

Anderton, Robert; di Mauro, Filippo; Moneta, Fabio

**Research Report**

## Understanding the impact of the external dimension on the euro area - trade, capital flows and other international macroeconomic linkages

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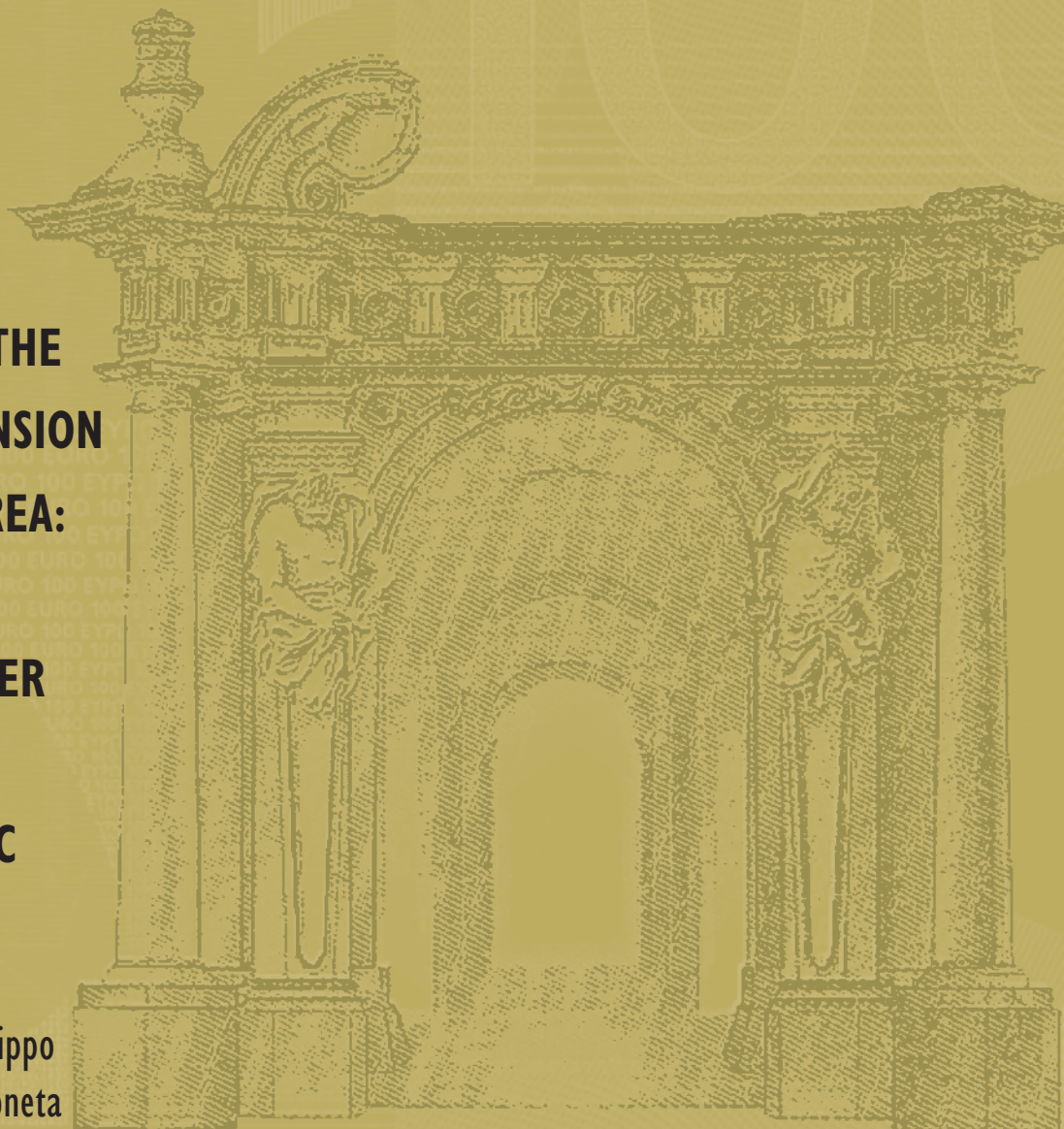
EUROPEAN CENTRAL BANK

OCCASIONAL PAPER SERIES

NO. 12 / APRIL 2004

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THE IMPACT OF THE  
EXTERNAL DIMENSION  
ON THE EURO AREA:  
TRADE, CAPITAL  
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INTERNATIONAL  
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# UNDERSTANDING THE IMPACT OF THE EXTERNAL DIMENSION ON THE EURO AREA: TRADE, CAPITAL FLOWS AND OTHER INTERNATIONAL MACROECONOMIC LINKAGES

by Robert Anderton, Filippo  
di Mauro and Fabio Moneta\*

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\* Respectively, Principal Economist, Head of Division and consultant, External Developments Division, ECB.

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**Address**

Kaiserstrasse 29  
60311 Frankfurt am Main  
Germany

**Postal address**

Postfach 16 03 19  
60066 Frankfurt am Main  
Germany

**Telephone**

+49 69 1344 0

**Website**

<http://www.ecb.int>

**Fax**

+49 69 1344 6000

**Telex**

411 144 ecb d

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## EXECUTIVE SUMMARY<sup>1</sup>

The euro area is a large and relatively closed economy, much more closed than the individual economies of the euro area countries. However, the euro area economy is still affected by a broad range of external developments, with impacts originating not only through the more direct and traditional channels such as trade, but also through less measurable channels such as financial markets and confidence. Comprehending the various mechanisms by which external developments affect the euro area – i.e. gauging the importance of what we call the “external dimension” – is however very complex. Moreover, in the case of the euro area, increasingly important factors that are common to other economies, such as globalisation, are compounded by the fact that the euro area is a new and still somewhat unfamiliar entity and therefore many structural and possibly some global changes are at play contemporaneously.

From a central bank viewpoint with a forward-looking perspective, it is obviously crucial to have the best possible understanding of how these various channels work, along with insights regarding the magnitude and speed of their impacts. Therefore, the ECB continually assesses the nature and magnitude of external shocks. In this paper, we try to provide a framework for understanding how external forces may affect the euro area economy. Accordingly, the “common thread” linking the various sections of this paper is to improve our understanding of the various channels of transmission of external shocks within the context of the *economic analysis* pillar of the ECB’s monetary policy strategy.<sup>2</sup>

To do so we analyse three main aspects of the euro area’s external dimension, namely: (i) external trade, (ii) its cross-border capital flows with the rest of the world, as well as (iii) other channels through which the euro area is influenced by global developments. With respect to the first two topics, the analysis of channels of transmission is accompanied by detailed information on the nature, structure and geographical breakdown of trade and capital flows from and to the euro area. As for the third

topic, for which information is much less detailed, we attempt to provide a broad picture of the existing evidence regarding other channels and international spillovers affecting the euro area. This latter part is also complemented by some analysis as to whether euro area business cycles are exhibiting a higher degree of synchronisation vis-à-vis world economic activity.

In Section 2 the paper provides some stylised facts regarding the external dimension of the euro area. More specifically, we try to assess the degree of openness of the euro area, comparing it with that of the US and Japan as measured by standard indicators. We find that, despite the fact that the openness of the euro area is lower than that of the individual euro area countries, the euro area remains somewhat less closed than the United States and Japan. However, these standard measures of openness only provide a limited understanding of the “external dimension” of the euro area and the degree of international interdependence. Achieving a more satisfactory understanding of the “effective” openness of the euro area is indeed the ultimate objective of the paper.

1 The paper draws heavily on some substantial works on the subject – sometimes not yet published – by economist colleagues of the External Developments Division of the ECB. We would also like to thank all colleagues of the External Developments Division, in particular Tobias Blattner, Matthieu Bussiere, Olli Castrén, Roberto De Santis, Marcel Fratzscher, Paul Hiebert, Chiara Osbat, Rasmus Ruffer, Marcelo Sanchez, Bernd Schnatz and Roger Stiegert for their detailed comments and encouragement on an earlier draft. Special thanks also to the Editorial Board of the ECB Occasional Paper Series and especially an anonymous referee – for their detailed, constructive and very useful comments on earlier drafts of this Occasional Paper. We are grateful for the advice provided by Pierre van der Haegen and Francesco Mongelli, and particularly Wolfgang Schill who provided many helpful points. The significant contributions of Directorate General Statistics in various boxes are also gratefully acknowledged. Finally, we would like to thank Julia Fritz, Agata Stawinska and Anja Tonn for secretarial support. Any remaining errors or omissions are the sole responsibility of the authors. The views expressed in the paper are those of the authors and do not necessarily reflect those of the European Central Bank.

2 The Governing Council of the ECB bases its monetary policy decisions on a comprehensive analysis of the risks to price stability based on a two-pillar approach comprising economic analysis and monetary analysis. Therefore, the impact of external shocks on the euro area primarily falls under the economic analysis pillar.

Section 2 then describes movements in the current account, and in particular the external trade, of the euro area with the aim of shedding light on their main determinants. Movements in the balance of the current account – i.e. moving into deficit at the end of the 1990s and then back into surplus in 2002 and 2003 – appear to be mainly the result of developments in the goods balance. In turn, the latter seems to have been particularly affected by external factors such as the exchange rate, oil prices and foreign demand. Some econometric estimates confirm and qualify such results. Estimated elasticities for export and import prices suggest that only about half of any change in exchange rates feeds through to a change in price competitiveness: this would imply that euro area exporters have rather importantly utilised changes in their profit margins which have limited the impact on their market shares. At the same time, for example, estimates of trade parameters help to explain why changes in the euro exchange rates had an impact on trade which was possibly smaller than expected. In particular, export volumes appear to have responded somewhat weakly to changes in price competitiveness, which may also be a result of some substitution between euro area exports and foreign direct investment (FDI) outflows.

To provide further details on the trade channels, Section 2 analyses the sectoral and geographical breakdown of the euro area's external trade in goods. In general, the euro area is a substantial importer of raw materials and energy, while specialising in the export of manufactured goods. In terms of geographical breakdown, more than 40% of the euro area's trade in goods is with four countries: the United Kingdom, the United States, Switzerland and Japan.

Overall – as in other economic areas – international trade in goods and services represents a critical channel through which the world economy affects the euro area. This was indeed the case during the Asian crisis in 1997-1998, given the high trade links of the euro area with the Asian region, which is the euro area's main regional trade partner. Asia was

ostensibly less important during the US-driven downturn in the early 2000s – in which financial channels appear to have played a notable role – although even here trade linkages with Asia, activated by third market effects, turned out to have been significant.

Section 3 analyses the stylised facts regarding developments in the euro area's direct and portfolio investment along with the main determinants of these flows. Direct and portfolio investment flows between the euro area and abroad have risen substantially since the end of the 1990s. Overall, the euro area registered net outflows of combined direct and portfolio investment during the 1998-2001 period, before recording net inflows in 2002, and achieving a virtual balance in 2003. These changes reflect a decrease in net outflows in direct investment, along with a shift from net outflows to net inflows in equity portfolio investment.

Risk diversification and expectations about relative corporate profitability seem to have been the main key factors affecting cross-border financial flows of the euro area. Liberalisation of financial markets and technological innovations, which allowed investors to trade more easily on global markets, represent additional underlying reasons. Towards the end of the 1990s many of the equity-related investments abroad were linked to the strong performance of both the US economy and the US stock market, particularly optimistic expectations about the profitability of US companies in the “new economy” sectors. These outflows from the euro area took the form of portfolio investments in equity or foreign direct investments often associated with merger and acquisition (M&A) activities.

The rapid increase in M&A activity and related foreign direct investments represents another channel for the transmission of external shocks. Towards the end of the 1990s the global activities of large multinationals may have created additional links among the economies in which they operate. We investigate this

hypothesis by assessing the empirical evidence as to whether the income and balance sheets generated by the foreign assets of euro area multinational corporations were significantly affected by external developments. The main finding is that FDI-related links represent a notable channel for the international transmission of shocks.

Section 4 focuses on identifying some additional transmission channels through which spillovers may take place from the rest of the world to the euro area. Among the channels, we investigate cross-border links related to financial markets as well as business and consumer confidence. We assess the evidence of the importance of these channels and of spillover effects, especially those originating from the US.

On a related topic, Section 4 also examines whether stronger international linkages of the different kinds examined could also be associated with the formation of what is known as the “international business cycle”. The focus is on evaluating whether global economic integration and international linkages have actually resulted in a greater degree of synchronisation of international activity at a global level, with particular reference to the euro area. Possibly contrary to expectations, some empirical evidence suggests that the degree of synchronisation of international business cycles has not increased relative to historical averages in a trend-like fashion, although it may have increased somewhat during the latter part of the 1990s and early 2000s. This latter increase in synchronisation may be partly the result of some common shocks, most notably the rise in oil prices. In summary, the evidence regarding the impact of the various international macroeconomic linkages on the synchronisation of business cycles among the major economies turns out to be rather mixed. However, there seem to be various possible interlinkages between the numerous channels of transmission which may reinforce the impact of external shocks, thereby

perhaps contributing to the aforementioned increase in the international synchronisation of cycles.

Overall, the paper underlines the difficulties in spelling out the transmission and the final effects of external shocks on the euro area, and highlights the complexity of the various direct and indirect mechanisms. We describe the main channels by which potential spillovers from external economic shocks may affect the euro area. Although the evidence is unclear on the extent to which the synchronisation of international cycles may have changed, the conclusion of the paper is that the “external dimension” of the euro area has a complex impact on economic developments in the euro area, while the relative importance of the various transmission channels may have changed rather substantially over time. Accordingly, this calls for continuous monitoring and further study of the evidence available. Finally, an efficient reaction to external shocks requires a flexible economy which allows an appropriate and rapid response to external shocks. Therefore, the continuation of structural reforms in the labour and product markets in the euro area countries is essential, and will encourage a better allocation and utilisation of capital and human resources, while enhancing the euro area’s growth potential.



# I INTRODUCTION

On 1 January 1999, a new currency area was created with the start of the third stage of European Economic and Monetary Union (EMU). Eleven European countries (twelve with the inclusion of Greece in January 2001) adopted the euro as their single currency, with monetary policy determined by the Governing Council of the ECB. This was however only the most recent in a series of actions designed to further economic integration among European economies that goes back fifty years, encompassing in particular the creation of a single market for goods, services, labour and capital in the European Union. Nevertheless, the euro area remains a relatively new economic entity, with its characteristics possibly still not fully understood, including its interactions with its external environment.

This paper has three main goals:

- Firstly, it aims to examine the set of economic linkages – trade, capital flows and other international macroeconomic linkages – through which the euro area connects with the rest of the world. This is what we call the “external dimension” of the euro area. The euro area is a large and relatively closed economy and significantly less “open” than the individual euro area countries. However, experience indicates that external developments have significant effects on the euro area economy, with impacts originating through a variety of other channels that add to those associated with the more direct channels such as trade.
- Secondly, this paper aims to improve our understanding of how external developments affect the euro area, and to provide some idea of the magnitude and speed of these impacts. Monitoring external developments and their impact on the euro area forms an important input in the context of the monetary policy strategy of the ECB, particularly given the complexity of these interactions as well as the mechanisms by which external developments affect the euro area. The identification of these channels and the

extent of these interactions with the external environment is the common thread linking the various sections of this occasional paper.

- Thirdly, the paper also aims to provide a useful reference guide regarding the euro area balance of payments (b.o.p.). Therefore, it describes basic information and stylised facts about developments in euro area trade and capital flows in order to contribute to a better overall understanding of the euro area as a new economic entity.

For policy-makers, it is obviously important to understand and monitor the channels of the transmission of external shocks, including an evaluation of the extent to which external shocks have an impact on the domestic economy. In this paper, we try to provide a framework for understanding the developments and the external forces that may shape the euro area economy, thereby providing important information for policy-makers.

Information concerning the external dimension of the euro area is important to the ECB for the conduct of monetary policy. In particular, it affects the broad set of economic and financial indicators which are analysed under the *economic analysis* pillar of the ECB’s monetary policy strategy. These indicators cover a broad variety of variables which directly or indirectly affect economic activity and price developments.<sup>3</sup> As we will show later, partly because of the impact of globalisation, real and financial market linkages between the euro area and the rest of the world seem to have changed over time both in number and in strength. Through these linkages, disturbances are transmitted not only to the equity market, affecting asset price developments, but also bond markets, affecting medium to long-term interest rates.

Against the background of enhanced international linkages and the globalisation of financial

<sup>3</sup> See ECB (2000/a) and (2003).

markets, the impact of external shocks may have changed in a number of ways.

First, while non-trade channels of international spillovers tend to be increasing in importance, they remain rather uncharted territory for theorists as well as policy-makers. Substantial analysis is therefore undertaken to gauge the relevance of non-trade spillovers.

Second, whether the increasing globalisation and integration of the world economy has also stimulated greater synchronisation of business cycles across countries is of importance for policy-makers. Indeed, if economic cycles are more closely synchronised, recessions and slowdowns across countries are likely to reinforce each other. By contrast, when business cycles are unsynchronised, channels of international linkages can help to dampen economic fluctuations. Accordingly, if an economy is experiencing strong cyclical growth, this will tend to stimulate activity in other economies where output growth is weaker.

Third, and somewhat related, it may matter greatly for policy-makers as to whether business cycles across countries share a common generating factor, such as a common shock. Should this be the case, as in the event of oil price shocks, policy-makers will need to disentangle the common shock from purely “local” shocks in order to properly assess the most appropriate policy response. Although the oil price remains the most classic example of a common shock, it is by no means necessarily the most powerful. For instance, the world experienced the strong rise and subsequent fall in the valuation and proliferation of Information and Communication Technology (ICT) related companies. This technology shock, which was global in nature, had significant direct and indirect repercussions, particularly with respect to perceptions of profitability and productivity. This, in turn, affected stock markets and exchange rates as well as many other variables, leading to changes in activity and prices across the globe.

Lastly, external shocks can have different, or even asymmetric impacts, across the individual euro area countries. For example, an oil price shock can have much stronger inflationary impacts on countries with a high degree of oil-dependency. Another important variable is the exchange rate and the pass-through of changes in the exchange rate on prices, which may also differ across euro area countries according to their degree of openness.

Following on from the above, price stability – the primary objective of the ECB’s monetary policy – is therefore importantly affected by the “external dimension” of the euro area, which justifies the importance of studying its different channels and impacts. To accomplish this task, this paper systematically explores not only known and rather well-documented channels, such as trade (Section 2), financial flows (Section 3), but also some less traditional channels (Section 4), particularly those operating through equity markets and consumer and business confidence spillovers. The identification and, where possible, the quantification of the above linkages is supplemented by analysis in Sections 2 and 3 of the most relevant developments in both trade and financial flows, with the intention of shedding light on critical external factors that have affected the euro area economy.

Finally, against the background of the increasing globalisation and integration of the world economy, this paper also investigates in Section 4 whether, in the light of the increasing correlation suggested by the downturn in the G7 countries in the early 2000s, business cycles have now become more highly synchronised in comparison with historical trends. In this way, we also provide a final summary measure of changes in the impact of the external dimension on the euro area.

The contribution of the paper to the discussion of the interactions of the euro area with the rest of the world, however, is limited in several respects. First, we focus on the impact of the rest of the world on the euro area and not vice

versa. Second, owing to data limitations, the period of observation is much too short to derive any definitive conclusions. Third, there are problems of data heterogeneity which may affect the international comparisons. Fourth, since we concentrate on the euro area as a whole, we only partially take into consideration the fact that the highly differentiated external openness of individual euro area countries, as well as their different dependence on external factors (such as oil), may tend to deepen and possibly cause the impact of the external dimension on the euro area as a whole to diverge. Fifth, the paper mainly concentrates on the identification of channels rather than sources of external shocks, although occasionally examples of specific shocks (for instance, ICT and oil price shocks) are provided.

## 2 THE EXTERNAL TRADE OF THE EURO AREA

International trade in goods and services is the traditional channel through which economies may affect each other, and represents one of the main aspects of the euro area's external dimension. This section complements an analysis of trade openness indicators with estimates of trade elasticities. More specifically, this section begins by providing some stylised facts regarding the measurement of the trade openness of the euro area. The section then presents a description of developments in the current account, and in particular the external trade, of the euro area with the aim of shedding light on the main determinants behind the movements in the euro area current account balance and its main components. In this context, we consider how the trade channel has been influential in episodes of changes in the euro area's external environment. Next, a detailed geographical and sectoral breakdown of the euro area's external trade in goods aims to provide useful information that can explain from which countries, or within which sectors, external shocks are likely to be transmitted to the euro area via trade links. Finally, developments in the trade surplus in goods are put into perspective by describing extra-euro area trade elasticities as estimated by ECB staff.

### 2.1 THE OPENNESS OF THE EURO AREA

The euro area is one of the world's major economies, comparable in size to the United States and considerably larger than Japan. Measured in terms of population, the euro area, with more than 300 million people, is the largest

developed economy in the world (Table 1). The euro area accounts for around 16% of world GDP, which is somewhat below that of the United States (21%), but more than twice as large as that of Japan (7%). By contrast, the euro area has the highest share of world trade, accounting for around 16% of world exports (i.e., excluding intra-euro area exports) compared with approximately 12% and 6% for the United States and Japan respectively.

With regard to both exports and imports, the euro area is somewhat less closed than either the United States or Japan (measuring the degree of openness with regard to extra-area trade flows as a proportion of GDP in nominal terms). In fact, its exports of goods and services represent around 20% of its GDP, compared with around 9% for the United States and almost 11% for Japan, while its imports are equivalent to just over 18%, compared with around 13% and 10% for the United States and Japan respectively.

Over time, as shown in Chart 1, the euro area seems to have become relatively more open in comparison with the United States and Japan. In particular, as a proportion of GDP, the euro area's exports and imports of services amount to almost as much as those of Japan and the United States combined over the period 2000-2002<sup>4</sup>.

4 Caution is required in considering this finding, since data quality issues and differences in the methodologies used to compile the data can affect the validity of international comparisons. In addition, movements in these measures of trade openness in terms of 'values' are also influenced by changes in exchange rates as well as world commodity prices, and oil prices in particular.

Table 1 Key real economy characteristics of the euro area in 2002<sup>1)</sup>

	Euro area	USA	Japan
Population (millions)	307.8	287.5	127.3
GDP (share of world GDP, %)	15.7	21.1	7.1
Exports (goods & services, % GDP)	19.7	9.3	10.7
Imports (goods & services, % GDP)	17.7	13.3	10.2
Exports (share of world exports) <sup>2)</sup>	31.2	12.4	5.8

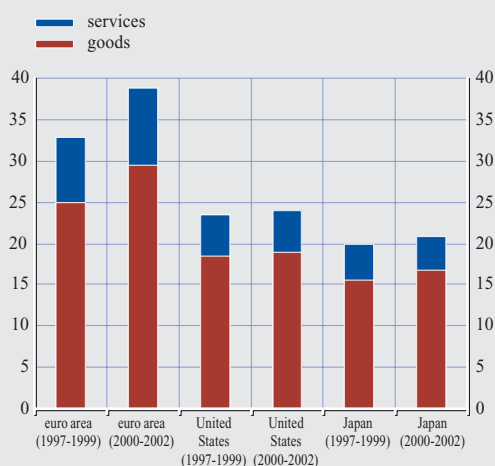
Source: ECB (2004).

1) All Tables and Charts referring to euro area trade refer to extra-euro area trade unless otherwise indicated.

2) The world export share of the euro area includes intra-area trade, which represents roughly 50% of the euro area's total exports.

**Chart 1 Relative openness of the euro area compared with the United States and Japan**

(the degree of openness is measured as exports plus imports as a percentage of GDP, average 1997-2002)



Sources: Eurostat, BIS, IMF, Bureau of Economic Analysis (BEA), Bank of Japan and ECB calculations.

Looking at the direction of trade, the euro area tends to be somewhat more open than the United States and Japan vis-à-vis both industrialised countries and emerging economies (Table 2).<sup>5</sup> Unlike the euro area and the US, Japan tends to share its exports equally between industrialised and emerging economies. With respect to industrialised countries, the United States'

trade links with the other two major economies compared with the 'other industrialised countries' are similar (around 2% for exports and 3% for imports of its respective GDP). Japan's trade is more concentrated with the United States and the euro area than with the other industrialised countries. By contrast, the euro area has larger trade links with other industrialised countries, such as the United Kingdom (see sub-section 2.4.2 for more details).

