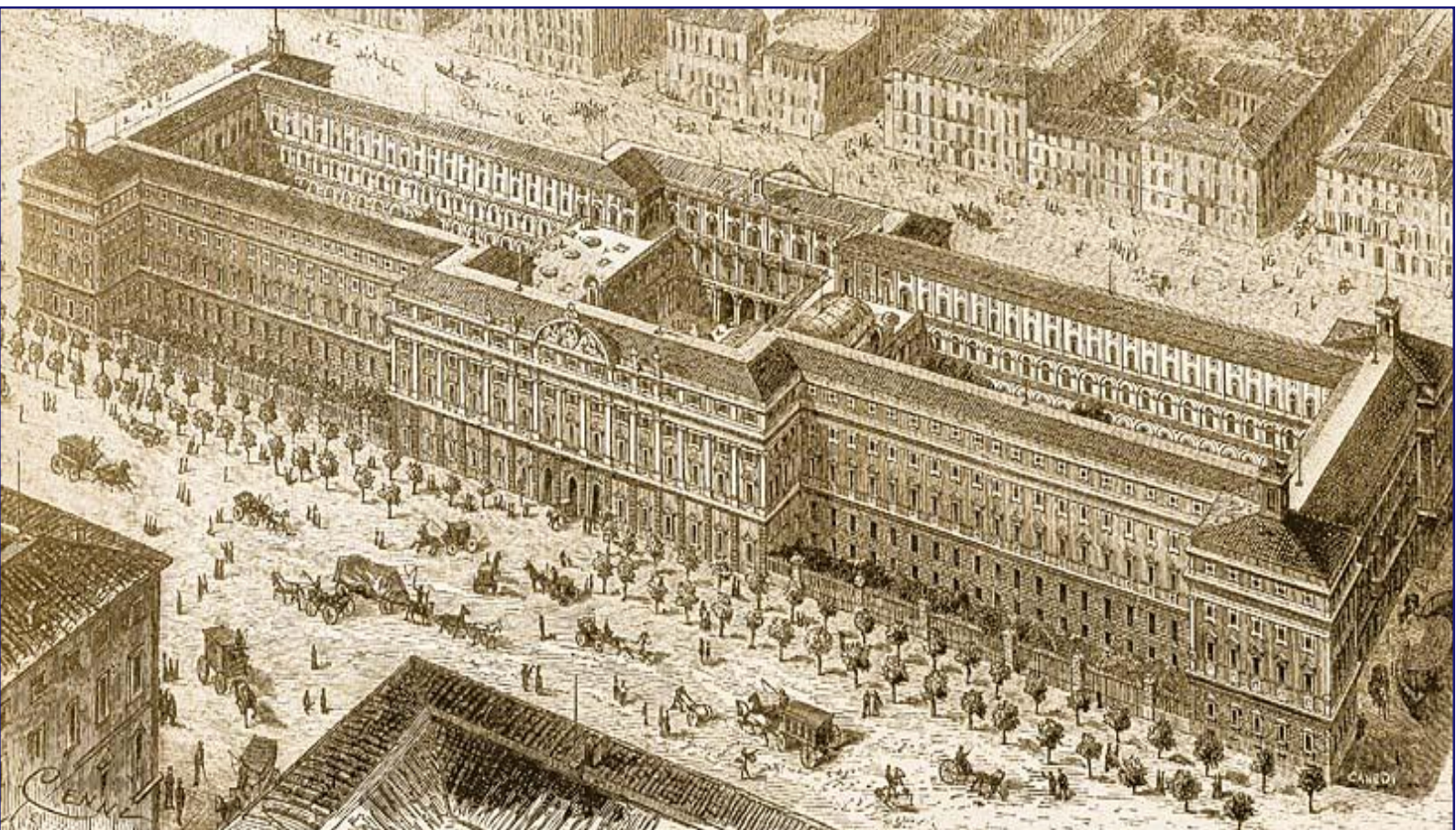# Globalisation and the competitiveness
of the Euro area

Filippo di Mauro, Katrin Forster

Working Papers

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Globalisation and the competitiveness of the Euro area[1]

Filippo di Mauro (*), Katrin Forster (**)

Abstract

Against the background of increasing competition and other significant structural changes implied by globalisation, maintaining and enhancing competitiveness has evolved into one of the prime concerns in most countries. Following up on previous work (see in particular ECB Occasional Papers No. 30 and No. 55), this Occasional Paper examines the latest developments and prospects for the competitiveness and trade performance of the euro area and the euro area countries. Starting from an analysis of most commonly used, traditional competitiveness indicators, the paper largely confirms the findings of previous studies that there have been substantial adjustments in euro area trade. Euro area firms have taken advantage of the new opportunities offered by globalisation, and have at the same time been increasingly challenged by emerging economies. This is primarily reflected in the loss of export market shares which have been recorded over the last decade. While these can partly be related to the losses in the euro area's price competitiveness, further adjustment also seems warranted with regard to the export specialisation. Compared with other advanced competitors, the euro area remains relatively more specialised in labour-intensive categories of goods and has shown only a few signs of a stronger specialisation in research-intensive goods. Nevertheless, the paper generally calls for a more cautious approach when assessing the prospects for euro area competitiveness, as globalisation has made it increasingly difficult to define and measure competitiveness. Stressing the need to take a broader view on competitiveness, specifically with a stronger emphasis on productivity performance, the paper also introduces a more elaborate framework that takes into account the interactions between country-specific factors and firm-level productivity. It thus makes it possible to construct more broadly defined competitiveness measures. Pointing to four key factors determining the global competitiveness of euro area

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countries – market accessibility, market size, technological leadership of firms and institutional set-up – the analysis provides further arguments for continuing efforts to increase market integration and strengthen the competitive environment within Europe as a mean of enhancing resource allocation and coping with the challenges globalisation creates.

JEL Classification: F15, F43, O52

Keywords: Globalisation, competitiveness, productivity

NON-TECHNICAL SUMMARY

With globalisation radically altering the environment in which firms operate over the past decade, how to maintain and to enhance competitiveness has become one of the prime concern in most countries. Policymakers and firms have both been tuning their policies and strategies in an attempt to reap the full benefits of globalisation and absorb the costs of the associated changes. Against this background, this Occasional Paper aims at examining most recent trends in euro area competitiveness and assessing future trends. Apart from providing new evidence on the competitiveness of the euro area and euro area countries, the paper argues that globalisation has made it more difficult to define and measure competitiveness. Focusing solely on price competitiveness and a country's trade performance may provide only partial insight into the country's ability to compete in international markets, so the paper stresses the need to take a broader view on competitiveness, with a stronger emphasis on the productivity performance. In this context, the paper relies on a more complex, micro-founded framework. Taking into account the interaction between country specific factors, including market access and institutional barriers, and firm-level productivity, the framework offers new insights into the underlying determinants of competitiveness, also allowing the construction of broadly defined competitiveness measures. Analysis of the latest developments in competitiveness, based on most commonly used, traditional indicators, largely confirms the findings of previous studies.[2] This Occasional Paper highlights the substantial adjustments in euro area trade over the last decade. Euro area firms have been taking advantage of the new opportunities offered by globalisation, in particular by expanding trade with emerging economies, investing abroad and outsourcing activities internationally. Nevertheless, like most other advanced economies, the euro area has also been increasingly challenged by emerging economies, as reflected in the loss of export market share experienced over the last decade. While movements in price competitiveness over the second half of the 1990s were a rather good indicator of euro area export market share developments, more recently there have been signs of this correlation weakening. While this may point to an increasing importance of structural factors, further adjustment also seems needed with regard to the export specialisation of the euro area. Compared with other advanced economies, the euro area remains more specialised in labour-intensive categories of goods and has been showing only a few signs of stronger specialisation in research intensive goods – a trend that is much more pronounced in other advanced countries and among competitors from emerging economies, such as China. Nevertheless, the paper calls for a more cautious approach when gauging the prospects for euro area competitiveness. As the standard indicators of specialisation may hide important changes in specialisation within sectors – and most notably trends toward a stronger specialisation in higher quality goods – it remains very difficult to gauge whether the economy is converging to the "right" export sectors, even when using a more disaggregated approach.

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[2] See in particular MPC task force of the ESCB (2005) and Baumann and di Mauro (2007).

Furthermore, as globalisation has fundamentally changed the way that firms do business, and as production processes are becoming more and more internationalised, trade flows may not be enough to fully capture globalisation-related adjustments. Rather than focusing solely on trade performance and price competitiveness, we need to put a stronger emphasis on the conditions under which companies become more productive. Recognising the pitfalls of analysing productivity at the aggregate level, the more elaborate, micro-founded framework points to four key factors determining the global competitiveness of euro area countries: market accessibility, market size, technological advancement of firms based in the country and the institutional set-up. Granting better access to foreign competitors, enlarging the domestic market and increasing the technological advancement of domestic firms and the quality of the political and institutional framework all lead to stronger domestic competition. This, together with the reallocation of resources across firms, sectors and countries, will translate into higher productivity growth for a country's firms and thus increase the country's competitiveness. The ability of the framework to distinguish between the impact of accessibility and market size on the one hand and the technological advancement and the quality of institutions on the other hand is further used to rank countries accordingly and to assess alternative policy regimes. More generally, the analysis calls for continuing efforts to strengthen competition and market flexibility and to pursue further structural reforms of the product and labour markets in order to foster innovation, improve the allocation of resources and facilitate the adjustment of firms and workers to globalisation-related structural changes.

INTRODUCTION

Over the past decade, globalisation – which we define as the increasing interdependence of economies via cross-border transactions in goods, services, natural resources, capital and labour – has evolved rapidly. This process has radically altered the competitive environment euro area firms are facing, as it is ultimately testing the adjustment capabilities of industrialised economies. This is particularly true against the backdrop of the emergence of new global players, such as China and India, as well as the reintegration of the central and eastern European countries (CEECs) into the world economy. While there is no doubt that globalisation has offered unprecedented opportunities and benefits for both developed and emerging countries alike, it has also led to growing concerns in the industrialised nations about their capacity to compete in global markets while sustaining relatively high and evenly shared living standards. With competitiveness [3] still at the centre of the public debate, this Occasional Paper

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[3] Given the difficulty of precisely defining competitiveness and the broad line of policy questions we are interested in, we start out by following other major institutions (for example, the OECD and the Irish National Competitiveness Council) using a somewhat loose, but comprehensive definition of competitiveness, defining it as "all those factors that impact on the ability of an economy to compete in international markets". The main difficulties of defining and measuring competitiveness as well as its various dimensions will be further discussed in Chapter III.

again takes up the three questions also raised in previous work [4]: How has the euro area adjusted to an increasingly competitive global environment so far? How has it been performing relative to other countries, and how is the euro area positioned going forward? What policies should be pursued to facilitate adjustment to a substantially more competitive environment and to reap the full benefits of globalisation? While the questions remain the same, the difference lies in the way they are addressed in this Occasional Paper. Starting with a review of the results of standard competitiveness indicators, most notably international price competitiveness and export market shares, the paper provides new evidence on the latest developments in euro area competitiveness by also offering a more detailed analysis of differences between euro area countries and among sectors than in previous work. However, given that globalisation has fundamentally changed the way firms do business – with production processes becoming increasingly internationalised – the paper also points to the need to go beyond such traditional competitiveness indicators, as focusing solely on price competitiveness and trade performance measures may provide only partial insights into the overall determinants of a country's ability to compete in international markets. In contrast to previous work, the paper therefore takes a broader view of competitiveness by putting a stronger emphasis on the productivity performance. Recognising the pitfalls of analysing productivity developments at the aggregate level, in the latter part of this Occasional Paper we will further introduce a more complex micro-founded framework that takes into account interactions between country-specific factors, including market access and institutional barriers, and firm-level productivity. This framework also makes it possible to construct more broadly defined competitiveness measures, which can further be used to rank countries and to assess alternative policy regimes. The structure of the paper is as follows. Chapter II presents some stylised facts about globalisation and indicates how globalisation is having an impact on euro area trade performance and competitiveness, creating both new challenges and opportunities. Chapter III looks in more detail into how the euro area and its member countries have responded to the significant structural changes implied by globalisation, using the most commonly used indicators. Considering the possible limitations of these indicators, the paper recommends a more cautious approach when gauging the prospects for competitiveness. Against this background, rather than providing a final assessment of the competitive position and the outlook for the euro area and the euro area countries, it is argued that the analysis of price competitiveness indicators and changes in export specialisation should be complemented by a broader analysis of productivity, the main determinant of competitiveness in the medium and longer term. In contrast to previous ECB studies on competitiveness, the last section of Chapter III therefore also provides a summary of the most recent trends in productivity at the aggregate, sector and country level. This will lead over to a more sophisticated analysis of the foundations of productivity and competitiveness based on the above mentioned, micro-founded framework, which will be introduced in Chapter IV. Chapter V concludes.

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[4] MPC task force of the ESCB (2005) and Baumann and di Mauro (2007).

STYLIZED FACTS ABOUT GLOBALISATION

Although globalisation – the growing interdependence of economies through trade, production and financial market linkages – has been going on for decades and, in this sense, is not a novel phenomenon, it has been accelerating at a fast pace recently, prompting growing interest and even fears by the public. Technical progress, the surge in information and communication technology, and a sizable reduction in tariffs have resulted in a massive fall in the cost of transporting goods, services and information, as well as a sharp increase in cross-border activities, all of which have encouraged a further rapid integration of the world economies. More and more goods and services have become tradable, and domestic companies have been increasingly becoming involved in international trade. Accordingly, world trade has grown significantly faster than worldwide output, by around one and a half times since 1991 (see Chart 1), and the degree of openness of many countries – measured by the sum of total exports and total imports as a ratio of GDP – has increased significantly. For the euro area, for instance, the openness over the period 2001 to 2007 was equivalent to around 38%, compared with 33% in the period 1997 to 2000 (see Chart 2). This trend of higher degrees of openness is also shared by Japan and the United States. However, they still remain less open than the euro area (with openness reaching on average around 23% and 25% respectively over the more recent period). At the same time, production processes have also become more geographically integrated. Multinational enterprises (MNEs), in particular, have further expanded their global reach to best take advantage of changing demand and cost conditions across world regions. For the euro area, such further internationalisation of activity is also reflected in higher outward and inward FDI, which has virtually doubled as a percentage of GDP since 1999. By investing abroad, outsourcing activities internationally (see Chart 3) and increasingly importing from cheaper suppliers located in emerging markets (see Chart 4), firms with headquarters in the euro area have enhanced their profitability and strengthened their competitive position – options that have also become increasingly available for small and medium-sized firms. At the same time, the larger share of imports from these, also called "low-cost", countries also benefited the consumers in advanced economies by moderating import price dynamics, and hence consumer price inflation. [5] Of note is the fact that the emergence of economies like China and India, as well as Indonesia, Brazil, Russia and others, with their high and rapidly growing populations, has not only opened up (low-cost) labour pools of unprecedented size, it has also given advanced economies access to large and growing consumer markets. Although the fast- growing populations mean that the growth in per capita income will be much slower than the rapid output growth, many emerging economies, by their sheer size, are already important consumer markets, and the growth potential is significantly larger than that of the developed economies. [6] In this context, the increasing importance of these consumer markets is only partially reflected in the strong growth of exports towards these

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[5] For more details see, for instance, ECB (2007, 2008).

[6] See, for example, US Council of Competitiveness (2007), for projections by A. T. Kearney.

countries (see Chart 5), since a significant portion of such products is provided directly by foreign affiliates of multinational corporations in destination markets, i.e. without trade impacts. This notwithstanding, while the greater openness and strong increase in capital flows show that the euro area, as well as other advanced economies, has been an active participant in the globalising world economy, there is also no doubt that globalisation has created new challenges that call for adjustment. For instance, the export market shares of all advanced industrialised economies – such as the United States, the United Kingdom and Japan – have fallen in recent years (see Chart 6), a development, that – as we will see later (Chart 14) – is common to all euro area countries with the exception of Germany and Ireland.

Although these losses should not be overemphasised, as they mainly reflect the dramatic increase in the shares of new entrants like China (see Chart 6), the challenge for advanced economies remains to successfully adjust their export portfolio and to take full advantage of the international division of labour. This adjustment process is currently ongoing, but as the new competitors climb up the value chain, the challenge for the advanced economies is to keep producing new, more diversified and higher value-added products, thus staying ahead of other countries, and also to efficiently exploit economies of scale and scope.

