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European Competitiveness Report 2010

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Putting Competitiveness and Sustainability at Front Stage**

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Table of Contents

EXECUTIVE SUMMARY	3
1. Introduction	3
2. Overall competitiveness performance	3
3. Trade in intermediate products and EU manufacturing supply chains	4
4. Foreign corporate R&D and innovation in the European Union	6
5. European competitiveness in key enabling technologies	9
6. Innovation and competitiveness of the creative industries in the EU	11
7. Conclusions	13
INTRODUCTION	15
1. GROWING IMBALANCES AND EUROPEAN INDUSTRY	17
1.1 The crisis as a major adjustment	17
1.1.1 A big recession	17
1.1.2 Sudden drop and slow recovery in the labour market	18
1.2 The years before the crisis	20
1.2.1 Aggregate trends and the crisis	20
1.2.2 Industrial trends	23
1.2.3 R&D in EU industries	24
1.3 Growing imbalances and external competitiveness	26
1.3.1 Soaring asset prices	26
1.3.2 Growing distortions and external competitiveness	31
1.3.3 Rising unit labour costs, cause or consequence?	33
1.3.4 World market shares	36
1.3.5 Summarizing	41
1.4 The impact of the boom on industry and competitiveness	41
1.4.1 Has the housing bubble crowded out productive investment?	41
1.4.2 Employment growth in construction and real estate services	45
1.4.3 The allocation of productive investment	50
1.4.4 Summarizing	51
1.5 The impact of the crisis on industry	51
1.5.1 Output	53
1.5.2 Employment	55
1.6 Conclusions	57

EXECUTIVE SUMMARY

1. Introduction

The European Union and the world economy went through a deep financial and economic crisis in 2008 and 2009. The first signs of recovery were visible in 2009 and were confirmed in the first half of 2010. These developments and the quickly evolving world market situation are a compelling call for the importance of remaining competitive.

This year's edition of the annual European Competitiveness Report looks first at the implications of the economic downturn for productivity — the key factor for competitiveness in the long run — and at some of the main future determinants of EU competitiveness on world markets: in the changing pattern of trade in intermediate products and EU manufacturing supply chains; foreign corporate R&D and innovation activities in the EU; European competitiveness in key enabling technologies; and innovation and competitiveness in the creative industries.

2. Overall competitiveness performance

With the exception of the 2001 slowdown, the period 1995-2006 has been one of remarkable stability for industrialised countries. In the EU in particular, it has been a period of sustained growth, increasing participation in employment and increasing income per capita. In the US and some European countries, however, this stability was hiding the accumulation of significant imbalances that ultimately led to a downturn of a severity unseen since the early 1970s' oil shocks. In the EU, with the only exception of Poland, all Member States saw a drop in their production in 2009: from around 3 per cent in Belgium or France to double digit drops for Ireland and the Baltic republics. Even if some individual countries had experienced similar recessions in the recent past, this recession is unusual for its combination of a large drop in economic activity and its scope: synchronized global downturn with all advanced economies in nose-dive.

Beyond the issue of recovery, it is legitimate to ask what could be the impact of the crisis on economic performance in the medium to long term. The European Competitiveness Report 2009 examined the potential impact of the recession on competitiveness. All in all, the conclusion was that the recession need not have a negative impact on the rate of technical change in the years to come; for a recession includes two types of mechanisms: those that impinge negatively on economic efficiency, but also those that improve our ability to increase productivity in the future. Furthermore, understanding those mechanisms makes it possible to design economic policies to tone down the negative effects and amplify the positive ones in order to speed recovery and boost future growth.

The first chapter of the present edition of the Report examines the potential impact of the boom years 2000-07 on competitiveness. The above-mentioned accumulation of large imbalances has the potential to distort significantly the allocation of resources among and within our economies.

Seen in retrospective, the boom period 2000-07 was also a period of growing imbalances, notably in the housing sector in the US but also in Europe: some Member States saw investment in dwellings increase by the order of magnitude of several percentage points of

GDP. For a decade or more, in some countries, particularly in the UK, Denmark, Ireland and Spain, the prices of dwellings increased over their fundamental value. The distortion did not affect all countries, but in those affected it was not a minor one. In countries like Spain, for instance, at the height of the boom (around 2005-06) housing prices were increasing by 15 % annually. For years millions of agents in the private sector, notably households, made consumption-saving decisions counting on house prices increasing in a way that ex-post appeared not to be sustainable. Indeed, in countries affected, the fast growth of housing prices led households to overinvest in housing and to overstate their wealth, pulling down their saving rate. If houses constituted an attractive investment for locals, so they did for foreigners as well, directly or indirectly.

The period 2000-06 witnessed as well a substantial change in the lending/borrowing position of many European countries. In those with a housing bubble, the demand for credit fuelled capital inflows. When the boom came to an end, the magnitude of the adjustment was proportional to the magnitude of the accumulated distortions. Once the value of houses dropped — or was believed to drop in the future — a large portion of perceived wealth vanished leading to a major adjustment of consumption and saving patterns. Consumption dropped and saving increased to recompose the latter. Hence, countries affected by bubbles found themselves in a classical demand-side recession caused by the consumption-saving adjustments performed by households. Other countries, not necessarily affected by these imbalances, were affected through a drop in external demand.

The European Competitiveness Report 2009 examined the potential impact of the recession itself on competitiveness. The European Competitiveness Report 2010 examines the potential impact of the boom years; in particular, whether these growing imbalances had an impact on competitiveness via the distortion of prices, wages or the allocation of investment.

For instance, during the boom some countries experienced large increases in unit labour costs, a measure of the nominal cost of labour. However, it does not seem that the evolution of unit labour costs has had a significant effect beyond coming along with the corresponding increases in the general level of prices. In principle raising the nominal cost of labour may affect the competitive position of domestic firms in international markets. However, when the international market shares are compared to the evolution of unit labour costs, there is no obvious relation. Part of the explanation to this apparent paradox may lie in the fact that wage inflation takes place mostly in non-tradable sectors, notably services and, in particular, in the construction sector.

In short, if the boom years have affected competitiveness, that is, the ability to increase productivity in the forthcoming years, the evidence remains elusive. Nevertheless, this is not to say that exiting the crisis may not be a slow adjustment process in some EU countries. For instance, it is possible that a part of those large capital inflows has not been used productively in some of the so-called deficit countries, therefore hampering the ability of these countries to generate income in the future while at the same time increasing the interest burden on these economies.

3. Trade in intermediate products and EU manufacturing supply chains

A large and growing number of products, especially in the high-tech area, consist of many different components that are manufactured in various parts of the world. Manufacturing production processes also require many kinds of services from different parts of the world if firms are to develop, produce and market their products.

However, this multi-country nature of products is no longer typical only for complex high-tech goods. Components and services are purchased abroad for many products. This is the case for *direct* inputs when firms purchase both domestically and foreign produced intermediate inputs, but also in an *indirect* way: components imported from a particular country might already include inputs from other countries, which are then used indirectly in the final product.

A prominent feature of the globalisation of today's economy is the increasing adjustment and adaptation of production structures to more international sourcing structures and cross-border production networks. Firms distribute their production activities and develop supply chains in different geographical locations according to the comparative advantages of the locations. So these developments can be said to have led to increased trade in intermediate goods.

Important shifts in the composition of EU-27 intermediate trade have taken place during the last decade

Trade in intermediates accounts for the largest part of overall trade, with an average share of about 50% of both imports and exports. There are, however, big differences across countries. This share has increased little over the last decade or so and, has been driven mostly by industry specialisation. The shift towards more knowledge-intensive sectors in the EU has led to an increasing role of imported intermediates.

Large shifts have taken place in the geographical structure of trade in intermediates for the EU-27 countries. BRICs (Brazil, Russia, India and China) have become more important for EU exports and imports. They increased their share in EU-27 imports by 5 percentage points during the last decade. Gains of market shares can in general be related to relative price changes or increased product quality. Product quality upgrading also explains part of the EU-12¹ market share increase within the EU.

A large part of trade in intermediates consists of two-way trade, i.e. most countries are both exporters and importers of intermediates, which blurs the common perception of certain countries being predominantly outsourcing or target countries. Smaller emerging economies, including most of EU-12, are more specialised in trade in intermediates as compared to larger ones, both in imports and exports. This raises the more general question whether trade in intermediates might help countries to integrate into the world economy and how this shapes patterns of specialisation in both production and trade.

Increasing sourcing of inputs, trade of intermediates and inter-industry linkages

The growing trade in intermediates means that inter-industry linkages across borders have increased over time. For instance, when demand for cars increases in a particular country, more intermediate goods have to be imported than was the case a few years ago. Between 1995 and 2005 imports of intermediate goods increased in all manufacturing industries and in almost all EU countries. During the same period of time, the share of imported intermediates in total intermediates has also grown indicating an increasing role of imported intermediates in final products. There are, however, some distinct industry differences in the use of imported intermediates. High-technology industries import more intermediate goods than other industries: imported intermediates accounted for 55% of total inputs in high-technology manufacturing industries in 2005. On the other hand, foreign trade plays a smaller role in service industries than in manufacturing. Among service industries, the largest share of imported intermediate goods in 2005 (26%) was in transport services.

¹ EU-12 are the 12 countries which joined the European Union in 2004 and 2007.

Detailed information from a leading European mobile phone producer on supply chains shows that Europe captures 55% of a particular phone's total value added. The phone was assembled both in Europe and China. When it was assembled and sold in Europe, the European share accounted for 68%. But even when it was assembled in China and sold on the US market, Europe still captured as much as 51% of the value. This shows that the final assembly, though important, represents only a fraction of the overall value added of a high-tech product like a mobile phone. The value is largely detached from the physical flows of goods within the supply chain. The major parts of the value are attributed to design, R&D, brand, marketing and distribution, and management of these activities.

The financial crisis hit intermediate trade relatively harder and disrupted supply chains

There is a risk that the economic crisis of 2008-2009, characterised by trade flows collapsing by more than the drop in GDP growth rates, might have changed sourcing patterns and firms' supply chains. Trade in intermediates, and especially in parts and components, was hit harder by the crisis than other types of goods. Trading volumes of parts and components slumped by some 38% percent compared to pre-crisis levels. As a result, the relative importance of parts and components in EU-27 trade declined both in EU-27 trade overall and in almost all sectors in which vertical supply chains play a major role. These vertical supply chains are important especially for the industries producing electrical machinery, mechanical equipment and motor vehicles.

The automotive industry has one of the highest shares of parts and components trade. During the recent recession its exports and imports registered the biggest falls, of some 45% compared to before the crisis. Such disruptions to international supply chains might have resulted from changes in the sourcing strategies of multinational corporations, such as shifting to domestic suppliers. Inventory adjustments have also contributed to the decline. An upturn in EU-27 trade can be expected if the marked decline in parts and components trade is primarily driven by the inventory cycle, as empty stocks have to be replenished. However, the recovery may be delayed if there is a reversal of the trend towards ever more complex international vertical supply chains.

Globalisation and localisation of the value chain

Trade in intermediates constitutes only one of many business activities in the value chain. As the mobile phone example shows, large parts are attributed to more knowledge-intensive activities, like management, design and R&D. These are especially important for high-tech industries, which tend to locate them close to the firm's headquarters, where it is easier to control and manage them. So EU firms' R&D and innovation activities are still predominantly domestic, though they are becoming increasingly internationalised as adapting products to foreign markets necessitates the presence of product development close to those markets. Firms also seek to ensure access to scientific and technological capabilities, human capital and other resources, which is another motive for the foreign location of R&D activities. Localisation decisions are not based on local preferences but on strategic considerations concerning the provision of strategic resources.

4. Foreign corporate R&D and innovation in the European Union

Corporate research, development and innovation (R&D&I) activities were long seen as one of the few business areas still relatively insulated from offshoring and globalisation. This perception has lately been changing rapidly. Over the last thirty years, globalisation has changed international trade and foreign direct investment flows considerably, reshaping and

transforming R&D&I processes and the knowledge and skills that enable firms to compete in domestic and international markets. As a result, a growing number of firms, in particular large multinational enterprises, started locating R&D&I activities outside their home countries.

Firms decide to (re-)locate R&D&I activities abroad by weighing a number of important considerations against each other. Potential benefits include local development and design of new products and services to capture new markets and growth opportunities; gaining access to new sources of scientific and technological capabilities, skills and talent; and reducing R&D&I capacity bottlenecks. Potential costs include foregone benefits of R&D&I centralisation, including economies of scale and scope, the need for more coordination and complexities in the transfer of knowledge, given its often "tacit", cumulative, localised and context-related nature.

The European Union has been an important player in this emerging internationalisation of R&D&I, as documented by a number of datasets (patents, R&D expenditure of foreign affiliates and various surveys). The analysis points to some important differences across countries, sectors, technologies and firms, as well as to some of the likely effects of the increasing and uneven degree of internationalisation on productivity and employment in the European Union.

EU performance in the emerging internationalisation of R&D&I

In a global perspective, the EU is still in a position of strength, but the global competition to attract R&D&I flows is set to continue rising. R&D&I internationalisation is predominantly a matter for the triad US, EU and Japan, with smaller roles for countries like Canada, Switzerland, Korea and Israel. The bilateral flows between the EU and the US clearly take prominence on a global scale. For instance, from 2001 to 2007, US multinational firms significantly increased their R&D expenditure in the EU, still the main location for their R&D (the EU single market attracted more than 60% of all US overseas R&D expenditure in this period). The EU, however, is facing growing global competition in this field, from both developed and emerging economies. R&D expenditure of US subsidiaries in the BRICs is still relatively low (altogether representing about one tenth of the value for the EU-27 in 2007), but is growing fast.

The considerable increase in R&D&I cross-border links is evident at extra-EU and in particular intra-EU levels, as further documented by the locations of patent applicants and inventors. For instance, some 17% of all European Patent Office patents resulting from inventions made in the EU were foreign-owned (9% by non-EU and 8% by EU-based organisations); in 1990, only 10% of such patents had foreign owners (6% non-EU and 4% EU-based organisations). Moreover, the last two decades have seen an increase in the number of both domestic and foreign-owned patents resulting from inventions made in the EU, which suggests that the internationalisation of R&D&I did not squeeze out domestically owned patenting.

Altogether, the various sources of evidence confirm the rise of R&D&I cross-border links and flows, indicating at the same time a possible slowdown in recent years and showing that domestic activities still account for the bulk of R&D&I, particularly in the large countries.

Uneven levels and trends across EU countries, sectors, technologies and firms

Cross-border R&D&I links between the EU-15 countries tend to be relatively strong, but are often limited to the large and medium-sized R&D-intensive Member States. In contrast, links

between the EU-12 and the EU-15 countries, and in particular within the EU-12, tend to be rare.

Medium-sized or small Member States tend to have a higher degree of internationalisation and in some cases relatively higher R&D&I inflows than large countries. Patent data suggest that strong country links in terms of R&D&I often appear to be explained by a common language, geographical proximity or a long history of economic integration. Key examples are the links between the Nordic countries, and the links between a large country and a smaller neighbour, such as Germany and Austria, UK and Ireland, or France and Belgium. There are at least five countries in the EU (Austria, Czech Republic, Hungary, Ireland, and Slovakia) where foreign-owned firms currently account for more than 50% of total R&D expenditure in manufacturing.

Services tend to be less internationalised than manufacturing, but their share of total overseas R&D expenditure is rising. Also, different sectors and technologies present different internationalisation levels and dynamics. For instance, a high and increasing level of internationalisation is generally found in technology-intensive sectors, such as information technologies, telecommunications and pharmaceuticals (characterised by high R&D intensity and fast rates of technological change). A high, but more or less stable internationalisation level is found, for instance, in the food industry, possibly reflecting the presence of a number of large multinational enterprises and a high degree of product variation and innovation in response to differing consumer tastes.

Internationalisation is mainly pursued by a small number of large, R&D-intensive firms. Typically, firms move R&D&I to high-income countries to access knowledge, while relocation to low-income countries is driven by the quest for new markets.

EU firms are increasing their R&D&I outside the EU

EU firms are increasingly seizing opportunities to start or expand R&D&I abroad (extra-EU), particularly in the US. The outward internationalisation of EU firms has increased considerably over the last two decades and is catching up with the top levels of R&D&I internationalisation that US firms overall still tend to hold. For instance, between the periods 1991-1995 and 2001-2005, the share of all EU patent applications (in the OECD triadic database) resulting from inventions made outside the EU increased from 4% to 11%. It is worth comparing the outward internationalisation dynamics among the triad (US, EU and Japan): the EU more or less caught up with the US (11% share of patent applications from inventions made abroad in the period 2001-2005), leaving Japan well behind (3% in the same period).

Patent data and R&D expenditure surveys both indicate that the US is by far the preferred location for overseas R&D&I of EU-27 — as a whole and across countries, sectors and technologies. R&D-intensive European firms, sectors and technologies (such as pharmaceuticals, cosmetics or semiconductors) tend to have a somewhat higher level of outward internationalisation.

Foreign-owned firms innovate differently in the EU than domestically owned companies...

Foreign-owned firms tend to have lower innovation input intensities than domestically owned companies, but achieve similar innovation outputs. This suggests that the innovation efforts of foreign-owned firms are based to a considerable degree on knowledge and technologies received from the group or parent company. Many of the differences between foreign-owned

and domestically owned firms can be explained by related firm characteristics, e.g. foreign-owned firms are larger, have higher absorptive capacities, or operate more often in technology-intensive sectors.

Cooperation with domestic partners, in particular domestic research organisations (including universities), is common among foreign-owned firms, a sign of their embeddedness in the host countries' innovation systems and of potential spillover effects. Foreign-owned firms can act as agents of international technology diffusion and as links between organisations in the host country and foreign sources of knowledge.

...but both groups of firms contribute to productivity growth and employment creation

Foreign-owned firms have significantly higher productivity levels (measured by sales per employee) than domestically owned companies. They also show higher levels of productivity growth, though differences in relation to domestically owned firms are considerably smaller and less significant here. Productivity growth of foreign-owned companies is mainly related to output growth of old products and the effects of product innovation, but not process innovation. There are no major differences between foreign-owned firms, domestic group enterprises and domestic unaffiliated firms in the way innovation affects productivity levels.

Foreign-owned companies also differ from domestically owned firms in the way they transform new technologies into employment growth. General productivity increases as a result of job cuts are on average compensated by the employment-creating effects of higher sales from old products and product innovation in the foreign-owned firms. Together, these effects result in net employment growth in foreign-owned companies.

5. European competitiveness in key enabling technologies

Because they can generate new growth, spur innovation, increase productivity, help tackle environmental and climate challenges, and give rise to new applications, key enabling technologies are attracting growing interest, and the importance of staying competitive in these technologies cannot be overstated.

Trends in six key enabling technologies (KETs) — nanotechnology, micro and nanoelectronics (including semiconductors), industrial biotechnology, photonics, advanced materials, and advanced manufacturing technologies — are reviewed from a variety of perspectives: (i) state of development, (ii) existing and future applications, (iii) current market volume and future potential, and (iv) European competitiveness in comparison with North America, East Asia and the rest of the world.

There is considerable uncertainty about how fast the markets for applications of the six technologies — nanotechnology in particular — will grow in the medium term. A contributing factor to the uncertainty is that there are no agreed definitions of key enabling technologies. A broad definition is likely to lead to a more optimistic assessment of potential market volume than a more narrowly defined technology. With this in mind it is hardly surprising that the potential market for key enabling technology applications in 2015 (as reflected in the literature) covers a very wide range.

Most applications of key enabling technologies are still at a conceptual or pre-competitive stage, and it is not possible to use market data to assess how competitive Europe is compared with the rest of the world. Instead, patent data analysis and a number of case studies are used to analyse Europe's competitiveness in these areas.

Strong European position in advanced manufacturing technologies and industrial biotechnology

The overall conclusion is that European producers of KETs are well placed in all six technologies, representing between a quarter and half of all patent applications analysed. Europe is the world leader in advanced manufacturing technologies and shares the lead with North America in industrial biotechnology. In photonics, nanotechnology and micro and nanoelectronics, Europe contributes less to total output than North America and East Asia.

