well (See Chapter 2 in European Competitiveness Report 2010).

Table 1.6. Share of exports of intermediate goods to total exports

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	57.1	55.5	56.4	55.9	55.2	55.4	52.7	55.2	56.2	56.6	57.1	55.8	57.8
Belgium	51.6	51.9	53.5	50.8	48.6	49.7	51.5	52.7	54.3	55	56.5	54	57.6
Czech Re	61.2	61.2	62.8	61.4	60.6	61.1	60.6	58.7	57.1	56.7	56.7	54.1	53.8
Denmark	38	38.2	39	37.9	37.6	38.8	39.8	39.9	41.8	41.3	40.4	41.4	39.8
Estonia	56.6	60	51.9	54.7	58.9	59.2	56.7	58.7	62.7	61.7	60.9	59.2	59.6
Finland	60.8	61.2	60.5	58.8	59.3	60.1	63.5	59.7	60.8	60.4	59.3	62	68.7
France	49.9	49.8	50.4	48.6	47.7	47.5	47.8	48.6	49.5	50.3	50.8	48	49
Germany	49.7	49.2	50.7	48.8	48.5	48.9	49.5	49.7	50.7	50.6	51.1	47.3	48.9
Greece	45	45.8	53.1	51	49.6	48.1	50.9	51.6	56.2	55.8	56	51.4	54.2
Hungary	54.7	53.7	54	53.3	51.3	52.9	51.5	52.7	51.3	47.4	46.7	43.4	46
Ireland	58.2	58.5	61.2	59.2	57.6	55.6	54.1	55	53	55.3	56.3	53.9	54.4
Italy	47.4	47	48.2	47.9	47	48.2	48.8	49.9	50.9	51.2	51.5	49.4	51.8
Luxembo ..		70.7	68.8	63.1	63.4	66	70.1	68.2	71.8	71.7	74	68.9	73.1
Netherlan	54.9	51	53.3	52.1	52.8	53.8	53.7	56.8	58.3	57	59.3	56.8	58.6
Norway	61.3	60.1	66.4	61.9	63.5	65.3	69.3	70.8	72.5	74.3	72.5	67.5	70.7
Poland	48.1	49.6	52.9	52	52.7	55	55.2	54.2	54.8	55.3	53.1	47.2	50.8
Portugal	42.5	44.3	46.8	46.2	48.4	50.1	51.5	50.6	53.4	54.1	53	51.5	56
Slovak Re	59.3	57.8	58.6	59.5	59.5	58	58.9	57.7	53.1	49.7	49.8	48.3	49.5
Slovenia	50.4	52.2	53.5	53.8	52.9	53.8	54.8	54.2	56.4	54.6	55.1	51.4	55.2
Spain	47.9	47.8	49.2	48.6	47.6	47.9	48.7	50	51.1	51.9	54.2	49.2	52.3
Sweden	58.8	57.1	56.8	57.9	57	54.8	57.3	56.2	57.9	58.7	60.3	58.1	60.2
United Ki	46.5	46.7	46.8	46.4	46.3	46.2	47.2	48.2	49.9	48.7	49.6	48.2	47.9

Source: OECD STAN Bilateral Trade Database.

Figure 1.13. The international of value chains: Openness and exports and imports of intermediate goods

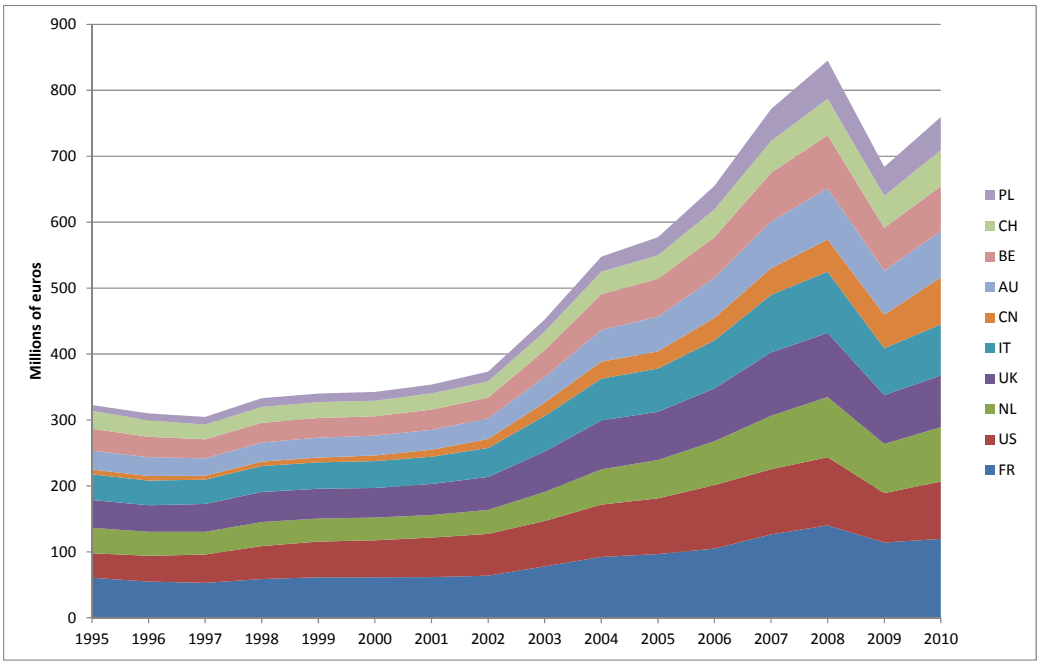


Source: OECD STAN Bilateral Trade database and AMECO database, Commission services.

Figure 1.14 suggests that through trade the country is strongly specializing in manufactures but no single trade partner explains this trend. For example, China or Poland has become

important markets for Germany but are not yet comparable to France, the US, or Italy.[21] The figure shows how exports have grown similarly for all trade partners with no overwhelming importance of any individual partner. All in all it seems that further research is needed to understand the increasing internationalization of the German economy.

Figure 1.14. German exports in current prices, main trade partners



Source: OECD STAN Bilateral Trade database.

1.6 The boom period and imbalances

The trends mentioned above do not seem to have been altered significantly by the events that preceded the recession. Mispriced assets have the potential to distort the real economy, for instance diverting capital to mispriced property or stocks instead of productive investments. In that sense, the risk is that the imbalances not only feed the current recession but also hamper future productivity growth because of this inefficient allocation of capital.

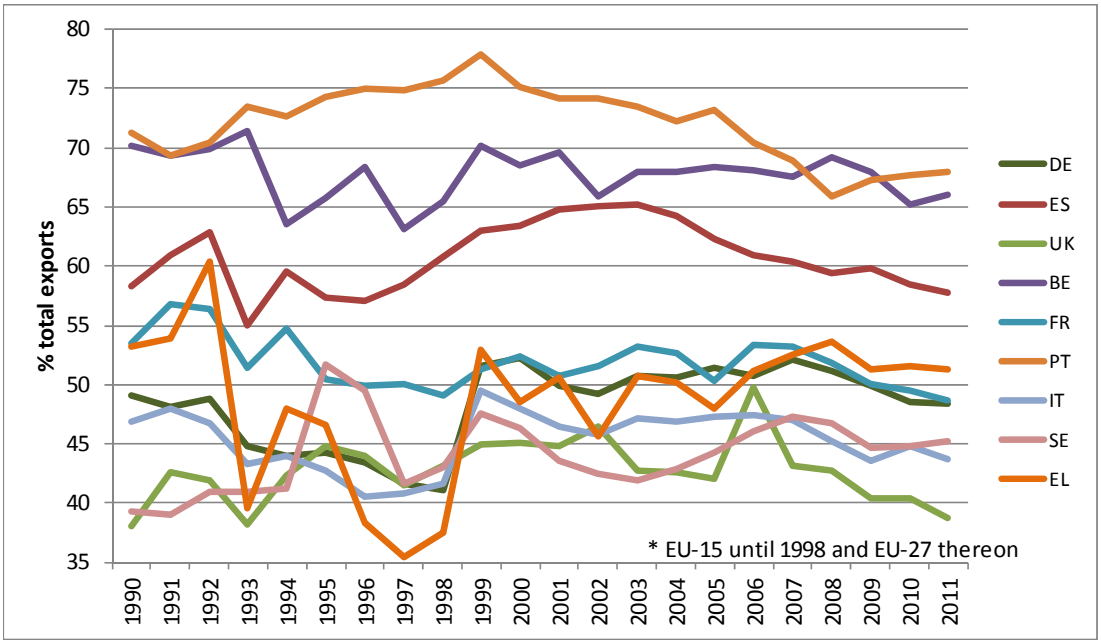
Somewhat paradoxically, however, the speculative bubbles that grew over the boom period created considerable financial capital flows but have not affected seriously the real economy as measured by productive investment or external performance.[22] Not even within the euro area, despite is fixed exchange rate, can we observe significant distortions. Figure 1.15 depicts

21 The picture is slightly different for imports. China has become a major source of German imports. In this respect, however, Germany is no different from many other advanced economies, and while Chine has become an important source of imports (9% total), traditional trade partners still constitute the bulk of German imports.

22 The hypothesis that the boom period has diverted resources from the "real economy" was examined in chapter 1 in the European Competitiveness Report 2010. It turned out that countries that overinvested in dwelligs also increased productive investment or exports. In other words, beyond the obvious oversizing of the construction sector, it does not seem that productive sectors were drained resources. This is likely explained by the net borrowing abroad.

the percentage of trade destined to the EU market. Most countries fluctuate around their historical trends: Belgium around 70%; the UK from almost nothing in 1960 stabilized around 45% in the 1980s; after accession, Spain reached 63%; or Sweden that was remarkably stable around 45% before and after accession. Otherwise, these series have remained quite stable in the last 20 years. If anything, we observe a slight decreasing trend for some countries like Spain, Belgium and the UK.[23]

Figure 1.15. The share exports of goods to the EU over total exports, selected countries



Source: AMECO database, Commission services.

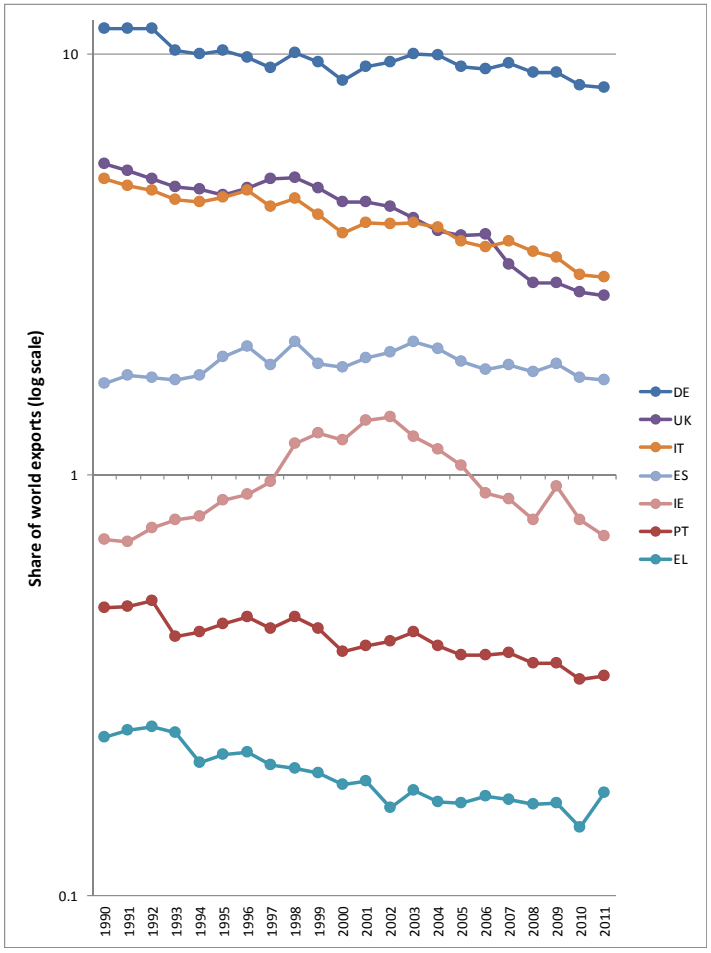
If the boom years did not reveal any obvious impact of the accumulated imbalances, the subsequent recession and the current sovereign debt crisis do not seem to have had impact on external performance as measured by the share of exports in world exports.[24] Figure 1.16 represents the international market share for the economies in trouble with Germany as a comparison. There is a decreasing trend most likely due to a composition effect because of increasing globalization.[25] Some other long-term trends are also apparent: Italy and the UK are losing market share relatively faster than other EU countries, or the Spanish share remaining remarkably constant along this period. Other than that, the build-up of the imbalances and the burst of the bubble do not seem to have harmed the ability of these countries to export.

[23] Comparable data for EU-12 Member States is not available although it is easy to expect a surge in exports to the EU since the mid-1990's.

[24] Of course, this does not mean that trade was not affected by the crisis. The implication is rather that the EU was not impacted differently from the average trading country in the world.

[25] A decreasing share can be due to poor performance (exports growing more slowly than other countries) or to a composition effect (volume of trade growing because of new actors coming in). When all major industrial powers are losing trade shares, the composition effect is the only reasonable hypothesis: it is developing countries joining international trade.

Figure 1.16. Export market shares, selected countries

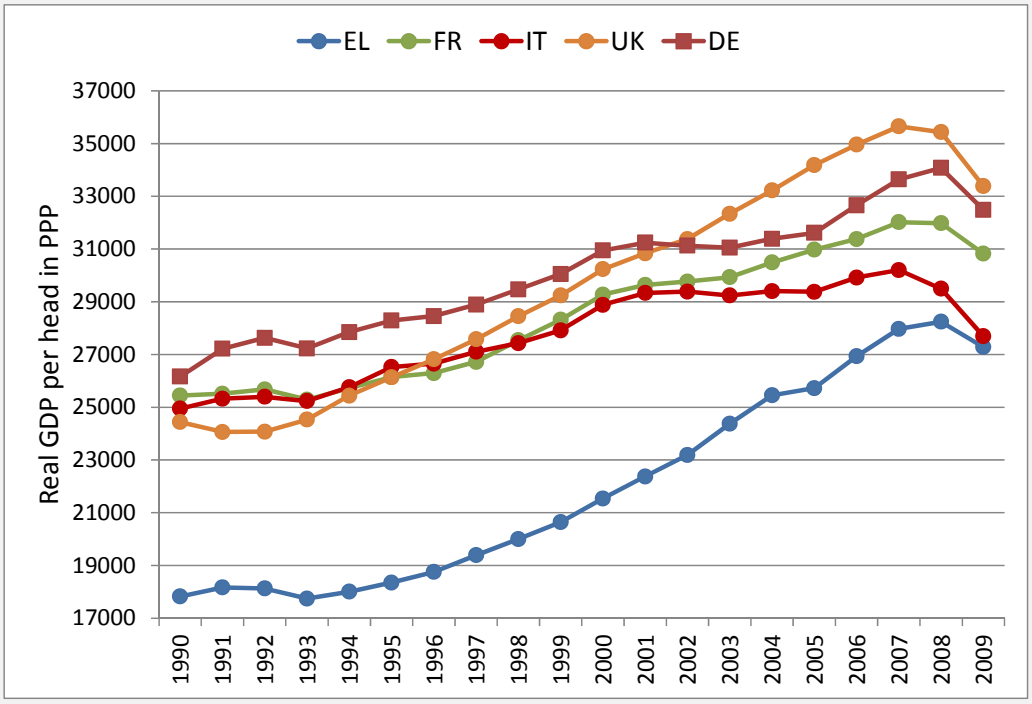


Note: Share of exports of goods including intra-EU trade over total exports. This excludes services; in the light of section 1.4 above, it is important to keep this in mind to interpret correctly the series of the UK, IE and EL.
Source: AMECO database, Commission services.

Box 1.2. Competitiveness and public finances: The case of Greece

Despite current turmoil, Greece performed reasonably well in the years preceding the crisis. After a period of relative depression in the 1980s, the country took-off in 1993 for a long period of sustained growth. During the boom years Greece had improved by 40% its relative position in the distribution of income in the EU. That was reflecting true improvements in standards of living: since the take-off, and before the crisis, Greek GDP per head in purchasing power standards had closed significantly the gap with the EU average, and had reached similar levels to Italy by 2007.[26] At the same time, the external performance of the country was relatively stable in goods (see Figure 1.16 above) while section 1.9 discusses the notable performance of the export of services.[27]

Real income growth. Comparison with selected EU-15 Member States



Source: Penn World Table 7.0, CIC, University of Pennsylvania.

Hence, it seems that the ongoing trouble in Greece is less related to a lack of external competitiveness and more with a government solvency problem that spilled over the real economy through uncertain business conditions and stringent programs to close the gap between revenues and expenditures.

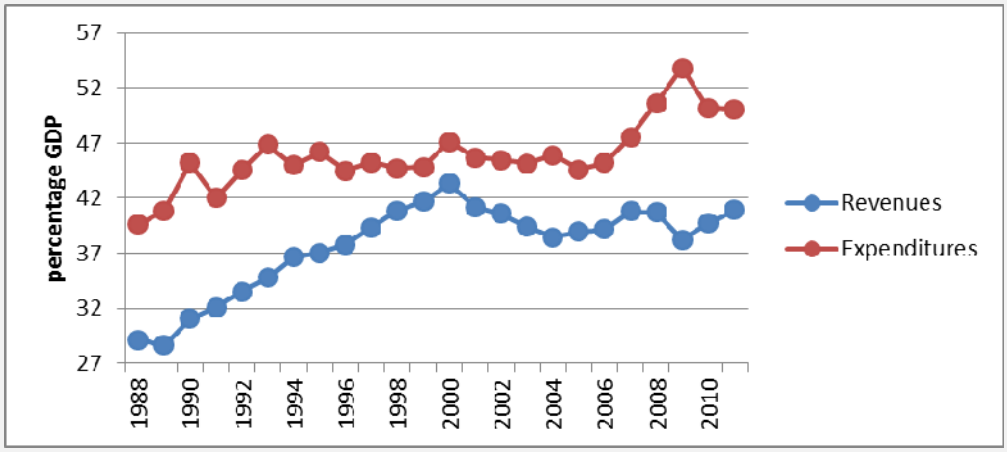
At the beginning of the expansion period, growth came along with an increase in

[26] Data for the nominal comparison, is from the AMECO database, GDP a current market prices, EU-15=100. For the PPS comparison, Penn World Table.

[27] The reader may also refer to the more systematic analysis of export performance in chapters 3 in the monograph devoted to the recovery of trade in the Quarterly Report of the Euro Area 2012-2.

government revenues almost closing the gap with expenditures in a decade. Then, in 2000, the trend is reversed and despite ongoing growth of income government revenues as a percentage of GDP start to lag significantly below expenditures that remained constant. With the exception of Hungary, no other EU Member State runs so large public deficits in the booming years immediately before the recession.

Public revenues and expenditures in Greece



Source: AMECO database, Commission services.

It seems, then that the Greek problem is more related to the ability of the government to raise revenues rather than the ability of its industry to exports goods and services. [28] Alas, if the accumulation of public debt did not seem to affect the real economy, it does not seem that the same is true for the uncertainty surrounding the resolution of the crisis as well as the drastic measures that try to bring public expenditures and revenues closer. In Table 1.1 Greece appears as the only country that has been in recession since the onset of the crisis.

As for the future, while the country has been successfully growing in these past two decades, catch-up is still partial. If the economy seems to keep up the pace of development of the EU, and even improve its relative position, in many respects Greece is still well below the EU average. Indeed, despite progress, Greece could improve sensibly along a number of dimensions (income per head, labour market participation, etc.). Most notably, it is still a much closed economy: for its size, exports relative to GDP ought to be around 50% but they represent hardly 25% (see Figure 1.12 above). In the sections below it is shown that Greece is at the bottom of the class when it comes to business environment as measured by the Doing Business indicators. Improvements in these areas would certainly help the country leap ahead.

[28] See Darvas (2010) for a review of the European fiscal crisis in comparison to the US with a special reference to the case of Greece and the revenue-side of the problem. See also Henning and Kessler (2012) for a more general comparison of the building of the American and European monetary, fiscal and banking area.

1.7 The increasing weight of exports of services

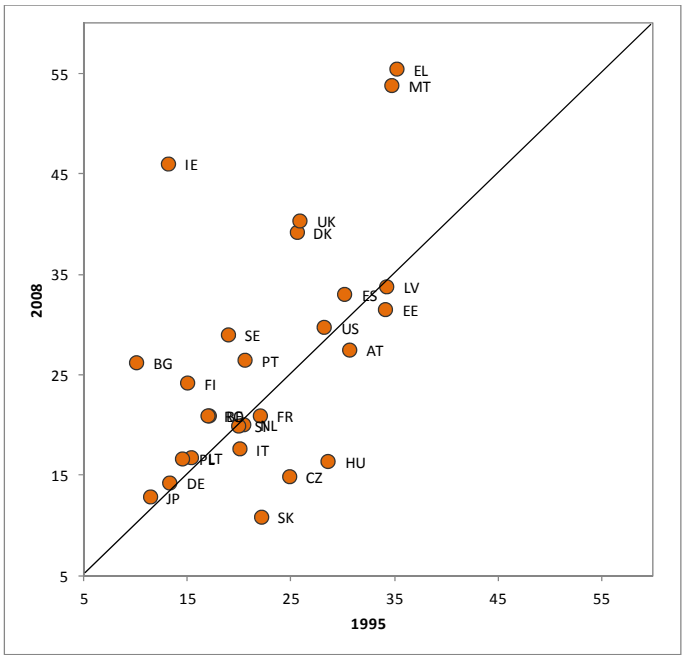
Together with increasing openness, a sign of these last decades is the growing importance of services in international trade: financial services, civil construction, transport, environmental services, and so on.[29]

Exports of services constitute an important share of total exports for the EU and as a whole, close to 25% for the EU-15 in 2008 after a long period of moderate but constant increase. Together with the US, with services weighting 29% of total exports, the EU is one of the most important providers of services in the world. The aggregate figure, however, masks considerable heterogeneity within the EU. Several groups can be distinguished.

