QUARTERLY REPORT ON THE EURO AREA

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- Recent economic developments and short-term prospects
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- The international role of the euro
- Labour market reforms in the euro area
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EDITORIAL

Conditions in international financial markets remain fragile and have deteriorated significantly in recent weeks. Several key credit markets are either impaired or have ceased to function altogether, creating problems of liquidity management in the banking system and restricting credit availability. This reflects uncertainty about the location of financial losses related to rising default rates in the US mortgage market. According to financial market estimates, these losses are now expected to amount to 250-500 billion USD compared to an earlier range of 50-100 billion USD.

The immediate effects of the turmoil have, so far, been largely confined to the financial sector where financial losses and declines in equity values are putting pressure on the capital of banks and of some insurance companies. However, the real economy is unlikely to escape unscathed. Global economic growth has been robust in recent years, but future performance is likely to be adversely affected by the turmoil via three main channels.

The first channel is a generalised tightening in credit conditions, amid an abrupt correction in the mispricing of risk over recent years as investors become significantly more risk averse. Indeed, some overshooting in risk aversion cannot be excluded, implying very difficult financing conditions for both corporate and household sectors in the coming years. The lending capacity of banks will be reduced to the extent that the financial-market turmoil impacts significantly on their capital (e.g. bank losses in the US are now extending from their mortgage portfolios also to auto-loan and credit card portfolios). As private-sector debt levels are historically high in many parts of the global economy, the need to provision against further losses will further constrain bank lending.

The second channel is US private consumption, which appears particularly vulnerable to current developments. The US consumer has been the engine of growth in the global economy for many years. While this role has become less important recently, a sharp downturn in US consumption would still have serious growth implications in the rest of the world.

The third channel is economic confidence. The effect of financial crises on economic confidence is always difficult to predict but the longer this period of financial turbulence continues, the greater the risk is of significant negative spillovers to consumer and business sentiment.

In the euro area, there are already some signs that the turmoil has begun to affect the non-financial sectors of the economy. Banks have tightened their credit conditions to both households and non-financial corporations. Although credit growth remains sustained, there are indications that funding to the non-financial corporate sector is slowing down. Business and consumer confidence have also weakened significantly since the summer.

Although the euro-area economy is still underpinned by strong fundamentals, recent developments in financial markets will take their toll on real growth next year. According to our Autumn Forecasts, economic growth in the euro area is expected to decelerate from 2.6% in 2007 to 2.2% in 2008. The forecast for 2008 is 0.3 pp. lower than in the spring. The downward revision mostly reflects the negative effect of the financial turmoil. The forecast is predicated on a gradual resolution of the distress in financial markets. Simulations show, however, that a deeper and more protracted financial crisis would entail significant additional losses in terms of economic growth.

It is not only the financial turmoil which presents risks to the growth outlook, but also the high level of oil prices – which have temporarily pushed inflation to an unusually high level – and the external value of the euro. The euro's appreciation has been substantial during the autumn with its value in US dollars coming close to 1.50 at the end of November. In nominal effective terms, the euro is now more than 6% above its average value in 2006.

The euro's strength has several causes. It reflects recent economic developments, namely better growth prospects in the euro area than in the US or Japan. In a longer-term perspective, it is also underpinned by the rising importance of the euro in the international financial system. The euro is

the second most important international currency after the US dollar. It is now extensively used in international debt markets and its role in international trade and in official foreign exchange reserves is growing gradually. The international use of the euro continues to be characterised by a strong regional and institutional pattern. It is expected that the expansion in the use of the euro will continue.

However, any significant further appreciation would bring the euro outside the range that can be explained by fundamentals. The impact of the strong euro on euro-area exports, which has been limited so far, would then probably be felt more strongly. Further appreciation would also aggravate the lopsidedness of the ongoing adjustment to global imbalances in which the euro is already shouldering an excessive share of the adjustment burden. Although the euro area is running a broadly balanced current account and is therefore not a source of global imbalances, the necessary weakening of the US dollar against the currencies of the main trading partners has been associated mainly with a sharp appreciation of the euro. Yet in the meantime, other parts of the world, particularly in Asia, have been running large and growing current account surpluses whilst seeing only a modest appreciation of their currencies against the dollar and a depreciation against the euro.

It is therefore important that the exchange rate impact of the rebalancing of global imbalances is spread more evenly across the main world regions. In particular, Asian economies with large current account surpluses should contribute to this process through an appreciation of their currencies. The recent discussions between Chinese authorities and representatives of the Eurogroup are a step forward in this respect. The two sides reached an understanding that it is necessary to make concerted efforts to intensify structural adjustment and avoid drastic movements of exchange rates so as to make due contribution to the orderly adjustment of global imbalances.

Turning to the long-term growth performance of the euro area, this report provides some empirical evidence on the nature and importance of the structural reforms carried out in labour markets since the launch of the euro. This evidence is mixed. For the euro area as a whole, the reform process in the early years of the euro was characterised by a sequence of gradual reforms rather than by a few radical changes. Nevertheless, the data do show an encouraging shift in the pattern of reforms at the Member State level with more reforms being introduced by those countries that need them most.

The report also investigates the possible causes of the disappointing productivity performance of the euro area. Most of the deterioration in the euro-area's performance relative to the US can be traced back to a small group of industries, namely the high technology part of the manufacturing sector and a few services sectors – wholesale and retail trade, financial and business services. On a more encouraging note, there are also a few industries – essentially 'network' industries – where the euro area has managed to consistently outperform the US over recent years.

Our analysis suggests that the underperformance of the euro area reflects a diverse range of factors. It also lends support to the broad view that the productivity slowdown is linked to a generalised failure by Europe to sufficiently adapt its policies and institutions to a changing environment. Over the bulk of the postwar period, the euro area largely drove its productivity performance through a catching-up process focused in essence on imitating US technological advances. In recent years, catching-up has increasingly given way to a phase in which euro-area countries operate at the global technology frontier. As a result, a large number of Member States have found it increasingly difficult to replicate the productivity successes of earlier decades. Being at, or close to, the technology frontier, demands a re-focusing of policies and institutions towards an innovation-based economic model, with less emphasis on the imitation of available leading-edge technologies and a more intensive use of R&D and high-skilled human capital.

Klaus REGLING
DIRECTOR GENERAL

I. Economic situation in the euro area

GDP growth in the euro area rebounded to 0.7% in the third quarter of 2007, broadly in line with the growth projected in the Commission's Autumn 2007 Forecasts. Growth continued to be driven by domestic demand. Investment picked up again after a pause in the second quarter and consumption growth remained at 0.5% supported by a very robust labour market and high confidence. Looking ahead, economic activity is expected to moderate. Tighter financing conditions, reduced confidence in the aftermath of the financial market turmoil, rising inflation as well as a cooling-off of the global environment will weigh on growth in the next quarters. Activity will, however, continue to benefit from robust employment growth and record-high profitability in the non-financial corporate sector.

Developments in inflation volatility. The inflation performance has been exceptionally good since the launch of the euro, with most Member States registering their lowest inflation rates for 5 decades as well as a marked reduction of inflation volatility. Remarkably, this has occurred despite a series of adverse shocks. A preliminary review of the explanatory factors behind the decline of inflation volatility suggests that changed inflation expectations and greater credibility of monetary policy have played an important role. Clear improvements in the policy framework were instrumental in bringing about these changes.

The evolving international role of the euro. From its introduction in 1999, the euro quickly emerged as the second most important international currency after the US dollar and it continues to consolidate its position. It is used extensively in international debt markets and its role in international trade and in official foreign exchange reserves has been growing gradually. Almost 10 years after its introduction, the internationalisation of the euro remains characterised by a strong regional and institutional pattern. The structural characteristics of the euro area – including the size of its economy and a macroeconomic framework geared at stability – support the international importance of the euro. Its international role could evolve in the future depending on a number of factors, including first and foremost the euro area's ability to develop more integrated and more efficient financial markets.

The pace of structural reforms in EMU. Empirical evidence on possible changes in the pace of structural reforms since the introduction of the euro is limited and contradictory. While research based on indicators developed by the OECD seems to show that the introduction of the euro did not entail a pick up of reforms, evidence drawn from another dataset presented in this report suggests that this conclusion needs to be qualified. In the euro area as a whole, the reform process in the early years of the euro was characterised by a sequence of gradual reforms rather than by a few radical changes. However, data also shows an encouraging shift in the pattern of reforms at the Member State level with more reforms being introduced by those countries that need them most.

1. Recent economic developments and short-term prospects[1]

A rebound in the third quarter of 2007

Following signs of deceleration in the second quarter of 2007, economic activity in the euro area, rebounded in the third quarter. Quarter-on quarter GDP growth increased from 0.3% in the second quarter to 0.7% in the third quarter of 2007. This is broadly in line with the Commission's Autumn Forecasts (0.6% q-o-q). The pick-up in activity in the third quarter was broad-based across most euro-area countries. It was particularly impressive in the Netherlands. Growth accelerated from 0.3% to 0.7% in France and Germany and from 0.1% to 0.4% in Italy. In Spain, however, GDP growth fell to 0.7%, the lowest q-o-q figure since 2004.

Domestic demand supported by both private consumption and investment

After the pause registered in the second quarter, gross fixed capital formation rebounded in the third quarter (0.9% q-o-q). After a sharp contraction in the previous quarter, activity in the construction sector recovered in the third quarter. Meanwhile investment in equipment continued to expand rapidly, at more than 4% in annualised terms.

Despite a weather related rebound in the third quarter, recent developments in construction confirm the cooling-off of the housing sector. Over the past three quarters, year-on-year growth in residential construction investment has come down from 6.6% to 1.8%. Since the beginning of

[1] The cut-off date for the statistics included in this issue was 12 December 2007.

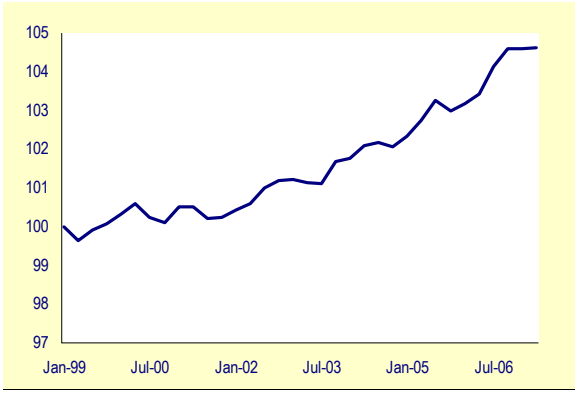
Table 1: **Euro-area growth components**

	2006 Q4	2007 Q1	2007 Q2	2007 Q3	Carryover to 2007	Forecast (1)	
						2007 (2)	2008 (2)
Percentage change on previous period, volumes							
GDP	0.8	0.8	0.3	0.7	2.5	2.6	2.2
Private consumption	0.5	0.0	0.6	0.5	1.4	1.7	2.1
Government consumption	0.4	0.9	0.2	0.6	1.9	2.0	2.1
Gross fixed capital formation	1.6	1.8	0.0	0.9	4.6	4.7	2.9
Exports of goods and services	3.0	0.9	0.8	2.5	6.0	5.8	5.3
Imports of goods and services	1.7	1.4	0.1	2.7	5.3	5.3	5.5
Percentage point contribution to change in GDP							
Private consumption	0.3	0.0	0.3	0.3	0.8	1.0	1.2
Government consumption	0.1	0.2	0.0	0.1	0.4	0.4	0.4
Gross fixed capital formation	0.3	0.4	0.0	0.2	1.0	1.0	0.6
Changes in inventories	-0.4	0.4	-0.4	0.2	-0.1	0.0	0.0
Net exports	0.6	-0.2	0.3	-0.1	0.4	0.2	0.0

(1) Annual change in %. (2) European Commission Autumn 2007 Forecasts.
Source: Commission services.

2006, residential building permits have been on a steep downward trend. The y-o-y rate of change of permit issuance fell to its lowest level since 1996 during the first half of 2007. Confidence indicators also show a cooling-off in the construction sector. The moderate weakening of sentiment in construction experienced for a year now seems to have become more pronounced since October.

Graph 1: **Profitability, euro area**
(Index 1999Q1=100; 1999Q1 – 2007Q2)



Source: Commission services.

Recent business indicators give mixed signals concerning future corporate investment growth.

On the positive side, capacity utilisation in the manufacturing sector is still well above its long-term average (84.2%) and profitability is at a record high (Graph 1). The growth of loans to the non-financial corporate sector has remained robust, broadly unchanged at 14.1% in September and close to the highest rate observed since the 1980s. Furthermore, industrial production grew by 3.9% y-o-y in the third quarter compared to 2.7% in the second quarter and started the fourth quarter on a relatively solid note (0.4% q-o-q and 3.8% y-o-y).

On the negative side, the financial market turmoil has entailed a tightening of credit conditions for the non-financial corporate sector. The average interest rate for new non-financial corporate loans has risen to 6.1% in September, up 0.28% since July. This is the sharpest increase since the start of the ECB's interest rate statistics series in 2003 (see Box 1). Meanwhile, recent data on business confidence are not very encouraging. While confidence is still reasonably robust (above its long-term average), it has been declining gradually since the summer while showing higher volatility (Table 2). For instance, the European Commission Business Climate Indicator fell from 1.58 in April 2007 to 1.08 in September and to 0.88 in October, followed by a rebound to 1.04 in November. The PMI, NBB, IFO and INSEE followed similar patterns with small rebounds in November. In contrast, confidence in services deteriorated further that month.

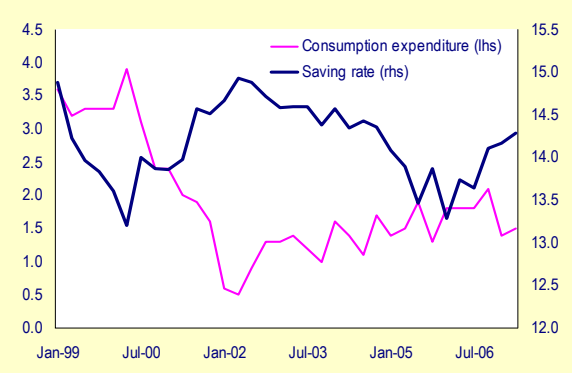
Turning to household spending, private consumption contributed 3 pp to GDP growth in the third quarter. It increased by 0.5% q-o-q, slightly down from 0.6% in the previous quarter. Private consumption has been on a modest 1.5% growth path since the beginning of the year.

Table 2: **Selected euro-area and national leading indicators, 2006-2007**

	SENT. IND[1)]	BCI[2)]	OECD[3)]	PMI Man.[4)]	PMI Ser [5)]	IFO[6)]	NBB[7)]	ZEW[8)]
Long-term average	100.5	-0.07	93.1	52..8	54.9	96.8	-6.7	25.8
Trough in latest downturn	89.3	-0.92	98.1	46.4	47.7	90.3	-26.5	-28.5
November 2006	109.9	1.48	107.4	56.6	57.6	100.2	4.1	-27.4
December 2006	109.8	1.54	107.5	56.5	57.6	102.5	2.4	-28.5
January 2007	109.2	1.34	107.5	55.5	57.9	103.2	1.1	-19
February 2007	109.7	1.51	107.5	55.6	57.5	102.6	2.0	-3.6
March 2007	111.1	1.51	107.6	55.4	57.4	103.2	-1.0	2.9
April 2007	111.0	1.59	107.7	55.4	57.0	104.2	2.3	5.8
May 2007	112.1	1.50	107.9	55	57.3	104.7	3.9	16.5
June 2007	111.7	1.52	107.9	55.6	58.3	102.8	6.5	24
July 2007	111.0	1.35	107.7	54.9	58.3	101.7	4.5	20.3
August 2007	110.0	1.41	107.2	54.3	58.0	100.4	2.8	10.4
September 2007	106.9	1.08	106.7	53.2	54.2	98.7	1.4	-6.9
October 2007	106.0	0.88		51.5	55.8	98.6	-1.8	-18.1
November 2007	104.8	1.04		52.8	54.1	98.3	-0.5	-32.5

1) Economic sentiment indicator, DG ECFIN. 2) Business climate indicator, DG ECFIN. 3) Composite leading indicator. 4) Reuters Purchasing Managers Index, manufacturing. 5) Reuters Purchasing Manager Index, services. 6) Business expectations, West Germany. 7) National Bank of Belgium indicator for manufacturing. 8) ZEW Indicator of Economic Sentiment, Germany

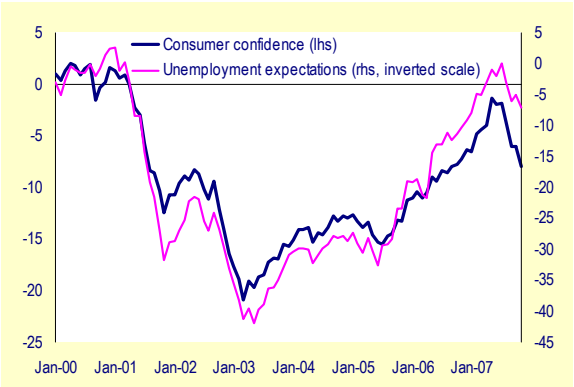
Graph 2: **Household saving rate and y-o-y consumption growth, euro area**
(in %; 1999Q1 – 2007Q2)



Source: Commission services.