Europe is in principle holding its position in all six technologies. In recent decades it has neither lost nor gained ground, despite increasing competition from East Asia, which in the past decade has made great strides in most of the technologies. At the same time the contribution of North America to global technology output has gradually diminished. Germany is the main producer of key enabling technology patents in the EU, followed by France and the United Kingdom.

Importance of skills, venture capital and of maintaining a manufacturing base

Maintaining a strong European manufacturing base in each key enabling technology is critical if the EU is to benefit fully from productivity and innovation effects. Direct interaction between research and development, manufacture and application in user industries is needed if new fields of application are to emerge and good facilities for new technologies are to be developed.

KET research is often at the cutting edge of technology. Complex technologies and new technological challenges have to be addressed. In such a context progress depends on bringing together different scientific disciplines and fields of technology in a joint endeavour. More coordination is needed between research and industry, going beyond any coordination by market mechanisms. Providing incentives for networking and clustering can help to achieve this. In some areas global networks of the leading organisations from research and industry are ideal; elsewhere regional networks (clusters) can spur technology development. Clusters can be particularly helpful in linking research and commercial applications. Best practices for facilitating the flow of knowhow, ideas and personnel between industry and research institutions should be circulated between and within Member States.

With Europe facing a likely shortage of skilled labour, promoting higher education and training in KETs will be essential. Strengthening cross-disciplinary education is a main challenge in that context. Higher education institutions need to offer curricula that are better geared to meeting the specific demands of KETs. Students need to be made aware of the career opportunities offered by cross-disciplinary studies. Education and training may be complemented by immigration policies to address the shortage of skilled personnel.

Venture capital markets are important for commercialising research results in KETs through spin-offs and other types of start-ups. To work, venture capital needs a supportive regulatory environment, and public programmes may need to step in to address any failures by European private venture capital markets to provide sufficient funds for start-up and early-stage financing.

The role of regulation

In some KETs there is a particular focus on health, environment and safety issues. Cases in point are nanotechnology, industrial biotechnology and advanced materials. Procedures, standards and implementation tools (e.g. test methods and guidance documents) are needed to

deal with health, safety and environmental issues and to provide incentives for further technological advances and innovative dynamics. Legislation has to be flexible enough to adjust to technological progress within each KET.

Industrial standardisation, intellectual property rights, and enabling and promoting spin-offs are of critical importance to the transfer of technology. All in all, an integrated, coherent policy approach is required if KETs are to increase productivity and wealth. This should bring in regional, national and international levels and the various policy domains, including research, innovation, education, competition, industry, taxation, health and environment.

6. Innovation and competitiveness of the creative industries in the EU

The creative industries have large growth potential. A survey in the EU Member States in early 2010 found that more than 97% of respondents thought the creative industries were ‘important’ or ‘very important’ in supporting innovative activities, encouraging economic growth and creating new jobs. Creative industries are at the crossroads between arts, business and technology. They range from information services, such as publishing or software, to professional services like architecture, advertising or design². Creative industries are among the fastest growing sectors in the EU, creating new jobs, playing key roles in global value chains, and spurring innovation.

Creative industries are increasingly a source of growth in the EU

Creative industries account for 3.3% of total EU GDP and 3% of employment, and are among the most dynamic sectors in the EU. Though employment growth was uneven across subsectors, overall employment in the creative industries increased by an average of 3.5% a year in 2000-2007, compared to 1.0% a year for the EU economy as a whole. Software consulting accounted for more than half of creative industries’ employment growth in the EU-27 in 2000–2007. Indeed, the employment growth rate for software consultancy in the EU-27 was about 5.2% per year on average in 2000-2007. Within software publishing, the video games industry is one of the fastest growing industries worldwide. The Baltic states and other new Member States have the highest annual employment growth rates in the creative industries. Among the EU-15 countries, Portugal and Ireland report a higher than average increase. The fast growth of the creative industries in the EU is partly due to catching up in the less developed EU countries. Demand factors and a strong entrepreneurial culture are further job creation factors. Creative industries are dominated by micro-firms (95% have fewer than ten employees) co-existing with very large corporations. They typically include large shares of self-employed and highly skilled professionals.

The increasing importance of skills and creativity in the EU job market is clearer when one looks at professions that are ‘creative’ in essence, regardless of whether they belong to the ‘creative industries’ proper or to more traditional activities. Occupations considered as ‘creative’ include for example professions such as mathematicians or engineers, along with writers, creative and performing artists and artistic or entertainment professions. What they all have in common is that they produce intangible assets such as ideas, knowledge and information that increase firms’ value added. In the EU-15, creative occupations grew at around 3% per year on average between 2002 and 2008, with the highest growth for artistic,

² The concept of creative industries is very close to another concept of creative and cultural industries used in the ‘Green paper — Unlocking the potential of cultural and creative industries’: http://ec.europa.eu/culture/our-policy-development/doc2577_en.htm.

entertainment occupations (5.7%), followed by social science and related professionals (5.0%), and architects, engineers and computing professionals (each 3.2%). Creative occupations are growing within and outside the creative industries, indicating that creativity is spreading to other sectors. Similar trends can be observed for the new Member States (though fewer data are available here).

New empirical evidence is given on how the creative industries strengthen regional growth. Recent findings at the regional level for ten EU countries show that the creative industries had a positive and significant effect on the growth rate of local GDP per capita in 2002-2007. However, in terms of the related but different concept of 'creative occupations', there is no consensus on the impact of the creative workforce on regional growth.

Though there are not many tradable creative services, the EU's position on the global markets is bolstered by the most tradable parts of the creative sectors. Europe is one of the world's leading exporters of creative industries products. There was an increase in the revealed comparative advantage of the EU in publishing, music records, audiovisuals (film), and most notably in the new media (digital records) — with strong growth in video games.

Creative industries stand out because of their propensity for innovation

Some creative industries are among the most potentially innovative of all EU sectors. Firms in software consultancy and supply are the most innovative of the service industries. The architecture and advertising industries have a higher than usual share of firms introducing new or significantly improved services.

Creative industries are not only innovators themselves but have also been an important driver for innovation. As far as supply chain relationships are concerned, they account for increasing inputs in the development of other sectors. A creative industry like industrial design contributes substantially to the production process and product design innovations of several manufacturing industries, such as chemicals and pharmaceuticals, minerals, glass and ceramics, motor vehicles and tobacco. Conversely, some creative industries are major users of new technologies, playing a key role in stepping up the spread of technological innovations. Outside the ICT sector itself, publishing and software firms were among the earliest users of the internet and e-business practices.

Reinforcing the growth and innovation potential of creative industries: action needed!

Creative industries tend to be small-scale organisations, which makes them natural candidates for small-business policies. They tend to be more prone to rationing of funding, and many sub-markets of the creative industries urge the authorities to provide for a level playing-field of competition. Certain creative sectors may justify consideration for targeted approaches because of their public utility aspect. They do a lot to generate innovation and build knowledge. Under-investment must therefore be avoided. Appropriate education and training are also essential to provide the sector with the skills it needs to grow.

More coordination, networking and sharing of best practices will enable all creative industries and occupations to optimise their growth prospects and contribute to the economy as a whole. EU policies can help in the dissemination of best practice.

Ultimately, the impact of the creative industries is not only economic and thus calls for more than national or local action. While the welfare effects are difficult to quantify, it is clear that some of the creative industries facilitate structural adjustment in declining regions. They can

boost social cohesion and get the less well-off more involved in cultural activities. Where concerted and coordinated action would increase the economic and social impact of creative industries, the EU can play a role. EU prerogative areas such as intellectual property rights or the single market for services are the bedrock of creative industries. A recent Amsterdam declaration on the ‘European Creative Industries Alliance’ and a Green Paper³ on cultural and creative industries are some recent initiatives on competitiveness and innovation in this sector.

7. Conclusions

The present edition of the European Competitiveness Report 2010 examines the potential impact of the boom years on competitiveness. The accumulation of large imbalances has the potential to distort significantly the allocation of resources in our economies. However, a glance at the evidence shows that exports performance does not seem to have been severely affected by these developments. As for productivity growth, construction and real estate activities have attracted much investment in countries affected by housing bubbles; there is no obvious impact on aggregate productivity so far but these distorted investments have the potential to hamper the ability of affected countries to generate income in the future to compensate the interest burden.

Nonetheless, the financial and economic crisis hit international trade in intermediate goods (especially parts and components) quite hard, accounting for something like 50% of all international trade. It also disrupted some of the established international supply chains (e.g. in the automotive industry) and resulted in some changes to multinational corporations’ sourcing strategies, such as shifting to domestic suppliers. If confirmed, this may have longer-term consequences — by at least temporarily restricting the internationalisation of certain companies’ activities, and perhaps by delaying the recovery in some industries.

EU firms’ R&D and innovation activities, especially in high-tech industries, are still predominantly domestic, but are becoming increasingly internationalised, as the need to adapt products to foreign markets brings product development closer to local markets. Firms’ location decisions are also increasingly based on the provision of strategic resources, such as ensuring access to scientific and technological capabilities and to human capital. A detailed analysis of a specific high-tech product) shows that the value captured has little to do with the physical flows of goods within the supply chain: major parts of the value are attributed to design, R&D, brand, marketing, distribution and management. This shows how important it is to keep a strong grip on these activities.

Maintaining and developing a position of maximum strength for the EU and the Member States in the inward and outward cross-border flows of R&D&I is crucial to keep the EU economies competitive and dynamic in the medium and long term. Inward foreign research, development and innovation offer great potential for the transfer and diffusion of knowledge and innovation across all business sectors. They can complement EU homegrown activities and help to catch up R&D&I in certain sectors and technologies; they can help achieving a critical mass and agglomeration of these capacities in certain areas and countries; and they may help to smooth and sustain a steady R&D&I effort in times of crisis. Key policies and measures for maintaining and attracting new R&D&I) include: enhancing the quality of Science and Technology (S&T) bases and the mobility of researchers and S&T personnel; widening the scope and tightening up the enforcement of Intellectual Property Rights, including the competitiveness and efficiency of the patenting system; promoting R&D&I

³ ‘Green paper — Unlocking the potential of cultural and creative industries’: http://ec.europa.eu/culture/our-policy-development/doc2577_en.htm.

partnerships and consortiums — open to foreign (intra and extra-EU) business and research organisations — fostering competition and cooperation, integration and spillovers into EU innovation systems; promoting an international regulatory dialogue and a level playing-field in public R&D&I support measures; and adopting proactive standards and public procurement policies with a view to developing a dynamic single market for research, development and innovation in the EU. There may well be considerable benefits for firms, the EU's innovation systems and the economy as a whole from outward R&D&I flows by EU firms, in particular SMEs. Potential benefits include opening up and seizing opportunities in new and fast growing markets, adapting innovative products to local requirements and preferences, and gaining access to foreign sources of knowledge which are of strategic importance for certain businesses.

The European producers of key enabling technologies seem to be well placed in the international arena, and Europe is in principle in a strong position in all six identified KETs. KET research is often at the technological frontier. However, more coordination between research and industry is needed, over and above the coordinating effect of market mechanisms. Incentives for networking and clustering can be helpful. Best practices should be disseminated between and within the Member States. Promoting higher education and training will be essential to secure a supply of skilled personnel. In addition, venture capital markets are needed to commercialise the results of KETs, and they in turn need a supportive regulatory environment. Public programmes may be needed to provide additional funds for start-up and early-stage financing.

Creative industries have great potential for reinforcing economic growth and creating new jobs. They have long been among the fastest growing sectors in the EU; they play a key role in global value chains, and they spur innovation. Moreover, creative occupations are growing within and outside the creative industries, i.e. creative professions are spreading to other sectors. The EU is one of the world's leading exporters of creative industries' products. Their importance, however, is not purely economic — they can facilitate structural adjustment in declining regions and do a lot to enhance social cohesion and inclusion. EU policies can therefore play a role in strengthening intellectual property rights and the single market for services. The creative industries must be brought into the scope of SME policies; they need access to proper financing facilities and creative companies need to be helped to grow.

INTRODUCTION

This is the thirteenth edition of the Commission's European Competitiveness Report since the 1994 Industry Council Resolution, which called on the Commission to report annually. Competitiveness is taken here to mean a sustained rise in the standard of living of a nation or region and as low a level of involuntary unemployment as possible. For an industrial sector, the main competitiveness criterion is maintaining and improving its position in the global market.

As in previous years, the Report approaches the issues using insights from economic theory and empirical research, and its ambition is to contribute to policy-making by drawing attention to trends and developments and by discussing policy options. Its main subjects continue to be related to productivity, this being the most reliable indicator for competitiveness over the longer term, and other microeconomic issues underpinning the EU's future economic developments, in particular its Europe 2020 strategy.

Chapter 1 presents a snapshot of recent economic developments in a period of financial and economic crisis and the beginning of recovery. In addition, the boom period 2000-07 is explored in order to analyse its likely impact on European competitiveness.

Chapter 2 analyses trade in intermediate products and EU manufacturing supply chains with a view to shedding light on the relative importance of trade in intermediates in overall EU-27 trade and in individual countries. The questions addressed in this chapter include: what is the share of these products in overall trade in exports and imports, what are the changes over time, and what factors are driving these changes and the geographical structure of trade in intermediate goods? There is also a case study from the high-tech area, which addresses the issue of who 'captures' the value of the production process. Finally it examines the extent to which trade in intermediaries has been affected by the economic crisis (including a comparison with other product categories) and how the crisis has affected EU manufacturing supply chains.

The issue of foreign corporate research and development and its impact on innovation in the European Union is addressed in chapter 3. The aim is to study why firms internationalise R&D and innovation; analyse R&D&I activities of foreign-owned firms in the EU by sector, country and technology; and examine the activities of EU firms outside the European Union. The chapter also investigates whether — and how — foreign-owned and domestically owned firms differ in their innovation behaviour and how they transform innovation into productivity and employment growth.

Chapter 4 on key enabling technologies (KETs) discusses their role in increasing wealth by boosting innovation and raising productivity, and the performance of Europe (firms as well as public institutions) in producing new technology compared to the main competing regions (North America and East Asia). The analysis looks at the industrial sectors and fields of application that are most affected by different KETs, what their likely medium-term growth potential is, and which factors are likely to drive technological and commercial success.

The main objective of chapter 5 is to give a comprehensive picture of the innovation performance and competitiveness of the creative industries, along with their relative size and economic performance in the EU-27 countries. It explores what drives creative industries growth and their impact in the wider economy in different forms: direct contribution to the economy (employment and some output measures); spillovers into the wider economy; the

direct, but less quantifiable, contributions of the creative industries to innovation; and their role in improving the quality of life. The scope and opportunities for policy intervention are then explored.

1. GROWING IMBALANCES AND EUROPEAN INDUSTRY

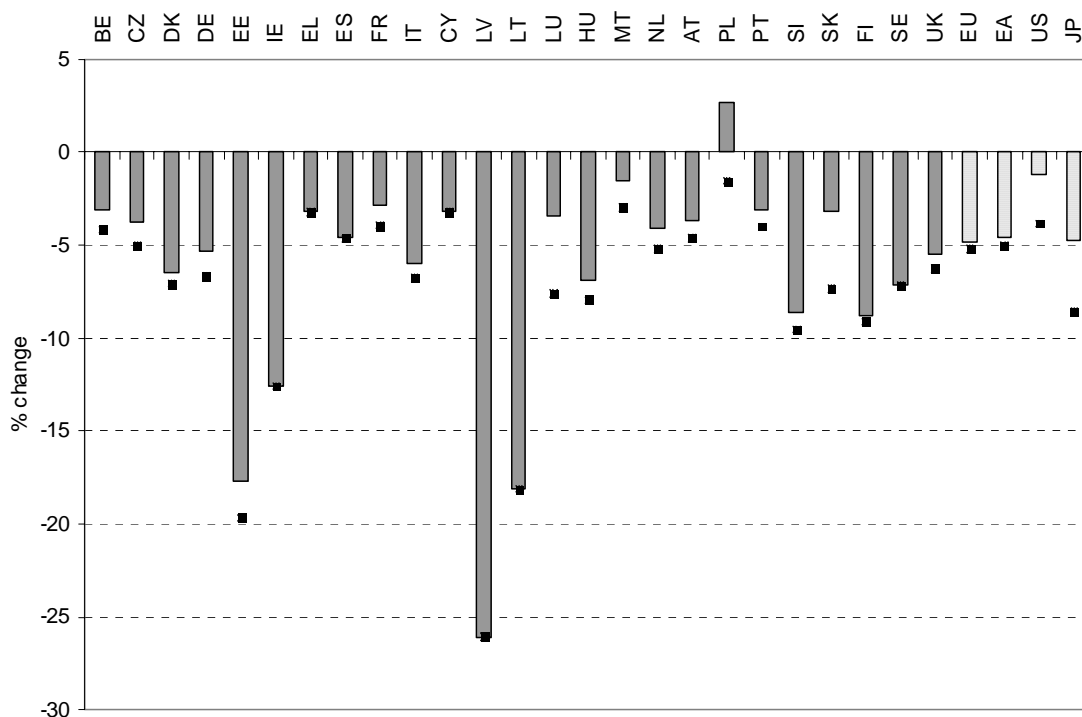
1.1 The crisis as a major adjustment

With the exception of the 2001 slowdown, the period 1995-2006 was one of remarkable stability for the industrialised countries. In the EU in particular, it was a period of sustained growth, more people in employment, and higher income per capita. In some countries, though, stability concealed the accumulation of significant disequilibria that in 2008 brought on a global recession of a severity unseen since the Oil Shocks in the 1970s.

1.1.1 A big recession

Individual countries had experienced similar recessions in the recent past but this recession is unusual for its combination of a big drop in economic activity and its global nature: most countries in the world were touched in one way or another. In the EU, with the sole exception of Poland, all Member States saw their production fall: from around 3% in Belgium and France to double-digit drops for Ireland and the Baltic republics. Latvia suffered the biggest contraction: 26% drop in GDP compared with its peak value in 2007.

Figure 1.1. The magnitude of the contraction: real GDP current (bars) and maximum (dots) drop with respect to peak*



*Seasonally adjusted data; the last data are for 2010Q01 when available; otherwise 2009Q04 data are used.

Source: Eurostat, Quarterly National Accounts.

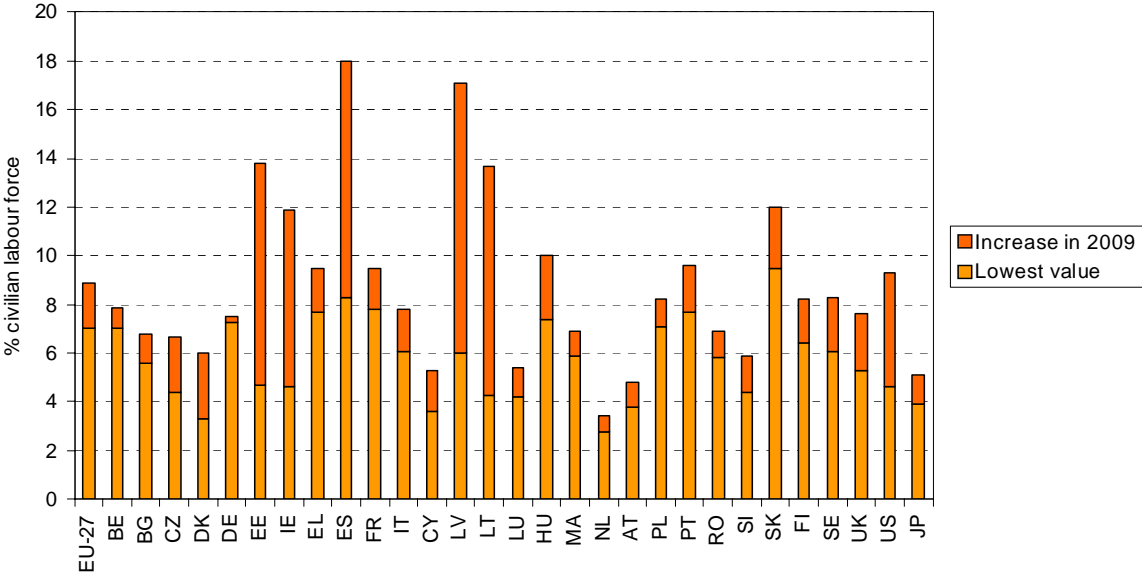
While most countries emerged from the trough in 2010, none of them, again with the exception of Poland, recovered to the level of real GDP they had in 2007. The varied picture showed in Figure 1.1 reflects differing patterns during the boom period 2000-07. As will be discussed below, several Member States were affected by large speculative bubbles and were

afterwards hit hard by the ensuing readjustment; countries not suffering from these asset pricing distortions were quickly affected by contagion — through international trade and through problems in the international supply chain; this is particularly true of many of the new Member States.