Chart 1 World trade and GDP

(index: 1990 = 100; annual data)

— world GDP
····· world trade

Sources: IMF World Economic Outlook and ECB calculations.
Note: Latest observation refers to 2007.

Chart 2 Openness of the euro area, the United States and Japan
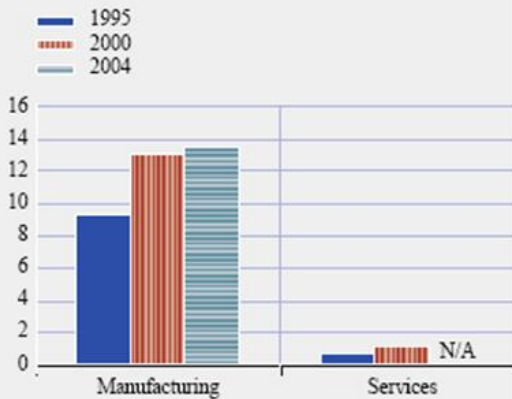
(percentage of GDP)

■ goods
▥ services
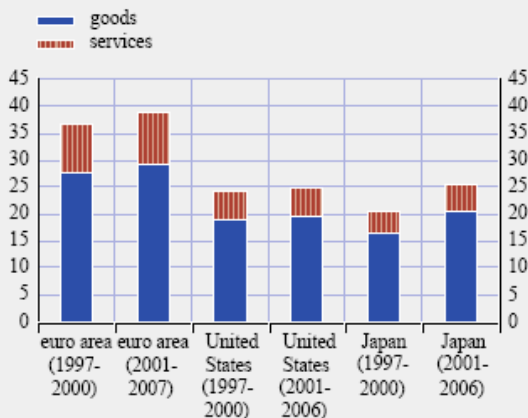
Source: ECB calculations.
Note: The degree of openness is measures as exports plus imports as a percentage of GDP, averages for the respective periods. Euro area based on extra-euro area trade.

Chart 3 Euro area offshoring [1]

(share of industry's imported inputs in the industry's output; percentages)

- 1995
- 2000
- 2004

Sources: ECB calculations based on COMEXT data and O[...] input-output tables.
Notes: Offshoring is defined "narrowly", i.e. sectoral sha[...] imported inputs of the given sector in its output; includes intra and extra euro area trade; extrapolation for 2004 base[...] interpolated input-output table coefficients.
1) This measure is a proxy with several caveats, most not[...] that the import share, which could reflect domestic deman[...] well as domestic supply channels, plays a very important[...] in its dynamics. The computation of post-2000 outsour[...] estimates is based on interpolated input-output table coeffic[...] (unavailable for services).

Chart 4 Euro area goods imports from emerging economies

(index: 1999=100; quarterly data; values)

- total EA imports
- China
- Brazil
- Taiwan
- Korea
- India
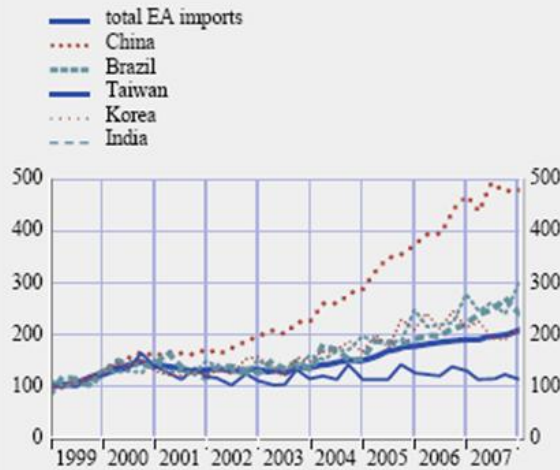
Source: Eurostat.
Note: Latest observation refers to March 2008.

Chart 5 Extra-euro area exports by destination country/regions

(index: 1999 =100; quarterly data; values)

- total EA exports
- China
- Russia
- Taiwan
- Korea
- India
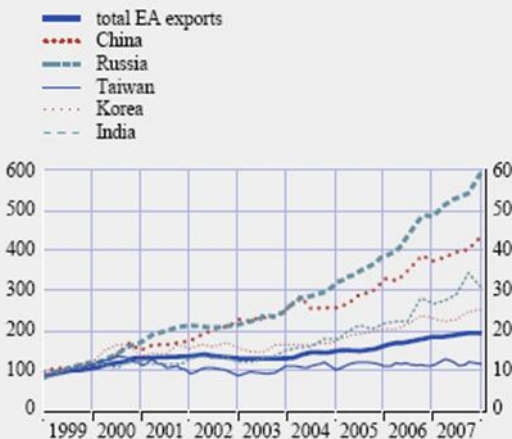
Source: Eurostat.
Note: Latest observation refers to March 2008.

Chart 6 Export market shares

(index: 1995=100; annual data; in volumes)

- euro area
- United States
- United Kingdom
- Japan
- China (right-hand scale)
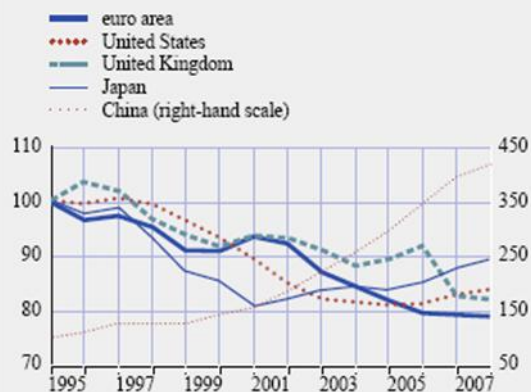
Sources: IMF, Eurostat and ECB calculations.
Note: The real export market share corresponds to the volume of exports divided by a country-specific weighted average of import volumes for major trading partners. Latest observation refers to 2007 Q4.

RECENT DEVELOPMENTS IN COMPETITIVENESS

This chapter provides evidence on recent developments in the euro area's competitiveness, analysing in more detail how the euro area and its member states have so far responded to the challenges of globalisation. Which factors have supported or weakened the euro area's competitiveness? And what can we expect going forward? After providing a more precise definition of "competitiveness", we address these questions by looking at various benchmark indicators for the short and long term. However, while these indicators – all of which are commonly used to assess developments in competitiveness – provide relevant information, they also have important pitfalls. Highlighting the nature of such limitations, this chapter further illustrates why globalisation has made it more difficult to assess developments in competitiveness and suggests possible additions to our analysis in previous studies. Instead of focusing solely on price competitiveness and trade performance, we also place more emphasis on the productivity performance.

DEFINING COMPETITIVENESS

Even though "competitiveness" is at the centre of the public debate, analysis and discussions are complicated by the fact that it is not an unequivocal concept. Competitiveness is often narrowly referred to as international price competitiveness as measured by exchange rate indicators, differently deflated. It has to do with export results. This was also the definition that we used in previous work. However, while prices, costs, wages and exchange rates continue to be important factors in determining the ability of firms to compete in international markets, particularly in the short run, whether firms, and thus countries, manage to successfully adjust to the sizable changes implied by globalisation also depends on other factors. One important element is the ability to adapt their export specialisation into line with comparative advantages when new low-cost players enter world trade. More broadly, the international competitiveness of the euro area in this context appears to be more broadly determined by the productivity performance of its firms, which in turn also depends on country-specific factors such as a well-developed infrastructure, high levels of training and research, and a favourable regulatory and tax environment. To capture the various factors, we will rely on a broader definition of competitiveness in this Occasional Paper, with competitiveness encompassing "all those factors that impact on the ability of an economy to compete in international markets". Starting from the narrow definition and a review of various indicators of price and cost competitiveness, we will add further aspects, looking more specifically at recent developments in euro area export specialisation and trends in euro area productivity.

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PRICE AND COST COMPETITIVENESS

Regarding the narrow definition of competitiveness, i.e. "price competitiveness", two categories of indicators can be identified. The first comprises the wide range of real effective exchange rate indicators [7] based on various cost and price measures, such as consumer prices, producer prices, unit labour costs and the GDP deflator. Such indicators are presumably the most direct ways of measuring a country's "underlying competitiveness", defined as its relative cost position. The other category of indicators is based on relative export prices. Such indicator include firms' pricing-to-market strategies, i.e. how firms offset exchange rate movements by adjusting their profit margin instead of instantly passing them on in the prices charged to their foreign customers. In this sense, such indicator is a better gauge of the country's capacity to compete in export markets [8] and a better predictor of export performance. [9] This is the reason why we will mainly concentrate on this indicator. [10]

Recent developments in the euro area and in euro area countries

Following its introduction in 1999, the euro experienced four main phases: rather strong depreciation until 2001, appreciation until 2004, a period of variability within a relatively narrow range up to end 2005, and lastly a prolonged appreciation (see Chart 7, LHS). Such exchange rate movements are broadly reflected, though to a less volatile extent, in euro area relative export prices (see Chart 7, RHS). Measured in this way, price competitiveness deteriorated by around 10% between 1999Q1 and 2008Q1.

By contrast, over the same period, Japan, the United States, and to a lesser extent, the United Kingdom all recorded gains in price competitiveness. Focusing only on the more recent period, from the end of 2005 to 2008Q1, price competitiveness also deteriorated in the United Kingdom, while both the United States and, in particular, Japan experienced gains. As in the euro area, all these developments broadly corresponded to movements in nominal exchange rates. The alternative traditional measures of price competitiveness – based on different measures of the real effective exchange rate (REER) - would signal a very similar pattern, i.e. a loss in price competitiveness over the period 1999Q1 - 2008Q1 (see Chart 8) ranging between 6% and 13% depending on the deflator used. By comparison with the REER-based indicators, relative export prices generally tend to differ and to be less volatile, mainly because of two reasons: first, relative export prices include only traded goods. Second, as mentioned, such

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[7] The real effective exchange rate corresponds to the nominal effective exchange rate deflated by domestic and foreign prices. The effective exchange rate is a weighted average of bilateral exchange rates across a country's trading partners. The weights reflect the importance of each partner country in total exports, as well as competition in third markets.

[8] See Chinn (2006). Like all other indicators, relative export prices also have a number of potential shortcomings (for a discussion also see ECB, 2003). For instance, it is generally more difficult to find comparable export price measures among different countries than for other indicators of price and cost competitiveness.

[9] Comparing the (out-of-sample) forecasting performance of alternative cost and price competitiveness measures of the euro area, Ca'Zorzi and Schnatz (2007) find that relative export prices provide the most accurate forecasts of export volumes, if a recursive structure is used. In general, the forecast performance of different indicators is found to be very close to each other.

[10] In this section, relative export prices are defined as the ratio of a weighted sum of competitors' export prices to domestic export prices (both expressed in domestic currency). Therefore, an increase in relative export prices represents a gain in price competitiveness.
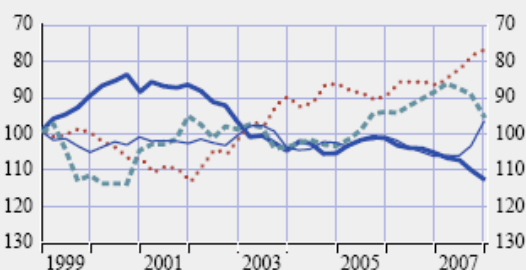
indicators include the pricing-to-market of the exporters, which appears to have been relevant for the euro area, at least until late 2003. Since then, relative export prices have tended to move much closer to REER measures. This can be, on the one hand, the result of a decline in pricing to market due to higher international competition.

On the other hand, higher energy prices appear to have exerted upside pressure on the export prices of both the euro area (see Chart 9) and its competitors. Across individual euro area countries, relative developments in export prices have been highly differentiated since 1999 (see Chart 10). While some countries (like Germany, France, Finland, Ireland and the Netherlands) experienced small losses in price competitiveness, Italy, Spain and Greece recorded a marked decrease in their relative export prices. This heterogeneity also emerges when using alternative indicators. According to the so-called Harmonised Competitiveness Indicators (HCI) based on consumer price indices published by the ECB, all countries recorded a deterioration in price competitiveness between 1999Q1 and 2007Q2 (see Chart 11, LHS). [11]

Chart 10 Relative export prices of euro area countries

(index: 1999Q1=100; quarterly data; seasonally adjusted)

Legend: Germany, Spain, France, Italy, Netherlands, euro area, Finland, Portugal, Austria, Ireland, Belgium

Large euro area countries — Other euro area countries
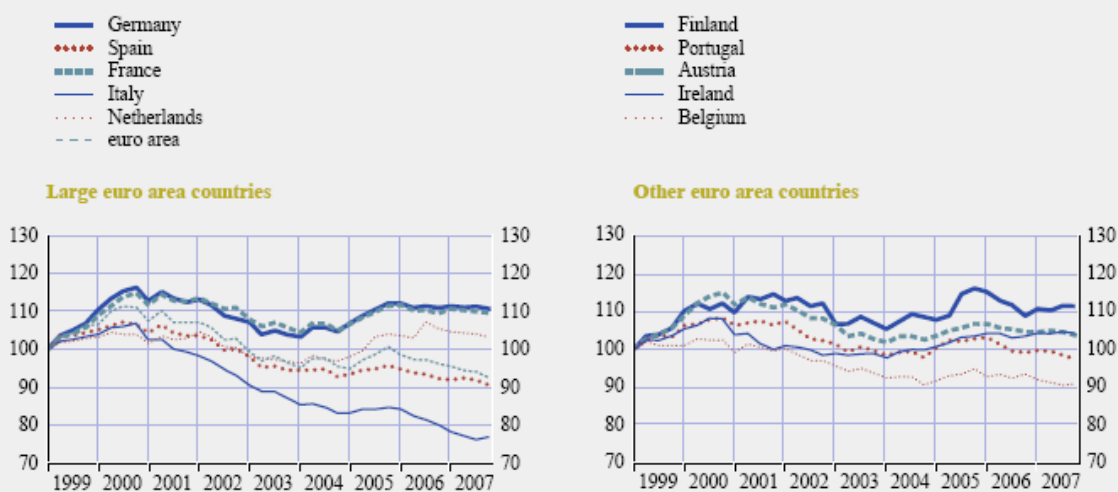
Source: Eurostat National Accounts.
Note: Relative export prices for the individual euro area countries relate to extra- and intra-euro area trade. An increase in relative export prices represents a gain in price competitiveness. Greece was excluded from this chart, as comparable data was only available from 2000Q1 onward. The latest observation refers to 2007Q4.

As with export prices, the results differ substantially across countries. Germany, Austria and Finland experienced a moderate loss, whereas Ireland and Spain appear to have experienced a particularly strong loss of competitiveness. When focusing on the period of the most recent appreciation, i.e. since the beginning of 2006, the differences appear less pronounced, with all countries recording losses in price competitiveness (see Chart 11, RHS). The individual country ranking by price competitiveness developments does not change much when separately considering relative prices from trade within (intra-HCIs) as opposed to outside the euro area (extra-HCIs).[12]

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[11] HCI are computed by the ECB on a monthly basis. For more details on HCIs see Box 6, entitled "The introduction of harmonised competitiveness indicators for the euro area", in the February 2007 issue of the Monthly Bulletin.

[12] HCIs for individual euro area countries are currently only calculated on the basis of weighted averages of bilateral real exchange rates with trading partners both within and outside the euro area. However, it is possible to separately calculate CPI-based competitiveness indicators for each euro area country, either only vis-à-vis currencies of trading partners outside the euro area (extra-HCI) or only vis-à-vis trading partners within the euro area (intra-HCI, as a trade-weighted average of relative developments in CPIs).