Recent developments in euro-area consumption have been somewhat less dynamic than suggested by developments in the labour market and disposable income. The unemployment rate has continued to decline in recent months reaching 7.2% in October. In the third quarter, employment growth decelerated on a quarter-on-quarter basis (0.3% against 0.7% a quarter before) but reached its fastest year-on-year expansion rate since 2001 (1.9%). With such a robust labour market, developments in disposable income cannot explain the relatively subdued path of consumption. The saving ratio has actually been on an upward path since the beginning of 2006. It rose to 14.3% in the second quarter of 2007 and has probably continued to increase in the third quarter (Graph 2).

Graph 3: **Consumer confidence, euro area**
(Balance in %; Jan 2000 to Nov 2007)



Source: Commission services.

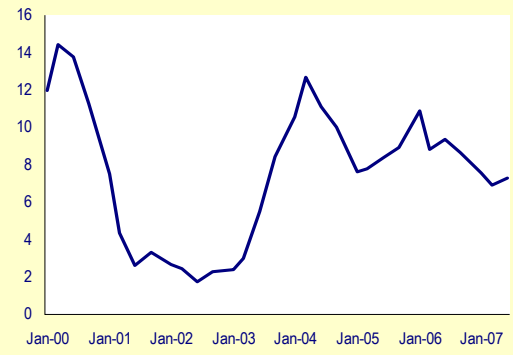
Looking ahead, the labour market is projected to remain relatively dynamic but this is unlikely to be sufficient to maintain consumer confidence at the very high levels experienced in the early part of 2007. Although still above its long-term average, household confidence has weakened significantly since the summer, reflecting mostly mounting concerns about the economic situation and deteriorating purchasing power (Graph 3). In light of recent developments in inflation, worries about purchasing power are unlikely to abate in the coming months, suggesting continued moderation in consumer spending in the months

ahead. Given the fact that household spending has lately become the main engine of growth, this can significantly impact the short-term outlook of the euro-area economy.

World trade on a slight downward trend

After a softening in the two first quarters of 2007, the rate of growth of world trade picked up again in the third quarter. According to the latest estimates of the CPB Netherlands Bureau of Economic Policy Analysis, world trade increased by 2.6% (q-o-q) in the third quarter of 2007, up from 0.8% in the previous quarter. These positive developments were also visible in euro-area trade figures. Euro-area export growth increased from 0.8% q-o-q in the second quarter to 2.5% in the third quarter. At the same time, import growth also accelerated (from 0.1% to 2.7%).

Graph 4: **World trade**
(y-o-y % changes in volume; 1999Q1 – 2007Q3)



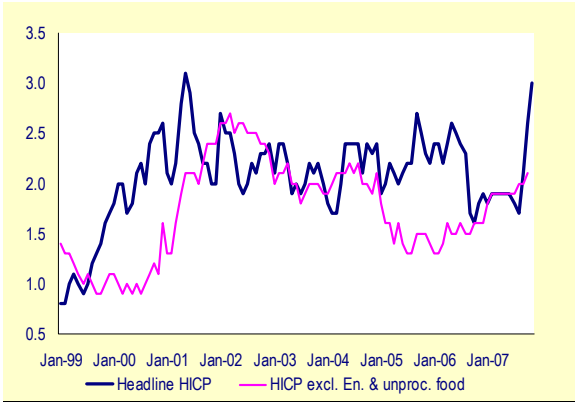
Source: Commission services.

Nevertheless, the positive result of the third quarter should be interpreted with prudence. First, y-o-y growth figures show that world trade growth is on a downward trajectory (Graph 4). World trade in the third quarter increased by 7.3% (y-o-y), down from the record high of 10.9% in the first quarter of 2006. The loss in momentum is now discernible both in industrial and emerging economies, though the deceleration of import growth was particularly sharp in the US during the third quarter (0.6% y-o-y in Q3 after 2.6% in Q2). Second, recent survey indicators of the world economy point to further growth moderation in the next few quarters. The November reading of the quarterly World Economic Survey indicates a deterioration of expectations for the next six months. The November Global Manufacturing PMI likewise points to a deceleration of growth in the global manufacturing sector in the fourth quarter. In a similar vein, export expectations in the euro-area manufacturing industry for the fourth quarter, as recorded in the European Commission's manufacturing survey, have weakened substantially. The euro-area business sector also became less optimistic as regards its competitive position outside the EU for the fourth quarter.

Inflation increases substantially

According to Eurostat's latest flash estimate, annual euro-area headline inflation rose markedly again in November to 3%, from 2.6% in October and 2.1% in September. The November reading is a six-and-a-half-year high and will push inflation for the fourth quarter of 2007 well above the 2.5% level projected in the Commission Services' Autumn Forecasts.

Graph 5: **HICP consumer prices, euro area**
(y-o-y changes in %; Jan 1999 – Oct 2007)



Source: Commission services.

At the cut-off date for this publication, a detailed breakdown of HICP data for November was not yet available. However, provisional HICP data for Germany (3.3%, +0.6 pp), Spain (4.1%, + 0.6) and Italy (2.5%, +0.2), as well as non-harmonised CPI data for Belgium (2.9%, +0.7) and Slovenia (5.7%, +0.6), indicate strong increases in a number of Member States.

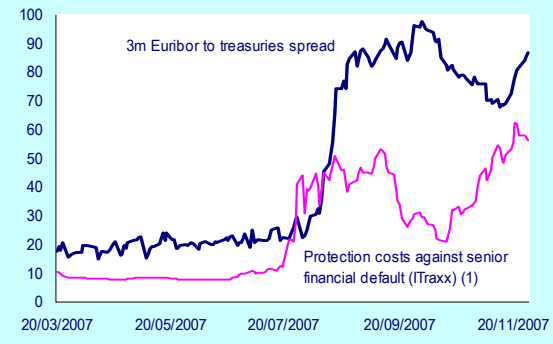
The causes of this high rate are almost certainly due to the continued effects on the HICP of increased oil and agricultural commodity prices. This is confirmed by provisional November data

Box 1: **Effects of financial turmoil on growth - an update**

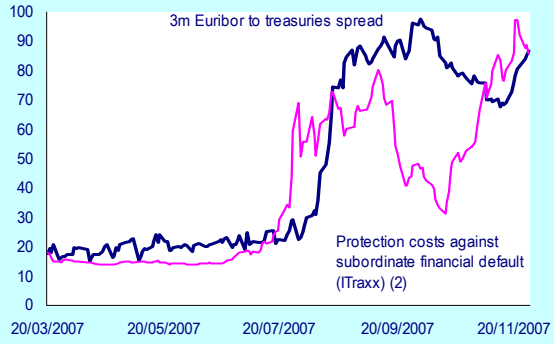
This box updates the analysis of the implications of the financial turmoil presented in the previous issue of the Quarterly Report on the Euro Area. Events in financial markets so far suggest that the process of risk re-pricing will be far from smooth, instead oscillating back and forth. While the immediate turbulence in August was replaced by a calmer – but still far from normal – period thereafter, heightened credit fears returned in November in the face of increased bank write-downs, asset backed security downgrades and a further deterioration of the US housing market.

In face of the ongoing interbank market dislocation, the ECB announced that extra liquidity will be provided for as long as necessary' with 'no deadline' and central banks have started to inject emergency liquidity into the system again. The picture of continued tension is also confirmed by the most recent ECB Bank Lending Survey (ECB-BLS) – released early October – where a significant number of banks reported hampered access to their usual funding sources. According to the survey, funding sources most affected are securitisation activities, medium to long-term debt securities issuance and interbank term funding.

Protection against default cost in financial market
(in bp; 20 Mar 2007 to 28 Nov 2007)



(1) Premium for insuring 10 million euro of senior debt in the financial sector against bankruptcy.
Source: Commission services.



(2) Premium for insuring 10 million euro of subordinate debt in the financial sector against bankruptcy.
Source: Commission services.

In addition, investor perception of financial institution default risk has risen sharply in recent weeks, surpassing levels reached in August. Indices tracking US sub-prime and commercial property debt touched new lows in November, suggesting that underlying credit losses for financial institutions in relation to the complex structured finance products might be still mounting. In line with a generalised investor flight to safety, government bond yields headed lower again.

Currently, funding for financial intermediaries is far from normal. In addition, the stock market valuation of financial companies has declined, reducing the attractiveness of equity funding. However, euro-area banks were well capitalised when the current period of turmoil began in the summer. The average Tier 1 capital ratio increased slightly from 7.9% in 2006 to 8.1% over the first six months of 2007 and the weighted average total capital ratio stood at 11.3%, well above the regulatory minimum of 8%. On this basis regulatory capital remains adequate to cope with unexpected losses.

Financial institutions face also the challenge of finding new profitable activities in an environment which might change fundamentally in the wake of the pre-turmoil world. They will probably have to adapt to a new era characterised by weaker lending growth, much less structured finance and securitisation activity and less merger and acquisition financing. In the absence of new profit opportunities, and with the time of easy credit gone, intermediation activities could be significantly affected.

Impact for corporations

While it is much too early to judge the full impact of the credit turmoil on economic activity, any assessment has to look at (i) credit conditions and (ii) credit flows to economic sectors, such as non-financial corporations and households.

For the non-financial corporate sector, credit conditions are tighter now than before. The ECB-BLS indicated tightening credit conditions with 31% of all banks tightening during the third quarter of 2007 (against a net 3% of all banks reporting loosening conditions in the previous quarter). Long-term loans and loans to large enterprises were most affected by credit tightening. On balance, a net 28% of all banks expect to tighten loan conditions further in the current quarter.

In addition, the average interest rate for new non-financial corporate loans rose to 6.1% in September, up 0.28% since July, the sharpest interest rate increase since the start of the ECB interest rate statistics series in 2003. Furthermore, corporate credit spreads have widened to levels not seen in many years. Equity markets held up reasonably well until mid-October, although prices have started to decline again lately in volatile trading sessions.

Since the outbreak of the turmoil in August, the amount of funding to the non-financial corporate sector shows some tentative signs of slowing down, especially in the non-bank sector. Net issuance of non-financial corporate debt securities declined in August and September by a combined EUR 6.3 billion (seasonally adjusted), adding up to one of the worst 2-month net contraction in corporate bond issuance since the start of the series in 1990. Quoted share net issuance declined by a non-seasonally adjusted EUR 0.7 billion in September, following a EUR 2.8 billion decline in August. Heightened volatility might have affected the pricing of new stock issuance and therefore impacted on funding possibilities there. In contrast, the picture is less clear as regards bank loans to the corporate sector, a dataset which is not seasonally adjusted. The year-on-year rate of growth of bank loans to corporations increased to 13.9% in October, up from 13.6% in July. As a result of this ambiguous set of data, it seems difficult to pinpoint a clear slowdown in non-financial corporate funding. That said, full results – when available – are expected to show that overall Q3 funding for the corporate sector came down significantly when compared with earlier periods this year.

Impact for household sector

Credit conditions have also tightened for the household sector. According to the ECB-BLS a net balance of 12% of all banks tightened credit conditions for loans for house purchase in the third quarter (22% tightening and 10% easing) against previous credit standards in the quarter before and a net 15% of all banks expect to tighten credit conditions further in the current quarter. For consumer credit and other household sector loans, a net 3% of banks eased credit conditions in Q3, but – on balance – 11% expect credit conditions to tighten in the current quarter. Interest rates charged by banks for new loans to the household sector have also risen steeply, but not by a record amount.

Year-on-year growth in bank lending to the household sector decelerated slightly to 6.8% in October, down marginally from the 7% recorded in July before the beginning of the turmoil. Balance sheet pressure on households could also increase in the face of rising interest rates on outstanding loans and record levels of debt when measured against both GDP and gross disposable income.

for Germany, which shows strong increases for the food and non-alcoholic beverages categories, as well as for liquid fuels.

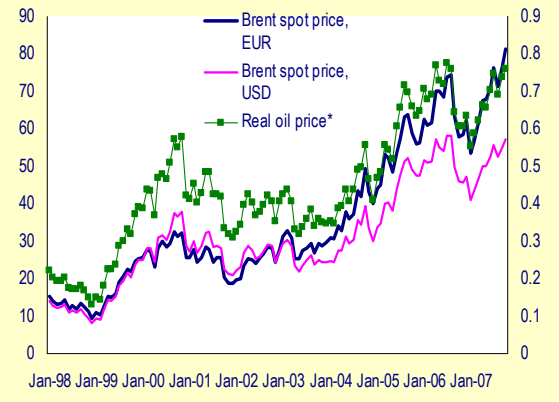
In October, energy inflation reached 5.5% in the euro area, contributing 0.5 pp. to headline inflation (up from 0.3 pp. in September and -0.1 pp in August). The strong growth in HICP energy prices reflects recent strong increases in oil prices on the one hand and, on the other, base effects owing to the low level of oil prices registered in the second part of last year (Graph 6). Between November 2006 and November 2007, Brent oil prices measured in USD increased by 57%. In euro terms the increase was 38%, highlighting the dampening effects of the appreciation of the euro against the dollar over this period.

Recent empirical estimations carried out by DG ECFIN suggest the pass-through of oil price changes to euro-area inflation to be strong and rapid. Results show a 10 euro increase in oil prices raises the HICP energy component by about 8 pp in the year following the shock, with most of the effect (73%) occurring within one month. Based on the observed increase in oil prices of 18 euros over the past year (between November 2006 and November 2007), the above estimate implies a total increase in HICP energy inflation of 14.4 pp and a resultant increase in headline HICP inflation of about 1.4 pp.[2]

Sustained high oil prices (current futures put Brent oil prices at approximately USD 87 for December 2008), together with continuing base effects and lagged pass-through of past oil price rises, imply that energy price inflation will continue to contribute strongly to overall headline inflation over the next few months.

[2] The estimations were carried out using an autoregressive model of order one for y-o-y HICP energy inflation on y-o-y oil price changes and a number of lags at monthly frequency for the period January 1999 to October 2007. Tests for unit roots were carried out and confirmed the use of variables in differences/percentage differences. All explanatory variables were significant at the 1% or 5% levels and the fit of the model was very high, with an adjusted R squared of about 0.97.

Graph 6: **Oil price developments**
(Jan 1998 – Oct 2007)



*Index, 1981=1
Source: Ecowin, own calculations

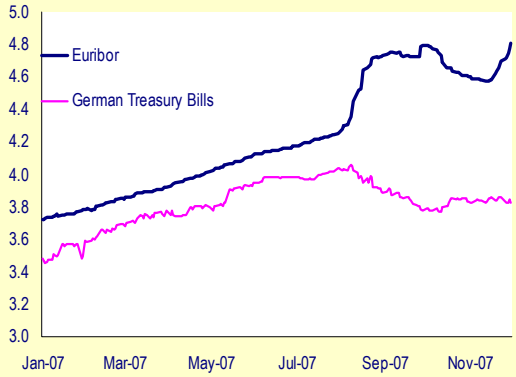
Food price inflation also contributed significantly to the increase in HICP inflation in October. Both processed and unprocessed food prices picked up significantly (to 3.8% and 3.1% respectively), contributing a combined 0.7 pp to headline inflation in the euro area. After an initially muted impact, HICP food prices have more recently been strongly affected by the growth in international agricultural commodity prices over the last year. While these commodity prices have now begun to fall, and are expected to do so throughout next year, continuing base effects and further possible lagged effects will continue to affect HICP food price over the next few months.