As for trade with emerging economies, the degree of openness of Japan vis-à-vis the rest of Asia in terms of exports is almost three times as large as that of the United States and the euro area, whereas the trade links in terms of imports from the same area are virtually the same for both the United States and Japan. By contrast, a significant part of emerging market trade with the euro area is concentrated with the acceding and transition countries of Eastern Europe, while trade between this region and the United States and Japan is negligible. Similarly, Japan and the euro area have only limited trade links with Latin American countries, whereas a significant part of US trade is with this region. These developments highlight the importance of

5 Based on information derived from the IMF's Direction of Trade Statistics database.

**Table 2 Regional trade in goods as percentage of GDP**

(1999-2002 average)

	Euro area		USA		Japan	
	Exports	Imports	Exports	Imports	Exports	Imports
<b>Industrialised countries</b>	7.5	6.8	4.1	6.0	4.9	3.1
<i>Euro area</i>			1.3	1.6	1.3	0.7
<i>Japan</i>	0.4	0.8	0.6	1.4		
<i>US</i>	2.3	1.9			2.9	1.5
<i>Other industrialised countries</i>	4.8	4.1	2.2	3.1	0.7	1.0
<b>Emerging economies</b>	5.8	6.4	3.2	5.8	4.7	4.6
<i>Non-Japan Asia</i>	1.4	2.2	1.2	3.0	3.9	3.3
<i>Accession and transition economies of eastern Europe<sup>1)</sup></i>	1.8	1.7	0.1	0.2	0.1	0.1
<i>Latin America</i>	0.7	0.6	1.6	2.0	0.4	0.2
<i>Other emerging economies</i>	1.9	1.8	0.3	0.6	0.4	1.0

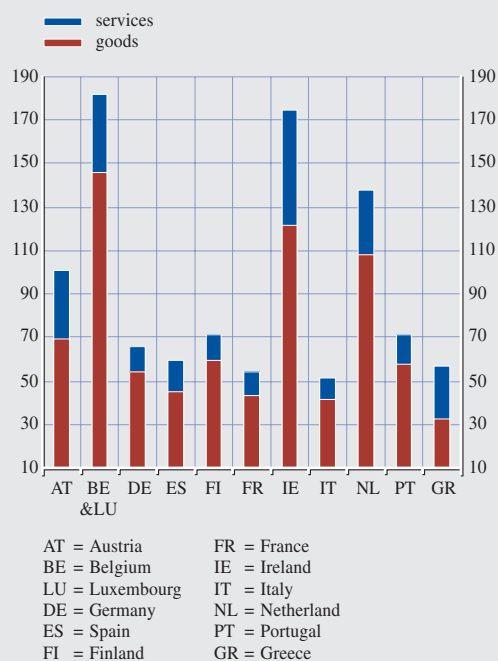
Sources: Eurostat, IMF and ECB calculations.

Note: Other industrialised countries represents the difference between the total industrialised countries (code 101 in IMF DOTS database) and the two main industrialised countries. Other emerging economies represents the difference between the total (code 202) and the specific categories.

1) This group includes countries who become EU Member States on 1 May 2004.

**Chart 2 Relative openness of the euro area countries as a percentage of GDP<sup>1)</sup>**

(the degree of openness is measured as exports plus imports as a percentage of GDP, average 1997-2002)



Sources: ECB and Eurostat.  
1) Includes the extra and intra-euro area trade of each country.

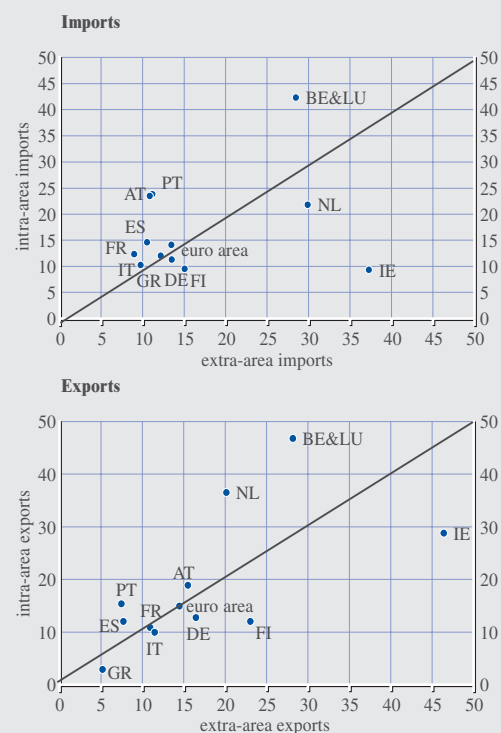
geographical proximity in determining the degree of trade integration.<sup>6</sup>

Since internal cross-border trade is not part of the external transactions of the euro area, the openness of the euro area is much lower than that of the individual euro area countries. Indeed, the openness of the euro area countries, measured as extra plus intra-area trade (both imports and exports) as a percentage of GDP, varies from approximately 52%, 53% and 56% for Italy, France and Greece respectively to 138%, 175% and 182% for the Netherlands, Ireland and Belgium/Luxembourg respectively (Chart 2).

As the euro area is composed of very open economies, substantial trade activities take place not only with respect to countries and

**Chart 3 Extra and intra-euro area exports and imports of goods as a percentage of GDP for each of the euro area countries**

(average 1999-2002)



Sources: ECB and Eurostat.

regions outside the euro area, but also between the individual euro area countries themselves, the so called “intra-area” trade. Chart 3 presents intra and extra-area imports and exports of goods as a percentage of GDP for both the euro area and the individual euro area countries. The countries plotted to the right of the euro area have a higher degree of external openness than the average for the euro area, while those to the left have a relatively lower degree of external openness. Accordingly, Belgium/Luxembourg, Ireland and the Netherlands are, in relative terms, more “open” than the other euro area countries<sup>7</sup>.

6 However, both the US and the euro area import more from the countries of Asia than their regional neighbours, Latin America and the accession countries respectively.

7 It should be noted that “transit trade” activity influences the figures for these countries (see Box 2).

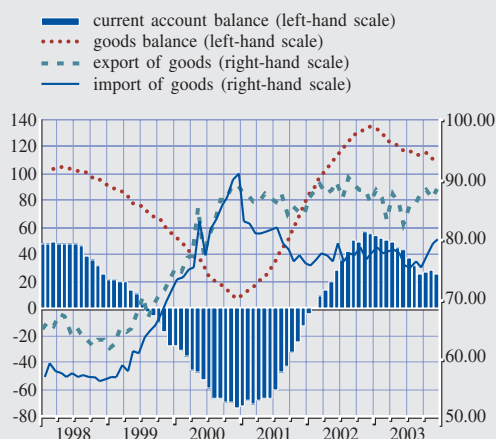
Another interesting observation that can be drawn from Chart 3 is related to the rather wide dispersion among euro area countries of their relative magnitudes of intra and extra-area trade as a proportion of GDP. The most prominent example is the case of Ireland, in which extra-area imports are around three times the size of intra-area imports. By contrast, intra-area imports are roughly twice as large as extra-area imports for both Austria and Portugal. These differences often reflect the importance of specific trading partners for some of the individual euro area countries; for example, the case of Ireland can partly be explained by its strong historical trade links with the United Kingdom. This diversity in the relative openness of the euro area countries also holds for trade in services.

The indicators of openness presented earlier should be interpreted cautiously. To start with, they are influenced by data quality issues and differences in the methodologies used to compile the data. Moreover, the period of observation is much too short to derive definite conclusions. The indicators are also influenced by the magnitude of the economy, with an inverse relationship between the level of trade openness and the size of the domestic economy.

Given the limits of an overall synthetic indicator to gauge the importance of the trade channel, in the following sub-section we briefly analyse developments in the euro area current account, underlining in particular the

**Chart 4 The euro area current account, the goods balance, and exports and imports of goods**

(in EUR billions, seasonally adjusted)



Source: ECB  
Note: Balances are cumulated over 12 months; exports and imports of goods are monthly values.

determinants of trade performance and, therefore, the corresponding impact on economic activity in the euro area.

## 2.2 DEVELOPMENTS IN THE EURO AREA CURRENT ACCOUNT BALANCE

The euro area current account is mostly determined by trade in goods, given the relative stability of the other components (services, income and current transfers) and their comparatively small magnitudes in terms of credits and debits (see Table 3). Therefore, shifts

**Table 3 Euro area current account**

(EUR billions (ECU billions to end-1998); balances)

	Current account					Current account as a percentage of GDP <sup>1)</sup>
	Goods	Services	Income	Current transfers	Total	
1998	92,7	0,1	-30,2	-42,4	20,1	0,3
1999	54,9	-8,3	-38,1	-40,6	-32,1	-0,5
2000	6,4	-7,0	-29,2	-50,1	-79,9	-1,2
2001	74,0	-1,4	-35,3	-51,4	-14,1	-0,2
2002	130,9	11,1	-27,8	-47,1	67,1	1,0
2003	110,3	17,7	-43,8	-56,1	28,1	0,4

Sources: ECB and Eurostat. Note: Greece is included from 2001.

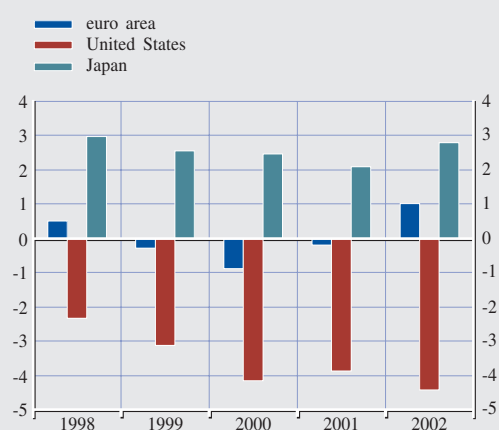
1) GDP data are nominal and seasonally adjusted.

## Box 1

### THE EURO AREA CURRENT ACCOUNT AND GLOBAL CURRENT ACCOUNT PATTERNS

By contrast with the surplus of the euro area, the United States recorded a large, and growing, current account deficit greater than 4% of GDP in 2002, while Japan's current account surplus amounts to almost 3% of GDP (see Chart A). Of course, apart from being partly counterparts of each other, these quite different current account positions also reflect differences in factors such as relative growth rates and cyclical positions. For example, exceptionally strong GDP growth rates for the United States until 2001, resulting in a significant rise in import penetration, partly explain the widening of the US deficit. Meanwhile, Japanese imports actually registered a significant decline on account of a decline in expenditure and weak economic growth over this period. In comparison, the current account of the euro area has remained somewhat more stable, reflecting a more steady expansion of demand up to 2000 before a slowing down in 2001 and 2002. As a result, the euro area has maintained a small external imbalance in comparison to the US and Japan, with the current account, on average, being virtually in balance over the period 1998-2002.

Chart A Current Account of the euro area, the United States and Japan as a percentage of GDP



Sources: ECB, Eurostat, BEA and Bank of Japan.

in the current account balance have been largely driven by developments in the euro area goods balance, which reached a minimum in January 2001 (Chart 4). It is also interesting to examine the balance of the euro area current account in the context of global patterns (see Box 1).

### 2.3 THE MAIN DETERMINANTS OF THE EURO AREA GOODS BALANCE

Taking a long-term perspective, Chart 5 shows that, after growing steadily over the period 1993-1997, extra-euro area import values and export values and volumes of goods declined in 1998.<sup>8</sup> They then recovered in 1999 before declining again in 2001 and at the end of 2002.

Focusing on the period since the launch of the euro<sup>9</sup>, three main factors explain the developments of imports and exports and consequently the development of the euro area goods balance.

First, the sizeable fluctuations of the euro – most notably the euro's strong depreciation between early 1999 and the end of 2000, followed by a significant appreciation. These fluctuations partly explain the changing trends in the euro area's external trade (Chart 6).

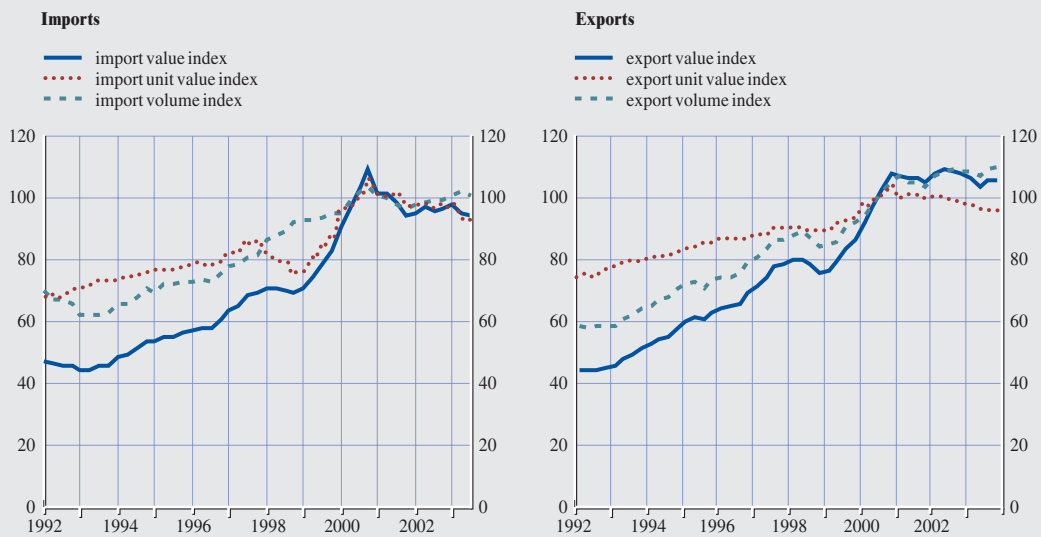
<sup>8</sup> We examine developments in exports and imports since 1992 in order to provide a broader overview. However, we focus on the first four years of the euro's existence (1999-2002).

<sup>9</sup> We start from 1998, using this as a benchmark.



**Chart 5 Euro area import and export values, volumes and unit values in levels**

(seasonally adjusted; index: 2000=100)



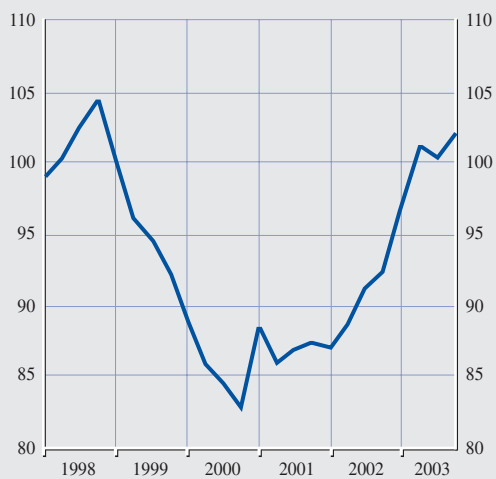
Sources: Eurostat and ECB calculations.

A second relevant factor behind the developments over the period 1998-2002 was that oil prices increased sharply starting from

the end of 1998, resulting in a lower goods surplus owing to the higher trade deficit for oil (see Chart 7).

**Chart 6 Euro nominal effective exchange rate**

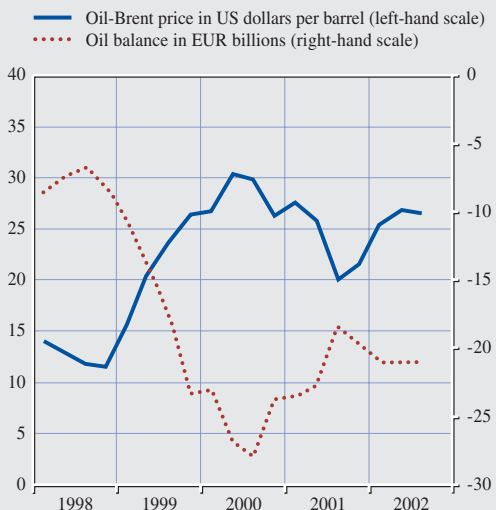
(index: 1999 Q1=100)



Source: ECB.

**Chart 7 Oil prices and the euro area oil balance**

(quarterly data)



Sources: Datastream and ECB.

Third, developments in foreign and domestic demand also had a noticeable impact on euro area exports and imports of goods (Chart 8).<sup>10</sup> The marginal decline in foreign demand in 1998 – and the associated fall in extra-euro area export volumes – can mainly be explained by the Asian crisis (see Chart 9). By contrast, over the same period domestic demand continued to grow robustly before recording a slowdown from 2001 onwards, resulting in import volumes of goods following a similar profile. In 2001, foreign demand strongly declined, owing to the global downturn, before recovering in 2002 and 2003 and, combined with the impact of the euro appreciation, largely explains the weakness of exports over this period.

The decrease in the goods balance in the period 1998–2000 – primarily owing to the stronger increase in the value of imports compared with exports (Chart 4) – can be explained by higher import prices resulting from both the hike in oil prices (Chart 7) and the depreciation of the euro (Chart 6). An interesting development in this period which is relevant for our analysis is that the euro depreciation appeared to improve the non-oil goods surplus (Chart 10) not only with a possible lagged impact (“J-curve” effect), but

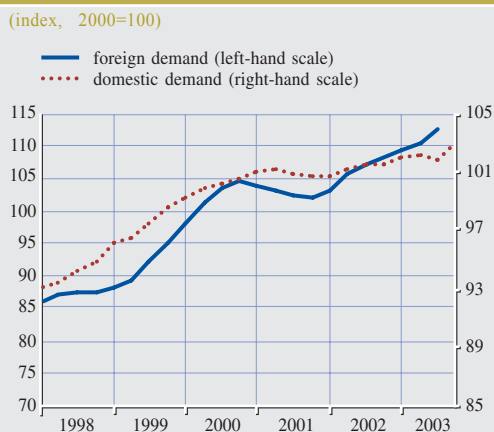
also by an extent which was somewhat less than might have been expected.

Two sets of possible explanations can be advanced for this limited response to the exchange rate changes, which possibly indicate some structural factors affecting the trade linkages for the euro area. First, the euro depreciation resulted in only a limited improvement in the relative price competitiveness of the euro area. In particular, export prices (in euro) – proxied by unit values – rose significantly during the depreciation of the euro in 1999–2000 (see Chart 5). As this increase was in excess of rising costs, this implies that exporters passed through only part of the depreciation to gains in price competitiveness, while instead increasing their profit margins (Chart 11).<sup>11</sup> Rather symmetrically, during the euro appreciation during 2001 to 2003, export prices stopped rising – and declined in 2002 and 2003 – as exporters started to squeeze their profit margins in order to limit the loss in price

10 Euro area foreign demand is computed as a weighted average of imports of extra-euro area trade partners. The weights are defined as the share of each partner in euro area total exports.

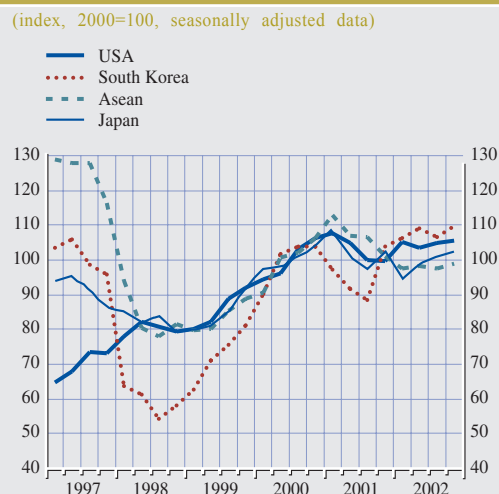
11 Of course, comparing the growth rate of the extra-area export unit value index with the growth rate of euro area costs – with the latter represented by euro area producer prices excluding construction – provides only a rough proxy for the change in export profit margins.

**Chart 8 Foreign and domestic demand**



Source: ECB.

**Chart 9 Euro area export volumes**



Sources: Eurostat and ECB.

competitiveness arising from the appreciation. On the import side, although the import price increased significantly, partly as a result of the oil price hike, the depreciation and subsequent appreciation were not fully passed through to extra-euro area import prices. Therefore, there is evidence that the exchange rate pass-through to import prices has been significantly less than 100% (see sub-section 2.5.2 below for details of estimated elasticities).

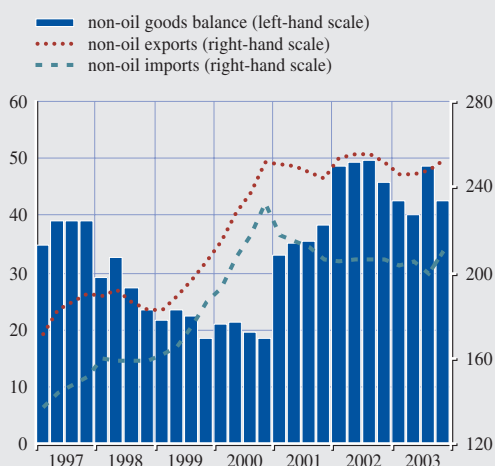
The second set of explanations relates to the response of extra-euro area trade volumes to changes in competitiveness and foreign and domestic demand. On the exports side, export volumes showed only a limited response to the significant improvements in relative price competitiveness, possibly because part of the euro depreciation was perceived as transitory rather than permanent. In addition, the large-scale net FDI outflows from the euro area since the mid-1990s may have substituted for euro area exports, as outward FDI from the euro area may be used to purchase or set up production plants abroad so that euro area companies can sell goods directly in those foreign markets. As

a result, some goods which were previously exported from the euro area may now be manufactured and sold directly in those export markets.

Moreover, on the imports side, it seems that the composition of the growth in euro area expenditure may explain why import volume growth over 1999-2000 was so robust despite the higher cost of imports owing to the depreciation of the euro. For example, estimates for the euro area suggest that the investment and export components of domestic expenditure are far more import-intensive than consumption. Accordingly, the strong growth of these import-intensive expenditure categories during the period 1999-2000 partly explains why import volumes grew so robustly over this period, thereby contributing to the weaker than expected response of the goods balance to the euro depreciation. Meanwhile, in the following years, import volumes declined in line with decreases in some import-intensive categories of domestic expenditure, such as capital expenditure on plant and machinery. The

**Chart 10 Euro area non-oil exports and imports**

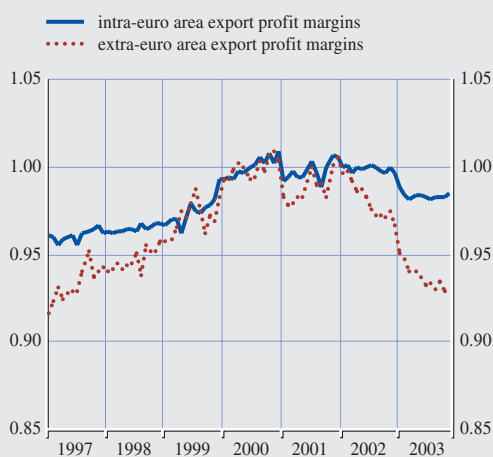
(EUR billions, seasonally adjusted)



Sources: Eurostat and ECB.

**Chart 11 Profit margins: intra and extra exports**

(monthly data and seasonally adjusted data for exports; index 2000=1)

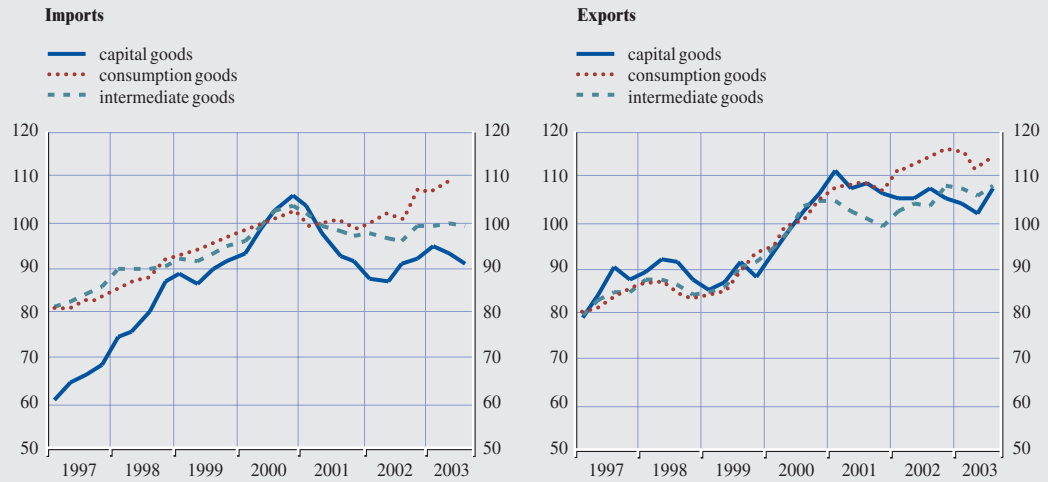


Sources: ECB and Eurostat.