1.1.2 Sudden drop and slow recovery in the labour market

With a few exceptions, in the boom years, i.e. the period from 2000 to 2007, the unemployment rate fell in most European countries. For some, however, the crisis reversed the situation within a few quarters, and they now have significantly higher unemployment rates. The experience of previous recessions is that employment takes something like two to four times the length of the recession to return to its earlier level⁴. So with this rule of thumb, employment is expected to remain below its peak level for one to four years in the EU.

Figure 1.2. Breakdown of unemployment in 2009



The lower value indicates the lowest rate of unemployment (civilian labour force) in 2007 or 2008; the stacked bar is the rise over this initial low value up to 2009.

Source: AMECO database, European Commission.

Needless to say, the experience across Member States is quite uneven, and depends on institutional arrangements that vary considerably across the EU. Not surprisingly, the scale of job cuts and the increase in unemployment was particularly sizeable in the countries hardest hit (e.g. the Baltic republics, Ireland and Spain). Given the magnitude of the recession, other countries, notably Germany, experienced only modest losses in employment. The unevenness of performance reflects the nature of the recession as well as labour market institutions. For instance, when employers regard demand shocks as temporary, they tend to smooth their labour responses⁵; this appears to be the case with Germany, which was affected primarily by the collapse in global trade. In contrast, large labour changes and reorganisations are the best response to permanent demand shocks that involve large sectoral restructuring; this appears to

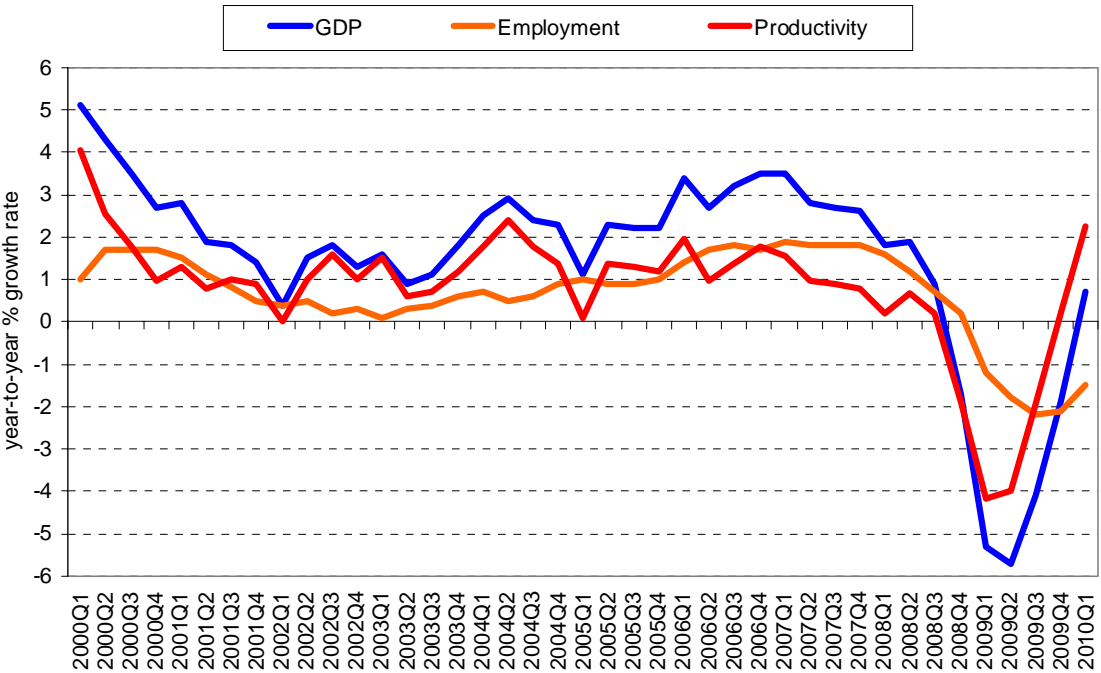
⁴ See the discussion in section 1.2 in European Competitiveness Report 2009 or European Commission (2009a).

⁵ Section 1.4 in European Competitiveness Report 2009.

be the case in, say, Spain and Ireland, both of which had major problems with a housing bubble.

In the midst of such a crisis, and over and above the issue of recovery, it is reasonable to wonder about the impact on economic performance in the medium to long term. The European Competitiveness Report 2009 examined the potential impact of the recession on long-term productivity growth; all in all, the conclusion was that the recession need not have a negative impact on the rate of technical change in the years to come; for a recession includes two types of mechanisms: those that impinge negatively on economic efficiency, but also those that improve our ability to increase productivity in the future. Furthermore, understanding those mechanisms make it possible to design economic policies to tone down the negative and amplify the positive effects⁶ in order to avoid a slow recovery followed by an era of sluggish growth⁷.

Figure 1.3. GDP, employment and productivity growth rates in the EU-27



Source: Eurostat.

The present edition of the European Competitiveness Report examines the potential impact of the boom years on competitiveness. The abovementioned accumulation of serious imbalances has a potential to significantly distort the way resources are used in our economies, and hence on productivity growth in the years to come.

⁶ For instance, the Product Market Review 2009 (European Commission (2009b)) examines the negative impact of the crisis on R&D (section 4.1) and, accordingly, discusses policy measures that attempt to tone down the potentially negative impact (section 4.2).

⁷ European Commission (2009a) discusses the possible impact of the crisis on potential output and a scenario with lower permanent growth rates is not ruled out.

Box 1.1. Competitiveness and external competitiveness

Competitiveness refers to the overall economic performance of a nation measured in terms of its ability to provide its citizens with growing living standards on a sustainable basis and broad access to jobs for those willing to work. In short, competitiveness refers to the institutional and policy arrangements that create the conditions under which productivity can grow sustainably (productivity growth is the only source of sustained income growth, in turn the backbone of growing living standards).

When applied to international trade, however, competitiveness, or external competitiveness, may convey a different more specific meaning. Unless otherwise stated, in this chapter external competitiveness refers to the ability to export goods and services in order to afford imports, and hence it will be summarized by world market shares (the share of exports in total exports).

1.2 The years before the crisis

The period preceding the crisis was characterised by remarkable stability: steady income growth, low inflation, and growing employment.

1.2.1 Aggregate trends and the crisis

Table 1.1 sets out average annual growth rates for the five-year intervals 1996-2000 and 2001-2005, and for the years 2006, 2007, 2008 and 2009. As mentioned, the unprecedented fall in GDP per capita in 2009 was somewhat uneven, but all EU countries were affected, reflecting the severity and dire consequences of the economic and financial crisis. The GDP per capita fall was particularly sizeable in some of the EU-12 countries (particularly in the Baltic republics, ranging from -13.6% in Estonia to -17.5% in Latvia and Lithuania, but also in Hungary, Romania and Slovenia, at -6% to -9%), thus wiping out part of their previous performance and catching-up achievements within the EU. Some of the EU-15 countries were also severely hit, such as Ireland and Finland (with a GDP per capita fall of 8% and 7.3% respectively).

Table 1.1. Real GDP per capita growth and GDP level in PPS

	Annual growth rate of GDP per capita ¹⁾						2009 GDP per capita (in pps; EU-27=100) ³⁾
	1996-2000 ²⁾	2001-2005 ²⁾	2006	2007	2008	2009	
BE	2.64	1.14	2.10	2.18	1.04	-3.58	114.9
BG	-0.21	6.66	6.59	6.17	6.01	-5.40	41.2
CZ	1.60	3.82	6.47	5.55	1.41	-5.46	80.5
DK	2.44	0.95	3.00	1.22	-1.78	-4.72	117.4
DE	1.88	0.53	3.29	2.59	1.43	-4.88	116.2
EE	7.19	8.32	10.18	7.39	-3.47	-13.62	62.0
IE	8.44	3.64	2.76	3.50	-4.91	-7.96	131.1
EL	2.91	3.72	4.10	4.06	1.61	-1.54	94.8
ES	3.65	1.73	2.44	1.70	-0.73	-4.92	103.3
FR	2.36	0.93	1.53	1.72	-0.14	-2.65	107.4
IT	1.87	0.31	1.46	0.82	-1.80	-5.20	101.7
CY	2.49	1.42	2.15	2.93	2.65	-1.67	98.3
LV	6.34	8.86	12.85	10.55	-4.13	-17.57	48.6
LT	5.20	8.32	8.49	10.44	3.30	-17.54	53.2
LU	4.70	2.37	3.92	4.83	-1.73	-4.85	268.0
HU	4.25	4.49	4.13	1.12	0.82	-6.38	63.0
MT	3.88	0.33	2.65	3.10	1.61	-2.97	77.6
NL	3.43	0.82	3.24	3.38	1.61	-4.93	129.9
AT	2.82	1.04	2.85	3.13	1.70	-4.03	123.6
PL	5.42	3.13	6.31	6.83	5.00	1.21	60.8
PT	3.68	0.25	1.03	1.64	-0.17	-3.07	78.3
RO	-1.00	6.50	8.07	6.55	6.45	-7.79	45.3
SI	4.35	3.57	5.44	6.22	2.39	-7.04	86.1
SK	3.25	4.97	8.42	10.31	6.14	-5.90	71.6
FI	4.54	2.24	4.50	3.76	0.58	-7.27	110.5
SE	3.23	2.19	3.66	1.81	-0.92	-5.05	120.4
UK	3.13	2.03	2.26	1.91	-0.06	-5.21	116.4
EU-15	2.57	1.12	2.43	2.03	-0.02	-4.56	110.6
EU-27	2.70	1.43	2.77	2.39	0.32	-4.46	100.0
US	3.15	1.45	1.72	1.15	-0.50	-3.34	147.3

1) GDP per capita is measured in 2000 prices; 2) Geometric Average; 3) PPS stands for Purchasing Power Standards.

Source: AMECO database, European Commission.

Table 1.1 shows that in 2009 employment contracted less in the EU-27 (-2%) than in the US (-3.5%), reflecting the lower responsiveness of EU labour markets. The crisis also has the potential to affect labour supply in the short and medium term, by changing either the total population (e.g. via reduction of immigration flows) or the participation rates. On one hand, recessions tend to discourage labour entry (e.g. young people may decide to stay longer in full-time education) and encourage exit (early retirement for older workers). On the other hand, households affected by significant income reductions may delay retirement decisions, and formerly inactive household members may seek to enter the labour force, particularly when labour markets are flexible and the recovery starts to generate new job opportunities. The participation rate in the EU-27 has indeed fallen from 65.9% in 2008 to 64.6% in 2009

(roughly the level attained in 2006 and 2007). The participation of young workers (15-24) appears to have accentuated its declining trend in 2009⁸.

Table 1.2. Annual growth rate of employment¹⁾

	1996-2000	2001-2005	2006	2007	2008	2009
BE	1.22	0.71	1.19	1.63	1.88	-0.84
BG	-0.26	1.53	3.34	2.82	3.27	-2.03
CZ	-0.82	0.21	1.94	2.66	1.55	-2.03
DK	1.02	0.05	1.99	2.69	0.83	-2.61
DE	0.81	-0.16	0.62	1.66	1.40	-0.30
EE	-2.03	1.10	5.38	0.75	0.17	-8.98
IE	5.72	2.91	4.30	3.56	-0.82	-7.79
EL	0.55	1.35	2.03	1.36	0.11	-0.91
ES	3.88	3.26	3.92	3.02	-0.61	-6.63
FR	1.40	0.64	0.98	1.35	0.53	-1.77
IT	0.98	1.25	1.96	1.24	0.32	-1.13
CY	1.24	3.08	1.76	3.25	2.63	-0.35
LV	-0.54	1.66	4.70	3.58	0.74	-11.86
LT	-1.12	0.86	1.83	2.78	-0.48	-8.25
LU	4.13	3.13	3.64	4.42	4.71	1.09
HU	1.26	0.23	0.73	-0.10	-1.19	-2.99
MT	0.75	0.83	1.31	3.18	2.42	-0.61
NL	2.55	0.33	1.70	2.60	1.44	-0.11
AT	0.92	0.68	1.40	1.80	1.76	-1.47
PL	-0.37	-0.61	3.21	4.43	3.78	-0.70
PT	2.11	0.28	0.51	-0.03	0.44	-2.29
RO	-1.89	-1.35	0.69	0.36	0.28	-3.28
SI	-0.29	0.36	1.50	2.98	2.87	-2.59
SK	-0.79	0.58	2.29	2.12	2.94	-2.04
FI	2.27	0.86	1.76	2.21	1.61	-2.87
SE	0.82	0.22	1.69	2.16	0.91	-2.22
UK	1.26	0.93	0.87	0.68	0.73	-1.97
EU-15	1.47	0.86	1.49	1.60	0.70	-1.92
EU-27	1.01	0.65	1.63	1.78	0.95	-2.03
US	1.78	0.68	1.87	1.10	-0.44	-3.53

1) Employment in persons; all domestic industries (National accounts); 2) Geometric Average.

Source: AMECO database, European Commission.

Labour productivity in the EU-27 appears to be recovering faster than GDP (see Figure 1.3) due to the adjustment lags of employment. Table 1.3 shows a substantial variation in measured labour productivity across countries, reflecting the patchy nature and the magnitude of economic shocks, flexibility and response in labour and market adjustments, the stage in the business cycle, the strength of the recovery, etc.

⁸ For details, see chapter 3 'Youth and Segmentation in EU labour markets' in Employment in Europe 2010 (forthcoming).

Table 1.3. Annual growth rate of real labour productivity⁽¹⁾

	1996-2000 ²⁾	2001-2005 ²⁾	2006	2007	2008	2009
BE	2.17	0.65	1.29	1.52	-1.09	-0.97
BG	1.68	3.68	3.17	2.78	2.69	-2.94
CZ	1.94	4.47	5.03	4.04	0.51	-0.06
DK	1.08	1.18	0.81	-0.38	-2.31	-0.85
DE	2.01	1.30	2.86	0.69	-0.04	-2.27
EE	N/A	6.50	4.82	6.53	-2.26	3.04
IE	5.15	3.08	1.44	3.19	-0.17	1.45
EL	2.86	3.06	-0.53	4.64	1.88	-0.13
ES	0.25	0.75	0.84	1.69	0.82	4.92
FR	2.13	1.44	2.72	-0.14	-0.24	-0.87
IT	0.89	0.11	0.29	0.21	-0.94	-1.66
CY	2.08	0.96	1.46	1.47	0.92	1.26
LV	N/A	6.95	7.96	7.53	-1.21	-2.22
LT	4.29	6.59	6.77	5.70	1.61	-10.90
LU	2.61	1.34	2.29	1.44	-4.23	-1.57
HU	2.53	3.21	3.81	1.34	1.88	-3.98
MT	N/A	0.85	3.95	-0.44	-0.79	-1.41
NL	1.75	1.58	1.58	1.56	0.87	-3.50
AT	1.79	1.16	2.56	2.24	0.31	-2.38
PL	6.17	3.75	2.94	2.28	1.57	5.75
PT	3.41	0.93	1.40	2.78	-0.40	-0.96
RO	N/A	8.95	6.20	5.43	6.45	N/A
SI	N/A	N/A	6.03	4.54	-1.20	-5.53
SK	4.93	4.87	6.84	8.26	2.56	0.77
FI	2.81	2.08	3.45	2.13	-0.34	-1.02
SE	2.48	2.80	2.88	-0.59	-1.69	-1.70
UK	2.52	1.99	2.27	1.75	1.03	-1.95
EU-15	1.77	1.23	1.80	1.09	0.07	-0.96
EU-27	N/A	N/A	1.77	1.09	0.01	N/A
US	2.38	2.49	0.82	1.46	1.36	N/A

1) GDP at 2000 prices over total hours worked; 2) Geometric Average.

Source: AMECO database, European Commission.

1.2.2 Industrial trends

At the sectoral level, the years preceding the crisis confirmed historical trends like the faster productivity growth of manufactures compared with services (see Table 1.4), notably in high-tech sectors like chemicals and pharmaceuticals. This is also true for 'Electrical and optical equipment, including ICT manufacturing', as well as the associated service industry 'Transport, storage and communication', which includes ICT services. The highest productivity and value added growth rate was in a different high-tech sector: Electrical and optical equipment. Within services, value added growth was higher for 'Transport, storage and communication' and 'Financial intermediation'; the latter was an exception in the sense that it is the only services sector with higher productivity growth than the average of manufactures. Labour-intensive services like 'Construction and real estate' display negative productivity growth due to relatively higher employment growth, probably associated with the boom described in section 1.3 below.

Table 1.4. Sectoral labour productivity in the EU-27; annual average % change 1995-2008

NACE - 31 sector classification	Sector	Labour productivity	Value added	Employment
A	Agriculture	3,2	1,0	-2,2
B	Fishing	0,0	-1,7	-1,7
C	Mining and quarrying	1,1	-1,7	-2,8
D	Manufacturing	2,6	2,1	-0,6
DA	Food products, beverages and tobacco	0,4	0,4	0,0
DB	Textiles and textiles products	1,4	-1,8	-3,2
DC	Leather and leather products	-0,8	-3,9	-3,1
DD	Wood and wood products	1,6	0,6	-1,0
DE	Pulp, paper paper products; publishing and printing	1,9	1,0	-0,9
DF	Coke, refined petroleum products and nuclear fuel	2,8	-0,1	-2,9
DG	Chemicals, chemical products and man-made fibres	4,1	3,3	-0,8
DH	Rubber and plastic products	1,5	2,3	0,8
DI	Other non-metallic mineral products	2,1	1,2	-1,0
DJ	Basic metals and fabricated metal products	2,3	2,1	-0,2
DK	Machinery and equipment n.e.c.	3,0	2,2	-0,8
DL	Electrical and optical equipment	6,3	5,9	-0,3
DM	Transport equipment	1,8	2,7	0,9
DN	Manufacturing n.e.c.	0,3	0,9	0,6
E	Electricity, gas and water supply	2,3	1,5	-0,8
F	Construction	-0,4	1,1	1,5
G	Wholesale and retail trade; repair of motor vehicles	1,3	2,6	1,3
H	Hotels and restaurants	-0,4	2,1	2,4
I	Transport, storage and communication	3,0	3,8	0,8
J	Financial intermediation	2,9	3,4	0,5
K	Real estate, renting and business activities	-1,0	3,4	4,4
L	Public administration and defence	0,5	1,0	0,5
M	Education	0,0	0,9	1,0
N	Health and social work	0,5	2,2	1,7
O	Other community, social, personal service activities	-0,1	2,1	2,3
TOTAL		1,3	2,4	1,0

Source: Eurostat.