In addition to the direct effects of commodity price increases, euro-area inflation over the coming months may be affected by likely future indirect effects on other sectors, persistently strong inflation in services and increased inflation expectations. There is also a risk of second-round effects.

Monetary and financial conditions

The financial market tensions since July/August have led to a moderate downward revision in growth prospects in the euro area but have greatly increased the level of uncertainty surrounding the economic outlook. This has led the ECB to keep interest rates unchanged since the summer, contrary to what was expected until July, even though inflation has been on the rise and the ECB has pointed out that upside risks to price stability still remain. Currently, interest rate expectations as derived from financial market prices suggest that the most likely scenario is that the ECB will stay on hold in the coming months.

Graph 7: **Euro-area money market**
(in % ; 1 Jan 2007 to 30 Nov 2007)



Source: Commission services

However, even with stable policy interest rates since June, monetary conditions in the euro area have become tighter, for three reasons.

First, the financial turmoil has led to a significant reappraisal of credit risks, reflected in higher interbank interest rate spreads. Banks are holding on to their cash balances and useing the deposit facility of the ECB rather than lending to other banks. In the midst of the turmoil, the 3-month Euribor was as high as 4.80%, leading to a spread versus the 3-month German treasury bill of around 100 bps.[3] Following a temporary improvement in money market conditions, renewed credit concerns became apparent in November in the wake of banks signalling possible higher than expected write-downs due to credit losses related to the US sub-prime crisis. Presently, the 3-month Euribor is above 4.80% and the spread versus German Treasury bill again close to 100 bps.

[3] The difference between 3-month EURIBOR and 3-month German Treasury bill (the so-called TED spread) is a measure of liquidity that can also be used as an indicator of credit risk. This is because German Treasury-bills are considered risk-free while the rate associated with the EURIBOR reflects the credit risk of non-government borrowers. The average spread for the difference between the 3-month EURIBOR and 3-month German Treasury bill has in the past been around 20 bps. The acronym comes from 'T-Bill' and 'ED' - the ticker symbol for the Eurodollar futures contract.

Box 2: China's trade surplus and renminbi exchange rate

A soaring trade surplus

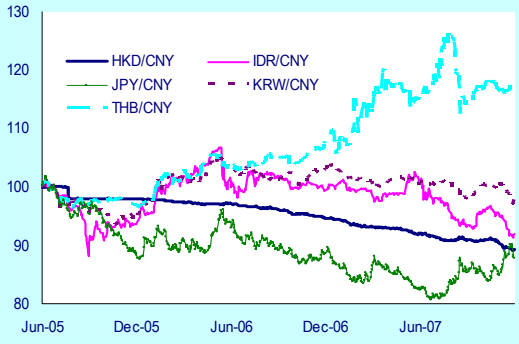
China is the world's third largest world exporter after the US and Germany and the third largest trading partner of the euro area in terms of its combined share of exports and imports. From 2000 to 2006, bilateral trade between the euro area and China increased by 167% (overall euro-area trade increased by 37%). China is running a high and increasing trade surplus. According to Chinese statistics, its global trade surplus has increased from 35 bn US dollar in 2000 to USD 178 bn in 2006, and again to USD 214 bn in the first ten months of 2007 alone. China also has the largest bilateral trade surplus with the euro area.

The Chinese trade surplus is a major element of global current account imbalances. As a result of IMF-led multilateral consultations(1) to address these imbalances, the Chinese authorities committed to a number of reforms including structural measures to rebalance growth towards private consumption and a flexibilisation of the renminbi exchange rate. Together with structural weaknesses which have led to excessive domestic savings, the undervaluation of the renminbi is widely seen as a key driver of China's large trade surplus.

Renminbi against euro and USD
(daily values)

Source: ECB.

East Asian currencies to renminbi
(index, June 2005=100)



Source: ECB and Commission services.

In June 2005, China reformed its exchange rate policy, revaluating the renminbi by 2.1% and formally abandoning its peg to the US dollar in favour of a peg to a basket of currencies. Since then, the renminbi has gradually appreciated against the US dollar, by a cumulative 10.6% until early December 2007. The very regular pace of its development against the dollar (as opposed to the euro, see left panel of the graph) suggests that the US dollar ha *de facto* remained the main reference for the renminbi exchange rate. However, as the dollar depreciated significantly over the same period, the renminbi hardly appreciated in effective terms, and depreciated by 9.4% against the euro. This has led to calls by the G7 for China '*to allow an accelerated appreciation of its effective exchange rate*'.(2)

The structure of China's external trade: does the exchange rate affect exports?

China's role as a processing hub, it has been argued, would result in a very low exchange rate elasticity for China's exports. An appreciation of the renminbi would make intermediate goods imported from the East Asian region cheaper, allowing Chinese exporters to reduce their prices and thus offset the nominal appreciation. However, the structure of China's production and exports has been changing fast in recent years.(3) In particular, more inputs into export goods are now produced domestically, as witnessed by the stabilisation of China's trade deficit with the rest of Asia at a time when its exports to the US and the euro area have soared. Moreover, the technology content of China's exports has increased and there are indications that this has made them more price-sensitive. Trade elasticities are therefore probably higher than estimates based on historical data suggest.(4)

A domestic policy dilemma

Some observers(5) have argued that a strategy of export-led growth with an artificially low exchange rate is a sustainable and indeed optimal development strategy for China. However, the sustainability of this strategy now seems to be threatened by domestic developments even more than by external constraints (mostly related to concerns about the sustainability of the corresponding US deficit). Large-scale intervention in the foreign exchange market is increasingly posing problems for the pursuit of China's domestic policy goals. China's foreign exchange reserves now amount to USD 1.4 trillion, or 85% of GDP, and have recently been increasing by an average of 2 billion US dollar per day. In an attempt to sterilise the liquidity created by the interventions, the People's Bank of

China has increased minimum reserve requirements nine times in 2007 so far and has issued bills worth 2.6 trillion renminbi in the first half of the year. The massive absorption of central bank bills by the banking sector creates opportunity costs and stands in the way of asset diversification. Despite the sterilisation efforts, liquidity is increasing and is likely to be fuelling the emergence of asset price bubbles – the Shanghai stock index has soared by 400% since 2006 – and inflation.[6] The authorities are applying administrative restrictions to curb rapid credit growth, which is often directed to already overheating sectors of the economy. An appreciation would reduce the need to intervene and free the central bank to pursue its domestic monetary objectives. At the same time, increasing expectations of renminbi appreciation are likely to be an important determinant of the latest inflows of portfolio investment.[7]

A potential broader impact of renminbi appreciation

China remains an important destination for exports from other East Asian countries, with which it also competes for market shares in third countries. Many countries in the region have sizeable current account surpluses and undervalued exchange rates. In 2007, the founding members of ASEAN (Thailand, Indonesia, Malaysia, the Philippines and Singapore) are expected to have a combined current account surplus of 7.6% of GDP, and Japan a surplus of 4.5%. Since June 2005 (i.e. the month before China's initial exchange rate policy adjustment), the Malaysian ringgit and the Singapore dollar continued to track the renminbi closely. The Korean won also remained in a range of +/- 5% to the renminbi, while the yen, the Indonesian rupiah and the Hong Kong dollar depreciated substantially. The Thai baht and the Philippine peso appreciated against both the renminbi and the euro.

Effective renminbi appreciation would allow more of the countries in the region to let their currencies appreciate without fear of losing exports. Overall, an effective appreciation of East Asian currencies would contribute to an orderly reduction of global current account imbalances and would alleviate pressures on the bilateral exchange rate of the US dollar against the euro.

Notes

(1) These consultations took place between the summer of 2006 and the spring of 2007 and involved the US (as the main deficit country), China, Japan and Saudi Arabia for the main surplus countries and the euro area as a major global player, despite its overall balanced current account.

(2) Statement by G7 Finance Ministers and Central Bank Governors, Washington D.C., 19 October 2007.

(3) Aziz, J. and Z. Li (2007), 'China's Changing Trade Elasticities', IMF Working Paper WP/07/266.

(4) Cui, L. and M. Syed (2007), 'Is China Changing its Stripes? The Shifting Structure of China's External Trade and its Implications', paper presented at the conference 'Global Implications of China's Trade, Investment and Growth', 6 April, Washington D.C

(5) Dooley,P., D. Folkerts-Landau and P. Garber (2004),'The revived Bretton Woods System', *International Journal of Finance and Economics*, 9(4), pp 307-313.

(6) Price-earnings ratios increased somewhat less, as firms experienced strong profit growth.

(7) McKinnon warned about the destabilising potential of such a combination of appreciation expectations and speculative capital inflows. McKinnon, R (2006), 'China's Exchange Rate Trap: Japan Redux?', *American Economic Review* 96(2), pp 427-431

Second, while government bond yields in the euro area and the US have fallen since August – mostly driven by US economic news but also due to investors looking for a 'safe haven'– the cost of debt financing for companies has not declined, as corporate spreads and bank-lending standards have tightened.

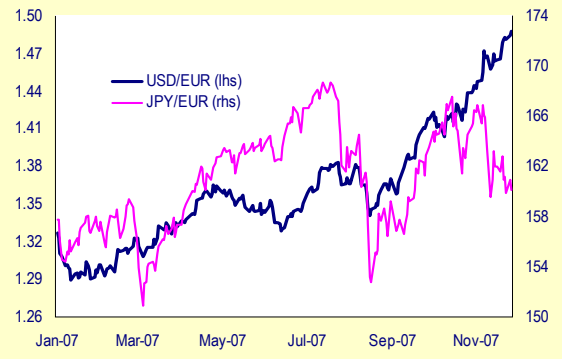
Third, the euro's has significantly appreciated further during the autumn. The euro reached close to USD 1.50 on 23 November and now stands at USD 1.47, 8% higher than three months ago. It has appreciated by 5.3% against the pound sterling in the past three months, coming close to the record high of 0.724 set in May 2003. The financial turmoil has also caused an unwinding of carry trade positions. After a strong initial appreciation in July and August, the yen exchange rate has remained very volatile in the past three months, within a range of 157-168 to the euro.

In comparison with its average for 2006, the euro has appreciated 6.3% in nominal effective terms, 3.4 pp of which occurred in the past three months. The nominal effective depreciation of the US dollar has also become steeper, gaining 4.5% in the past three months, and the Chinese renminbi depreciated 1.5% in effective terms over the same period.

The euro's strength has been largely due to the developments in fundamental variables – namely a stronger growth outlook for 2008 in the euro area than in the US or Japan and expectations of

a closing interest rate gap with the US. More specifically, the Fed lowered its interest rates three times during the autumn, bringing down the Fed funds target to 4.25%.

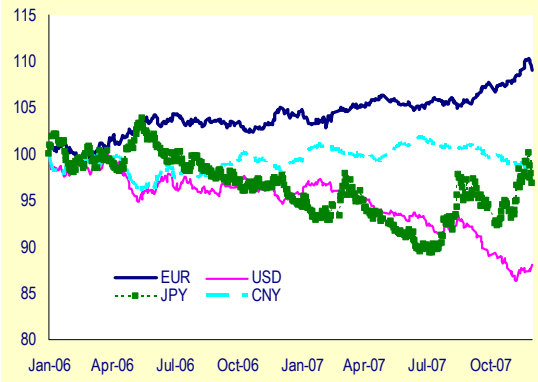
Graph 8: **Euro exchange rates**
(2 Jan 2007 to 27 Nov 2007)



Source: Commission services

However, significant further effective appreciation could bring the euro outside the range that can be explained by the development of fundamentals. The impact of the strong euro on euro-area exports, which has been limited so far, would then probably be felt more strongly. It is therefore even more important at the current juncture that the exchange rate impact of the rebalancing of global imbalances is spread more evenly across the main world regions and countries. In particular, Asian economies with large current account surpluses should contribute to this process through an appreciation of their currencies. For instance, the Chinese renminbi should be allowed to appreciate in effective terms. This would increase the room for manoeuvre of the monetary policy authorities, and would also facilitate the appreciation of the currencies of other East Asian economies with large current account surpluses (see Box 2).

Graph 9: **NEER against 41 parties**
(Index 2 Jan 2006 =100; 2 Jan 2006 to 30 Nov 2007)



Source: Commission services

Box 3: **The upcoming euro-area enlargement to Cyprus and Malta**

One year after Slovenia, on 1 January 2008, Cyprus and Malta will become the next countries of the ten Member States that joined the EU on 1 May 2004 to enter the euro area. Euro notes and coins will be issued by these countries at the same time that they adopt the euro. The conversion rates are set at 0.4293 Maltese lira and at 0.585274 Cyprus pound to the euro, the current central rates of these currencies within the ERM II exchange rate mechanism.

Cyprus' and Malta's entry into the euro area is the result of a successful process of convergence towards the euro area, accompanied by stability-oriented policies and structural reforms. Although at times volatile, inflation in the two countries has traditionally been moderate and in recent years it has been very close to the euro-area average, standing at 2.2% in Cyprus and 2.6% in Malta in 2006. Interest rate convergence has largely been achieved. In both countries, the short-term interest rate differential vis-à-vis the euro has declined sharply after their ERM II accession. Since August 2006, it has almost vanished in Cyprus, while it has been below 50 basis points in Malta. In addition, spreads for long-term interest rates have narrowed substantially in both countries in the last two years and, since January 2007, have been below 30 basis points in Cyprus and close to 40 basis points in Malta. General government deficits have declined in recent years in both countries (and now stand at 1.2% of GDP in Cyprus and 2.5% of GDP in Malta in 2006), as has the public debt as a share of GDP (which amounted to 65.2% in Cyprus and 64.7% in Malta in 2006).

The GDP per capita in Purchasing Power Standards (PPS) of Cyprus and Malta reached respectively 77.3% and 69.1% of the euro-area level in 2006, while consumer price levels were respectively 86.7% and 70.9% of the euro-area average. Cyprus has experienced high GDP growth in the last decade. Annual average growth was slightly below 4% in the period 2004-2006 and strong growth is expected to continue in 2007 and 2008. In Malta, real GDP growth oscillated around zero between 2001 and 2004. As a result, the process of real convergence towards the euro-area

decelerated in those years. Real GDP growth picked up strongly in 2005 and 2006 and, according to the Commission Autumn 2007 Forecasts, is expected to continue at close to 3% in 2007 and 2008. In both countries, further progress is however needed in order to increase labour productivity, which is still below the euro-area average. While the labour market situation in Cyprus compares well vis-à-vis the euro area, with an average unemployment rate of 4.6% in 2006 (8.2% for euro-area average) and a high employment rate (69.6% compared to 64.6% in the euro area), the picture is less rosy in Malta. The Maltese employment rate is relatively low (at 54.8%), notably for women and older persons, and unemployment rate is relatively high (7.3%), although still below the euro-area average. In both countries, the current account has been in deficit over the last decade, with a trade deficit only partially compensated for by a sizeable surplus in services trade, reflecting the competitive advantages of these two islands in tourism, financial and businesses services.

Recent macroeconomic performance, Cyprus and Malta
(in %)

	Cyprus				Malta			
	2004	**2005**	**2006**	**2007** (1)	**2004**	**2005**	**2006**	**2007** (1)
GDP growth	4.2	3.9	3.8	3.8	0.1	2.5	2.6	3.1
Inflation	1.9	2.0	2.2	2.0	2.7	2.5	2.6	0.8
Current account deficit (%of GDP)	-5.0	-5.6	-5.9	-6.0	-6.0	-8.8	-6.7	-3.8
Budget balance (% of GDP)	-4.1	-2.4	-1.2	-1.0	-4.9	-3.1	-2.5	-1.8

(1) European Commission Autumn 2007 Forecasts;
Source: Commission services.

Cyprus' and Malta's convergence process has been accompanied by a sustained increase in trade and financial integration with the euro area. Cyprus and Malta are both small, open economies which are highly integrated in terms of trade and FDI with the euro area. Trade with the euro area represents 51% of total trade for Cyprus and 48% for Malta. In addition, a large share of FDI comes from the euro area (34% for Cyprus and 55% in Malta in 2005).(*) Reflecting their history as regional financial centres, the Cypriot and Maltese financial systems are also substantially interlinked with the financial systems of the euro area. In both countries, the financial sector is well developed in relation to their stage of economic development, with a predominant banking sector but with other financial intermediates also developing.