Note: The profit margin is calculated as the export unit value index divided by the industrial producer price index (excluding construction).

**Chart 12 Extra-euro area import and export volumes for broad economic commodities (BEC)**

(seasonally adjusted; index:2000=100)



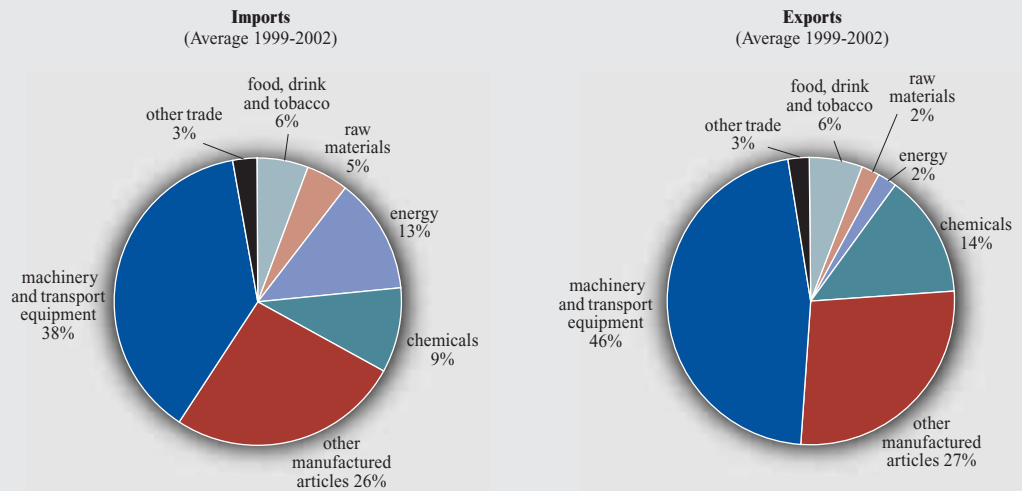
Sources: Eurostat and ECB calculations.

important role of import-intensive categories of expenditure in determining import volumes is highlighted by Chart 12, which shows the strong growth in import volumes of capital goods during the boom in capital expenditure in 2000, followed by the sharp decline in capital goods imports in the following years, in line

with the fall in euro area investment expenditure over the same period. In terms of composition, export volumes of intermediate and capital goods registered the strongest slowdown in 2001, while exports of consumer products were less affected (see Chart 12). This seems consistent with the general trends in world

**Chart 13 Extra-euro area trade for selected sectors in value shares**

(SITC classification; monthly data; seasonally adjusted; average 1999-2002)



Sources: Eurostat and ECB calculations.

Notes: SITC stands for the Standard International Trade Classification (1-digit level).

Box 2<sup>1</sup>**METHODOLOGICAL ISSUES REGARDING TRADE DATA**

Data for the components of the current account of the euro area are derived by the ECB according to balance of payments standards (see the first charts and Table 3 of this section). The remaining charts and tables are based on External Trade Statistics, which are not fully comparable with the goods item in the balance of payments statistics. Part of the difference between these series arises from the inclusion of insurance and freight services in the recording of goods imported.

External Trade Statistics for both the EU and the euro area are compiled by the European Commission (Eurostat) from Extrastat and Intrastat data transmitted by Member States. Extrastat data are derived from customs documentation relating to trade in goods between EU Member States and non-EU members. Intrastat data relate to transactions between EU Member States, and originate from specific reporting systems which were first set up in January 1993, following the abolition of intra-EU customs controls. One deficiency of Intrastat data is that the value of dispatches is consistently higher than that of arrivals and is equivalent to around 5% of intra-EU gross trade flows. The impact this has on extra-euro area net trade in goods – i.e. the trade balance between the euro area and other EU countries – is an overestimation to the order of around €10 billion on an annual basis.

Other points to note regarding the External Trade Statistics used in this article are as follows:

- “transit trade” affects the trade data of some euro area countries. In these countries, primarily the Netherlands and Belgium, a large amount of trade is related to the transit of goods both within and outside the euro area;
- trade “price” data are not available for the euro area. Consequently, throughout this article, unit value indices are used as a proxy for trade prices.

<sup>1</sup> See ECB (2000/b).

activity, where the demand for capital goods and intermediate inputs underwent a serious downturn, whereas consumption expenditure remained more robust.

## 2.4 CHARACTERISTICS OF EURO AREA TRADE: SECTORAL AND GEOGRAPHICAL BREAKDOWN

The aim of this sub-section is to examine in which sectors euro area trade is more specialised and which countries are the euro area’s major trade partners. This will help to improve our understanding of the sources of shocks via the trade channel for the euro area economy.

### 2.4.1 SECTORAL BREAKDOWN

As is typical of an advanced industrialised economy, the euro area as a whole imports

substantial quantities of raw materials and energy – which account for around 18% of euro area imports – while specialising in the export of manufactured goods (see Chart 13). The three major manufacturing categories – machinery and transport equipment, chemicals and other manufactured articles – account for 87% of exports and 73% of imports. Table 4 presents the sectoral composition of 10 different sectors for extra-euro area trade. An examination of the evolution of the sectoral composition during the 1990s yields three pertinent observations. Within both exports and imports, some sectors have become increasingly important, such as computers and telecommunications, as well as electrical machinery and appliances, while others have substantially declined in share over the last decade, such as food and metal manufactures. The first observation is particularly relevant

**Table 4 Sectoral composition of extra-euro area imports and exports**

(percentage of total extra-euro area imports and exports; monthly data; seasonally adjusted)

	Food	Clothes and footwear	Chemicals	Manuf. of metals	Power generating machinery	Machinery industries	Computers & telecomm.	Electrical Machinery & appliances	Vehicles	Petroleum and fuels
<b>Sectoral composition of extra-area exports</b>										
1990	6.5	3.7	13.0	7.9	3.0	13.6	4.5	5.6	10.9	5.3
1995	5.8	3.1	13.5	7.1	2.7	13.1	5.6	7.2	10.3	3.5
2000	4.6	2.7	13.9	5.9	3.2	11.0	8.4	8.7	11.1	4.8
<b>Sectoral composition of extra-area imports</b>										
1990	7.8	4.9	8.2	6.3	2.2	5.9	8.8	4.5	4.9	30.4
1995	7.4	5.7	9.5	7.1	2.3	5.6	9.1	6.8	5.3	20.7
2000	4.8	4.8	8.6	6.0	3.2	5.5	11.7	8.2	5.8	26.9

Sources: Eurostat and ECB calculations.

considering that the international downturn in the ICT sector represents one of the factors explaining the spillover of the US recession to the euro area economy.

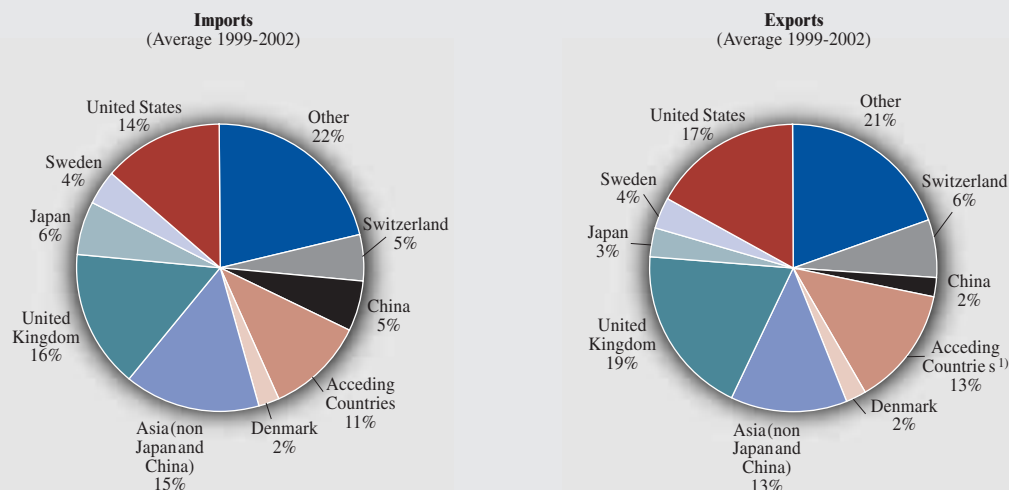
#### 2.4.2 GEOGRAPHICAL BREAKDOWN

In terms of geographical breakdown (Chart 14), the euro area's largest trading partner is the UK, followed by the US. Among the regions, almost one-third of the euro area's trade in goods takes place with the remaining European Union countries that are not part of the euro

area (the UK, Denmark and Sweden), and with Switzerland and Norway. Asia is another major trading partner, totalling around 26% of euro area imports and almost 20% of exports, with China accounting for a growing and significant part of this trade, particularly on the imports side. Trade with EU acceding countries is also rapidly increasing, averaging approximately 11% of imports and 13% of exports during the period 1999-2002. In particular, as shown in Table 5, extra-euro area exports and imports vis-à-vis EU acceding countries almost tripled

**Chart 14 Extra-euro area trade in goods for selected partners in value shares**

(value shares; monthly data; seasonally adjusted; average 1999-2002)



Sources: Eurostat and ECB calculations.

1) Acceding countries become EU Member States on 1 May 2004.

**Table 5 Geographical breakdown of extra-euro area trade in goods**

(percentage of total extra-euro area imports and exports; monthly data; seasonally adjusted)

	Latin America	Acceding Countries <sup>1)</sup>	Asia <sup>2)</sup>	Russia	China	Canada	UK	Japan	US
<i>Imports</i>									
<b>1990</b>	5.1	4.3	23.9	NA	2.0	1.5	16.2	8.6	14.3
<b>1995</b>	4.6	8.7	24.9	3.4	3.6	1.5	17.5	7.2	13.2
<b>2000</b>	3.9	10.1	27.6	4.0	5.2	1.1	15.6	6.6	14.0
<b>2002</b>	4.0	12.7	26.2	4.3	6.3	1.0	14.8	5.4	12.8
<i>Exports</i>									
<b>1990</b>	3.3	5.0	19.1	NA	1.1	1.6	20.5	4.5	13.9
<b>1995</b>	4.7	10.3	22.7	2.3	2.0	1.2	18.5	4.1	12.4
<b>2000</b>	4.7	13.4	18.8	1.8	2.0	1.3	18.9	3.4	17.3
<b>2002</b>	4.0	13.7	18.8	2.5	2.7	1.5	18.9	3.0	16.8

Sources: Eurostat and ECB calculations.

1) Acceding countries become EU Members States on 1 May 2004.

2) Figures for Asia include China and Japan.

from 1990 to 2002, rising from an export share of 5.0% in 1990 to 13.7% in 2002, and from an import share of 4.3% to 12.7% over the same period. Import penetration by Asia significantly increased, especially influenced by the strong growth of China's share. The share of euro area exports and imports with Japan actually slightly decreased between 1990 and 2002.

We have previously shown how the trade channel was influential during the Asian crisis. This traditional channel was also important in transmitting the 2001 US recession to the euro area economy. Indeed, it turns out that in this case, despite the apparently limited transmission through the direct trade links between the US and the euro area, the spillover through the trade channel seems more important when one considers the ICT sector and the indirect links working through third-market effects (see Box 11 in Section 4).

## 2.5 ECONOMETRIC FINDINGS ON EXTRA-EURO AREA TRADE

This sub-section describes some key *extra-euro area* trade elasticities as estimated by ECB staff using econometric techniques and quarterly data over the period 1989-2001.<sup>12</sup> It therefore helps us to quantify the possible impact of external shocks on the euro area originating from trade developments, and sheds further light on the

factors behind the trends in the goods balance described in the previous sub-section. We provide information on the possible magnitude of the impact of changes in competitiveness and foreign and domestic demand on extra-euro area export and import volumes, as well as the impact of changes in exchange rates on both export and import prices. The focus is on trade in goods, as this accounts for the largest part of the current account. Given that import values are highly sensitive to developments in oil prices, and import volumes of oil seem somewhat price-inelastic, imports of goods are described in terms of their separate non-oil and oil components.

### 2.5.1 TRADE VOLUMES OF GOODS

In line with previous econometric studies of trade elasticities, extra-euro area trade volumes of goods have been regressed against measures of demand and relative prices. For exports, foreign demand is computed as a weighted average of the real import volumes of major euro area export markets, while the demand term for euro area imports is real euro area total final expenditure. Regarding *export volumes*,

12 This section reports trade elasticities for extra-euro area trade estimated by the External Developments Division, Directorate General Economics. For estimates based on national accounts data, which are based on "intra plus extra" trade, see Fagan, Henry and Mestre (2001). In addition, the ECB uses various other tools for gauging the impact of exchange rates on trade variables and GDP, etc, but the elasticities reported in this chapter are broadly consistent with the range of tools used by the ECB.

**Table 6 Estimates of long-run elasticities for extra-euro area trade volumes and prices**

Export volumes		Non-oil import volumes <sup>1)</sup> (Oil) <sup>2)</sup>	
Relative prices	Foreign demand	Relative prices	Euro area demand
0.50	1.0	0.81 (0.18) <sup>3)</sup>	2.77 <sup>1)</sup> (0.51) <sup>2)</sup>
Export prices <sup>3)</sup>		Manuf. import prices <sup>3),4)</sup>	
Domestic costs	Competitors' prices	Foreign costs	Domestic prices
0.50	0.48	0.51-0.71	0.49-0.29

1) The non-oil import volumes equation also includes a negative time trend which partially offsets the impact of the high demand parameter.

2) Parameters for oil import volumes are given in parentheses.

3) Exchange rate pass-through is given by the 'competitors' prices' parameter in the export price equation and by the 'foreign costs' parameter in the import price equation.

4) A range of estimates are given for manufacturing import prices, as in Anderton (2003).

5) Sample period for estimation varies by equation but the majority of equations used data for the period 1989 Q1-2001 Q4.

estimates suggest that a 1% increase in foreign demand will increase extra-euro area export volumes by 1% in the long run, while the long-term impact of a 1% improvement in relative export price competitiveness is estimated to result in a 0.5% increase in export volumes (see long-run parameters reported in Table 6). On the imports side, the estimated demand elasticity is quite high, suggesting that a 1% increase in total final expenditure leads to a 2.8% increase in *non-oil import volumes* in the long-run, while the long-run relative import price elasticity is approximately 0.8.<sup>13</sup> However, the estimated equation for non-oil import volumes includes a negative time trend which partially offsets the ostensibly high impact of a rise in total final expenditure.<sup>14</sup> With respect to *oil import volumes*, the long-run demand elasticity is around 0.5. This is much lower than the demand elasticity for non-oil import volumes, as it captures the significant decline in the oil-intensity of production over time. Moreover, the long-run price elasticity of oil is also relatively lower at around 0.18, reflecting the fact that demand for oil is relatively price-inelastic. The econometric findings generally suggest that for both non-oil imports and exports, the majority of the trade volume response to a change in relative prices or demand occurs in about a year. However, the speed of response of oil import volumes to changes in both demand and prices is measured as being considerably slower than for non-oil import volumes. For example, our estimates

indicate that it takes about three years for extra-euro area oil import volumes to react fully to a change in the price of oil.

One caveat relating to the above estimates is that various factors may lead to changes in the above responses over time, or the responses may differ according to different circumstances. For example, as mentioned earlier, exports may not grow in line with foreign demand if the large-scale net FDI outflows from the euro area in the second half of the 1990s have resulted in euro area multinationals substituting their euro area exports with increased production abroad. Furthermore, on the imports side, the composition of the growth in euro area

13 It is difficult to compare the demand elasticity for exports with that of imports, as the equations use different measures of demand (i.e. weighted imports for the exports equation and total final expenditure for the imports equation). Hence, the higher demand elasticity for imports does not necessarily imply a stronger trend rate of growth for imports in comparison to exports.

14 The elasticities estimated by ECB staff for the euro area trade volume equations seem to be fully in line with published estimates for the individual countries of the euro area (for a comparison of trade volume parameters across different macro-models, see "Economie et prevision: Structure et comportements macro-économiques: comparaisons économétriques entre nations", No. 147, Jan-Mar, 2001/1, pp. 27-28). For example, the National Institute's Global Econometric Model (NiGEM) also has a parameter of 1 for the export volumes demand term – along with export relative price elasticities ranging from 0.31 to 0.63 – for the largest euro area countries. Meanwhile, NiGEM's long-run parameters for the largest euro area countries' import volume equations range from 0.28 to 0.82 for the relative import price elasticities, and from 1.5 to 2 for the import demand elasticities. As mentioned earlier, the import demand elasticities estimated by ECB staff are more difficult to compare with NiGEM because the former also include a negative time trend.



expenditure has an important impact on import volumes, as some categories of expenditure seem to be far more import-intensive than others (exports and capital expenditure, for example, seem to be more than twice as import-intensive as consumption).

### 2.5.2 TRADE PRICES AND EXCHANGE RATE PASS-THROUGH

International trade is only partly based on price-taking behaviour, so import and export prices tend to be a combination of a mark-up on costs as well as pricing-to-market concerns. As a result, extra-euro area export prices of goods are likely to change in line both with movements in domestic costs as well as competitors' export prices (the latter representing pricing-to-market), both expressed in euro. According to the estimated long-run parameters, extra-euro area exporters give virtually equal weight to the pricing-to-market and the costs components (Table 6). This implies that a 1% increase in either costs or competitors' prices brings about a 0.5% increase in export prices, with most of the long-run impact coming through in about a year.<sup>15</sup> As competitors' prices include the impact of changes in exchange rates, the results indicate that the pass-through of changes in the effective exchange rate of the euro to extra-euro area export prices of goods is around 50%. This implies that euro area export profit margins are reduced (increased) in response to an appreciation (depreciation), thereby limiting the impact on export price competitiveness of movements in exchange rates. As described in the previous sub-section, this partly explains why the goods balance showed a somewhat muted response to the significant depreciation of the euro during the period 1999-2000.

From the perspective of inflation, an accurate assessment of the degree of exchange rate pass-through for *import prices* is important, as changes in the price of imports feed both directly and indirectly into euro area prices and inflation. However, imports are made up of a heterogeneous range of products, and the exchange rate pass-through may vary considerably across these different types of

imports. Accordingly, we break down import prices of goods into three categories: *manufactures*, which account for approximately 75% of goods imports; and *oil* and *non-oil* commodities, which account for the rest of imported goods in roughly equal proportions. A more detailed explanation is given later, but estimates suggest that around 50-70% of a change in the effective exchange rate of the euro is passed through to manufacturing import prices. Meanwhile, in contrast to highly differentiated manufactured goods, one might expect the exchange rate pass-through to be around 100%, and for it to be immediate for more homogeneous and widely-traded goods and commodities where the so-called "law-of-one-price" might hold, such as oil and some non-oil commodities.<sup>16</sup> Accordingly, weighting these three categories together gives an exchange rate pass-through for total extra-euro area imports of goods of somewhere between 60-80%. Again, as discussed earlier, this partial exchange rate pass-through reduces the gain in competitiveness of domestic products vis-à-vis imports originating from a fall in the exchange rate, thereby again partly explaining the somewhat limited impact of the euro depreciation on the goods balance during the period 1999-2000.

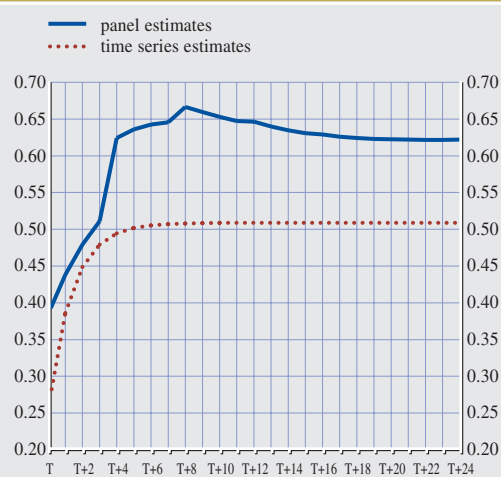
For *manufacturing import prices*, Anderton (2003) uses a framework whereby exporters to the euro area set prices partly as a mark-up on their production costs expressed in euro (i.e. the degree of exchange rate pass-through), and partly in line with euro area producer prices (i.e. the degree of pricing-to-market). Using various econometric techniques, the results suggest that the pass-through of changes in the effective

15 These results are broadly in line with those published by the IMF for the individual euro area countries (see Spencer, 1984). Although the IMF has somewhat higher elasticities for competitors' prices, one would expect this to be the case, as the IMF estimates are based on manufacturing export prices - a sector characterised by a high degree of competition which creates a greater tendency for pricing-to-market. By contrast, the estimates reported by ECB staff are based on exports of total goods.

16 As oil - and some non-oil commodities - is denominated in US dollars, the assumed 100% and immediate exchange rate pass-through relates to movements in the bilateral exchange rate of the euro against the dollar.

exchange rate of the euro to extra-euro area imports of manufactures in the long-run is in the range of around 50-70%, while pricing-to-market has an estimated weight of between 50-30%.<sup>17</sup> Moreover, these effects are estimated to occur fairly rapidly, with most of the long-run exchange rate impact passed through to import prices in about fifteen months, and at least half of the impact occurring in the same quarter as the exchange rate shock (see Chart 15). Anderton (ibid.) also finds some evidence that the degree of exchange rate pass-through may differ across extra-euro area import suppliers. For example, it seems that EU Member States that are not currently part of the euro area give a relatively larger weight to pricing-to-market – i.e. a lower exchange rate pass-through – when exporting to the euro area in comparison to non-EU members. This may be the result of pressures for price convergence within the European Union arising from increased competition owing to the integration of EU markets, but is also consistent with the fact that smaller countries are more likely to be price takers. On the other hand, further results show that the estimated lower pricing-to-market parameter for the non-EU countries may be driven by the much higher estimated exchange rate pass-through for imports from the United States (a result consistent with theoretical arguments that ‘large-country’ export suppliers exert a greater degree of monopoly power in world markets and tend to base their export prices primarily as a mark-up on costs with little pricing-to-market).<sup>18</sup> Indeed, the estimates suggest that the exchange rate pass-through for euro area imports of manufactures from the United States is closer to 90%, as opposed to the average estimates of 50-70%.<sup>19</sup> Given that the weight of the United States in this category of imports is around one quarter, this can be an important factor to consider in terms of its implications for euro area inflation, particularly when the magnitude of changes in the bilateral exchange rate of the euro against the dollar is markedly different to movements in the other bilateral exchange rates which form the effective exchange rate of the euro.

**Chart 15 Impulse responses showing quarterly time profile of percentage increase in extra-euro area manufacturing import prices owing to a 1% depreciation of the euro**



Source: Anderton (2003).

## 2.6 SUMMARY OF THE TRADE CHANNEL

Although the euro area is a large and relatively closed economy when compared to the individual euro area countries, it is still subject to shocks originating from external developments such as the Asian crisis, or the US boom in the second half of the 1990s and subsequent recession, and the associated strong growth and subsequent downturn in the ICT sector. Furthermore, even from a simple trade perspective, these links are not straightforward – often involving indirect links working through third-markets – and the impacts may

17 The estimated weight for the degree of exchange rate pass-through is similar to other estimates reported in the import price literature. For example, Anderton (1999) estimates an exchange rate pass-through of between 60-75% for UK manufacturing import prices; Mastropasqua and Vona (1989) estimate a pass-through of 54-68% for US import prices; and Athukorala and Menon (1994) estimate a pass-through of 67% for Japanese exports.