1.2.3 R&D in EU industries

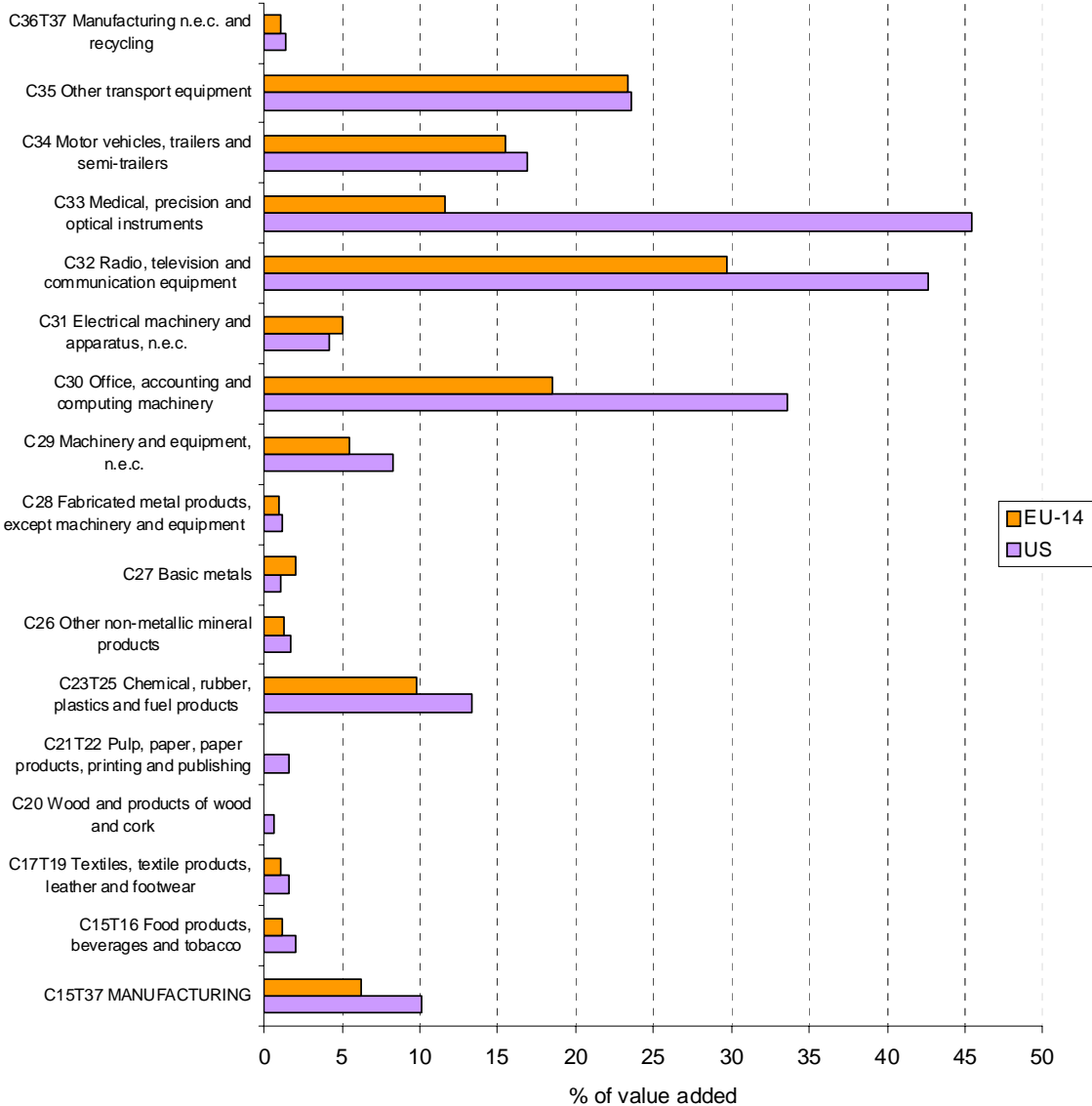
Before the crisis the US spent significantly more on R&D than the EU, both in absolute terms and as a percentage of GDP; the widest gap is in business enterprise R&D expenditure. The distribution of total manufacturing R&D expenditure shows a relatively similar pattern between the EU-14 and the US^{9,10}. However, when looking at the relative effort, R&D expenditure as a percentage of value added (see Figure 1.4), it transpires that US businesses

⁹ EU-14 stands for the EU-15 minus Luxembourg. No data for the EU-27 was available at this level of disaggregation.

¹⁰ The lion's share goes to C23T25 Chemical, rubber, plastics and fuel products, which accounts for roughly 27% of total manufacturing R&D expenditure on either side of the Atlantic. In the EU-14 C34 Motor vehicles sector stands out, accounting for 20% of total manufacturing R&D, contrasting with only 10% in the US.

make a significantly higher effort than their EU counterparts, particularly in sectors considered to be high-technology. For instance, C33 Medical precision and optical instruments devotes close to half of its value added to R&D in the US, compared with barely 12% in the EU. In short, the EU does not invest enough in R&D, neither in absolute nor in relative terms, and a look at the sectoral distribution of R&D intensity in manufacturing clearly shows that it is the high-tech sectors that underperform compared to their American counterparts¹¹.

Figure 1.4 – Sectoral R&D intensity



Notes: Sector classification is ISIC Rev.3.1; R&D expenditure is ANBERD, i.e. it includes R&D activities carried out in the business enterprise sector, regardless of the origin of funding; data for EU-14 is 2005, for the US 2006; the EU-14 is the EU-15 minus Luxembourg; no data for EU-12 countries is available at this level of disaggregation.

Source: OECD STAN indicators, ed.2009.

¹¹ Even if it can be argued whether these R&D expenditures are cost efficient, or what is the sense of seeking causality between R&D and performance, these differences undoubtedly reflect a thriving and innovative market economy in the US compared to the EU.

1.3 Growing imbalances and external competitiveness

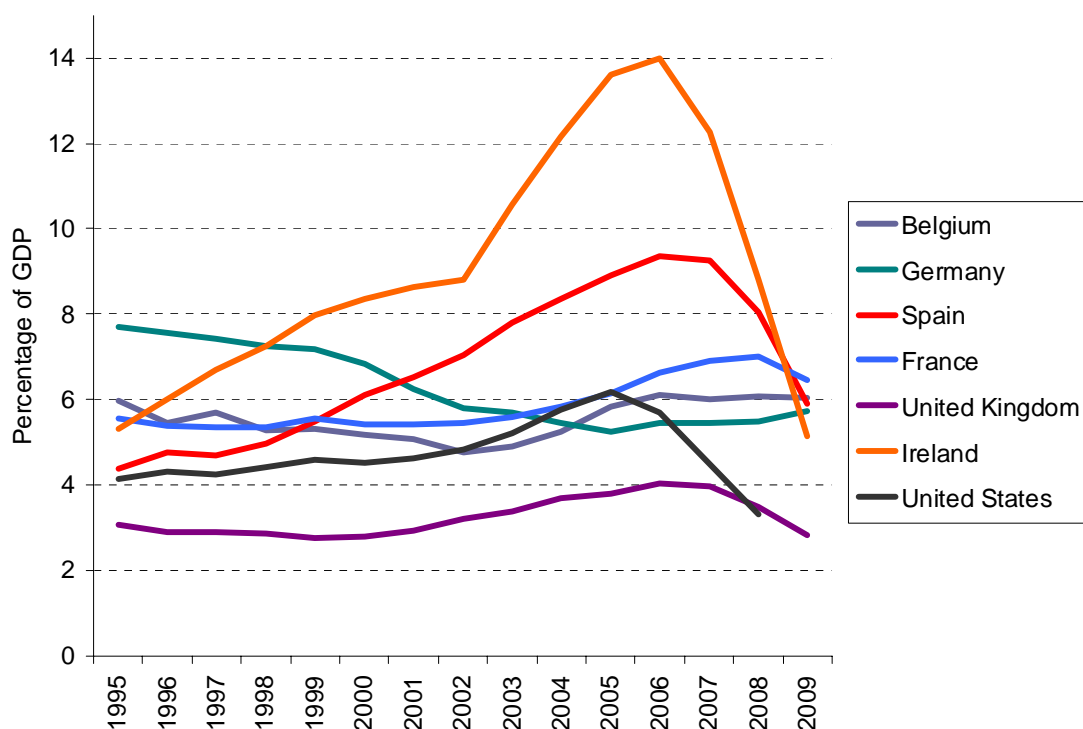
This period of relative stability, with the exception of the slowdown in 2001, came to an abrupt end in 2007 when signs of unrest in the US subprime mortgage market and of a slowdown started to become apparent.

1.3.1 Soaring asset prices

Seen in retrospect, the 2000-07 period can be seen as an incubation period; it was the boom years, notably in the housing sector in the US, but also in Europe: some Member States saw investment in dwellings — that is, housing excluding non-residential and civil engineering — increase by several points of GDP (see Box 1.2). In line with previous major 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’¹².

The present chapter examines the potential impact of the boom years on competitiveness. The accumulation of large distortions has the potential to significantly distort the way resources are allocated in European economies. The following sections examine this possibility.

Figure 1.5 - The rise in investment in dwellings



Note: Investment in dwellings does not comprise non-residential construction and civil engineering.

Source: AMECO database, European Commission.

¹² From the introduction to European Commission (2009c); see chapters 1 ‘Root causes of the crisis’ and 2 ‘The crisis from a historical perspective’. See also European Commission (2010b), ‘Surveillance of Intra-Euro-Area Competitiveness and Imbalances’.

Box 1.2. Accumulated distortions

For a decade or more in some countries, notably the UK, Denmark, Ireland and Spain, house prices increased over their fundamental value. Prices went up because economic players expected them to increase in a speculative spiral that made investment in dwellings attractive to households compared to other forms of investment. The distortion did not affect all countries, but where it did it was not a minor one. In countries like Spain, for instance, at the height of the boom period, around 2005-06, house prices increased by 15% a year¹³.

This means that for years millions of households and firms made consumption-saving decisions counting on trends in the price of houses that subsequently proved to be unsustainable. Households invest most of their savings in property. Large and sustained increases in the price of houses led them to overinvest in housing and to overstate their wealth, pulling down their savings rate. If houses constituted an attractive investment for locals, the same was true for foreigners, directly or indirectly. In 2000-06, on average, countries with a large housing boom also experienced a substantial change in their lending/borrowing position. In some cases it was a dramatic change; Spain for instance was a net lender by the end of the 1990s and was borrowing almost 10% of its GDP annually in 2007. To see this graphically, the housing bubble can be linked to the increase in investment in dwellings, measured in percentage points of GDP, during the boom period: Figure 1.6 relates the housing bubble during 2000-06 to the change in the net lending/borrowing position in the same period. In regard of this figure, it looks like countries like Germany and Austria became lenders to countries like Spain, Ireland and Estonia¹⁴.

These flows of capital further fuelled the behaviour of households, misguided by the trend in housing prices. The rising consumption rate financed by these incoming flows of capital induced a deterioration of the commercial balance with the rest of the world (see Figure 1.7 and Figure 1.8).

When the boom came to an end, accumulated distortions gave way to the corresponding adjustment process. Once the value of houses drop — or is thought to be going to drop in the future — a large portion of perceived wealth vanishes, leading to a major adjustment of consumption and saving. Consumption drops and saving increases to rebuild net wealth. Moreover, if liabilities are substantial with respect to assets, the saving rate will grow further in an effort to deleverage. In the countries most affected by the housing bubble the increase in the savings rate in 2007-09 range from three percentage points of disposable income in the UK to eleven points in Spain. That these increases are related to the previous intensity in investment in dwellings is illustrated in Figure 1.9¹⁵.

Likewise, the countries that accumulated a sizeable deterioration of net exports during the boom years (Figure 1.7) were those that suffered most from the subsequent collapse

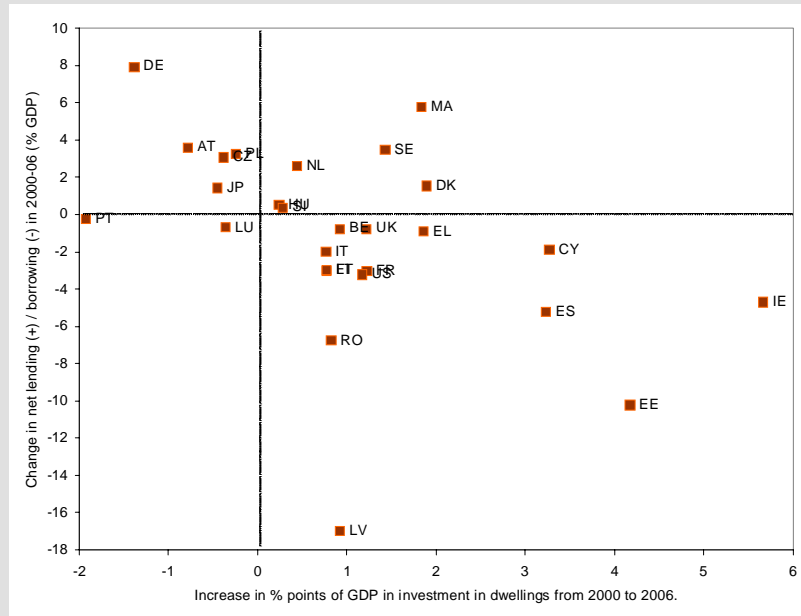
¹³ For Spain and Ireland see, for instance, Ahearne et al (2008) or Díaz and Raya (2009). For an overview of EU countries see Setzer, van den Noord and Wolff (2010).

¹⁴ This is further clarified by the examination of the Bank of International Settlements consolidated bank statistics; see pages 18 to 21 in the BIS Quarterly Review, June 2010.

¹⁵ For a description of the mechanics and magnitude of the adjustment in the US, see Robert A. Solow (2009), 'How to Understand the Disaster', New York Review of Books, 56(8). Retrieved 20 May 2010 from <http://www.nybooks.com/articles/22655>.

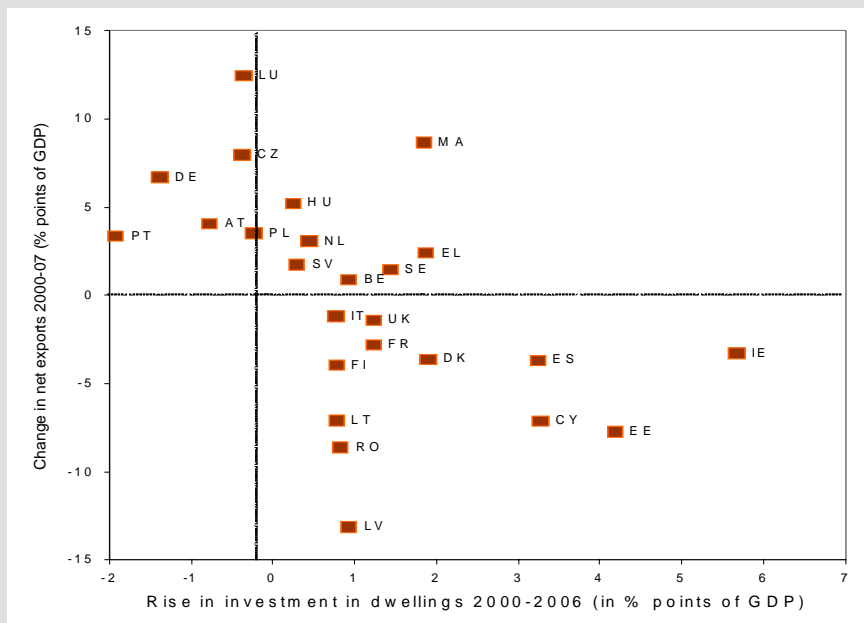
of private consumption at the outbreak of the crisis (see Figure 1.9 and Figure 1.10).

Figure 1.6. Investment in dwellings and net lending/borrowing



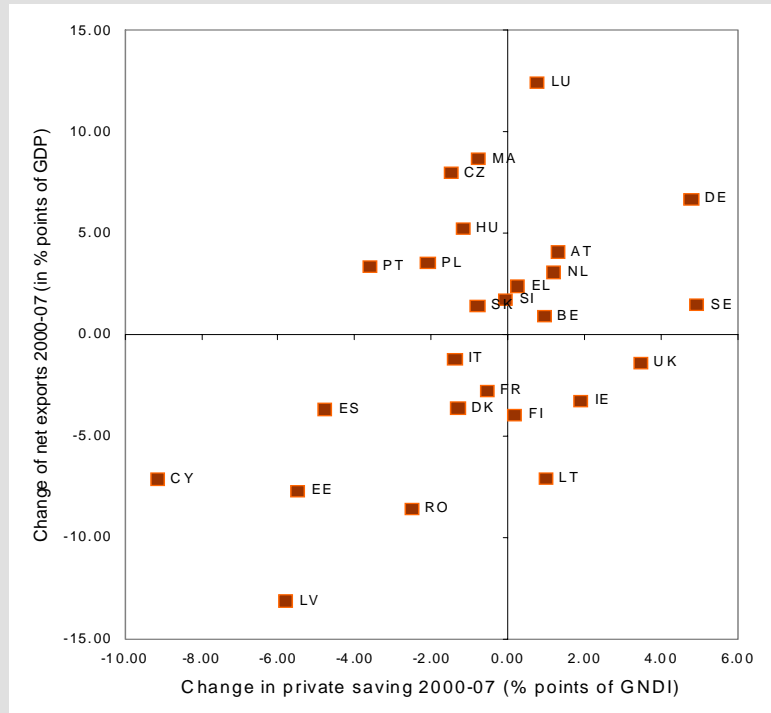
Source: AMECO database, European Commission.

Figure 1.7. Changes in net exports 2000-06



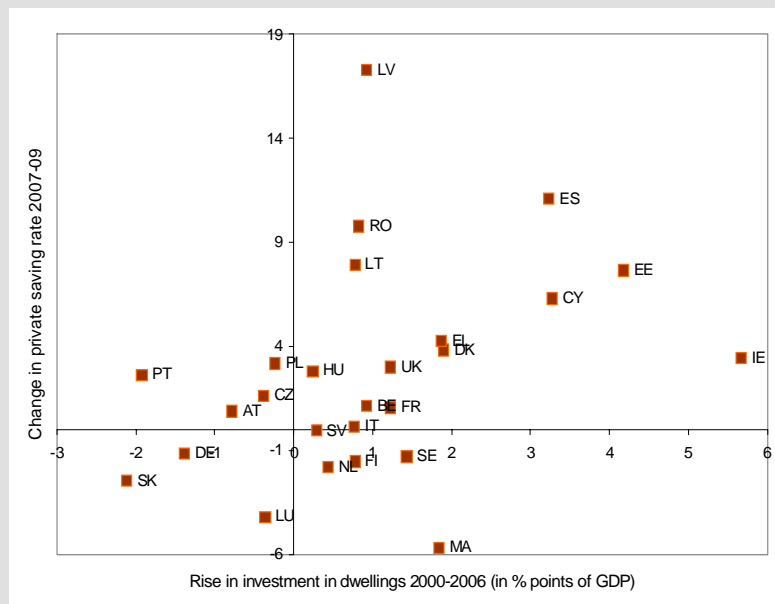
Source: AMECO database, European Commission.

Figure 1.8. Changes in saving rates and net exports 2000-06



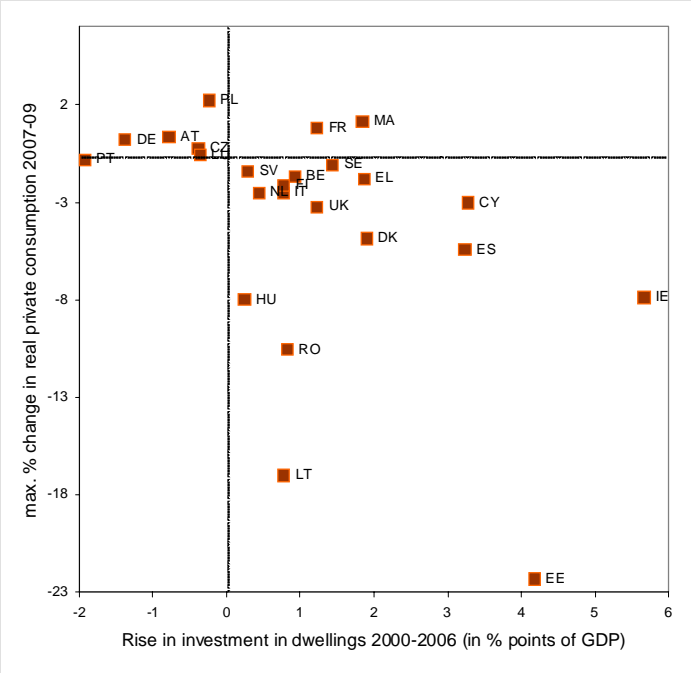
Source: AMECO database, European Commission.

Figure 1.9. The rise in the private saving rate 2007-09



Source: AMECO database, European Commission.

Figure 1.10. The fall in private consumption 2007-09



Source: AMECO database, European Commission.