Countries like Germany, France, or Italy are traditional exporters of manufactures. The service sector contributes relatively little to exports. The fast catch-up process of Slovakia, the Czech Republic or Hungary is mostly based on FDI inflows that explain important increases in exports of manufactures. From these countries most exports are goods rather than services. Countries like UK, Greece, Ireland, Denmark and Malta stand out for the large weight of services in their exports. Furthermore, these countries have shown an important increase in the last years. For instance, in Greece it has moved from an already high 35% in 1995 to close to 55% in 2008. The ultimate explanation for these changes differs across countries. The UK is the largest economy of the EU where services have grown to be so important, and a glance at Table 1.5 makes obvious that it is closely linked to the expansion of the financial sector: between 2000 and 2008 Financial and Insurance activities have gained almost 4 percentage points of weight in gross value added, a change that reflects the size of a sector that today represents close to 10% of GDP, the highest share in the EU together with Ireland. The case of Greece, instead, is linked to the transport sector, most likely because of the traditional importance of the cabotage industry.

[29] The UN *Manual on Statistics of International Trade in Services 2010* distinguishes: Business services, Communication services, Construction and related engineering services, Distribution services, Educational services, Environmental services, Financial services, Health-related and social services, Tourism and travel-related services, Recreational, cultural, and sporting services, Transport services, Other services not included elsewhere.

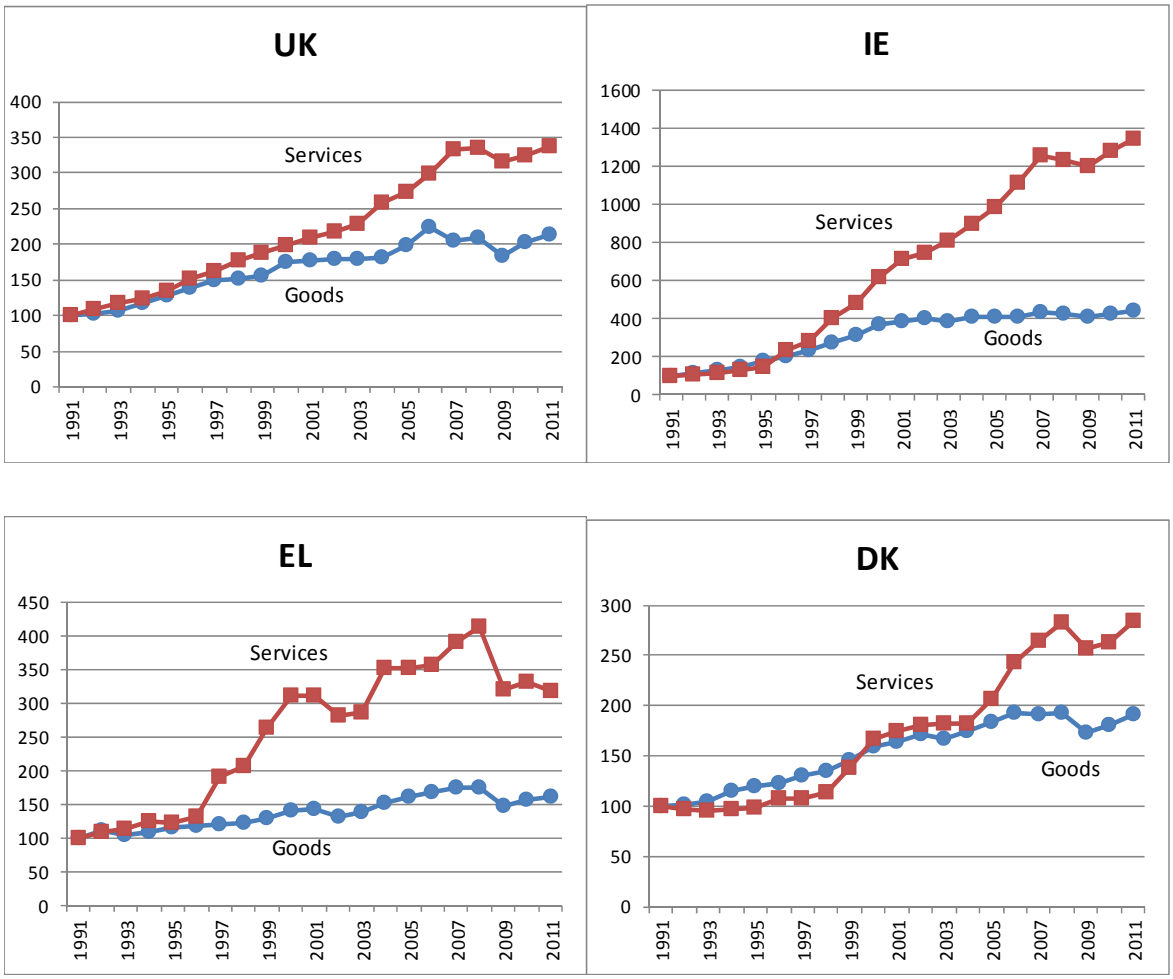
Figure 1.17. The weight of exports of services in total exports; comparison 1995-2008



Source: AMECO database, Commission services.

It may be worth noting that these notable increases in shares reflect real growth of exports of services rather than shrinking exports of goods. These four services' exporters have experience large real increases of exports of services, in the case of Ireland reaching a ten-fold increase in since 1991 (see Figure 1.17). This contrasts with more manufacturing-oriented exporters like Germany or France where the share of services in exports is moderate, between 15% and 25%, and has remained stable. In these countries the real evolution of services lags moderately the real increase of merchandise exports, maybe reflecting poor domestic performance in services.

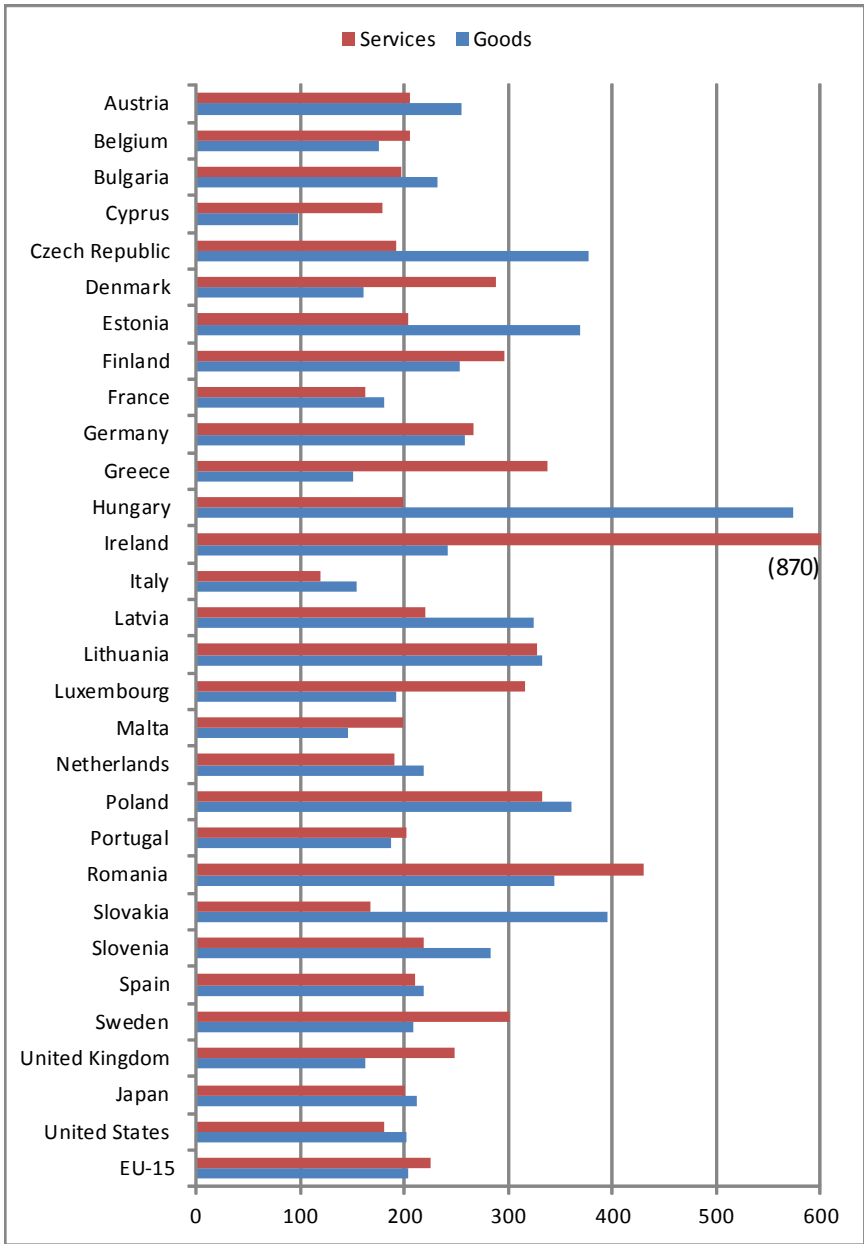
Figure 1.18. Some services' exporters. Real growth of exports of goods and services; index, 1991=100



Source: AMECO database, Commission services.

At the aggregate EU level, the importance of services' exports has increased moderately from 20 to 25% between 1991 and 2011 but it is still relatively lower than the US and definitively higher than Japan, a classical exporter of manufactures. In real terms, aggregate EU changes are aligned with those of Japan and the US with exports of goods growing at a similar pace to services, an indication that the patterns described above do not reflect a general pattern but rather the relative specialization of these countries as service providers.

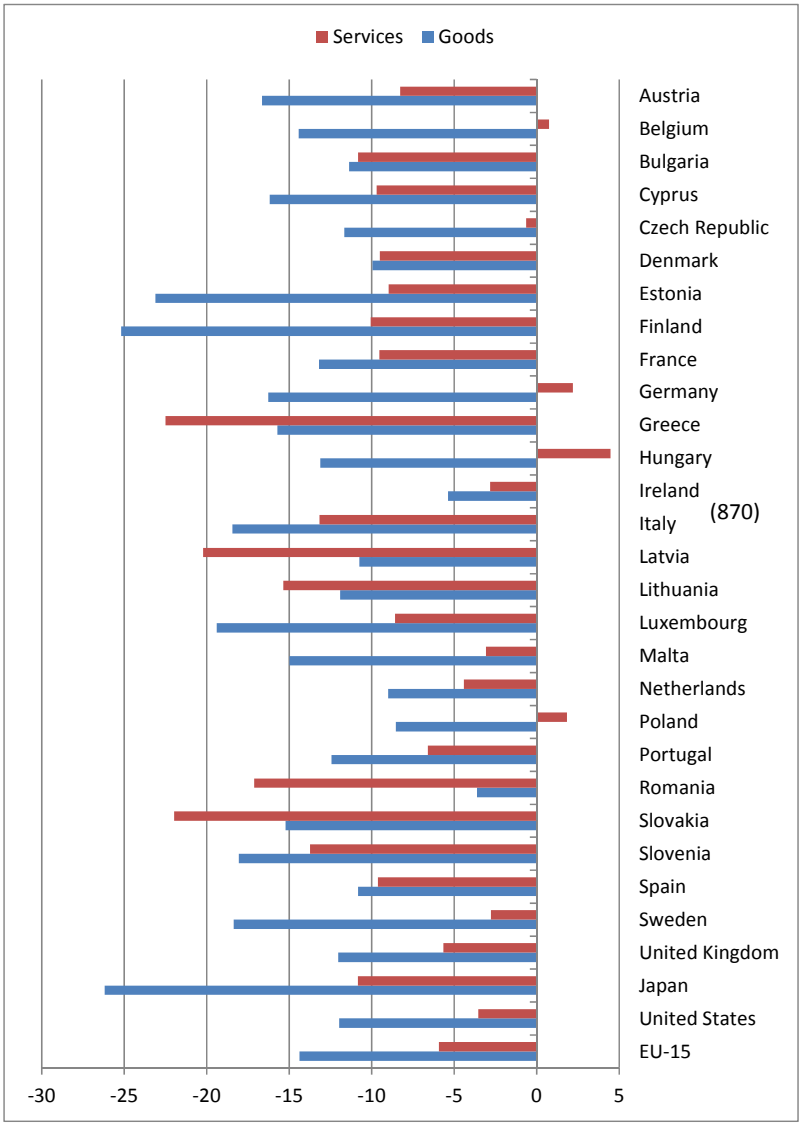
Figure 1.19. Real growth of exports of goods and services in 1995-2008; index 1995=100



Source: AMECO database, Commission services.

Finally, in the current circumstances it is legitimate to ask whether it is goods or services that are more resilient along a recession. The answer is that it depends on the services. In Figure 1.20 one can see that there is no clear association across Member States. The UK or Denmark, more focused on financial services, exports of goods have contracted more than trade in services. In Greece, on the contrary, services have contracted more, most likely because of the reliance on cabotage and the contraction in international trade (and hence in international transport services). In other countries, the weight of business services links more tightly manufacturing with services.

Figure 1.20. The contraction of exports: Real percentage change of exports of goods and services in 2008-09



Source: AMECO database, Commission services.

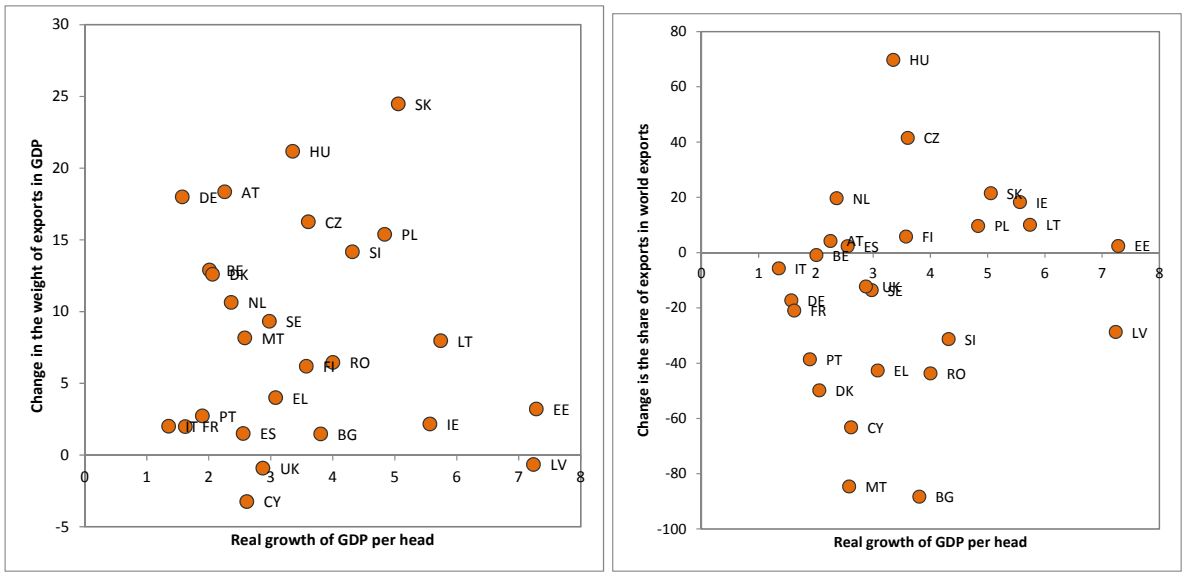
1.8 About the idea of performance

Having examined recent trends and developments of the external sectors begs the question of whether a good external performance is good per se or the reflection of a buoyant economy capable to produce commodities demanded in the international markets. Taking the increase in income per head as a performance index, the correlation with the variation in export openness is positive but weak in the medium term.[30] This is most likely due to factors other

[30] The literature on the export-led growth hypothesis examines whether exports induce changes in the rate of technical change. That is, the possibility that exports can induce sustained growth beyond the obvious instantaneous impact on income. If this literature is inconclusive, this is reflected in this weak relationship observed in EU recent experience.

than exports contributing to growth other than exports. This is shown by the high dispersion of the observations in Figure 1.21.

Figure 1.21. Exports and income growth



Note: The change in the weight of exports is the comparison of the average 1995-98 and 2004-08, in % points GDP. The change in the share of exports in world exports compares the average 1993-96 and 2005-08 and is adjusted by initial level of income in euros to compensate the fact that, mechanically, in countries growing fast, exports tend to grow fast as well.

Source: AMECO database, Commission services.

Indeed, net exports have an obvious immediate contribution to income in the short term. Hence, as mentioned above, a good net export "performance" will soften the impact the recession. In the longer term, however, even if it is clear that trade, or more generally openness, is essential for growth and development, the relationship is less direct than it is often assumed. As an exchange of goods and services it has a direct welfare effect: it allows consumers to access to a larger variety of commodities. This is, after all, the main reason why we export: to afford imports. In the long-run, however, as discussed in Box 1.1, it is not trade in the narrow sense of exchange (exports for imports) but openness in general (including foreign investment and investment abroad, migrants, exchanges of students, tourism, etc.) that exposes an economy to foreign technology, equipment goods, management techniques, and so on. Openness helps technologies to circulate and provide the incentives to be adopted. Indeed, technologies are adopted and further developed because competitive pressures of foreign firms (both in the domestic and foreign market) provide the incentive to local firms to improve performance.

The ability of an open economy to effectively adopt and develop new ideas, in turn, is likely to depend on the environment created by the level of education, the legal system, the quality of administration and so on. This environment is what the Doing Business rank is trying to capture.

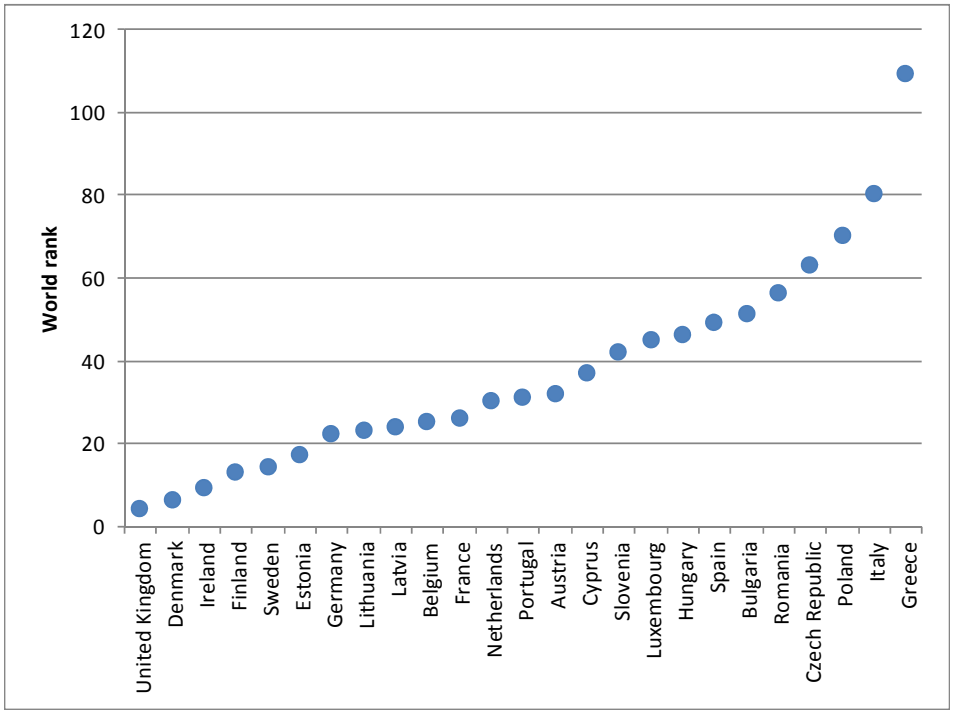
Box 1.3. Chapters of the Ease of Doing Business index

The World Bank's Ease of Doing Business attempts to measure some key elements of doing business, from the number of days required to start a business to the number of documents needed to export. This is a brief description of the contents of each section:

Starting a Business	Procedures (number)	Paying Taxes	Payments (number per year)
	Time (days)		Time (hours per year)
	Cost (% of income per capita)		Profit tax (%)
	Paid-in Min. Capital (% of income per capita)		Labor tax and contributions (%)
Construction Permits	Procedures (number)		Other taxes (%)
	Time (days)		Total tax rate (% profit)
	Cost (% of income per capita)	Trading Across Borders	Documents to export (number)
Registering Property	Procedures (number)		Time to export (days)
	Time (days)		Cost to export (US$ per container)
	Cost (% of property value)		Documents to import (number)
Getting Credit	Strength of legal rights index (0-10)		Time to import (days)
	Depth of credit information index (0-6)		Cost to import (US$ per container)
	Public registry coverage (% of adults)	Enforcing Contracts	Procedures (number)
	Private bureau coverage (% of adults)		Time (days)
Protecting Investors	Extent of disclosure index (0-10)		Cost (% of claim)
	Extent of director liability index (0-10)	Closing a Business	Recovery rate (cents on the dollar)
	Ease of shareholder suits index (0-10)		Time (years)
	Strength of investor protection index (0-10)		Cost (% of estate)

Figure 1.22 shows how spread EU countries are in the Ease of Doing Business world rank. Greece ranked 109 out of 180 ranked countries, meaning that EU Member States are ranked over the first two thirds of the support of the distribution. Below it is discussed that this can be seen as room for easy improvements.