The two sets of indicators appear, in fact, to be highly correlated with each other (see Chart 12), with the correlation over the period 1999Q 1 -2008Q2 being close to 70%. [13] The main message is therefore that developments in domestic costs and prices appear to have been the main drivers of the changes in the relative competitive position of each individual euro area country. Differences in the individual countries' exposure to intra- as opposed to extra-euro area exports, for which the euro exchange rate would matter, appear to have been less important. Against this background the growing concerns about the dispersion of the growth in unit labour costs across euro area countries appear to be justified. Although this dispersion has declined substantially in the last fifteen years and is broadly in line with that observed, for example, in the United States, the divergences are still considerable. Since higher unit labour cost growth rates are associated with strong wage growth and/or low productivity growth, wage moderation and appropriate policies to achieve higher productivity growth remain critical. [14]

Chart 11 Changes in HCIs across euro area countries (CPI-based, including extra and intra trade)

(changes in percentage points; quarterly data)

1999Q1 – 2008Q2

1 Austria	6 Belgium	11 euro area
2 Germany	7 Italy	12 Luxembourg
3 Finland	8 Greece	13 Cyprus
4 France	9 Portugal	14 Malta
5 Slovenia	10 Netherlands	15 Spain
		16 Ireland

2006Q1 – 2008Q2

1 Austria	6 Germany	11 Spain
2 Portugal	7 France	12 Belgium
3 Finland	8 Italy	13 Greece
4 Netherlands	9 Luxembourg	14 Malta
5 Cyprus	10 Slovenia	15 euro area
		16 Ireland

Source: Eurostat.
Note: A negative (positive) number signifies a gain (loss) in price competitiveness. For the euro area the real effective exchange rate of the euro (euro EER) vis-à-vis 42 trading partners is displayed which is not directly comparable to the Harmonised Competitiveness Indicators (HCIs) for the euro area countries. While the HCI of a specific country takes into account both intra and extra-euro area trade, the euro EER is based on extra-euro area trade only.

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[13] Excluding the three countries that have only recently joined the euro area, i.e. Slovenia, Malta and Cyprus, the correlation between extra- and intra-HCI reaches almost 90%.

[14] See Annex 1 for country details on developments in unit labour costs and competitiveness indicators.

Chart 12 Developments in intra and extra HCIs (CPI-based)

(cumulated changes in percent; over 1999Q1-2008Q2)

x-axis: change in extra-NCI
y-axis: change in intra-NCI
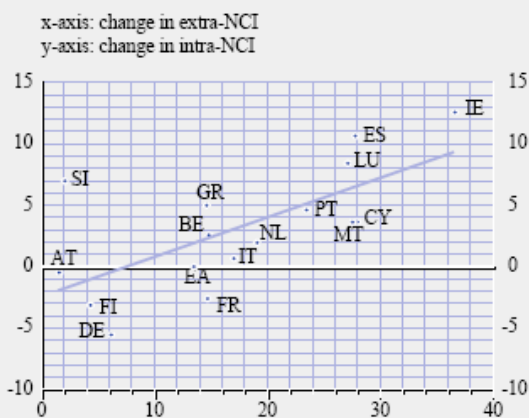
Source: ECB calculations.
Note: A positive (negative) number represents a loss (gain) in price competitiveness. For the euro are, the chart shows the real effective exchange rate of the euro (euro EER) vis-à-vis 42 trading partners based only on extra-trade.

Chart 13 Relative export prices and euro area export market shares

(index 1999=100; quarterly data)

— EA export market share
••••• relative export prices
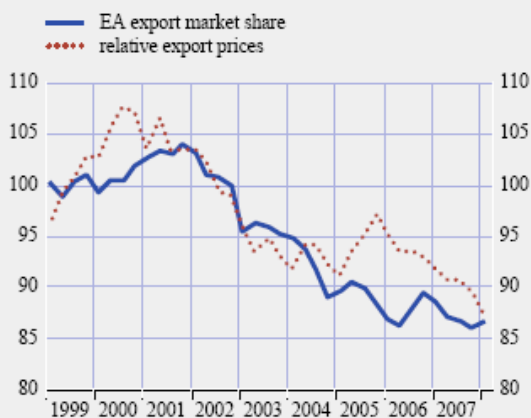
Source: Eurostat ECB calculations.
Note: The latest observation refers to 2008Q1.

Price competitiveness and export performance

Having examined developments in price competitiveness, we now look at their impact on export performance. While movements in relative export prices over the second half of the 1990s were a rather good indicator of euro area global export market share developments, since the late 1990s there have been some signs of this correlation weakening, particularly over the periods 1999-2001 and 2005-2006 (see Chart 13). The results of the estimation of a standard export volumes equation also confirm this. Featuring a statistically significant negative time trend over the last years, this equation also points to an increasing role of other structural factors affecting euro area market shares. [15] As shown in Baumann and di Mauro (2007), the rising global trade integration of China – which has also led to a rise in intra-regional trade between Asian countries – seems to be the main counterpart of this non-price related fall in euro area export market share. [16] Signs of a possible decoupling of export performance (see Chart 14) from developments in price competitiveness also appear when looking at individual euro area

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[15] Export volumes are estimated using a single error-correction equation, capturing a long-run relationship as well as short- term dynamics. In the long run, export volumes are assumed to depend on relative export prices and foreign demand (calculated as a weighted average of the annual growth rates of imports by extra-euro area trading partners). In the long run, a unit elasticity is imposed on the foreign demand term, which assumes a stable euro area export share in world markets if competitiveness remains unchanged. However, a time trend that is included in the equation has a negative and statistically signiÞcant coefÞcient, indicating that export market share experienced a trend decline over the sample period, which cannot explained by export price and exchange rate variations.

[16] If China is excluded (from both the extra-euro area export volumes and the euro area foreign demand variable), the negative time trend becomes insignificant.

countries, particularly more recently. [17] Looking at the period 1999-2007, it is interesting to note that for some countries the change in price competitiveness was in line with developments in market gains (see Chart 15). Most notably, the increase in Germany's market share seems to be closely associated with improvements in price competitiveness; in the opposite appears to be true of Italy's market share losses. On the other hand, there are also a number of countries, such as France, that recorded losses in export market shares despite an improvement in price competitiveness. Other factors like sectoral export specialisation or differences in internationalisation strategies for example, appear to have played a larger role.

Chart 14 Developments in export market shares across euro area countries

(index: 1999Q1=100; quarterly data; seasonally adjusted)

Germany — Belgium
Spain — Portugal
France — Austria
Italy — Ireland
Netherlands — Finland
euro area

Large euro area countries

Other euro area countries
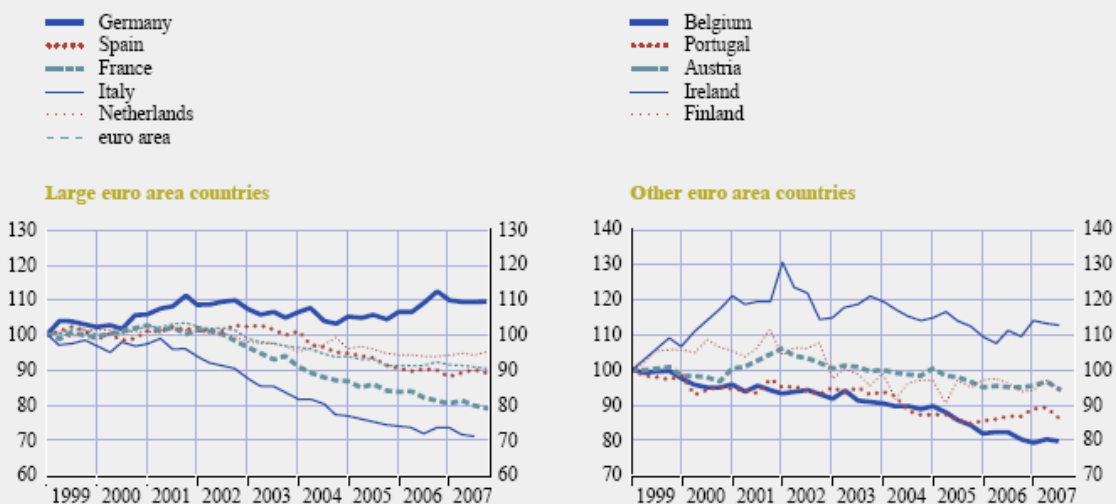
Source: Eurostat National Accounts.
Note: The latest observation refers to 2007 Q4. Greece was excluded from this chart, as comparable data was only available from 2000Q1 onward.

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[17] A correlation analysis shows that the positive correlation between changes in export market shares and changes in relative export prices was generally lower, in absolute terms, or even turned negative over the last four years with respect to the period 1999-2003.

Chart 15 Price competitiveness and export market shares across euro area countries

(average annual percentage changes; 1999-2007)

x-axis: change in relative export prices
y-axis: change in export market shares
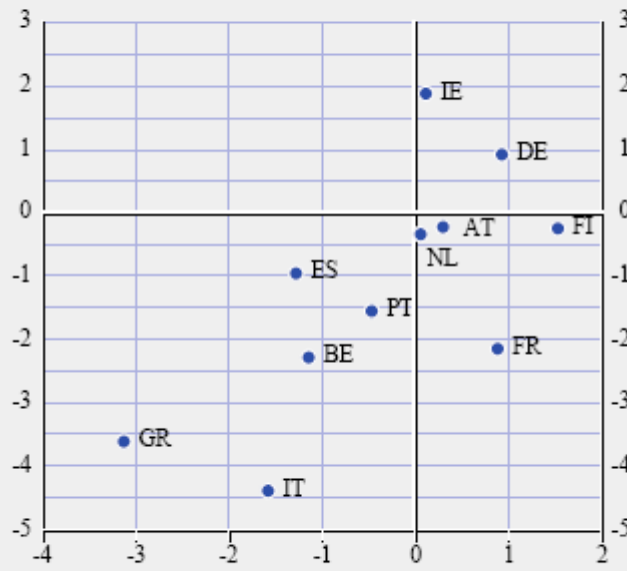
Source: Eurostat ECB calculations.
Note: Price competitiveness is proxied by relative export prices (competitor's export prices divided by the country's export prices). An increase in relative export prices implies a gain in competitiveness. Data for Greece only start in 2000.

Why has the correlation between changes in price competitiveness and trade performance declined?

As non-price related factors appear to have become increasingly important for the export performance of the euro area, the next step is to try to capture the role that globalisation might have played. Four observations are in order. First, as mentioned above, it was to some extent expected that the major economies would lose export market share once new low-cost trade players entered world markets. The losses can therefore parùy be seen as a mechanical adjustment. Second, regarding export market shares, the ongoing process of internationalising production is an important factor that can help explain differences in export performance. Some countries made significant foreign investment in key destinations and shifted production facilities abroad. Depending on the purpose of the engagement in FDI (vertical vs. horizontal) and the stage of the investment, this can either lead to higher or lower exports. Notwithstanding the resulting effect on export performance, driven by the increasing relocation of production abroad, losses or gains in export market share may therefore not necessarily be due to developments in

price competitiveness, but rather to different strategies of internationalisation. Using FDI destination countries as export bases would lower home production and, ceteris paribus, country exports. The opposite holds true if unfinished products are imported back and exported after getting a "stamp of approval".

Third, globalisation also has an impact on trade prices. On the one hand, it may have improved – via lower manufacturing import prices – the terms of trade of developed economies. On the other hand, by heightening international competition, globalisation may have lowered export volumes' overall responsiveness to changes in relative export prices.

Finally, given the sizeable changes – e.g. in export specialisation, world import demand and market structure – that are implied by globalisation, trade performance is likely to depend predominantly on other factors. Unlike in a relatively stable environment, where changes in competitiveness can be explained mostly by changes in exchange rates, or more generally in relative prices, the ability of countries and firms to successfully adjust to this changing environment will be determined by their capacity to change and adapt to new market conditions, by reviewing their production and export portfolios in view of comparative advantage and by other means of enhancing productivity.

PATTERNS OF SECTORAL SPECIALISATION

Starting from the main result of our previous analysis of changes in the export specialisation of the euro area over the last decade, [18] this section provides further evidence on the changes in the export structures in recent years by also focusing on developments in euro area countries.

Over the period 1993-2006, euro area exporters largely specialised in capital intensive, research intensive and labour intensive goods, the latter in contrast with other industrialised countries (see Table 1). [19] Both Japan and the United States were relatively more specialised in research intensive goods (with Japan also specialising in capital goods exports). Meanwhile, China was specialised in labour-intensive goods, although more recently it has also shown a marked increase in its specialisation in research intensive production. The latter, however, may also be due to foreign firms outsourcing the labour intensive parts of their research intensive production to China. Nevertheless, a similar trend towards a greater specialisation in research intensive production has also been recorded for other emerging Asian countries. Overall, the export specialisation broadly reflected the countries' relative factor endowments, with higher-skilled workers being relatively abundant in the euro area, Japan and the United States, while lower-skilled workers are prevalent in China and other Asian countries.

Somewhat surprisingly, and in contrast to the United States and Japan, for example, the euro area's export specialisation did not change much over this period (see Charts 16 and 17), showing neither the expected shift towards a more research intensive production, nor a decline in the specialisation in labour intensive products, which was notably the case in the United

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[18] For more details see Baumann and di Mauro (2007).

[19] The sectoral classification used here is subject to important caveats. These will be covered in a separate section, following the analysis of recent developments.

States and Japan. [20]

While this might reflect structural rigidities that could constrain the ability of euro area firms to adjust rapidly, a more detailed analysis distinguishing 17 sectors according to their technological content also suggests that euro area firms may not have been under significant pressure to change substantially their specialisation structure. [21] Being relatively specialised in medium-high-tech exports, the euro area has been most active in sectors such as chemicals and motor vehicles (see Chart 18, first quadrant), which have been growing rather strongly worldwide and that so far appear to have been less prone to direct competition from China (see Table 1 and Chart 19), reducing the incentive of diversifying away from them.

Table 1 Revealed comparative advantage by factor intensity

(averages over the period 1993-2006)

Exports are predominantly	Euro area	USA	Japan	China	CEECs
Raw materials intensive	0.5	0.7	0.1	0.5	1.7
Labour intensive	1.1	0.8	0.5	2.3	1.1
Capital intensive	1.2	0.9	1.6	0.3	1.2
Research intensive	1.1	1.4	1.5	1.0	0.5

Sources: Chelem and ECB calculations.
* Balassa index of revealed comparative advantage. An index greater than one indicates that a country specializes in that product. CEECs denote Central and Eastern European Countries (for details see Annex 2).

Chart 16 Revealed comparative advantage by factor intensity in 2006

- low-technology industries
- medium-low-technology industries
- medium-high-technology industries
- high-technology industries

Sources: Chelem and ECB calculations.
* Balassa index of revealed comparative advantage. An index greater than one indicates that a country specializes in that product. CEECs denote Central and Eastern European Countries (for details see Annex 2).

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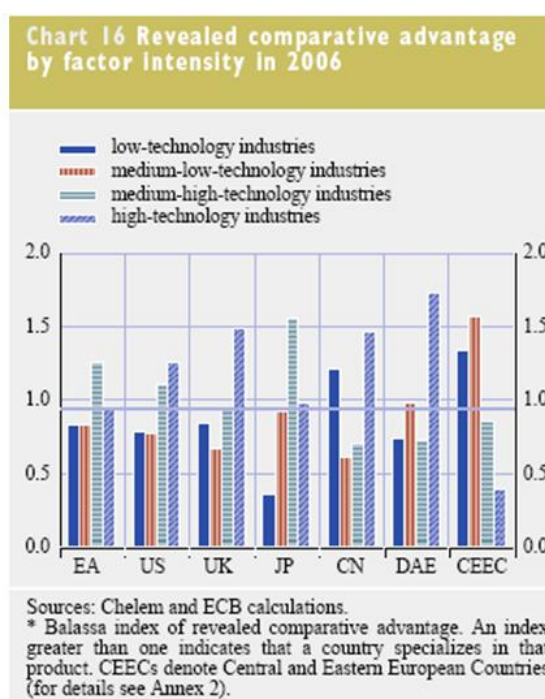
[20] By considering two different classifications of export specialisation by industry, we continue to assess revealed comparative advantages (RCA) by computing the respective Balassa index (following Balassa, 1965):

$$RCA_{k,i} = \frac{X_{k,i}/\sum_{k=1}^{n} X_{k,i}}{X_{k,world}/\sum_{k=1}^{n} X_{k,world}}$$

The numerator represents the share of sector k in total exports of country i and the denominator represents the same share in world exports. The first grouping orders export sectors by factor intensity (raw materials, labour, capital and research), the second by technology content (low, medium-low, medium-high and high). For more details on the data classification and on individual euro area countries, refer to Annex 2.

[21] For details on the sector classification, see Annex 2.

As the competitive environment is changing rapidly, there may, however, be an increasing need for adjustment going forward. Although China and other emerging countries continue to specialise in low- and medium-low-technology industries, these countries have also shown growing revealed comparative advantages in easy-to-imitate research intensive production coupled with a decline in raw materials intensive sectors. These developments are also apparent in specialisation by technology content, showing an increasing Chinese specialisation in high- technology industries in recent years and a corresponding lower specialisation in low-tech industries (see Chart 19).