18 See Spencer (1984), who describes the theory concerning the monopoly power of large country export suppliers, and reports trade price elasticities of the IMF's World Trade Model which are consistent with the US having a high degree of monopoly power.

19 Another interpretation is that the pass-through is higher for US import suppliers because they mostly tend to invoice their exports in dollars.

differ quite considerably, depending on the specific nature of the shock and how it might spread across countries.<sup>20</sup>

Trade elasticities reported in this paper show that changes in the exchange rate, as well as oil price shocks, can have a notable impact on extra-euro area import prices. However, the trade volume responses are still difficult to predict accurately as, for example, FDI might be substituting for exports, while growth in imports is highly dependent on the composition of demand given that the individual components of domestic expenditure are quite different in terms of their import intensity. This is further complicated by the fact that the degree of exchange rate pass-through to import prices may differ across extra-euro area import suppliers.

In summary, the implication for the *economic analysis* pillar of the ECB's monetary policy is that external shocks can have a notable impact on the euro area via the trade link, as the euro area is not as "closed" as simple measures of "openness" might ostensibly suggest. Accordingly, external shocks and their impact on trade volume and prices should be monitored carefully, taking into account the possibility that the impacts might depend on the specific characteristics of the shock, and that the magnitudes of the impacts might also change over time.

<sup>20</sup> This is related to globalisation and the 'internationalisation of production', which we will examine in more detail later.

## 3 THE FINANCIAL TRANSACTIONS OF THE EURO AREA WITH THE REST OF THE WORLD

Cross-border capital and financial flows represent one aspect of the euro area's external dimension. During the 1990s, the euro area experienced a substantial surge in cross-border capital flows in parallel with the sustained and extensive integration of financial markets across the world. Cross-border portfolio financial flows increased in magnitude, stimulated by the liberalisation of financial markets and technological innovations that allowed investors to trade more easily on global markets. Moreover, global competition spurred M&A activities between euro area and non-euro area companies, leading to a considerable increase in FDI. As illustrated in an ECB Working Paper<sup>21</sup> (see also Box 7 in Section 4), incentives for international risk sharing may be another important factor explaining the increase in cross-border financial flows, particularly in equities.<sup>22</sup> Indeed, financial markets allow economic agents to smooth consumption across time and to hedge part of the risk associated with financial investments.

In order to assess how and to what extent financial flows may represent a notable channel of transmission of external shocks, this section begins by analysing the stylised facts regarding developments in the euro area's foreign direct and portfolio investment, particularly the magnitudes and the main determinants of the gross flows. A special emphasis is given to FDI, particularly FDI related to M&A activities, which have lately represented the bulk of FDI. The reason is that FDI represents a potentially important channel for the transmission of external shocks, given that globalisation and the internationalisation of production make the balance sheets of multinational corporations increasingly dependent on the external environment. This implies that, owing to increased outward FDI from the euro area particularly in the second half of the 1990s, downturns in activity across the globe can have direct impacts on the euro area by affecting the profitability and earnings of euro area subsidiaries based abroad. A key finding is that the gross financial flows, and consequently the stocks of foreign assets and

liabilities of the euro area, have grown strongly over this period (particularly FDI outflows), implying that the potential magnitude of the impact of this international transmission channel has increased. Finally, based on the information described in the sections regarding the size and destination of euro area financial flows, we look at various ways in which shocks may be transmitted internationally via the FDI channel.

### 3.1 THE OVERALL SIZE OF FINANCIAL FLOWS

The financial account of the euro area balance of payments records flows of financial assets and liabilities with the rest of the world. It is divided into five sub-components (see Box 3), of which we will examine in detail just the first two, i.e. direct investment and portfolio investment, as they are the most meaningful from an economic point of view. In fact, financial derivatives and reserve assets are quantitatively small, while the "other investment" account is mainly the counterpart to the settlement of transactions in the other accounts of the b.o.p.

21 See Castrén, Miller and Stiegert (2003).

22 In such circumstances, international financial flows can become independent of the underlying current account considerations, as investors expecting rapid future growth in the home economy are able to hedge part of their risk by selling equity shares and buying foreign bonds.

Box 3<sup>1</sup>

COMPONENTS OF THE FINANCIAL ACCOUNT OF THE EURO AREA BALANCE OF PAYMENTS

In the balance of payments, the sum of the current account and the much smaller capital account balances must by definition – taking into account errors and omissions – be equal to the financial account balance. The financial account of the euro area b.o.p. is divided into five main sub-components: direct investment, portfolio investment, financial derivatives, other investment and reserve assets.

- *Direct investment* reflects the objective of a resident entity in one economy to obtain a lasting interest in an enterprise resident in another economy. The lasting interest implies both the existence of a long-term economic relationship and a significant degree of influence by the direct investor on the management of the enterprise. In line with international standards, a “10% ownership criterion” is used to infer such a relationship. Direct investment comprises three categories: “equity capital”, which includes in particular M&As (so-called brownfield investments) as well as new investments (so-called greenfield investments); “reinvested earnings” (earnings of the “direct investor” not distributed as dividends); and “other capital”, which mainly consists of inter-company loans.
- The *portfolio investment* account shows transactions in securities, except those included in direct investment and reserve assets. It includes equity securities and debt securities in the form of bonds and notes and money market instruments. Euro area asset flows refer to the transactions by resident investors in securities issued by non-resident entities, while liability flows reflect the transactions between residents and non-residents in securities issued by residents of the euro area.
- *Financial derivatives* are financial instruments linked to a specific financial instrument, indicator or commodity, and through which specific financial risks can be traded in financial markets in their own right. The transactions and positions recorded under this item are those in options, futures, swaps, forward foreign exchange contracts and credit derivatives.
- The *other investment* account is a residual category that includes all financial transactions not covered under direct investment, portfolio investment, financial derivatives or reserve assets. It includes trade credits, loans/currency and deposits, and other assets/other liabilities. *Trade credits* consist of claims or liabilities arising from the direct extension of credit relating to transactions in goods and services, as well as advance payments for work in progress (or to be undertaken) associated with such transactions. There are two types of trade credit assets: (i) prepayments on imports, and (ii) trade credit extended on exports. *Loans/currency and deposits* comprise transactions in loans, deposits, currency and repo-type operations such as repurchase agreements. Finally, *other assets/other liabilities* is a residual item.
- The *reserve assets* of the euro area consist of the Eurosystem’s reserve assets (holdings of foreign liquid and creditworthy assets), i. e. the ECB’s reserve assets and the reserve assets held by the NCBs of the participating Member States.

<sup>1</sup> ECB (2002).

**Table 7 Euro area net financial flows**

(EUR billions (ECU billions to end-1998))

	1998	1999	2000	2001	2002	2003	Average (1998-2003)
<b>Combined net direct and portfolio investment</b>	<b>-191</b>	<b>-161</b>	<b>-128</b>	<b>-38</b>	<b>62</b>	<b>-9</b>	<b>-78</b>
A. Direct investment	-81	-120	-16	-103	-42	-22	-64
<i>Assets</i>	-173	-321	-443	-259	-184	-130	-252
<i>Liabilities</i>	91	201	427	156	142	108	188
B. Portfolio investment	-110	-41	-112	65	103	12	-14
<i>Assets</i>	-363	-311	-409	-291	-174	-296	-307
<i>Liabilities</i>	253	270	297	356	277	308	294
1 Equities	-12	-64	-236	125	51	39	-16
<i>Assets</i>	-116	-157	-286	-108	-40	-76	-131
<i>Liabilities</i>	104	93	50	233	91	115	114
2 Debt instruments	-98	22	124	-60	53	-27	2
<i>Assets</i>	-247	-155	-123	-183	-134	-220	-177
<i>Liabilities</i>	149	177	248	123	187	193	180
2.1 Bonds and notes	-118	-38	125	-45	39	23	-2
<i>Assets</i>	-239	-155	-114	-160	-89	-172	-155
<i>Liabilities</i>	121	117	239	115	128	195	153
2.2 Money market instruments	20	60	-1	-15	14	-51	5
<i>Assets</i>	-8	0	-9	-23	-45	-48	-22
<i>Liabilities</i>	28	60	8	7	59	-3	27

Source: ECB.

Note: Inflows (+); outflows (-). Greece is included from 2001.

Table 7 shows direct and portfolio investment flows between the euro area and abroad during the period 1998-2003. Overall, the euro area has turned gradually from being a net exporter of capital to a net importer in 2002 and close to balance in 2003. In particular, the euro area registered average net annual outflows of €130 billion (equivalent to 2% of GDP) in combined direct and portfolio investment over the period 1998-2001, whereas in 2002 it experienced a net inflow of €62 billion and a small outflow in 2003. From the point of view of gross flows – which may be more important with respect to the transmission of external shocks, as they represent changes in the stocks of assets and liabilities which in turn may influence the economic structure and external relationships of an economy – the euro area registered average annual gross outflows in combined direct and portfolio investment of €643 billion (equivalent to around 10% of GDP) over the period 1998-2001, while the average figure for gross inflows in combined direct and portfolio investment over the same period was €513 billion (or almost 8% of GDP). Accordingly, if we ignore the impact of revaluations, the euro area's stock of foreign assets in direct and

portfolio investment increased by around 40% of GDP over this period (i.e. an average of 10% of GDP per annum between 1998 and 2001). More detailed information on these stocks can be found in Box 4, which describes the overall international investment position of the euro area, including financial derivatives and other investments and reserve assets, in addition to direct and portfolio investments. According to these data, the gross external assets and liabilities of the euro area increased by almost 25% between 1999 and 2002, which obviously points to a possible increase in the importance of the financial flows link in the transmission of international shocks to the euro area.

### 3.2 TRANSMISSION MECHANISMS

Having established the magnitude of such financial flows, in this section we tackle the issue of identifying the channels through which the transmission of shocks takes place. The discussion focusses on two possible mechanisms. First, we suggest that in order to gauge the impacts, it is critical to identify not only the size but also the composition of the

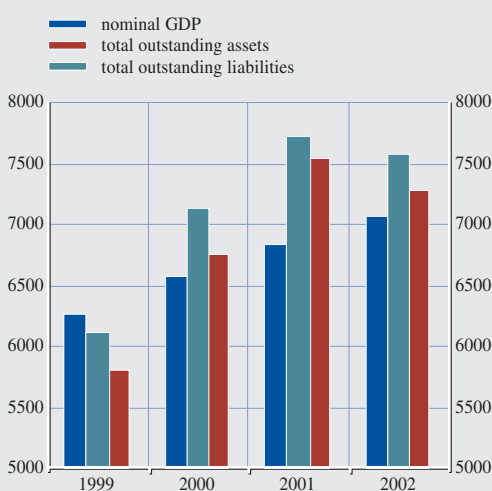
Box 4

THE INTERNATIONAL INVESTMENT POSITION OF THE EURO AREA

The stock variable resulting from developments in financial flows is the so-called international investment position (i.i.p.), which summarises the financial relationship of an economy with the rest of the world. More precisely, the i.i.p. reports the net external position of stocks of direct and portfolio investment, financial derivatives, other investment and reserve assets. Data for the euro area as a whole are only available for the period 1999-2002.<sup>1</sup> Over this period (Chart A), gross external assets and liabilities increased from approximately €5.8 and €6.1 trillion respectively in 1999 to €7.3 and €7.6 trillion respectively in 2002. This represents an increase in both categories of around 25% over the four-year period, well above the increase recorded by euro area nominal GDP (approximately 14%). On balance, the euro area has a small overall debtor position vis-à-vis the rest of the world, with net liabilities of around €290 billion in 2002 (representing approximately 4% of euro area GDP). The increase in the net liabilities of the i.i.p. between 2001 and 2002 can be explained by

Chart A Euro area gross external assets and liabilities

(EUR billions, end of period)

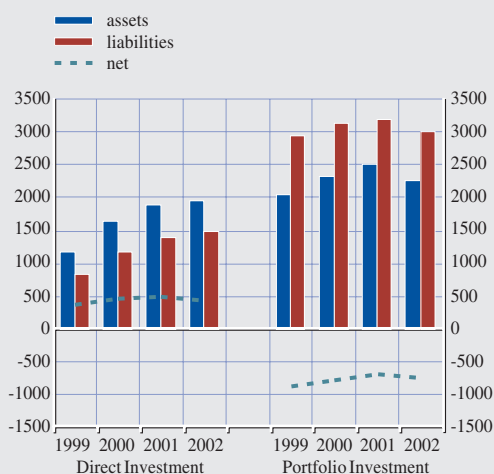


Source: ECB.

1 See the ECB Monthly Bulletin, December 2003, pp. 72-73.

Chart B The international direct and portfolio investment position of the euro area

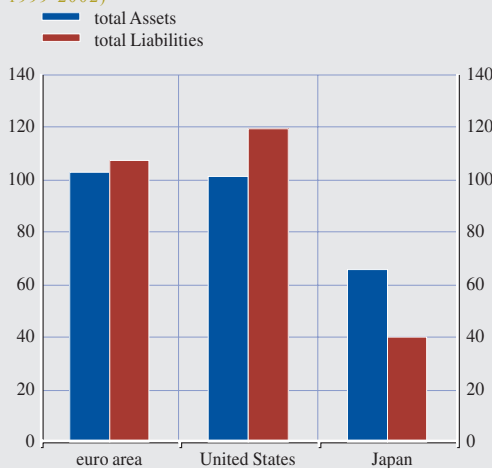
(in EUR billions, end of period)



Source: ECB.

Chart C International investment position of the euro area, the United States and Japan

(assets and liabilities as a percentage of GDP, average 1999-2002)



Sources: ECB, Eurostat, BEA and the Bank of Japan.

the greater increase in liabilities than in assets in direct investment and the larger decrease in assets than in liabilities in portfolio investment (Chart B). The net direct investment position decreased from €496.4 billion in 2001 to €425.1 billion in 2002, in particular owing to valuation changes in euro area assets held abroad. Conversely, the net portfolio investment liability position increased from €691.4 billion in 2001 to €756.3 billion in 2002, largely due to portfolio inflows to the euro area.

Using i.i.p. data we can present a measure of openness in financial terms as well. Chart C shows the stock of euro area assets and liabilities as a proportion of GDP compared with the United States and Japan. According to this measure, the euro area is more open in financial terms than Japan but slightly less open than the US, albeit only on the liabilities side.

financial flows. For instance, it has not been irrelevant for euro area investors that a large part of the bilateral flows to the US towards the end of the 1990s took the form of equity investments, i.e. subject to stock market adjustments, rather than bond purchases.

Second, the surge in M&A activity represents a major part of the large FDI outflows from the euro area, and implies a strengthening of interactions among world economies as a result of the behaviour of large firms across the globe. For instance, a drop in the profitability of a particular product market abroad – as was the case for ICT-related products in the US in the late 1990s – may rapidly spill over to the euro area through the impact on the foreign affiliates of euro area multinational corporations, regardless of the macroeconomic conditions in the euro area. More specifically, a downturn in US activity generally lowers earnings and profits for those euro area subsidiaries that are based in the US and produce for the US market and, via the impacts on the parent company, may thus affect the euro area economy. Similarly, the FDI channel also reflects the increased presence of US companies in Europe which, in the case of a US slowdown, may use their profits earned in the euro area to compensate for losses at home rather than using them for investment expenditure in the euro area.

### 3.2.1 THE COMPOSITION OF FINANCIAL FLOWS<sup>23</sup>

During the period under review the composition of financial flows of the euro area vis-à-vis the rest of the world changed markedly, causing distinctive changes in the way the euro area is exposed through this channel to international factors.

As mentioned above, the euro area was a net exporter of capital on average, peaking in gross terms in 2000 and coinciding with the strong growth in M&A activities (see below). This net exporter position was apparent for the individual foreign direct and portfolio investment accounts. However, the sharp shift within the portfolio account, i.e. between investment in equities and bonds, represented an important development. Equities were highly negative in net terms in 2000 (the euro area was a net creditor) and strongly positive in 2001, while rather symmetric developments occurred within the debt instruments account over the same period (see Table 7).

As explained in Box 5, an important reason for this shift was the ICT-related global economic expansion, which culminated in 2000. A large proportion of euro area equity outflows went to

<sup>23</sup> The analysis is based on ECB (2002).



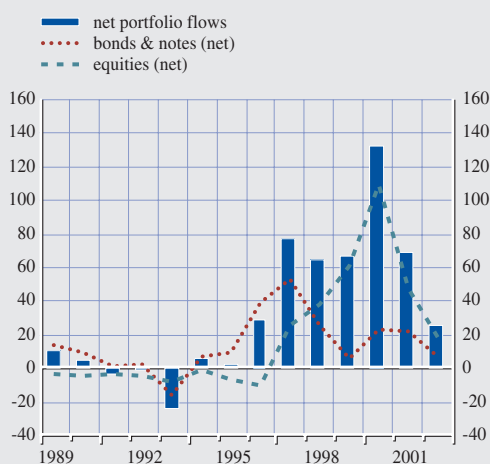
Box 5

DETERMINANTS OF EQUITY AND BOND FLOWS

Looking at the first component of portfolio flows, equity securities were characterised by net outflows during the period 1998-2000. As shown in Chart A, net equity outflows from the euro area to the US strongly increased in the late 1990s.<sup>1</sup> In particular, the peak in equity outflows in 2000 resulted in the net portfolio flows between the euro area and the US almost doubling from €67 billion in 1999 to €132 billion in 2000. This pattern can partly be explained by strong productivity growth in the US, which increased at an average of around 4% per year in the period 1995-99 compared with just over 2% per year for the euro area. Therefore, the differential in real GDP growth between the US and the euro area (see Chart B), combined with optimistic expectations about the profitability of US companies, especially in the “new economy” sectors, encouraged European investors to invest in the US, particularly in the context of M&A transactions mostly settled through the exchange of shares, rather than in cash.

Chart A Net security outflows from the euro area to the US, 1989-2002

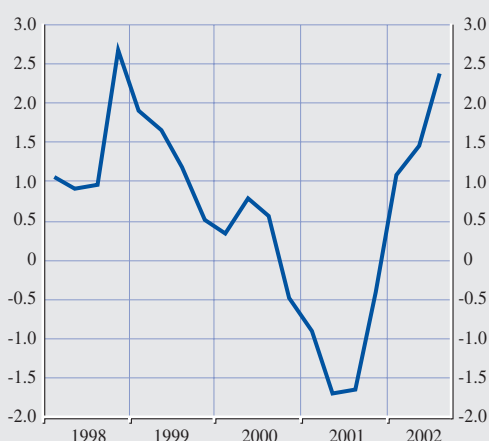
(EUR billions)



Source: Author's calculations based on data from the US Department of the Treasury.

Chart B Real GDP growth differential between the United States and the euro area

(in percentage points, year-on-year growth rate)



Sources: BIS, Eurostat and ECB calculations.  
Note: The difference between US and euro area real GDP growth rates is measured against the same quarter in the previous year.

By contrast, the succeeding period (2001-2002) was characterised by net inflows in equities in the euro area (totalling €125 billion in 2001 compared with net outflows of €236 billion in 2000<sup>2</sup>), which can be attributed to the recession in the US and the global economic slowdown. In 2001, purchases of foreign equity assets by euro area residents were approximately €178

1 For the time being, the euro area b.o.p. does not include a geographical breakdown. Chart A therefore uses statistics published by a counterpart country, in this case the United States, even though there may be some methodological differences between these data and the euro area b.o.p.

2 The strong net equity inflows in 2001 were also strongly influenced by the acquisition of Voicestream (based in the US) by Deutsche Telekom, which was settled largely through an exchange of shares (around €30 billion). However, if we do not take into account the Vodafone-Mannesmann and the Voicestream-Deutsche Telekom mergers in 2000 and 2001 respectively, €72 billion net outflows in equities would have been registered in 2000 and €93 billion net inflows in 2001.

**Chart C Interest rate differential between the United States, the United Kingdom and the euro area**

(monthly averages, percentage points)

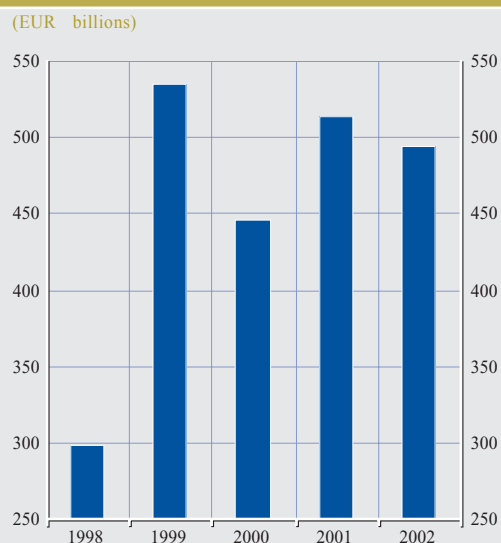


Source: BIS.  
Sources: OECD and ECB.

billion lower than in the previous year, while euro area liabilities were higher by a similar amount over the same period. Developments in 2002 confirmed the continuation of this trend.

In terms of debt instruments – which mainly consist of bonds and notes – the movement from net outflows in 1998 to significant net inflows in 2000 for the euro area might be explained by the hypothesis that foreign residents had begun to diversify away from risky US equities by purchasing euro area bonds. As shown in an ECB Working Paper,<sup>3</sup> US investors expecting rapid future growth in the home economy were able to hedge part of their risk by selling equity shares and buying foreign bonds. The fall in the ten-year government bond yield differential of both the United States and the United Kingdom vis-à-vis the euro area (see Chart C) and the rapid increase in bond issuance by euro area residents (see Chart D) – driven partially by the introduction of the euro, corporate restructuring within the euro area and the creation of a deeper and more liquid market for debt securities in Europe – may also partly explain the trend in the bonds and notes account and the relative attractiveness of euro area bonds for US investors.<sup>4</sup>

**Chart D Net issuance of debt securities by euro area residents**



Source: ECB.

3 See Castrén, Miller and Stiegert (2003).

4 The particularly strong growth in bond issuance by euro area residents in 1999 seems to be an anomaly which was then corrected in subsequent years.

Net inflows in debt instruments of €124 billion in 2000 turned into net outflows of €60 billion in 2001. This swing seemed to be driven by international portfolio rebalancing activities owing to the expected slowdown in the US. In fact, euro area non-residents directed an increasing amount of their net portfolio investment in the euro area to equity (up from €50 billion in 2000 to €233 billion in 2001), thus reducing investment in euro area bonds and notes (down from €239 billion in 2000 to €115 billion in 2001). By contrast, euro area residents partially replaced foreign equity investment with foreign bond investment (euro area equity outflows decreased from €286 to €108 billion, whereas bond and note outflows increased from €114 to €160 billion in 2000 and 2001 respectively). It is difficult to disentangle the determinants of these portfolio rebalancing activities. However, the expected large decline in the interest rate in US long-term government bonds relative to the euro area in the course of 2001 (see Chart C) and consequently the expectation of capital gains in the US are likely to have been key motivating factors for investment in bonds and notes abroad. Meanwhile, the differential in interest rates between the US and the euro area – which turned negative in 2002 (Chart C) – seems to explain the swing from net outflows in 2001 to net inflows in 2002.

the US, partly attracted by the relatively strong performance of the US economy, while the flows of bonds and notes could in part be explained by the hypothesis that foreign residents had begun to diversify away from risky US equities by purchasing euro area bonds, also in view of the greater availability of bonds issued by euro area residents.

However, it is critical to look at the composition of the flows, since a correct identification of the most important triggers – both of a conjunctural and structural nature – can help in gauging the possible impacts.