Table 1.5. A summary view of the bubble

Country		Boom period				Crisis		
		Increase in % points of GDP in investment in dwellings from 2000 to 2006.	Change in net lending 2000-06	Change in private saving 2000-07 (% GNDI)	Change of net exports from 2000 to 2007 in % points of GDP	Change in private saving 2007-09 (% GNDI)	% fall in private consumption from 2007-08 to 2009	% fall in GDP from 2008 to 2009
Belgium	BE	0,92	-0,76	0,93	0,92	1,15	-1,64	-2,01
Czech Republic	CZ	-0,39	3,07	-1,51	7,99	1,65	-0,20	-1,68
Denmark	DK	1,89	1,55	-1,32	-3,60	3,85	-4,84	-4,47
Germany	DE	-1,39	7,93	4,76	6,72	-1,13	0,23	-3,55
Estonia	EE	4,17	-10,20	-5,50	-7,71	7,67	-22,30	-14,58
Ireland	IE	5,66	-4,69	1,89	-3,25	3,44	-7,86	-10,05
Greece	EL	1,86	-0,90	0,23	2,41	4,28	-1,79	-0,69
Spain	ES	3,23	-5,20	-4,80	-3,65	11,13	-5,41	-3,43
France	FR	1,22	-3,01	-0,57	-2,77	1,07	0,82	-1,44
Italy	IT	0,76	-1,99	-1,40	-1,17	0,17	-2,50	-3,00
Cyprus	CY	3,27	-1,88	-9,16	-7,10	6,31	-3,01	-1,75
Latvia	LV	0,92	-16,96	-5,82	-13,12	17,29	-26,62	-18,62
Lithuania	LT	0,77	-3,00	0,96	-7,07	7,95	-16,99	-16,94
Luxembourg	LU	-0,37	-0,69	0,75	12,47	-4,19	-0,56	-4,05
Hungary	HU	0,24	0,52	-1,20	5,25	2,82	-7,98	-1,69
Malta	MA	1,84	5,79	-0,78	8,69	-5,66	1,16	0,26
Netherlands	NL	0,43	2,60	1,18	3,10	-1,81	-2,51	-4,31
Austria	AT	-0,79	3,61	1,28	4,11	0,89	0,36	-1,77
Poland	PL	-0,25	3,25	-2,10	3,55	3,19	2,25	5,42
Portugal	PT	-1,93	-0,23	-3,63	3,37	2,65	-0,79	-1,54
Romania	RO	0,82	-6,73	-2,53	-8,59	9,79	-10,54	-4,54
Slovenia	SI	0,28	0,38	-0,09	1,76	-0,02	-1,41	-6,04
Slovakia	SK	-2,12	-5,08	-0,82	1,44	-2,44	-0,67	-5,79
Finland	FI	0,77	-2,97	0,16	-3,94	-1,52	-2,12	-7,17
Sweden	SE	1,43	3,48	4,92	1,48	-1,29	-1,07	-3,09
United Kingdom	UK	1,22	-0,77	3,44	-1,37	3,00	-3,22	-3,63
United States	US	1,17	-3,20	0,26	-1,23	4,57	-0,85	-1,28
Japan	JP	-0,45	1,44	-0,46	0,22	-0,15	-1,67	-6,12

Source: AMECO database, European Commission.

1.3.2 Growing distortions and external competitiveness

Growing imbalances during the boom period could have had an impact on factors that will condition productivity growth, and hence would affect the performance of some Member States beyond their recovery from the recession (see Box 1.3). For instance, the real estate

boom could have detracted resources from productive sectors damaging productivity growth; or nominal wage inflation could erode the international competitiveness of domestic firms, notably in countries within the Euro area.

In particular, much attention has been paid to the large changes in the trade balance of many countries illustrated in Figure 1.7. The excess of imports over exports is often associated with a loss of external competitiveness. As the story goes, so-called surplus countries like Germany were able to compete more effectively in international markets (e.g. by keeping wages low) and then invested abroad the surplus of its trade balance, thus financing the commercial deficit of other less well performing countries, the deficit countries like Spain. This view, however, cannot explain some of the key facts discussed in Box 1.2. In particular, it does not explain why the 'surplus' countries typically saw their saving rate soar during the boom period while deficit countries experienced the opposite, as illustrated in Figure 1.8¹⁶.

The remainder of this section argues that the deterioration of the trade balance is only reflecting capital flows — in turn reflecting differences in asset prices across countries — and that external competitiveness, as measured by exports performance, was neither playing an important role in this deterioration nor being substantially affected by these developments. In other words, as we shall discuss below, in the EU trade deficits were related to significant capital flows within Member States while external competitiveness seemed to be more related to developments in productivity.

¹⁶ Box 1.5 below examines in detail the cases of Germany and Spain. Both before and during the crisis, these countries constitute two polar cases as far as the experience the last decade is concerned.

Box 1.3. Imbalances do not (necessarily) reflect distortions

If two trading countries, for whatever institutional reasons, have two different saving rates, they will always have a commercial deficit and surplus respectively: because the saving country will permanently finance a level of imports higher than exports in the consuming country. This type of equilibrium is sometimes said to entail an ‘imbalance’ in the literature¹⁷. However, as long as prices correctly reflect preferences and technology, it does not need to reflect any fundamental problem. A typical case would be fast catching-up developing countries that constitute attractive investment opportunities.

In contrast, when some prices are sending the wrong signal, similar ‘imbalances’ may be reflecting true distortions that, accumulated, may lead to an adjustment process that can take the form of a recession like the current one. The flows of capital referred to in section 1.3.1 reflected the overpricing of certain assets in certain countries. Correcting this deviation of prices from the fundamental value of the assets was the first stage in readjusting the consumption-saving behaviour of households and was the ultimate cause of the downturn.

In other words, an ‘imbalance’ may or may not signal an underlying problem depending on whether it reflects some mispricing. That is most likely the reason why even ex post there is no consensus on whether the so-called ‘global imbalances’ are at the origin of the crisis; see Suominen (2010) and references therein.

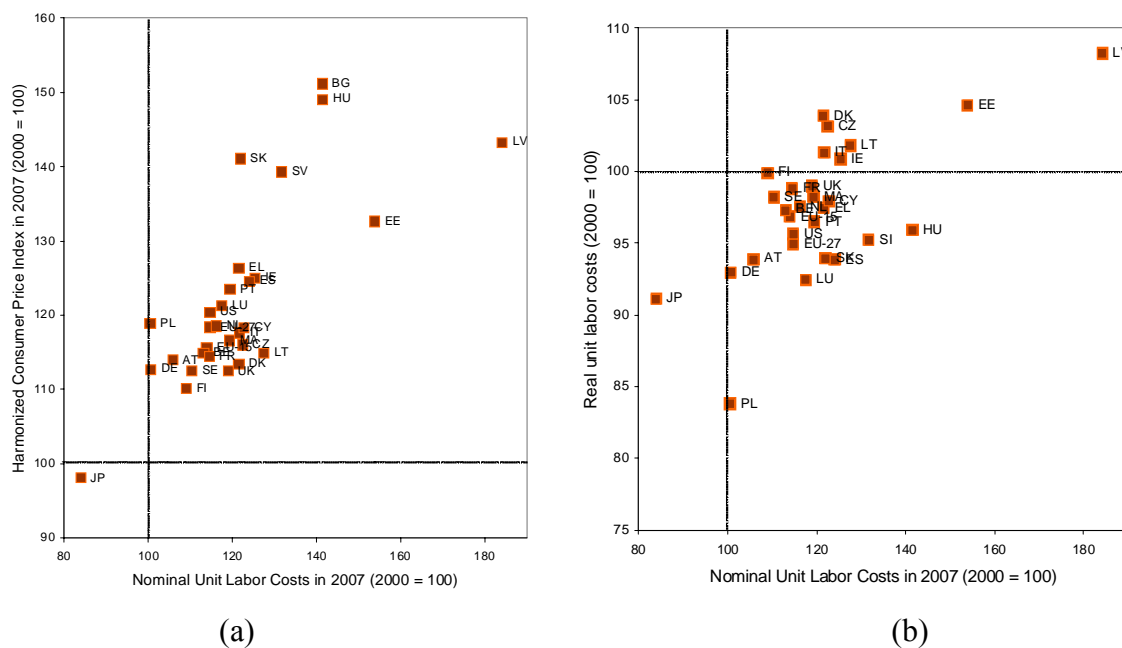
1.3.3 Rising unit labour costs, cause or consequence?

The boom years witnessed a major increase in unit labour costs (ULC) in certain countries, generally the so-called deficit countries. It has been suggested that large increases in ULC could explain, if not the crisis, at least its depth and duration.

However, the development of ULC does not seem to have had a significant effect beyond being associated with corresponding increases in the general level of prices. As discussed below, if there is a relation between ULC and export performance, it is weak and of second order of magnitude compared with the deterioration of the trade balance (and hence the former cannot be the cause of the latter).

¹⁷ In European Commission documentation an imbalance only occurs when there is a market or policy failure. Hence, housing bubbles like those examined in this chapter would be indeed classified as an imbalance.

Figure 1.11. Rising unit labour costs, inflation and the share of labour in income



Source: AMECO database, European Commission.

A bubble economy may affect the development of wages because the inflows of capital will not be entirely directed to the demand for foreign goods. As these flows increase demand for domestic goods beyond productivity, domestic prices will rise, thereby applying upward pressure on nominal wages and increasing ULC. But this is a nominal effect, not necessarily affecting real wages in net terms¹⁸.

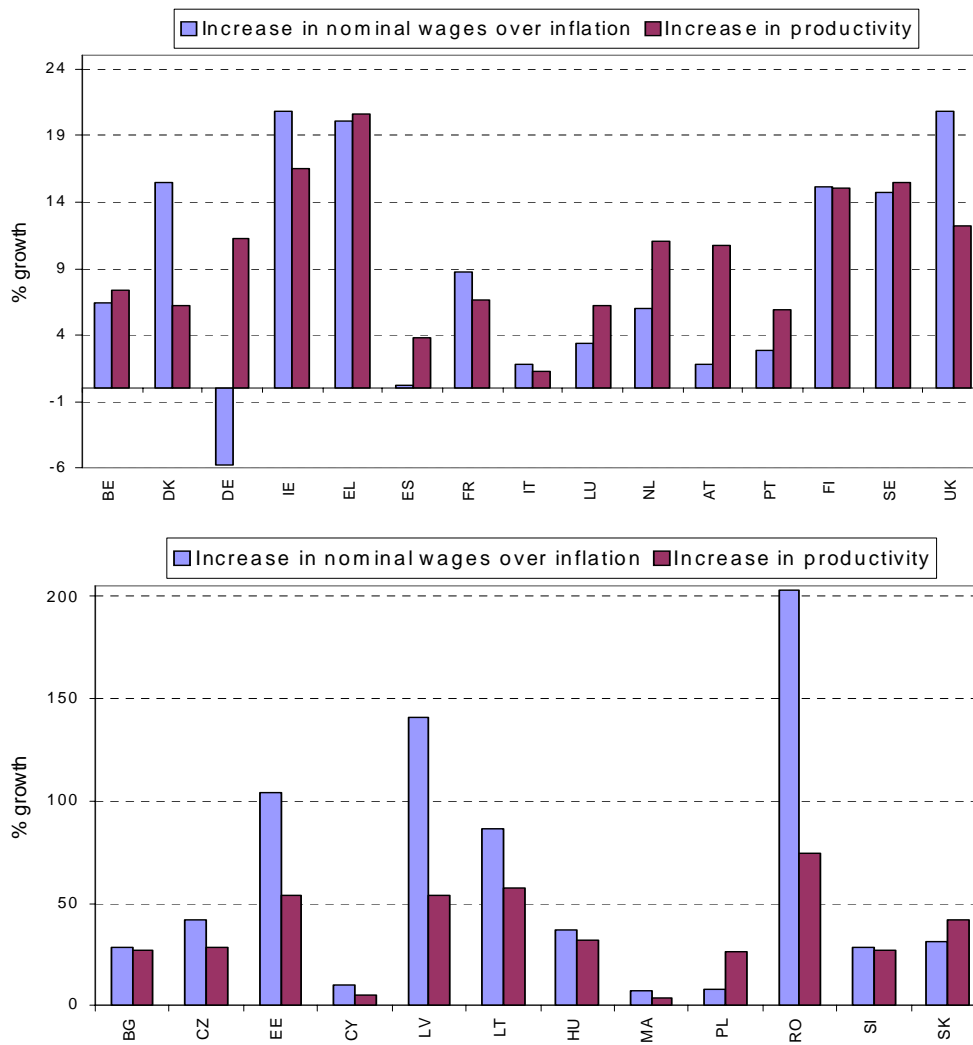
Figure 1.11(a) can thus be seen as not only reflecting a logical relation between nominal wages and prices, but also suggesting that real wages did not deviate from productivity that much during the boom period. This can be seen from the absence of any link between nominal unit labour costs and the share of 'compensation of labour' in national income, i.e. real unit labour costs, in Figure 1.11(b). Changes in the general level of prices have brought down real wages and left labour's share of income at its slightly declining level of recent years.

To test this conjecture one can compare the increase in nominal wages over the general level of prices with the increase in productivity. This is done in Figure 1.12 where it can be seen that, with some exceptions, wherever nominal wages increased over the general level of prices during the boom years, it was because productivity was increasing by a similar magnitude. That real wages have not grown beyond productivity in most European economies is confirmed by the general downward trend of the share of wages in national income 2000-07: for the EU-27 as a whole prices (HICP) grew by 18%, ULC by 14% and the share of labour in income fell by 5% (see again Figure 1.11(b))¹⁹.

¹⁸ Even inside a monetary union, this nominal effect is not necessarily translated into a real effect; it will depend on the extent to which these wage distortions are concentrated in non-tradables or tradables sectors; see box 1.4 below.

¹⁹ Manipulating the definition of ULC, one can prove that the gap between the growth rates of ULC and the general level of prices is approximately the percentage change in the share of wages in income.

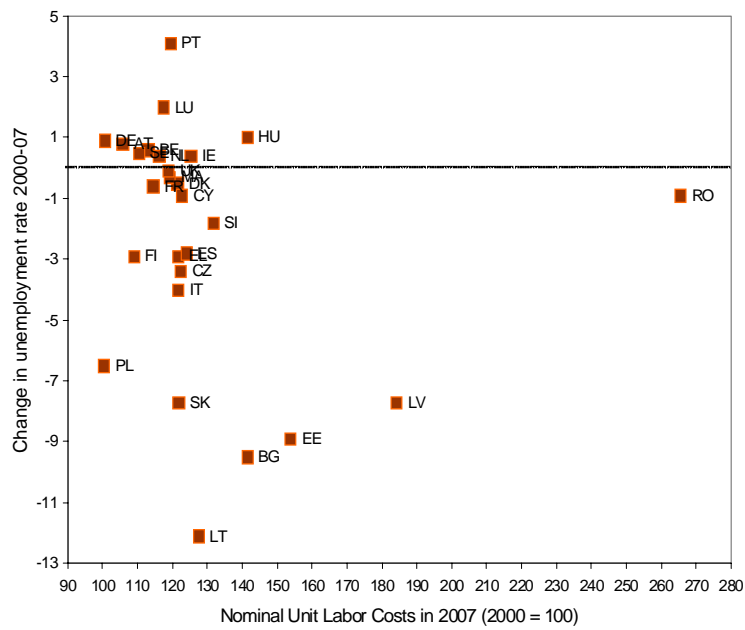
Figure 1.12. Real wages and productivity: changes 2000-07



Source: AMECO database, European Commission.

It is not surprising, then, that the rise in unit labour costs bears no relation to the changes in unemployment rates during this period (Figure 1.13). In short, labour market institutions do not seem to have played any great role in the boom period beyond their ability or inability to track productivity without causing inflation (mostly in non-tradables sectors, see Box 1.4).

Figure 1.13. Rising unit labour costs and unemployment

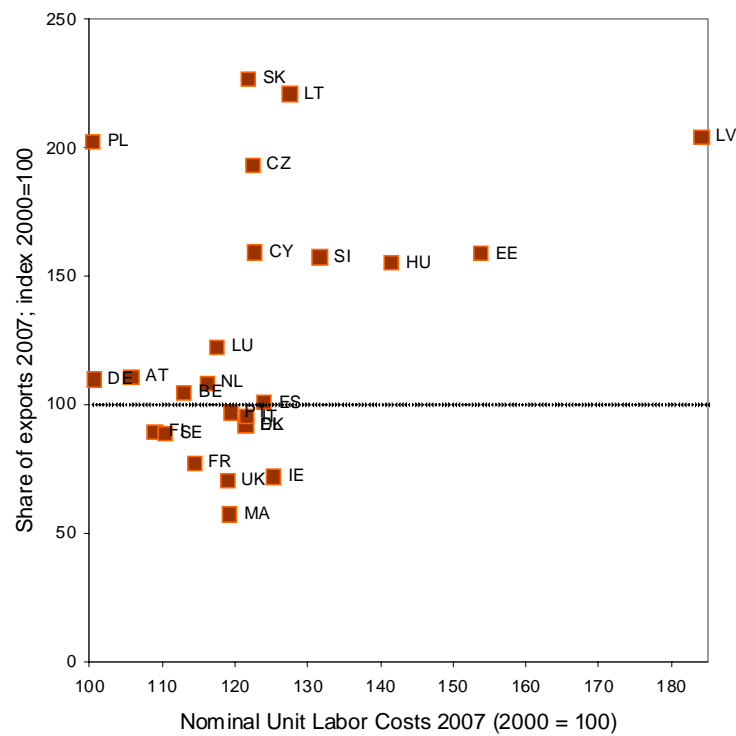


Source: AMECO database, European Commission.

1.3.4 World market shares

The emphasis on nominal labour costs is generally justified by the open character of our economies. However, exports' performance, as measured by world market shares, does not seem to be affected by changing labour costs either — even if there is a good reason for this to be the case in theory, at least within the Euro area.

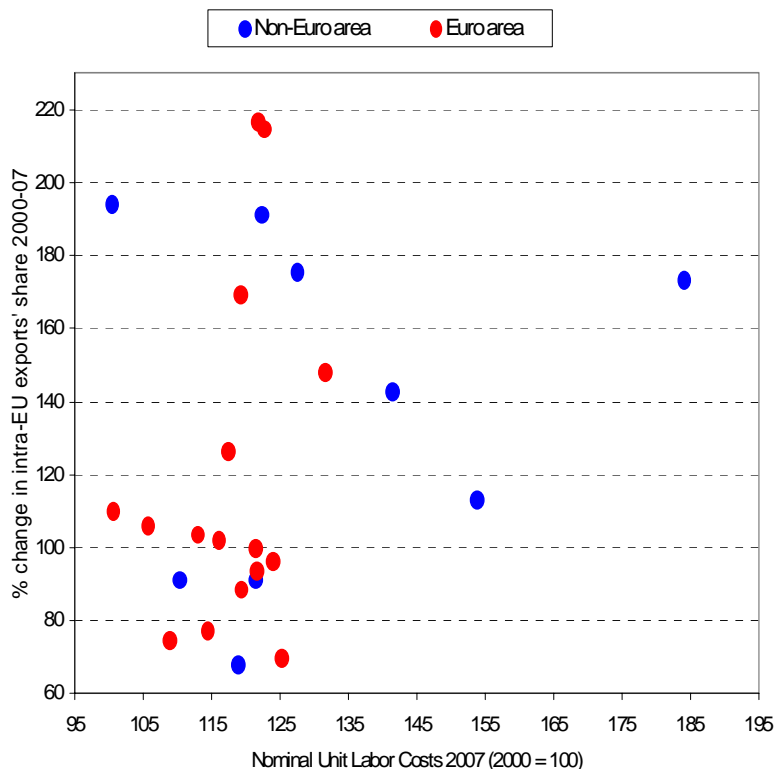
Figure 1.14. Rising unit labour costs and changing world market shares



Source: AMECO database, European Commission.

In principle, increasing the nominal cost of labour may affect the competitive position of domestic firms in international markets. This is particularly true in countries in a monetary union where there is no national currency, and hence no possibility of depreciation or devaluation. However, Figure 1.14 compares the changes in nominal unit labour costs in the boom period with changes in world market shares as measured by the share of exports in total world exports; the only obvious fact that arises from this chart is the large expansion in EU-12 Member States in this post-enlargement period. Focusing on intra-EU trade and distinguishing between euro area and non-euro area countries does not reveal any obvious pattern either.