Figure 1.22. Ease of Doing Business world rank, EU Member States

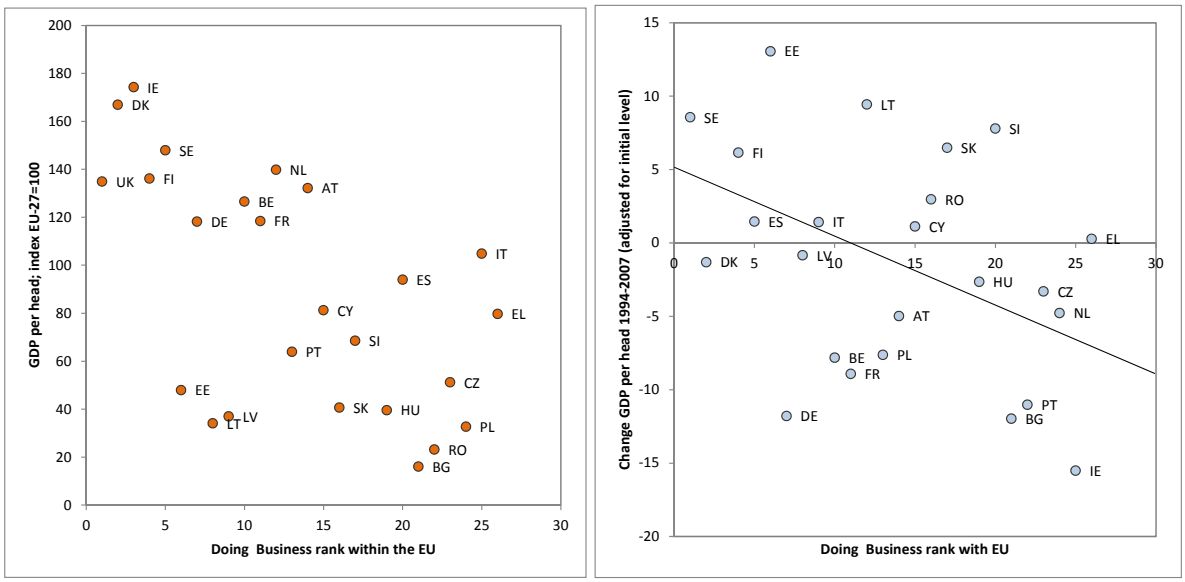


Source: World Bank, Ease of Doing Business database.

In Figure 1.23 a clear relation arises between the Doing Business rank and the level of income per head. This scatter plot is most likely capturing something very relevant.[31] The position in the rank entails large differences in the level of income per head. It should be noted that the relation with growth is less obvious. Correcting growth by the initial level of income (catching-up countries are expected to grow faster), the relation with the Doing Business rank is quite weak: at most slightly negative and with a large dispersion around the mean relation.

[31] The disclaimer implicit in the use of the expression "most likely" is due to the possibility that this chart reflects the reverse causality: e.g. rich countries can afford an efficient administration.

Figure 1.23. Ease of Doing Business and GDP per head



Note: The change in GDP per head is adjusted by initial level of income to compensate the fact that countries with a lower initial level of income tend to grow faster.

Source: World Bank, Ease of Doing Business database and AMECO database, Commission services.

1.9 Conclusions

Europe is the largest trading block in the world. EU economies are characterized by a notable degree of openness: both within the EU and by a strong integration in world markets. This chapter suggests that a good export performance is mostly reflecting something that is going well domestically: a buoyant economy able to produce commodities that meet the test international markets. For instance, a good record of exports of manufactures cannot be possible without a solid manufacturing base. Another way to see it is to consider the connection between trade and overall economic performance as conditional on many factors, most notably internal factors such as the Ease of Doing Business. For foreign new ideas, techniques and machines to impact the productivity, an economy must provide with the right incentives to adopt these technologies, a sound financial system to fund new investments, or the legal framework that eases the creation of new businesses.

This is not only a long-term issue. The elusive recovery of income in many EU Member States despite the swift recovery of exports during this recession points as well in the direction of the weight of internal factors. To see this, note that countries without internal imbalances, whose income is recovering from the initial contraction, are also those countries in which imports are recovering as fast as exports. Countries stagnating show a recovery of exports – external demand is independent of internal developments – but not of imports or other components of internal demand. It may be worth noting that an immediate corollary to this observation is that devaluations are only one of the instruments in the policy toolbox to fight the consequences of a recession. Both euro and non-euro Member States are witnessing strong increases in exports, but some countries see their income stagnate while others are recovering fast, and this in both groups. Factors other than price-competitiveness seem to be playing a determinant role.[32]

The importance of domestic conditions relative and in combination to external performance has a different meaning depending whether we focus in the short or in the long term. In the short-term, the denouement of the recession requires internal imbalances to be corrected, in particular leverage by private agents in countries with severe imbalances accumulated. The role of policy there is to strike a delicate balance between government finances equilibrium and stimulus measures to soften the impact of the adjustment as much as possible. And of course, even if exports alone cannot pull EU economies out of the recession, they constitute a precious positive stimulus.

In the long-run growth will be enhanced and sustained by a combination of many factors, with openness and a business-friendly environment being two key ingredients. In a time when government finances are under stress, revising the regulatory environment or increasing the efficiency of the administration alongside an ambitious external trade agenda may be seen as cost-effective measures. The large impact of the Doing Business rank in the level of income and the considerable heterogeneity within the EU suggests that there being room for easy improvements, easy in the sense that most chapters of the index concern regulation rather than expenditures. Of course, it may not be "easy" in the sense that vested interests may resist

[32] On the limited role of price-competitiveness, see chapters 1 and 2 in the monograph devoted to the recovery of trade in the Quarterly Report of the Euro Area 2012-2.

changes, but together with other far-reaching reforms, like labour market of tax reforms, they may put the basis for strong growth in the forthcoming years.

REFERENCES

Bentolila, S., Cahuc, P., Dolado, J.J. and Le Barbanchon, T. (2011), ´Two-Tier Labor Markets in the Great Recession: France vs. Spain´, *Economic Journal*, forthcoming.

Bustos, P. (2011), ´Trade Liberalization, Exports, and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinian Firms´, *American Economic Review*, 101(1), 304-340.

Costantini, J.A. and Melitz, M.J. (2008), ´The Dynamics of Firm-Level Adjustment to Trade´, in Helpman, E., Marin, D. and Verdier, T. (eds.) *The Organization of Firms in a Global Economy*, Cambridge, MA: *Harvard University Press.*

Darvas, Z. (2010) ´Fiscal federalism in crisis: lessons for Europe from the US´, Bruegel Policy Contribution 2010-07.

European Commission (2009), *Economic Crisis in Europe: Causes, Consequences and Responses*, European Economy 2009-7, Directorate-General Economic and Financial Affairs, European Commission.

European Commission (2010a), *Employment in Europe 2010*, Directorate-General Employment and Social Affairs, European Commission.

European Commission (2010b), ´Surveillance of Intra-Euro-Area Competitiveness and Imbalances´, Directorate-General Economic and Financial Affairs, European Commission.

European Commission (2012), *Quarterly Report of the Euro Area*, 11(1).

Hall, R.E. (2005), ´Job Loss, Job Finding, and Unemployment in the U.S. Economy over the Past Fifty Years´, *NBER Macroeconomics Annual*, 101-137.

Henning, C.R. and Kessler, M. (2012), *Fiscal federalism: US history for architects of Europe's fiscal union,* Bruegel.

Krugman, P. (1978), ´The Theory of Interstellar Trade´, *mimeo*, Princeton University.

Legrain, P. (2008), *Immigrants: Your Country Needs Them*, Abacus.

Lileeva, A. and Trefler, D. (2010), ´Improved Access to Foreign Markets Raises Plant-level Productivity... For Some Plants´, *Quarterly Journal of Economics*, 125(3), 1051-1099.

Melitz, M.J. (2003), ´The impact of trade on intra-industry reallocations and aggregate industry productivity´, Econometrica, 71(6), 1695-1725.

Reinhart, C.M. and Rogoff, K.S. (2011), *This Time Is Different: Eight Centuries of Financial Folly*, *Princeton University Press*.

UN (2010), *Manual on Statistics of International Trade in Services 2010*. United Nations.

Wolf, M. (2012), ´What was Spain supposed to have done?´, *Financial Times*, 25 June 2012.

World Bank (2012), *Doing Business 2012. Doing Business in a More Transparent World.* World Bank.

APPENDIX. STATISTICS

Table 1.7. Changes in GDP components during the recession

	2008-2009											
		Consumption		Investment		Government		Exports		Imports		
	GDP	Growth	*Share*	Growth	*Share*	Growth	*Share*	Growth	*Share*	Growth	*Share*
European	-4.31	-1.77	*57.08*	-12.46	*20.81*	2.06	*20.65*	-12.05	*40.89*	-12.16	*40.04567*
Belgium	-2.84	0.76	*50.83*	-8.11	*21.54*	0.84	*22.41*	-11.21	*83.21*	-10.73	*80.00*
Bulgaria	-5.48	-7.56	*70.38*	-17.59	*32.97*	-6.48	*15.63*	-11.22	*55.46*	-20.97	*77.95*
Czech Rep	-4.70	-0.38	*47.32*	-11.49	*27.60*	3.80	*18.54*	-10.01	*72.67*	-11.64	*67.85*
Denmark	-5.83	-4.24	*49.21*	-13.40	*20.60*	2.54	*26.53*	-9.77	*54.40*	-11.64	*51.71*
Germany	-5.13	-0.08	*55.32*	-11.41	*18.40*	3.32	*18.29*	-13.62	*47.85*	-9.23	*40.63*
Estonia	-14.26	-15.61	*56.41*	-37.86	*32.13*	-1.58	*17.73*	-18.64	*75.45*	-32.38	*83.83*
Ireland	-6.99	-7.23	*48.10*	-28.81	*23.79*	-3.74	*16.86*	-4.20	*84.96*	-9.30	*72.28*
Greece	-3.25	-1.26	*72.34*	-15.16	*22.63*	4.83	*17.96*	-19.48	*24.28*	-20.20	*38.39*
Spain	-3.74	-4.35	*56.90*	-16.57	*28.86*	3.73	*19.33*	-10.42	*26.62*	-17.25	*32.13*
France	-2.73	0.18	*57.01*	-9.04	*20.48*	2.28	*23.64*	-12.42	*27.01*	-10.84	*28.83*
Italy	-5.49	-1.56	*58.42*	-11.73	*20.65*	0.78	*20.02*	-17.51	*28.20*	-13.37	*27.82*
Cyprus	-1.85	-7.54	*71.08*	-9.73	*22.68*	6.83	*18.24*	-10.68	*46.91*	-18.58	*59.29*
Latvia	-17.73	-22.65	*70.03*	-37.38	*28.50*	-9.42	*16.80*	-14.08	*48.86*	-33.33	*65.75*
Lithuania	-14.84	-17.53	*67.96*	-39.53	*25.90*	-1.44	*15.88*	-12.48	*60.72*	-28.34	*73.32*
Luxembou	-5.30	1.08	*34.70*	-13.02	*22.95*	4.81	*15.52*	-10.86	*177.00*	-12.04	*150.42*
Hungary	-6.80	-6.24	*53.44*	-10.98	*22.58*	-0.63	*20.90*	-10.23	*90.88*	-14.77	*88.81*
Malta	-2.71	-1.40	*64.14*	-17.47	*15.44*	-1.34	*21.53*	-10.46	*90.41*	-11.30	*91.12*
Netherland	-3.54	-2.58	*45.79*	-10.20	*20.47*	4.84	*25.25*	-8.08	*74.11*	-7.99	*65.70*
Austria	-3.81	-0.28	*52.27*	-8.35	*21.07*	0.25	*18.45*	-14.34	*58.73*	-13.82	*51.50*
Poland	1.63	2.02	*61.93*	-1.23	*22.62*	2.14	*17.90*	-6.81	*41.64*	-12.43	*45.71*
Portugal	-2.91	-2.33	*65.92*	-8.61	*22.32*	4.74	*20.41*	-10.92	*31.94*	-10.02	*41.32*
Romania	-6.58	-10.08	*77.63*	-28.09	*34.77*	3.06	*14.49*	-6.45	*34.66*	-20.54	*59.19*
Slovenia	-8.01	-0.15	*52.39*	-23.32	*29.21*	2.86	*17.99*	-17.19	*69.89*	-19.63	*72.47*
Slovakia	-4.93	0.18	*54.45*	-19.69	*25.22*	6.12	*16.69*	-15.94	*85.88*	-18.14	*84.78*
Finland	-8.35	-2.73	*51.36*	-13.26	*20.37*	1.11	*21.13*	-21.52	*48.61*	-16.44	*42.36*
Sweden	-5.03	-0.26	*47.98*	-15.46	*20.15*	2.16	*25.29*	-13.83	*53.00*	-14.26	*46.61*
United Kin	-4.37	-3.54	*63.71*	-13.39	*17.43*	-0.06	*21.14*	-9.45	*28.05*	-12.22	*30.62*

	2009-2010										
		Consumption		Investment		Government		Exports		Imports	
	GDP	Growth	*Share*	Growth	*Share*	Growth	*Share*	Growth	*Share*	Growth	*Share*
European	2.04	1.02	*58.59*	-0.19	*19.04*	0.69	*22.03*	10.90	*37.58*	9.76	*36.76331*
Belgium	2.27	2.48	*52.72*	-0.72	*20.37*	0.16	*23.25*	9.92	*76.04*	8.67	*73.50*
Bulgaria	0.39	0.11	*68.83*	-18.28	*28.74*	1.89	*15.46*	14.73	*52.09*	2.41	*65.17*
Czech Rep	2.74	0.61	*49.46*	0.10	*25.64*	0.56	*20.20*	16.44	*68.62*	16.04	*62.91*
Denmark	1.30	1.88	*50.05*	-3.76	*18.95*	0.28	*28.89*	3.23	*52.13*	3.49	*48.52*
Germany	3.69	0.61	*58.26*	5.51	*17.18*	1.68	*19.91*	13.73	*43.57*	11.71	*38.87*
Estonia	2.26	-1.74	*55.52*	-9.08	*23.28*	-1.07	*20.35*	22.53	*71.59*	20.56	*66.11*
Ireland	-0.43	-0.91	*47.98*	-25.06	*18.21*	-3.12	*17.45*	6.31	*87.51*	2.71	*70.49*
Greece	-3.52	-3.63	*73.83*	-15.00	*19.84*	-7.15	*19.46*	4.20	*20.21*	-7.25	*31.66*
Spain	-0.07	0.77	*56.54*	-6.31	*25.02*	0.23	*20.83*	13.47	*24.77*	8.89	*27.62*
France	1.48	1.36	*58.72*	-1.16	*19.15*	1.22	*24.86*	9.74	*24.32*	8.78	*26.43*
Italy	1.80	1.16	*60.85*	2.11	*19.29*	-0.59	*21.35*	11.59	*24.61*	12.69	*25.50*
Cyprus	1.14	1.26	*66.96*	-1.71	*20.86*	0.84	*19.85*	3.68	*42.69*	4.90	*49.19*
Latvia	-0.34	0.44	*65.84*	-12.25	*21.69*	-9.66	*18.50*	11.48	*51.03*	11.52	*53.28*
Lithuania	1.44	-4.87	*65.82*	1.00	*18.39*	-3.29	*18.37*	17.36	*62.39*	17.27	*61.70*
Luxembou	2.68	2.13	*37.04*	2.98	*21.07*	2.91	*17.18*	2.84	*166.59*	4.58	*139.72*
Hungary	1.26	-2.17	*53.76*	-9.67	*21.57*	-2.09	*22.29*	14.29	*87.54*	12.81	*81.22*
Malta	2.29	-1.66	*65.00*	9.85	*13.10*	0.56	*21.83*	17.71	*83.20*	13.67	*83.07*
Netherland	1.69	0.40	*46.24*	-4.38	*19.06*	0.96	*27.44*	10.79	*70.62*	10.55	*62.67*
Austria	2.31	2.17	*54.19*	0.08	*20.08*	-0.18	*19.23*	8.29	*52.30*	8.02	*46.14*
Poland	3.90	3.17	*62.16*	-0.16	*21.99*	4.13	*17.99*	12.09	*38.19*	13.88	*39.38*
Portugal	1.40	2.12	*66.31*	-4.11	*21.01*	0.93	*22.02*	8.79	*29.30*	5.38	*38.29*
Romania	-1.65	-0.43	*74.72*	-2.09	*26.76*	-4.42	*15.98*	14.05	*34.70*	11.87	*50.34*
Slovenia	1.38	-0.68	*56.87*	-8.31	*24.35*	1.47	*20.12*	9.54	*62.91*	7.16	*63.32*
Slovakia	4.18	-0.71	*57.38*	12.38	*21.30*	1.12	*18.62*	16.55	*75.93*	16.35	*73.00*
Finland	3.73	2.98	*54.51*	2.59	*19.28*	0.18	*23.31*	7.82	*41.62*	7.74	*38.62*
Sweden	6.13	3.67	*50.39*	7.68	*17.94*	1.88	*27.20*	11.75	*48.09*	12.72	*42.08*
United Kin	2.09	1.24	*64.27*	3.14	*15.79*	1.48	*22.09*	7.37	*26.56*	8.59	*28.11*

	2010-2011										
		Consumption		Investment		Government		Exports		Imports	
	GDP	Growth	*Share*	Growth	*Share*	Growth	*Share*	Growth	*Share*	Growth	*Share*
European	1.54	0.14	*58.01*	1.33	*18.62*	-0.06	*21.73*	6.32	*40.85*	3.92	*39.54186*
Belgium	1.89	0.74	*52.83*	5.11	*19.78*	0.80	*22.77*	4.78	*81.74*	4.90	*78.10*
Bulgaria	1.67	-0.56	*68.64*	-9.69	*23.40*	0.55	*15.69*	12.80	*59.53*	8.52	*66.48*
Czech Rep	1.65	-0.48	*48.44*	-1.16	*24.98*	-1.39	*19.77*	10.96	*77.77*	7.50	*71.05*
Denmark	1.00	-0.51	*50.34*	0.39	*18.00*	-1.02	*28.60*	6.78	*53.12*	5.20	*49.57*
Germany	3.00	1.47	*56.53*	6.41	*17.48*	1.39	*19.53*	8.25	*47.79*	7.42	*41.88*
Estonia	7.64	4.18	*53.35*	26.79	*20.70*	1.64	*19.68*	24.87	*85.78*	27.03	*77.94*
Ireland	0.70	-2.70	*47.74*	-10.61	*13.71*	-3.70	*16.98*	4.11	*93.43*	-0.70	*72.71*
Greece	-6.91	-7.12	*73.75*	-20.75	*17.48*	-9.11	*18.73*	-0.33	*21.83*	-8.10	*30.44*
Spain	0.71	-0.14	*57.02*	-5.13	*23.45*	-2.18	*20.89*	8.97	*28.13*	-0.14	*30.09*
France	1.68	0.38	*58.65*	2.86	*18.65*	0.83	*24.80*	4.90	*26.29*	4.55	*28.33*
Italy	0.43	0.25	*60.46*	-1.86	*19.35*	-0.90	*20.85*	5.63	*26.98*	0.42	*28.23*
Cyprus	0.48	0.16	*67.04*	-13.78	*20.27*	-4.66	*19.79*	3.62	*43.77*	-4.97	*51.01*
Latvia	5.47	4.43	*66.35*	24.62	*19.10*	1.29	*16.77*	12.59	*57.07*	20.72	*59.62*
Lithuania	5.87	6.11	*61.72*	17.05	*18.31*	0.37	*17.52*	13.65	*72.19*	12.72	*71.33*
Luxembou	1.55	1.82	*36.84*	7.66	*21.14*	4.13	*17.22*	1.73	*166.85*	3.24	*142.30*
Hungary	1.69	0.01	*51.94*	-5.45	*19.24*	-0.37	*21.55*	8.39	*98.81*	6.32	*90.48*
Malta	2.06	3.07	*62.49*	-13.42	*14.07*	3.90	*21.46*	1.01	*95.74*	-0.97	*92.31*
Netherland	1.17	-1.08	*45.65*	5.83	*17.92*	0.19	*27.25*	3.78	*76.94*	3.50	*68.13*
Austria	3.11	0.61	*54.11*	5.66	*19.64*	2.65	*18.76*	6.70	*55.36*	6.97	*48.72*
Poland	4.35	3.06	*61.73*	8.26	*21.13*	-1.32	*18.03*	7.48	*41.20*	5.77	*43.17*
Portugal	-1.61	-3.91	*66.78*	-11.39	*19.86*	-3.86	*21.92*	7.40	*31.44*	-5.51	*39.79*
Romania	2.45	1.31	*75.65*	6.31	*26.64*	-3.53	*15.53*	9.86	*40.24*	10.48	*57.26*
Slovenia	-0.17	-0.27	*55.72*	-10.67	*22.02*	-0.93	*20.14*	6.81	*67.98*	4.67	*66.92*
Slovakia	3.35	-0.36	*54.68*	5.69	*22.98*	-3.53	*18.08*	10.79	*84.95*	4.46	*81.53*
Finland	2.85	3.33	*54.12*	4.63	*19.07*	0.83	*22.51*	-0.82	*43.26*	0.05	*40.12*
Sweden	3.94	2.12	*49.22*	5.83	*18.20*	1.77	*26.11*	6.76	*50.63*	6.10	*44.69*
United Kin	0.65	-1.22	*63.73*	-1.20	*15.95*	0.07	*21.96*	4.59	*27.94*	1.20	*29.89*