### 3.2.2 DETERMINANTS AND DEVELOPMENTS IN THE EURO AREA'S FOREIGN DIRECT INVESTMENT

As mentioned earlier, one source for the transmission of external shocks is the FDI channel. This channel is linked to globalisation and especially to the internationalisation of production, which makes the balance sheets and consequently the profits of multinational corporations more dependent on the external environment. Given the potential role of FDI in the international transmission of shocks, this sub-section provides more detailed information on the destination and sectoral composition of euro area FDI. In particular, we focus on M&A transactions, given their significant magnitude

and given the fact that the data available for euro area M&A are far more detailed than the purely aggregate FDI data available for the euro area.<sup>24</sup>

In the late 1990s and in 2000, the scale of FDI flows among OECD countries reached new heights. Total inflows in the OECD area in 2000 registered a historical high of USD 1,274 billion, almost six times the level recorded five years earlier. Total outflows were also important, reaching a value of approximately USD 1,286 billion in 2000, almost four times the value registered in 1995.<sup>25</sup> In 2001 FDI flows in and out of OECD countries dropped to roughly USD 566 and USD 593 billion respectively. FDI flows between the euro area and abroad exhibit a similar profile. As previously shown, net FDI investment abroad by euro area companies rose substantially over the period 1998-2000 and thereafter declined in 2001 and 2002. Other evidence shows that the bulk of world FDI took place between developed countries. For example, during the period 1998-2000 the European Union, Japan and the US alone accounted for 75% of world inflows and 85% of world outflows (UNCTAD 2001).

<sup>24</sup> M&A data are taken from the Thomson Financial database.

<sup>25</sup> OECD International Direct Investment Statistics Yearbook, 2001 and International Investment Perspectives, September 2002.

A large part of the above FDI flows were channelled through M&A deals. An approximate calculation suggests that M&As accounted for almost 70% of FDI assets and 58% of FDI liabilities over the period 1998-2001.<sup>26</sup> Until 1997, M&A activity by euro area companies was relatively subdued, characterised by a relatively small amount of transactions in terms of both value and quantity. In 1998, M&A investment by euro area companies increased strongly, especially cross-border investments, and reached a peak in 2000, when the value of euro area M&A flows to abroad reached in excess of €366 billion, or around 6% of GDP (see Chart 16).<sup>27</sup> Thereafter, these flows decreased markedly to €162.4 billion in 2001 and €68.7 billion in the first half of 2002. Particularly in the last five years, the value of euro area M&A transactions with companies located outside the euro area has been greater than with M&A companies located in the euro area. Therefore, it seems interesting to examine to which countries, and in which sectors, these large M&A outflows have been directed.

As Box 6 shows in greater detail, the US is, by far, the major destination for euro area M&A investments, with the acquisitions of high-tech (or “new economy”) US companies increasing dramatically in the late 1990s.

#### Box 6

##### EURO AREA M&A ABROAD: THE ROLE OF THE US AND THE “NEW ECONOMY”<sup>1</sup>

As Chart A shows, the US is by far the most important destination of euro area M&A. Over the period 1985-2002, the US received 49% of all M&As originating from the euro area (€479 billion) on a cumulated basis. The second largest recipient of euro area M&A was the UK, with 27%. Among emerging markets, the largest recipients were Latin American countries, which received 14% of total euro area M&A-related foreign investment.

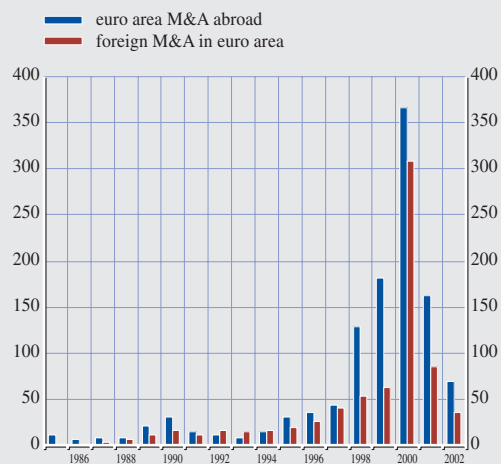
Turning to a sectoral breakdown, high-tech sector-related M&A activity<sup>2</sup> takes the lion’s share in the euro area outflows in the late 1990s. Indeed, the share of M&A transactions in the high-tech sector increased exponentially from around 10% at the start of the 1990s to around 50% in

1 See 2002 ECB Annual Report, Box 8, pp. 63-66.

2 The high-tech sectors, as defined in the Thomson Financial database, include biotechnology, computer equipment, electronics, communications technology and other high-tech companies.

**Chart 16 Euro area M&A activity 1985-2002**

(EUR billions)



Source: Thomson Financial.

In addition to the desire of euro area firms to gain expertise, another factor that may explain

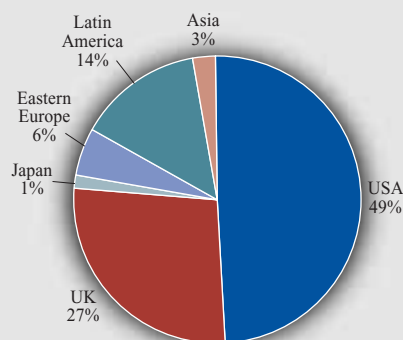
26 ECB and Thomson Financial database. The other components of FDI (greenfield investments, reinvested earnings and inter-company loans, see Box 3) are quantitatively less important and detailed data are not available.

27 As a benchmark, domestic capital expenditure in the euro area amounted to around 22% of GDP in 2000. The strength of the M&A flows in 2000 should be interpreted in the light of the stock market bubble. Accordingly, the drop in M&A flows in 2001 partly reflects the correction in the equity market.

2000. If we focus on the period 1990-2002, and we split the period into two sub-periods, one stretching from 1990 to 1996 and the other from 1997 to 2002, it is possible to highlight some significant changes in the sectoral composition of euro area M&A activity. For example, the service sector has become the most important sector, with its share of M&A rising from 18% in the 1990-96 period to 37% of all transactions in the second sub-period. By contrast, the manufacturing sector declined in importance, with its share falling from 41% to 26% across the two periods. Meanwhile, the share of the financial sector remained constant at around 27%. The high-tech sector, which is mostly comprised of various sub-sectors of manufacturing and services, rose over the two sub-periods and accounted for almost one-third of M&A activity over the period 1997-2002 (Chart B).

**Chart A Euro area M&A abroad by region, 1985-2002**

(percentage of total)

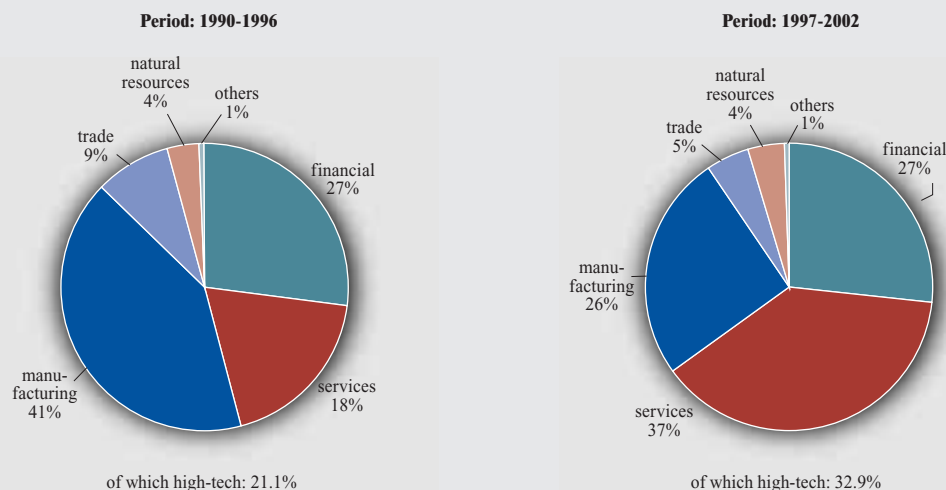


Source: Thomson Financial.

In the second half of the 1990s, euro area firms were remarkably active in acquiring US companies, especially in the high-tech sector. As shown in Chart C, M&A investment by euro area firms in the United States and M&A investment by US firms in the euro area were at similar levels in value terms in the first half of the 1990s. However, since 1996, while euro area M&A outflows to the United States have increased dramatically, rising more than fivefold between 1996 and 2000, M&A flows from the US into the euro area have risen only modestly. The trends are particularly apparent with regard to the high-tech sector (Chart D). Therefore, euro area

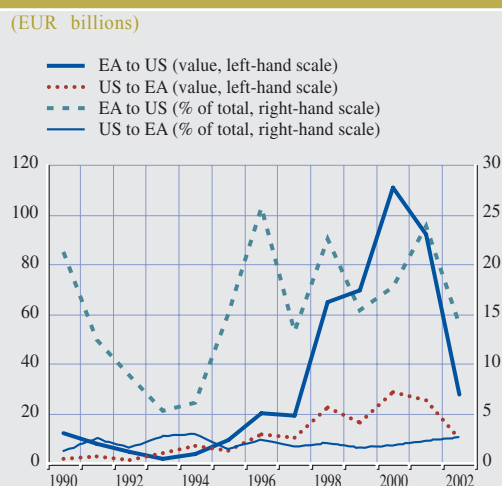
**Chart B Euro area M&A investment by sector**

(percentage of total)



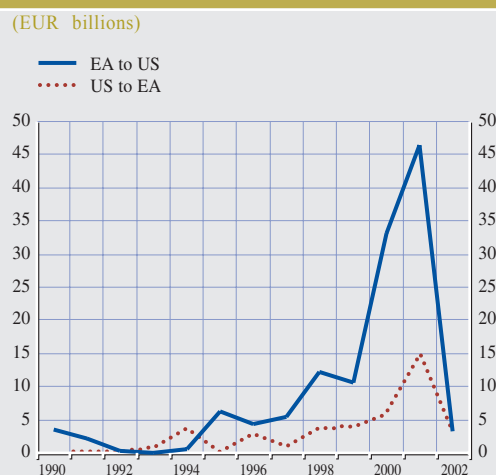
Sources: Thomson Financial and ECB calculations.

**Chart C Bilateral euro area – US M&A transactions, 1990-2002**



Sources: Thomson Financial and ECB calculations.

**Chart D Bilateral euro area – US M&A activity in high-tech industry, 1990-2002**



Sources: Thomson Financial and ECB calculations.

firms can be seen to have been much more active in acquiring US firms during this period than vice versa, possibly as a result of the attempt by euro area firms to catch up with their US counterparts by investing heavily in acquiring US technology companies and thereby internalising the knowledge capital of the US economy.<sup>3</sup>

3 See, for example, De Santis, Anderton and Hijzen (2004), who investigate long-run determinants of euro area FDI to the United States during the period 1980-2001. The empirical results suggest that the surge in euro area FDI to the USA, in particular in the form of M&As, was significantly affected by technological developments in the euro area and the US.

the large wave of M&As is the surge in equity prices. The latter made it easier for firms to raise finance to acquire domestic or foreign firms, while the rise in equity prices, coupled with expectations of further increases, made M&As appear more attractive and profitable. Indeed, the peak in euro area M&A activity at home and abroad in the latter half of the 1990s coincided with the stock market boom. This seems to support the notion that M&A transactions were, at least partly, driven by stock market valuations.<sup>28</sup> The bursting of the stock market “bubble” was likewise accompanied by a plunge in M&A.

Other explanatory factors behind the remarkable development in M&A activity may be related to some structural factors such as the

ongoing globalisation process and advances in information technology. These factors increased the amount of global competition, providing a stimulus to M&A activity, while other important structural factors include the liberalisation and harmonisation of regulations governing FDI and M&A. In particular, a number of European Union directives induced greater competition and transparency, creating an environment in which it became easier for firms to expand internationally and engage in cross-border M&A activities.

28 See for example Shleifer and Vishny (2001), who claim that the wave of M&As in the 1990s coincided with very high stock market valuations. Similarly, De Santis, Anderton and Hijzen (2004) find that euro area FDI outflows to the US were partly driven by movements in the stock market.

In the light of the significant decline in international equity prices since March 2000, this sizeable investment of European firms in the US, which peaked in 2000 just before the burst of the equity price bubble, raises questions about the potential negative effects on euro area firms. In particular, M&A transactions in the high-technology sector, and in the telecommunications sub-sector, which accounted for a large share of M&A transactions in 1999 and 2000, were undertaken at very high share prices in relation to operations in other sectors. Therefore, the sizeable stock market corrections since March 2000 strongly affected the valuation of the investments made in these sectors. This represents a possible further spillover effect that we will analyse in more detail in the next sub-section.

### 3.3 SOME PRELIMINARY QUANTITATIVE ASSESSMENTS OF THE IMPACT OF THE FDI CHANNEL

No hard empirical evidence exists yet on the relevance of the FDI channel for spillovers of external shocks to the euro area, although the magnitudes involved seem to be significant. For instance, in a recent paper<sup>29</sup> the BIS mentions that sales by US subsidiaries of European companies are five times higher than European exports to the US. Using this estimate, combined with the fact that euro area exports to the US represent around 2.5% of euro area GDP, this implies that such sales amount to roughly 12.5% of euro area GDP. There are obviously difficulties in providing a precise quantitative assessment of the impacts originating through the FDI channel, but in this occasional paper we use two particular channels to try to roughly quantify at least some of the mechanisms at work. First, we adopt a macro approach, looking at developments in income receipts within the euro area current account. Second, we perform some preliminary calculations regarding the approximate impact of the strong correction in the equity market on the value of past euro area M&A investments.

#### 3.3.1 THE IMPACT ON THE INCOME ACCOUNT

The FDI channel should partly be reflected in the current account of the euro area, as income receipts include investment income (i.e. the income returns on euro area foreign assets which include repatriated profits associated with foreign direct investment). Seasonally adjusted data show that gross income receipts for the euro area grew very rapidly for the first nine months of 2000, but then flattened out in the final quarter of 2000 before falling rapidly (see Chart 17).<sup>30</sup> In terms of timing, this behaviour seems to correspond with the slowdown in world activity and the associated decline in profits in the US and other parts of the world. US current account data also provide further evidence on the decline in income payments. Chart 17 also shows a large fall, in absolute value, in direct investment income payments and in income payments on assets held by foreigners in the US from the second half of 2000 to the second half of 2001 (from around USD 13 to USD 1 billion, and from USD 80 to USD 50 billion respectively<sup>31</sup>). Accordingly, we have some limited indirect evidence that a fall in US profitability may reduce the income of euro area corporations and consumers.

To further investigate the importance of the FDI channel for euro area growth, one would ideally seek to measure the effect of lower profits in the US on, say, the investment behaviour of euro area companies. No such analysis, however, has been undertaken so far. One possible tentative indicator for gauging the relative importance of the US operations of euro area companies is to compare the size of FDI by euro area companies in the US with the magnitude of domestic investment in the euro area. Chart 18 shows that the ratio of FDI to domestic investment for the euro area increased dramatically throughout the 1990s, from about 2-4% in the mid 1990s to

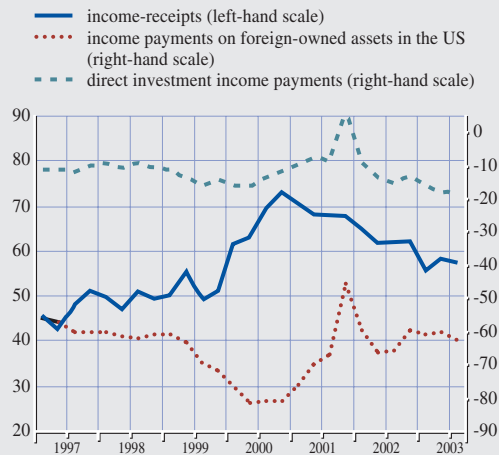
<sup>29</sup> See BIS (2001).

<sup>30</sup> In 2002-2003 the negative trend of income receipts for the euro area was also driven by the appreciation of the euro vis-à-vis the other currencies.

<sup>31</sup> In Chart 17 the figures are negative because they represent outflows for the US.

**Chart 17 Euro area income receipts and income payments on foreign-owned assets in the US**

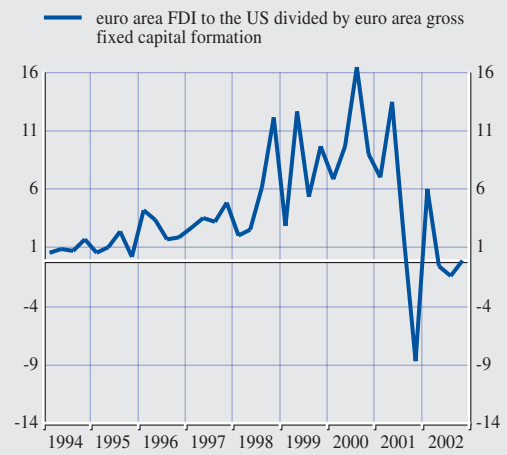
(seasonally adjusted data, EUR billions left axis and USD billions right axis)



Sources: ECB and BEA.

**Chart 18 Ratio of euro area FDI into US to euro area gross fixed capital formation**

(as a percentage)



Sources: ECB and BEA.

Note: FDI data refer to the euro area excluding Portugal and Greece.

around 10% in 1999 and 2000, before dropping in 2001. However, one should note that FDI is not strictly comparable with domestic investment as FDI includes M&A deals as well as “greenfield investments”.

### 3.3.2 THE IMPACT OF THE EQUITY PRICES FALL ON M&A INVESTMENTS

As we pointed out previously, M&A activity picked up in the period before the burst of the equity price bubble. In particular, M&A transactions in the high-tech sector and in the telecommunications sub-sector, which accounted for a large share of M&A transactions in 1999 and 2000, were undertaken at very high prices in relation to operations in other sectors. Therefore, the sizeable stock market corrections which started in March 2000 strongly affected the valuation of the investments carried out in these sectors. Preliminary computations suggest that more than 30% of the total effective value of initial M&A investment in the US and the UK had been lost by the middle of 2002 as a consequence of the past decline in equity prices. These estimates are obtained using the changes

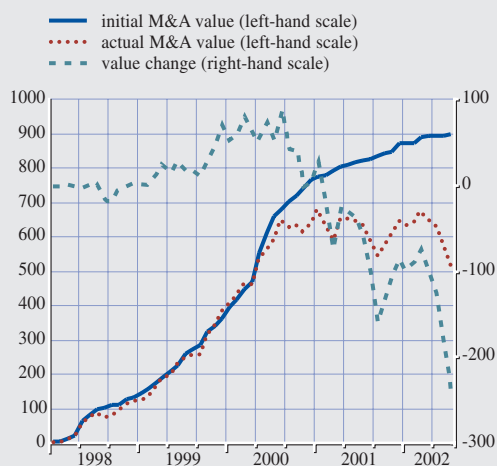
in the foreign equity indices to calculate the variation in the value of the cross-border M&A investment of euro area companies. For this purpose, the data used here refer to the dates of announced and completed M&A transactions, rather than the dates of settlement, because the initial value of M&A deals is probably more closely related to equity market developments at the time of announcement than at the time of settlement. Another caveat is that the M&A data do not provide information about whether firms that undertook such transactions still hold all of the shares involved in those deals. If they sold part of their acquired assets, for instance before the stock market peak in March 2000, the true losses incurred owing to the equity market downturn may be somewhat lower. Chart 19 allows a comparison between the cumulated value of the initial M&A investment (solid line) and the value of the M&A investments after taking into account the variation in the overall equity market index (the dashed line).

This comparison shows a significant decline in M&A investments relative to the initial investment. This loss is larger if we focus



**Chart 19 M&A of euro area companies abroad: change in equity market value**

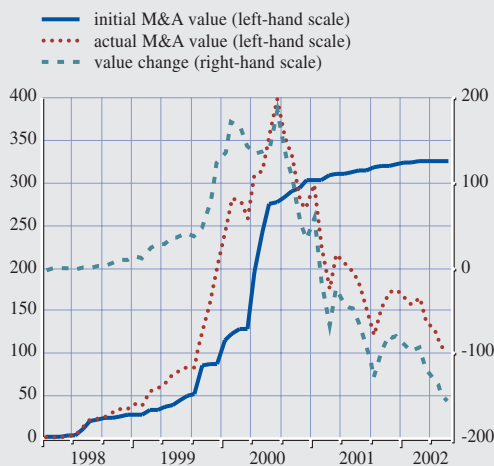
(in EUR billions, all sectors and based on broad equity market indices)



Sources: Thomson Financial and ECB calculations.

**Chart 20 M&A of euro area companies abroad in the high-tech sector: change in equity market value**

(in EUR billions)



Sources: Thomson Financial and ECB calculations.

only on the high-tech and telecommunications sectors (Chart 20 and 21) with a decline of 61% (around €133 billion) and 67% (€131 billion) respectively of the cumulated initial M&A investment by the middle of 2002<sup>32</sup>.

Assessing the implications of these valuation losses, which are not necessarily realised, is quite a complex affair.<sup>33</sup> The described changes in the value of the acquired companies can affect euro area parent/consolidated firms through different channels. In particular, changes in the valuation of M&A investments can affect euro area parent/consolidated companies through changes in market expectations of their own return. This can have repercussions on the availability of external financial resources (quantity effect) for these firms and on the risk premia charged by financial firms (price effect). In this way, or simply via the impact on corporate wealth, employment and investment decisions of the acquirer/parent company can also be affected.<sup>34</sup>

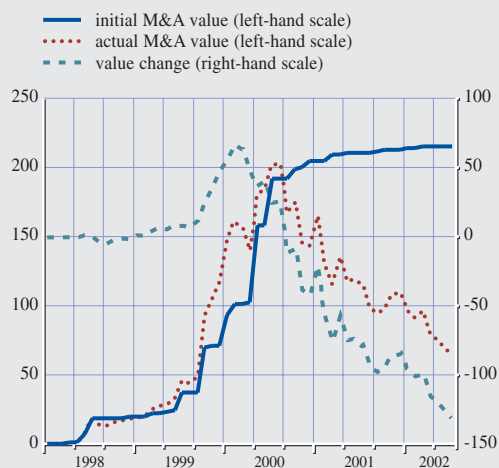
32 However, in order to assess the impact of this strong reduction in the valuation of the investments carried out by these sectors, it should be noted that the relative weight of the high-tech sector in the total added value of the euro area does not appear to be very high. In fact, according to the OECD Stan database, in 1998 the contribution of the high-tech sector to the total added value of the euro area stood at around 4.2%, and 2.2% in the case of telecommunications (whereas in the US these percentages were approximately 7.0% and 3.4% respectively).

33 This also depends on accounting regulation and practices. In particular, practices differ concerning the goodwill: the difference between the acquisition price and the accounting book value of the acquired firm. In many euro area countries, unlike in the US, the goodwill can be amortised over a long period of time. Therefore, the losses in the valuation of M&A transactions cannot be fully reflected in the profit and loss account of euro area firms. In addition, the impairment test (the test that compares the market price at the time of the acquisition with the current fair market value) is not commonly required across euro area countries; moreover, in this case the amortisation period amounts to between 20-30 years.

34 Furthermore, the method adopted for financing M&A transactions is important. Indeed, an acquisition can be settled in cash and/or through an exchange of shares. Since 1998, payments in cash have constituted more than 70% of the total effective value of euro area M&A abroad. This caused a sensible increase in the level of indebtedness of euro area firms involved in these operations. The debt-to-GDP ratio of euro area non-financial firms particularly increased between 1998 and 2000, up to 75% in 2001 from levels below 65% in 1997, coinciding with the peak in M&A activity. Therefore, in a situation of high level of indebtedness, the spillovers from the losses described before can be more important and can affect the capacity of euro area firms to raise new funds and to finance domestic investment plans. The financial wealth of households can also be affected by changes in the valuation of parent companies. However, consumption in the euro area, in contrast to the US, does not seem to be significantly linked to financial wealth.

**Chart 21 M&A of euro area companies abroad in the telecommunications sector: change in equity market value**

(in EUR billions)



Sources: Thomson Financial and ECB calculations.

significant past losses in the value of euro area corporations' M&A investments in the US owing to the fall in equity prices, particularly in the "new economy" sectors, which may have had a negative impact on euro area capital expenditure through the implied decline in the corporate wealth of the acquirer/parent company.

In summary, these channels, particularly those related to the activities of multinational corporations, make it more difficult to gauge both the speed and magnitude of the impact of external shocks on euro area activity and growth. As a result, the possibility of these indirect links requires the careful monitoring of external developments, as well as comparing and juxtaposing them with domestic developments across a broad range of variables.