Cyprus and Malta will become the two smallest economies in the euro area, contributing only 0.17% and 0.06% respectively to euro-area GDP, and 0.24% and 0.13% to its population. Their membership of the monetary union will bring additional opportunities for their citizens and businesses. However, it will be essential that their economic policies continue to be geared towards preserving macroeconomic stability and competitiveness. In particular, further improvement in the functioning of product and labour markets are needed to foster productivity growth and facilitate the restructuring towards more innovation-driven activities. This would prevent competitiveness strains as income further catches up with EU average levels and help to maintain a sustainable current account balance. While this is a challenge in both countries, it is more acute in Malta, where labour productivity and the employment rate stand well below the euro-area average and the unemployment rate is still high. In addition, in both countries, a prudent fiscal stance aimed at avoiding the build-up of excessive demand pressures and wage developments in line with productivity gains are needed. Malta, in particular, will have to continue its fiscal consolidation efforts to reduce the still high fiscal deficit.

References

European Commission (2007), 'Convergence Reports 2007 on Cyprus and Malta', Directorate-General for Economic and Financial Affairs, May.
European Central Bank (2007), 'Convergence Report', May.

(*) The share for Malta is a Commission estimate based on partial data for 2005.

2. The decline of inflation volatility in the euro area

This section provides a broad analytical review of developments in inflation volatility in the euro area. It first compares the area's inflation performance since the launch of Stage III of EMU with previous periods and with the other main industrialised countries. It then discusses the main explanatory factors for the observed developments in inflation volatility.

The inflation performance since the inception of the euro

Table 3 gives an overall characterisation of inflation performance during current and previous decades. The euro area has registered a clear improvement in terms of the level of inflation over the last four decades. While in the 1970s average inflation in the euro area more than doubled, to over 9%, compared to the 1960s, as a consequence of the two oil price shocks and the policy responses to them, it has since declined to 2% in the current decade.

Table 3: **Inflation performance by decade: euro area** (in%)

	Average inflation	Standard deviat. of inflation	Maximum inflation	Date of max. inflation
1960s	3.7	0.9	5.1	1963
1970s	9.3	2.8	13.6	1974
1980s	7.5	3.8	12.8	1980
1990s	2.8	1.2	5.0	1990
2000s(1)	2.0	0.3	2.4	2001

(1) Corresponds to the period since the start of Stage III of EMU, of which the last 2 years are forecast values.
Source: Commission services

It is noteworthy that a sizable part of the decline in inflation occurred in the 1990s, reflecting the efforts made by Member States to meet the Maastricht criteria and be part of the first wave to adopt the euro. Key among these efforts was an improvement in monetary policy making, which included granting independence to national central banks, introducing some forms of inflation targeting and paying more attention to credibility issues and expectations. Indeed, the evidence from the 1990s indicates that greater central bank independence and the adoption of inflation targets have helped bringing down both inflation and its volatility.[4]

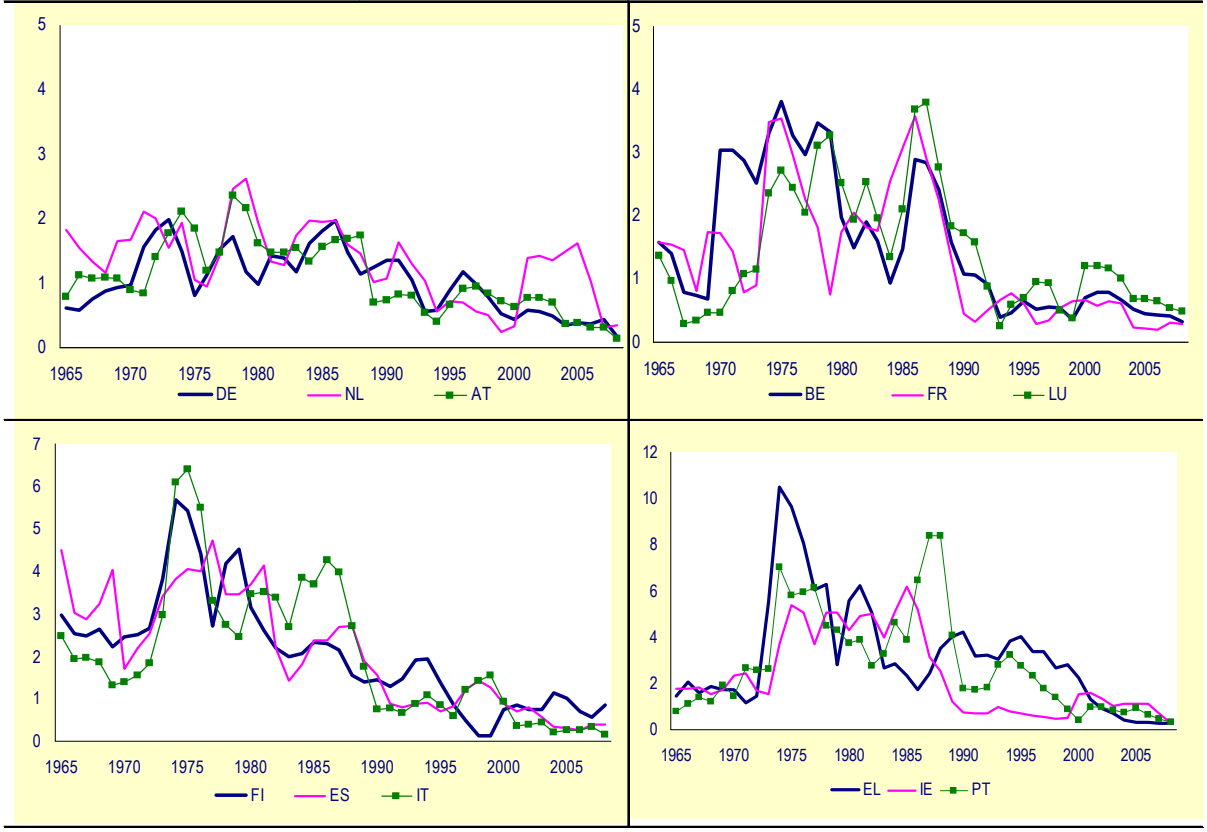
Average inflation declined even further in the current decade, to stand at 2%, the lowest rate in the last 50 years. Remarkably, this has been achieved in spite of a series of severe inflationary shocks hitting the euro-area countries from the start, including surges in oil prices, swings in the euro exchange rate, temporary rises in food prices and increases in indirect taxes and administered prices in several Member States.

Even more impressive than the performance of average inflation is that of inflation volatility. Using the standard deviation in each decade to gauge inflation volatility, the current decade displays more stable inflation than any other decade in the last 50 years. As can be seen in the second column of table 3, the standard deviation of inflation peaked in the 1980s, at close to 4 pp. In the 1990s, when the institutional arrangements for participation in Stage III of EMU were put in place, the standard deviation of inflation declined to nearly one fourth of that of the preceding decade. In the last period, the volatility of inflation was yet again reduced to one fourth of that of the preceding decade. As a result, the volatility of inflation in the last decade is also markedly lower than in the 1960s, the next-best decade for low inflation volatility.

Another way to look at the progress in terms of inflation performance is to examine how bad inflation has been at its worst in each period. The third column in table 3 gives the highest annual average inflation rate recorded in each decade and the fourth column the year in which this occurred. By this measure, inflation performance in the 1990s was not markedly different from that of the 1960s, when the Bretton Woods system sheltered economies from exchange rate movements. However, the most recent period stands out again with a maximum level of inflation that is half the level of the 1960s and 1990s.

[4] Eijffinger, S.C.W. and de Haan, J. (1996) 'The Political Economy of Central Bank Independence', Princeton University: Special Papers in International Economics, N°19 (May); Woodford M. (2004), 'Inflation targeting and optimal monetary policy', *Federal Reserve Bank of St. Louis Review*, July/August; (86)4, pp.15-41.

Graph 10: **Inflation volatility, euro-area Member States**
(Standard deviations; 5 years rolling, annual data) (1)



(1) Slovenia is not shown due to the relatively short historical series available for that country.
Sources: Commission services.

The decline of inflation volatility in euro-area Member States

Within the euro area, three groups of countries can be identified with noticeable differences in the timing and scope of reductions of inflation volatility. In the first group, the standard deviations of inflation in the last five decades hardly went above 2 pp (DE, AT and NL). A second group registered average standard deviations of twice that level (BE, FR and LU). The third group includes the countries where inflation was the most volatile with standard deviations in excess of 4 pp (IE, EL, ES, IT, PT and FI). That group also registered the largest falls in both inflation volatility and the inflation level over the last two decades.

To gain more insight into the time profile of changes in inflation volatility, Graph 10 shows the evolution of rolling 5-year standard deviations for all euro-area Member States. The chart shows that countries in the first group (DE, AT and NL) embarked on a relatively mild trend decline of inflation volatility already in the early 1980s. For the countries in the second group (BE, FR and LU) the decline took place in the late 1980s. Four countries of the third group (ES, EL, IT and FI) also show a trend decline in volatility since the early 1980s, although from considerably higher levels, while the two remaining countries in this group (IE and PT) followed suit in the late 1980s.

Interestingly, a noticeable break in the series for inflation volatility can be observed in the 1990s for most countries. The countries in the first group recorded a sustained drop of about 25% in the volatility of inflation in the 1990s, with standard deviations generally below 1 pp since then. The break is more clearly noticeable for countries in the second group, which saw a decline in volatility of some 70% in the 1990s,

with standard deviations also durably below 1 pp since then. A noticeable break can also be observed in the 1990s for some countries in the third group, albeit with inflation remaining twice as volatile as in the former groups (IE, ES, IT and FI). The remaining countries (EL and PT) reached similarly low levels of inflation volatility only in the last 10 years.

In the current decade, most countries have registered further substantial reductions in inflation volatility, to reach standard deviations of around ½ pp for the decade. This includes even countries that had a history of relatively low and stable inflation. Germany, in particular, recorded a 50% reduction in the standard deviation of inflation, from 1 pp in the 1990s to ½ pp in the last ten years. This is a remarkable achievement, as it means that the last decade corresponds to a period with unprecedented low inflation volatility since the 1960s for all Member States, except Ireland and the Netherlands. Although remaining low by historical standards, the standard deviation of inflation in these two countries rose by about 50% in the last decade compared to the 1990s.

The euro-area experience in an international perspective

Table 4 presents a synthetic view of inflation performance in the US and in two non-euro-area EU Member States, the UK and Sweden. These countries underwent the same overall patterns as those described for the euro area. Average inflation was highest in the 1970s. Inflation declined thereafter, with the last decade showing the lowest levels of the last 50 years in the UK and Sweden, while in the US the 1960s remains the decade with lowest average inflation. However, in all three countries the last decade is unambiguously the one with the lowest inflation volatility.

In terms of timing, the US embarked on a trend decline in volatility in the second half of the 1980s. Several authors have pointed to major changes at the Federal Reserve, which were implemented during the tenure as chairman of Paul Volcker, as one of the main explanatory factors for the moderation of inflation volatility. In the pre-Volcker period (i.e. pre-1979), monetary policy seemed to have adopted an accommodative stance, responding less than one-for-one to changes in inflation.[5] According to these authors, by being more aggressive in the post-1979 period US monetary policy managed to reduce and stabilise inflation and expected inflation. By the first half of the 1990s, standard deviations were typically around 1 pp. and dropped further in the following decade.

Table 4: **Inflation performance by decade: UK, SE and US** (in %)

	Average inflation	Standard deviat. of inflation	Maximum inflation	Date of max. inflation
UK				
1960s	3.8	1.0	5.4	1969
1970s	12.5	5.3	24.2	1975
1980s	7.4	4.5	18.0	1980
1990s	3.9	2.6	9.5	1990
2000s(1)	2.7	0.5	2.4	2007
SE				
1960s	3.7	1.3	6.3	1966
1970s	8.6	1.8	11.4	1977
1980s	7.9	3.1	13.6	1980
1990s	3.5	3.6	10.5	1990
2000s(1)	1.4	0.7	2.7	2001
US				
1960s	2.4	1.5	5.4	1969
1970s	7.1	2.5	11.3	1979
1980s	5.5	3.6	13.5	1980
1990s	3.1	1.1	5.4	1990
2000s(1)	2.6	0.6	3.4	2000

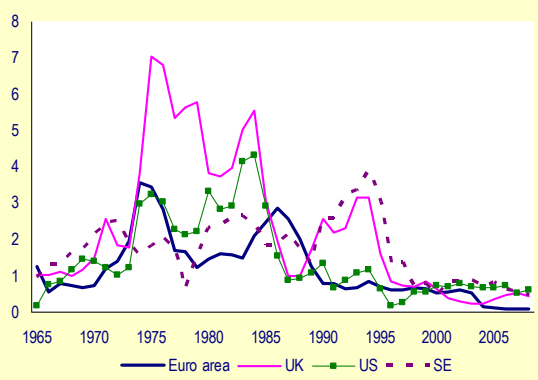
(1) Corresponds to the period since the start of Stage III of EMU, of which the last 2 years are forecast values

Source: Commission services

[5] See for instance, Clarida, R., J. Galí. and M. Gertler (2000), 'Monetary policy rules and macroeconomic stability: evidence and some theory', *Quarterly Journal of Economics*, Vol.115, N°1, pp.147-80. However, Gordon (2005) argues that monetary policy reactions were very similar during the Greenspan and the pre-Volcker years. Gordon, R. (2005), 'What caused the decline in business cycle volatility', NBER Working Paper No. 11777.

The UK has followed a pattern relatively similar to that of the US although volatility rebounded temporarily in the late 1980s early 1990s. Sweden experienced a marked rise in volatility in the late 1980s early 1990s but lower volatility than the US and the UK in the late 1970s and early 1980s. Barrel and Davis (2005) argue that UK monetary policy improved markedly in 1993 when it became more open and less influenced by short-term political needs.[6] The independence of the Bank of England in 1997 confirmed the policy direction. In the case of Sweden, there is evidence that the move of the Riksbank to inflation targeting in 1995 and the increased independence gained later in the decade greatly improved monetary performance. Already by the end of that decade, both the UK and Sweden entered a period of remarkably low inflation volatility, with standard deviations similar to those of the US, though still somewhat higher than in the euro area.

Graph 11: **Inflation volatility: euro area, UK, SE and US**
(Standard deviations; 5 years rolling, annual data)



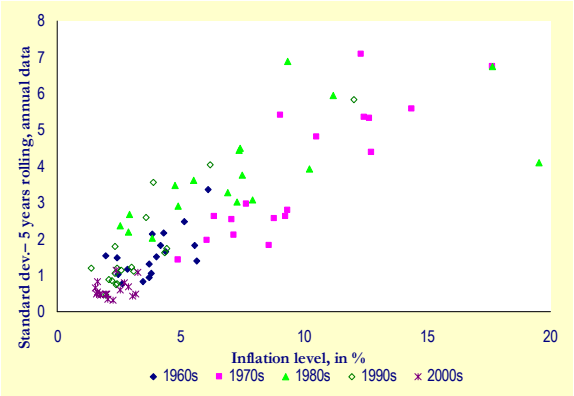
Source: Commission services.

Thus, it is not only the euro area that has seen sustained and substantial declines in the level and volatility of inflation since the 1990s. This suggests that, while certainly important, changes in the macroeconomic policy framework related to Stage III of EMU might not be the only explanatory factor behind the remarkable improvement in inflation performance over the last two decades. An alternative interpretation is that many of the institutional changes that matter for achieving an environment of low and stable inflation, which have been embedded in the EMU policy framework in the early 1990s, also took place in non-euro-area countries. These changes include granting independence to the central bank, giving it an explicit and clear mandate for achieving price stability, and wide recognition by policy makers and the public at large that price stability is a key policy objective.

Exploring possible factors behind the decline of inflation volatility

This section explores some of the possible factors that may have played an important role in explaining the decline in inflation volatility. Graph 12 presents a scatter plot of average inflation and its standard deviation for euro-area Member States. The chart also includes data for the countries that served as benchmarks for a comparison of the inflation performance of the euro area, namely Sweden, the UK and the US. A strong positive correlation can be observed between the level and the standard deviation of inflation over the whole sample period. In addition, examining the data by decade shows that in nearly every country, periods of low inflation were associated with more stable inflation, while periods of higher inflation went together with increased volatility of inflation.