Figure 1.15. Rising unit labour costs and intra-EU trade for Euro and non-Euro area



Source: AMECO database, European Commission.

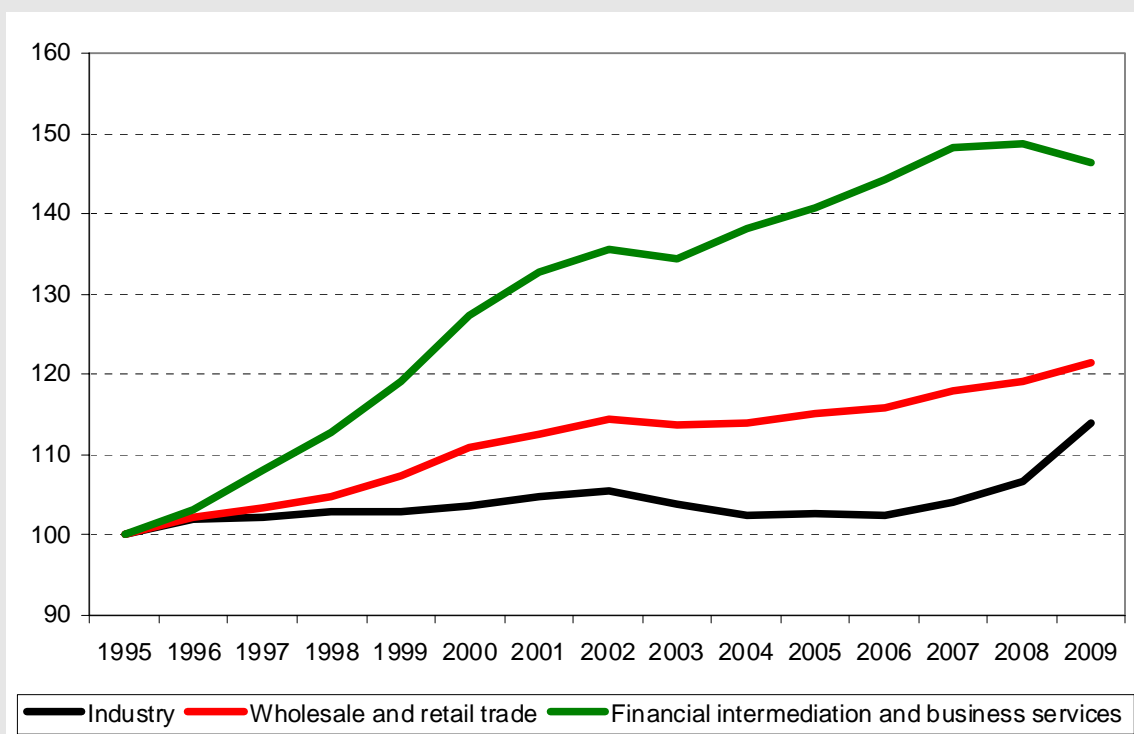
One possible explanation for the lack of any relation between ULC and export shares is that trading sectors face competitive pressures that prevent nominal wages growing much faster than productivity or, alternatively, limit the ability of firms to pass the increasing cost of labour through to higher prices. There is some evidence for this (see Box 1.4).

Box 1.4. Unit labour costs in tradables and non-tradables

Most economic activity in large countries is domestic. The aggregate evolution of ULC may reflect wage developments in sectors not exposed to trade. A case in point is that of Spain, an economy displaying one of the largest housing bubbles as well as one of the largest increases in ULC. In the boom times the general level of prices rose by 24%, 8 points above euro area inflation. Nevertheless, the deflator of exports rose by 15%, a point below the euro area level. This is no exception: the long-term behaviour of ULC differs between tradables and non-tradables as illustrated in Figure 1.16 for the EU as a whole.

This differing behaviour may stem from two different forces. On the one hand, industry, typically producing tradables, is more exposed to international competition than are services. On the other, the faster productivity growth in manufacturing compared with services may also explain a large share of this differing behaviour.

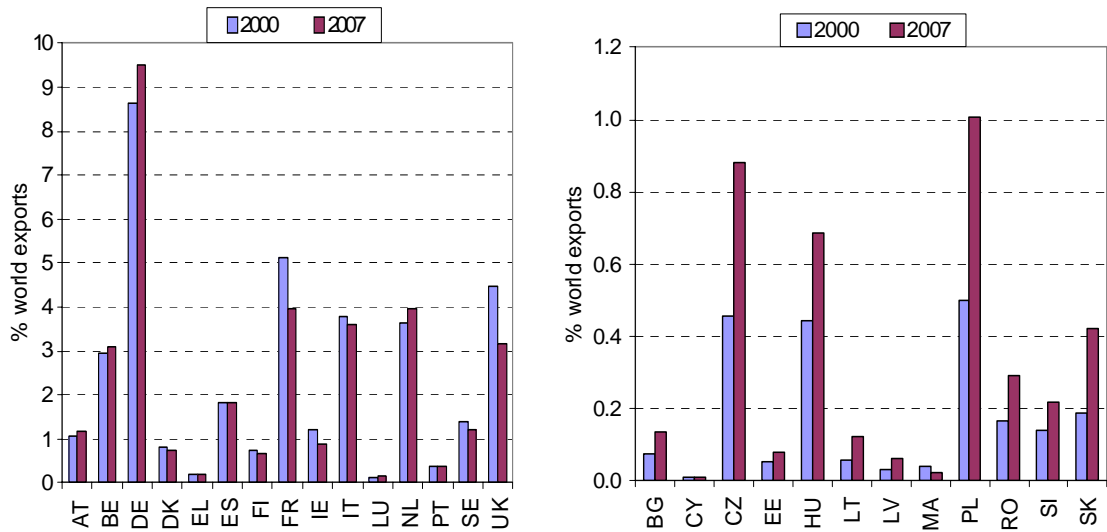
Figure 1.16. Sectoral unit labour costs in the EU-27; index 1995=100



Source: European Union Industrial Structure 2011, forthcoming.

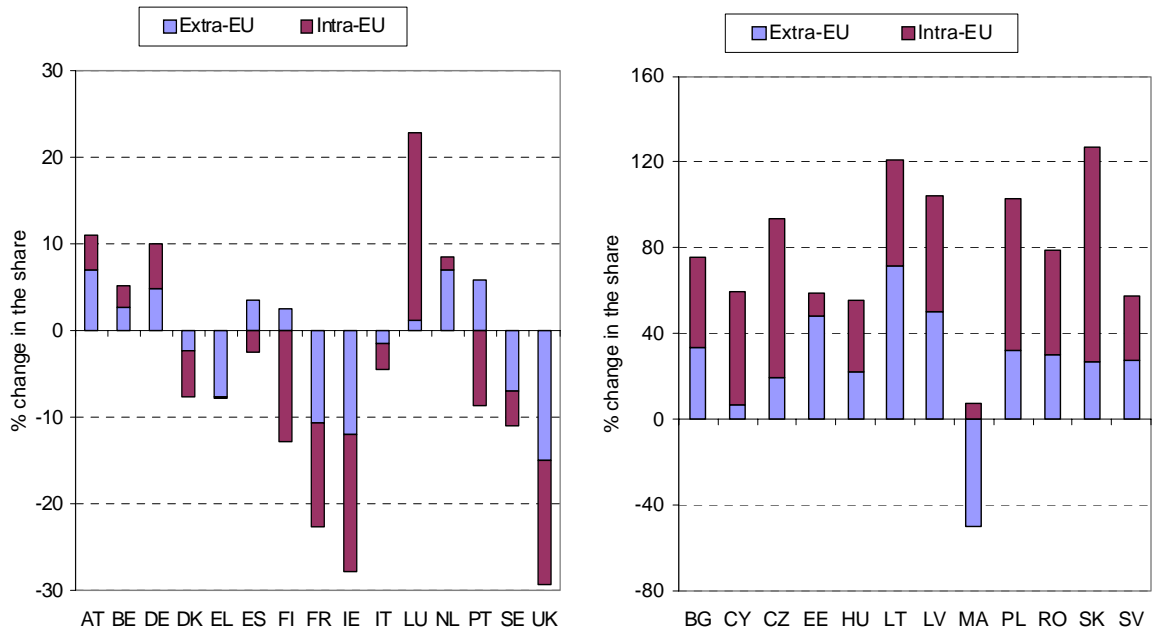
The share of exports in world exports for most European countries has been roughly constant or decreasing since 2000. This general decreasing trend is most likely due to a compound effect resulting from the fast increase of the level of trade during this period, in turn due to the rise of emerging economies.

Figure 1.17. Share of exports in world exports 2000-07



Source: AMECO database, European Commission.

Figure 1.18. Contribution to changes in the share of exports in world exports 2000-07 by extra- and intra-EU trade



Source: AMECO database, European Commission, and own calculations.

The focus, however, should be on Figure 1.19. It is in regard of this figure that it is clear that countries with a housing bubble — inside the euro area like Spain or outside it like Denmark — retained their market share reasonably well. Germany increased its export share by 10% but the contribution of intra- and extra-EU trade is roughly the same; France lost ground in both intra- and extra-EU markets, and by the same magnitude as the UK, which is not in the euro area. This is evidence against the hypothesis that countries like Spain or France, with relatively high unit labour costs, have lost market shares to countries like Germany, with lower unit labour costs, because of a deterioration of ‘cost-competitiveness’ in the euro area.

1.3.5 Summarizing

In short, net exports only reflect capital flows caused by mispriced assets, not losses of external competitiveness. In fact, there is no clear relation between the real estate bubble and the performance of exports during the boom period. In other words, the growing imbalances of the boom period do not seem to have had a very clear impact on external competitiveness; if any, through growing nominal labour costs, and of second order of magnitude compared with the accumulated imbalances and the ensuing contraction²⁰.

What about productivity growth? If large capital inflows during the boom period are not used productively to eventually generate resources to pay back the external debt, they are hampering the ability of countries to generate income in the future while at the same time increasing the interest burden on these economies.

This is the possibility explored in the next section.

1.4 The impact of the boom on industry and competitiveness

From the discussion in the previous section, the boom period does not seem to have had any obvious impact on external competitiveness as measured by the ability to maintain exports shares. True, the boom period has affected nominal wages and prices but there is no systematic impact on exports. Countries like France with moderate increases in ULC or even reductions in real effective exchange rates (REER)²¹ have lost substantial international market shares (see again Figure 1.19) while others, like Spain, with large increases in ULC and REER, have more or less kept their market shares.

Nevertheless, this lack of impact on exports (external competitiveness) does not rule out the possibility that these developments may have distorted the way resources are allocated within countries and across sectors hampering productivity growth in the years to come (competitiveness as productivity growth).

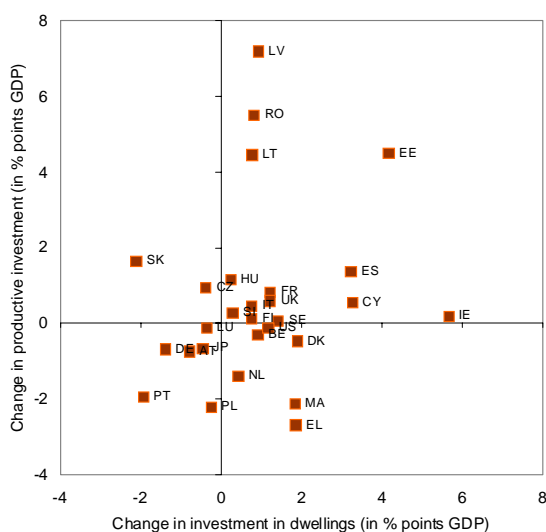
1.4.1 Has the housing bubble crowded out productive investment?

The most obvious distortion one would expect is not apparent: it does not seem that investment in dwellings crowded out productive investment at the aggregate level (productive investment here is gross fixed capital formation excluding dwellings but including non-residential construction and civil engineering). In other words, countries that increased considerably their investment in dwellings, also increased their productive investment.

²⁰ At this point it may be worth recalling that this chapter examines the impact of growing imbalances in competitiveness and external competitiveness. To conclude that the evolution of the ability to export does not seem to bear a clear relationship with these imbalances is not to say that they are not fundamental to understand the crisis and the recovery. First, countries more affected by these distortions tended afterwards to be more hit hard by the recession, as illustrated in figure 1.10. Second, the accumulation of imbalances yielded in many cases a leveraged household and corporate sector —this is a promise of a slow recovery in countries affected by the bubble (see Kocherlakota (2010) and McKinsey Global Institute (2010)).

²¹ The real effective exchange rate (REER) is another common indicator of external competitiveness; see graph I.1 in European Commission (2010a).

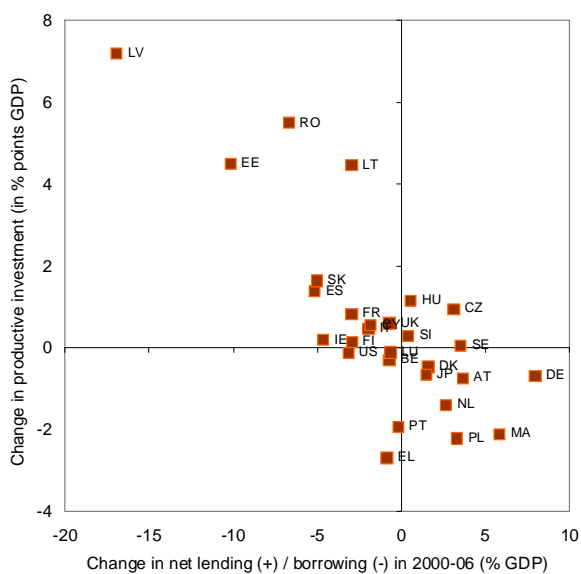
Figure 1.19. Changes in productive investment and investment in dwellings in 2000-06



Source: AMECO database, European Commission.

If there is any distortion, it is that countries engaged in heavy borrowing have also increased their productive investment. It is a small effect, though; from Figure 1.20 it is clear that the largest changes in productive investment in 2000-06 occurred in new Member States, which were also the target of substantial foreign direct investment.

Figure 1.20. Changes in lending/borrowing position and productive investment in 2000-06



Source: AMECO database, European Commission.

Box 1.5. Two polar cases

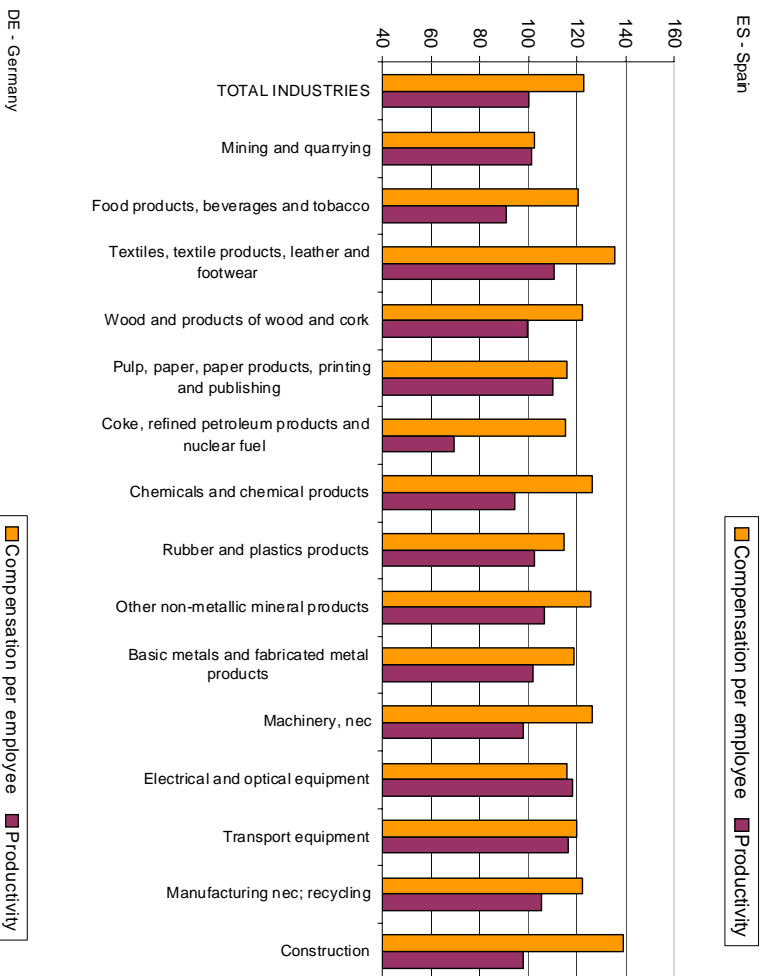
The cases of Spain and Germany illustrate two contrasting experiences in the boom period. Examining the different paths followed by these two economies may help us to understand the imbalances and the different behaviour during the subsequent adjustment.

One major argument is that unit labour costs are not growing enough in Germany. Figure 1.21 shows for 2000-07 nominal compensation per employee and productivity defined as real value added per person in employment in the respective sector.

A glance at these charts reveals two significant differences. First, unit labour costs, the ratio of these indexes, are increasing in all sectors in the Spanish economy and decreasing in most German sectors. Second, productivity is up in most German sectors, often on a significant scale, while for Spanish sectors productivity is either falling or growing only modestly. In the light of the discussion about the role of aggregate unit labour costs and export performance in the previous section, the second fact is more likely to be the relevant one, and the one explaining the roughly 10% increase in market share of German exports in 2000-07.

This interpretation is further strengthened by Table 1.6. As mentioned above, the two countries differ markedly in their experience over recent years. In particular, unit labour costs increased significantly in Spain during the boom period. However, these differences are not reflected in the distribution of exports between the EU and the rest of the world. If any, between 2000 and 2007 Spain displays a slight bias towards low-tech exports. For Germany there is no obvious trend; this is consistent with Figure 1.18 above, where the increase in the world market shares of Germany is shown to be due as much to intra-EU trade as to extra-EU trade.

Figure 1.21. Nominal wages and productivity in 2007; index 2000=100



Source: EU KLEMS research database and own calculations.

Table 1.6. Export characteristics — a comparison between Germany and Spain

	Germany				Spain			
	Share of exports over total exports		Share of exports to the EU over total exports		Share of exports over total exports		Share of exports to the EU over total exports	
	2000	2007	2000	2007	2000	2007	2000	2007
CTOTAL: GRAND TOTAL	100,0	100,0	63,2	63,3	100,0	100,0	72,4	70,0
C01T05: AGRICULTURE FORESTRY AND FISHING	0,9	0,7	65,9	75,1	6,0	5,4	90,7	90,0
C10T14: MINING AND QUARRYING	0,2	0,2	80,5	79,1	0,5	0,5	51,8	46,4
C15T37: TOTAL MANUFACTURING	96,0	91,2	63,3	62,1	91,6	91,4	72,2	70,1
C15T16: + Food beverages and tobacco	4,0	3,9	80,9	81,4	8,1	8,6	71,9	74,9
C17T19: + Textiles leather and footwear	3,8	2,7	74,6	72,9	6,4	5,5	67,4	66,4
C20: + Wood and cork	0,6	0,7	70,7	72,4	0,7	0,7	73,2	72,3
C21T22: + Pulp paper printing and publishing	3,2	2,8	72,9	73,2	3,1	2,5	69,7	74,8
C23T25: + Chemical rubber plastics and fuel	17,1	18,3	59,0	62,7	16,2	19,9	62,7	58,3
C26: + Non-metallic products	1,4	1,2	64,2	63,1	3,3	2,9	60,1	64,8
C27T28: + Basic metals and fabricated metal products	7,9	9,0	68,8	67,5	7,8	9,9	69,4	75,2
C29T33: + Machinery and equipment	33,0	30,2	60,0	53,5	16,3	14,4	68,9	64,1
C34T35: + Transport equipment	23,2	21,2	62,6	63,3	27,5	25,3	84,0	80,1
C36T37: + Manufacturing n.e.c and recycling	1,9	1,8	66,2	71,2	2,3	1,7	65,9	68,5
HITECH: HIGH TECHNOLOGY MANUFACTURES	19,1	17,3	60,8	61,1	9,3	9,5	70,8	68,8
MHTECH: MEDIUM-HIGH TECHNOLOGY MANUFACTURES	48,0	46,7	59,8	57,3	42,9	41,4	79,1	74,7
MLTECH: MEDIUM-LOW TECHNOLOGY MANUFACTURES	14,1	15,9	67,4	66,4	18,8	21,6	60,0	60,3
LOTECH: LOW TECHNOLOGY MANUFACTURES	13,4	11,9	74,7	75,5	20,6	19,0	69,5	71,8
ICTMAN: ICT MANUFACTURES	11,3	8,9	66,7	60,7	6,0	4,0	76,0	78,0

Source: OECD STAN Bilateral Trade and own calculations.