### 3.4 SUMMARY OF THE CAPITAL FLOWS CHANNEL

Euro area capital flows have undergone considerable changes corresponding to the global surge in cross-border capital flows, which has resulted in strong growth in the stocks of foreign assets and liabilities of the euro area. Accordingly, the potential magnitude of the impact of capital flows as a channel for the transmission of external shocks to the euro area is now larger than it was previously, including the FDI channel. For example, profits of euro area multinationals may now be more exposed to fluctuations in US activity and profitability, while the increased presence of US multinationals in the euro area also strengthens the economic links between the two economies. Meanwhile, the increase in the stock of euro area foreign assets means that the income returns on assets held abroad account for a part of total euro area consumer and corporate income, implying that euro area income flows are exposed to external shocks. At the same time, the changing value of the stock of euro area firms' foreign direct investments in the US highlights another channel for the international transmission of shocks. In particular, we highlight the

## 4 ADDITIONAL TRANSMISSION CHANNELS AND SYNCHRONISATION

Starting in the second half of 2000, there was an almost simultaneous deceleration in real GDP growth in the US and the euro area, accompanied by a sharp contraction in world trade. In Section 2, we have already described the slowdown in both intra and extra-area exports, which occurred around the end of the third quarter of 2000 and was rather evenly spread across the major euro area export markets (US, Asia, the central and eastern European countries and the UK, etc.) (Chart 22). Given the relatively closed nature of the euro area economy as measured by standard trade indicators, the extent to which euro area activity declined in line with the global downturn seems to have surprised some forecasters.

Indeed, looking at the Consensus Forecast, projections for euro area real GDP growth in 2001 had been steadily revised downwards since autumn 2000 (see Chart 23). By contrast, projections for US real GDP growth in 2001 were significantly revised only twice, in February 2001 and in October 2001.

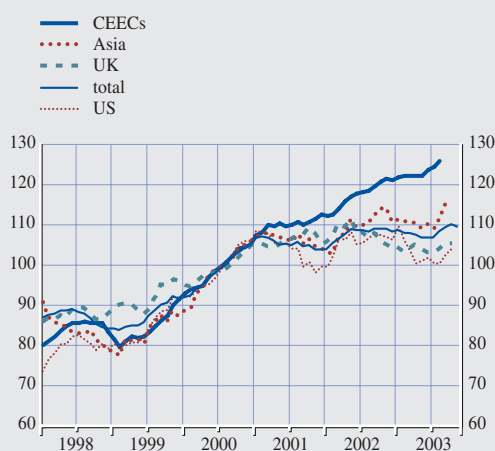
The fact that euro area growth forecasts have been revised downwards more frequently than US growth forecasts could signal that spillover effects from the US slowdown were initially underestimated. Alternatively, it could also simply reflect a change in the central scenario, namely that the global slowdown was more protracted than expected.

Drawing from this episode and others, this section seeks to study how external shocks can, directly or indirectly, spill over and affect euro area growth via additional mechanisms to those already examined. In this context, special emphasis will be placed on additional links with the US, particularly those related to financial markets and confidence.

Following this analysis, the section will assess whether global economic integration and international linkages have actually resulted in a greater degree of synchronisation of international activity at a global level, with particular reference to the euro area.

**Chart 22 Extra-euro area exports to selected destinations**

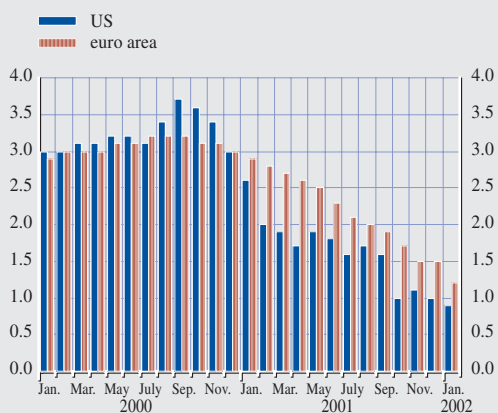
(monthly data, seasonally adjusted, index 2000=100, three-month moving average)



Sources: Eurostat and ECB calculations.

**Chart 23 Consensus forecast for real GDP growth in the euro area and the US**

(annual percentage changes)



Source: Consensus Economics.

Note: Each of the bars in 2000 and 2001 shows the forecast produced in each month of those years for GDP growth in 2001; January 2002 is the forecast for 2001 GDP growth produced in 2002.

#### 4.1 FINANCIAL MARKET LINKAGES

Equity markets can have substantial effects on the business cycle, as they provide an important source of finance for investment and may have an impact on consumption via wealth effects and confidence. As regards the relative magnitudes, equity holdings by consumers in the euro area are smaller and more concentrated than in the US. Sharp movements in equity prices can, nevertheless, have notable impacts on investment and consumption behaviour in the euro area. Thus, the transmission of shocks in equity markets from abroad to Europe may constitute an important transmission channel and could explain some of the co-movements in economic activity between the US and the euro area.

An IMF study argues that there has been a substantial increase in the importance of global factors, rather than local factors, in explaining movements in share prices since the mid-1990s.<sup>35</sup> According to this study, the greater relevance of global factors, and thus the smaller role of local factors, has increased the co-movements of equity markets around the world, in particular between the US and the euro area.

There are various reasons for co-movements in equity markets across countries. First, a high correlation of returns may reflect real factors in the economy, such as a stronger presence of the same multinational corporations in more countries, as stock market valuations of companies are increasingly linked to their global profitability rather than local factors. Second, investors are increasingly investing in foreign equity markets to diversify their portfolios and to take advantage of investment opportunities. The diversification, and consequent reduction of “home bias” in equity markets, seems to have resulted in greater co-movement in equity markets. Indeed, according to another IMF study (IMF 2001, October), cross-border diversification of assets and liabilities in the G7 countries has greatly increased over the last two decades, with foreign assets and liabilities of residents more than doubling as a percentage of

GDP between 1980 and 2000.<sup>36</sup> This increase in cross-border diversification brings to the fore the role of international risk sharing as another potential source for transmission of financial shocks (see Box 7). Finally, another reason for the possible reduction in home bias may be related to cross-border asset price arbitrage. Financial innovation may have facilitated these operations, implying that comparable risks should be priced similarly across countries.

A commonly-used, simple method for evaluating the potential relevance of the equity market channel is to look at the correlation of equity returns across countries.<sup>37</sup> The correlation between US and European share prices is calculated to have risen from 0.4 in the mid-1990s to 0.8 in 2000.<sup>38</sup>

However, it is imperative to distinguish between causality and mere correlation. The fact that two equity markets are highly correlated does not necessarily mean that shocks in one market cause movements in the other, as the correlation may simply be due to common external shocks rather than similarities across economies. Evaluating whether, for example, the US slowdown may have been transmitted to the euro area partly through equity markets requires direct analysis of the causality of equity market spillovers. In this context, an ECB Working Paper<sup>39</sup> investigates the extent to which returns in individual equity markets in Europe can be explained by spillovers from the US and by spillovers from other euro area markets. The overall finding is that individual stock markets within the euro area have become substantially more interdependent with each other. On the other hand, although the US equity market has an important effect on its euro area

35 See Brooks and Catao (2000).

36 However, cross-border diversification in terms of household wealth does not show the same pattern and provides evidence of what is called the “home bias puzzle”. Investors in all major economies do not exploit risk-sharing opportunities, and their cross-border portfolios remain below the optimum suggested by models of international portfolio allocation. See, among others, Tesar and Werner (1995), Levis (1999) and Jeske (2001).

37 Several studies have examined the international equity market correlation. See, for example, Karolyi and Stulz (1996), Ramchand and Susmel (1998) and Goetzmann et al. (2001).

38 See Economist, 24 March 2001.

39 See Fratzscher (2001).

## Box 7

**INTERNATIONAL RISK SHARING AS A POTENTIAL SOURCE FOR CROSS-BORDER TRANSMISSION OF FINANCIAL SHOCKS**

As noted previously, over the past decade cross-border financial flows have increased in importance and have, on many occasions, significantly exceeded the underlying current account positions. This phenomenon has been accompanied by an increase in the volume of international equity and derivatives transactions, which could accentuate the role of international risk sharing as a factor explaining the macroeconomic response to shocks and the degree of business cycle synchronisation across economic areas. The equity market boom and bust in the late 1990s and early 2000s in the United States, which was participated in by many foreign investors, provides a case study for such international wealth transfers.

The US “new economy” boom was to a large extent financed by equity, which implies that the subsequent decline in asset valuations was largely absorbed by shareholders. Therefore – and unlike in the case of bond or credit financing, which imply fixed payments from debtors – a concentration of risks in the domestic corporate sector was avoided. Indeed, in a speech delivered in October 2002, Alan Greenspan, the Chairman of the Federal Reserve, cited the steadiness of the US financial system in the face of “the draining impact of a loss of USD 8 trillion of stock market wealth” and other adverse shocks throughout 2001-02. Such remarks highlight the ways risk sharing and financial assets can smooth consumption across time and provide insurance against uncertainty regarding future outcomes. However, the dramatic increase in international capital flows in the 1990s allowed financial shocks to be transmitted across national borders as well. These financial links could, in turn, have contributed to an increased synchronisation of business cycles across economic areas.

An ECB Working Paper<sup>1</sup> demonstrates that in the presence of stochastic expectations of higher future economic growth, efficient risk allocation implies substantial ex ante financial transactions over and above those needed to finance the current account. In particular, investors residing in the economic area that is at the centre of the expected economic boom are able to hedge part of their risk by selling risky equity shares to foreigners and buying foreign risk-free bonds in exchange. The size of the international risk-sharing flows is dependent on assumptions regarding investors’ ex ante optimism vis-à-vis future economic growth prospects, in line with the “irrational exuberance” argument suggested by Shiller in the context of the US “new economy” of the 1990s<sup>2</sup>. Moreover, if expectations are disappointed, equity finance can generate significant ex post wealth transfers across the world that are very different from those associated with debt finance. Model simulations using plausible parameter values regarding expectations show that this simple framework is capable of replicating the losses of the US economy caused by the fall in stock market valuations in the early 2000s. In addition, in the simple two-country setting that was applied, it turns out that a substantial share of the losses would have been carried by foreign participants in the US equity markets. A central implication of this research is that an anticipated supply-side shock that fails to materialise ex post has asymmetric implications on global wealth positions, depending on the assets involved in the ex ante capital transfers and the degree of international participation in domestic asset market booms.

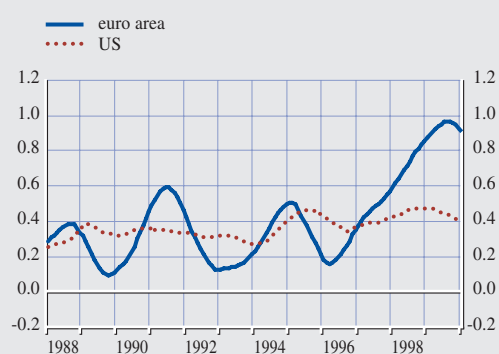
1 Castrén et al. (2003).

2 Shiller (2000).

counterparts, there has generally been only a small increase in this impact over time.

Chart 24 presents the results of the aforementioned econometric analysis, and shows the strength of the transmission of shocks to US returns and to other euro area markets returns on the euro area equity market. The coefficient of around 0.4 for the US spillover in 1999 and 2000 indicates that a 1% shock to the US equity market causes, on average, a change of about 0.4% in euro area equity markets. Moreover, the analysis shows that the individual euro area equity markets became significantly more integrated throughout the 1990s: by 2000, individual euro area equity markets had moved almost one-to-one with each other. The results imply that spillovers to individual equity markets are strongest from shocks in other euro area stock markets, although the US market remains highly relevant for the euro area. In addition, the transmission of equity shocks tends to intensify when large movements occur.<sup>40</sup> Hence the transmission of a US shock to the euro area could have been proportionally larger during the large-scale decline in the US equity market in the early 2000s.<sup>41</sup>

**Chart 24 Equity market spillovers to the euro area (GDP weighted euro area markets)**



Source: Fratzscher (2001).

Note: The figure shows the 12-month rolling estimates of the coefficients, which measure in a GARCH framework the transmission of equity shocks originating in the US to the euro area and the transmission of equity shocks between the euro area countries.

In summary, the equity market connection appears to provide a significant channel through which the US and the euro area real economies are linked, although the strength of the spillovers through this channel does not appear to have greatly increased in the second half of the 1990s.

Another related connection is the interest rate linkage. Indeed, the international integration of financial markets might have resulted in an increase in the co-movement of interest rates. Clare and Lekkos (2000) highlight a number of channels through which a correlation between bond markets may arise: the presence of a world price of risk, evidence that bond holdings have become more internationally diversified, the fact that real rates are determined by global factors, and the possibility that there is a “flight to quality” during periods of financial stress.

Empirical work shows that the linkages between major international bond markets increased from the 1960s until the early 1980s, but thereafter have not exhibited a clear trend.<sup>42</sup> Clare and Lekkos (2000) provide evidence that these linkages are significant during periods of financial stress. Laopodis (2002) argues that there have been stronger linkages among major bond markets since 1990 at the volatility level. In particular, interest rate changes in major bond markets tend to spill over to bond markets in other countries.<sup>43</sup> Bremmes et al. (2001) find, for example, that US interest rates have a significant influence on both German and

40 Longin and Solnik (2001) find that correlations between equity markets are not related to market volatility per se as previous studies claimed, but instead to the market trend. In particular, correlations and asset price spillovers tend to increase during bear markets.

41 Kaltenhaeuser (2003) comes to a slightly different conclusion. He claims that the European equity market has increased its impact on foreign equity markets since the late 1990s and has become simultaneously more exposed to US shocks. However, while equity markets in the euro area and the US have become more integrated with each other in recent years, the Japanese equity market seems less affected by price innovations in foreign equity markets and has also had little impact on foreign equity markets.

42 See, among others, Christiansen and Pigott (1997).

43 An example often mentioned is the US monetary tightening in 1994, which was thought to be the cause of an increase in long-term rates in Europe and Japan in spite of the fact that the state of these economies was considerably weaker than that of the US.

**Chart 25 Consumer confidence in the euro area and the US**

(percentage balances – mean adjusted)



Sources: European Commission, OECD and ECB calculations.

Norwegian interest rates. Furthermore, Hassapis et al. (1999) show that the US rate affected the European Monetary System interest rates. An ECB Working Paper (Ehrmann and Fratzscher 2002) has looked at the interdependence between the euro area and the US money markets. It finds evidence that this interdependence has increased over time, and that the spillover effects from the US to the euro area are somewhat stronger than in the opposite direction.

#### 4.2 CONFIDENCE CHANNELS

The events of 11 September 2001 in the US brought to the fore confidence as another potential channel of transmission of international disturbances. Two distinct channels can be identified: one concerning consumer confidence, and the other concerning business/industrial confidence. Consumer confidence tends to impact on consumption, whereas industrial confidence is likely to affect investment. In addition, we can also identify a third channel, investor confidence, which affects the demand for securities.

Considering that the share of industrial output in overall euro area real GDP is only around one

quarter, whereas that of private consumption is around half, contagion effects via consumer confidence may be expected to be relatively more important than those via industrial confidence.<sup>44</sup> In the euro area, consumer confidence seems to be rather closely aligned with total employment growth and unemployment changes, which, to a large extent, reflect factors in the domestic economy.<sup>45</sup> Stock market prices appear to play instead a somewhat more limited role in the euro area than in the US. Despite the relatively larger importance of domestic factors, consumer confidence in the euro area follows a pattern that is rather similar to that in the US (see Chart 25).

External developments could also impact on euro area production growth via contagion effects in terms of confidence. For example, confidence in the US may influence confidence in the euro area which, in turn, may impact on euro area industrial production growth. In this respect, the overall pattern of movements in business confidence in the euro area and the US shows, by contrast with the dissimilarity in the first half of the 1990s, some similarity in the second half of the 1990s. Indeed, from 1995 the turning points in the Purchasing Managers Index for the US seem to lead those in the European Commission's industrial confidence indicator for the euro area by around two quarters (Chart 26). However, it is not possible to say whether this lead implies contagion in the sense of causality, or if it is simply a reflection of the lead in US output growth vis-à-vis growth in the euro area.

To assess the extent of the confidence linkages between the US and the euro area, Box 8 provides details of an empirical analysis.<sup>46</sup> From the analysis of contemporaneous and

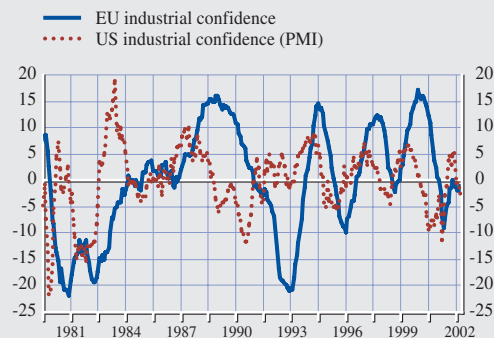
<sup>44</sup> See, among others, Otoo (1999).

<sup>45</sup> Boone et al. (1998) provide evidence of the impact of major equity price movements on the real economy and especially on consumption. For the US, the impact of consumption is in the range of 4-7%. Such effects appear weaker for the continental European countries owing to a smaller degree of stock ownership, a less equal distribution of equities, and later financial liberalisation.

<sup>46</sup> As in the rest of the paper, we focus on the impact of the rest of the world (the US in this case) on the euro area and not vice-versa.

**Chart 26 Industrial confidence in the euro area and the US**

(percentage balances – mean adjusted)



Sources: European Commission, OECD and ECB calculations.

lagged correlations between consumer and industrial confidence in the US and in the euro area, and from the estimation of a Vector Autoregression (VAR) model, it seems that confidence linkages contain factors not necessarily included in the other factors that usually explain business cycle linkages already examined above. Indeed, we find evidence of the impact of US confidence on euro area confidence. Therefore, confidence linkages may constitute an additional channel for the transmission of economic and financial shocks. It is difficult, nevertheless, to suggest whether this additional channel implies only an increase in the speed of the transmission of shocks or also a stronger impact.

### Box 8

#### CONFIDENCE SPILLOVERS: AN EMPIRICAL INVESTIGATION

In order to assess the extent of the confidence linkages between the US and the euro area, we carry out an empirical analysis. However, it is difficult to interpret the evidence of this linkage, as it could simply reflect real spillovers or merely common shocks rather than an additional effect. In addition, more research is required to disentangle causality and leading indicator properties of confidence measures. In the light of these and other caveats pointed out below, the evidence outlined here should be taken as a starting point for possible extensions and further studies.

First, an analysis of contemporaneous and lagged correlations between consumer and industrial confidence in the US and in the euro area is carried out; the results can be found in Table A. The contemporaneous correlation in consumer confidence is quite important, with a correlation coefficient of 0.54 over the period 1985-2002. The correlation in industrial confidence is less strong, registering a value of 0.10 over the period 1980-2002. There is a larger correlation between the lagged – from one to three quarters – industrial and consumer confidence indicator in the US and the indicator in the euro area. The correlation increases with the increase in the number of lags (however, after a lag of three quarters the correlation decreases) and also seems to increase over time, particularly in the most recent period 1998-2002. The evidence of an increase over time of spillover effects from the US to the euro area is confirmed by analysing a three-year rolling window correlation between the US confidence indicator, lagged three quarters, and the euro area indicator (see Chart A). In fact, both the industrial and consumer confidence lagged correlations appear to become stronger in the last period of the sample.

These confidence spillover effects may partly reflect underlying business cycles linkages that have been analysed in the previous sub-sections. However, they could also represent an additional channel in the transmission of external disturbances. Some empirical work provides



Table A Industrial and consumer confidence linkages

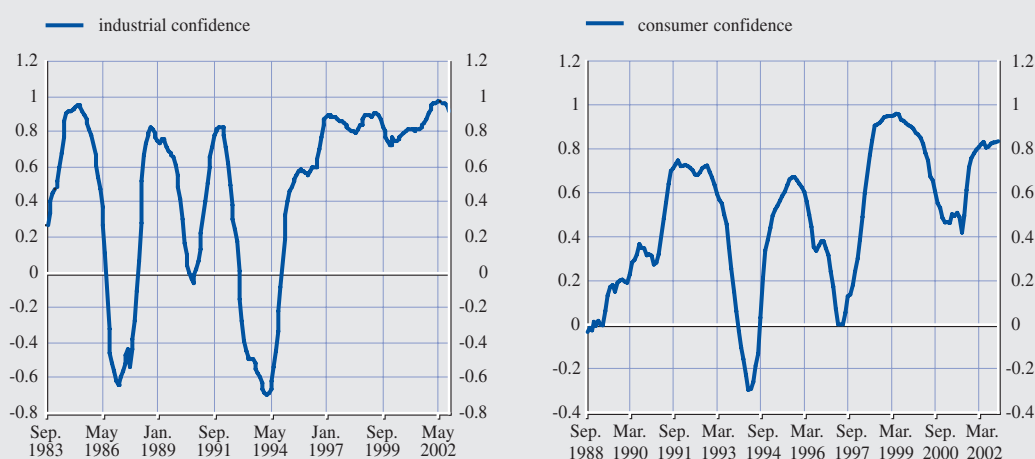
US – euro	Contemporaneous	1 quarter lag	2 quarter lag	3 quarter lag
<i>Industrial confidence linkages</i>				
1980-2002	0.10	0.29	0.42	0.49
1998-2002	0.10	0.46	0.72	0.85
<i>Consumer confidence linkages</i>				
1985-2002	0.54	0.65	0.71	0.74
1998-2002	0.61	0.72	0.82	0.82

evidence of other factors which are particularly difficult to quantify, related to investor and consumer behaviour, which are transmitted across borders. These factors are given various names, such as information “cascades”, “fads” or “herd” behaviour. They seem to increase in importance during periods of financial crises in particular, such as in October 1987.<sup>1</sup>

In order to assess whether these additional transmission mechanisms are actually present, we estimate a VAR including US and euro area confidence indicators, the annual growth of industrial production and the annual rate of inflation as variables.<sup>2</sup> According to the Bayesian information criteria (BIC), the variables enter in the VAR lagged once. The aim is to examine the relationship between the confidence indicator in the US and in the euro area by trying to separate its impact from other linkages. For this reason, real and nominal variables have been included to take into account possible real and nominal spillovers between the US and the euro

Chart A Industrial and consumer confidence lagged correlation between the euro area and the US

(rolling 3-year correlation windows, US indicator 3-quarter lagged)



Sources: European Commission, OECD and ECB calculations.

1 See, among others, Shiller (1998), Avery and Zemsky (1998), IMF (2001), Kumar and Persaud (2001).

2 The Dickey-Fuller test was used to check for non-stationarity of the series, and the null hypothesis of non-stationarity was rejected for all the series. Furthermore, the variance of the confidence indicators has been standardised to one. We also tried to consider the Standard & Poor’s 500 and the Dow Jones EURO STOXX 50 return index in the VAR in order to check if the equity market linkages could affect the relationship between the US and the euro area confidence indicators. However, when these variables were added, the overall results reported in the box were confirmed.

area. Table B shows the estimation results for industrial and consumer confidence. There is some evidence of spillover effects from the US to the euro area confidence indicators, as the US indicators are significant variables in the VAR for the euro area confidence indicators. In fact, the Granger causality test (F-test on the coefficient) suggests that the US confidence indicator Granger-causes the euro area confidence indicator (the null hypothesis of zero coefficient is rejected) for both industrial and consumer confidence.<sup>3</sup>

It should be noted that Granger causality is not equivalent to causality, because it simply tells us if one series leads another. Hence the previous results must be interpreted with caution. However, it seems that confidence linkages contain factors not necessarily covered by the business cycle linkages already examined.

<sup>3</sup> An estimation of the VAR for the last period of the sample shows that these spillover effects seem to have become more important in recent years, especially for industrial confidence.