The more detailed sectoral analysis confirms some of the previous findings. First, China has been specialising only marginally in sectors where the euro area has a strong specialisation (see Chart 19). Looking at the faster-growing sectors in terms of world demand, China has increased its specialisation mainly in the production of radio, TV and telecommunications equipment, as well as in office, accounting and computing machinery – areas in which the euro area has a rather low presence.

Chart 17 Revealed comparative advantage by factor intensity – major advanced economies

Source: Chelem, ECB calculations.
Note: The latest data refers to 2006. Data for the euro area refers to extra-euro area exports. For more details on the data classification see Annex 2.
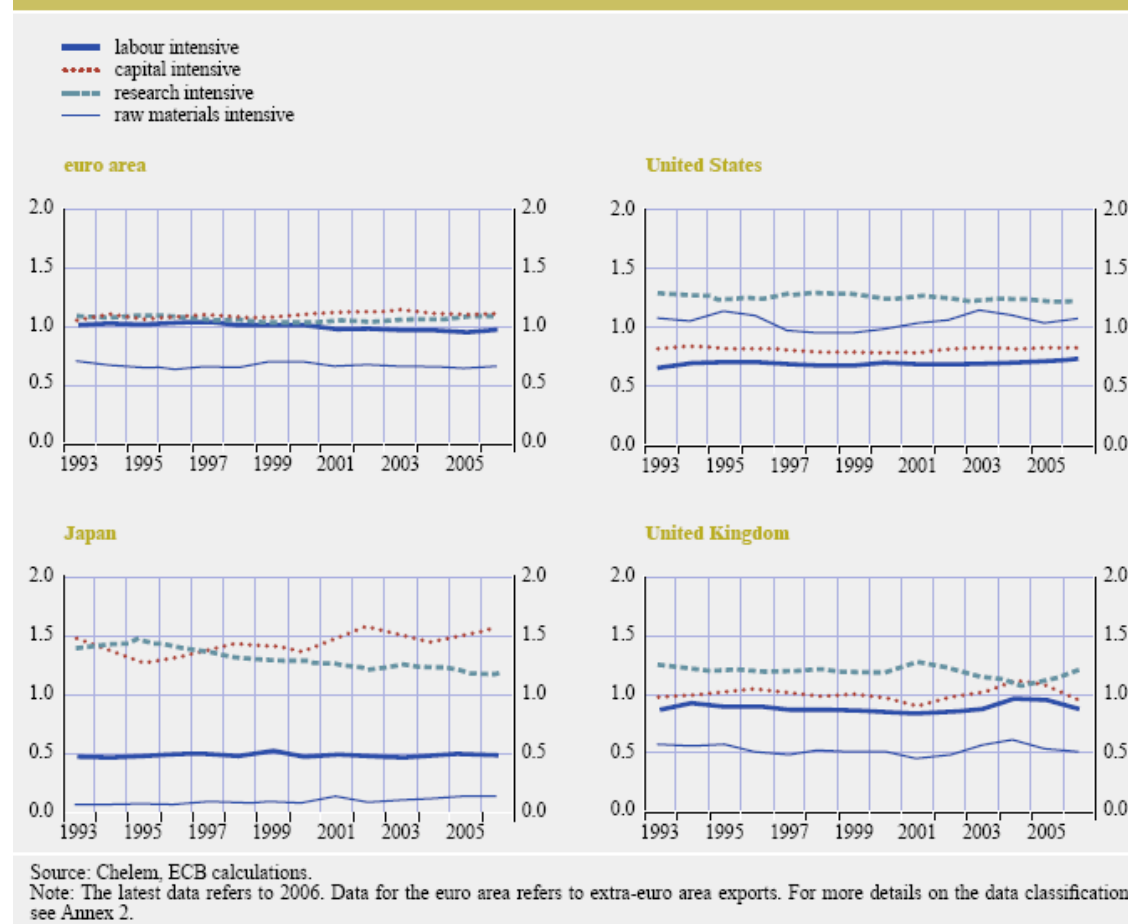
Another interesting fact is that China is increasingly specialising in industries with higher technological content, while retreating from some "traditional" industries – like manufacturing of textiles, leather and footwear. Nevertheless the share of these traditional, labour-intensive sectors in China's exports remains high.

As these developments in China are likely to continue, and as other emerging countries are showing similar trends, it seems even more striking that the analysis shows only relatively few signs of an adjustment in euro area export specialisation, a pattern that is also confirmed by the analysis for the most recent period (compare the results of Chart 20 for the most recent period with respect to Chart 17). Instead of showing an increasing specialisation in fast-growing sectors, euro area exporters appear rather to have moved away from those sectors, with the notable exception of medical, precision and optical instruments.

Chart 18 Change in euro area export specialisation and world trade growth

(based on extra-euro area exports)

x-axis: change in export specialisation
y-axis: world trade growth, percentages, per annum, average 1999-2006

— high-tech   ┄┄ medium-low-tech
— medium-high-tech ┄┄ low-tech

Average growth rate of sector's world exports relative to all sectors, p.a. 1993-2006

| Falling specialisation, fast-growing sector | Growing specialisation, fast-growing sector |
| Falling specialisation, slow-growing sector | Growing specialisation, slow-growing sector |

Change in specialisation in a given country[1]
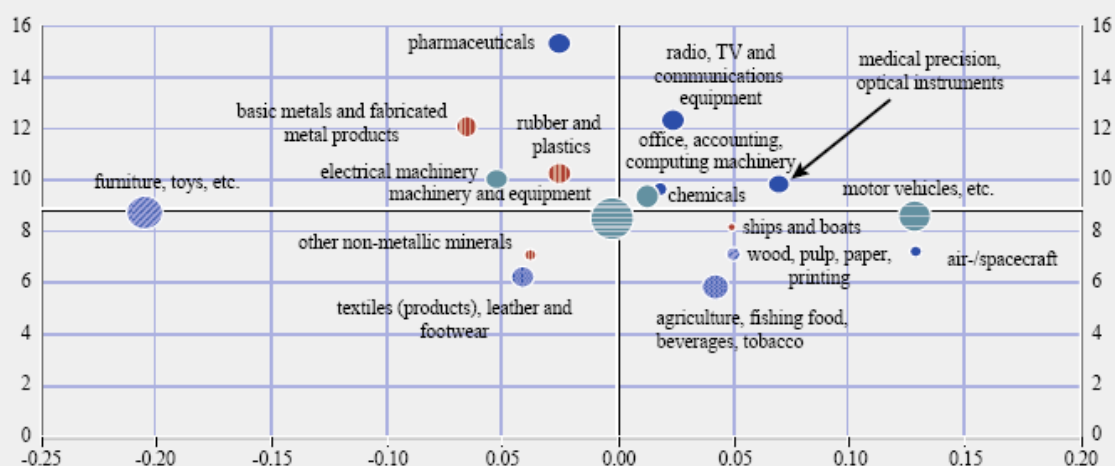
1) The change in export specialisation is defined as the change in the Balassa index of revealed comparative advantage on average between 1993-1999 and 2000-2006 (also see footnote 18). The size of the bubbles is determined by the share of exports in total extra-euro area exports in 2006.

However, while at first glance, it appears advantageous to specialise in fast-growing areas and to move out of those that are growing slowly, in practice, indications about such classifications should be interpreted with caution. These classifications are based on a methodology that does not take into account other important factors such as differences across sectors in value added per worker and relative factor endowments. [22]

Chart 19 Balassa indices of revealed comparative advantage in China

legend:
- medium-low-technology industries
- high-technology industries
- medium-high-technology industries
- low-technology industries

Sources: Chelem, ECB calculations.

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[22] When interpreting the dynamics in RCA, it should also be borne in mind that the interpretation of a given change might be very different, depending on whether it results from a change in the country's sectoral share in world exports in this sector or from a change in a country's total exports relative to world exports (i.e. the numerator or the denominator of the Balassa index of RCA). If, for example, an increase of the RCA was mainly the result of a declining share in world exports, this would reflect the pattern of countries' overall exports rather than the international competitiveness of the considered sector (also see De Benedictis and Taberi, 2006).

Chart 20 Change in China's export specialisation and world trade growth

x-axis: change in export specialisation
y-axis: world trade growth, percentages, per annum, average 1993-2006

— high-tech   ▦ medium-low-tech
— medium-high-tech   ▦ low-tech

Sources: ECB calculations, CHELEM data.
Note: The change in export specialisation is defined as the change in the Balassa index of revealed comparative advantage on a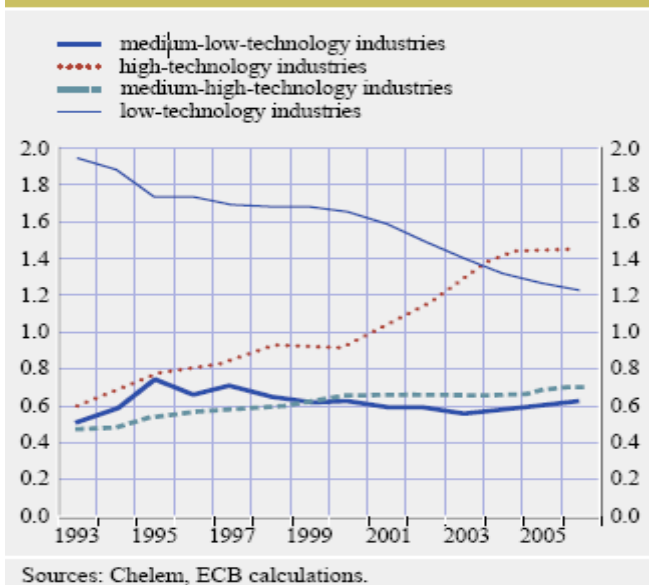verage between 1993-98 and 1999-2006. The size of the bubbles is determined by the share of exports in total Chinese exports in 2006.

Sectoral export specialisation of individual euro area countries

The overall strong specialisation of the euro area as a whole in medium-high-tech exports can largely be explained by the export structures of Germany, France, Spain and perhaps Italy (see Chart 21). [23] Both Germany and France showed an increasing specialisation in motor vehicles over the two periods 1993-99 and 2000-06, benefiting from the particularly strong growth in world demand, but reduced their specialisation in other fast-growing sectors such as chemicals, electrical machinery, rubber and plastic products, as well as in basic metals and fabricated metal products. While Germany has specialised more in radio, TV and communication equipment, France excelled in pharmaceuticals.

Considering extra-euro area exports only, France also seems to have specialised in radio, TV and telecommunication, while its extra-euro area aircraft and spacecraft exports are retreating. In contrast to this, Germany's specialisation in aircraft and spacecraft exports became more pronounced as far extra-euro area exports are concerned, while the shift away

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[23] For more details on other euro area countries, see Annex 2, Table 11

from the exports of pharmaceuticals appears even more distinct when only looking at global markets outside the euro area (see Chart 23).

The intra vs. extra breakdown of export specialisation seems to be more relevant for the two large southern countries of the euro area. While Italy's traditional specialisation in textile, leather and footwear has increased further as far as extra-euro area exports are concerned, it has actually decreased when measured in terms of total exports. This is in contrast to Spain, which has continued to increase its specialisation in traditional sectors, such as textiles, leather and footwear, but also agricultural products, in terms of both total and extra-euro area exports. Furthermore, Spain also increased its extra-euro area export specialisation in motor vehicles, while decreasing it in terms of total euro area exports.

Chart 21 Recent changes in euro area export specialisation and world trade growth

(based on extra-euro area exports)

x-axis: change in export specialisation
y-axis: world trade growth, percentages, per annum, average 1999-2006

- high-tech
- medium-high-tech
- medium-low-tech
- low-tech
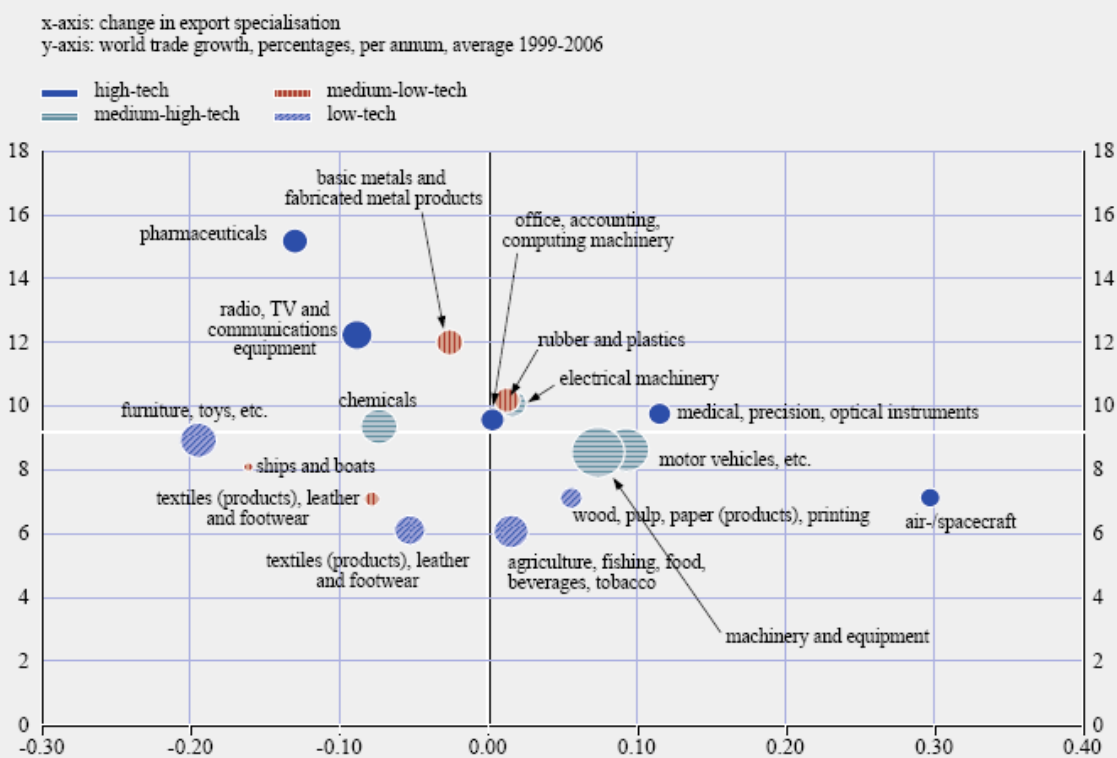
Sources: ECB calculations, CHELEM data.
Note: The change in export specialisation is defined as the change in the Balassa index of revealed comparative advantage on average between 1998-2000 and 2004-2006. The size of the bubbles is determined by the share exports in total extra-euro area exports in 2006.