1.4.2 Employment growth in construction and real estate services

In 2000-2007 employment in the EU-27 increased by more than 6%, from 211 million to 224 million. The employment rate improved by more than 3 percentage points in 2000-2007 (see Table 1.7.). Some of the countries with low or average employment at the beginning of the

decade managed to increase their rates close to the Lisbon target (e.g. Estonia, Ireland, and Latvia).

Table 1.7. Employment rates

	2000	2007	Growth in employment rates 2000-07, percentage points
	Employment rates, %		
EU27	62,2	65,4	3,2
Belgium	60,5	62,0	1,5
Bulgaria	50,4	61,7	11,3
Czech Republic	65,0	66,1	1,1
Denmark	76,3	77,1	0,8
Germany	65,6	69,4	3,8
Estonia	60,4	69,4	9,0
Ireland	65,2	69,1	3,9
Greece	56,5	61,4	4,9
Spain	56,3	65,6	9,3
France	62,1	64,3	2,2
Italy	53,7	58,7	5,0
Cyprus	65,7	71,0	5,3
Latvia	57,5	68,3	10,8
Lithuania	59,1	64,9	5,8
Luxembourg	62,7	64,2	1,5
Hungary	56,3	57,3	1,0
Malta	54,2	54,6	0,4
Netherlands	72,9	76,0	3,1
Austria	68,5	71,4	2,9
Poland	55,0	57,0	2,0
Portugal	68,4	67,8	-0,6
Romania	63,0	58,8	-4,2
Slovenia	62,8	67,8	5,0
Slovakia	56,8	60,7	3,9
Finland	67,2	70,3	3,1
Sweden	73,0	74,2	1,2
United Kingdom	71,2	71,5	0,3
United States	74,1	71,8	-2,3
Japan	68,9	70,7	1,8

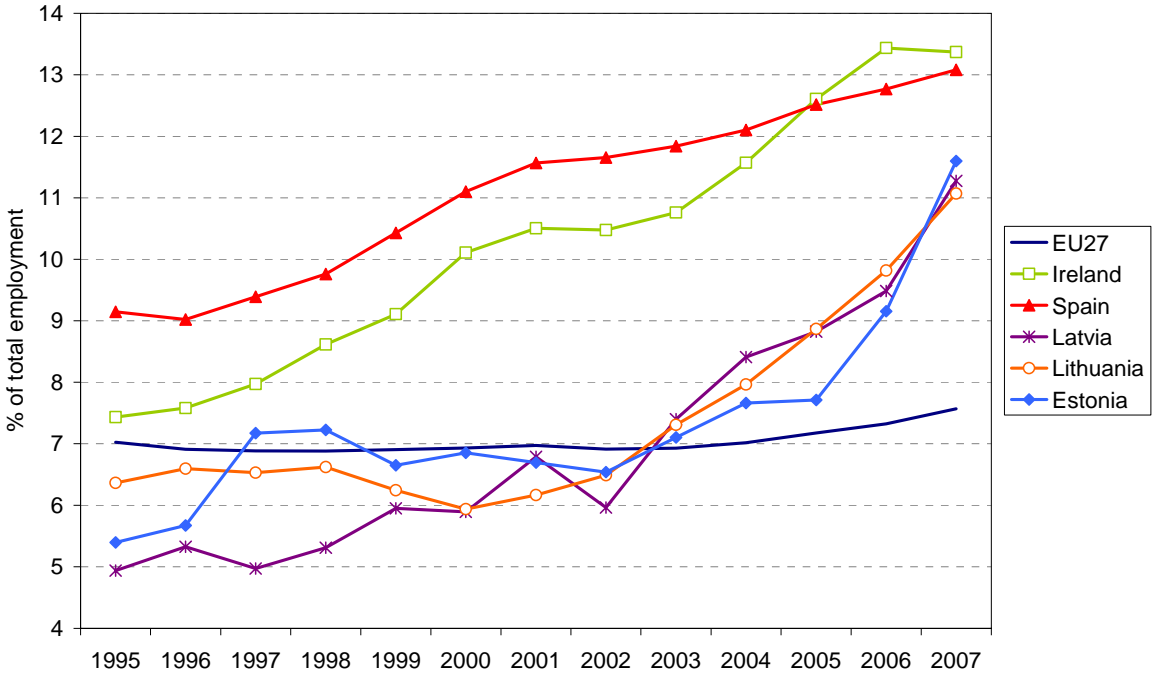
Source: Eurostat, LFS series.

In this context, countries affected by the housing boom showed different patterns regarding manufacturing. In Spain, for example, employment in manufacturing increased (3.5%), especially in manufacturing of food, chemicals, rubber products, mineral and metal products, machinery and transport equipments — taking into account branches with larger relative weights. At the same time in Ireland, the number of people employed in manufacturing fell by 8%, with decreases virtually across the board.

As expected, the role of construction in employment changed considerably during 2000-2007 (at the EU level by 17%, which is more than 2 million people in absolute terms). A significant drop can be observed only in Germany, Austria and Portugal, while the role of construction gained in importance in almost all the other countries, especially in Ireland,

Spain and in the Baltic republics (see Table 1.8.)²². Generally, this can be explained on the one hand by rising demand for housing requiring huge numbers of construction workers, and by huge infrastructural development works (motorways, roads, railways etc.) on the other. The share of construction in total employment exceeded 13% in Ireland and Spain (see Figure 1.23.). This could have caused tensions in the labor market but the role of immigrant workers became important: they helped to alleviate capacity constraints in the sector and at the same time contributed to the increasing demand for housing²³.

Figure 1.22. Employment in construction over total employment



Source: Eurostat, National Accounts.

Another activity related to the housing boom is the banking sector. The role of the financial sector in employment increased, especially in the countries affected by the housing boom and where the role of external financial sources became more important in those years. Significant increases occurred in most new member states (Baltic republics, Bulgaria, Romania, Poland) and in Ireland²⁴. Finally, the growing importance of housing investment was reflected in the growing number of employees in the real estate sector (almost half a million people — a 24% increase at the EU level). Real estate, renting and business activities together registered an increase of 5.8 million employees (26%), with 'other business activities' (NACE 74) playing the most significant role.

²² Bover and Jimeno (2007) examined the relationship between house prices and labour demand in the construction sector. They found substantial cross-country differences in the time series correlation of house prices and sectoral composition of employment. Countries with more building possibilities, like Spain, experienced a high sectoral allocation of employment and displayed larger elasticities of labour demand in the construction with respect to house prices than countries that were not affected by the housing boom.

²³ See Aherne et al (2008).

²⁴ More widely available and lower-cost housing financing contributed to the rapid growth of mortgage debt in several countries (IMF, 2008). For instance in Ireland, residential mortgage lending grew annually by 25% on average in the period 2000-2006 (Malzubris, 2008). In Estonia credit inflows progressively accelerated: gross debt liabilities increased on average by 32% annually in 2005-2007 and by 20% in 2000-2004 (Lamine, 2008).

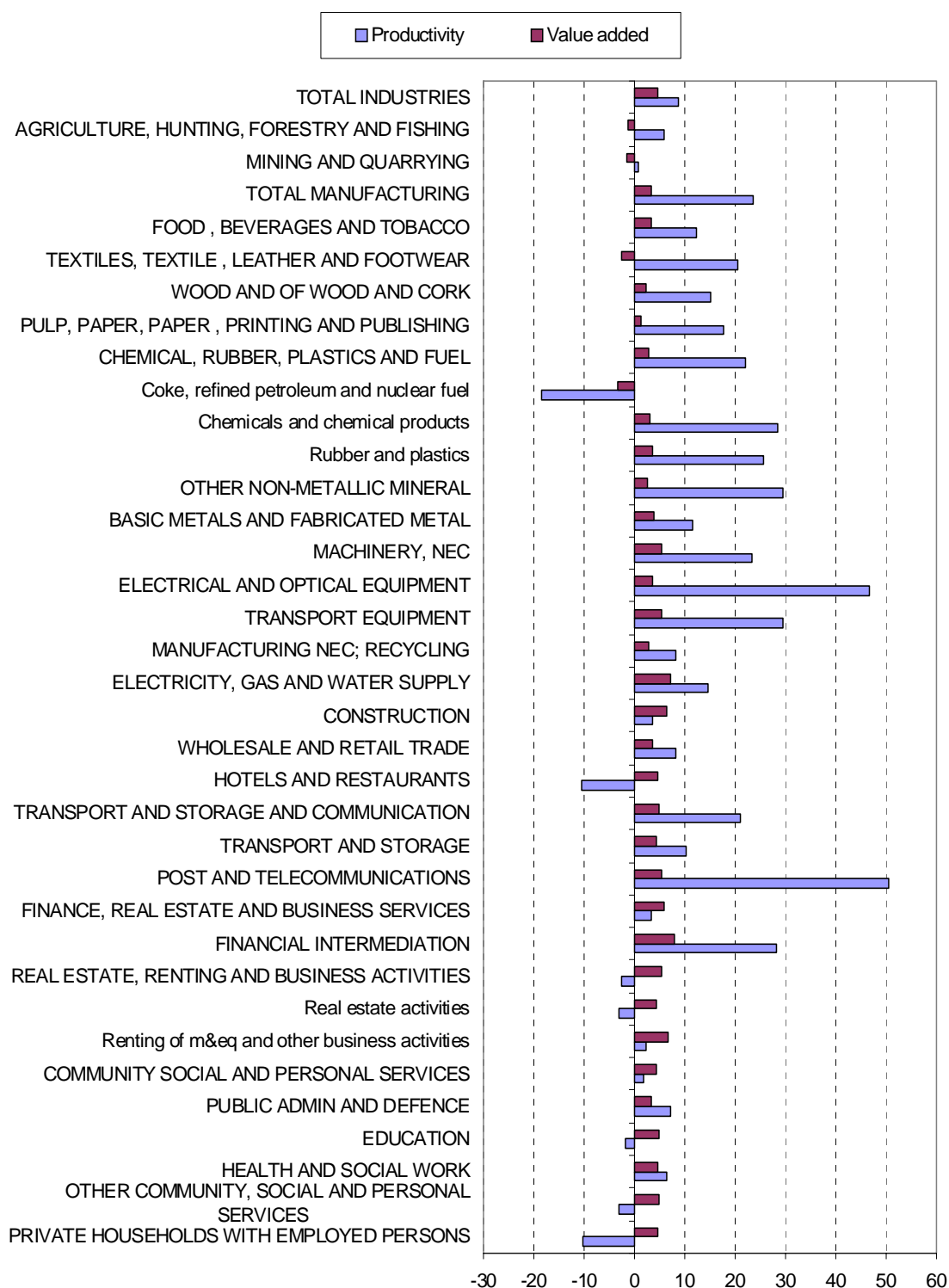
Table 1.8. Employment changes between 2000 and 2007

NACE	Manufacturing		Construction		Wholesale and retail trade		Hotels and restaurants		Financial intermediation		Real estate, renting and business activities	
	in 1000	in %	in 1000	in %	in 1000	in %	in 1000	in %	in 1000	in %	in 1000	in %
EU27	-1873,0	-4,8	2428,6	16,7	2403,3	7,7	1582,3	18,3	188,7	3,2	5807,2	26,4
EU15	-2229,7	-7,5	1608,8	13,4	1518,9	6,0	1387,2	18,0	110,1	2,2	5141,8	26,0
Belgium	-69,2	-10,5	13,0	5,3	29,1	5,0	1,9	1,3	-6,3	-4,3	156,0	26,1
Bulgaria	69,1	10,5	99,7	75,6	146,4	38,1	42,9	41,9	13,5	36,9	83,9	71,2
Czech Republic	60,6	4,4	28,6	6,6	34,8	4,8	15,2	8,7	2,7	3,1	140,1	32,9
Denmark	-51	-11,4	26,0	15,6	30,0	6,9	15	18,1	8	10,1	96,0	34,4
Germany	-566	-7,0	-560,0	-20,2	-149,0	-2,5	210	13,0	-78	-6,1	1097,0	24,2
Estonia	3,9	3,0	35,2	89,8	9,1	11,0	3,1	15,0	2	24,7	10,5	26,0
Ireland	-27,3	-9,1	112,3	65,5	63,0	26,1	18,8	17,2	23,4	33,9	54,7	38,0
Greece	17,2	3,5	85,2	28,4	186,0	23,1	38,3	14,4	8,8	8,2	92,2	45,8
Spain	104,4	3,5	876,9	48,1	610,6	24,1	430,4	41,9	42,9	11,8	755,0	59,1
France	-413,7	-11,3	288,2	19,7	202,2	6,4	111	12,8	63,2	8,7	566,2	16,3
Italy	64,6	1,3	397,1	25,6	230,0	6,7	274,2	28,4	46,1	7,8	702,0	29,8
Cyprus	0,6	1,6	12,1	46,2	14,2	25,1	4,6	13,0	1,2	7,2	8,9	56,0
Latvia	7,8	4,9	70,5	127,0	50,2	32,4	13	60,5	3,8	23,2	29,5	49,0
Lithuania	12,8	5,1	86,1	103,6	60,8	30,4	5,4	20,5	7,8	53,8	32,2	74,5
Luxembourg	2,1	6,3	11,1	42,9	5,6	14,7	2,7	21,3	8,8	29,8	13,9	33,9
Hungary	-56,2	-5,7	64,4	24,5	46,4	8,5	18,2	13,7	-0,3	-0,4	78,0	38,2
Malta	-5	-14,1	3,2	36,0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	-109,3	-10,5	-4,0	-0,8	57,9	4,2	22,7	7,6	0,4	0,1	229,5	16,8
Austria	4,3	0,7	-14,3	-5,0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Poland	349,1	12,5	170,0	19,7	162,6	7,7	75,6	35,2	73,1	25,4	139,3	17,1
Portugal	-129,8	-13,0	-52,9	-9,0	113,7	14,6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Romania	36,2	1,9	275,2	71,2	252,2	28,4	7,4	6,1	10,6	12,1	88,9	45,8
Slovenia	-18,3	-7,1	13,7	20,5	7,0	6,3	2,9	9,6	3	15,1	41,3	60,7
Slovakia	10,6	2,1	34,7	25,9	126,6	45,4	10,4	21,2	-3,6	-9,4	69,9	51,0
Finland	-19,6	-4,3	28,8	18,5	31,7	10,9	4,8	6,5	-0,4	-1,0	74,2	35,0
Sweden	-64,7	-8,2	56,1	25,6	26,7	5,1	14,2	12,0	-1,9	-2,0	113,8	23,0
United Kingdom	-1019	-24,3	364	19,5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Notes: manufacturing and construction from NACE 6 others from NACE 31 data when data for 2007 not available 2006 used instead.

Source: Eurostat, National Accounts, and own calculations.

Figure 1.23. Changes in value added and productivity in the EU-25* in the boom period 2000-07



*EU-25 refers to Member States as of 1st of May 2004

Source: EU KLEMS research database and own calculations.

Inspection of productivity changes at the sectoral level does not reveal a very clear pattern. Again, it is difficult to disentangle an eventual impact of the boom years from secular trends. Breaking down productivity changes by broad sectors shows, not surprisingly, that it is in

industry where the largest increases in productivity, 10%, are recorded (which eventually could explain the behaviour of export shares, Figure 1.17). The only clear impact of the housing boom is in the construction and real estate sectors: productivity was down in construction by more than 5%, mainly because of the flow of workers (particularly migrant workers) reflected in Figure 1.22.

1.4.3 The allocation of productive investment

In section 1.4.1 we argued that aggregate productive investment was not crowded-out by investment in dwellings. Another kind of distortion, however, would be that part of this productive investment was disproportionately directed to housing-related sectors to the detriment of other productive sectors. There is some evidence in this direction.

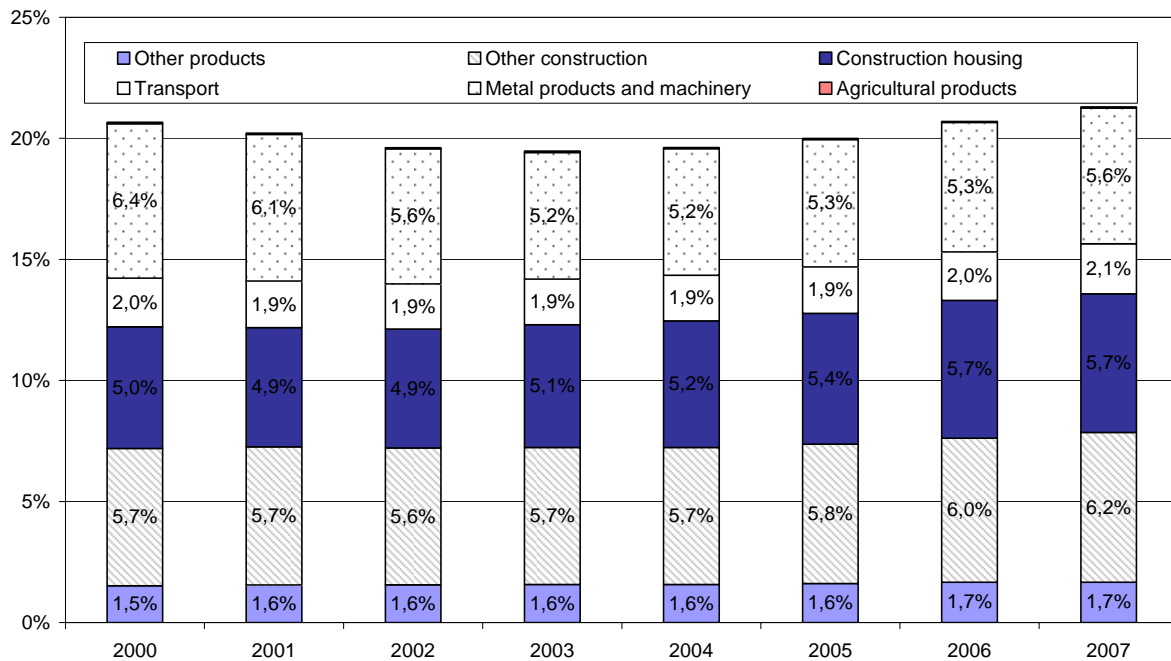
In countries affected by the housing boom (e.g. Estonia, Spain, Ireland, United Kingdom) the relative weight of manufacturing investment shrank considerably during this period. In these economies real investments were typically reallocated to the non-tradable sectors²⁵, especially to construction and real estate²⁶. These figures come, however, with a caveat: it is difficult to disentangle this drop and the increasing role of market services against manufacturing in the European economy (a long-term structural trend)²⁷. Figure 1.25 depicts the evolution of investment by type of assets in the EU-27. Taking into account the asset type distribution of GFCF, the role of housing and other construction investment increased significantly in the EU during the review period. At the same time the share of metal products and machinery dropped considerably. This points partly to less investment in tradable sectors, but it is also in line with a GVA share and employment loss in manufacturing and the increasing role of services in general.

²⁵ Brixiova et al. (2009).

²⁶ In Estonia, for instance, the shares of the construction and the real estate sectors in total fixed investment exceeded the weight of the sectors in total value added, while in manufacturing the investment share fell increasingly below the share in total value added in 2005-2007 (Lamine, 2008).

²⁷ European Commission (2004).

Figure 1.24. GFCF in the EU-27 by asset types; % of GDP



Source: Eurostat, National Accounts, and own calculations.