**Table B Industrial and consumer confidence VAR results: coefficient values with T-statistics and F-test statistics**

(estimation period 1986:02 – 2002:10)

Explanatory variables <sup>1)</sup>	Dependent variables			
	EA Industrial Confidence <sup>2)</sup>	F- statistics <sup>3)</sup>	EA Consumer Confidence <sup>2)</sup>	F- statistics <sup>3)</sup>
US Industrial. Confidence (-1)	<b>0.11</b> <b>(7.20)</b>	<b>51.83</b> <b>(0.00)</b>		
EA Industrial Confidence (-1)	0.91 (38.11)	1452.14 (0.00)		
US Consumer Confidence (-1)			<b>0.08</b> <b>(2.89)</b>	<b>8.34</b> <b>(0.00)</b>
EA Consumer Confidence (-1)			0.90 (38.52)	1483.55 (0.00)
US Industrial Production Growth (-1)	-0.01 (-2.04)	4.16 (0.04)	-0.00 (0.35)	0.12 (0.73)
EA Industrial Production Growth (-1)	0.02 (3.47)	12.07 (0.00)	0.02 (3.41)	11.63 (0.00)
US Inflation Rate (-1)	0.02 (1.69)	2.83 (0.09)	-0.02 (-1.11)	1.22 (0.27)
EA Inflation Rate (-1)	-0.02 (-1.14)	1.30 (0.25)	0.04 (1.37)	1.88 (0.17)
Constant	-1.01 (-7.81)		-1.03 (-3.10)	

Sources: Eurostat, OECD and ECB.

1) The lag length was chosen according to the Bayesian information criterion (BIC).

2) t-statistics in parentheses.

3) P values in parentheses.

### 4.3 IS INTERNATIONAL ACTIVITY MORE SYNCHRONISED?

The channels examined above and in the previous sections allow shocks to be transmitted cross-border, thereby increasing the degree of economic interdependence across nations. This international interdependence among business cycles has stimulated a rather extensive literature studying the existence and characteristics of an “international business cycle” (see Box 9). In this sub-section, we begin by explaining the formation of the international business cycle – i.e. the co-movements in the main macroeconomics variables across countries – paying specific attention to oil price shocks. This is followed by an evaluation of the evidence as to whether the increased interdependence in trade and finance has raised the synchronisation of international activity. Indeed, the simultaneous slowdown experienced by the advanced economies in the early 2000s has, in particular, prompted renewed interest in this topic.

This is a relevant issue for policy purposes. Indeed, if economic cycles are more closely synchronised, recessions and slowdowns in more countries are likely to reinforce each other. By contrast, when business cycles are unsynchronised, channels of international linkages can help to dampen economic fluctuations. Accordingly, if an economy is experiencing strong cyclical growth, this will tend to stimulate activity in other economies where output growth is weaker. Moreover, the degree of synchronisation of business cycles can affect price developments. Indeed, periods of desynchronisation may help to contain inflationary pressures, since excess demand can be redistributed across countries. In addition, if there is a common factor present in business cycles across countries, and this is found to be present systematically, policy-makers would have to consider it when assessing developments in individual economies.

#### Box 9

#### THE INTERNATIONAL BUSINESS CYCLE: RELATED LITERATURE AND STYLISED FACTS

In this box we review the existing literature and document some stylised facts about business cycles in industrial countries, particularly in the US and the euro area.<sup>1</sup> Considerable research has been undertaken to examine whether business cycles, and thus the main macroeconomic aggregates, are synchronised across industrial countries. Indeed, this type of research has a long history: back in 1927, Mitchell found a positive correlation in this respect. During the 1980s the co-movements in output, consumption and investment led to the notion of the “world” business cycle or “international” business cycle. Many authors documented the empirical evidence regarding this phenomenon, which has acquired the status of a stylised fact.<sup>2</sup>

1 We focus on the common fluctuations of output. The business cycle in fact concerns more variables, even if output is one of the most significant. Burns and Mitchell (1946) define the business cycle as “a type of fluctuation in the aggregate economic activities of nations that organise their production and distribution mainly in business enterprises; a cycle consists of expansion occurring at about the same time in many economic activities, followed by similarly general recessions, contractions and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration, business cycles vary from more than one year to ten to twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own.” Business cycles are not defined as a fluctuation in a single time series (such as GDP), but as a fluctuation in the “aggregate economic activities”.

2 In addition to those mentioned in the text, we can quote Stockman (1990), Bowden and Martin (1995), Ravn (1997) and Kose, Otrok and Whiteman (2001). Agresti et al. (2001), analysing the business cycle properties of up to 20 economic time series, find that the business cycle of the euro area aggregate is highly comparable to the US business cycle. Artis et al. (1997) study an international business cycle for the G7 countries, considering turning points in the cycle based on time series of industrial production. The results suggest a strong association between business cycle regimes (expansion/contraction) across countries.

Dellas (1986) studied the behaviour of macroeconomic variables relating to the US, the UK, Germany and Japan, finding significant co-movements over the business cycle. Using cross-spectral methods, Gerlach (1988) analysed the dynamic correlations of industrial production in a set of economies from 1963 to 1986. The author provided evidence of a world business cycle: output movements seem to be correlated across countries, especially during periods of flexible exchange rates. Backus and Kehoe (1992) examined the historical business cycle behaviour of output, pricing levels and the money stock in ten countries<sup>3</sup>, documenting similar features across countries. Gregory et al. (1997), using a dynamic factor analysis, found that fluctuations in aggregate output, consumption and investment for the G7 countries contain a significant and persistent common world component.<sup>4</sup> Lumsdaine and Prasad (1999) documented a world business cycle, showing that the correlations between industrial production growth in 17 OECD countries and a common component are highly positive in the case of most countries. Many other papers provide empirical evidence in favour of strong and systematic positive co-movements across economies, and seek explanations for these international co-movements.

An IMF study<sup>5</sup> points to the common features of business cycle fluctuations in recent years: recessions are becoming weaker, while expansions are lengthening.<sup>6</sup> The synchronisation of recessions also seems to be a feature of business cycles across industrial countries. In particular, this IMF study shows that after 1873, most recessions have occurred when other countries were also in recession. By contrast, the downturn of the early 1990s was different because the recession in the US was not synchronised with those of the major advanced economies. In fact, continental Europe and Japan went into recession at somewhat different times, reflecting asymmetric shocks.

Other related evidence concerns the decline over time in the volatility of output and other macroeconomic variables in the advanced economies. This reduction in output volatility has been investigated in detail in the case of the US, but only recently have studies begun to focus on other countries.<sup>7</sup> Dalsgaard et al. (2002) document the decrease in the volatility of output in OECD countries. In particular, using the average and the standard deviation of the output gap, they show that the amplitude of the business cycle of most OECD countries has declined over the last few decades, with the important exception of Japan. Dijk et al. (2002) test and document possible structural breaks in volatility, which in terms of industrial production and consumer prices are largely synchronised across the G7 countries. There are several probable explanations for this. An initial explanation is the increasing importance of the services sector, which seems to be less cyclical relative to the agricultural and manufacturing sectors. Improvements in inventory control may have also played a role in flattening the cycle. Other causes could be the automatic fiscal stabilisers, a more credible monetary policy with a low inflation objective, and financial deregulation that allows consumers and firms to smooth their spending over time.<sup>8</sup>

3 The ten countries are Australia, Canada, Denmark, Germany, Italy, Japan, Norway, Sweden, the United Kingdom and the United States.

4 A dynamic factor framework is also used by Forni and Reichlin (1996), Norrbin and Schlagenhauf (1996) and Monfort et al. (2004). As Monfort et al. (ibid.) point out, a dynamic factor approach presents some advantages in comparison with a simpler approach such as a bivariate correlation. In fact, the simple correlation cannot allow for the separation between an idiosyncratic component and a common component. In addition, a static correlation analysis misses the possible persistence of common fluctuations.

5 See IMF (2002/a).

6 The study considers business cycles in 21 industrial countries over the period 1973-2000.

7 For the US literature, see Kim and Nelson (1999), McConnel and Perez-Quiros (2002) and Kim et al. (2001).

8 Some authors such as Stock and Watson (2002) attribute the reduction in US volatility to "good luck in the form of smaller economic disturbances". This decline in the volatility of shocks that affect the real economy, however, as pointed out by Dijk et al. (2002), is also common to other countries, hence a deeper explanation might be possible.

### 4.3.1 DETERMINANTS OF BUSINESS CYCLE SYNCHRONISATION

Numerous contributions have attempted to explain international business cycle co-movements and synchronisation. In one such theory, called “business cycle transmission” or the “locomotive” hypothesis, economic fluctuations originating in one country are transmitted to another country, usually from a large country to a smaller one, through the spillover channels which have been examined previously. In another theory, the “common shock hypothesis”, business cycle synchronisation is caused by exogenous common shocks, such as the oil price shock of the 1970s.<sup>47</sup>

Dellas (1986) rejected the locomotive transmission hypothesis and concluded that common shocks, such as technology or commodity supply shocks, rather than trade and capital flows, explain the existence of the world business cycle.<sup>48</sup> Canova and Marrinan (1998), using a multi-country equilibrium model, show that common shocks are more important than the transmission of country-specific disturbances. Monfort et al. (2004) also find that a significant part of the co-movement in activity in the G7 countries is due to common shocks such as oil price shocks (see Box 10). Nevertheless, Monfort et al. claim that spillover effects have become more important over time (using a dynamic factor model which allows for the identification of an “area-wide” common factor). The authors provide evidence of strong spillover effects from a North American “area” (the US plus Canada) to a Continental European “area” (Germany, France and Italy). In addition, Laxton and Prasad (2000) examine the international spillover effects of US macroeconomic shocks on other industrial countries. Using an IMF model (MULTIMOD), the paper shows that the transmission of US domestic macroeconomic shocks to other countries is quite significant.

Moreover, historically, business cycles seem to be synchronised even in the absence of global common exogenous shocks. Selover and Jensen

(1999) argue that the general idea that international interdependence arising from trade and capital flows plays no important role in the formation of the world business cycle is implausible. In fact, as noted previously, there is some evidence of international transmissions of disturbances, such as the recession in the US in the early 2000s and its impact on other economies. Selover and Jensen (*ibid.*) suggest that common exogenous shocks and business cycle transmission are both responsible for creating world business cycles, operating through a non-linear process called the mode-locking mechanism.<sup>49</sup>

Therefore, it seems that the international linkages examined in this paper together with common shocks play a role in explaining the co-movement of business cycles.<sup>50</sup> However, the impact of international linkages on the synchronisation of the business cycle is still not very well understood.

On the one hand, Frankel and Rose (1998) – who examine the hypothesis that an increase in trade flows between two countries causes a greater degree of synchronicity between their business cycles – offer positive evidence: they conclude that greater overall trade leads to an increase in business cycle correlation, since a higher level of trade will allow demand

47 The distinction between the two theories is also important for policy-makers. Indeed, as pointed out by Peiró (2002), in the first case Keynesian, or exchange rate policies, could mitigate foreign disturbances and thus smooth economic fluctuations.

48 Dellas based his evidence on an estimation of a Vector Autoregression. He found that lagged values are less significant than present values considering the growth rates of different countries in a VAR.

49 This phenomenon occurs when systems with a tendency to oscillate – such as economies – will, even with weak coupling, affect the timing of each other’s oscillation in a way that tends to synchronise oscillations in the systems (for more details, see Selover and Jensen, *ibid.*).

50 International real business cycles models attempt to give a theoretical explanation of the synchronisation of international activity. The seminal work of Backus et al. (1992) presents a one-good two-country model that extends the real business cycle theory to open economies. According to this model, the main determinant of business cycle fluctuations is technology shocks. Ahmed et al. (1993) also identify technology shocks as being very important in generating international business cycles. As a detailed investigation of these issues is beyond the scope of this paper, we instead focus on the channels of international transmission and on common shocks.

shocks to be more easily spread across national borders, or because of the increasing importance of intra-industry trade.<sup>51</sup> In addition, the other international linkages examined in this paper could produce a higher degree of business cycle synchronisation. For example, Jansen and Stokman (2002) find that there is a positive relationship between the size of bilateral FDI positions and the degree of business cycle co-movement across countries. As noted previously (see sub-section 4.1), financial linkages could also result in a higher degree of business cycle synchronisation. Indeed, financial links allow international wealth transfers as well as international risk sharing. In addition, although it is more important for emerging markets, these financial linkages can transmit contagion effects, thereby increasing the transmission of disturbances. Finally, particularly from the perspective of the speed of transmission, the confidence channel may strengthen the degree of business cycle synchronisation.

On the other hand, according to economic theory, trade flows and a more integrated market can lead each country to specialise in the production of goods in which it has a comparative advantage.<sup>52</sup> This increase in specialisation could therefore decrease the correlation of output across countries.<sup>53</sup> Moreover, Kalemli-Ozcan et al. (2003) provide

evidence that not only trade but also financial integration can increase the degree of specialisation, which can make business cycles less synchronised (Kalemli-Ozcan et al., 2001). In fact, financial integration allows companies to share the risk of specialisation in production.

#### 4.3.2 EMPIRICAL EVIDENCE

We explore whether the degree of business cycle synchronisation has increased over time and, therefore, indirectly investigate whether the increasing globalisation and integration of the world economy has stimulated a greater synchronisation of business cycles across countries. In particular, from the previous analysis, it seems that the transmission of international disturbances may

- 51 However, some authors question whether trade flows are one of the main determinants of the synchronisation of business cycles. Canova and Dellas (1993) find empirical evidence that international trade plays a weak role. Imbs (1999 and 2000) documents that sectoral similarities are more important than trade intensity in explaining business cycle synchronisation. Norrbin and Schlagenhauf (1996) identify the importance of industry-specific shocks – shocks that affect a specific industry in all countries – in explaining fluctuations in output. For Coe and Helpman (1995), economic integration renders policy shocks more correlated and increases knowledge and technology spillovers.
- 52 However, it should be noted that, as shown later, such specialisation is not consistent with developments in the 1990s. Indeed, most trade is among advanced economies which tend to produce similar product ranges.
- 53 See, for instance, Krugman (1993), who considers the example of EMU and compares it with the US case. He suggests that the economic integration related to the creation of the euro will increase specialisation within countries and consequently decrease the degree of business cycle synchronisation.

#### Box 10

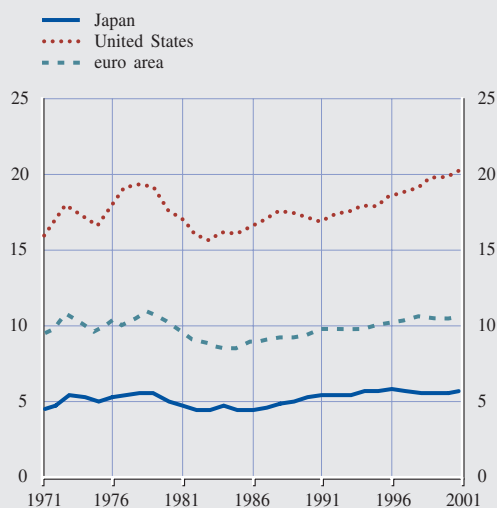
##### OIL PRICE SHOCKS

One of the most important common shocks is an oil price shock. As shown in Chart A, oil consumption has increased since the early 1970s in the US, Japan and the euro area economies. The increase is more important in the case of the US. A quite similar evolution is presented in net imports of oil (Chart B). Comparing the same variables to some measure of real activity, we can gain some idea of the degree of oil dependency.

Chart C shows the intensity of oil utilisation, i.e. the ratio of oil consumption to real GDP, and Chart D presents the ratio of net imports to real GDP. The three major industrial areas have experienced a strong reduction in oil dependency since the 1970s. Nevertheless, in the last decade, the degree of oil dependency has been quite constant or has even slightly increased in the case of the euro area. Furthermore, the recent slowdown in activity in the early 2000s

**Chart A Oil consumption in the euro area, the US and Japan**

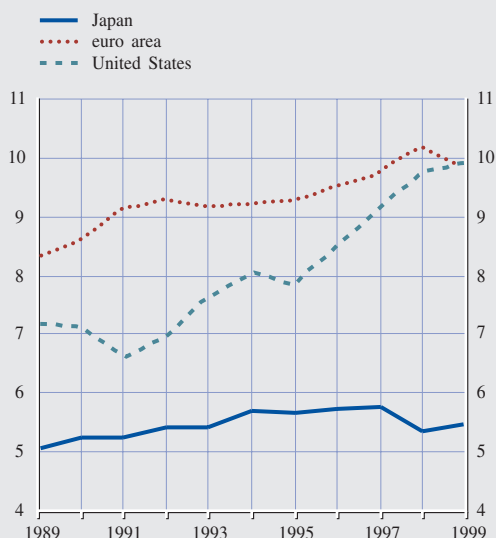
(Mil. barrels/day)



Source: IEA.

**Chart B Net imports of crude oil in the euro area, the US and Japan**

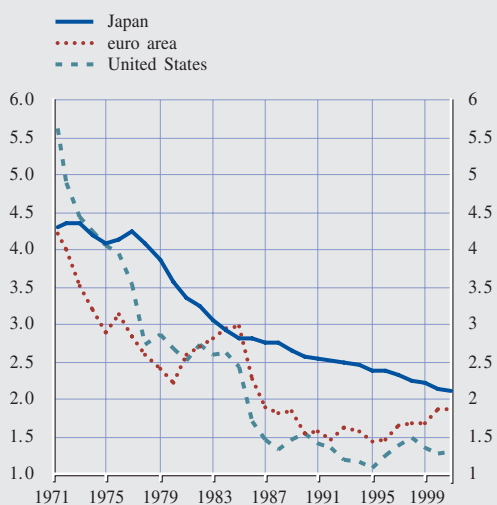
(Mil. barrels/day)



Source: IEA.  
Note: Net imports are a proxy calculated as consumption minus production.

**Chart C Intensity in oil use in the euro area, the US and Japan**

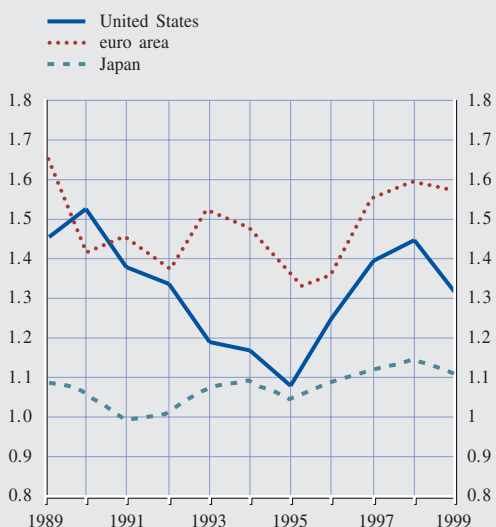
(Barrels per day/1986 USD billions)



Sources: IEA, IMF and ECB calculations.  
Note: The intensity in oil use is defined as the ratio of the oil consumption to GDP.

**Chart D Ratio of net imports/GDP for the euro area, the US and Japan**

(Barrels per day/1986 USD billions)



Sources: IEA, IMF and ECB calculations.  
Note: Net imports are a proxy calculated as consumption minus production.

experienced by the advanced economies can be explained, at least in part, by the oil price increase.<sup>1</sup> Oil prices rose in 1999 before reaching around \$32.4 per barrel in September 2000 before declining to around \$19.1 at the end of 2001 (Chart E).<sup>2</sup> In 2002, the oil price increased again, possibly exerting an influence on expectations of the duration of the oil shock. Indeed, over the period 2000-2003 the average oil price was equal to \$26.7, approximately 50% more than the average registered during the period 1991-1999. This represents the most prolonged oil price rise over this period.

The peak in the oil price rise seems to correspond to the start of the world slowdown in 2000, and reminds us that there are various mechanisms by which an oil price hike may affect growth. On the demand side, an oil price rise may reduce real incomes and thereby put downward pressure on consumption. It can also have a negative impact on investment via a reduction in profitability, particularly if the oil shock is expected to be relatively persistent. On the supply side, there may also be negative effects, as the increased cost of oil will reduce profit margins and may lead to reductions in both output and employment.<sup>3</sup> In addition, since oil price hikes are inflationary, some central banks could adopt a tight monetary policy which may induce a downward adjustment in activity.

**Chart E Oil price**

(US dollars per barrel, monthly average)



Source: Datastream.

- 1 Some papers (Monfort et al., 2004 and Peersman, 2002) consider the oil price shock an important variable in explaining the slowdown experienced by the industrialised countries in the early 2000s.
- 2 Historically, an oil price spike was followed by recession in the world economy, notably in 1974, 1979 and 1990.
- 3 See Jiménez-Rodríguez and Sanchez (2003). Several empirical researchers have found clear negative correlations between oil prices and output and employment (see for instance Keane and Prasad, 1996). A paper by Carruth et al. (1998) also suggests that oil prices play a strong and significant role in generating the general path of unemployment in the US. Hamilton (2000) documents that the empirical relation between oil prices and economic activity is non-linear, claiming that oil price increases affect output, whereas decreases do not. Moreover, oil price increases that come after a long period of stable prices have a greater effect than those which simply correct previous oil price decreases. Hunt et al. (2001) simulate the impact of changes in oil prices on the real economy of industrialised countries, and suggest that the effects of oil price shocks can be limited under forward-looking, and well-chosen, reactions by the monetary authorities.

have strengthened, perhaps increasing the comovement of the euro area economy with other major economies such as the United States. Moreover, the above evidence that common shocks such as an oil price shock also seem to play a notable role, especially in the early 2000s, represents another factor which could increase the degree of synchronisation.

An OECD study (OECD, 2002/a) suggests that the degree of business cycle divergence across countries, measured by the standard deviation of the output gap, is decreasing over time. As noted earlier, the standard deviation of output growth in the advanced economies has decreased in recent years. Considering the standard definition of correlation between the



growth of two countries, a decrease in the standard deviation of the output growth in one country, *ceteris paribus*, results in an increase in the correlation.<sup>54</sup>

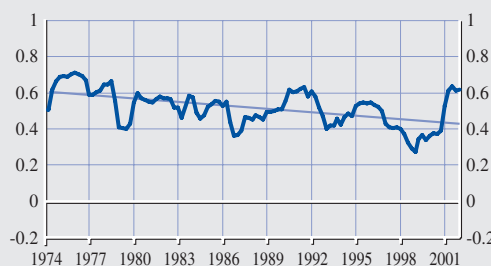
In short, increases in spillovers, the presence of common shocks and decreases in idiosyncratic shocks (i.e. the decrease in the standard deviation of output growth) may have led to an increase in common movements among industrialised economies. Nevertheless, a deeper analysis is required. In fact, some published work provides evidence that, in spite of the recent increasing correlation confirmed by the slowdown which began in the US in 2000, we are not experiencing a historically high degree of synchronisation across business cycles.

A study carried out at the ECB using a dynamic factor model (Monfort et al., 2004) examines the co-movement of GDP and industrial production between the G7 countries for the period 1972-2002. Using Kalman filter techniques, the authors extract a common component from these variables. Chart 27 presents this measure of synchronisation of international activity given by the correlation between the common factor and GDP growth, and reveals that the degree of synchronisation has declined over the past three decades in the G7 countries.

Although Monfort et al. (*ibid.*) also found an increase in correlation towards the end of their sample period, this is not sufficient to offset the general declining trend in correlation. This long-term negative trend in the co-movements of output is confirmed by Doyle and Faust (2002), who analyse the correlation between the output growth of the US and the other G7 countries. However, in line with historical evidence, they also note the recent increase in correlation, particularly during periods of recession. The asymmetries in economic fluctuations in the major economies experienced during the 1990s had caused economists to question the existence of an international business cycle; the recent increase in the

**Chart 27 G7 – GDP growth common factor correlation**

(Quarterly data; ticks refer to 2nd quarter of year-reference)



Source: Monfort et al. (2004).