Source: AMECO database, Commission services, and own calculations

Table 1.8. The average weight of services in total exports

	1991-94	1995-98	1999-2002	2003-06	2007-11
European Union (15 countri	21.92	21.18	22.97	24.02	25.56
Belgium	20.68	17.53	19.78	19.79	22.43
Bulgaria	6.15	18.96	30.13	32.99	25.55
Czech Republic	22.28	24.75	18.02	13.89	15.04
Denmark	27.93	26.60	31.97	34.25	38.35
Germany	13.45	13.74	13.98	13.93	14.80
Estonia	29.42	36.10	33.46	31.51	31.14
Ireland	14.43	15.28	23.52	36.51	46.69
Greece	33.96	41.18	52.83	54.26	53.70
Spain	33.26	29.84	32.00	32.15	32.61
France	23.83	21.61	21.43	21.00	21.30
Italy	22.42	20.39	19.81	19.61	18.16
Cyprus		73.67	81.95	83.72	84.50
Latvia	33.14	37.41	35.07	31.17	31.83
Lithuania	11.41	19.09	21.47	20.61	17.36
Luxembourg	59.12	65.00	71.77	74.48	80.26
Hungary	27.91	25.85	18.58	15.39	17.28
Malta	37.38	37.91	34.73	40.59	53.18
Netherlands	21.49	21.01	21.72	21.15	20.67
Austria	33.58	29.29	27.42	27.26	27.78
Poland	15.34	19.88	20.11	14.76	16.60
Portugal	24.43	19.94	21.67	22.95	26.95
Romania	14.42	15.78	14.81	15.38	17.75
Slovenia	16.56	19.63	17.78	17.89	19.92
Slovakia	25.71	19.40	16.31	11.89	9.74
Finland	15.30	14.10	16.63	18.79	25.19
Sweden	21.43	19.58	23.30	25.25	29.93
United Kingdom	25.86	27.54	31.78	36.04	40.44
Turkey	36.76	42.65	36.79	24.36	21.34
Iceland	28.42	30.24	33.56	37.09	33.55
Norway	27.92	26.01	25.03	23.29	22.77
Switzerland	25.74	25.87	26.17	27.31	30.32
United States	29.38	28.36	29.20	30.47	30.49
Japan	11.83	11.74	11.32	12.61	12.85
Canada	13.61	12.95	12.98	13.48	14.65
Mexico	15.92	9.84	7.55	6.76	5.51
Korea	13.43	16.16	15.41	12.99	12.84
Australia	22.21	23.75	23.14	22.89	20.20
New Zealand	21.52	24.18	25.77	27.86	22.21

Source: AMECO database, Commission services.

2. THE EU INDUSTRY IN THE GLOBAL VALUE CHAIN

On-going globalisation has changed the economic landscape. Many products used to be produced locally from mainly domestic resources. This meant that most of the value chains or production processes were located in the country where firms had their headquarters. Technological development has facilitated the geographical fragmentation of production processes, resulting in the emergence of global value chains. Different parts of firms' production processes are now located in different parts of the world, according to the comparative advantages of the locations. This 'slicing up of the value chains' has given rise to increased trade flows of goods and services in the world economy. A large share of this trade is intra-firm trade in intermediate goods, conducted by multinational companies. The use of imported intermediate goods in manufacturing industries has increased globally, thereby involving more industries and countries in the value chains.

The increasingly important role of global value chains for the EU industry is emphasised in the EU flagship initiative 'An integrated industrial policy for the globalisation era' which states: 'The EU needs to pay greater attention to the manufacturing value-chain … Industry is increasingly dependent on inputs of raw material and intermediate goods, and is also crucially dependent on the business services industries that add value and help to design and market new goods and services. This new perspective requires a different approach to industrial policy that takes increased account of the interlinkages' (European Commission, 2010). This initiative identifies a number of policy areas that would help EU firms to reap the benefits of globalisation and to compete on global markets. The design of appropriate policies requires better understanding of the development and prospects of global industrial value chains. This chapter tries to respond to this need by looking for empirical answers to the following questions:

- What have been the main changes in industries' value chains since 1995?
- How have the inter-industry and inter-regional linkages within the EU and in extra-EU relations developed?
- How do these compare with inter-industry and inter-regional linkages in the US, Japan and other countries?

- What was the impact of the 2008/09 economic recession on the offshoring decisions of EU firms?
- What are the effects of the crisis on vertical specialisation and value chains in industries producing chemicals, machinery and equipment, electrical and optical equipment and transport equipment?

- What types of firms are more likely to offshore parts of their supply chain?
- What leads firms to offshore and what drives the decisions with respect to the characteristics of the host and destination country and those of the offshoring firms?
- What are the preferred target countries for relocating production for European manufacturing companies?
- Is offshoring related to framework conditions in the different locations?

These questions are addressed by focusing largely on four important manufacturing industries, classified according to NACE Rev. 1.1: chemicals, chemical products and man-made fibres (DG); machinery and equipment (DK); electrical and optical equipment (DL); and transport equipment (DM). The first questions are addressed in Section 2.2, which analyses patterns and trends in vertical specialisation across countries. The analyses for the four selected industries are preceded by overviews of the patterns for total exports, manufacturing exports and services exports. Section 2.3 focuses on the changes in trade patterns of the four individual manufacturing industries by geography. The analyses differentiate between the use categories of products: trade in parts and components is important for industries producing machinery and equipment, electrical and optical equipment and transport equipment, while trade in semi-finished products is important for the chemicals industry. Section 2.4 focuses on offshoring decisions at company level; it contains analyses of the motives and determinants of company strategies with respect to the relocation of production. A summary and conclusions are provided in Section 2.5.

2.1 The many facets of international production integration

Many different concepts are used in analysing the internationalisation of production. Examples include 'global production sharing', '(international) fragmentation', 'slicing up the value chain', 'vertical specialisation', 'international (out)sourcing', 'offshoring', 'global supply chains', 'global value chains', etc. Here, an account of the most widely used categories is given. A rigorous, precise and accurate definition is used as a starting point, and other categories are related to that. 'Offshoring' and 'offshore outsourcing' refer to a company's decision to transfer certain activities that have so far been carried out inside the company to either another unit of the firm in a foreign location (intra-firm or captive offshoring) or to an independent firm (offshore outsourcing). Offshoring and offshore outsourcing are sometimes referred to as (international) relocation (OECD, 2004; UNCTAD, 2004; Kirkegaard, 2005). These and related terms are used in rather an unsystematic way in the literature — something that needs to be considered in any discussion.[33]

Table 2.1 – Understanding intra-firm or captive offshoring, outsourcing and offshore outsourcing

Location of production	**Internalised (inside the company)**	**Externalised (outside the company, outsourcing to an independent firm)**
Home country	Production kept in-house at home	Outsourcing (at home)
Foreign country (offshoring)	Intra-firm (captive) offshoring	Offshore outsourcing

Source: UNCTAD (2004).

'Offshoring' is also widely used to denote the relocation of processes to foreign countries, regardless of their links to the relocating company (see, for example, Olsen, 2006; Bertoli, 2008; Jabbour, 2010). In this case, attention is focused only on the movement of production and related jobs between countries. Similarly, some papers make no distinction between offshoring and offshore outsourcing: they are usually both referred to as offshoring (see, for

[33] Bhagwati et al. (2004) drew attention to the problem of the lack of a consistent use of definitions.

example, Görg et al., 2008; Wagner, 2011). Here again the emphasis is on the moving of the activities abroad from the home country.[34]

Other approaches rely on various trade data to analyse changes in the structure of global production and the increase in trading links across countries. One such approach concerns the trade in parts and components. Yeats (1997) was the first to use these data to try and measure the phenomenon; he called it 'production sharing'. Other studies with the same approach include Ng and Yeats (1999) and Kaminski and Ng (2001). Trade in intermediates is a similar concept often used in empirical analyses on which other approaches are based on. International fragmentation (e.g. Jones and Kierzkowski, 1990) places more emphasis on production activities, with fragmentation being defined as the splitting of production processes into parts that can be done in different countries (see, for example, Baldone et al., 2001, in the European context).[35] Vertical specialisation (Hummels et al., 2001) is based on trade between different countries, each specialising in a particular production stage. The authors make the connection between the fragmentation of production and exports by sector by calculating direct and indirect (through suppliers) imports that are then incorporated into the exports of a given country, in order to determine that country's specialisation.

International 'trade in tasks' (reflecting a finer division of labour across countries) — as opposed to trade in finished goods (e.g. Grossman and Rossi-Hansberg, 2008) — refers to captive offshoring and offshore outsourcing. This approach is used in many theoretical models.

Furthermore, two further concepts describe the phenomenon of Western European firms concentrating their offshoring and offshore outsourcing activities in Central and Eastern Europe (Jacoby, 2010). 'Nearshoring' — as opposed to 'farshoring' — emphasises the geographical proximity between the offshoring and outsourcing company and its affiliate/partner. 'Nearsourcing' is used as an equivalent to 'nearshoring' (ACM, 2006). For example, in the US, 'nearshoring' is referred to in the context of relocations to Canada or Mexico (Olsen, 2006). Similarly, in Europe, 'nearshoring' is usually used in the context of offshoring and offshore outsourcing to Central and Eastern Europe. A key aspect of nearshoring is the fact that global value chains are more regional than global (De Backer and Yamano, 2011). The term 'backshoring' or 'reshoring' is used when previously captive offshored or offshore outsourced activities are brought back to the original location.

As is obvious from the existing diversity of definitions, the old approaches and the widely-used existing data are not considered adequate or appropriate to grasp all the aspects of this phenomenon. For example, at the macro-level, the concepts 'offshore outsourcing' and 'offshoring' are differently connected to foreign direct investment (FDI) and foreign trade. Offshore outsourcing is usually not connected to FDI, but is usually connected to international trade. In the case of captive offshoring, an initial FDI project of the vertical type is always involved, and later the output is exported to other affiliates and sold to the local affiliate of the same company. In captive offshoring all these transactions remain within the boundaries of the company, in contrast to offshore outsourcing. So both flows of FDI and foreign trade are involved.

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34 The Eurostat survey uses the term 'international sourcing'. According to Alajääskö (2009), captive offshoring is about twice as common as offshore outsourcing in the sample.

35 In addition to the economics literature, papers on these concepts can be found in the business, management and economic geography literature; understandably, the focus of these is different.

Thus neither the available FDI data nor the foreign trade data are able to fully cover developments connected to offshoring and offshore outsourcing. It must also be emphasised that widely-used measurements based on trade statistics should be used with caution. It could be misleading to use trade statistics designed to collect trade flows in final products, because of the increase of trade in parts and components or intermediaries. For example, revealed comparative advantage indicators, specialisation indices or classification according to the technology content of products may give an erroneous result concerning the specialisation and role of a given country in the international distribution of labour.

Different methods are applied in this chapter to take account of the many aspects of the internationalisation of production. Section 2.3 builds on the measurement of vertical specialisation, which is derived from a global input-output matrix combining industry-level information on sourcing structures with detailed trade data. Section 2.4 is based on trade data that differentiate between the various end-use categories of traded products, which allows the effects of the crisis to be captured. Finally, Section 2.5 builds on firm-level data to shed light on micro-economic aspects of the internationalisation process.

2.2. Changes in industries' value chains since 1995

International linkages vary across industries, and change over time. Not only do countries have to rely on imports of products not produced domestically, e.g. raw materials, but industries are likely to participate in the international division of labour, by offshoring the production of semi-finished products or via inputs of parts and components or assembly activities. This section analyses vertical specialisation patterns and the respective changes over time for EU-27 industries, drawing comparisons with the US and Japan in the period from 1995 until recent years. Particular questions to be addressed are whether and to what extent the import content of exports has changed over the longer term and in more recent years? Have there been any major shifts with respect to source patterns by geographical regions, and are there significant differences across countries? Have the industries examined in more detail here faced significant changes in vertical specialisation patterns compared to overall patterns?

Methodologically, the chapter builds on the measurement of vertical specialisation developed by Hummels et al. (2001). It uses a global input-output table, which provides a more precise metric of vertical specialisation. The use of a global input-output table allows for not only differentiating direct imports from different countries but also indirect imports from different countries arising from the flows of intermediate goods in different parts of the value chains. The data used for this section are the world input-output tables from the World Input-Output Database (WIOD) project, which have recently become available.[36]

This approach facilitates more detailed analyses of changes in the international sourcing structures. By using information from the WIOD it is possible to analyse the structures of sourcing and vertical specialisation. Hummels et al. (2001) recommended a widely used measure of vertical integration, which has subsequently been extended and made more sophisticated. In this study, a slightly more generalised measure of vertical integration is used, which takes full advantage of a global input-output table. A global matrix such as this allows the calculation of the global Leontief inverse matrix, from which a vertical specialisation indicator can be calculated. Such a measure of vertical specialisation is closely related to the

[36] See the Annex for a short description and www.wiod.org for a detailed description of the world inpout-output database. The WIOD project was funded by the FP7 SSH research programme.

concept of output multipliers, and therefore also to backward (and forward) linkage indicators, cf. Box 2.1.[37]

BOX 2.1 – A GENERALISED MEASURE OF VERTICAL SPECIALISATION

The most widely used measure of vertical specialisation is the VS measure proposed in Hummels et al. (2001) which pre-multiplies the domestic Leontief inverse by the import coefficients matrix and expresses the resulting matrix sum as a ratio to total gross exports.[38] A more sophisticated measure, VS1, pre-multiplies the domestic Leontief inverse by the import matrices for each individual partner country; the results are then summed together and expressed as a ratio to total gross exports.

These measures, however, do not take account of all inter-country linkages, i.e. imports from a country might (directly and indirectly) include imports from other countries, or even the country under consideration. The availability of a world input-output table therefore allows these inter-regional linkage effects to be taken into account. This would suggest an appropriate indicator – VS2 – using the Leontief inverse of the global input-output table times the vector of exports of the reporter country under consideration and summed over all partner countries. This can be expressed as a share of total gross output produced for production of this export vector. Formally, this can be expressed as

$$VS2^{r} = \frac{1}{\mathbf{1}'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{x}^{r}}(\mathbf{1}^{-r})'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{x}^{r}$$

Let C denote the number of countries and N the number of industries. The vector $\mathbf{x}^{r}$ denotes an NCx1 vector with country *r*'s exports included in the appropriate elements of the vector and zeros otherwise. The vector $\mathbf{1}^{-r}$ denotes a summation vector (of dimension NCx1) with 0 in country *r*'s appropriate elements of the vector and 1 otherwise, i.e. summing over all partner countries. Similarly, $\mathbf{1}$ denotes a summation vector of ones of dimension NCx1, summing over all countries. Matrix **A** denotes the coefficient matrix, i.e. inputs per unit of gross output, and **I** is the identity matrix, both are of dimension NCxNC. The prime indicates the transpose of the respective vectors.

When examining particular regions or sectors, the summation and export vectors $\mathbf{1}^{-r}$ and $\mathbf{x}^{r}$ have to be adjusted accordingly (i.e. summing up over only those partner countries that are of interest). In case that one is interested in only one particular industry the export vector contains exports of this industry only and 0's otherwise and the summation vector $\mathbf{1}^{-r}$ contains a one for that industry and 0's otherwise. Using gross output associated with the production of the particular exports, i.e. $\mathbf{1}'(\mathbf{I}-\mathbf{A})^{-1}\mathbf{x}^{r}$ the sourcing structure to produce a particular vector of exports is expressed as a percentage of total production needed for these exports. This can further be broken down by individual partner countries or groups of partner countries.

Multiplying the Leontief inverse by the total export vector, including the intermediates, involves a certain degree of 'double-counting'. One possibility to remedy this would be to use exports of final demand goods only. Empirically, it does not make a big difference when expressed as a share of gross output to be produced, however, and is more akin to the original

[37] See Stehrer et. al., (2012) for a more detailed description.

[38] The Leontief inverse is used in input-output analysis in order to take into account that the output of a certain industry i needs the outputs of a number of other industries n in order to satisfy the demand for a product from industry i.

measure proposed in Hummels et al. (2001). It should be noted that this measure is closely linked to the linkage indicators – or, more specifically, to the backward linkage measure – and the concept of (simple output) multipliers, which are also based on the Leontief inverse. Therefore, one would expect, first, a country to be more vertically integrated the higher its (backward) linkages. If this country's output should increase (e.g. by assembly of final products), it needs more inputs from other countries, and thus its backward linkages are higher and it is more vertically integrated.

Secondly, this also explains why larger countries tend to be less vertically integrated in the global economy, since large countries source relatively more from their domestic economy. Conversely, smaller countries are not able to produce all the inputs themselves and thus tend to be more vertically integrated. For a more detailed discussion, see Stehrer et al. (2012a) and the literature cited therein.

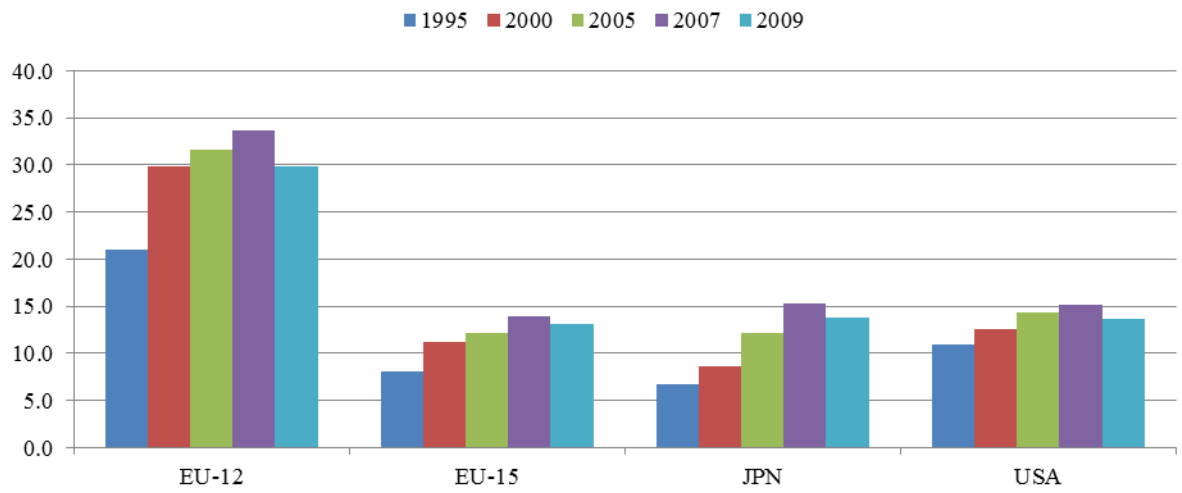
2.2.1 International linkages and the foreign content of exports

The aggregate results for EU, US and Japan are presented before the four selected industries are analysed. For the economy-wide analyses, the EU-27 is split into the EU-15 and the EU-12, as the latter group shows a particular pattern in the European division of labour. The EU-15, Japan and the US show initial low levels for the foreign content of exports of between 5% and 10%. In 1995 the figure for the US was comparable to that for the EU-15 in 2000. The vertical specialisation is higher in the EU-12 countries and, even in 1995, the EU-12 countries had a much higher vertical specialisation than the other countries. This was partly due to the strong backward linkages these countries already had as providers of intermediate inputs for (mainly) the EU-15, but was also due to the fact that the country group consists of relatively small countries. Their integration intensified even further over time, peaking in 2007 at about 34%.

In the three other countries and regions, the foreign content of exports increased to levels of about 14–16%. The particularly strong increase experienced in the EU-12 countries points to the strong integration process with the EU since 1995, generated especially by production networks.

During the recent economic crisis, however, the foreign content dropped slightly, by 1–2 percentage points, in three of the regions. As the data end in 2009, this drop might also have been driven by an industry composition effect, since it was particularly sectors with stronger production linkages that were affected more severely by the crisis. The decrease was even stronger for the EU-12 countries, with a drop of about 4 percentage points.