Graph 12: **Inflation level and volatility: euro area, UK, SE and US**



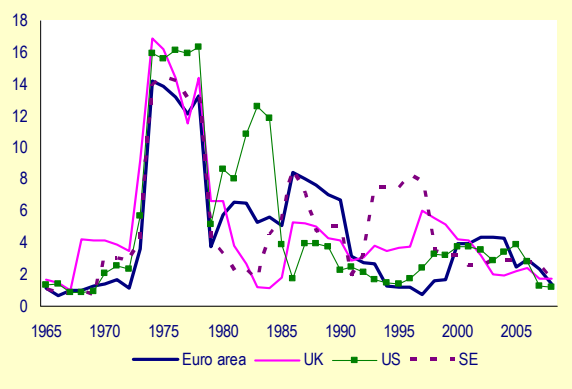
Source: Commission services.

The fact that the data reveals a positive link between the level of inflation and its volatility lends support to the hypothesis that improved monetary policy has played a role. Over the last two decades, there has been a conscious and

[6] Barrel, R. and P. Davis (2005), 'Policy Design and Macroeconomic Stability in Europe', *National Institute Economic Review*, N°19, January, pp.94-105.

systematic move away from unpredictable monetary policy which tends to generate price surprises towards stabilising the economy.[7] This has gone hand in hand with a better understanding of the importance of expectations and ensuring that monetary policy is credible.[8] By committing credibly to achieving an inflation objective/target that is equivalent to price stability, monetary policy has managed to lower not only the level but also the volatility of inflation.[9] With a credible commitment to price stability, economic agents do not have to change their expected inflation in the face of an adverse inflation shock.

Graph 13: **Volatility of growth in import prices, euro area, UK, SE and US**
(Standard deviations; 5 years rolling, annual data)



Source: Commission services.

Among other factors that could explain the reduced volatility of inflation is lower volatility in the main variables that traditionally drive the inflation process, which, of course, could also translate the effect of an improved policy framework. Examining first inflationary impulses from the external side, Graph 13 shows that the volatility of import prices declined markedly in the last three decades across the main industrialised countries. Import price inflation volatility was very low in the 1960s, reflecting the predominance of fixed exchange rate regimes at the time. In the 1970s, with the break-up of Bretton Woods and the oil price shocks, the volatility of import price inflation surged. It then fell back in the 1980s, while remaining considerably higher than in the 1960s. Further declines have been registered in the last two decades.

This evidence suggests that reduced volatility in world prices has contributed to the decline in the volatility of CPI inflation. An additional dimension, in the case of euro-area Member States, has been the disappearance of nominal exchange rate fluctuations within the area. There is indeed evidence that, despite large swings in the external value of the euro, the volatility of Member States' nominal effective exchange rates has remained relatively low since the launch of the euro, at least in comparison with the 1970s and 1980s.

Additionally, the literature on import prices provides evidence suggesting that the degree of pass-through to domestic inflation may have declined in advanced countries in recent years, reflecting, for instance, the increased use of pricing-to-market strategies.[10] This would imply a diminished role for import price volatility in explaining the volatility of domestic inflation. Moreover, there is also an issue of endogeneity here. An international environment characterised

[7] Research has highlighted the high level of predictability of the ECB's monetary policy. See for instance Perez-Quiros, G. and J. Sicilia (2002), 'Is the European Central Bank (and the United States Federal Reserve) predictable?', Working Paper No. 192, ECB; or Wilhelmsen, B.R. and A. Zaghini (2005), 'Monetary policy predictability in the euro area – An international comparison', Working Paper No. 504, ECB.

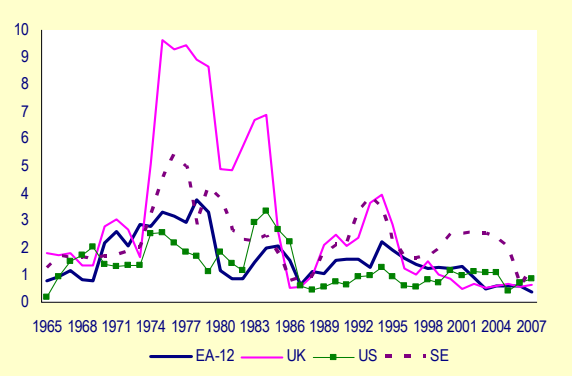
[8] See for instance Kydland, F. and E. Prescott (1977), 'Rules rather than discretion: the inconsistency of optimal plans', *Journal of Political Economy*, (86)3: 473-492.
Barro, R. J. and D. Gordon (1983), 'A positive theory of monetary policy in a natural rate model', *Journal of Political Economy*, 91(2): 586-610.

[9] The countries which registered the highest rates of inflation in the 1970s also registered the highest levels of volatility. It is now generally admitted that the high inflation prevailing at the time reflected not only strong supply shocks but also inefficient monetary policies. The strong correlation between inflation and inflation volatility across both countries and time suggests that inefficient monetary policy was responsible not only for high inflation but also for high volatility.

[10] See for instance Taylor (2000) who argues that in a low inflation environment the degree of pass-through is likely to be lower. Taylor, J.B. (2000), 'Low inflation, pass-through, and the pricing power of frms' *European Economic Review*, 44, pp. 1389-1408. See Faruquee (2006) for a recent finding of very low estimated short-run pass-through to import, wholesale and retail prices in the euro area. Faruqee, H. (2006), 'Exchange rate pass-through in the euro area', *IMF Staff Papers*, 53(1): 63-88.

by lower and less volatile inflation would be also conducive to lower import price volatility.

Graph 14: **Volatility of growth in unit labour costs, euro area, UK, SE and US**
(Standard deviations; 5 years rolling, annual data)



Source: Commission services.

Turning to domestic determinants of inflation, Graph 14 displays the development of the volatility of growth in unit labour costs (ULCs) since the 1960s for the same group of countries. The volatility of ULC growth in the euro area was fairly low in the 1960s. It increased sharply in the 1970s, declined in the 1980s, increased somewhat again in the early 1990s and has been on a broad downward trend since. A broadly similar pattern can be observed in the other countries except in the US which experienced its largest rise in volatility in the early 1980s.

These developments in ULCs can mostly be traced back to similar developments in the volatility of wages. In contrast, data shows that fluctuations in labour productivity only played a significant role in the 1970s and 1980s and even then the volatility of growth in productivity was smaller than that of wages (except in the US). This suggests that reduced productivity shocks have contributed to the decline in inflation volatility although more modestly than wages. However, while lower wage growth volatility has clearly facilitated the decline in inflation volatility, it is difficult to say to what extent this is the result of an autonomous development or a response to better macroeconomic policies and the corresponding changes in expectations.

A final link to explore is the one between inflation volatility and the volatility of GDP growth.[11] From a period of low growth volatility in the 1960s, the following decade saw a marked rise in output growth volatility in the euro area as well as in the US. While this development was reversed in the 1980s, there was a temporary resurgence of volatility (peaking at a much lower level than in the 1970s-80s) in the first half of the 1990s and then again, to a lesser degree, in the early 2000s. The overall level of volatility has remained quite low in the last decade.

There is a large and growing body of literature examining the reasons behind the observed marked decline in growth volatility, particularly in US, which is often labelled the 'Great Moderation'. Although no consensus has yet been reached on the proximate causes, it is clear that there has been a positive correlation between the paths of inflation volatility and growth volatility over the last decades. This suggests that improvements in monetary policy responses to shocks may have contributed to the decline in the volatility of both inflation and growth. However, there are also other salient candidate explanations for the reduced volatility of inflation and growth, namely structural changes in the economy (including reduced energy intensity of production, more intense product market competition and greater financial market integration), but also simply 'good luck', in the sense of fewer or smaller shocks to the economy.

Although these factors have likely all played a role, disentangling their respective contribution is not easy. Some recent studies for the US have tended to give a prominent role to economic shocks and 'good luck'. Stock and Watson (2003), for instance, find that although improved monetary policy played a key role in getting inflation under control, it only made a modest contribution to the moderation of output volatility in the US.[12] Gordon (2005) goes one step further and ascribes most of the decline in both growth and inflation volatility in the US to

[11] For an assessment of the volatility of output growth in the euro area, see Focus Section on 'The reduced volatility of output growth in the euro area', Quarterly Report on the Euro Area, Vol. 6, No 1 (2007) .

[12] Stock, J. H., and M. W. Watson, (2003), 'Has the business cycle changed? Evidence and explanations', in *Monetary Policy and Uncertainty*, Federal Reserve Bank of Kansas City, pp 9 – 56.

reduced shocks. However, other researchers such as Cecchetti et al. (2006) conclude that better monetary policy has made a substantial contribution to lower output volatility and inflation volatility in the US as well as a large number of OECD countries.[13]

Finally, two arguments should be borne in mind when comparing developments in inflation volatility in the euro area and the US. First, in several Member States, inflation peaked in the late 1970s and early 1980s at much higher levels than in the US, which suggests that there was more scope for improvements in the conduct of monetary policy in these countries than in the US. Second, a stark difference between the US and the euro area is that there was no unexpected acceleration of productivity in Europe in the 1990s. Because it was partly unexpected, the pick-up of US productivity has contributed to dampen inflation pressures across the Atlantic and can therefore be considered as a key ingredient of the good luck hypothesis in this country.

Concluding remarks

The main findings of this section are the following:

(1) The inflation performance in the euro area since the launch of the euro has been exceptionally good, yielding the lowest inflation rates in the last 5 decades as well as a marked reduction of inflation volatility. Remarkably, this has occurred despite a series of adverse shocks.

(2) While further improvements have occurred since the beginning of Stage III of EMU, the most significant changes took place in general in the late 1980s and the decade of the 1990s. The aggregate euro-area picture, however, conceals some heterogeneity among Member States regarding the timing and scope of the improvement in inflation performance.

(3) A preliminary exploration of the possible explanatory factors behind the decline of inflation volatility and the related developments in output volatility points to the role of inflation expectations and improved credibility of monetary policy – reflecting strengthened policy frameworks – in bringing about such developments.

[13] Cecchetti, S. G., A. Flores-Lagunes and S. Krause (2006), 'Assessing the sources of changes in the volatility of real growth', NBER Working Papers 11946, National Bureau of Economic Research.

3. The international role of the euro

The euro has firmly established itself as the second most important international currency after the US dollar. In many key functions, the euro surpasses the role of the Deutsche mark, but it has not displaced the US dollar as the world's most dominant currency.

An international currency is used outside its home country as a *unit of account*, *medium of exchange* and *store of value*. Table 5 provides a simple decomposition of the various functions of an international currency, distinguishing between private and public sector usage. In practice, however, there are close relationships and interactions between the different functions.

The euro as a unit of account

In the private sector, the unit-of-account role is linked to the currency choice for invoicing of international trade and quotation in international commodities markets. The euro area is one of the most important trading blocs in the world. Consequently, the euro is often used to invoice and settle[14] international trade transactions between euro-area countries and third countries. The use of the euro as a trade-invoicing currency by euro-area countries has risen markedly since 2000 and, in the majority of euro-area countries for which data are available, the share of euro-denominated merchandise exports is above 50 per cent. A notable feature of the use of the euro in international trade is the strong regional concentration in countries and regions neighbouring the euro area. For instance, for non-euro-area EU Member States and EU candidate countries, the euro's share in invoicing and settlement of trade exceeds their share of trade with the euro area. In contrast, outside the euro-area's neighbourhood, the use of the euro in invoicing and settlement of trade with the euro area is much less prominent.

In the oil and other international commodity markets, the US dollar remains the standard currency for quotation, invoicing and settlement.[15] While oil and other commodity producers have from time to time considered denominating their goods in other currencies, e.g. in euro or in a basket of currencies,[16] the US dollar has maintained its dominant position in this area.

In official use, the unit-of-account role is linked to the choice of a reference or anchor currency in a country's exchange rate regime. The choice of anchor currency is particularly important for the internationalisation of a currency, because it has significant spillover effects on the use of the same currency in official foreign exchange reserves and in foreign exchange market interventions. The euro plays an important role as *de jure* anchor or reference currency in the managed exchange rate regimes of about 40 countries. Most of these countries are geographically close to the euro area, or have special institutional arrangements with the EU, notably candidate countries, potential candidate countries and the countries of the CFA franc zone. Seven non-euro-area EU Member States are currently part of ERM II, one Member State is running a euro-based currency board and three others are operating either a peg to the euro or managed floats using the euro as a reference (Table 7). Russia's currency is pegged to a trade-weighted basket of currencies with a substantial weight (45%) of the euro.

There is also some empirical evidence that indicates that the euro has an increasingly important gravitational pull on other currencies. Galati and Wooldridge (2006) consider actual co-movements of the euro with other currencies.[17] They find that the Swiss franc, the Scandinavian currencies and the currencies of central and eastern Europe closely track the euro's daily movements vis-à-vis the US dollar. In particular, the currencies of central and eastern European countries have tended to co-move more closely with the euro over the past years than with the Deutsche mark during the pre-EMU period. The authors also find that the pound sterling now tracks about two thirds of the euro's movements vis-à-vis the dollar, compared to around 50%

[14] Settlement of trade is linked to the medium-of-exchange role of a currency.

[15] See ECB (2007), 'Review of the international role of the euro', June 2007.

[16] For a recent case, see 'Opec looks at switch to strong currency', *Financial Times*, 19 November 2007.

[17] Galati, G and P. Wooldridge (2006), 'The euro as a reserve currency: a challenge to the pre-eminence of the US dollar?', BIS Working Papers, No. 218.

Table 5: **Functions of an international currency**

Function	Private Sector	Public sector
Unit of account	Invoicing of international trade; quotation of international commodity prices; denomination of international financial transactions; parallel currency	Anchor or reference currency in exchange rate regimes
Medium of exchange	Vehicle currency in the foreign exchange markets; settlement of international financial transactions; parallel currency	Official interventions in the foreign exchange markets; official financial flows
Store of value	Holding of international financial assets; parallel currency	Foreign exchange reserve currency

with the mark in the late 1990s. Finally, the Australian, Canadian and New Zealand dollars – which have traditionally belonged to the US dollar pole – now seem to behave similarly to the pound sterling. The euro's gravitational role is also becoming more important for certain emerging market currencies, notably in South America. By contrast, emerging market currencies in Asia still follow movements of the US dollar quite closely.

The euro as a medium of exchange

In foreign exchange markets, private sector participants use an international currency as a medium of exchange. The most actively traded currencies in foreign exchange markets are those that are used as *vehicle* currencies, i.e. as a means to exchange one relatively illiquid currency into another. According to the latest triennial survey of the Bank for International Settlements (BIS), published in late 2007, the euro was the second most actively traded currency in foreign exchange markets worldwide, after the US dollar but ahead of the Japanese yen and the pound sterling.[18] In spring 2007, the euro was involved in 37% of all foreign exchange transactions, compared to 86% for the US dollar (Table 6).[19] The euro is traded predominantly against the US dollar in global markets. The euro/US dollar currency pair is the most actively traded pair in global foreign exchange markets, accounting for more than one quarter of global turnover. The combined market share of other currency pairs involving the euro is small, around 10% of global turnover, compared with more than 60% for the US dollar. This suggests that the use of the euro as a vehicle currency in foreign exchange markets is still limited, partly because the US dollar's incumbency advantages are particularly strong in the foreign exchange vehicle function.

Table 6: **Currency distribution of foreign exchange market turnover**
(% shares of average daily turnover in April) (1)

	1992	1998	2001	2004	2007
US dollar	82.0	87.3	90.3	88.7	86.3
Euro (2)	39.6	30.1	37.6	37.2	37.0
Japanese yen	23.4	20.2	22.7	20.3	16.5
Pound sterling	13.6	11.0	13.2	16.9	15.0

(1) Because two currencies are involved in each transaction, the sum of the percentage shares of individual currencies totals 200% instead of 100%.
(2) DEM before 1999
Source: BIS Triennial Central Bank Survey 2007

In official use, the medium-of-exchange function is related to monetary authorities' choice of intervention currency in foreign exchange markets. Countries using any form of peg or managed float regularly intervene in foreign exchange markets to keep their exchange rate in line with the chosen regime. The choice of anchor or reference currency influences the choice of intervention currency, although the liquidity and efficiency of the financial markets of the intervention currency can also be an important consideration. While most monetary authorities do not disclose the currency composition of interventions, there are indications that several non-euro-area Member States, countries operating a euro-based currency board, and countries in the EU neighbourhood area have used the euro as an intervention currency (ECB 2007).