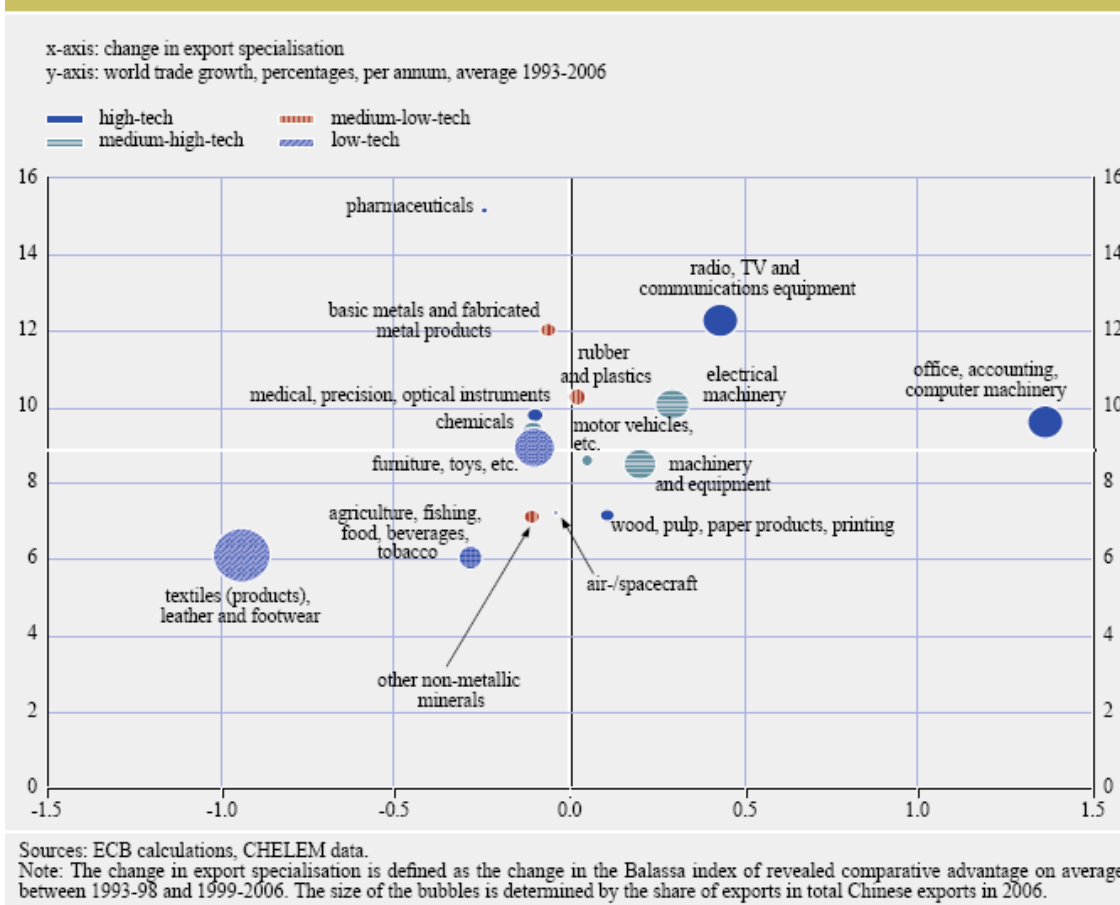The country analysis further points to important differences in the extent to which euro area countries specialise in high-tech goods, whereby some countries, for example Ireland and the Netherlands, seem to have been benefi ting much more from the change in the composition of world demand towards high-tech products. By contrast, Greece, Portugal, and to a lesser extent, Italy appear to specialise rather strongly in the lowand medium-technology sectors (textiles, etc.), suggesting that these countries are more directly exposed to competition from low-cost countries, and in particular from China. Such observations are also consistent with the significant market share losses of Greece, Portugal and Italy since 1999. Moreover those countries have been retreating very slowly from the production of goods with lower technological content, probably pointing to persistent adjustment costs in the future.

Chart 22 Change in export specialisation of the four largest euro area countries and in world import growth

(based on total euro area exports)

x-axis: change in specialisation
y-axis: world trade growth, percentage per annum, average 1993-2006

high-tech
medium-high-tech
medium-low-tech
low-tech

(based on total euro area exports)

x-axis: change in specialisation
y-axis: world trade growth, percentage per annum, average 1993-2006

— high-tech   ▦ medium-low-tech
— medium-high-tech ▨ low-tech

Italy
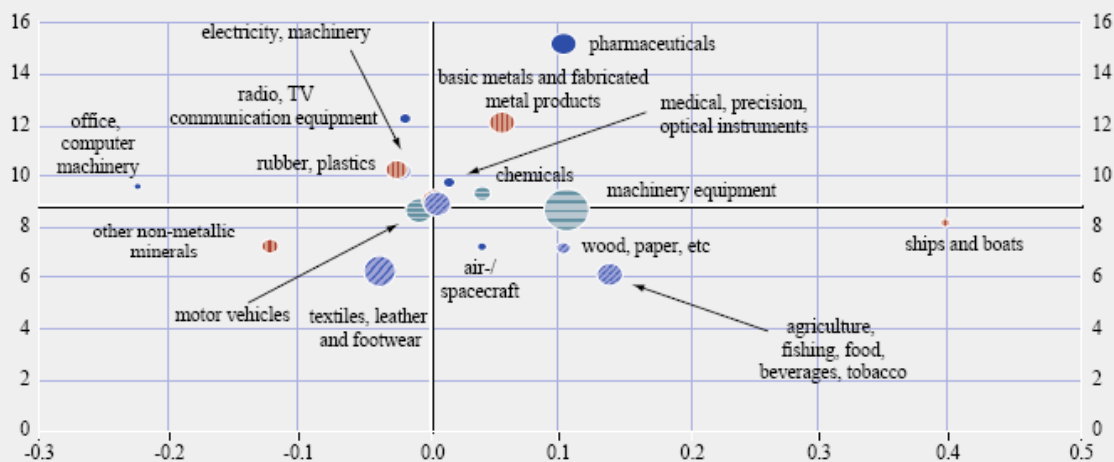
Spain
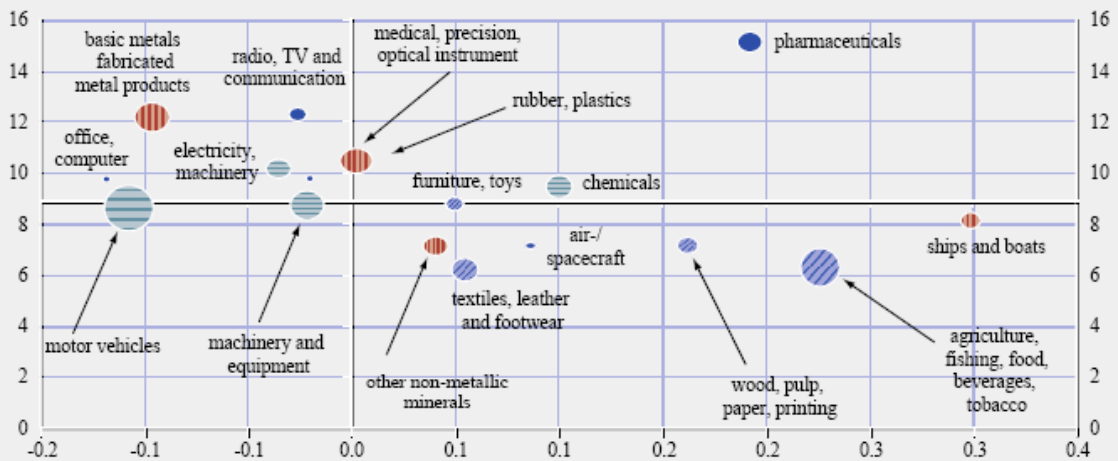
Sources: ECB calculations, CHELEM data.
Notes: The change in export specialisation is defined as the change in the Balassa index of revealed comparative advantage on average between 1993-1998 and 1999-2006. The size of the bubbles is determined by the share of the sector in the country's total exports in 2006.

Chart 23 Change in export specialisation of the four largest euro area countries and in world import growth

(based on extra-euro area exports)

x-axis: change in export specialisation
y-axis: world trade growth, percentages, per annum, average 1993-2006

— high-tech   ▦ medium-low-tech
— medium-high-tech   ▦ low-tech

Germany

pharmaceuticals

radio, TV and communication equipment

basic metals, metal products

machinery and equipment

rubber, plastics

office, accounting, computer machinery

electricity machinery

medical, precision, optical

chemicals

motor vehicles

furniture, toys, etc.

air-/spacecraft

wood, pulp, paper, printing

textiles (products), leather and footwear

agriculture, fishing, food, beverages, tobacco

other non-metallic minerals

France

basic metals, fabric metal products

radio, TV, communication

pharmaceuticals

rubber and plastics

medical, precision, optical instruments

office, computer machinery

electrical machinery

furniture, toys

motor vehicles

chemicals

machinery/ equipment

ships and boats

other non-metallic minerals

agriculture, fishing, food, beverages, tobacco

wood, pulp, paper, printing

textiles (products), leather and footwear

(based on extra-euro area exports)

x-axis: change in export specialisation
y-axis: world trade growth, percentages, per annum, average 1993-2006

— high-tech   ▪▪▪▪ medium-low-tech
— medium-high-tech   ▪▪▪▪ low-tech

Italy

Spain

Sources: ECB calculations, CHELEM data.
Note: The change in export specialisation is defined as the change in the Balassa index of revealed comparative advantage on average between 1993-98 and 1999-2006. The size of the bubbles is determined by the share of the sector in the country's total extra-euro area exports in 2006.

Limitations and caveats of the analysis of revealed competitive advantages

Although the measures of revealed comparative advantages support a first indication about how the euro area is adjusting to the competitive challenges, it appears important to stress the possible shortcomings of these measures. [24] Not only may the results vary depending on the period considered and across individual countries, but the outcome may also depend on the classification of sectors and industries used when calculating these measures. More importantly, even when using a rather detailed sectoral classification the measures remain subjective, as within the sectors considered there is a vast range of differences with regard to technological content and/or factor intensity. For instance, within sectors classified as high-technology there are production stages of low technological content and high labour use which may even represent a large share of the production process (such as IT assembling). Others instead classified as low-technology industries – such as textile – may at times require stages that are highly research-intensive. A similar, yet even stronger caveat is evident with regard to the classification 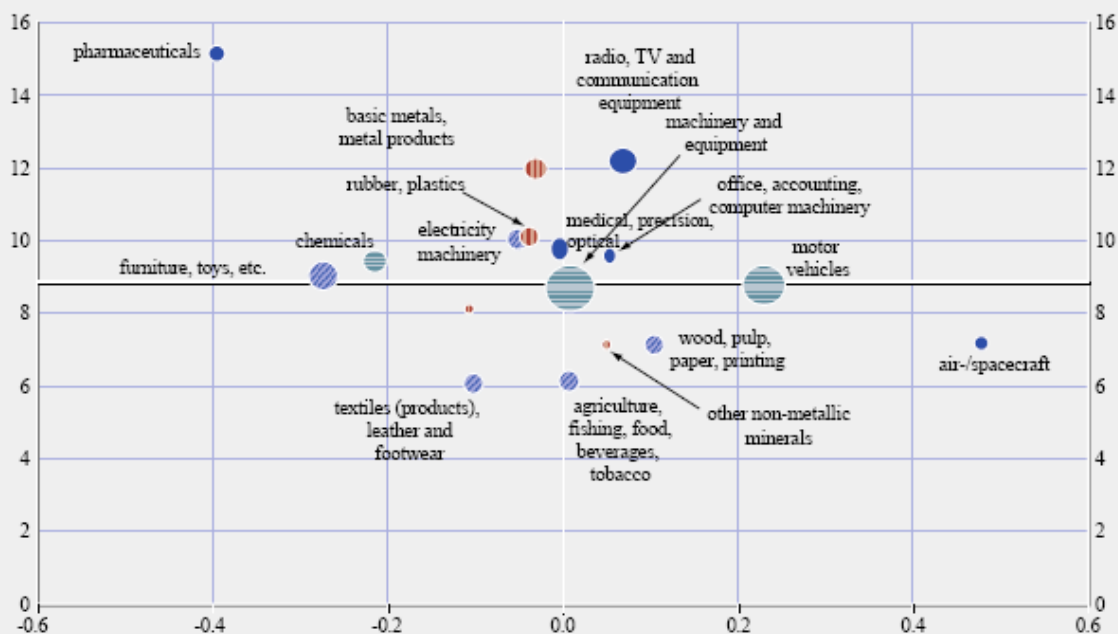by factor intensity, which can be easily misleading if, for example, a country focuses primarily on the labour-intensive stages of predominantly research-intensive goods. This may apply particularly to China, where foreign firms may be outsourcing the labour-intensive parts of production for a variety of research- or capital-intensive products and then using China as an export base. In a similar vein to these caveats, these indicators may also lack the ability to capture differences in quality. Taking again the example of textile, rather reflecting the need for adjustment, the ongoing strong specialisation of some countries like Italy may also reflect comparative advantages in producing higher quality and higher price varieties of these products. [25]

Lastly, as we already mentioned in the context of export market shares, measures of trade flows and export specialisation are further affected by the internationalisation of production, and may therefore provide only an imperfect measure of the globalisation induced impacts. With exported goods embodying substantial international outsourcing of production inputs, this may render these measures less meaningful. Baumann and di Mauro (2007) address this issue by computing an index of trade specialisation which nets out intermediate imports of exports. [26] While using this modified version of the Lafay index of revealed comparative advantage by industry generally gives similar results as those again reported here, the first caveat still applies, leaving the possibility that these measures may hide important adjustment processes that may only be detected at a more disaggregated level. Furthermore, as mentioned by the authors, their analysis omits a number of possibly important types of offshoring activities that could only be better understood by also tracing back the origin of intermediate inputs.

Overall, it might therefore be premature to draw final – and necessarily negative – conclusions from the finding that the euro area's export specialisation has not changed much

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[24] For a review of some general undesired features of RCA indicators, see also De Benedictis and Tamberi (2006).

[25] This argument is further supported by the findings of recent studies that focus on price differences within product categories. According to these studies, low-cost countries like China continue to specialise in varieties with low unit values – or prices. By contrast, high-unit value varieties are mainly supplied and exported by rich countries (see, for example, Fontagné, Gaulier and Zignago, 2008)

[26] See section 3.4. in Baumann and di Mauro (2007).

over time. On the one hand, the analysis may conceal important changes in specialisation within sectors. As the example of higher quality goods within textiles showed, we should therefore be cautious and avoid arguing as if we knew the "right" sectors in which euro area countries should specialise. On the other hand, as data on trade flows may, in general, not be enough to fully capture globalisation-related adjustments, further analysis will be needed to assess the implications and prospects for euro area competitiveness in the longer run. Therefore, in the next section, we will shift our focus away from the export specialisation and look more broadly at the source of euro area firms' competitiveness in the long run: the determinants of higher productivity growth.

DEVELOPMENTS IN PRODUCTIVITY GROWTH

While developments in prices, costs, wages and the trade specialisation are all important determinants of firms' ability to compete in international markets, particularly in the short run, the euro area's competitiveness in the medium and long term depends more broadly on the prospects of reaching higher productivity growth, which is one, or even the main driving force behind higher and sustained economic growth. In the long run, the ability to generate high income and employment, and hence, higher living standards, will very much depend on the ability of a country's firms to produce and develop goods either at a lower cost or of a higher quality, and to market them successfully in both domestic and international markets. Focusing on productivity brings together various aspects of competitiveness, like the technological competitiveness of a country's firms, as well as factors determining the structural competitiveness of a country, such as, for example, the quality of the infrastructure, the level of education and the tax and regulatory environment.

Moreover, with globalisation being closely linked to the process of technological advancement, an analysis of the determinants of productivity growth also appears crucial to understanding how globalisation is affecting the competitiveness of euro area firms. In principle, globalisation is expected to boost productivity through three main channels. First, globalisation may contribute to technology transfer, through cross-border movements of both capital goods and labour, but also through the convergence of management techniques and best practice standards. Second, and partly related to the first channel, enhanced competitive pressures will improve the allocation of production factors across countries and may also encourage firms to be more innovative. Third, globalisation may result in higher average productivity in the economy, both by changing the composition of active firms and by giving firms the possibility of increasing the scale of their operations. [27] As we will see in this context, higher productivity may also in turn reinforce globalisation trends by giving firms the necessary edge to enter global markets, which directly links the productivity and the export performance of firms.

To get a first assessment of whether the euro area has been benefiting from these developments, we will look at recent trends in the aggregate productivity of the euro area and across euro area countries.

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[27] This channel will be covered in more detail in Chapter 4

Recent developments in labour productivity growth

While the international openness of the euro area has steadily increased, its productivity performance since 1995 has been rather disappointing overall, particularly when compared with the United States. According to the EU KLEMS database, euro area average annual labour productivity growth (per hour worked) fell from 2.3% in the period 1980-1994, to 1.2% and 1.0% on average over the periods 1995-1999 and 2000-2005 respectively. [28]

A closer look at the sectoral dimension underlying these aggregate productivity developments yields a more nuanced picture, particularly as sluggish productivity growth was recorded, to a large extent in sectors with limited exposure to international competitive pressures (see Table 2). Productivity growth remains considerably higher in manufacturing than services, with the latter showing a particularly low out-turn in the most recent period. "Distribution services", and "business services", which also include computer and related activities and research and development, are also the main contributors to the productivity gap in the service sector with the US. [29]

Nevertheless, apart from competitive pressures, other factors – such as capital intensity, technology and skill content, as well as developments in commodity prices or exchange rates – may also have contributed to this development.

The slowdown in labour productivity growth has been a rather general trend, observed for all large euro area countries. Growth in all countries has been considerably lower than for the United States in the period from 1995 to 2005, but the downward trend has been particularly marked in Italy and Spain, where labour productivity growth was significantly below the euro area average for the same period (see Chart 24).

Chart 24 Labour productivity growth in the euro area

(annual averages, 1995-2005; percentages)

1 Slovenia 6 Germany 11 Belgium
2 Ireland 7 Netherlands 12 Luxembourg
3 Greece 8 Portugal 13 Spain
4 Finland 9 Austria 14 Italy
5 France 10 Euro area

Source: Authors' calculations based on EU KLEMS.