1.4.4 Summarizing

In short, if the boom years have affected future productivity growth, the effect does not seem to be obvious. Apart from the growth in employment in housing-related sectors, there is no obvious deviation from secular trends: decreasing weight of manufacturing in employment and value added caused by faster productivity growth relative to services. If any, there is some evidence that productive investment has been disproportionately directed to construction and real estate activities. It is not clear, however, whether the magnitude of this distortion is enough to provoke a productivity slowdown in the coming years.

1.5. The impact of the crisis on industry

Both by international standards and in comparison with other parts of the EU economy, the EU manufacturing and construction industries were very severely hit by the global recession. Output dropped in all sectors but one, and jobs were lost on a massive scale.

Table 1.9. The crisis and European industry

% change in 2009Q04 relative to 2008Q01 *

NACE Rev.2		Highest drop in output relative to 2008q01	Output	Employment	Hours	Productivity **
c	Manufacturing	-19,03	-18,10	-10,63	-10,01	-8,77
c10	Food products	-2,87	-2,87	-3,55	-2,04	0,06
c11	Beverages	-7,40	-6,62	-10,17	-8,18	2,74
c12	Tobacco products	-12,28	-12,28	-9,30	-3,21	-5,74
c13	Textiles	-24,23	-23,40	-18,56	-17,39	-7,78
c14	Wearing apparel	-16,12	-16,12	-20,80	-17,63	1,52
c15	Leather and related products	-19,25	-18,41	-15,88	-13,05	-6,42
c16	Wood and of products of wood and cork	-21,47	-21,47	-17,82	-16,09	-5,27
c17	Paper and paper products	-14,93	-11,93	-7,50	-9,03	-4,60
c18	Printing and reproduction of recorded media	-12,03	-12,03	-8,85	-6,07	-4,73
c19	Coke and refined petroleum products	-10,05	-10,05	-5,01	-9,70	1,50
c20	Chemicals and chemical products	-19,54	-12,17	-7,13	-5,21	-10,88
c21	Basic pharmaceutical products	-0,29	4,65	-4,48	-3,25	8,27
c22	Rubber and plastic products	-21,54	-16,44	-8,56	-9,02	-10,41
c23	Other non-metallic mineral products	-28,03	-28,03	-18,15	-14,53	-13,19
c24	Basic metals	-35,57	-28,32	-12,54	-16,32	-17,70
c25	Fabricated metal products	-27,11	-26,85	-11,00	-10,89	-18,14
c26	Computer, electronic and optical products	-22,23	-21,98	-12,20	-11,89	-11,73
c27	Electrical equipment	-24,88	-22,50	-10,67	-11,95	-14,02
c28	Machinery and equipment n.e.c.	-30,26	-30,18	-7,94	-11,31	-21,41
c29	Motor vehicles, trailers and semi-trailers	-39,24	-28,22	-11,91	-15,57	-19,94
c30	Other transport equipment	-13,64	-13,64	-7,87	-7,75	-5,07
c31	Furniture	-22,46	-22,29	-15,18	-15,09	-8,68
c32	Other manufacturing	-7,35	-6,54	-4,76	-4,31	-2,90
c33	Repair and installation of machinery	-6,82	-6,82	-2,89	2,90	-9,31

* When 2009Q04 not available 2009Q03 used instead, notably for hours and productivity.

** Productivity is measured as output per hour; rates of change approximate rates of change of value added per hour.

Source: Eurostat, Short-term Business Statistics.

The effects of the crisis were not identical across sectors, though: some manufacturing sectors fared better than manufacturing as a whole, others considerably worse. Examples of sectors outperforming other manufacturing sectors during the crisis include food products and basic pharmaceutical products and pharmaceutical preparations. At the other end of the scale, sectors such as motor vehicles, trailers and semitrailers, machinery and equipment, textiles, wearing apparel, leather and leather-related products suffered the greatest job losses and output reductions. The construction industry, being highly cyclical, also falls in the latter category.

Whereas manufacturing industry as a whole started to recover by mid-2010, some of the worst affected manufacturing sectors were still shrinking and may not yet have reached their lowest level and the start of recovery. A similar scenario might await the construction industry.

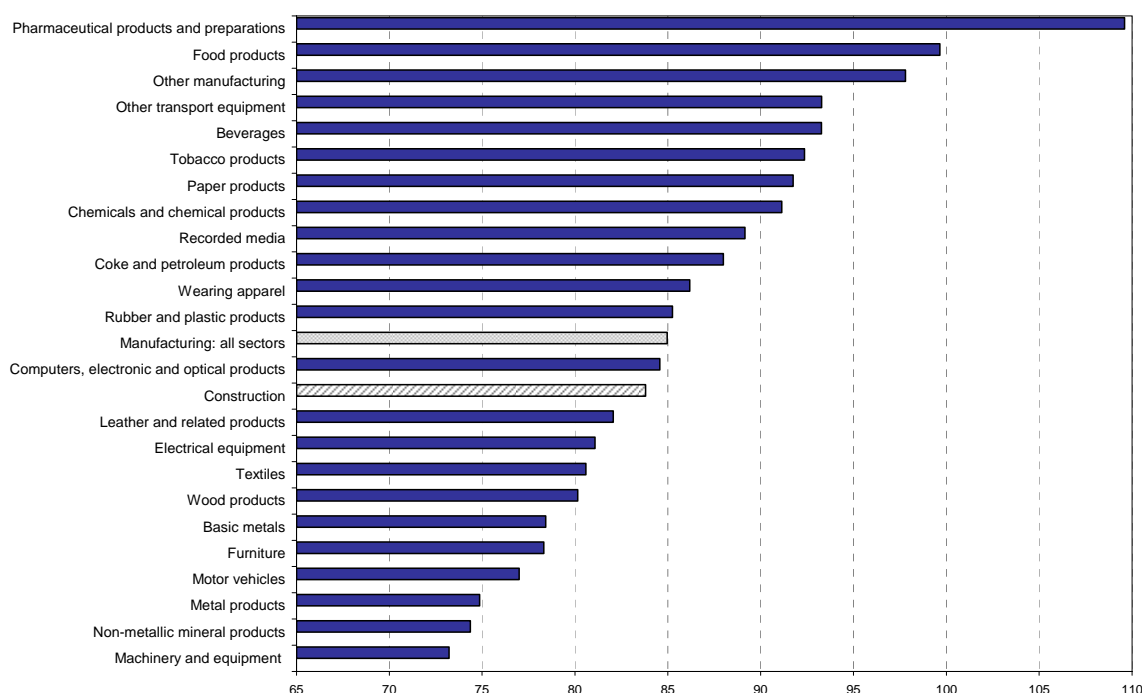
1.5.1 Output

Across the manufacturing industry as a whole, output fell by almost 15% from its cyclical peak in the first quarter of 2008 to the first quarter of 2010. By mid-2009 output had dropped by even more, but it then started to recover and this general recovery has continued in 2010. The volume of output is now some 7% higher than at the lowest point in 2009, and around a quarter of the total drop from the 2008 peak to the 2009 nadir has been recovered.

However, as Figure 1.25 shows, the overall recovery is not reflected in all manufacturing sectors. In some sectors (notably furniture, coke and refined petroleum products, tobacco products, and beverages) output is still diminishing and may not yet have reached its lowest level. In other sectors the drop in output was far greater than the average manufacturing output loss (motor vehicles, trailers and semitrailers -39.5%; basic metals -35.8%; machinery and equipment -30.5%), and although output has since started to recover it still has some way to go to make up the average of nearly -15% across all manufacturing sectors, as reflected in Figure 1.25.

The figure also shows the remarkable resilience of the pharmaceutical sector (basic pharmaceutical products and pharmaceutical preparations), where output now stands at a higher level than in 2008. The recession initially caused output to drop slightly in the pharmaceutical sector too, but it quickly returned to positive growth and has since bucked the trend of negative growth in other sectors. The food sector has also been able to keep up production remarkably well in spite of initial output reductions and despite having had to shed more than 3% of its workforce (see the next section).

Figure 1.25. Construction and manufacturing sector output in 2010Q1; index 2008Q1=100



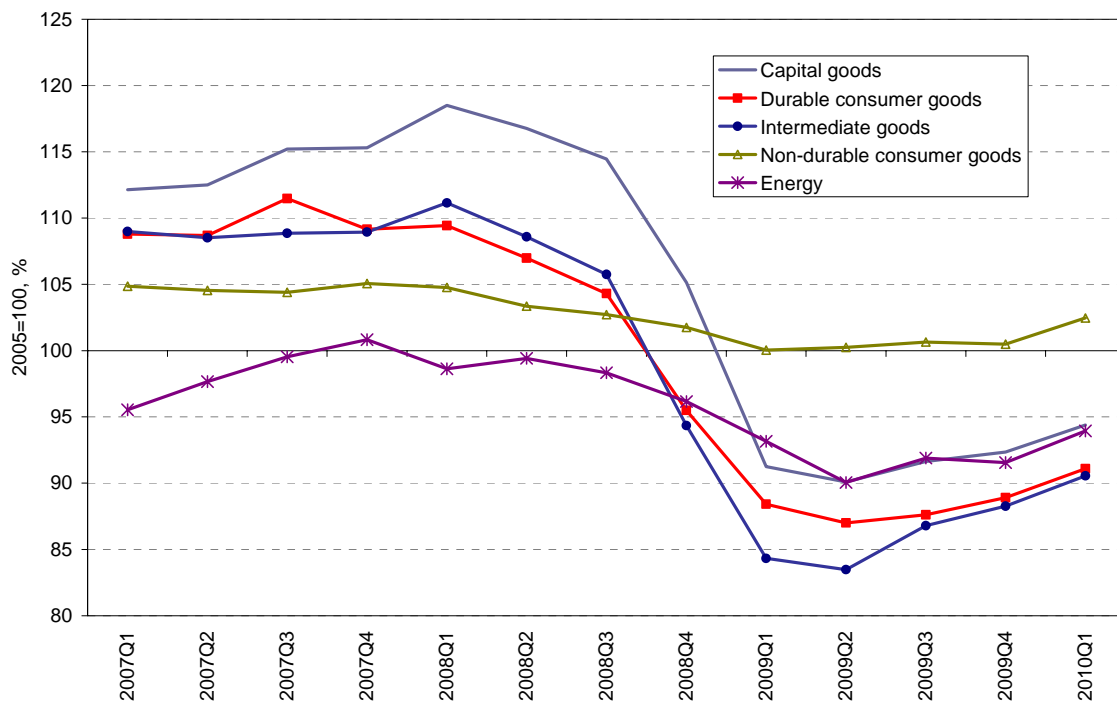
Source: Monthly note on economic recovery in manufacturing, construction, and selected service industries, June 2010, DG Enterprise and Industry, European Commission.

Output in the construction industry fell by 16.2% from the first quarter of 2008 to the first quarter of 2010, and may have fallen further since. As in some manufacturing sectors, the construction industry may yet have to reach its lowest output level of this cyclical downturn before returning to positive growth.

Taking into account change of production and employment in terms of end-use categories (intermediate goods, capital goods, consumer durables, consumer non-durables and energy) the following can be observed.

Intermediate goods (accounting for the largest weight of total) suffered most during the crisis, indicating significantly less demand for goods used in manufacturing production. Production of capital goods showed the largest drop as compared to the period before the recession, representing very weak investment activity in the business sector. These two categories, given their large shares in total, had the most significant effect on the production index of total industry. Households responded to the changed circumstances quite rapidly, as reflected in the sharp contraction for durable goods. Non-durable consumer goods recorded only a maximum drop of 5% compared with the pre-crisis peak.

Figure 1.26. Production index change of end-use categories in the EU-27



Source: Eurostat, Short-term Business Statistics.

Looking at individual EU countries' performance in industries, the largest GDP contraction and decline in industrial output occurred in small open economies like Estonia or Slovakia, but their impact on EU industrial output as a whole was not significant, because of their relatively small weights. In contrast, Germany, representing the highest share in EU industrial output, contributed considerably to the fall in EU industrial performance. Italy, representing the fourth largest weight in industrial value added, showed the second largest impact on the overall EU industrial production index²⁸.

1.5.2 Employment

Employment in the manufacturing industry, which accounts for around 16% of total EU employment, fell by 11.8% from its peak in the first quarter of 2008 to the first quarter of 2010. Though it fell short of the 15% reduction in output over the same period, the fall nonetheless meant that more than four million jobs were lost in manufacturing, representing nearly two-thirds of all job losses in the EU from the first quarter 2008 to the first quarter of 2010. No other part of the EU economy has suffered job losses on a similar scale.

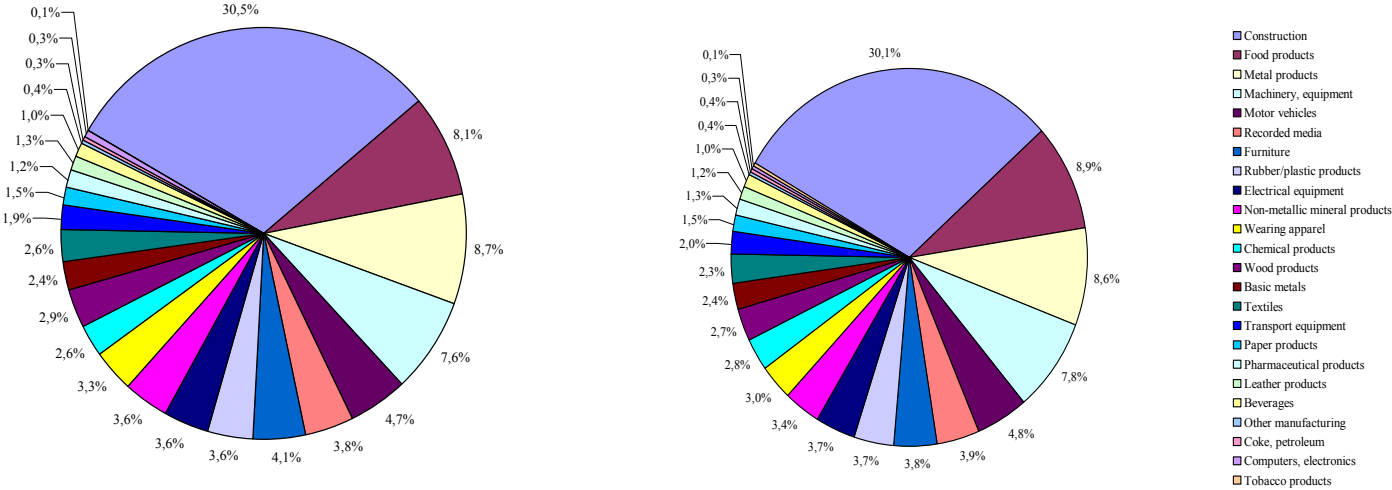
Employment diminished in all manufacturing sectors from the first quarter 2008 to the first quarter of 2010; in two sectors, textiles and wearing apparel, job losses were in excess of 20%. The manufacture of leather and related products also suffered similar cuts in numbers. This is the reason for the diminished shares of overall employment for these three sectors in Figure 1.27. It is worth noting that while the job losses in the textiles and leather sectors were proportionate to the output reductions in those sectors from 2008 to 2010, the wearing apparel sector employed 22.5% fewer people in the first quarter of 2010 than the same quarter of 2008 but the remaining workforce produced more than 85% of the 2008 sector output, reflecting higher labour productivity.

²⁸ European Commission (2010c)

Several manufacturing sectors reported job losses of less than 5% during the period: food products (-3.1%), basic pharmaceutical products and pharmaceutical preparations (-4.0%) as well as coke and refined petroleum products (-4.9%). This explains why the relative shares of these three sectors in overall employment increased between 2008 and 2010, as depicted in Figure 1.27.

Employment in the construction industry, which represents around 6% of total EU employment, fell by 13.9% from the first quarter of 2008 to the first quarter of 2010, or by more than two million jobs. As a consequence the share in overall employment of manufacturing and construction diminished from 30.5% to 30.1%.

Figure 1.27. Industry sectors and construction, relative shares of employment

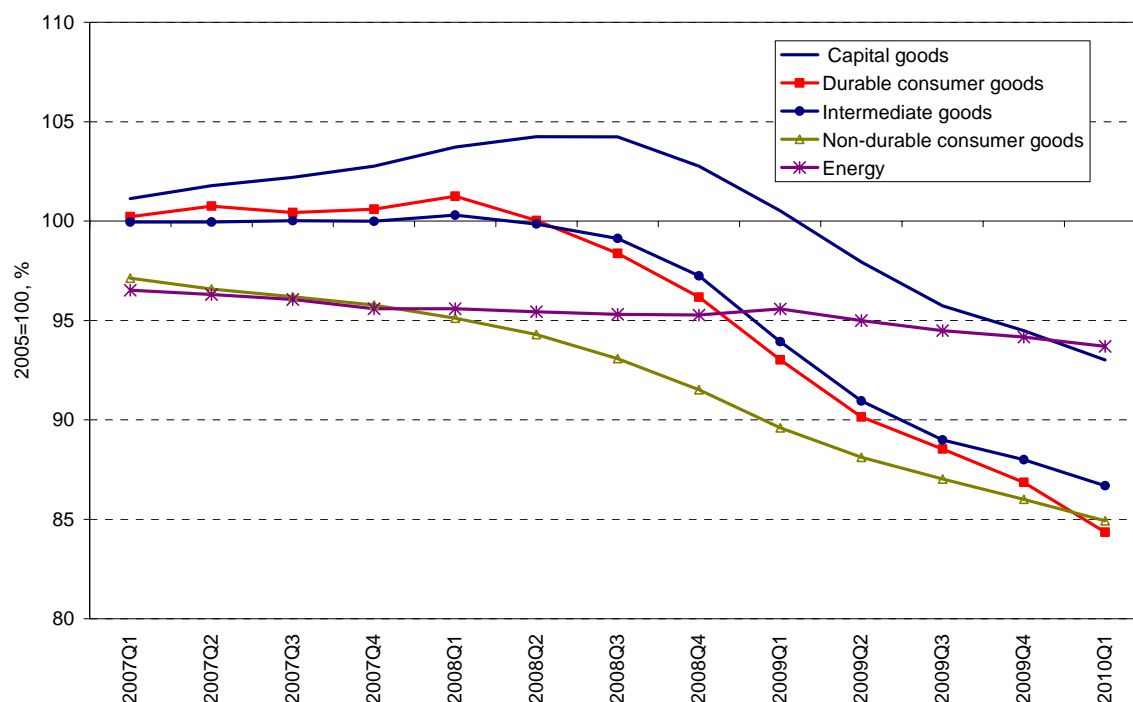


Employment in first quarter 2008 (55 million) and first quarter 2010 (48.5 million).

Source: Monthly note on economic recovery in manufacturing, construction, and selected service industries, June 2010, DG Enterprise and Industry, European Commission.

As regards end-use categories, however, the largest drops were registered in capital and intermediate goods in terms of production, while job losses were more significant in other categories (durables and non-durables). Comparing the two figures (Figure 1.26 and 1.28), it can be seen that while enterprises responded to the changed circumstances very fast by reducing production, job losses were more gradual and more protracted.

Figure 1.28. Labour input index change of end-use categories in the EU27



Source: Eurostat, Short-term Business Statistics.

1.6 Conclusions

The European Union is in the midst of a considerable downturn. The recession originated in a major readjustment of consumption and saving behaviour of households after a boom period in which considerable distortions were accumulated — in other words, a classic demand-side recession.

A close inspection of the boom years 2000-07 shows that if these growing distortions had any impact on competitiveness, it was probably only modest and mostly associated with distortions in the allocation of labour across sectors within countries affected by a speculative bubble. External competitiveness does not seem to have been affected by these developments; large increases in unit labour costs in some Member States have not been reflected in the share of exports in world trade, not even within the euro area. One explanation for this apparent paradox may be the different setting of nominal wages in the tradable and non-tradable sectors. In turn, these differences may also explain the growth in employment of some domestic sectors in bubble economies, notably the construction sector. Those countries that are more severely affected by the crisis and likely to undergo a longer readjustment process, especially as far as employment is concerned, because of the construction sector workers who will have to be redeployed to other sectors. Other countries which suffered collateral damage through trade and integration in the global supply chain will probably recover faster.

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