[18] BIS (2007), 'Triennial central bank survey of foreign exchange and derivatives market activity', September.
[19] Because two currencies are involved in each transaction, the sum of the percentage shares of all individual currencies totals 200% instead of 100%.

Table 7: **Countries with exchange rate regimes linked to the euro** (as of 1 January 2007) (1)

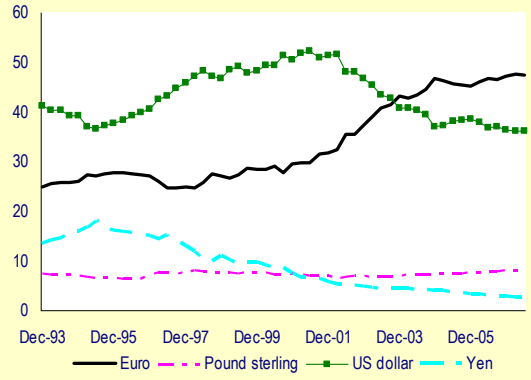
Region	Exchange rate regimes	Countries
European Union (non-euro area)	ERM II	Cyprus, Denmark, Estonia, Latvia, Lithuania, Malta, Slovakia
	Euro-based currency boards	Bulgaria
	Peg arrangements with fluctuation band based on the euro	Hungary
	Managed floating with the euro as reference currency	Czech Republic, Romania
Candidate and potential candidate countries	Euro-based currency boards	Bosnia and Herzegovina
	Peg arrangements or managed floating with the euro as reference currency	Croatia, FYR Macedonia, Serbia
Others	Peg arrangements based on the euro	CFA Franc Zone, French overseas territories, Cape Verde, Comoros
	Peg arrangements and managed floats based on the SDR and other currency baskets including the euro (share of euro)	Seychelles (37.7%), Russian Federation (40%) (2), Libya, Botswana, Morocco, Tunisia, Vannatu

(1) The following are also using the euro: Montenegro; Kosovo under UNSCR1244, European microstates; French territorial communities.
(2) Euro share in Russia's operational basket increased in Feb 2007 to 45%
Source: ECB (2007), 'Review of the international role of the euro, June.

The euro as a store of value

In private use, the store-of-value function is linked to holdings of international financial assets. The euro has quickly established its role as a store of value in international financial markets. Euro-denominated debt securities now account for more than 47% of the outstanding stock of international bonds and notes, surpassing the share of the US dollar (see Graph 15).

Graph 15: **International bonds and notes by currency of issue** (1)
(Amounts outstanding, in % of total, at current exchange rates; Dec 93 to Jun 07)



(1) Broad measure (includes home-currency issuance if targeted to the international market).

Source: BIS Quarterly Review, September 2007, Table 13B.

Since 2002, the ratio of total euro banknotes in circulation (i.e. including both domestic and external use) to euro-area nominal GDP has followed a continuous upward trend and is now higher than the equivalent ratio for the United States. Due to the stability and wide acceptance of the single currency, euro banknotes circulate in a large number of countries outside the euro area, functioning as a store of value and a medium of exchange. However, given the short history of the euro, the US dollar remains of considerably greater importance outside its borders. While difficult to measure accurately, estimates suggest that about USD 450 billion in banknotes circulate outside the US whereas the value of euro banknotes held by non-residents is estimated at around USD 100 billion (ECB 2007).

The official use of an international currency in the store-of-value function is linked to the monetary authorities' choice of denomination of their official foreign exchange reserves. Their choice depends *inter alia* on the country's exchange rate regime and anchor, the direction of trade flows and invoicing currency, the currency denomination of debt, and risk diversification strategies.[20] This means that, similarly to the use of the euro as an anchor currency, the role of the euro as a reserve currency is most prominent in countries in the geographical neighbourhood of the euro area and in countries with an institutional link to the EU.

[20] See Dooley, M. P., S. Lizondo, and D. Mathieson (1989), 'The currency composition of foreign exchange reserves', IMF Staff Papers, 36(2), pp. 385-434,

and Eichengreen, B. J. and D.J. Mathieson (2000), 'The currency composition of foreign exchange reserves: retrospect and prospect', IMF Working Paper No. 00/131.

The ECB (2007) shows that in most EU neighbouring economies that disclose the currency composition of their reserves, the share of the euro ranges from 40% to 85%. In the world's total disclosed official foreign exchange reserves, however, the dollar remains the dominant currency. The euro accounted for a share of around 25% by mid-2007, compared to a share of 65% for the US dollar.[21] Data on the currency composition of global foreign reserves also shows that, since 1999, some diversification out of US dollars into euros has taken place. Diversification out of US dollars and into euros appears to have been more pronounced among countries with close economic and institutional links to the euro area and less important in Asia, the Americas and countries with dollar pegs.[22]

Factors supporting the internationalisation of the euro

As outlined above, the euro has rapidly gained recognition since its introduction and has become the second most important international currency behind the US dollar. The internationalisation of a currency depends on (i) the economic size and significance of foreign trade flows of the issuing country; (ii) the size, liquidity and efficiency of its financial markets; and (iii) the degree of confidence in the currency value.

(i) Economic size and trade flows. International currencies are usually associated with large and competitive economies with important trade and financial links across the world. The larger a country's share in world output, the more likely it is that other countries will use its currency in international transactions. Based on current exchange rates, the euro area accounted for around 22% of world GDP in 2006, somewhat below the 27% share of the US but well above the shares of Japan and China (Table 8). The share of the EU in world GDP was 30%, larger than that of the US. With euro-area enlargement expected to continue in the coming years, the euro-area's share in world GDP should therefore move closer to that of the US.

The size of a country's foreign trade flows is also a relevant factor for the internationalisation of a currency. Its use in trade invoicing and as exchange rate anchor is more directly linked to the magnitude of an economy's trade flows than to the size of its GDP. As Table 8 shows, the euro area's share of world trade flows is similar to that of the US.

Table 8: **Key characteristics of selected economies** (2006)

	Population (million)	**Share of world GDP** (%) (1)	**Share of world trade** (%) (2)
EU	493	30.3	17.4
Euro area	317	21.9	13.3
USA	300	27.3	13.1
UK	61	5.0	6.1
Japan	128	9.1	7.1
China	1314	5.5	N/A

(1) GDP based on nominal exchange rate.
(2) Average share in world trade of imports and exports of goods and services, excluding intra-EU trade.
Source: IMF and World Trade Organisation.

(ii) Financial markets. International currency status is usually associated with open, large and liquid financial markets, including well-functioning secondary markets for international securities and a wide range of additional financial services that attracts business from abroad. As shown in Table 9, the size of the euro area's financial system (USD 53.3 trillion at end-2006), as measured by the sum of its stock market capitalisation, debt securities and commercial bank assets, is roughly the same as that of the US (USD 56.5 trillion) and much larger than that of Japan (USD 19.9 trillion). The corresponding figure for the EU as a whole is much higher (USD 72.9 trillion), substantially exceeding that of the United States. This largely reflects the addition of the UK, whose stock market is the third largest in the world. But for enjoying an international currency status, the size of the equity and debt securities markets is more relevant than the size of the banking system. As

[21] Full data on the currency breakdown of reserves is not available. IMF COFER data are the most comprehensive but they are only published at an aggregate level and only include reserves held by central banks that actually disclose the currency composition of their reserves to the IMF. This means that some major reserve accumulators, most notably in Asia, including China, are not included in COFER data.

[22] See Lim, E.G. (2006), 'The euro's challenge to the dollar: different views from economists and evidence from COFER (Currency Composition of Foreign Exchange Reserves) and other data', IMF Working Paper No. 06/153.

Table 9: **Selected indicators of financial market size**
(in billions of U.S dollars, 2006)

	Stock market capitalisation (1)	Total debt securities (2)	Commercial bank assets (3)	Equity, debt and bank assets (1+2+3)	Forex market turnover (1)
EU	13068.8	23202.7	36642.0	72913.5	49.0
Euro area	8419.1	18768.3	25837.6	53268.8	10.8
USA	19569.0	26735.8	10204.7	56509.4	16.6
UK	3794.3	3297.7	9212.6	16304.6	34.1
Japan	4795.8	8719.3	6415.4	19930.5	6.0

(1) Geographical distribution of foreign exchange market turnover (% of total).
Source: IMF and BIS.

Table 9 shows, commercial bank assets are 2½ times larger in the euro area than in the US, but the US stock market capitalisation is more than twice the size of that of the euro area.[23]

An indicator of both financial market size and financial development is the geographical distribution of foreign exchange market turnover as it reflects, to some extent, all kinds of international financial transactions, including short- and long-term transactions, bank and securities assets, equities, bonds and derivatives. The last column of Table 9 shows that the euro area's importance as a global financial hub is still limited. Its share of global foreign exchange market turnover is considerably smaller than that of the UK and the US. However, these statistics on foreign exchange rate turnover by country/region do not reflect the fact that a considerable share of trading in the UK's foreign exchange and derivatives markets is denominated in euros (respectively about one third and one half, of total turnover).

The liquidity and efficiency of the underlying financial markets is at least as important as their size for the development of a currency's international functions. Before the launch of EMU, several authors pointed out that the euro area still lagged significantly behind the US in terms of financial market efficiency, as measured by indicators such as average spreads reported by dealers and bond market turnover ratios. However, by contributing to the integration of the euro area's financial markets, the euro is helping to increase their depth, liquidity, and efficiency.[24] This process, which is being reinforced by the implementation of the EU's legislation in the area of financial services, should support the internationalisation of the euro.

(iii) Confidence in the value of the currency. A precondition for gaining and keeping international currency status is confidence that the currency's value is reliable in terms of future purchasing power. This confidence depends on, *inter alia*, the perceived strength and stability of the economy of the issuing country or area. High and volatile inflation or the presence of large external imbalances tends to increase the uncertainty about a currency's future value. The ECB, with its high degree of statutory autonomy and clear mandate to maintain price stability, has kept euro-area consumer price inflation low and stable since it took charge of the single monetary policy in 1999. The EU's fiscal policy framework, including the Stability and Growth Pact, helps to ensure that euro-area countries pursue prudent fiscal policies. Regarding the external position, the euro-area current account position has been in surplus or in broad balance since 1999 while its net international investment position amounts to 12½% of GDP. This compares favourably with the external position of the United States, which has a sizeable current account deficit and has moved from a positive net creditor position of almost 13% of GDP in 1980 to a net debtor equivalent to 20% of GDP at the end of 2006.

[23] This reflects the fact that EU companies have tended to finance their activities through bank loans rather than through bond and equity, whereas the US corporate sector relies more heavily on bond and equity financing.

[24] See for instance Pagano, M. and E-L. von Thadden, (2004), 'The European bond markets under EMU', *Oxford Review of Economic Policy*, Vol. 20, No. 4.

Incumbency advantages and historical inertia

The determinants of a currency's international status discussed above suggest that the euro's international currency role could eventually attain roughly the same importance as the dollar. However, historical experience shows that incumbency advantages and inertia tend to prolong the international role of a currency even after the circumstances that led to its international expansion have changed. Just like domestic money, an international currency derives its value from the fact that others are using it. As the network grows, the currency's liquidity increases while transaction costs decline which, in turn, attracts new users to the network. Network externalities tend to drive one currency toward market dominance and, once achieved, to keep it in that position. They are especially important in determining the use of a currency as a foreign exchange vehicle. Similarly, the advantages of using a single unit of account in international commodity markets make it very difficult for this role to be shared among two or more currencies. The implication is that small changes in the determinants discussed above will not lead to corresponding changes in the status and use of an international currency, at least not in the short run.

Conclusion

From its introduction in 1999, the euro quickly emerged as the second most important international currency after the US dollar and it continues to consolidate its position. The euro is extensively used in international debt markets and its role in international trade and in official foreign exchange reserves has been growing gradually. But almost 10 years after its introduction, the internationalisation of the euro is characterised by a strong regional and institutional pattern. The international use of the euro is mainly concentrated to countries neighbouring the euro area, in other countries with special economic and political links to the EU, and in transactions directly involving euro-area economic agents.

The structural characteristics of the euro area support the international importance of the euro. Its international role, particularly in the regions neighbouring the euro area, could evolve in the future depending on a number of factors, including first and foremost the euro-area's ability to develop more integrated and more efficient financial markets. It will also depend on the eventual size of the euro area and in particular on whether the United Kingdom will eventually join it, which would boost the importance of the euro area as a global financial hub. A third factor concerns the future relative evolution of the euro-area and US economies and, in particular, on the extent to which the US manages to bring its current account deficit to a more sustainable position. Finally, it will depend on the portfolio diversification policies of central banks with large reserve holdings.

4. Labour market reforms in the euro area

Introduction

The need for labour market reforms was already widely acknowledged during the run-up to the third stage of EMU. Increased economic turbulence, globalisation, skill-biased technological change and demographic developments called into question the design of existing labour market institutions. With economic interactions more subject to competitive pressures, the lack of reforms will raise the efficiency losses of labour market institutions motivated only by distributional concerns[25]. What membership of the euro area adds is a greater demand for adjustment capacity, since monetary instruments previously used to cushion shocks are no longer available, while the creation of the euro area may increase the degree of competition and regional specialisation (and thus the frequency of asymmetric shocks).

An issue widely discussed in the literature is whether membership of the euro area has led to a speeding up or slowing down of labour market reforms in euro-area countries. In a fixed-but-adjustable exchange rate regime, mounting structural disequilibria culminate in an exchange rate crisis which highlights the need to reform.[26] In a monetary union, the exchange rate is no longer available to national governments as a tool to ease adjustment to country-specific shocks. This would imply an acceleration of the reform process within the euro area. However, since within monetary union structural imbalances are less likely to be punished by the financial markets, structural disequilibria tend to accumulate over time and reveal only gradually the need for reforms. Thus, the reform process is likely to be discontinuous, with stops and starts.

The present section reviews the different, and sometimes conflicting, views on the incentives to undertake labour market reforms in the euro area. It also presents some evidence on the recent path of labour market reforms, drawing on the Fondazione Rodolfo DeBenedetti database (FRDB). This dataset allows to compare the reform experience for the first seven years under the euro with the period that immediately preceded Stage III of EMU.

EMU and labour market reforms

The prevalent view before 1999 was that: (i) the smooth operation of the euro area would require a more flexible labour market that could bear a larger share of the short-term adjustment burden to asymmetric shocks; and (ii) competitive forces unleashed by euro-area membership might well increase the pressure for reforms.

Some argued that euro-area participation would help remove the barriers to labour market reforms and create incentives to implement reforms that favour flexibility and efficiency, the so-called 'There Is No Alternative' to reform ('TINA' argument).[27] Euro-area participation should encourage structural reforms on the grounds that it provides a precautionary motive to speed up labour and product market reforms at the country level as it makes the costs of not reforming more evident.[28] Insofar as the common currency increases the transparency of price signals, the costs of non-reformed institutions become more evident. If lower trading costs reduce product market rents, the incentives to resist reform that prevent the appropriation of these rents is lessened.

Others have argued that the incentives to reform labour markets are weaker inside than outside the monetary union.[29] Outside the euro area, reforms help to reduce both the inflation bias, which derives from the lack of credibility of anti-inflationary government policies (i.e. their time

[25] Bertola G. and T. Boeri (2003), 'Product market integration, institutions and the labour markets', mimeo.