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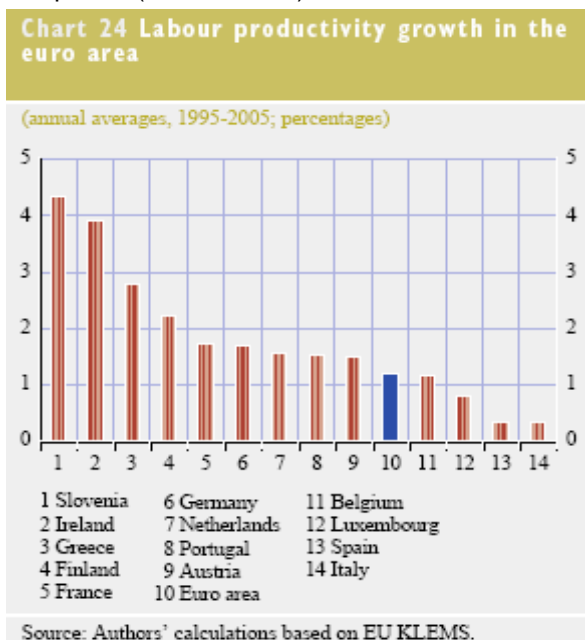
[28] Using the SIC classification, US average annual labour productivity growth (per hour worked) rose from 1.3% in the period 1980-1994, to 1.7% and 2.9%, over the periods 1995- 1999 and 2000-2005 respectively.

[29] "Distribution services" include transport, storage and communication; business services comprise real estate activities, renting and business activities. Business services can also be thought as "ICT-affine" services (for a more detailed exposition on this taxonomy see Gomez-Salvador et al., 2006).

Table 2 Sectoral breakdown of euro area labour productivity growth

(annual averages over respective periods; in percentages)

	1980-1994	1995-1999	2000-2005
Total industries	2.3	1.2	1.0
Manufacturing	3.2	2.0	2.0
Electrical and optical equipment	4.6	3.9	4.4
Wholesale and retail trade	2.0	1.5	1.0
Distribution services	3.4	4.0	2.4
Financial Services	1.6	2.5	2.0
Business Services	-0.8	-2.7	-0.5
Personal Services	-0.2	0.0	-0.4

Source: Authors' calculations based on EU KLEMS.
Note: The euro area corresponds to the EU KLEMS aggregate "Eurozone", comprising all countries that had entered the euro area prior to 1 January 2001.

Recent developments in total factor productivity growth

Additional insights can be gained by looking at developments in total factor productivity growth (TFP), the part of productivity growth generated by intangible factors such as technical progress or organisational innovation, as opposed to the increased use of inputs such as capital and labour. TFP is the most comprehensive measure of the efficiency of an economy; data on TFP can be obtained from the EU KLEMS Growth and Productivity Accounts, which offer a decomposition of measures of output growth into labour and capital input growth as well as in total factor productivity growth (TFP) at an aggregated and disaggregated industry level, for both the euro area as a whole and the individual euro area countries.

Major differences in the growth of TFP appear to have been the main factor behind the disparity in real output growth between the euro area and the United States. Between the periods 1980-1994 and 1995-2005 euro area TFP growth worsened in particular in the manufacturing (excluding the electrical industry), distribution services, and financial and business services sectors. TFP growth exhibited instead a better performance in 1995-2005 compared with 1980-1994 in the ICT-producing sector, other goods-producing industries, and personal and social services. A lower capital contribution also contributed to the increased disparity between US and euro area growth between 1980-1994 and 1995-2005. Although the industry level data point to considerable country-specificities, the slowdown in both capital deepening and TFP growth has been widespread across euro area countries. While the fall in TFP growth in manufacturing could mainly be attributed to Italy and Spain, it was rather broad-based across the euro area economies as far as business services are concerned (see Chart 25). The picture for Germany and France is generally more positive, with Spain exhibiting an exceptionally high annual TFP growth over the period 1995-2005 in financial services of 3.8%, which was even higher than in the United States. Over the same period, US financial sectors recorded an annual TFP growth of 3.5%.

Chart 25 Total factor productivity growth of major euro area countries

(annual averages for respective periods; percentages)

Germany / France / Italy / Spain

1980-1994

1995-2005

1 Personal Services
2 Business services
3 Financial Services
4 Distribution services
5 Wholesale and retail trade
6 Manufacturing
7 Total industries

Source: Authors' calculations based on EU KLEMS.
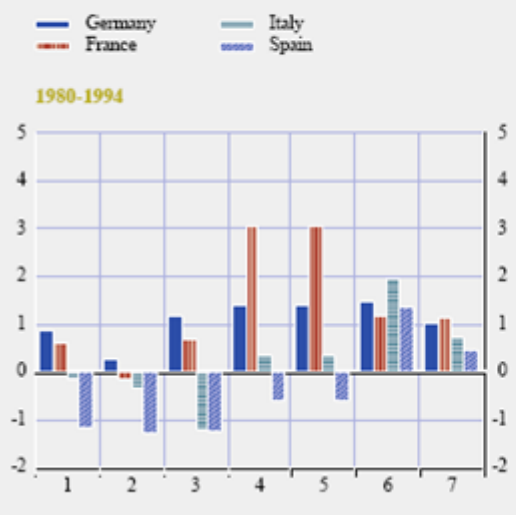
Overall, the poor labour and total factor productivity performance has been linked to insufficient technological and innovation spillovers and has more broadly been seen as a sign of labour and product market rigidities – an assessment that is also consistent with trends in patent and R&D data (see also Box 1).

Box I

PATENTS – A MEASURE OF NON-PRICE COMPETITIVENESS

This box provides an update of previous analysis (see OP 30) on the patenting activity of the euro area in comparison to its main competitors. Patenting is used as a proxy of R&D, an important component of "non-price" competitiveness.

The data analysed are provided by the US Patents and Trademark Office (USPTO), covering patents registered in the United States over the period 1963-2004, distinguished by nationality of the owner.

Total patenting activity in the United States has been characterised by a rapid upswing in the mid-1990s (see Chart A) driven by high-technology industries, overcompensating for declining patents in medium-technology sectors. Chinese patenting activity has just gained momentum since the year 2000. Albeit still low in absolute numbers, Chinese patents are catching up fast, especially in high-tech sectors.

Chart A Patenting activity

(total number of patents and shares by technology content)

y-axis: left-hand scale; in percentages
y-axis: right-hand scale; in thousands

total number of patents (right-hand scale)
low-tech
medium-tech
high-tech
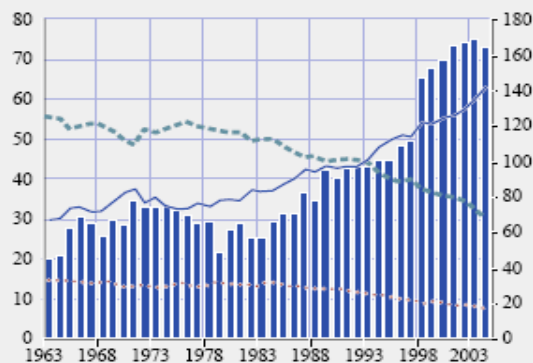
Source: ECB calculations on USPTO data.
Note: The latest observation refers to 2004.

y-axis: left-hand scale in percentage

y-axis: left-hand scale in percentage
y-axis: right-hand scale in thousand

— total number of patents (right-hand scale)
..... low-tech
==== medium-tech
— high-tech

— total number of patents (right-hand scale)
+++++ low-tech
==== medium-tech
— high-tech

China

Euro area
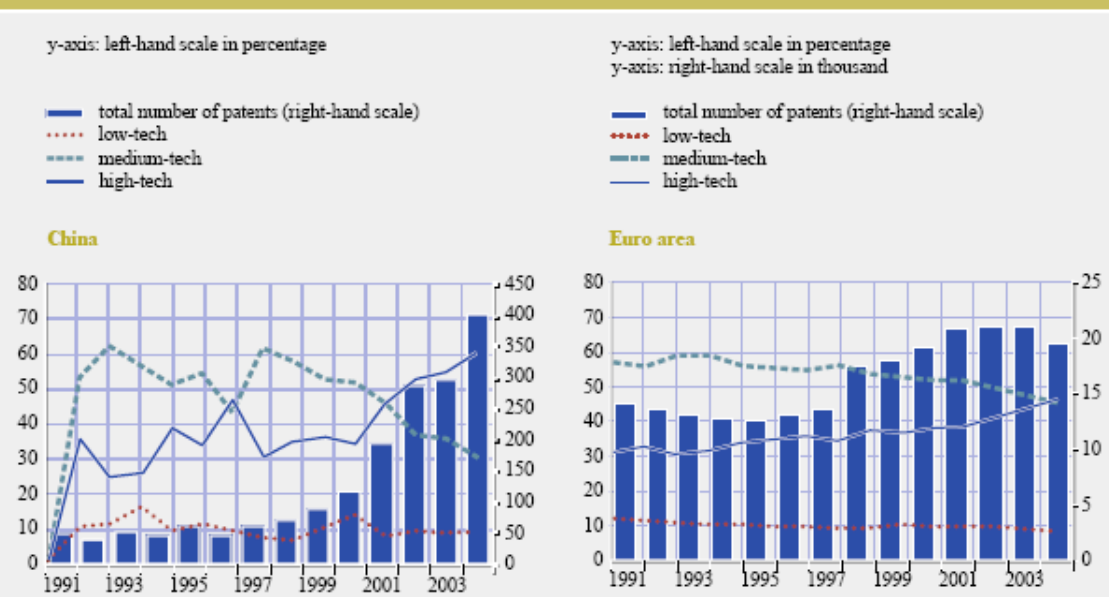
Source: ECB calculations USPTO data on USPTO data.

Chart C Shares of patents by technology content

— low-tech
===== medium-tech
— high-tech

1990-1994

2000-2004

1 EA	4 IT	7 PT	10 LU
2 DE	5 ES	8 BE	11 IE
3 FR	6 GR	9 NL	12 AT

13 SI	16 JP	19 TW
14 UK	17 SKO	20 PRC
15 US	18 I	21 WD
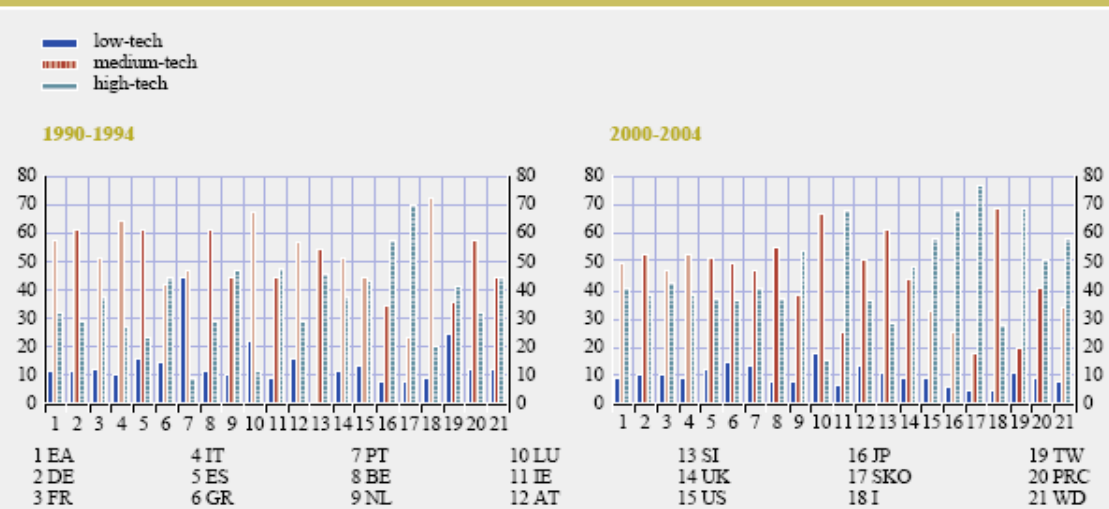
Source: ECB calculations on USPTO data.
Notes: SKO, I, TW, PRC and WD denote South Korea, India, Taiwan, China and World, respectively.

The distribution of patents registered by a number of other Asian economies, like Taiwan and South Korea, is more skewed towards high-tech sectors. While for South Korea, the share of high-tech sectors patents was already very high a decade ago, Taiwan has only recently been moving that way (see Chart C).

As regards the euro area, the latest available data show the same share for medium- and high-tech, with an increasing trend for the latter. This relatively high presence of medium-tech patents is in line with the sectoral specialisation previously reported, with a rather high representation of "traditional" industries compared with its main competitors, including developing countries.

In summary, the analysis based on the most recent data from the EU KLEMS database confirms our earlier observation that euro area productivity growth slowed down markedly over the last decade. While this slowdown was generally broad-based, the EU KLEMS database also documents a wide variation in productivity growth rates across euro area countries and sectors. Pointing to the need of further analysis, using more detailed sectoral decompositions or even firm-level data, this also appears important to better understanding the impact of globalisation. Developments at the aggregate, but also at the sectoral level, may blur productivity-enhancing effects related to globalisation, partly because of statistical problems, but also because they may interfere with other factors weighing down productivity. Various approaches have been taken to gain a better understanding of productivity growth. [30] In the next chapter, we will introduce a more elaborate, micro-founded framework that allows us to take into account the interactions between various determinants of productivity, by also providing further insights into the possible impact of globalisation.

GLOBALISATION AND COMPETITIVENESS: A FIRM-LEVEL PERSPECTIVE

Taking a further look at the foundations of productivity and competitiveness, and at the links between firms' productivity and export performance, we will introduce a more elaborate conceptual framework that will help us to better understand the underpinnings of developments in productivity. Combining information on firm-level productivity with macro fundamentals of the country, the framework is based on most recent trade models that explicitly account for firm heterogeneity. It also allows us to derive more broadly defined competitiveness measures, addressing some of the weaknesses of the commonly used competitiveness indicators that were identified in the previous chapter. Model simulations can further provide insights on which policies may foster the global competitiveness of European firms.

OPENNESS TO TRADE AND INTRA-INDUSTRY REALLOCATIONS

The observation that even firms within the same, narrowly defined industry appear to be hit very differently by increasing trade integration, and the growing number of empirical studies that provide evidence on the existence of a performance premium of exporters (also called "exporter premia", see Box 2) pose severe challenges to traditional ("old") and even more recent ("new") trade models. [31] In contrast to these models, in which welfare gains from trade openness derive from i) the pattern of export specialisation according to technological comparative advantage (Ricardian or HeckscherOhlin theories), or ii) a combination of economies of scale and expanding varieties available to consumer (intra-industry trade models, put forward by Krugman,

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[30] For an overview, see, for instance, van Ark, O'Mahony and Timmer (2008), Haltiwanger, Foster and Krizan (2001) and Crafts (2006).

[31] For more details on the empirical challenges and a summary of the differences between "old" and "new" theories of trade and most recent models, see Bernard et al. (2007)

1980, Helpman, 1981, and Ethier, 1982), the contribution of the most recent models is an explicit accounting for firm heterogeneity, allowing them to capture these empirical regularities.[32] Trade liberalisation hereby induces a reallocation of resources from less to more productive firms, which ultimately leads to gains in aggregate productivity of the countries where they are located. This outcome is due to a combination of greater import competition and easier access to foreign markets. Once countries become more exposed to trade, higher competition from foreign producers will have two impacts. On the one hand, it will lead to shrinking operating profits of domestic firms in those markets, whereby the least productive firms will be forced to exit the market. On the other hand, for those firms that are able to cover the additional costs of foreign activity, the opening of distant markets also provides additional opportunities to enlarge their market share and to get additional profits from foreign venues. Chart 26 helps to make clear the interaction between firm productivity and firm activity: while all firms are subject to increased import competition in domestic markets, only the more productive firms will be able to access foreign markets, compensating lower profits at home with new profits abroad. Firms that are, instead, not productive enough to serve foreign markets will either exit or will be confined to withering domestic sales only.

Chart 26 Logic of model with firm heterogeneity

x-axis: firm productivity
y-axis: density of firms

—— distribution of firms before...
•••• ...and after trade liberalisation
---- exit
—— exports

Note: $1/C_D$ and $1/C_X$ correspond to the minimal productivity of firms that are able to break even, being active only in domestic markets or in domestic and foreign markets, respectively.