Note: Correlation computed over a 4-year moving window.

correlation, therefore, seems to provide a positive answer to this question. It also seems that the degree of synchronisation of international activity actually changes over time and the rise in the correlation in the latter part of the 1990s and early 2000s is not unprecedented if it is compared not only over the last decade but also over the last 30 years. Moreover, Doyle and Faust (*ibid.*) show that common shocks and idiosyncratic shocks have both decreased in the US. In fact, as we also noted earlier (see Box 9), both the standard deviation and the covariance between the GDP growth of the US and the other G7 countries has fallen in recent years, leaving the correlation almost unchanged.<sup>55</sup>

Nevertheless, this result still appears quite puzzling.<sup>56</sup> As examined earlier, the euro area is becoming increasingly interconnected with other main economies through trade, FDI, financial and confidence linkages. In addition, increases in trade over the past decade do not appear to have been associated with increases in sectoral specialisation (OECD, 2002/b). By

54 In fact, the correlation of two growth rates is given by the covariance of the growth rates divided by the product of the standard deviations of each of the two growth rates.

55 As mentioned previously, the authors advance three explanations for these reductions in standard deviation and covariance: the decreased importance of common shocks, an improvement in inventory management, and improved government policy.

56 A paper (OECD, 2002/b) looking at the relationship between international integration and cross-border synchronisation addresses this issue.

contrast, large countries appear to have become more similar in sectoral composition (see Table 8). In addition, as documented by Hummels et al. (2001) for ten OECD and four emerging countries, trade is increasingly characterised by vertical specialisation, that is, by countries specialising in particular stages of a good's production sequence, rather than in producing the entire good. This type of trade is generally related to the internationalisation of production chains and should in principle increase the correlation of output across countries (see, for instance, Kose and Yi, 2001). However, this feature has increased the import content of exports. This affects the transmission of shocks and the synchronisation of business cycles. Indeed, the impact on output of an external shock transmitted by a reduction in exports is dampened if at the same time imports also drop. Therefore it seems, as examined previously, that the impact of international linkages on the international transmission of economic shocks is not still well understood in the literature. In particular, the evidence of the effects of these linkages on the synchronisation of business cycles is rather mixed.

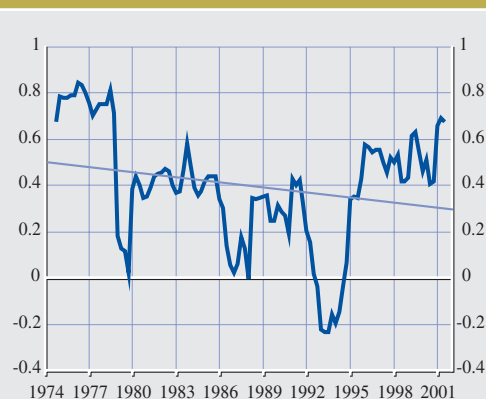
**Table 8 Sectoral similarity indicators**

	1976/1980	1995/1999
<b>Selected countries relative to the United States</b>		
Canada	21.9	19.6
France	21.3	12.4
Germany	23.3	17.0
Italy	27.2	15.2
Japan	23.3	24.7
United Kingdom	18.7	12.9

Source: OECD (2002).

Note: The sectoral similarity indicator is calculated as the sum of absolute deviations of sector shares in valued added from those of the reference country. Hence the closer the index is to zero, the more similar the sectoral structures. The upper band is a function of the number of sectors, which in this case, for eleven sectors, is 182. The specific industries used include: agriculture, forestry and fishing; mining and quarrying; total manufacturing; electricity, gas and water supply; construction; wholesale and retail trade; restaurants and hotels; transport and storage and communication; finance, insurance, real estate and business services; and community social and personal services. Note that SNA data for West Germany are used in the calculations prior to 1991.

**Chart 28 Euro area – GDP growth common factor correlation**



Note: Correlation computed over a 4-year moving window. The common factor is calculated using the GDP of the US, Canada, the euro area and the UK.

In order to shed light on this issue and adopt a euro area perspective, we use the model of Monfort et al. (ibid.) to calculate the correlation between the euro area GDP growth and a common factor obtained using GDP data for the US, Canada, UK and the euro area. The declining trend in the degree of synchronisation is still present; however, the increase in synchronisation at the end of the sample period is more evident and pronounced (see Chart 28). It is interesting to note that the lowest degree of synchronisation of euro area GDP growth using this common factor approach was registered in the first half of the 1990s when a large idiosyncratic shock, related to German reunification, affected the euro area. This idiosyncratic shock may also be a major factor in causing the overall trend decline in synchronisation over the whole sample period. A comparison of Charts 27 and 28 also seems to suggest that the behaviour of the euro area as a whole might be somewhat different to that of the individual euro area countries. For example, the degree of synchronisation between the GDP of Germany, France and Italy and the other G7 economies may be negatively affected by the growing intra-area trade of the three major euro area countries. By contrast, measures of the co-movements of the GDP of the euro area as a whole and the other G7 economies are not

affected by the increasing importance of internal trade within the euro area (as intra-euro area trade does not contribute to euro area GDP). In summary, it seems that for the euro area as a whole the evidence provided in this paper of spillovers from economic shocks in major economies, combined with the presence of common shocks, might explain the higher degree of synchronisation in the latter part of the 1990s and early 2000s.<sup>57</sup> Moreover, this higher degree of synchronisation may explain the impact of the global slowdown on the euro area – as shown at the beginning of the section – which could be related to the fact that only

traditional channels of transmission are usually considered in forecast models, thereby overlooking other important channels documented in this paper. Box 11 tries to shed light on these issues by examining the interlinkages between the various channels through which external shocks may be transmitted, and uses the downturn which started in the US in 2000 as an example of these mechanisms.

57 Kose et al. (2003) also provides evidence that globalisation, in the form of trade and financial market integration, increases the degree of synchronisation of business cycles.

#### Box 11

#### INTERLINKAGES BETWEEN THE CHANNELS AND THE SYNCHRONISATION OF CYCLES

This box discusses the linkages between the various channels through which external shocks may be transmitted, focusing on how the various channels may affect each other and therefore contribute to the increase in the international synchronisation of economic cycles during the latter part of the 1990s and the early 2000s. Each channel and its links with the others are described separately, along with their possible suggested contribution to the synchronisation of cycles. Finally, an illustration of these mechanisms is provided by describing the global shock originating from the ICT sector and the slowdown in the US that began in 2000.

#### Trade and FDI

Both the nature and magnitude of world trade has changed enormously in recent decades. This is partly attributable to the rapidly increasing "internationalisation of production", whereby the process of manufacturing a product can be broken down into a number of discrete parts involving vertical chains of production spread over numerous countries.<sup>1</sup> This vertical specialisation of production, which stimulates trade in similar products at different stages of production, could easily lead to the impact of shocks being dispersed across a greater number of countries, perhaps accompanied by an increase in the speed with which these shocks are transmitted across different nations. It seems that this type of intra-industry trade now dominates the more traditional inter-industry trade. As the latter is based on the trade of different products between countries – and assuming that inter-industry specialisation therefore results in a lower correlation of output across countries – the movement towards vertical specialisation trade may contribute to an increase in the international synchronisation of cycles.

This provides a direct link between trade and FDI, as a large and growing proportion of multinational (MNC) cross-border trade is vertical specialisation trade (i.e. the multinational's

1 Gorg (2000) analyses US trade with the EU in intermediate goods which are processed in the EU and then re-exported to destinations outside the EU (i.e. a type of vertical specialisation trade). Gorg finds that in 1994 this type of vertical specialisation trade accounted for about 20% of EU 12 imports from the US, with the proportion much higher for individual products and countries.

output is fragmented into different stages of production across countries made possible by vertical investment in production plants located in different countries). As a result, trade and FDI are complementary activities. By contrast, horizontal FDI is when an MNC accesses a foreign market by replicating abroad the production of a final good, resulting in FDI and trade being substitutes. Since FDI activities often combine aspects of both types, it is empirically difficult to separate them.<sup>2</sup>

Regardless of the relationship between trade and FDI, it seems clear that the rapid rise in global FDI up to 2001 could be associated with an increase in synchronisation across countries. For example, as mentioned earlier, if a multinational based in the euro area engages in FDI in the US, then the MNC's profits are dependent on conditions in both the euro area and the US. As a result, a decline in activity/profitability in either market may affect the MNC's output, investment and employment in both economies. The same applies to US MNCs investing in the euro area.

### **Financial linkages**

The observed increase in the correlation between equity markets in different countries will tend to increase the degree of synchronisation across countries (via the impact of changes in equity prices on corporate and consumer wealth and income which, in turn, may affect investment and consumption, etc.). However, this increased correlation in equity markets may partly reflect the rise in FDI across the globe. For example, as mentioned earlier, if the same MNC is quoted on stockmarkets in both the euro area and the US, then adverse conditions in one of these economies can bring down the MNC's equity price in both the euro area and the US, thereby again affecting both economies via wealth effects.

As we have seen above, positive stock market developments also seem to encourage FDI (i.e. the surge in M&A was associated with strong growth in equity markets), whereas financial integration may also help to increase trade and FDI. Meanwhile, increasing financial integration coupled with an increase in the international synchronisation of output may lead to an increased co-movement of bond yields across countries (in other words, similar movements in activity across countries lead to less divergence in interest rates).

### **Common shocks and confidence**

The growing internationalisation of production may result in common shocks having a much wider impact which may reinforce the effects of the original shock. With vertical specialisation, the effects of an oil price shock, or a shock to the ICT sector, can be dispersed more widely, while the greater co-movement of stockmarkets can also reinforce the original common shock and help to transmit it across borders.

Confidence can be affected by many of the factors listed above, but the important question is whether confidence linkages have any impact in addition to the impacts already described, or

2 In services, as has been pointed out by Nicoletti et al. (2003), trade and FDI can be expected to be complementary, because FDI in the service sectors generally brings stronger service trade in terms, for example, of transport and communications. In addition, some of the transformations carried out on products in the vertical specialisation chain are partly counted as services trade. Both of these factors will tend to reinforce the positive relationship between FDI and trade in goods and services.

whether the confidence linkage simply speeds up the transmission of shocks across countries. In this respect, two important conclusions from our empirical analysis in Box 8 should be emphasised. First, it seems that changes in confidence can have effects in addition to the other business cycle linkages mentioned above; and second, we find evidence of the impact of changes in US confidence on euro area confidence. Another general point is that during periods of financial crises, consumer confidence seems to be influenced by equity market conditions.

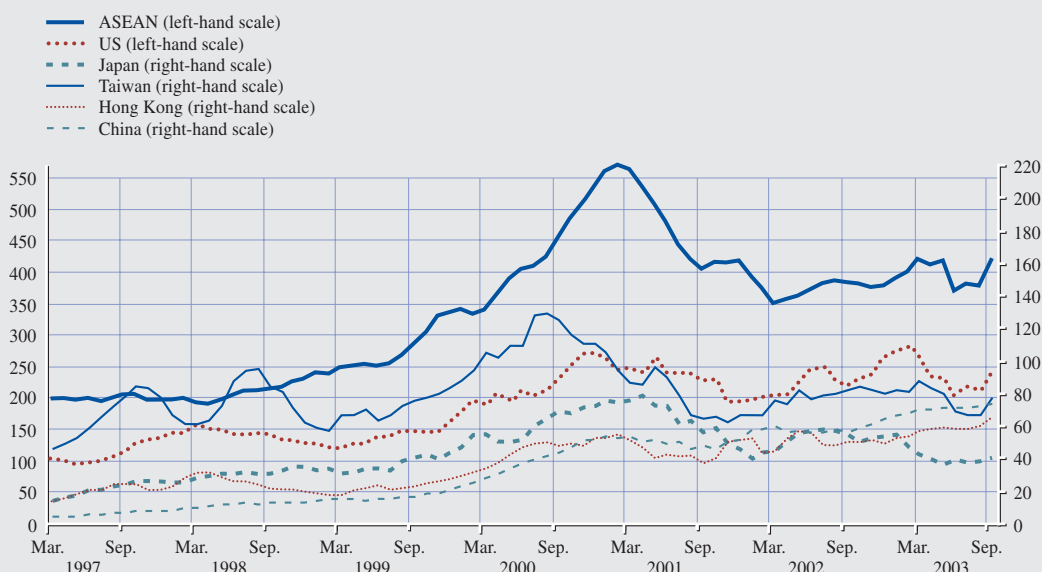
### An example of interlinkages between the channels

In the following, we provide a very simplistic description of the downturn in activity which started in the United States in 2000 as a way of highlighting some of the interlinkages between the various channels of transmission of external shocks. Accordingly, it is not meant to be a comprehensive and exhaustive analysis of the downturn in activity. The stylised facts are that in the second half of the 1990s, the US experienced very strong GDP growth rates related to an investment boom in the ICT sector and high rates of productivity growth. This was associated with a surge in the US stock market – especially for ICT firms – which further fuelled investment and consumption. Eventually, there was a downturn in the US followed by a sharp and rapid downturn in global activity. A significant role was played by some of the following mechanisms:

- When the boom in the ICT sector came to a halt, capital expenditure in ICT and other sectors declined. The complicated vertical specialisation chains in the highly globalised ICT industry resulted in reduced demand for ICT products across the globe, particularly in Asia, which accounts for roughly 45% of world exports of ICT products. As described earlier, the direct trade links between the euro area and the US in the ICT sector are fairly small, but the

Chart A Euro area value of ICT exports

(in EUR millions, seasonally adjusted data, 3-month moving average)



Sources: Eurostat and ECB.  
Note: ICT is SITC 8542 (integrated circuits and other computer parts).

international downturn in this sector had significant indirect impacts via third-market trade links on the euro area, particularly as the euro area accounts for around 15% of world exports of ICT products. Accordingly, euro area exports of ICT products to Asia fell dramatically, and declined more than euro area exports of ICT goods to the US (see Chart A).

- Meanwhile, the simultaneous sharp decline in the US stock market, particularly for equities in ICT companies, was accompanied by a fall in world equity prices. Accordingly, this may have had a negative impact on consumption and investment through wealth effects (in all countries, wealth decreased owing to declines in the equity prices of both domestic and foreign assets). FDI flows also declined largely due to the positive relationship between stock market prices and M&A activity, which also contributed to weaker capital expenditure in many countries. At the same time, as described above, the lower levels of activity/profitability originating in the US may have caused MNCs with interests in both the US and the euro area to cut back simultaneously on investment and employment in both areas. This negative impact was reinforced by lower income received by euro area corporations and consumers with respect to assets held in the US, as a result of declines in profits, activity and dividends.
- Confidence may have been an important factor in the speed and magnitude of the international transmission of shocks through all the chains of interlinkages detailed above. In particular, our empirical analysis suggests that euro area confidence is directly affected by changes in US confidence, resulting in such changes in confidence having a reinforcing and additional impact in addition to the linkages mentioned above.

In summary, it seems that many of the channels played a role during the virtually simultaneous slowdown in both the US and the euro area, with the interlinkages between the various channels frequently reinforcing the downward impact of the initial ICT shock. Therefore, focusing only on the traditional channels of transmission and their usual magnitudes cannot fully explain the extent to which the euro area has been affected by external disturbances.

#### 4.4 SUMMARY OF ADDITIONAL TRANSMISSION CHANNELS AND SYNCHRONISATION

In this chapter, we looked at other international linkages, focusing on additional channels and the degree of synchronisation of economic activity across countries. As regards financial linkages, the transmission of shocks across different national equity markets may explain some of the co-movements in activity between the US and the euro area. Some estimates show that the correlation between US and European share prices has doubled over time, while other studies claim that since the mid-1990s the importance of global factors, rather than local factors, in share prices has increased. This might be related to an increased presence of the same MNCs in more countries, along with their

stock market valuations linked to global profitability rather than local factors. Another related connection may be bond market linkages, as the increasing international integration of financial markets may have increased the co-movements of bond markets across the globe. Turning to possible confidence linkages, our limited empirical work finds evidence of US confidence affecting euro area confidence, and that these effects are in addition to those owing to movements in real and nominal variables. Meanwhile, common shocks, such as oil price shocks, or the recent ICT shock, can have considerable impacts, perhaps partly owing to the growing internationalisation of production, which could lead to a wider dispersion of the original shock and possibly reinforce it.

As regards the co-movement of output across countries, some measures of synchronisation of international activity reveal that the degree of synchronisation has shown a trend decline over the past three decades in the G7 countries, although there has also been an increase in synchronisation since the mid-1990s. To shed light on this issue, we examined the synchronisation of euro area GDP growth with a common factor obtained using GDP figures for the US, Canada, UK and the euro area. We found that the declining long-term trend in the degree of synchronisation is still present, although there is an evident increase in synchronisation since the mid 1990s which is pronounced and prolonged. In addition, the lowest degree of synchronisation of euro area GDP growth vis-à-vis the rest of the world was registered in the first half of the 1990s when an idiosyncratic shock, related to German reunification, affected the euro area. This idiosyncratic shock may also be a major factor in causing the overall trend decline in synchronisation over the whole sample period, implying that without this particular shock the degree of synchronisation between the euro area and North American GDP might have increased over time. Regarding this point, there also seem to be various possible interlinkages between the numerous transmission channels which may reinforce the impact of external shocks, thereby perhaps contributing to the aforementioned increase in the international synchronisation of cycles in the latter part of the 1990s and early 2000s.

## CONCLUSIONS

Our first step in analysing the impact of the external dimension on the euro area was to measure the openness of the euro area. We found that the euro area is a large and relatively closed economy in comparison with the individual euro area countries, which have different characteristics. However, the euro area is more open than either the US or Japan and is, therefore, relatively more exposed to shocks originating from external developments. Meanwhile, even from a simple trade perspective, these mechanisms and linkages are not straightforward and the impact on the euro area of external shocks can differ quite considerably, depending on the specific nature of the shock.

Some of the external shocks also contributed to the volatile movements in exchange rates and foreign demand which, in turn, also had an influence on euro area exports and imports as well as the current account of the euro area. In particular, estimated trade elasticities reported in this paper show that changes in the exchange rate can have a notable impact on extra-euro area import prices. Although still important, exchange rate movements seem to have a more limited impact on extra-euro area export volumes in comparison to movements in foreign demand.

In a similar fashion to trade, euro area capital flows have also undergone considerable changes. The euro area registered net outflows of combined direct and portfolio investment during the 1998-2001 period, before recording net inflows in 2002, and achieving a virtual balance in 2003. However, the key point is that the size of the gross flows for both direct and portfolio investment and, consequently, the stocks of foreign assets and liabilities of the euro area, have all grown strongly, particularly over the second half of the 1990s. This implies that the potential magnitude of the impact of capital flows as a channel for the transmission of external shocks to the euro area may have changed over time. In particular, FDI seems to provide possible channels for the transmission of external shocks. These channels are linked to

the globalisation and internationalisation of production and, consequently, the profits of multinational corporations are becoming ever more dependent on the external environment. For example, the large increase in outward FDI by euro area companies in the US means that the profits of euro area multinationals may be more exposed to fluctuations in US activity and profitability, while the increased presence of US multinationals in the euro area also strengthens the economic links between the two economies.

Meanwhile, the rising stock of euro area foreign assets means that the income returns on assets held abroad have an effect on total euro area consumer and corporate income. Euro area income flows are therefore partly exposed to external shocks. At the same time, the changing value of the stock of euro area firms' foreign direct investments in the US highlights another channel for the international transmission of shocks. For example, the past losses in the value of euro area corporations' M&A investments in the US owing to the past fall in equity prices, particularly in the "new economy" sectors, may have had a negative impact on capital expenditure in the euro area through the implied decline in corporate wealth of the acquirer/parent company.

Finally, we looked at other international linkages, with a special emphasis on the roles of additional channels and the degree of synchronisation of economic activity across countries. In particular, we described the main channels of spillovers and their complexities and whether additional channels of international shocks can be identified. As regards financial linkages, the transmission of shocks across different national equity markets may explain some of the co-movements in activity between the US and the euro area. For example, some estimates show that the correlation between US and European share prices has doubled over time. Other studies also indicate that since the mid-1990s there has been an increase in the importance of global factors, rather than local factors, in share prices. This might be related to



an increased presence of the same MNCs in more countries, along with their stock market valuations, which are linked to global profitability rather than local factors. Another related connection may be bond market linkages, as the increasing international integration of financial markets may have increased the co-movements of bond markets across the globe.

Turning to possible confidence linkages, the key question is whether co-movements in confidence across countries contain impacts not included in the various other usual factors explaining business cycles. In our limited empirical work, we find evidence of US confidence affecting euro area confidence, and that these effects are in addition to those owing to movements in real and nominal variables. Meanwhile, common shocks, such as oil price shocks, or the global ICT shock, can have considerable impacts, perhaps partly as a result of the growing internationalisation of production, which can lead to a wider dispersion of the original shock and possibly reinforce it.

As regards the co-movement of output across countries, some measures of synchronisation of international activity reveal that the degree of synchronisation has shown a trend decline over the past three decades in the G7 countries, although there has also been an increase in synchronisation since the mid-1990s onwards. There may be three main explanations for the longer-term trend decline in the co-movement of output across countries: the decreased importance of common shocks; an improvement in inventory management; and improved government policy. Nevertheless, this result still appears quite puzzling. As described earlier, the euro area may be increasingly interconnected with other major economies through trade, financial and confidence linkages. In addition, increases in trade over the past decade do not appear to have been associated with increases in sectoral specialisation, which may lead to desynchronisation. By contrast, large countries

appear to have become more similar in sectoral composition, while trade is increasingly characterised by vertical specialisation, that is, by countries specialising in particular stages of a good's production sequence, rather than in producing the entire good. This type of trade is generally related to the internationalisation of production chains and should in principle increase the correlation of output across countries. In addition, there seem to be various possible interlinkages between the numerous channels of transmission, which may reinforce the impact of external shocks, thereby perhaps contributing to the aforementioned increase in the international synchronisation of cycles during the latter part of the 1990s and early 2000s.

In order to shed light on this issue, we examined the synchronisation of euro area GDP growth with a common factor obtained using GDP figures for the US, Canada, UK and the euro area. We found that the declining long-term trend in the degree of synchronisation is still present, although there is an evident increase in synchronisation which is pronounced and prolonged in the years leading up to, and including, the global downturn which began in the early 2000s. In addition, the lowest degree of synchronisation of euro area GDP growth was registered in the first half of the 1990s, when an idiosyncratic shock, related to German reunification, affected the euro area. This idiosyncratic shock may also be a major factor causing the overall trend decline in synchronisation over the whole sample period, implying that without this particular shock the degree of synchronisation between the euro area and North American GDP might have increased over time. In addition, the results seem to imply that the co-movements in output between the euro area as a whole and the other major economies of the world may be somewhat different to those between the individual euro area countries and the other major economies. For example, the degree of synchronisation between the GDP of Germany, France and Italy and the other G7 economies may be negatively affected by the growing intra-euro area trade of

the three major euro area countries. By contrast, measures of the co-movements of the GDP of the euro area as a whole and the other G7 economies are not affected by the increasing importance of internal trade within the euro area (as intra-euro area trade does not contribute to euro area GDP). This seems to reinforce our earlier observation that the behaviour of the euro area as a whole might be somewhat different to that of the individual euro area countries.

It seems that for the euro area as a whole the evidence provided in this paper of potential spillovers from economic shocks in major economies, combined with the presence of common shocks, might explain the increase in the degree of synchronisation leading up to, and including, the slowdown in growth which began in 2000 in the US. Moreover, this increase in the degree of synchronisation as well as the seemingly growing influence of less traditional international linkages may partly explain the apparently significant impact of the US slowdown on the euro area in the early 2000s.

Turning to the relevance for monetary policy, it is clear that it is not sufficient to focus only on the traditional channels of transmission of external shocks, and their usual magnitudes. Monetary policy-makers must be aware of the possibility of changing, and more difficult to measure, linkages such as those arising from the activities of multinationals or changes in confidence. This is further complicated by the fact that the magnitudes of these impacts may change over time and can vary according to the nature of the specific shock. As a result, external developments must be carefully monitored and compared with domestic developments across a broad range of variables such as output, profits, employment, investment and wages, etc. Moreover, the evidence regarding possible linkages needs to be continually updated.

Finally, the clearest signal from the evidence above is that the euro area remains affected by

external shocks through a variety of channels. An efficient reaction to such shocks requires a flexible economy that can allow an appropriate and rapid response to such shocks. This requires the continuation of structural reforms in the labour and product markets in the euro area countries, thereby also encouraging a better allocation and utilisation of capital and human resources, and enhancing the euro area's growth potential.

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