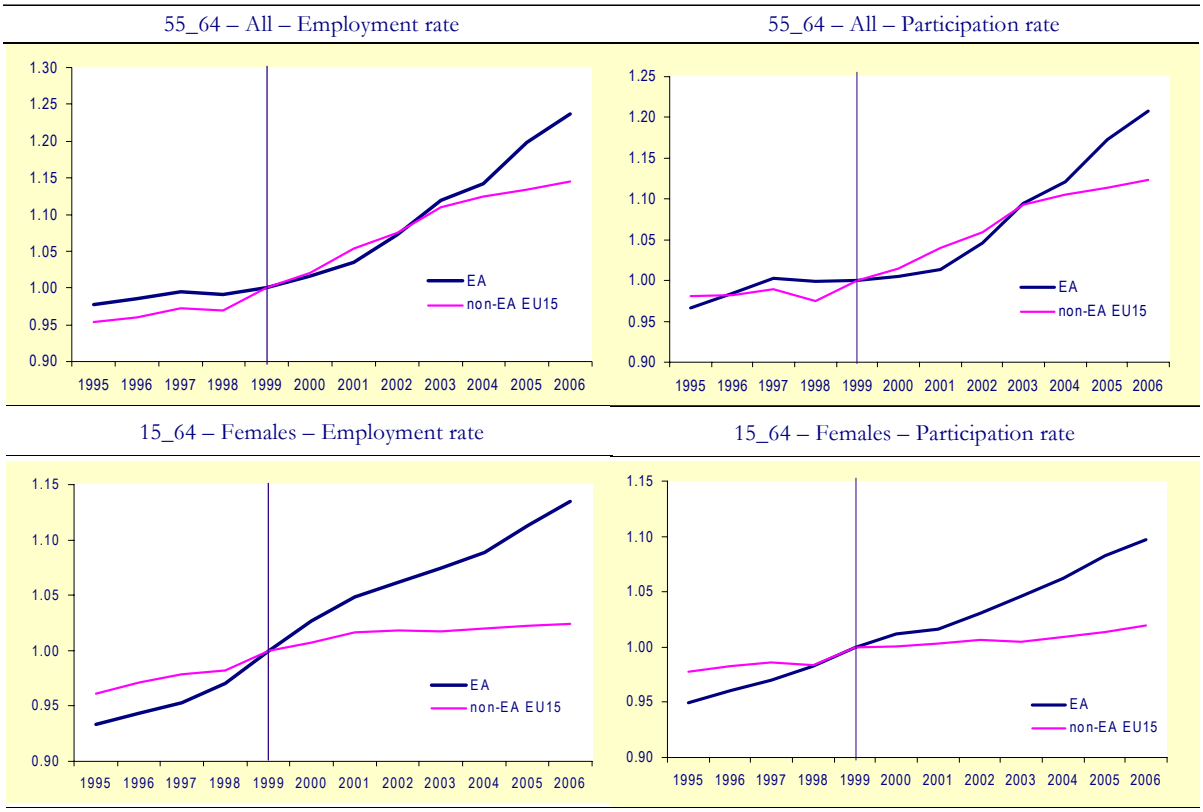
[26] However, no guarantees exist that credible reforms will be implemented in the aftermath of the crisis. For example, already during the period of ERM membership, the Netherlands introduced important labour market reforms, while Italy started to reform its labour market only at a time when the prospects of euro-area membership became certain.

[27] Bean C.R. (1998), 'The interaction of aggregate-demand policies and labour market reform', *Swedish Economic Policy Review*, Vol.5, No.2, pp.353-82.

[28] Calmfors L. (2001), 'Unemployment, labour market reform, and monetary union', *Journal of Labour Economics,* Vol.19, No.2, pp. 265-89.

[29] Calmfors L. (1998), 'Macroeconomic policy, wage setting, and employment – what difference does the EMU make?', *Oxford Review of Economic Policy,* Vol. 14, No. 3, pp. 125-51.

Graph 16: **Employment and participation rates in euro-area countries and non euro-area EU countries**
(Index 1999=1; 1995-2006)



Sources: Commission services.

inconsistency), and the level of unemployment. With the euro area, the inflation bias vanishes and the incentives to undertake structural reforms are weakened.[30] This argument has been summarised by saying that in EMU, 'there is no double dividend in labour market reforms'.

While there is broad agreement on the desirability of reforms, the directions such reforms might take appears to deserve a closer look, particularly whether they can be expected to enhance flexibility. The increase in the real wage elasticity of labour demand weakens the bargaining power of unions and raises the cost of labour market distortions. However, higher exposure to market risks may generate a demand for greater protection even at the costs of efficiency, particularly from those socio-economic groups at higher labour market risk, who may perceive their chances of stable employment relationship as beeing weakened by partial labour market reforms.[31]

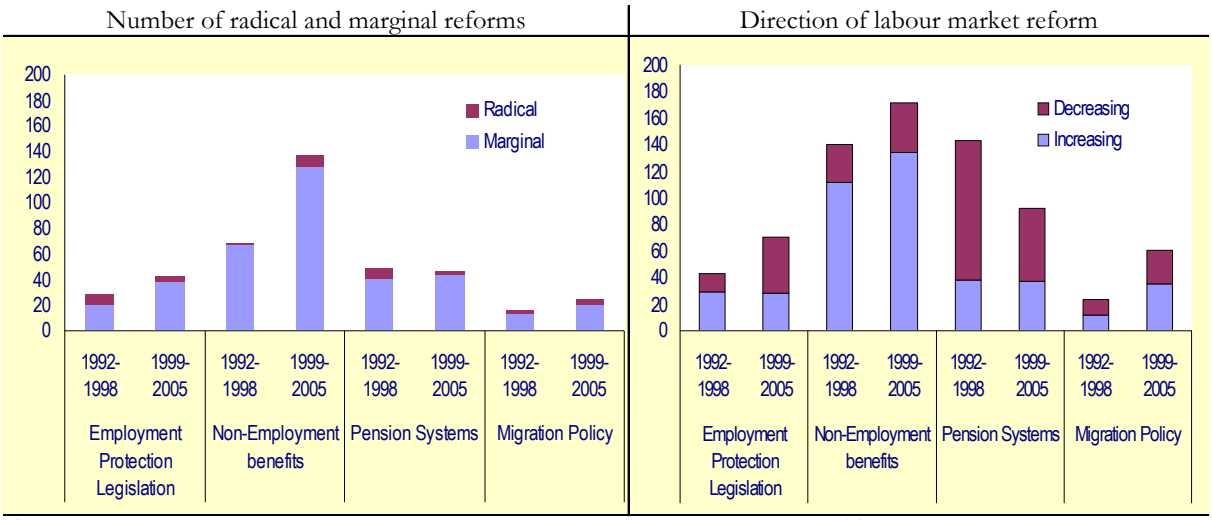
Participation in the euro area will affect the incentives to reform in directions that depend on the type of labour market distortions, public preferences and unions' strength.[32] For instance the incentive to reduce employment protection will depend on the extent to which society cares about the volatility of employment. When monetary policy cannot accommodate reforms undertaken in single countries, reforms that reduce the equilibrium unemployment engender a large deflationary shock that can only be absorbed by a gradual improvement in

[30] IMF (1999), 'Chronic unemployment in the Euro area: Causes and cures', World Economic Outlook, Chapter IV, pp. 88-121.

[31] Bertola G. and T. Boeri (2002), 'EMU labour markets two years on: Microeconomic tensions and institutional evolution', in M. Buti and A. Sapir (EDS), *EMU anbe arugued d economic policy in Europe: The challenge of the early years*, Aldershot: Edward Elgar, pp. 249-280.

[32] Bentolila S. and G. Saint-Paul (2001), 'Will EMU increase Eurosclerosis?', in C. Wyplosz, ed., *The impact of EMU on Europe and the developing countries*, Oxford: Oxford University Press, pp. 128-68.

Graph 17: **Reforms in the euro area: scope and direction**



The left panel shows the distribution of reforms according to whether they are radical or marginal. The right panel shows the distribution of reforms based on whether they increase/decrease labour market flexibility; increase/decrease reward from work; increase/decrease generosity of the pension system; increase/decrease generosity of immigration policies. Some reforms are not characterised either in terms of comprehensiveness (radical/marginal) or in terms of direction (increasing/decreasing). As a result the total number of reforms may differ in the left and the right panels of the graph. ***Sources:*** Commission services based on FRDB database.

competitiveness and exports.[33] The adjustment is likely to be slow, implying that large-scale reforms could be more difficult to put in place than more partial and gradual reforms.[34]

Describing the impact of euro-area participation on labour market reforms

After peaking at almost 11% in 1994, the euro-area unemployment rate started gradually to decline, and by 2007 was hovering around 7.5%. This decline occurred while both the employment and participation rates kept rising. Most notable were the increases in the female and the older workers employment and participation rates, the most dynamic components with increases since 1995 of higher than 9 pp (Graph 16). Commission estimates of the NAIRU suggest a reduction in structural unemployment, which is reflected in the decline of long-term unemployment (over 12 months) and youth unemployment (under-25s).

In spite of these improvements, the labour market performance of the euro area remains somewhat disappointing. Low labour force participation still prevails among women and older working-age people. Long-term unemployment remains a serious concern as about 45% of unemployed people have been out of work for one year or more, compared to less than 15% in the US. There is a distinct geographical dimension to the problem in several countries, with severe disparities (in terms of both employment and unemployment) between leading and lagging regions.

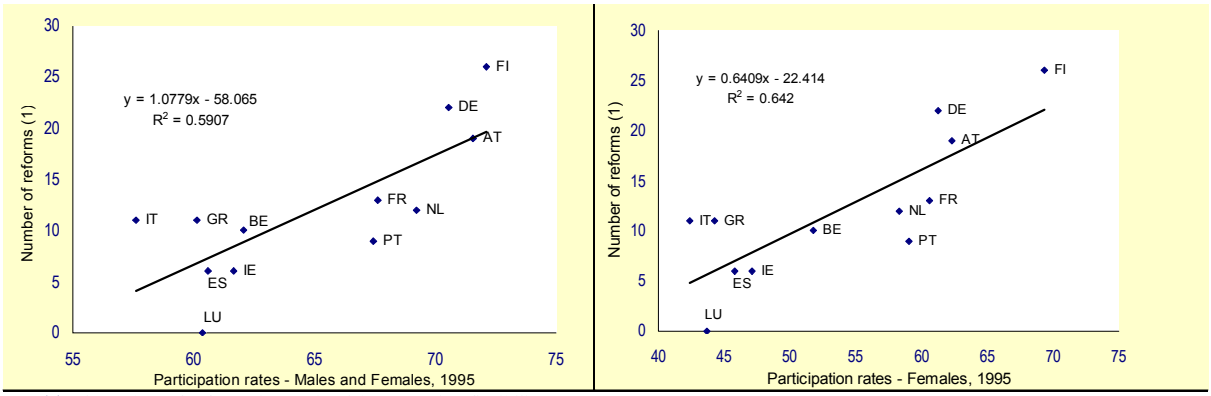
Most discussions of the impact of euro-area membership on labour markets have tended to focus on wage bargaining. Despite the vast literature on labour market institutions and labour market performances, only a few studies have described the effects of euro-area membership on labour market institutions. Bertola and Boeri (2002), using information on reforms of non-employment benefits and employment protection collected by a variety of sources, show an acceleration of reforms after 1998.[35] Driven by the increase in gradual reforms, the orientation of the reform efforts was towards relaxing employment protection legislation, through looser regulation of atypical contracts, and ensuring a rise in the rewards from

[33] If the reform reduces the equilibrium unemployment rate, while the initial level of unemployment remains high, the market mechanism will entail a downward adjustment of prices and wages that cannot be stabilised by the common monetary policy. Gains in competitiveness and exports will gradually remove the unemployment gap but the process is likely to be slow in case of nominal price/wage rigidities.

[34] This argument, however, suggests that in the euro area there is a case for undertaking reforms in a coordinated manner across Member States.

[35] Bertola G. and T. Boeri (2002), Op. cit.
The time span of the analysis in their paper is 1987-1999.

Graph 18: **Reforms increasing flexibility and initial labour market conditions: 1995-1998**



(1) Total number of reforms increasing labour market flexibility
Sources: Commission services based on FRDB and LFS data.

work. In contrast, Duval and Elmeskov (2006), using an indicator of the overall intensity of reforms developed as part of the assessment of the OECD Job Strategy, conclude that the advent of the third stage of EMU did not coincide with a pick up of labour market reforms.[36] [37]

The striking difference between the findings of these two studies highlights the importance of the methodology used to combine qualitative information which responds to different objectives. The OECD indicators have been developed to monitor progress in the implementation of the Job Strategy, while the data used by Bertola and Boeri (2002) categorise reforms according to their expected effects on labour market flexibility and/or their scope – i.e. marginal or radical.

Comparing reform efforts between the pre- and post-EMU period

Using FRDB data on the scope and the direction of the reforms[38], this section explores whether the pace of labour market reforms has accelerated since the creation of the euro area. It is important to bear in mind two main caveats:

- Labour market reforms follow a discontinuous path with many measures predating the establishment of the euro area and membership of the euro area being only one of several factors driving reforms;
- The impact of policy reforms on labour market performance usually occurs with lags while the interaction of a wide range of labour market policies and institutions also have a relevant bearing on the outcome, not to mention complementarities and interaction with policies in product and capital markets.

Data available from the FRDB enable the scope and direction of labour market reforms to be tracked over time.[39] In the early years of monetary union, there was an increase in the number of gradual reforms implemented in all areas except pension systems (Graph 17 – left panel). The reform process was characterised by a sequence of gradual reforms rather than a few radical changes, partly confirming the view that euro-area membership reduces the incentives for large-scale labour market reforms. However, since gradual reforms prevailed also in the years before 1999, the change in the monetary regime

[36] Duval R.. and J. Elmeskov (2006), 'The effects of EMU on structural reforms in labour and product markets', *European Central Bank working paper series*, No. 596, March.

[37] Yet, compared to the OECD average, it is shown that a number of euro-area countries have pursued both far-reaching and comprehensive reform strategies while only few have confined themselves to either minor reforms or reforms covering only a number of areas.

[38] This data was kindly provided by the Fondazione Rodolfo DeBenedetti.

[39] The FRDB database holds information on reforms of employment protection legislation, non-employment benefits, pensions and migration in the EU countries over the period 1987-2005. For each policy area, reforms are categorised according to their comprehensiveness, as well as on the basis of their expected effects on: labour market distortions, reward to labour market participation, generosity of pension systems and immigration policies. In the database terminology, comprehensiveness is labelled either 'marginal' or 'radical'. Reforms are 'marginal' if they do not cover all types of labour contracts, all beneficiaries of unemployment benefits or pensions etc.. In the present section these partial reforms are qualified as gradual.

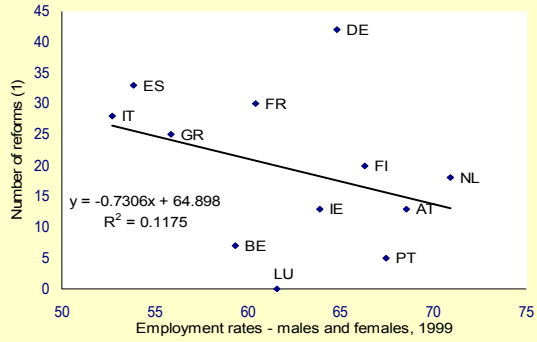
did not represent a clear break with respect to the previous reform strategies.

Turning to the broad orientation of labour market reforms, according to the TINA argument an acceleration of reforms improving the adjustment capacity of the labour market should be expected under the monetary union. Graph 17 (right panel) displays the number of reforms according to their broad orientation for the euro area as a whole. After the launch of the euro area, there was a shift toward reforms that reward overall work effort. Finally, reforms that reduce the generosity of migration policies are more prevalent, which is suggestive of a policy shift from non-national to national working-age population.

The effect of euro-area membership can be seen by looking at the changes in the distribution of the number of reforms at the Member State level (comparing Graph 18 and 19). During the years that preceded the launch of the common currency (1995-1998), countries implementing more reforms increasing the flexibility of the labour market (by loosening the employment protection legislation and by reducing the benefit dependency and the generosity of the pension system) were also those that performed relatively better in terms of both participation and employment rates (Graph 18). About 60% of the differences in the reforms increasing flexibility between 1995 and 1998 were accounted for by the diversity in the initial levels of the participation rates, especially of women (right panel). Similar patterns can be observed when using the employment rates instead of the participation rate.

However, in the EMU years, the relationship between the reforms increasing flexibility and the level of the participation rate at the beginning of Stage III turns out to be statistically insignificant. Furthermore, the employment rate at the start of Stage III is negatively correlated with the reforms increasing the labour market flexibility and the reward of work undertaken in the 1999-2005 period, suggestive of a policy convergence across euro-area countries (Graph 19).[40] The change in the sign of the correlation indicates that, contrary to the pre-EMU period, reforms in EMU were indeed introduced by those countries that needed them most.