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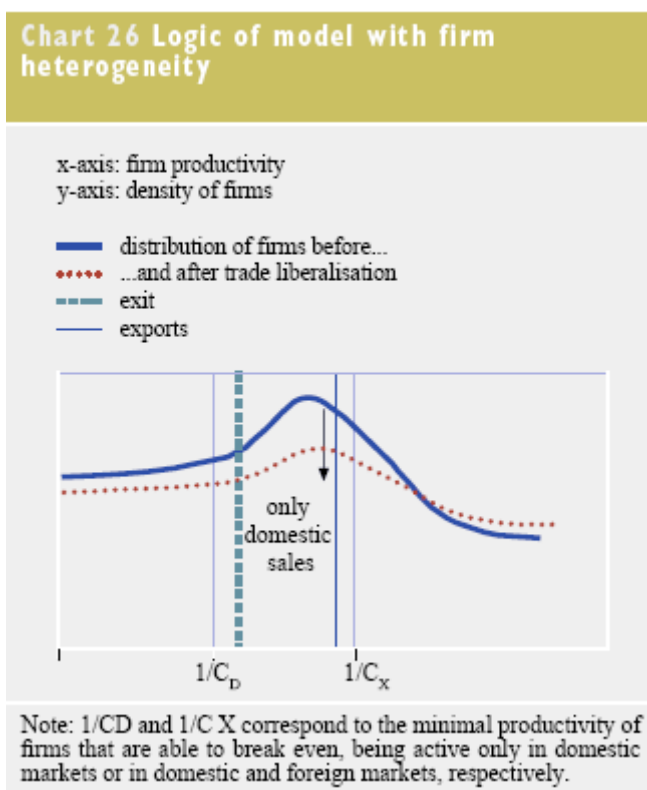
[32] See, for example, Melitz (2003); Bernard, Eaton, Jensen and Kortum (2003); and Melitz and Ottaviano (2005). Although the various models differ in which specific features generate heterogeneity among firms, they all build on the general idea that greater trade integration will set off a kind of a selection mechanism that eliminates the least productive firms, while reallocating resources to the most productive firms – not only across industries, but also within industries. Apart from pointing to this additional channel through which globalisation is boosting productivity, this mechanism can further "solve" one of the puzzles that often appears in the public debate: explaining why we observe an increasing number of firms closing down in the course of globalisation, while on the other hand globalisation is in principle expected to bring important benefits.

STYLISED FACTS ON EXPORTING FIRMS

Firm-level data are increasingly utilized in order to supplement the country competitiveness assessment with richer information. Since the mid-1990s an increasing number of empirical studies have, for instance, demonstrated that firms trading in international markets differ substantially from firms that solely serve the domestic market. Across a wide range of countries and industries, exporters are found to be larger, more productive, more skill and capital intensive than non-exporting firms, and to pay higher wages. For the euro area, this has just been confirmed by a recent report[1] which provides evidence for Germany, France, the United Kingdom, Italy, Hungary, Belgium and Norway, using different national micro-level data sets (see Table A). By the same measures, multinational firms, i.e. those that have undertaken FDI, perform better than exporters.

The finding that exporters are systematically more productive than non-exporters has raised the question of whether this productivity gap even existed before firms started exporting or whether the performance improved as a result of their access to export markets, through some form of "learning by exporting". The evidence generally supports the former hypothesis, suggesting a kind of self-selection, with the more efficient producers choosing to export.[2]

1 See Mayer and Ottaviano (2007).
2 A large literature documenting these findings has emerged, beginning with Bernard and Jensen (1995). Evidence is now available for a number of countries, including the United States (Bernard and Jensen, 1999, 2004), the United Kingdom (Girma et al., 2004), Germany (Arnold and Hussinger, 2005), Taiwan and Korea (Aw et al., 2000) and for developing countries such as Chile (Pavcnik, 2002), and Colombia, Mexico and Morocco (Clerides, Lach and Tybout, 1998).

Table A Various performance measures for exporters

Country of origin	Employment premia	Value added premia	Wage premia	Capital intensity premia	Skill intensity premia
Exporters' premia					
Germany	2.99 (4.39)		1.02 (0.06)		
France	2.24 (0.47)	2.68 (0.84)	1.09 (1.12)	1.49 (5.60)	
United Kingdom	1.01 (0.92)	1.29 (1.53)	1.15 (1.39)		
Italy	2.42 (2.06)	2.14 (1.78)	1.07 (1.06)	1.01 (0.45)	1.25 (1.04)
Hungary	5.31 (2.95)	13.53 (23.75)	1.44 (1.63)	0.79 (0.35)	
Belgium	9.16 (13.42)	14.8 (21.12)	1.26 (1.15)	1.04 (3.09)	
Norway	6.11 (5.59)	7.95 (7.48)	1.08 (0.68)	1.01 (0.23)	
FDI-makers' premia					
Germany	13.19 (2.86)				
France	18.45 (7.14)	22.68 (6.10)	1.13 (0.90)	1.52 (0.72)	
Belgium	16.45 (6.82)	24.65 (11.14)	1.53 (1.20)	1.03 (0.82)	
Norway	8.29 (4.48)	11 (5.41)	1.34 (0.13)	0.87 (0.13)	

Source: Mayer and Ottaviano (2007).
Notes: The table shows premia of the considered variable as the ratio of exporters over non exporters (standard deviation ratio between brackets). France, Germany, Hungary, Italy and the United Kingdom have large firms only. Belgian and Norwegian data are exhaustive.

Table B Distribution of French exporters over products and markets

No. of products	Number of countries			
	1	5	10+	Total
Share of French exporters in 2003 (total number exporters: 99,259)				
1	29.61	0.36	0.22	34.98
5	0.76	0.45	0.62	4.73
10+	0.95	0.89	10.72	18.57
Total	42.59	4.12	15.54	100.00
Share of French exports in 2003 (total exports: 314.3 billion €)				
1	0.70	0.08	0.38	1.86
5	0.30	0.08	1.06	1.97
10+	0.28	0.45	76.30	81.36
Total	2.85	1.55	85.44	100.00

Source: Mayer and Ottaviano (2007).

The evidence of a causal link between productivity and exporting in the other direction is more mixed. Comparing the performance of firms that became exporters during the period of observation and non-exporters for certain European countries, Mayer and Ottaviano (2007) find no clear evidence of firms performing differently after accessing foreign markets. While the performance of firms that started exporting was generally better than that of non-exporters one year or more after starting to export, the pattern over time is not clear.

Furthermore, as observed for most countries, aggregate exports usually appear to be driven by a small number of top exporters. Exporters, and even more so multinational firms, not only remain relatively rare, with exporters representing only between 30 to 75 percent[3] of total manufacturing firms in the various European countries, but their distribution is also highly skewed, with a few large exporters accounting for the bulk of aggregate exports. For France, for example, the top one percent of exporters account for more than 45 percent of aggregate exports, the top 5 percent for more than 70 percent of aggregate exports, and the top 10 percent of exporters for more than 80 percent of aggregate exports. Other countries show a similar pattern, with the top ten percent of exporters in, for example, Germany, the United Kingdom and Italy accounting for 90 percent, 72 percent and 80 percent, respectively.[4]

Looking further at the characteristics of the handful of firms that drive aggregate exports, these firms are usually found to be relatively large in terms of their turnover, and to supply several foreign markets with several differentiated products. While in the case of France, for example, 30 percent of the firms export only one product to one market, the top exporters, representing 10 percent of firms and accounting for more than 75 percent of total exports, export more than ten products to more than ten markets (see Table B).

3 See Mayer and Ottaviano (2007), Table 2, column 4.
4 See Mayer and Ottaviano (2007), Table 1.

WHAT DETERMINES THE COMPETITIVENESS OF EUROPEAN FIRMS?

The conceptual framework underlines four elements determining the competitiveness of firms, as well as of the countries where these firms are located. [33]

(1) Accessibility: Regions granting a better overall access to foreign and domestic firms are generally characterised by tougher competition and, therefore, richer product variety and higher productivity. This occurs because these countries are seen as better export bases, attracting a greater number of firms from neighbouring countries.

(2) Market size: Larger and more integrated local markets tend to be associated with a tougher competition and, hence, richer product variety, higher productivity and lower prices. Furthermore, larger markets may benefit from economies of scale.

(3) Technological leadership: Technologically advanced regions are characterised by tougher competition and higher productivity levels.

(4) Institutional and political framework: The quality and resilience of the domestic institutions, which also facilitate access to new markets and promote innovation, are key elements of success amid global competition.

Applying the theoretical framework to data on European firms, Ottaviano, Taglioni and di Mauro (2009) derive a set of comprehensive competitiveness indicators by country and are able to simulate the effects of alternative policy regimes. [34] The dataset includes around 150,000 European manufacturing firms across 12 manufacturing industries in 12 European countries. The estimates yield two sets of results.

The first set of results is expressed in terms of "overall competitiveness" and accounts for the actual level of access to international markets. According to the estimates, competitiveness is the highest in Belgium, followed by Finland, the Netherlands and Germany (see Table 3, left column).

Table 3 Country Ranking: overall versus Producer Competitiveness

Country	Overall competitiveness	Producer competitiveness
Belgium	1	8
Finland	2	1
Netherlands	3	7
Germany	4	6
France	5	5
Austria	6	3
Denmark	7	4
Sweden	8	2
UK	9	10
Italy	10	9
Spain	11	11
Portugal	12	12

Source: Ottaviano et al. (2009, forthcoming).

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[33] Calibrated multi-country models that were set up to quantify the impact of reallocations of resources across firms and countries point to these four elements. See, for example, Behrens, Ottaviano and Mion (2007).

[34] For more details, also see Del Gatto, Mion and Ottaviano (2006) and Ottaviano, Taglioni and di Mauro (2007).

The results are consistent with the theoretical framework's prediction, which holds that countries that are large or easily accessible to firms from trading partners should exhibit a tougher competitive environment and stronger selection. Italy, Spain and Portugal are at the bottom of the ranking because they are less central, but possibly also owing due technology disadvantages associated with high entry costs in new sectors.

The second set of results, which we refer to as "producer competitiveness", is obtained by filtering out productivity differences that stem from differences in trade frictions across individual countries and individual market setup (demand preferences, firm competition). The indicator solely depends on technology (i.e. ability to produce at low cost) and institutional factors (i.e. cost of access to a sector). According to this second ranking, the following interesting results come about:

- Sweden becomes the second most competitive country in terms of producer competitiveness. This implies that the country shows a strong technological advantage and good institutional environment, but has a disadvantage in terms of location (as it is only number 8 in terms of overall competitiveness). This suggests that being at the periphery does not represent per se a problem for countries, unless such an issue is compounded by a clear relative technological disadvantage and an institutional environment that is less conducive to firm productivity. In this context, it is also notable that Denmark shows a rather substantial improvement in its ranking.

- The opposite holds for Belgium, Germany and the Netherlands, which substantially lose positions in competitiveness when disregarding their (central) location advantage.

- Portugal and Spain, and to a lesser extent Italy and the United Kingdom, are consistently at the bottom of the competitiveness ranking, no matter how this is measured, pointing indeed to a relative technological disadvantage and a less favourable institutional environment, compounded by unfavourable market access.

Simulations of alternative scenarios using calibrated models have further been used to assess the role of different policy regimes. Del Gion, Mion and Ottaviano (2006), for example, find that trade liberalisation in general, and the creation of the EU in particular, had a sizeable impact on aggregate productivity. Accordingly, the introduction of prohibitive trade barriers in 2000 would have caused an average productivity loss of roughly 13 per cent, whereas the reduction of intra-EU trade costs by 5 percent would have generated a productivity gain of roughly 2 per cent. These gains and losses, however, vary a lot across countries and sectors, depending on the accessibility and trade costs. Meanwhile, simulations by Ottaviano, Taglioni and di Mauro (2009) demonstrate that EMU had a positive impact on the competitiveness of the participating countries.

POLICY IMPLICATIONS

By pointing to the importance of firm - as well as country - specific factors, the presented framework sheds new light on the factors affecting overall productivity and competitiveness, particularly in the context of increasing globalisation, with firms spreading production across different countries and markets being extremely open and competitive. While the simulation result point to potentially significant gains from trade liberalisation for euro area countries, they also yield other important policy implications.

First and foremost, given the key role of the toughness of competition and the increasing reallocation of resources across firms, countries and sectors, policy measures should aim at promoting market integration and stronger competition at all levels rather than sealing off the economy, or at least certain sectors. Fiercer competition in local markets enhances local firms' productivity growth, allowing them to better take advantage of the increased accessibility to foreign markets, and this will ultimately result in a better export performance of the euro area countries. Furthermore, larger local markets are generally more attractive for foreign competitors, whose entrance will again increase competition and foster higher productivity growth. Consequently, continuing and strengthening the process of market integration within Europe through EU policies on the single market appears to be an important tool for supporting and strengthening the global competitiveness of European firms. As highlighted by the outcome of the policy simulations, countries appear to have clearly benefited from membership in EMU, further indicating that the membership has helped them to cope with increased global competition rather than hindered them.

Second, turning to the remaining two key elements of a country's competitiveness, the technological advancement of its firms and the quality of its institutional and political framework, it appears crucial to further enhance market flexibility. Flexibility, which will facilitate the reallocation of resources to their most productive uses, will not only promote the technological advancement of European firms and foster innovation and higher human capital investment. It will also help to reduce the burden of adjustment to be borne by the workforce in industries with relatively low productivity. Therefore, in order to take full advantage of the positive effects stemming from globalisation, further structural reforms in the euro area and other EU countries are needed to facilitate a fast and smooth reallocation of firms and the workforce – from lagging to more advanced and promising industries, or from lower to higher productivity firms.

CONCLUSIONS

How to maintain and enhance competitiveness has become one of the prime concerns in most countries as globalisation has radically altered the environment in which firms operate over the past decade. Policymakers and firms have both been adapting their policies and strategies, in an attempt to fully reap the possible benefits of globalisation and to absorb the costs of the associated changes. Looking at a number of indicators, this Occasional Paper has aimed at examining recent trends in euro area competitiveness and assessing prospects going forward. However, as our analysis has shown, globalisation has made it increasingly difficult to define and measure competitiveness using traditional indicators based on price competitiveness, sectoral specialisation and market shares. For instance, while in a relatively stable environment, changes in competitiveness may mostly be explained by changes in relative prices, i.e. the prices of domestic exporters with respect to the foreign competition, this is no longer the case when market forces bring about dramatic changes in the export structure. Reductions in total export volumes, for instance, could in principle be offset by a concentration on higher value added ends of the market. But how can we make sure that the emerging loss in export market shares is not just the result of a simple shrinking of the export base rather than a sign of shifting to higher end markets? And how can we ascertain whether higher relative export prices are not

just reflecting higher cost and lower productivity rather than higher quality? Similarly, with the delocalisation of production taking hold it is increasingly difficult to think about export sectors as homogenous categories. For instance, while the IT sectors may be broadly defined as being of higher technological content with respect to other sectors, it also incorporates a substantial share of production processes which are very intensive in low-skilled labour. Against this background, an assessment of whether export specialisation is taking the "right" course based on simple relative resource endowment schemes and revealed specialisation appears almost impossible. This is so, even if one gets to an extremely fine disaggregation (i.e. up to more than 9,000 sectors), as statistics are geared to report on trade in goods rather than in "tasks".

Against this background, the approach we take in this Occasional Paper is rather eclectic. On the one hand we do report on a rather wide range of traditional indicators of trade performance and we indicate changes in sectoral specialisation that supposedly are taking place, particularly under the pressure of stronger competition emanating from globalisation. On the other hand, compared with previous work, we put a stronger emphasis on the conditions under which companies become more productive. In particular, taking into account that data on trade flows may not be enough to fully capture globalisation-related adjustments, we emphasise how the analysis of productivity developments could help us ascertain the longer-term underpinnings for competitiveness. Recognising the pitfalls of macro analyses of productivity, we thereby introduce a more elaborate framework combining information on firm-level productivity with macro fundamentals of the country. Helping us to better understand the interaction between micro and macro determinants of competitiveness, this framework can also be used to develop a more comprehensive competitiveness indicator and serve as a device to assess policy alternatives. Highlighting on the one hand the role of domestic competition, intra industry reallocations and the size of the domestic market as important determinants of the productivity, and hence, the global competitiveness of European firms, the framework calls in particular for policy measures promoting stronger competition and a further strengthening of the market integration within Europe. Policy simulations show that European countries have clearly benefited from the creation of the EU, not least because the fiercer internal competition that has forced them to increase their efficiency has also helped them to cope with increased global competition. On the other hand, by allowing the effects of differences in the accessibility and the market size of a country to "filter out", the framework can further be used to focus on the other two key determinants of a country's competitiveness, the technological advancement of its firms and the quality of its institutions. Against this background, it appears crucial to further strengthen market flexibility and to continue to pursue structural reforms of the product and labour markets, as this will not only foster innovation and promote the reallocation of resources to the most productive uses, but also facilitate the adjustment of firms and workers to globalisation-related structural changes.