Figure 2.1 Foreign content of total exports (%)



Source: WIOD.

Breaking down Figure 2.1 by source region shows how the sourcing structure at economy-wide levels has changed over time. Table 2.2 provides information on the geographical structure of the foreign content of exports across source regions over time for the EU, Japan and the US.

The table shows the foreign content of exports and the domestic content highlighted in grey. As shown, the domestic content is relatively high in all countries: it is lowest in the EU-12, standing at 66.4 % in 2007, and higher for the other economies: around 85 %. In all cases, the domestic share has decreased.

Table 2.2 – Content of total exports, by partner

	EU-12					EU-15				
	1995	**2000**	**2005**	**2007**	**2009**	**1995**	**2000**	**2005**	**2007**	**2009**
BRII	3.1	2.8	2.6	2.6	2.1	0.8	0.9	1.3	1.5	1.3
Canada	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3
China	0.2	0.8	2.1	3.4	4.8	0.4	0.8	1.3	2.0	2.8
EU-12	79.0	70.2	68.4	66.4	70.1	0.6	0.9	1.3	1.6	1.6
EU-15	13.1	18.4	18.6	18.6	15.7	92.0	88.8	87.8	86.0	86.8
Japan	0.5	1.1	1.1	1.2	0.9	1.0	1.1	0.8	0.8	0.7
Korea	0.3	0.5	0.7	0.9	0.8	0.3	0.4	0.5	0.4	0.4
Mexico	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1
USA	1.1	1.9	1.4	1.4	1.3	1.8	2.5	1.8	1.9	1.8
Rest of world	2.4	4.0	4.7	5.1	4.0	2.8	4.1	4.6	5.2	4.3

	Japan					USA				
	1995	**2000**	**2005**	**2007**	**2009**	**1995**	**2000**	**2005**	**2007**	**2009**
BRII	0.5	0.5	0.8	1.1	0.9	0.4	0.5	0.7	0.8	0.7
Canada	0.2	0.2	0.2	0.2	0.2	1.4	1.6	1.7	1.7	1.4
China	0.5	0.9	2.2	3.1	3.8	0.6	0.9	2.0	2.7	3.3
EU-12	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1
EU-15	1.4	1.7	2.1	2.4	1.9	2.8	3.1	3.4	3.3	2.7
Japan	93.3	91.3	87.8	84.7	86.2	1.9	1.6	1.3	1.2	0.9
Korea	0.6	0.7	0.9	1.1	0.7	0.5	0.6	0.6	0.5	0.4
Mexico	0.0	0.1	0.1	0.1	0.1	0.6	0.9	0.9	1.0	0.9
USA	1.3	1.5	1.3	1.5	1.2	89.0	87.5	85.7	84.8	86.3
Rest of world	2.1	3.0	4.5	5.6	4.9	2.6	3.1	3.6	3.9	3.1

Note: BRII comprises Brazil, Russia, India and Indonesia.

Source: WIOD..

The financial crises had a severe impact on global trade and thus also on the trend of increased vertical specialisation. In order to analyse the long-term trends, the year 2009 has therefore been omitted from the following analysis. In 2007, the BRII group accounted for about 10% or less of the import content of most countries, with a larger share for the EU-15. It is interesting to note that this group — although it includes India, which is comparable in size to China — does not account for higher shares of vertical integration, particularly not where the US is concerned. Canada is important for the US, even more so than Mexico. China accounts for about 10% of the foreign content of exports in the EU-12, 15% in the EU-15, 20% in Japan and about 18% in the US. China has surpassed the EU-12 as a source for the EU-15 in recent years. The EU-12 countries are only important as a source for the EU-15, where it accounts for about 12%. On the other hand, the EU-15 countries are very important for the EU-12, which use a lot of EU-15 outputs to produce their own exports.

The EU-15 accounts for about 16% and 20% of the foreign content of Japanese and US exports. The EU-15 share of Japanese exports decreased from 1995 to 2007. The Japanese share of EU-15 and US exports decreased from 1995 to 2007, the largest declines being recorded for exports to the US. As can be expected, the US is the main market for Mexico, making up about 5% of its export content, but the figure is considerably smaller for the other countries under consideration. Finally, US output accounts for about 13% of the foreign content of EU-15 exports and 10% of Japan's. The content of exports from the rest of the world (ROW) is particularly high in the EU-15 and Japan. It should be noted that the ROW includes countries like Switzerland and Norway and Turkey, which have strong trade relations with the EU countries. On the other hand, the ROW group includes a number of Latin and South American countries, important for the US, and a host of Asian countries with strong production networks, important for Japan.

The most impressive development has been the rise in the importance of China. The Chinese share of the foreign content of EU-12 exports increased from a negligible figure in 1995 to 10% in 2007. Its share of EU-15 exports increased from slightly above 5% to about 15%. The increase was even more marked in Japan, where China's share rose from about 7% to 20%, cf. Table 2.3.

Table 2.3. Geographical structure of the foreign content of exports, 1995 and 2007

	1995				2007			
	EU-12	**EU-15**	**Japan**	**USA**	**EU-12**	**EU-15**	**Japan**	**USA**
BRII	15.0	10.4	7.3	3.9	7.7	11.0	7.1	5.2
Canada	0.7	3.3	3.2	13.0	0.8	2.2	1.6	11.4
China	1.2	5.4	7.4	5.5	10.2	14.5	20.0	17.5
EU-12	-	7.8	0.5	0.8	-	11.5	1.0	1.2
EU-15	62.4	-	21.5	25.7	55.3	-	15.9	21.6
Japan	2.4	11.9	-	17.4	3.5	5.9	-	7.7
Korea	1.4	3.2	8.4	5.0	2.8	3.1	7.1	3.5
Mexico	0.2	1.1	0.6	5.3	0.4	1.2	0.7	6.4
USA	5.3	22.0	19.1	-	4.1	13.4	9.9	-
ROW	11.4	34.8	32.0	23.4	15.3	37.3	36.8	25.5

Note: BRII comprises Brazil, Russia, India and Indonesia. The columns sum to 100.
Source: WIOD.

The increase in the Chinese share from 1995 to 2007 may have taken place at the expense of other foreign sources or domestic sourcing. Table 2.4 below, which presents the changing share pattern in percentage points, can be used to analyse whether the rise of China in world trade and vertical specialisation has been at the expense of other countries.

With a few exceptions, the changes are positive, implying that, in terms of vertical specialisation, partner countries did not crowd each other out; instead China's share grew mainly at the expense of domestic sourcing in the period 1995–2007.

The Chinese share of other countries exports increased until 2007 and continued to grow during the crisis (up to 2009, the last year for which data are available). However, the overall share of the foreign content of exports decreased between 2007 and 2009. For example, in the EU-12, domestic sourcing increased by about 4 percentage points; in the EU-15 it increased by less than 1 percentage point and in the US and Japan domestic sourcing increased by about 1.5 percentage points, c.f. Table 2.4.

Table 2.4 – Changes in the geographical structure of production integration (percentage points).

	1995–2007				**2007–09**			
	EU-12	**EU-15**	**JPN**	**USA**	**EU-12**	**EU-15**	**JPN**	**USA**
BRII	-0.6	0.7	0.6	0.4	-0.5	-0.2	-0.2	-0.1
Canada	0.1	0.0	0.0	0.3	-0.1	-0.1	0.0	-0.3
China	3.2	1.6	2.6	2.0	1.3	0.7	0.8	0.7
EU-12	-12.7	1.0	0.1	0.1	3.7	0.0	0.0	0.0
EU-15	5.5	-5.9	1.0	0.5	-2.9	0.8	-0.6	-0.5
Japan	0.7	-0.1	-8.6	-0.7	-0.2	-0.2	1.5	-0.3
Korea	0.6	0.2	0.5	0.0	-0.1	0.0	-0.4	-0.1
Mexico	0.1	0.1	0.1	0.4	0.0	0.0	0.0	-0.1
USA	0.3	0.1	0.2	-4.2	-0.1	0.0	-0.3	1.6
Rest of world	2.7	2.4	3.5	1.3	-1.2	-0.9	-0.7	-0.7

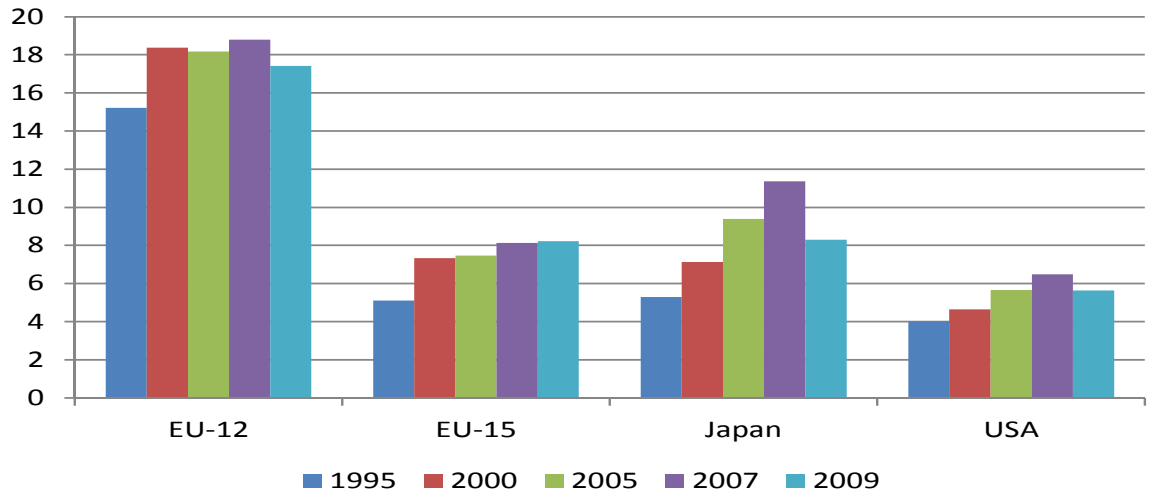
Note: BRII comprises Brazil, Russia, India and Indonesia. The columns sum to 0.0.

Source: WIOD.

Before analysing the four selected industries, an overview is provided of changes in the vertical specialisation in manufacturing and services. As in the case of total exports, the degree of vertical specialisation in the EU-12 is relatively high. This is mostly due to the strong backward linkages with industries in the EU-15. Starting at lower levels, the foreign content of exports in EU-15 and Japanese industries increased to around 8% in 2009. The crisis seems not to have had as big an impact on the global value chains of EU-15 services as it has in the other regions. A small increase was recorded for the EU-15 between 2007 and 2009, due to the increased share of Chinese production in EU-15 services exports. The foreign content of Japanese exports, which increased rapidly up to 2007, was severely hit by the crisis and decreased by some 3 percentage points between 2007 and 2009. The decrease can largely be explained by the large fall in Japanese services exports. Consequently, the share of services of total exports also decreased. The largest decreases were recorded in the sectors Water transport and Wholesale trade and commission trade, NACE codes 61 and 51 respectively, which account for a relatively large proportion of Japanese services. The decrease in the

foreign content of Japanese exports mostly affected EU-15 and Korean producers, c.f. Figure 2.2.[39]

Figure 2.2 Foreign content of services exports (%)



Source: WIOD.

The foreign content of *manufacturing* exports is higher than for total exports and services exports in all countries and regions. The largest differences in the degree of foreign content of exports between the total economies and the manufacturing industries are seen in the EU-12 and the US. The strong backward linkages between the EU-12 and EU-15 are mainly due to EU-12 manufacturing industries providing intermediate inputs for manufacturing to the EU-15. Large multinational enterprises in the US manufacturing sector account for much of the foreign content of total US exports. Domestic sourcing in Japanese manufacturing industries did not increase as much as in the services industries. The increase was more in line with the other regions.

Since most of the vertical specialisation process takes place within manufacturing industries, developments over time for manufacturing exports reflect the development over time for total exports. Domestic sourcing decreased from 1995 to 2007 but increased from 2007 to 2009, with the exception of Chinese sourcing, c.f. Table 2.5.

[39] See also the analyses of energy content in Japanese services exports in Chapter 3.

Table 2.5 – Content of manufacturing exports, by partner

	EU-12					EU-15				
	1995	**2000**	**2005**	**2007**	**2009**	**1995**	**2000**	**2005**	**2007**	**2009**
BRII	3.5	2.8	2.7	2.7	2.3	0.9	1.0	1.5	1.8	1.5
Canada	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3
China	0.3	0.3	2.5	4.0	5.7	0.5	0.9	1.6	2.4	3.3
EU-12	76.7	66.6	65.0	62.6	66.2	0.7	1.0	1.5	1.9	1.9
EU-15	14.7	20.9	20.8	20.8	17.7	91.2	87.7	86.4	84.1	85.0
Japan	0.6	1.3	1.3	1.3	1.1	1.1	1.3	0.9	0.9	0.8
Korea	0.3	0.5	0.8	1.1	1.0	0.3	0.4	0.5	0.5	0.5
Mexico	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1
USA	1.1	2.0	1.4	1.5	1.4	1.9	2.6	1.9	1.9	1.9
Rest of world	2.6	4.4	5.1	5.6	4.4	3.1	4.6	5.2	5.9	4.9
	Japan					**USA**				
	1995	**2000**	**2005**	**2007**	**2009**	**1995**	**2000**	**2005**	**2007**	**2009**
BRII	0.5	0.5	0.8	1.2	1.0	0.5	0.7	0.9	1.0	0.8
Canada	0.2	0.2	0.2	0.2	0.2	1.8	2.0	2.2	2.2	1.9
China	0.5	1.0	2.3	3.3	4.0	0.8	1.2	2.7	3.5	4.5
EU-12	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2
EU-15	1.5	1.8	2.2	2.5	2.0	3.4	3.8	4.3	4.2	3.5
Japan	93.1	91.1	87.3	84.0	85.6	2.5	2.1	1.7	1.6	1.2
Korea	0.5	0.6	0.9	1.0	0.7	0.7	1.1	0.8	0.7	0.6
Mexico	0.0	0.1	0.1	0.1	0.1	0.8	1.1	1.2	1.3	1.2
USA	1.4	1.6	1.4	1.6	1.2	86.2	84.4	81.8	80.7	82.3
Rest of world	2.2	3.1	4.7	5.9	5.1	3.1	3.7	4.3	4.5	3.8

Note: BRII comprises Brazil, Russia, India and Indonesia. The table shows the foreign content of exports and the domestic content highlighted in grey.

Source: WIOD.

When looking at the four selected industries, it is evident that vertical integration of the EU-12 industries is higher than that of other countries. This is to be expected due to strong production and backward linkages in the EU: an increase in the output of a final product in an EU-12 country triggers significant demand in other sectors and in EU-15 countries, implying strong backward linkages. The integration of production in the EU-12 industries — indicated by a low domestic share in Table 2.6 — is particularly strong in electrical products and transport equipment, and only slightly weaker in machinery. It is far lower in chemicals, whose production relies less on intermediates sourced from other countries. The EU-15, Japanese and US industries show fairly similar vertical integration patterns, though these tend to be somewhat lower for Japan in most industries. Generally, vertical integration is relatively higher in machinery and transport equipment, i.e. industries characterised by larger international production networks.

Table 2.6 – Vertical integration, 2007, in %

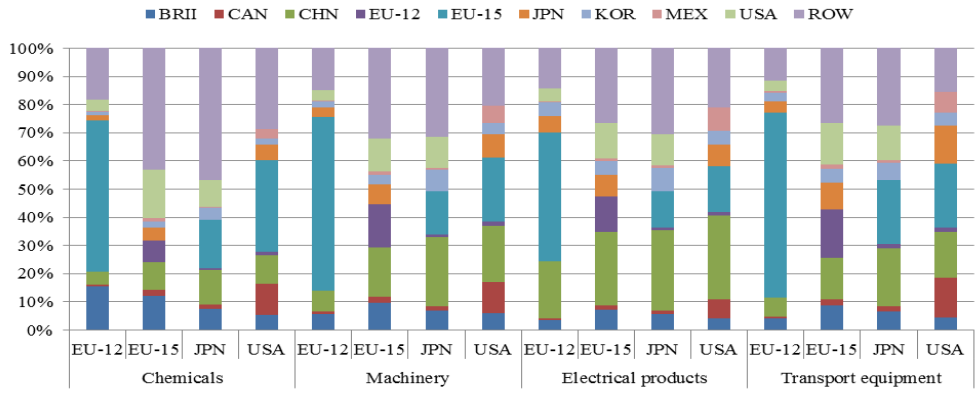
	Chemical, chemical products and man-made fibres				Machinery and equipment				Electrical and optical equipment				Transport equipment			
	EU-12	EU-15	JPN	USA	EU-12	EU-15	JPN	USA	EU-12	EU-15	JPN	USA	EU-12	EU-15	JPN	USA
BRII	5.0	1.7	1.3	0.9	2.1	1.4	1.1	1.2	1.6	1.3	1.0	0.9	1.7	1.4	0.9	1.0
Canada	0.2	0.3	0.3	1.8	0.3	0.3	0.2	2.1	0.3	0.3	0.2	1.4	0.3	0.4	0.2	3.3
China	1.5	1.3	2.1	1.7	2.7	2.5	3.7	3.8	9.6	4.9	4.8	6.3	2.8	2.3	2.8	3.7
EU-12	67.6	1.1	0.1	0.2	63.7	2.2	0.1	0.3	52.6	2.3	0.1	0.3	59.1	2.8	0.2	0.3
EU-15	17.4	86.0	3.0	5.4	22.4	85.5	2.4	4.4	21.7	81.3	2.2	3.5	26.8	83.8	3.0	5.3
Japan	0.6	0.7	82.6	0.9	1.2	1.0	84.8	1.6	2.7	1.4	83.1	1.6	1.7	1.5	86.7	3.1
Korea	0.4	0.3	0.7	0.4	0.8	0.5	1.2	0.8	2.4	0.9	1.4	1.1	1.3	0.7	0.8	1.1
Mexico	0.1	0.1	0.1	0.6	0.1	0.2	0.1	1.2	0.2	0.2	0.1	1.7	0.2	0.3	0.1	1.8
USA	1.3	2.4	1.7	83.6	1.4	1.7	1.7	80.8	2.2	2.4	1.9	78.8	1.6	2.4	1.6	76.9
Rest of world	5.9	6.0	8.1	4.7	5.4	4.7	4.8	3.9	6.7	5.0	5.1	4.5	4.6	4.3	3.6	3.5

Note: BRII comprises Brazil, Russia, India and Indonesia.

Source: WIOD.

With respect to geographical structure, foreign partners' shares of exports in the four selected industries in 2007 are presented in Figure 2.3. The EU-12 sourced most of their intermediates from the EU-15, with significant input also from China in electrical products and from BRII in chemicals. Japan also had a slightly larger share than other industries. It is interesting to note that the EU-12 share is no more than 20% for these industries, which serves to illustrate the EU-12's strong backward linkages with respect to the EU-15, and the EU-15's weaker backward linkages with respect to the EU-12. The highest EU-12 share of EU-15 exports is in transport equipment where there are strong international networks in the motor vehicles industry. Intermediates from the US and China, especially in electrical products, account for large shares of EU-15 industrial exports. Japanese intermediates account for a smaller share of EU-15 industrial exports. China, the EU-15 and, to a lesser extent, the US are the main sources for Japanese industries. The large shares of intermediates sourced from the ROW should be noted. These reflect the importance of South-East Asian production networks for Japanese industries. The relatively high Korean share in Japanese industries illustrates this phenomenon. Finally, important shares for the US industries can be seen for Canada and the EU-15. The EU-15 share of US exports is higher than the corresponding US share of EU-15 exports. Mexican industries seem less integrated in US industries' value chains than their Canadian counterparts. An exception is the relatively high share of Mexican sourced intermediates in US electrical products exports. The rest of the world also provides inputs, with a share of about 20% on average.

Figure 2.3 – Geographical structure of the foreign content, by industry, 2007



Note: BRII comprises Brazil, Russia, India and Indonesia.

Source: WIOD.

The change in sourcing patterns in 1995–2007 and 2007–2009, is similar to that for the total economy discussed above. In particular, over the period 1995–2007, other partners were not squeezed out. Instead sourcing from other countries increased with foreign intermediates substituting for domestic intermediates. On the other hand, domestic share increased at the expense of that of other countries over the crisis period, with the exception of Chinese intermediates. Particularly strong declines were observed in the EU-12. Due to the strong backward linkages of these countries and low demand for products assembled in the EU-12, the demand for EU-15 components fell, c.f. Table 2.7.

Table 2.7 – Changes in geographical sourcing patterns (in percentage points)

	Chemicals, chemical products and man-made fibres				Machinery and equipment				Electrical and optical equipment				Transport equipment			
	EU-12	**EU-15**	**JPN**	**USA**	**EU-12**	**EU-15**	**JPN**	**USA**	**EU-12**	**EU-15**	**JPN**	**USA**	**EU-12**	**EU-15**	**JPN**	**USA**
								1995–2007								
BRII	1.1	0.8	0.8	0.5	-0.1	0.7	0.6	0.6	0.1	0.7	0.6	0.4	-0.3	0.6	0.5	0.5
CAN	0.1	0.1	0.0	0.5	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.2	0.1	0.1	0.0	0.2
CHN	1.3	1.1	1.9	1.3	2.5	2.1	3.2	3.0	9.2	4.2	4.2	5.2	2.5	1.9	2.4	2.9
EU-12	-9.1	0.5	0.1	0.1	-12.7	1.4	0.1	0.2	-17.6	1.7	0.1	0.2	-13.3	2.0	0.2	0.2
EU-15	3.5	-6.0	1.2	1.8	5.9	-6.3	1.1	0.6	1.3	-7.3	1.0	0.0	6.9	-7.2	1.0	1.0
JPN	0.1	-0.1	-10.6	-0.5	0.6	-0.1	-9.0	-1.0	1.5	-0.5	-9.8	-1.8	0.5	-0.2	-7.1	-1.0
KOR	0.1	0.1	0.4	0.0	0.5	0.2	0.6	0.2	1.8	0.4	0.7	-0.3	0.7	0.4	0.5	0.3
MEX	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.8	0.1	0.2	0.1	0.7
USA	0.1	0.5	0.4	-6.1	0.1	-0.1	0.4	-5.9	0.0	-0.5	0.2	-4.6	0.3	0.4	0.2	-6.0
ROW	2.7	2.8	5.8	2.2	3.0	2.0	2.8	1.4	3.4	1.4	3.0	0.0	2.5	1.9	2.2	1.1
	2007–09															
BRII	-0.4	-0.2	-0.2	0.0	-0.6	-0.3	-0.2	-0.3	-0.1	-0.1	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2
CAN	-0.1	0.0	0.0	-0.2	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	-0.6
CHN	0.7	0.7	0.3	0.9	1.0	0.9	1.0	1.3	4.0	1.4	1.5	1.0	1.1	1.0	0.6	1.5
EU-12	1.7	0.1	0.0	0.0	4.8	-0.1	0.0	-0.1	2.5	0.1	0.0	-0.1	4.9	0.0	0.0	-0.1
EU-15	-0.9	0.0	-0.1	-0.1	-3.4	1.0	-0.6	-1.0	-3.7	0.5	-0.5	-0.9	-4.1	0.5	-0.8	-0.8
JPN	-0.1	-0.1	1.8	-0.1	-0.2	-0.2	1.6	-0.3	-0.6	-0.3	1.3	-0.5	-0.3	-0.2	2.0	-0.5
KOR	-0.1	0.0	-0.2	-0.1	0.0	-0.1	-0.3	-0.1	-0.2	-0.2	-0.4	-0.3	-0.1	0.1	-0.2	-0.1
MEX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	-0.1	0.0	0.0
USA	0.0	0.2	-0.2	0.0	-0.1	-0.1	-0.4	1.9	-0.2	-0.2	-0.4	3.2	-0.1	-0.2	-0.4	1.6
ROW	-0.9	-0.5	-1.4	-0.4	-1.5	-1.1	-1.0	-1.1	-1.6	-1.1	-1.1	-1.6	-0.9	-0.9	-0.8	-0.8

Note: BRII comprises Brazil, Russia, India and Indonesia.

Source: WIOD.

2.3. Effects of the crisis on trade and international supply chains

This section analyses the effects of the 2008 trade slump on EU-27 trade structures, compared to other major economies such as the US and Japan. Of particular interest is whether the geographical sourcing patterns by industry are different to those before the crisis. The analysis allows an assessment to be made as to whether the crisis has led to a change in the structure of vertical specialisation in this respect. Particular attention is paid to international supply structures with respect to traded intermediates, and in particular semi-finished products and parts and components in the industries concerned.

The analysis will be based on the UN Comtrade data, providing exports and imports at the HS 6-digit level, which allows for differentiation by broad end-use categories (BEC) and NACE industries. The time period covered is 2005–10. Methodologically, the study builds on recent attempts to decompose the trade slump (see e.g. Aurújo, 2009; Haddad et al., 2010; Levchenko and Lewis, 2009).

2.3.1 Geographical evolution of trade structures during the crisis

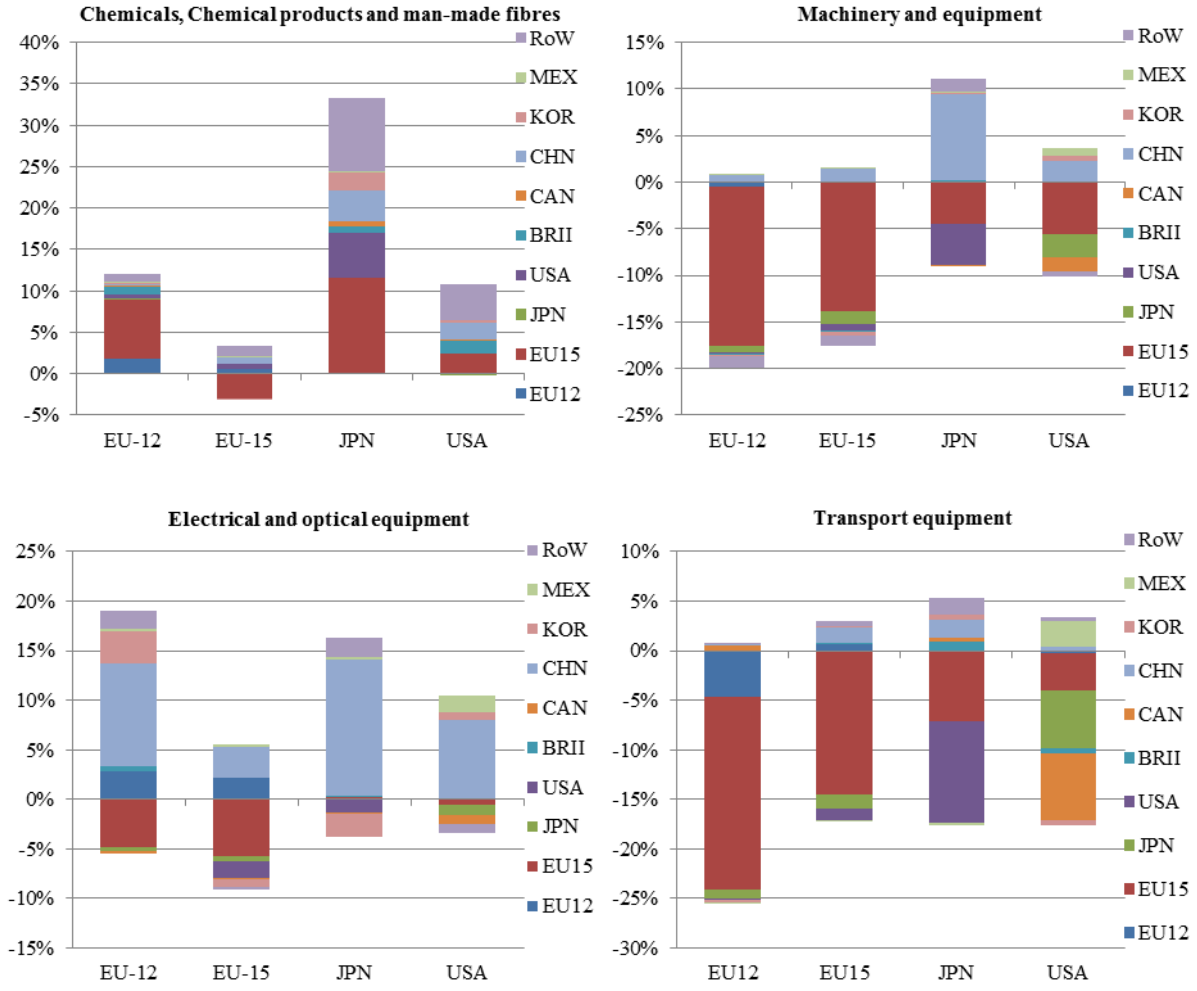
While the crisis had a major impact on all major economies, the more rapid recovery of countries such as China has had an impact on its main trading partners, e.g. Japan. Figure 2.4 presents data on changes in the imports of the EU-12, the EU-15, Japan and the US, by trading partner, as a percentage of total trade in 2007. It is immediately apparent that the 'Chemicals' and 'Electrical and optical equipment' industries have recovered faster than the other two industries. In all of the advanced economies considered, imports in the chemical industries in 2010 reached or surpassed 2007 levels. Japan, in particular, increased its imports dramatically, with those from the EU-15 rising by 34% and from the US by 25% relative to the initial trade values with these partners. Imports from the EU-15 and EU-12 rose in all the economies considered — with the exception of the EU-15 itself.

The 'Electrical and optical equipment' industry provides the most striking example of rising imports from China. Not only have exports to China increased for almost all reporters and industries, but so have imports from China. This is exceptional, given the economic crisis. Relative to imports from China in 2007, they have increased by 59% for the EU-12, 19% for the EU-15, 39% for Japan and 25% for the US. Imports from the EU-12 have also risen quite substantially for all reporting countries. While the EU-12 is not a major trading partner of Japan and the US, and import levels are therefore quite low, intra-EU-12 trade increased by 30% and imports from the EU-15 by 24% (see Stehrer et al. 2012b for details).

The two industries 'Machinery and equipment' and 'Transport equipment' are both characterised by a sharp decline in imports from the EU-15, Japan and the US. Imports from the EU-15 decreased in most countries by more than 20%. This has had a large impact on the total imports in these industries as the EU-15 is a major trading partner of all the reporters considered. In relative terms, most of the other major advanced economies did not perform any better. Imports from Japan decreased by 25–28% for 'Transport equipment', and Japanese imports from the US also plummeted by 25–28%. On the other hand, transatlantic linkages remained comparatively stable, as EU-27 imports from the US only declined by 11–16%.

Overall, imports from China rose in all major economies during this period. Firms maintained their sourcing connections with China, even though imports from almost all other major trading partners fell. These findings are in line with the results of the analyses in the previous section, which showed that China is essentially the only country with growing shares in extra sourcing.

Figure 2.4 – Changes in imports (2007–10) of total imports in 2007(%)



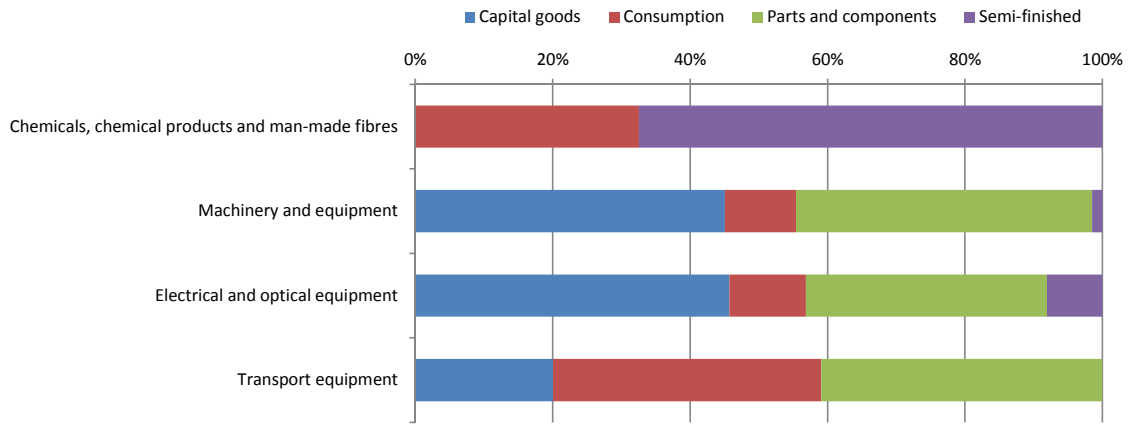
Source: UN Comtrade; authors' calculations.

2.3.2 Decomposition of trade by product usage

This section presents a more in-depth analysis of trade during the crisis by adding another layer. By decomposing the imports of an industry into trade in parts and components, semi-finished products, consumption and capital goods, it is possible to take a detailed look at vertical changes in trade. Figure 2.5 provides an overview of the import composition of each industry. Trade in parts and components constitutes a major part of total trade in the 'Machinery and equipment', 'Electrical and optical equipment' and 'Transport equipment' industries. Particularly in 'Machinery and equipment', the trade in parts and components was growing strongly before the crisis, with an annual rate of 19%, exceeding the growth rate in consumption goods (9%) and capital goods (16%).Trade in parts and components does not play a role in the chemical industry, where semi-finished products are the dominant trade element, comprising 67% of total imports.

The composition looks similar for EU-27 exports, albeit with slightly lower shares of capital and consumption goods.

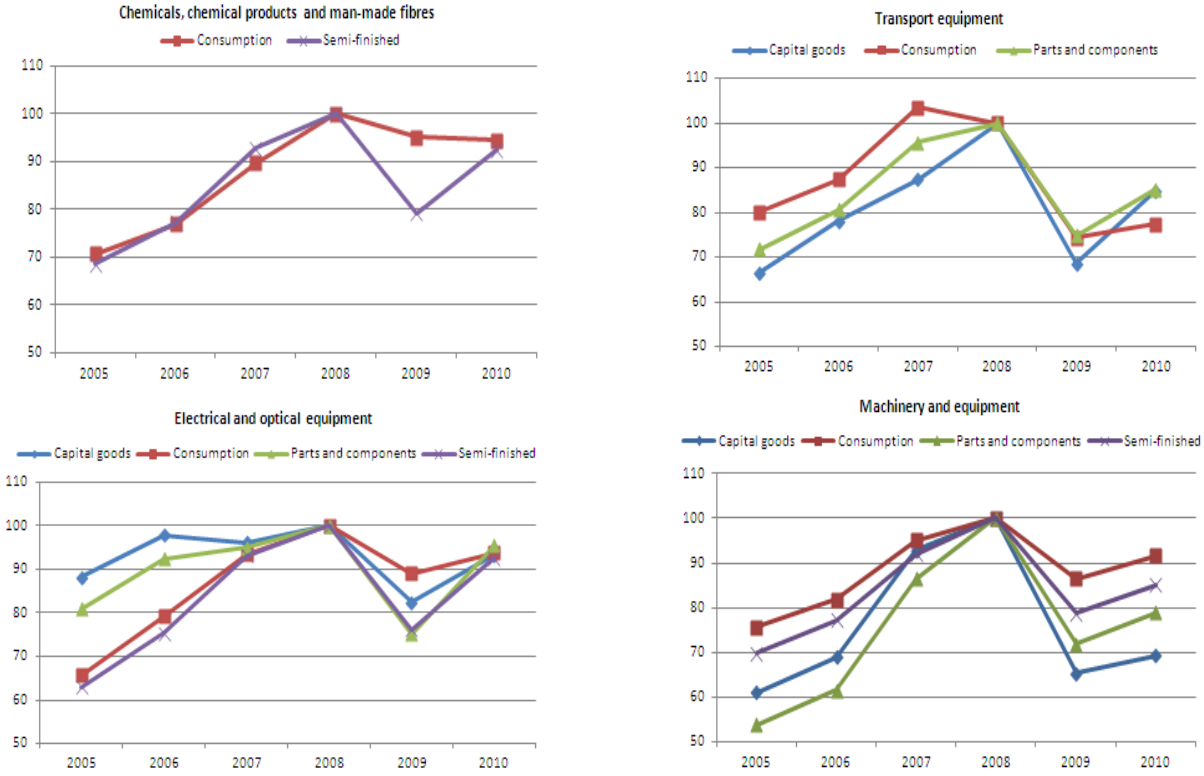
Figure 2.5 – Decomposition of EU-27 imports, by use categories, 2010



Source: UN Comtrade; authors' calculations.

Figure 2.6 shows the development of EU-27 imports by use categories. In most industries, there is a sharper decline in imports of semi-finished products and parts and components than in imports of consumption goods. There are two reasons for this strong decrease in intermediate products. The first is that, as countries become more vertically specialised, the processing of a product at various production stages tends to involve a number of countries. For this reason, trade declines not only by the value of the finished products which are exported, but also by the value of all the intermediate trade flows that have been traded to create it (see also Yi, 2009; Bergoeing et al., 2004).

Figure 2.6 – Development of EU-27 imports, by use categories (2008=100)



Source: UN Comtrade; authors' calculations.

Inventory management of firms is another reason for the downturn in trade in intermediate products during crisis periods, (Alessandria et al., 2011). As a reaction to the demand shock, retailers and manufacturers not only reduce their orders by the amount of the demand shock, but also reduce their inventories. This decrease in inventories can be seen in aggregate statistics over the recent crisis. Each supplier faces not only the demand shock from the customer, but also the inventory effect at each production stage. The effect is thus aggravated as one moves up the supply chain, from end consumer to raw material supplier (Altomonte et al., 2011). The more complex the supply chains and the more they are spread across countries, the more noticeable is this so-called 'bullwhip' or 'Forrester effect' (Forrester, 1961) in international trade patterns. The decline in intermediates in 'Transport equipment' has not been quite as big as for consumer goods. This is partly explained by 'just-in-time' production, which leads to minimal inventories and therefore a small bullwhip effect.

Finally, EU-27 trade is analysed with respect to the partner countries and use category. Trends before the crisis (2005–07) are compared with those during the crisis (2008–10). To do this, annual changes in imports in the EU-27 are calculated for each industry, use category and partner (Table 2.8).

Before the crisis, EU-27 imports of semi-finished chemical products from advanced countries increased much faster than imports of consumer goods. The opposite is true of trade with the EU-12, where trade in consumer goods increased most. This indicates that the EU-12 countries strengthened their position as a final producer of chemical products.

'Machinery and equipment' registered the strongest growth rates in imports of parts and components. The annual growth in EU-27 imports between 2005 and 2007 is impressive: 62% for China, 47% for Japan, 43% for Korea, 26% for the EU-12 and 20% for the EU-15. The role of the US in the EU-27 production networks has been decreasing, relatively

speaking, as imports of parts and components grew by 'only' 10%. During the crisis, imports of parts and components and semi-finished products fell more than imports of consumption goods. Also, the trade in capital goods dropped significantly as firms extended their investments. On the geographical front, it is clear that there was a similar fall in imports in the EU-27, the US and Japan (mostly between 10% and 20%), while imports from China increased slightly overall.

Table 2.8 – EU-27 imports by partner, industry and use category: import share of partner in 2007, annual growth 2005–07 and 2008–10 (%)

NACE	Use category	Partner																					
		EU-12			EU-15			JPN			USA			BRII			CHN			KOR			RoW		
		2007	05-07	08-10	2007	05-07	08-10	2007	05-07	08-10	2007	05-07	08-10	2007	05-07	08-10	2007	05-07	08-10	2007	05-07	08-10	2007	05-07	08-10
	Chemicals																								
	Consumption (33%)	3.3	30	10	76.4	11	-6	1.1	5	-8	8.2	8	6	0.5	10	24	1.1	25	2	0.3	59	-50	9.0	16	5
	Semi-finished (67%)	3.4	21	-7	67.0	14	-5	2.1	10	-3	9.0	15	-4	2.9	27	-5	2.1	23	4	0.5	18	0	13.0	20	0
	Machinery and equipment																								
	Capital goods (45%)	5.2	26	-8	63.6	19	-21	6.3	14	-21	5.6	15	-18	0.8	28	-16	7.1	46	-4	1.5	30	-26	10.0	22	-18
	Consumption (10%)	14.4	22	-2	48.1	6	-10	1.5	-1	-6	3.1	9	-13	0.3	-6	17	20.9	16	5	2.2	3	1	9.5	18	-4
	Parts and components (44%)	8.8	26	-15	60.0	20	-15	6.7	47	-12	7.3	10	-8	1.2	29	-14	5.7	62	0	0.9	43	-11	9.4	28	-6
	Semi-finished (1%)	15.5	19	-17	55.0	11	-10	2.4	12	0	2.9	13	-12	1.3	16	-22	13.3	22	4	0.4	0	7	9.2	17	-2
	Electrical and optical eqpt.																								
	Capital goods (46%)	6.8	11	4	42.8	2	-9	4.5	-8	-6	10.5	12	-11	1.0	15	1	19.6	11	7	3.2	-11	-22	11.6	0	-1
	Consumption (11%)	18.9	47	4	34.9	10	-9	3.0	3	-10	6.2	6	2	0.6	0	-15	17.6	26	-3	2.8	34	-11	15.9	7	-1
	Parts and components (35%)	7.0	19	-2	42.2	6	-6	5.5	-8	-17	7.7	-2	-9	0.8	18	-2	13.5	20	10	4.6	23	10	18.6	7	-2
	Semi-finished (8%)	17.7	21	-4	47.8	17	-8	2.8	23	-1	3.4	11	-3	1.1	24	-7	12.8	24	3	1.1	46	10	13.2	22	1
	Transport equipment																								
	Capital goods (20%)	4.7	30	-15	67.7	18	-13	1.5	23	-12	10.7	-5	-20	1.1	29	28	1.5	23	46	2.3	-1	16	10.5	1	-12
	Consumption (39%)	9.4	34	0	71.2	10	-14	7.6	7	-21	3.5	29	-32	0.5	13	6	0.5	26	-9	3.1	4	-26	4.2	19	-3
	Parts and components (41%)	12.8	20	-4	66.7	13	-11	3.2	9	-6	8.4	10	-1	1.1	16	-10	1.3	26	6	0.6	48	11	6.0	18	-7

Notes: The first (grey) column for each country is the share of this partner in EU-27 imports in this category in 2007. The second column is the annual growth rate in 2005–07 and the third column is the growth rate for 2008–10.