1 PRICE COMPETITIVENESS OF EURO AREA COUNTRIES – ADDITIONAL INFORMATION

Table 4 Unit labour costs: total economy. Growth rates across euro area countries

(year-on-year percentage changes; total economy)

	Unit labour costs - nominal									Cumulative growth 1999-2007
	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Belgium	1.3	0.3	4.2	2.1	0.7	-0.3	1.5	1.6	2.0	14.2
Germany	0.5	0.7	0.9	0.9	1.0	0.0	-0.8	-1.0	0.2	2.3
Ireland	0.6	3.4	4.4	0.8	3.9	5.1	3.7	3.1	4.2	33.0
Greece	3.0	1.3	2.5	6.0	2.4	1.8	3.7	4.6	4.4	33.8
Spain	1.9	2.8	3.2	2.9	2.9	2.4	2.5	2.3	2.7	26.4
France	0.9	1.1	2.3	2.9	1.8	1.1	1.7	1.9	2.3	17.2
Italy	1.2	0.6	3.1	3.6	4.4	2.1	2.8	2.3	1.5	23.7
Luxembourg	0.7	2.5	6.5	2.2	1.9	1.3	1.7	2.2	3.4	24.7
Netherlands	1.7	2.9	5.0	4.8	2.7	0.2	-0.2	1.1	1.6	21.7
Austria	0.1	-0.2	1.0	1.0	0.8	-0.3	1.4	0.7	1.2	5.9
Portugal	2.4	4.9	5.2	3.7	3.2	1.2	2.0	1.8	0.4	27.6
Finland	0.8	1.0	3.5	1.1	1.1	0.2	2.3	-0.2	1.1	11.6
Euro area	0.9	1.1	2.3	2.3	2.1	0.8	1.1	1.0	1.5	14.0

Sources: European Commission (Ameco database), BIS.
Notes: Unit labour costs are calculated on the basis of full-time equivalent measures of total employment and employees for DE, FR, IT, ES, NL and AT, and on the basis of persons for the remaining countries. Development of labour productivity in Greece is strongly affected by the structural decline of self-employed persons in the agricultural sector. Looking at dependent employment, the cumulated unit labour cost growth between 1999 and 2007 amounted to 32.7% (Source: Bank of Greece). The table excludes Slovenia, Malta and Cyprus, which only joined the euro area recently (in 2007 (Slovenia) and 2008, respectively). Figures for the euro area in 1999 and 2000 exclude Greece (joined in 2001).

Table 5 Harmonised competitiveness indicators

(HICP/CPI deflated effective exchange rates of 44 trading partners and euro area country currencies; year-on-year percentage changes)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Cumulative growth 1999 - 2007
Belgium	-1.7	-4.5	0.8	1.5	5.0	1.6	-0.1	0.2	1.1	5.5
Germany	-2.6	-7.0	0.0	1.3	5.4	1.8	-1.4	-0.5	1.9	1.0
Ireland	-2.8	-4.4	2.8	5.7	11.1	2.9	-0.4	0.6	3.5	23.1
Greece	0.4	-7.4	1.2	3.2	5.9	2.2	0.2	0.8	2.0	7.9
Spain	-0.4	-2.8	1.3	3.4	5.5	2.3	0.6	1.3	1.9	14.3
France	-2.5	-5.5	0.1	1.9	5.8	2.1	-1.0	-0.4	1.1	3.9
Italy	-1.2	-5.0	0.7	2.8	6.5	2.0	-1.1	-0.1	1.3	7.0
Luxembourg	-1.3	-2.1	0.6	1.6	4.9	2.6	1.0	0.9	2.0	12.0
Netherlands	-1.2	-5.5	3.9	4.2	6.8	1.5	-1.3	-0.5	1.3	10.2
Austria	-1.6	-3.8	0.0	0.5	3.3	1.0	-0.8	-0.4	0.7	0.3
Portugal	-0.2	-2.8	2.7	2.6	4.6	1.3	-0.7	0.7	1.2	9.8
Finland	0.7	-5.0	1.2	1.8	4.9	-0.1	-2.2	-1.1	0.9	0.1
Memo item:										
Euro area REER[1]	-3.5	-10.4	1.5	4.5	11.9	3.7	-1.8	-0.3	3.0	13.8

Source: ECB.
Notes: An increase in the indicator denotes a real effective appreciation, which implies a decline in national competitiveness.
1) Real effective exchange rate with 44 trading partners: trade flows between euro area members are not considered.
The table excludes Slovenia, Malta and Cyprus, which only joined the euro area recently (in 2007 (Slovenia) and 2008, respectively). Figures for the euro area in 1999 and 2000 exclude Greece (joined in 2001).

Table 6 Relative export prices

(year-on-year percentage changes; total economy)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Cumulative growth 1999 - 2007
Belgium	1.2	0.9	-2.1	-2.0	-3.7	-2.9	1.2	-0.4	-2.4	-11.0
Germany	2.3	9.2	-0.4	-2.8	-5.0	-0.3	4.3	1.7	-0.5	5.7
Ireland	-0.2	4.6	-4.5	-2.4	-1.3	0.2	3.0	1.6	-0.2	0.8
Greece	-	-	-4.6	-4.7	-7.5	-3.0	0.5	-0.5	-2.0	-20.0
Spain	1.1	2.9	-1.6	-3.2	-5.7	-2.0	0.5	-1.2	-2.2	-12.0
France	2.9	8.6	0.4	-1.1	-4.7	-1.1	2.9	0.6	-0.5	4.8
Italy	0.7	6.5	-2.3	-4.3	-6.9	-3.2	0.7	-1.8	-3.5	-14.4
Luxembourg	-4.4	0.2	4.6	-2.1	-3.5	-6.4	-2.9	-6.0	-4.3	-19.0
Netherlands	1.4	1.9	-1.4	-0.5	-4.8	-0.4	4.3	3.4	-1.0	1.1
Austria	0.0	8.9	-0.4	-2.5	-5.0	-1.5	2.4	0.2	-1.3	0.1
Portugal	0.5	4.7	-0.6	-2.3	-4.2	-1.6	3.2	-1.2	-2.5	-4.8
Finland	6.7	7.4	1.3	-0.2	-4.7	0.0	3.9	0.3	-0.7	7.1

Source: ECB calculations.
Note: The table excludes Slovenia, Malta and Cyprius, which only joined the euro area recently (in 2007 (Slovenia) and 2008, respectively).

Table 7 Export market shares

(year-on-year percentage changes; total economy)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Cumulative growth 1999-2007
Belgium	-1.5	-3.8	-1.1	-1.3	-1.7	-2.4	-3.0	-6.4	-2.4	-20.1
Germany	-0.5	0.4	4.7	1.1	-2.8	-0.8	-0.2	3.4	0.8	6.6
Ireland	7.9	7.3	6.7	2.5	-3.7	-1.2	-2.0	-4.3	3.8	8.7
Greece	-	-	-5.1	-10.1	-3.5	2.1	-4.7	-5.1	-2.4	-25.8
Spain	1.2	-2.3	2.5	0.2	-0.1	-4.1	-4.1	-3.5	-1.0	-11.9
France	-2.1	0.8	0.9	-1.2	-5.7	-6.1	-3.8	-3.4	-3.0	-19.8
Italy	-6.7	-1.6	0.4	-5.4	-7.0	-6.1	-5.7	-3.2	-2.6	-27.5
Luxembourg	6.9	0.4	2.7	0.8	1.0	2.0	-0.3	1.1	0.0	8.1
Netherlands	2.1	0.8	0.2	-0.8	-3.0	-0.6	-1.1	-1.9	0.7	-5.6
Austria	-0.1	-2.6	4.4	1.8	-3.3	-1.5	-0.7	-3.2	0.0	-5.2
Portugal	-4.2	-3.2	-0.4	-0.5	-0.3	-3.9	-4.9	0.2	2.0	-10.6
Finland	4.7	3.2	0.3	-0.7	-7.5	-2.1	-1.0	1.2	-2.2	-8.9
Euro area	-0.7	-0.3	2.1	-0.9	-3.8	-2.9	-2.4	-1.3	-0.6	-9.8

Source: ECB calculations.
Notes: The table excludes Slovenia, Malta and Cyprius, which only joined the euro area recently (in 2007 (Slovenia) and 2008, respectively).
Figures for the euro area in 1999 and 2000 exclude Greece (joined in 2001).

2 EURO AREA EXPORT SPECIALISATION – DATA CLASSIFICATIONS

Table 8 Definition of country groups

Country / region	Countries included
euro area	13 euro-area member countries; excludes intra-euro area trade flows
United Kingdom	United Kingdom
United States	United States
Japan	Japan
China	China
Other emerging Asia	India, Indonesia, Hong Kong, Singapore, South Korea, Taiwan, Malaysia, Philippines, Thailand
CEECs	CIS (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan), Estonia, Lithuania, Latvia, Former Yugoslavia, (then Bosnia and Herzegovina, Croatia, Macedonia, Serbia, Montenegro), Albania, Bulgaria, Former Czechoslovakia, (then Czech Republic and Slovakia), Hungary, Poland, Romania, Turkey

Table 9 Product classification by technological intensity

High-technology industries (HT)

Aircraft and spacecraft
Pharmaceuticals
Office, accounting and computing machinery
Electronics and communications equipment
Medical, precision and optical instruments

Medium-high-technology industries (MHT)

Electrical machinery and apparatus, n.e.s.
Motor vehicles, trailers and semi-trailers, railroad and transport equipment, n.e.s.
Chemicals excluding pharmaceuticals
Machinery and equipment, n.e.s.

Medium-low-technology industries (MLT)

Building and repairing of ships and boats
Rubber and plastics products
Other non-metallic mineral products (including mining and quarrying)
Basic metals and fabricated metal products (including mining and quarrying)

Low-technology industries (LT)

Wood, pulp, paper, paper products, printing and publishing
Agriculture, fishing and food products, beverages and tobacco
Textiles, textile products, leather and footwear
Manufacturing of furniture, toys, not elsewhere specified products (n.e.s.)

Sources: Based on OECD Science, Technology and Industry Scoreboard (2005), page 181-83.

Table 10 Product classification by factor intensity

Predominantly raw material intensive

Fertilizers
Iron ores
Non-ferrous ores
Unprocessed minerals n.e.s.
Coals
Crude oil
Natural gas
Coke
Refined petroleum products
Cereals
Other edible agricultural prod.
Non-edible agricultural prod.
Cereal products
Fats
Meat
Preserved meat/fish
Preserved fruits
Sugar
Animal food

Predominantly labour intensive

Cement
Ceramics
Glass
Yarns fabrics
Clothing
Knitwear
Carpets
Leather
Wood articles
Furniture
Paper
Printing
Miscellaneous manuf. articles
Metallic structures
Miscellaneous hardware
Arms
Plastics
Jewellery, works of art

Predominantly capital intensive

Iron Steel
Tubes
Non-ferrous metals
Vehicles components
Cars and cycles
Commercial vehicles
Paints
Rubber articles (incl. tyres)
Electricity
Beverages
Manufactured tobaccos
Toiletries

Predominantly research intensive

Consumer electronics
Telecommunications equipment
Computer equipment
Basic inorganic chemicals
Basic organic chemicals
Pharmaceuticals
Plastic articles
Engines
Agricultural equipment
Machine tools
Construction equipment
Specialised machines
Precision instruments
Clockmaking
Optics
Electronic components
Domestic electrical appliances
Electrical equipment
Electrical apparatus
Ships
Aeronautics

Not classified

Non-monetary gold
N.e.s. products

Source: Based on Yilmaz (2003), slightly modified by authors.

Table 11 Export specialisation by euro area country and by sector

(average 1993-2006; based in values in US$)

| | EA (intra+extra) | Revealed competitive advantage of each country/region | | | | | | | | | | | |
		of which: DE	FR	IT	NL	ES	IR	B/LUX	FI	AU	PT	GR	SI
Memo item:													
Share in total world exports	34.2	11.0	5.5	4.7	3.3	2.1	1.2	3.6	0.8	1.2	0.5	0.2	0.2
High-technology industries (HT)	**0.8**	**0.7**	**1.0**	**0.5**	**1.2**	**0.4**	**2.0**	**0.5**	**0.9**	**0.5**	**0.4**	**0.3**	**0.5**
Aircraft and spacecraft	0.8	0.6	2.7	0.4	0.3	0.5	0.2	0.2	0.1	0.2	0.2	0.4	0.1
Pharmaceuticals	1.5	1.3	1.7	1.2	1.2	1.0	4.7	2.0	0.4	1.4	0.4	1.1	2.4
Office, accounting and computing machinery	0.7	0.5	0.5	0.3	1.9	0.2	3.6	0.3	0.3	0.2	0.2	0.1	0.1
Electronics and communications equipment	0.5	0.5	0.6	0.3	0.8	0.3	0.8	0.3	1.8	0.5	0.6	0.2	0.2
Medical, precision and optical instruments	0.9	1.2	0.8	0.7	1.2	0.4	1.1	0.4	0.8	0.7	0.3	0.2	0.8
Medium-high-technology industries (MHT)	**1.2**	**1.4**	**1.1**	**1.2**	**0.8**	**1.3**	**0.8**	**1.0**	**0.8**	**1.2**	**0.9**	**0.4**	**1.2**
Electrical machinery and apparatus	0.9	1.1	0.9	0.7	0.6	0.8	0.6	0.5	1.1	1.3	1.3	0.5	1.4
Motor vehicles, railroad and transport equipment	1.3	1.6	1.3	0.8	0.5	2.4	0.1	1.4	0.4	1.0	1.2	0.1	1.2
Chemicals excluding pharmaceuticals	1.2	1.2	1.4	0.6	1.6	0.8	3.3	1.6	0.7	0.5	0.5	0.6	0.7
Machinery and equipment, n.e.s.	1.2	1.5	1.0	2.0	0.7	0.9	0.3	0.6	1.1	1.7	0.7	0.4	1.4
Medium-low-technology industries (MLT)	**1.0**	**1.0**	**1.0**	**1.1**	**1.0**	**1.2**	**0.2**	**1.4**	**1.2**	**1.2**	**0.9**	**1.5**	**1.1**
Building and repairing of ships and boats	0.7	0.5	0.7	1.1	0.6	1.5	0.1	0.1	2.8	0.1	0.4	0.9	0.2
Rubber and plastics products	1.3	1.3	1.2	1.1	1.6	1.2	0.3	2.0	0.7	1.2	0.9	0.9	1.3
Other non-metallic mineral products	1.3	0.9	1.1	2.3	0.7	2.3	0.5	1.3	0.9	1.5	2.5	3.0	1.4
Basic metals and fabricated metal products	0.9	0.8	0.8	0.7	0.8	0.9	0.1	1.2	1.3	1.2	0.5	1.7	1.1
Low-technology) industries (LT	**1.0**	**0.7**	**0.9**	**1.1**	**1.1**	**1.0**	**0.9**	**1.1**	**1.2**	**1.0**	**1.6**	**1.9**	**1.1**
Wood, pulp, paper and paper products	1.2	1.0	1.0	0.8	0.9	1.1	0.3	1.0	7.9	2.4	2.8	0.6	2.2
Agriculture, food, beverages and tobacco	1.0	0.5	1.3	0.7	2.2	1.6	1.2	1.0	0.7	0.7	0.9	3.1	0.5
Textiles, clothing and footwear	0.9	0.5	0.7	2.1	0.6	0.9	0.2	0.9	0.2	0.8	3.4	2.7	1.4
Not elsewhere specified products (n.e.s.)	0.9	1.0	0.5	0.9	0.6	0.5	1.2	1.5	0.3	1.1	0.4	0.5	1.0

Sources: CHELEM database and ECB calculations.
Notes: Euro area exports include intra euro area trade. Total exports exclude exports of energy related products.

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