Source: UN Comtrade; authors' calculations.

'Transport equipment' registered a significant drop in imports of consumption goods from the US (-32%), Japan (-21%) and Korea (-26%) — far greater than intra-EU-27 changes (-12%). On the other hand, overseas production network linkages remained fairly stable or were further strengthened, as in the case of China and Korea, while imports of parts and components from the EU-15 dropped by 11%.

Finally, Japan's traditional image as a prominent player in the 'Electrical and optical equipment' market seems to be starting to crumble. Even before the crisis, EU-27 imports of capital goods and parts and components were falling by 8% on an annual basis. This trend continued during the crisis, with the largest drop in parts and components trade (17%). By contrast, the importance of the EU-12, China and Korea increased significantly before the crisis, and China and Korea even increased their trade levels during the crisis in capital and parts and components. China's role as an assembly country and provider of consumption goods has decreased in very recent years, whereas its direct integration into production networks as a provider of parts and components has increased.

2.4. Off-shoring decisions of EU manufacturing firms

This section analyses the decision by European manufacturing firms to move their production to locations abroad (referred to as offshoring). There is a strong relationship between offshoring and the trade in intermediates, analysed in the previous section. If firms move production activities to their own or independent firms abroad, this will inevitably increase the imports of intermediates. However, offshoring may also go beyond a simple substitution of domestic production by imports. If new production facilities abroad have larger capacity than the previous activities at home, this can lead to positive 'second-round effects' (when the new locations need a higher amount of input or support from the home base). Offshoring is not only a strategy to cut costs, but is also driven by the need to open up new markets and to operate close to key clients.

Against this background, this section investigates the following questions: Which types of European manufacturing firms offshore their production activities? What are the main destination countries for offshoring? How is offshoring related to innovation and company performance? What are the short-term and long-term trends in offshoring? Has the 2008/09 economic crisis altered or even halted the trend towards stronger fragmentation of firms' global production chains? Or, on the contrary, have companies become more active again so as to better control their cost base at a time when production volumes are falling?

The data come from the European Manufacturing Survey (EMS), a survey of product, process, service and organisational innovation in European manufacturing. EMS data are available for the two periods mid-2004 to mid-2006 and 2007 to mid-2009. The sample includes firms from the four industrial sectors; they are studied in more detail below.

2.4.1 Which firms offshore?

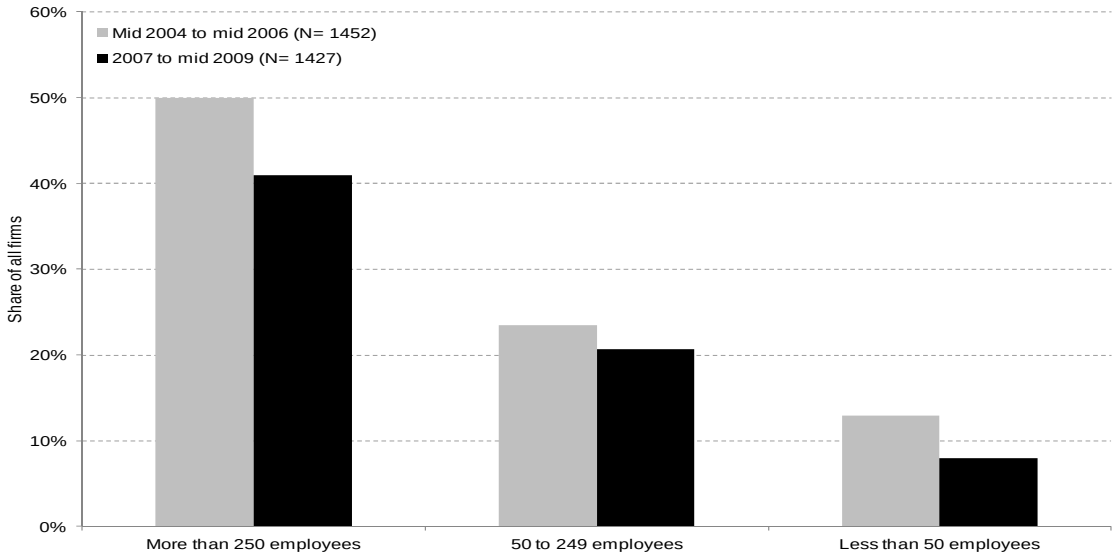
Around 20% of all firms in the four manufacturing sectors, covered by the 2009 survey, moved part of their production offshore to their own or independent firms abroad in the period from 2007 to mid-2009. Germany, the largest country in the sample, has a share of offshoring firms of around 16% in the four manufacturing sectors mentioned above.

If the two periods — mid-2004 to mid-2006 and 2007 to mid-2009 — are compared, six out of seven countries show a decrease in the proportion of firms with offshore production.

Manufacturing firms were less inclined to offshore during the crisis of 2008/09. European manufacturing companies tended to maintain production at home and make use of the capacity at their existing locations, rather than look for new offshoring ventures.

Production offshoring is a strategy favoured by large firms in particular (see Figure 2.7). In 2007-2009 some 41% of the firms with more than 250 employees relocated parts of their production abroad, whereas the corresponding share among small firms of less than 50 employees was only 8%. During the crisis, offshoring decreased in all firm size categories.

Figure 2.7 – Share of firms with production offshoring, by size category



Source: European Manufacturing Survey 2006, 2009.

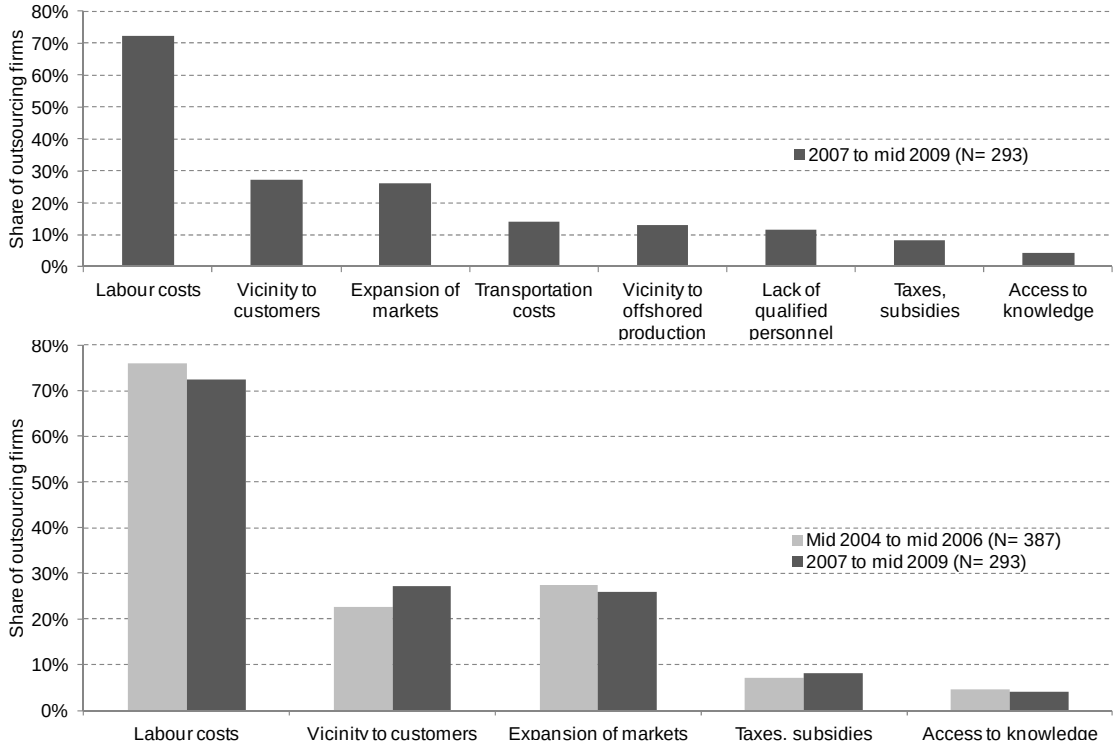
Firms in the electrical and optical equipment industry and automotive and transport equipment manufacturers are particularly active in production relocation (25% and 24% respectively), followed by machinery and equipment manufacturers (18%) and the chemical industry (14%). The chemical industry has traditionally been quite reserved about production relocation, due to the high capital intensity, the high degree of process integration and the low labour intensity of its production processes. As in the case of the different sizes of firms, offshoring is decreasing in all four sectors.

2.4.2 Offshoring motives and destinations

According to the data, cost reduction is the dominant motive for relocating production activities abroad: 72% of all firms with offshoring activities stated that labour costs had triggered their offshoring decision. Compared to the previous survey, the importance of labour costs decreased slightly (by 4 percentage points) (Figure 2.8).

Market-related motives, such as proximity to customers or market expansion, gained far fewer votes. The least relevant motives for production offshoring were better access to knowledge, and taxes and subsidies in the target country.

Figure 2.8 – Main motives for production relocations



Note: Multiple answers allowed.

Source: European Manufacturing Survey 2006, 2009.

Besides the all-important consideration of labour cost savings, there are usually a host of factors that make locations attractive as destinations for production offshoring. This is reflected in the high number of multiple answers, as shown in Figure 2.8. Besides cutting costs, production offshoring also has the goal of expanding activities and opening up new markets; this is reflected in the proportion of motives related to expansion of markets and proximity to key customers abroad (which has gained importance since the previous survey).

There is also a strong link between motives and choice of destination country for production offshoring. Regression analysis indicates that when companies are striving to reduce labour costs, the EU-12, China and other Asian countries are the preferred target regions. The main difference between Asian countries and the EU-12 is that the labour cost motive is linked to the market expansion motive in the case of Asian countries, but not in the case of the EU-12. The fact that markets in the EU-12 and Eastern Europe can more easily be supplied with exports from the home country might account for the lack of market and customer incentives in these countries.

Low transportation costs and access to knowledge, by contrast, are motives related to offshoring to the EU-15. Offshoring to North America is significantly related to the need to be close to important customers.

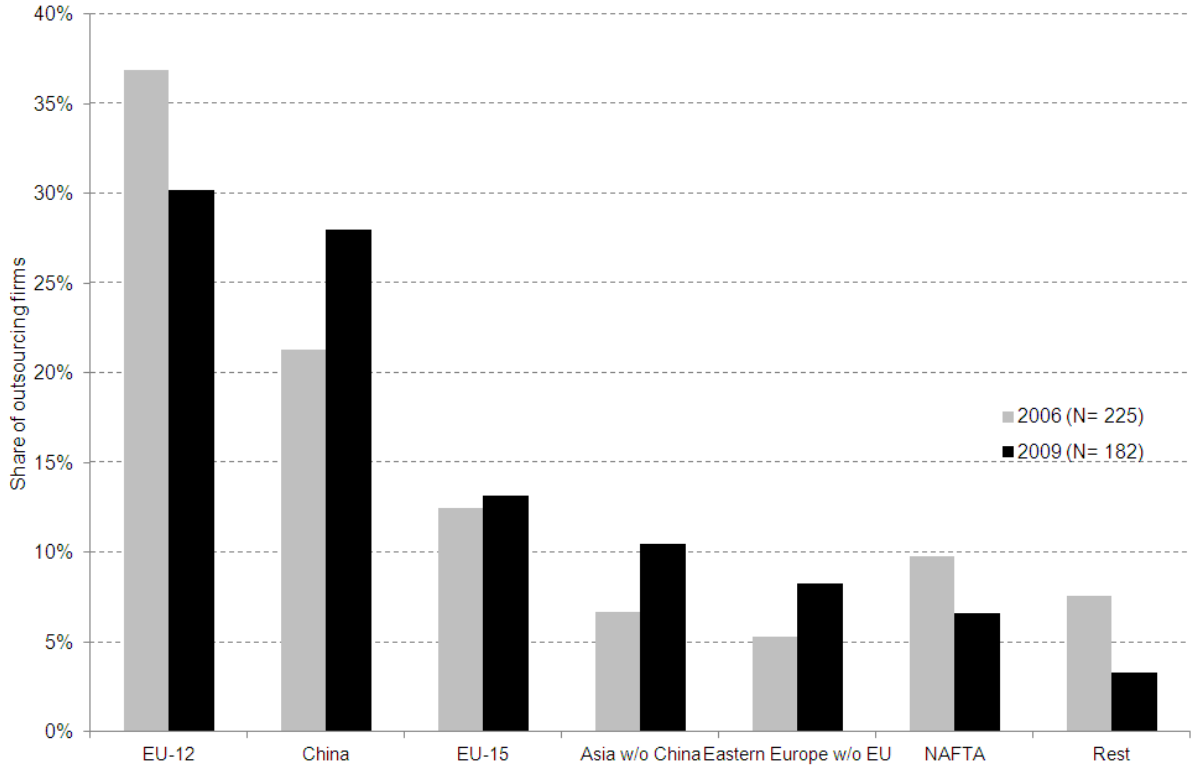
The EU-12 Member States are the preferred target region for production relocations, accounting for 30% of all valid responses from offshoring companies (Figure 2.9). Compared to the previous period (mid-2004 to mid-2006) their share dropped by 7 percentage points.

China is the second most attractive destination, accounting for 28 % of all valid answers in 2009. In contrast to the EU-12, China has become more attractive than before. In particular

small and medium-sized companies intensified their production relocation to China (from 6 % and 15 %, respectively, to 20 % and 33 % of all offshoring firms). It should be noted, however, that the share of firms that moved production offshore to China remained virtually unchanged if one looks at the whole sample rather than just the offshoring firms, because the overall propensity to offshore has declined. Relocations to the EU-15 Member States remained stable, at around 13 % of all offshoring firms. The EU-15 countries are still the third most attractive region for relocation for European manufacturing companies. They are followed by other Asian countries excluding China (10 %) and non-EU Eastern Europe (8 %).

Overall, it can be concluded that *farshoring* to Asian countries has gained in attractiveness for offshoring firms, while *nearshoring* to the EU-12 countries has decreased noticeably. As a result, production relocation between EU Member States (*intra-EU-27*) is decreasing while *extra-EU-27 relocation* activities have gained ground.

Figure 2.9 – Target regions of production offshoring, only offshoring firms



Note: Multiple answers allowed.

Source: European Manufacturing Survey 2006, 2009.

2.4.3 Characteristics of offshoring firms

The empirical evidence presented above indicates that firm size, sector and location of the firm strongly determine offshoring decisions. These determinants have been analysed further using multivariate analysis to gain a better understanding of which firms offshore and which do not.

The analysis shows the relationship between the decision to offshore and each explanatory variable included in the regression analysis, holding all other explanatory variables constant.

The dependent variable of the analysis is a dummy variable that is one if the firm offshored production activities to its own or independent firms between 2006 and 2009.

Explanatory variables include first a number of variables that describe firm characteristics, including *firm size*, *revenue per employee* as a measure of productivity, the share of *exports* on turnover or a dummy variable that is one if the firm is a *supplier of intermediary goods*. Based on the literature, larger, more productive firms are assumed have a higher propensity to move their production activities abroad. Moreover, an intermediate supplier may feel compelled to follow customers who move their production activities offshore.

A second set of explanatory variables describes the innovation behaviour of the firm. These variables include *R&D expenditure* as a share of turnover, a dummy variable that is one if the firm has introduced a *product innovation* in the period 2006-2008, and the share of *new products* on turnover. If more productive firms have a higher propensity to offshore, then they may also be more innovation active. Moreover, offshoring of production may lead to a new division of labour within the firm, where the parent company focuses on activities such as R&D, innovation and marketing.

A third set of variables describe the production process of the firm. Two dummy variables indicate whether the firm produces *simple* or *complex products* consisting of many parts. The baseline case for both variables is medium complex products. Two other dummy variables show whether the firm produces *single units* or in *large batches*. Here, the baseline case is small batches. Moreover, three dummies are included that gauge the *degree of standardisation* in product development. It is assumed that firms that produce complex, highly-customised products in single production unit may have less opportunity to offshore because they rely very much on a close interaction with the customer, and are therefore more bound to their location than producers of standardised goods in large batches.

Finally, the regression includes explanatory variables that control for the *sector* and the *location* of the firm to test if the differences in the offshoring propensity across sectors and countries can be explained by the firm characteristics listed above. The regression also tests the assumption that the degree of product market regulation in a country is related to offshoring, i.e. firms relocate production because of too much regulation. The variable *product market regulation* provided by the OECD has been introduced into the regression. This variable captures various aspects of regulation, such as barriers to trade and investment, state control or barriers to entrepreneurship, in one single number for each country.

A probit regression model is estimated to analyse the linkages between firm characteristics and the manufacturing firm's probability of offshoring production activities. The probit model is given as

$$Y^* = X'\beta + \varepsilon$$

where Y^* can be viewed as an indicator for whether the latent dependent variable Y – the probability of offshoring – is positive

$$Y = 1_{\{Y^*>0\}} = \begin{cases} 1 \text{ if } Y^* > 0 \text{ i.e. } X'\beta + \varepsilon > 0 \\ 0 \qquad\qquad\qquad \text{otherwise} \end{cases}$$

with X' denoting the vector of binary explanatory variables and β being the parameter reflecting the marginal effect of a discrete change in the probability to offshore for the

explanatory variables. E is the error term, which is assumed to be of zero mean and with a standard deviation of σ^2.

The results are presented in Table 2.9 which shows the results from the analysis of factors determining outshoring decisions between 2006 and 2009. The first three columns include dummy variables controlling for firms' home countries. The right three columns contains results from controlling for the degree of product market regulation in home countries.

The results confirm a positive relationship between firm size and offshoring, holding all other factors constant. If two firms are the same in all variables employed in the regression except for size, the larger firm will, on average, have a higher propensity to offshore. A similar positive relationship is also found for revenue per employee and offshoring.

The relationship between innovation and offshoring is not clear cut. Offshoring firms, on the one hand, spend slightly less on R&D than non-offshoring firms; on the other hand, they introduce new products onto the market significantly more often. This result points to the fact that offshoring is not only a passive reaction to rising wage costs, but has to be seen in the wider context of the international expansion of firms. Offshoring firms are also characterised by the development and production of a standard programme of less complex products.

The results clearly show that there is a strong relationship between the firm's sector affiliation and the probability that it will offshore production abroad. Firms that belong to the machinery and equipment, electrical and optical equipment, and transport equipment sectors show a higher propensity to offshore than those in the sector of chemicals and chemical products.

Moreover, the results confirm that not only do sector and firm size explain the propensity to offshore to a larger degree than firms' characteristics, but so does the firm's home country. Being a Dutch or a Swiss firm has a significant positive effect on offshoring, compared to being a German firm. Austrian, Danish, Finnish, Spanish and Slovenian/Croatian firms do not differ significantly from German firms in their propensity to offshore.

The regression also tests the assumption that the degree of product market regulation in a country is related to offshoring, i.e. firms relocate production because of too much regulation. The analysis does not support this assumption.

Table 2.9 – Probit regression on the probability of being an offshoring firm, 2006–2009

	2006			2009		
Propensity to offshore production	**Coefficient**	**Sig.**	**Std.err.**	**Coefficient**	**Sig.**	**Std.err.**
General						
Size (log function of number of employees)	0.101	***	0.007	0.094	***	0.007
log revenue per employee	0.041	***	0.015	0.050	***	0.016
Export share (% of turnover)	0.001	***	0.000	0.001	***	0.000
Intermediate supplier*	-0.037	*	0.019	-0.035	*	0.020
Innovation						
Share of R&D expenditure (% of turnover)	-0.004	**	0.002	-0.005	***	0.002
Product innovator (new to firm innovation)*	0.053	**	0.021	0.050	**	0.022
Share of product innovations (% of turnover)	-0.001	**	0.001	-0.001	*	0.001
Product complexity (a)						
Simple products*	0.035		0.037	0.040		0.038
Complex products*	-0.046	**	0.020	-0.044	**	0.020
Batch size (b)						
Single unit production*	-0.020		0.022	-0.032		0.022
Large batch*	0.068	**	0.029	0.040		0.029
Product development (c)						
According to customers' specification*	-0.007		0.020	-0.009		0.020
Standard programme*	0.064	**	0.031	0.064	**	0.031
No product development*	-0.069		0.039	-0.088	***	0.038
Sector (d)						
Machinery and equipment*	0.169	***	0.037	0.161	***	0.037
Electrical and optical equipment*	0.224	***	0.039	0.216	***	0.039
Transport equipment*	0.178	***	0.055	0.154	***	0.056
Country (e)						
AT*	0.031		0.037			
CH*	0.064	***	0.025			
NL*	0.142	***	0.046			
DK*	0.088		0.072			
HR & SI*	-0.057		0.038			
FI*	0.033		0.074			
ES*	-0.033		0.046			
Product market regulation				-0.071		0.046
Sample size	2,476			2,359		
Pseudo R^2	0.1502			0.1416		

Note: (*) dF/dx is for discrete change of dummy variable from 0 to 1. Reference groups: [(a)] medium complexity, [(b)] medium batch, [(c)] basic programme with alternative, [(d)] chemicals and chemical products, [(e)] Germany. Difference in means of the independent variables significantly diverge from zero, probability values of 10% (*), 5% (**) or 1% (***).

Source: European Manufacturing Survey 2006, 2009.

2.5. Summary and policy implications

The study provides an overview of the tendencies observed in the internationalisation of production since 1995 and over the period of the recent crisis. As outlined above, there is no single approach that allows the many facets of this phenomenon to be captured at the various levels of aggregation: from single-firm decisions to overall industry-level patterns and macroeconomic consequences. Therefore, various approaches have been used here to analyse this internationalisation process, in order to highlight some of the main aspects. Based on the recently compiled world input-output tables from the WIOD project, ongoing trends in the vertical specialisation patterns for the EU countries and other major economies have been documented. Generally, one finds that, for the EU, the integration process since 1995 has

intensified the internationalisation of production within Europe considerably — and the EU-12 countries play a particular role in this respect. But the rise of China as a major partner is also well documented in this exercise. An important finding is that during the recent crisis there was a tendency towards less integration, which manifested itself in the resurgence of domestic rather than foreign sourcing. The only foreign country that has continued to increase its share in the EU sourcing structures has been China. Although this phenomenon of 'backshoring' might be caused by those industries that have been most affected by the crisis, it might also be indicative of a rupture in the trend towards more offshoring and 'farshoring'. Albeit to varying degrees, the trends seem to be similar for all four sectors that have been studied in more detail.

The economic and financial crisis that broke out in 2008 was accompanied by a great fall in foreign trade volumes. The extent of the trade collapse was greater than the decline in output. Thus international trade can be regarded as one of the great 'victims' of the world crisis. At the same time, it was also one of the channels through which the crisis was transmitted between countries. It seems that production chains in the first phase of the crisis had an amplifying effect in terms of the decrease in international trade, which is referred to as the 'bullwhip effect'. On the other hand, there is a certain stabilising effect created by value chains, at least in the slightly longer run. This may be caused by the reversal of the bullwhip effect, as well as by the fact that companies inside the value chain helped each other, e.g. by providing trade finance. With regard to the changing role of the internationalisation of production as a result of the crisis, it is obvious that the internationalisation of production is here to stay.

The focus on industry-level data brought about by using trade statistics, or trade statistics combined with detailed input-output tables, might hide aspects of this internationalisation process that can only be seen at the level of firms. The last section investigated offshoring — the relocation of production activities to locations abroad — by European firms. The analyses show that the share of offshoring firms decreased across most countries, sectors and firm sizes between the periods 2004-06 and 2007-09. This may indicate that firms focus on utilising their activities at home in times of (upcoming) economic crisis.

The main target regions for offshoring by European firms are the EU-12, China, the EU-15 and other Asian locations excluding China. Despite a general decrease in the share of offshoring firms, *farshoring* to Asia and China, in particular, has increased. By contrast, *nearshoring* to the EU-12 has become less attractive, though it is still the most important target region. An explanation for this shift may be an increase in labour costs in the EU-12 countries, coupled with their geographical proximity, which allows firms to serve these markets from their home countries.

The dominant motive for production offshoring is the desire to reduce labour costs, followed (at some considerable distance) by proximity to customers and market expansion. Expected labour cost reductions explain offshoring to the EU-12, Asia and China, in particular. However, in contrast to the EU-12, where the offshoring decision is dominated solely by potential labour cost savings, customer and market expansion motives are also significantly related to offshoring activities involving Asia and China.

Characteristics of firms that have offshored production activities include larger firm size and greater revenue per employee, a standard programme of less complex products, and a higher probability of introducing new products to the market. Producers of electrical and optical equipment have a higher propensity to offshore production than do firms in the other three

sectors considered. Previous experience of production offshoring goes a long way towards determining production offshoring today. Product market regulation does not seem to be a push factor for firms to offshore production activities abroad.

The increasing use of foreign sourcing for the content of exports in the manufacturing industries illustrates well how globalisation has impacted firms' value chains. The increased pace of globalisation has improved firms' and industries' opportunities to source inputs and intermediates from locations which have comparative advantages in producing these inputs and intermediates which is now better reflected in different parts of firms' value chains. The higher use of foreign content by industries that are more highly dependent on intermediates clearly shows that this is key for competitiveness.

The globalisation of value chains gives rise to some policy challenges due to the new opportunities and challenges which the increased globalisation leads to. Some of these policy challenges are already familiar to some extent and relate to policies aimed at reaping the benefits of openness for trade and FDI.

The growing importance of intermediate goods for exports and competitiveness of firms illustrates that the costs of national borders have grown as trade costs are more important for intra-firm and vertical trade within global value chains (GVCs) compared to traditional trade where intermediates and inputs are produced domestically. Raising barriers to international trade and direct investments can therefore disrupt GVCs for domestic firms that source intermediates from abroad. As pointed out in the Communication 'Trade, Growth and World Affairs' and the associated Staff Working Document 'Trade as a driver of prosperity', openness to trade facilitates local companies' integration in GVCs which makes them more productive. And more than two thirds of EU imports consist of intermediate products which boost EU industry productivity.[40]

Multinational enterprises have been driving the emergence of GVCs through intra-firm trade and FDI flows. In order to reap the benefits of globalisation and GVCs on a broader scale, participation in GVCs, particularly of SMEs, needs to increase. In many cases, SMEs lack the expertise and capacity to engage in international trade directly; more opportunities for creating or strengthening linkages between local firms and firms that are already engaged in GVCs would be beneficial.

The emergence of GVCs and increased participation of countries also give rise to challenges. As is well established, most of the value is created in the upper and lower part of the value chains where activities such as R&D, branding, design, management, marketing and sales services are located. While emerging countries formulate policies on how to move up the value chain, policies to keep the comparative advantage in high value-added activities are more relevant for the EU. Intangible assets are crucial in this respect. Investments in intangibles are essential for innovation and important for capturing larger shares of value in the value chains. Investments in intangibles enable firms to create superior capabilities which help them acquire unique skills or suppliers of unique factors indispensable to the whole value chain. Firms that possess such unique, idiosyncratic, specific factors in the GVC capture the largest shares of value-added. Innovation is the most important source for capturing value-added and developing or keeping competitive advantages. The oft-cited examples of the Nokia 95 model and the iPhone illustrate that the locational advantages of the home countries

[40] European Commission (2010) "Trade as a driver of prosperity". Commission staff working document accompanying the Commission's Communication on "Trade, Growth and World affairs".

for activities in the upper part of the value chains relate to their attractiveness for innovation and the development of intangible assets. Innovation policies are therefore obvious candidates. But consideration should also be given to policies that help localise factors that are essential for activities which capture large shares of value-added.

REFERENCES

ACM, (2006) *Globalization and Offshoring of Software*, a report of the ACM Job Migration Task Force, available at:http://www.acm.org/globalizationreport/pdf/fullfinal.pdf.

Alajääskö, P. (2009), ´International Sourcing in Europe´, Eurostat, *Statistics in Focus, Industry Trade and Services*, No. 4, http://www.eds-destatis.de/de/downloads/sif/sf_09_004.pdf.

Alessandria, G., Kaboski, J.P. and Midrigan, V. (2011), ´US Trade and Inventory Dynamics´, *American Economic Review*, No. 101(3), pp. 303-07.

Altomonte, C., Di Mauro, F., Ottaviano, G., Rungi, A. and Vicard, V. (2011), ´Global Value Chains During the Great Trade Collapse. A Bullwhip Effect?´, European Central Bank, Working Paper Series, No. 1412.

Amiti, M. and Wei, S.J. (2009), ´Service Offshoring, Productivity and Employment: Evidence from the US´, *The World Economy*, Vol. 32, No. 2.

Aurújo, S. (2009), *The great synchronisation: What do high-frequency statistics tell us about the trade collapse*, OECD.

Baldone, S., Sdogati, F. and Tajoli, L. (2001), ´Patterns and determinants of international fragmentation of production: Evidence from outward processing trade between the EU and Central Eastern European countries´, *Review of World Economics*, Vol. 137, No. 1.

Baldwin R. (2009), ´Introduction: The Great Trade Collapse: What caused it and what does it mean?´, in *The great trade collapse: Causes, consequences and prospects*, VoxEU.org ebook, available at: http://www.voxeu.org/index.php?q=node/4297.

Baldwin, R. (2006), *Globalisation: the great unbundling(s), background paper to the project: Globalisation challenges for Europe*, Secretariat of the Economic Council, Finnish Prime Minister's Office, available at: http://appli8.hec.fr/map/files/globali-sationthegreatunbundling%28s%29.pdf.

Bergoeing, R., Kehoe, T.J., Strauss-Kahn, V. and Yi, K.M. (2004), ´Why is Manufacturing Trade Rising Even as Manufacturing Output is Falling?´, *American Economic Review*, Vol. 94, No. 2, pp. 134-138.

Bertoli, S. (2008), *The impact of material offshoring on employment in the Italian manufacturing industries: the relevance of intersectoral effects*, Centro Studi Luca d'Agliano Development Studies, Working Papers, No. 244, http://ssrn.com/abstract=1361789.

Bhagwati, J., Panagariya, A. and Srinivasan, T.N. (2004), ´The Muddles over Outsourcing´, *The Journal of Economic Perspectives*, Vol. 18, No. 4.

Blinder, A.S. (2007), *How Many U.S. Jobs Might Be Offshorable?*, CEPS Working Paper, No. 142, Princeton, NJ: Princeton University, Center for Economic Policy Studies.

Carson, S.E. (2009), *Boeing and Airbus face mass aircraft deferrals and cancellations*, http://www.centreforaviation.com/analysis/boeing-and-airbus-face-mass-aircraft-deferrals-and-cancellations-4837, access: 9.2.2012.

De Backer, K. and Yamano, N. (2011), *International comparative Evidence on Global Value Chains,* OECD Directorate for Science technology and Industry, in Sydor, (2011), pp. 103-126.

European Commission (2010), *An Integrated Industrial Policy for the Globalisation Era. Putting Competitiveness and Sustainability at Centre Stage*, Communication COM(2010)614, 28.10.2010, Brussels.

European Commission (2010), *Trade, Growth and World Affairs*, Communication COM(2010)612, Brussels.

European Commission (2010), ´Trade as a driver of prosperity´, Commission staff working document accompanying the Communication from the Commission *Trade, Growth and World affairs*.

Feenstra, R.C. (2010), ´Offshoring in the global economy. Microeconomic structure and macroeconomic implications´, Cambridge, MA: *MIT Press.*

Feenstra, R.C. and Hanson, G. (1996), ´Globalization, Outsourcing, and Wage Inequality´, *American Economic Review*, Vol. 86, No. 2.

Forrester, J. (1961), *Industrial Dynamics*, *MIT Press*, Cambridge, MA.

Geishecker, I., (2008), ´The Impact of International Outsourcing on Individual Employment Security: A Micro-Level Analysis´, *Labour Economics*, Vol. 15, No. 3.

Görg, H., Greenaway, D. and Kneller, R. (2008), ´The economic impact of offshoring´, *GEP Research Report*, Leverhulme Centre for Research on Globalisation and Economic Policy, University of Nottingham.

Grossman, G. and Rossi-Hansberg, E. (2008), ´Trading tasks. A simple theory of offshoring´, *American Economic Review*, Vol. 98, No. 5.

Haddad, M., Harrison, A. and Hausman, C. (2010), ´Decomposing the great trade collapse: Products, prices and quantities in the 2008-2009 crisis´, NBER Working Paper 16253.

Hummels, D., Ishii, J., and Yi, K.M. (2001), ´The Nature and Growth of Vertical Specialization in World Trade´, *Journal of International Economics*, Vol. 54 No. 1.

Jabbour, L. (2010), ´Offshoring and Firm Performance: Evidence from French Manufacturing Industry´, *The World Economy*, Vol. 33, No. 3.

Jacoby, W. (2010), ´Managing globalization by managing Central and Eastern Europe: the EU's backyard as threat and opportunity´, *Journal of European Public Policy,* Vol. 17, No. 3.

Jones, R.W. and Kierzkowski, H. (1990), ´The role of services in production and international trade: A theoretical framework´, in Jones, R., and Krueger, A., (eds.), *The political economy of international trade,* Festschrift in honor of Robert Baldwin. Oxford, Basil Blackwell.

Kaminski, B. and Ng, F. (2001), ´Trade and Production Fragmentation. Central European Economies in European Union Networks of Production and Marketing´, World Bank Policy Research Working Paper, No. 2611. Washington, World Bank.

Kirkegaard J.F. (2005), ´Outsourcing and offshoring: Pushing the European model over the hill, rather than off the cliff!´, *IIE Working Paper Series*, WP05-1, Institute for International Economics.

Leibl, P., Morefield, R. and Pfeiffer, R. (2011), ´A study of the effects of backshoring in the EU´, *Proceedings of the 13th International Conference of American Society of Business and Behavioural Sciences*, available at: http://asbbs.org/files/2010/ASBBS_%20Proceedings_13th_Intl_Meeting.pdf.

Levchenko, A.A. and Lewis, L.T. (2009), ´The collapse of international trade during the 2008-2009 crisis: In search of the smoking gun´, Working Papers 592, Research Seminar in International Economics, University of Michigan.

Neureiter, M. and Nunnenkamp, P. (2009.a), ´Outsourcing motives, location choice and labour market implications: an empirical analysis for European countries´, *Kiel Working Papers*, No. 1541, Kiel, Kiel Institute for the World Economy.

Neureiter, M. and Nunnenkamp, P. (2009.b), ´Modes of International Sourcing and the Competitiveness of Firms: An Analysis of European Survey Data´, *Kiel Working Papers*, No. 1558, October 2009. Kiel, Kiel Institute for the World Economy.

Ng, F. and Yeats, A. (1999), ´Production Sharing in East Asia. Who Does What for Whom and Why?´, *World Bank Policy Research Working Paper*, No. 2197, Washington, World Bank.

OECD (2004), *Information Technology Outlook*, Paris, OECD.

Olsen, K.B., (2006), ´Productivity impacts of offshoring and outsourcing: A review´, OECD Directorate for Science, *Technology and Industry STI Working Paper*, No.1, Paris, OECD, available at: http://www.oecd.org/dataoecd/16/29/36231337.pdf.

Stehrer, R., Foster, N., and deVries, G. (2012a), ´Value added and factors in trade. A comprehensive approach´, WIOD Working Paper, No. 7.

Stehrer, R., Biege, S., Borowiecki, M., Dachs, B., Francois, J., Hanzl, D., Hauknes, J., Jäger, A., Knell, M., Lay, G., Pindyuk, O. and Schartinger, D. (2012b), ´Convergence of Knowledge-Intensive Sectors and the EU's External Competitiveness', study for DG Enterprise carried out within Framework Service Contract No. ENTR/2009/033, Background Study for the *European Competitiveness Report 2011.*

Sturgeon, T.J., and Gereffi, G. (2009), ´Measuring success in the global economy: international trade, industrial upgrading, and business function outsourcing in global value chains´, *Transnational Corporations*, Vol. 18, No. 2.

Timmer, M., Erumban, A.A., Francois, J., Genty, A., Gouma, R., Los, B., Neuwahl, F., Pindyuk, O., Poeschl, J., Rueda-Cantuche, J.M., Stehrer, R., Streicher, G., Temurshoev, U., Villanueva, A. and d. Vries, G.J (2012), *The World Input-Output Database (WIOD): Contents, sources and methods,* WIOD Background document available at www.wiod.org.

UNCTAD (2004), ´The shift towards services´, *World Investment Report*, Geneva, UNCTAD.

Wagner, J. (2011), ´Offshoring and firm performance: self-selection, effects on performance or both?´, *Review of World Economics*, Vol. 147, No. 2.

Yeats, A. (1997), ´Just How Big Is Global Production Sharing?´, *World Bank Policy Research Paper*, No. 1871, Washington.

Yi, K.M. (2009), ´The collapse of global trade: the role of vertical specialization´, ´The collapse of global trade, murky protectionism, and the crisis´, *Recommendations for the G20*, Baldwin and Evenett (eds), CEPR.

Annex 1. The World Input-Output Database (WIOD)

BOX 2.1 – THE WORLD INPUT-OUTPUT DATABASE (WIOD)[41]

The data used are taken from the World Input-Output Database (WIOD), which became available in April 2012 (see www.wiod.org) and was compiled within the EU Framework programme. These data provide international supply and use and input-output tables for a set of 41 countries (the EU-27, Australia, Brazil, Canada, China, India, Indonesia, Japan, Korea, Mexico, Russia, Taiwan, Turkey, the US and the Rest of World) over the period 1995–2009. It was compiled on the basis of national accounts, national supply and use tables and detailed trade data on goods and services, combining information for 59 products and 35 industries. Corresponding data at the industry level allow the splitting up of value-added into capital and labour income. For detailed information see Timmer et al. (2012).

This results in a world input-output database for 41 (including the Rest of World) countries and 35 industries, i.e. the intermediates demand block is of the dimension 1 435x1 435, plus additional rows on value-added and columns on final demand categories. The outline of such a world input-output table is presented below. Each country listed vertically sources intermediates from its own industries and from other countries' industries. Together with value-added from this country, the level of gross output is obtained. Furthermore, each country also demands products from its own economy and the other economies for final use, such as consumption and gross fixed capital formation. The horizontal view shows what each country's industries provide to industries in its own country and the other countries, and as final demand for domestic and foreign consumers. Gross output produced in one country equals the value of demand for each country's industries.

Outline of world input-output table (industry by industry)

	Intermediate use			Final use			
	Country A	**Country B**	**Country C**	**Country A**	**Country B**	**Country C**	
Country A	A sources from A	B sources from A	C sources from A	A demands in A	B demands in A	C demands in A	GO in A
Country B	A sources from B	B sources from B	C sources from B	A demands in B	B demands in B	C demands in B	GO in B
Country C	A sources from C	B sources from C	C sources from C	A demands in C	B demands in C	C demands in C	GO in C
Value added	VA in A	VA in B	VA in C				
Gross output	GO in A	GO in B	GO in C				

[41] The WIOD project was funded by the FP7 SSH research programme.

Annex 2. The European manufacturing survey

The European Manufacturing Survey (EMS) investigates technological and non-technological innovation in European industry. It focuses on fields such as technical modernisation of value-adding processes, the introduction of innovative organisational concepts, including international offshoring and outsourcing of production and R&D activities, and new business models for complementing the product portfolio with innovative services. The questions on these indicators have been agreed upon in the EMS consortium and are surveyed in all the participating countries. Additionally, some countries ask questions on specific topics. The underlying idea of the question design is to have a common core of questions asked consistently over several survey rounds; to modify other common questions in a survey round in order to correspond to actual trends, problems and topics; and to provide space for some country- or project-specific topics.

In most countries, EMS is carried out as a paper-based survey at company level. In order to prepare for multinational analyses, the national data undergo a joint harmonisation procedure.

The latest survey – EMS 2009 – was carried out in 13 countries. Information on the utilisation of innovative organisation and technology concepts in the generation of products and services, as well as performance indicators such as productivity, flexibility and quality was collected for more than 3,500 companies from the manufacturing sector in these countries.

The dataset employed in this report was compiled using those country surveys that included questions on the companies' production relocation behaviour, conducted in nine European countries. It includes the Austrian, Croatian, German, Dutch, Slovenian, Spanish and Swiss datasets collected in 2009 and 2006. The Danish and Finnish datasets are only available for the 2009 round, as the respective partners joined the EMS network after 2006. While most partners sent out their questionnaires by mail, the Finnish and Danish data were collected using an online questionnaire. Those asked to fill in the questionnaires were the production managers or CEOs of the manufacturing firms contacted.

This report focuses on actual trends and developments in production relocation activities of European manufacturing companies in the following industrial sectors: chemicals/chemical products (NACE 24), machinery and equipment (NACE 29), electrical and optical equipment (NACE 30–33) and transport equipment (NACE 34–35).

Table A.2.1 below provides an overview of the sample, broken down by sector, firm size and country distribution for the EMS surveys 2006 and 2009.

Table A.2.1 – Sample of surveyed firms, by firm size, country and sector, 2006 and 2009

		2006		2009
Firm size	N	%	N	%
Up to 49	435	29.96	476	33.36
50 to 249	669	46.07	663	46.46
250 and more	348	23.97	288	20.18
Sector	N	%	N	%
Chemicals/chemical products [(a)]	170	11.71	180	12.61
Machinery & equipment [(b)]	617	42.49	628	44.01
Electrical & optical equipment [(c)]	537	36.98	507	35.53
Transport equipment [(d)]	128	8.82	112	7.85
Country	N	%	N	%
Germany	847	58.33	635	44.5
Austria	89	6.13	102	7.15
Switzerland	299	20.59	303	21.23
Netherlands	89	6.13	116	8.13
Denmark			143	10.02
Croatia	40	2.75	24	1.68
Finland			42	2.94
Spain	56	3.86	32	2.24
Slovenia	32	2.2	30	2.1
Total	1452		1427	

Note: (a) NACE 24, (b) NACE 29, (c) NACE 30–33, (d) NACE 34–35.

Source: European Manufacturing Survey 2006, 2009.