Graph 19: **Reforms increasing flexibility and initial labour market conditions: 1999-2005**



(1) Total number of reforms increasing labour market flexibility
Source: Commission services based on FRDB and LFS data.

Conclusion

While the case for reforms is widely recognised, and euro-area participation may in some respects act as a further encouragement, there are countervailing forces. In particular, while euro-area participation increases the demand for economic adjustment, it may also increase the demand for protection against the risks associated with adjustment. Although this may not necessarily be a barrier to reforms, it does need to be taken into account in designing them.

Empirical evidence of possible changes in the pace of structural reforms under the euro remains limited and contradictory. Research based on indicators developed by the OECD suggests that the advent of the third stage of EMU did not coincide with an acceleration of labour market reforms. Evidence drawn from the FRDB database presented in this section is somewhat more nuanced. For the euro area as a whole, the reform process in the early years of the euro was characterised by a sequence of gradual reforms rather than by a few radical changes. However, the data also shows an encouraging shift in the pattern of reforms at the Member State level in the early years of the euro with more reforms being introduced by those countries that need them most. The challenge is to pursue this reform process.

[40] Differences in the overall employment rates at the beginning of the Stage III account for 45% of all pension reforms enhancing the incentives to work introduced after 1999, suggestive of policy makers' efforts to increase the employment rate of future older workers.

Focus

II. Euro-area productivity trends – An industry-level perspective

Over the last decade, the euro area has experienced a slowdown in labour productivity relative both to previous time periods and to the US. This focus section exploits a new sectoral database to shed some light on the possible causes of this disappointing performance. The analysis shows that the relative weakness of productivity in the euro area can be traced back to developments in total factor productivity (TFP) rather than developments in capital formation patterns and can be attributed to a small group of industries, including electrical and optical equipment; wholesale and retail trade; financial services; and other business services. On a more encouraging note, there is one area of the economy where the euro area has managed to consistently outperform the US in TFP terms over the recent years, namely the 'network' industries.

An econometric analysis of the determinants of TFP growth shows that, whilst there is a convergence trend across countries in terms of TFP, the catching-up process has weakened over time, especially in the post-1995 period. In fact, TFP growth now appears to be increasingly associated with innovation and technological spillovers from countries positioned at the 'technology frontier'. Technological spillovers are likely to be stronger in countries making more intensive use of R&D and human capital.

The analysis suggests that the TFP trends in those specific industries where euro-area-US differences are concentrated are influenced by a relatively wide spectrum of factors. Whereas the relative under-performance of the euro area's ICT-producing manufacturing industry (mainly semiconductors) is linked to R&D intensity factors, the divergences in the retail and wholesale trade industries relate to cyclical factors and the better exploitation of scale economies. Finally, the euro-area's out-performance of the US in the network industries seems to be mainly linked to one-off static efficiency gains associated with the sustained deregulation drive which occurred in these industries over the last two decades.

Despite the recent upturn in growth, the euro area's overall growth performance since the mid-1990s has been relatively disappointing. While many Member States have managed to improve their labour market positions, this has unfortunately been accompanied by a slowdown on the productivity side in a significant number of countries, in sharp contrast to many other developed economies, in particular the US where the long-term downward movement in productivity growth rates experienced since the 1970s was reversed around the mid-1990s.

Whilst there have been a number of analyses of the possible causes of the euro area's disappointing performance at the macro level, it has until recently been difficult to conduct a detailed cross-country examination at the industry level due to lack of adequate data. This situation has significantly improved with the March 2007 release of the EU KLEMS datasets. EU KLEMS provides data on economic growth, productivity, employment, capital formation and technological change for a large range of manufacturing and service industries. This focus section exploits this dataset to shed new light on the likely causes of the productivity slowdown in the euro area.[41] Section 1 presents the broad stylised facts concerning productivity trends at the economy-wide and industry levels for the euro area and the US. Section 2 examines in more detail the possible determinants of total factor productivity (TFP) performance at the industry level, assessing in particular the role played by the regulatory environment and by knowledge production (R&D and education). Section 3 discusses some policy implications.

1. Euro-area productivity trends at the aggregate and sectoral level

A productivity slowdown mostly attributable to the private services sector

As shown in Graph 20, productivity growth in the euro area fell below the US rate in the late 1990s, bringing its post World War II convergence with US productivity levels to an end. Graph 20 also shows a decomposition of productivity growth in the euro area and the US into three broad sectors, namely manufacturing, private services and the rest of the economy (i.e.

[41] The analysis presented here is a shortened version of Chapter II in European Commission (2007), 'EU Economy 2007 Review', European Economy No 8.

Graph 20: **Trend contributions to the total change in labour productivity per hour: euro area and US**
(in %)

Sources: EU KLEMS, Commission services.

primary industries plus public services). The graph shows the contributions of each of these sectors to the change in labour productivity of the total economy. The four panels of the graph have the same scale and are additive (i.e. manufacturing + services + rest of economy = total economy).[42] This data shows that the US's out-performance of the euro area in terms of labour productivity has applied right across the various sectors of industry, with both the manufacturing and private services sectors showing contrasting fortunes for the two areas. It also indicates that most of the deterioration in the relative productivity performance of the euro area can be attributed to the private services sector. For the most recent years, there has been a gap between the trend productivity of the US and the euro area of the order of 0.8 pp., with roughly 95% of the gap emanating from private services and 33% from manufacturing (with an offsetting -28% contribution for the rest of the economy where the productivity performance was actually stronger in the euro area than in the US).

Some insights from growth accounting

A wide variety of methods can be used to decompose real GDP growth into its main determinants, one of which is applied by the EU KLEMS research consortium.[43] This variant essentially uses a production function which includes productive capital (a volume index of capital services); human capital (a skills-based indicator of the average qualifications of the labour force); employment levels adjusted for hours worked; and a residual term which, amongst other things, includes an estimate of the level of efficiency associated with the use of the various factors of production.

[42] The trends have been calculated using a Hodrick-Prescott (HP) filter.

[43] See European Commission, op. cit., for more details.

Table 10: **Growth accounting analysis – Gross value added growth and contributions**
(Annual average volume growth rates in %)

	Euro area (1)			US		
	1981-1995	1996-2000	2001-2004	1981-1995	1996-2000	2001-2004
Total Industries						
1. Labour Services	0.2	0.8	0.4	0.9	1.3	-0.5
2. Capital Services	1.0	1.3	0.9	1.7	2.0	0.9
Of which						
ICT	0.3	0.5	0.3	0.7	1.4	0.6
Non-ICT	0.8	0.8	0.7	1	0.6	0.3
3. TFP	0.6	0.4	-0.1	0.3	0.8	1.7
Total Industries	*1.9*	*2.4*	*1.3*	*2.8*	*4.1*	*2.1*
Manufacturing						
1. Labour Services	-1.1	0.0	-0.5	-0.2	0.3	-3.4
2. Capital Services	0.8	0.9	0.5	1.0	1.8	0.2
Of which						
ICT	0.2	0.3	0.2	0.5	1.1	0.3
Non-ICT	0.7	0.5	0.3	0.4	0.7	-0.1
3. TFP	1.6	1.3	0.5	2.2	2.8	4.0
Total Manufacturing	*1.4*	*2.2*	*0.4*	*3.0*	*4.9*	*0.8*
Private Services						
1. Labour Services	0.7	1.2	0.6	1.4	2.1	-0.1
2. Capital Services	1.4	1.7	1.3	2.4	2.5	1.2
Of which						
ICT	0.4	0.7	0.4	0.9	1.9	0.9
Non-ICT	1.0	1.1	0.9	1.5	0.6	0.3
3. TFP	0.6	0.0	-0.3	-0.5	0.5	1.6
Total Private Services	*2.7*	*2.9*	*1.6*	*3.2*	*5.1*	*2.6*
Rest of Economy						
1. Labour Services	0.5	0.7	0.5	1.5	1.3	1.4
2. Capital Services	0.6	0.6	0.6	0.7	1.1	0.8
Of which						
ICT	0.2	0.3	0.2	0.3	0.7	0.3
Non-ICT	0.4	0.4	0.4	0.4	0.5	0.5
3. TFP	-0.1	0.3	0.1	-0.4	-0.7	-0.2
Total Rest of Economy	*0.9*	*1.6*	*1.2*	*1.8*	*1.7*	*2.0*

(1) Euro area excluding EL, IE, LU and PT.
Source: EU KLEMS, Commission services

Table 10 gives the results for the euro area and the US using the EU KLEMS growth accounting approach, with value added being decomposed into labour services, capital services and TFP.[44] The table shows that the big labour productivity gap between the euro area and the US over the period since 1995 has been mainly driven by TFP developments although differences in the value added contribution of ICT capital services was a significant additional explanatory factor over the period 1996-2000. Over the most recent period, 2001-2004, it is clearly TFP which has driven the euro-area-US productivity differences. For 'total industries', the TFP growth rate differential since 2000 is an alarming 1.8 pp, compared with a TFP gap of only 0.4 pp over 1996-2000.

This gap in TFP growth rates is widespread at the sectoral level, with very large and rising euro-area-US TFP growth rate differentials for both the manufacturing and private services sectors. In the manufacturing sector, capital services trends in both areas appear to be broadly converging over time, with this pattern being a feature of both ICT and non-ICT capital deepening. In contrast, it is interesting to note that in the services sector there is a clear compositional shift in the US towards greater

[44] Due to the lack of capital stock data for some Member States, a detailed growth accounting analysis at the industry level is only possible for 8 euro-area countries. The euro-area aggregates computed below therefore exclude Greece, Ireland, Luxembourg and Portugal.

levels of ICT capital deepening. While the gap between the two areas with regard to total capital services is small, there is evidence that the US's capital spending is increasingly being focused on ICT rather than on the more traditional forms of capital expenditure. Furthermore, it should be noted that the bulk of the overall economy-wide differences in ICT capital spending between the euro area and the US since the mid-1990s is due to higher ICT investment spending in the private services sector.

TFP differentials with the US can be traced back to a small number of sectors

Due to the availability of capital stock data for a large number of individual industries in EU KLEMS, it is possible to do a more detailed productivity breakdown of the manufacturing, private services and 'rest of economy' sectors by examining those industries in the databank where capital stock data exists and which are therefore amenable to growth accounting analysis (28 in total – 14 manufacturing, 7 private services and 7 'other industries').

Graph 21: **28 Industry breakdown of total TFP Contribution to value added growth US minus euro area (**1996-2004**)** (1)

(1) Euro area excluding EL, IE, LU and PT.
Source: EU KLEMS, Commission services

Graph 21 decomposes the total TFP growth gap between the US and the euro area over the 1996-2004 period into the respective contributions of the 28 industries. The graph shows the highly industry-specific nature of the TFP differences, with only a handful of industries explaining the diverging euro-area-US trends, namely wholesale and retail trade; real estate and other business services; electrical and optical equipment (which includes semiconductors, the main ICT-producing industry); and to a lesser extent financial services. On a more positive note, the graph also shows some industries where the euro area has done better, with a number of the so-called 'network' industries doing particularly well.

2. The determinants of TFP growth

The analysis in this section aims to isolate the critical factors behind differences in the evolution of TFP, which, as shown earlier, accounts for the most important share of the gap in productivity growth between the euro area and the US over the last decade.

Conceptual framework: innovation as the key driver of growth

A better understanding of the key determinants of TFP growth has been high on the research agenda of international organisations and the academic community over the past decade. There is a growing consensus in the literature that recent growth theories, based on 'Schumpeterian' creative destruction mechanisms, can help interpret recent developments.[45] These theories focus on innovation as the key driver of growth in economies at, or close to, the 'technology frontier'. Innovators, by introducing superior product varieties and technologies, have the effect of both displacing existing firms and of inducing the adoption of new products and techniques at the wider industry level. At the aggregate level, the innovation rate depends on the resources devoted to the innovation effort (i.e. R&D and human capital) and on the stock of existing knowledge (knowledge spillovers). The growth rate of the economy will depend not only on the rate of innovation but also on the rate at which 'state-of-the-art' technologies are adopted / diffused throughout the wider economy. Countries that are close to the

[45] See for instance Aghion, P. and P. Howitt (2006), 'Joseph Schumpeter Lecture: Appropriate Growth Policy: A Unifying Framework', *Journal of the European Economic Association*, 4(2-3), pp. 269-314.

technology frontier will mainly grow thanks to the development of new technologies, whilst the 'follower' grouping of countries will derive the largest share of their TFP growth from the adoption of already existing, technologies which are available at the frontier.

In this 'Schumpeterian' world, institutions and policies play a key role in determining the relative position of countries in the global innovation race. These framework conditions directly impact on the relative ability of countries to innovate at the frontier or to adopt existing leading-edge technologies. Follower countries would gain from institutions and policies favouring the cost-efficient adoption of existing technologies, while countries operating at the frontier would profit from policies that promote excellence in higher education and R&D; financial markets that reward risky projects; and regulations that do not put an excessively heavy burden on either incumbent firms or on potential entrants.

A review of existing empirical work

A number of papers in the literature have already analysed the determinants of TFP in a Schumpeterian framework. Most of the existing analyses use panel data information, pooling data on TFP levels and growth rates over several years and countries. Some papers also use information at the sectoral / industry levels, with the datasets usually obtained from the OECD's STAN database. The available empirical specifications normally reflect a reduced form of the basic innovation-imitation model, with most of them regressing TFP growth on two essential variables:

- a measure of the technology gap (i.e. the distance between the TFP of the country analysed and that of the country with the highest level of efficiency); and
- an estimate of the growth rate of TFP at the frontier (i.e. the TFP growth rate of the most efficient country).

The first variable captures the extent to which TFP growth in a specific country can be explained by the adoption of more efficient existing technologies. The assumption here is simply that the larger the technology gap, the higher the potential gains from adopting more efficient, internationally available, technologies and consequently the faster the rate of TFP growth. The second variable aims to capture the link between TFP growth in the 'catching-up' country and the extent of innovation and knowledge spillovers which are occurring in the technologically most advanced country. In addition to these two basic explanatory variables, most papers also control for a series of policy and institutional factors that may affect the rate of TFP growth independently or may interact with the 'technology gap' and 'technology spillovers' variables to have an impact on TFP.

The choice of explanatory factors which we use in our analysis of the factors driving technological change and efficiency gains is strongly driven by the work of Aghion and Howitt (2006) as well as the Sapir report.[46] Both studies suggest that the failure of the EU's economic system to deliver a satisfactory growth performance from the mid-1990s onwards was due to outdated economic institutions (which were supportive of growth in the past but have now become an obstacle to growth) and the failure of the EU to transform its industrial structure to achieve an innovation-based economy. High growth in the post-WWII era was driven by high levels of industrial production, economies of scale and imitation of US technological advances. As the EU approached the technological frontier, growth became increasingly dependent on innovation.

Both studies suggest that economies based on innovation are the key to higher employment and growth. The studies stress that innovation stems from entrepreneurial activities but that these activities can only develop if Europe focuses on reforming its education systems; promoting higher levels of better targeted R&D; ensuring better regulation to facilitate entry and exit of firms; providing more adequate infrastructure to facilitate the free movement of people, goods and ideas; stimulating innovation via financial and tax incentives; and promoting more labour market flexibility.

[46] Aghion and Howitt (2006), op. cit.

Sapir, A. et al. (2003), 'An agenda for a growing Europe: Making the EU system deliver', report by an Independent High Level Group established on the initiative of the President of the European Commission'.

The growth-policy recommendations included in the above studies also find support in the empirical literature where innovation and imitation (i.e. adoption of available technologies) are assessed as to their respective roles in determining the overall technological gains of an economy. Within this overarching endogenous growth framework, the importance of the high / low skill composition of a country's human capital and the economy's distance from the technological frontier are both assessed.

Vandenbussche, Aghion and Méghir (2006) show that if one holds the level of human capital constant, its growth-enhancing effects depend both on its composition and on distance to the technology frontier.[47] More specifically, Vandenbussche et al. contend that the TFP growth-enhancing impact of skilled labour increases with a country's proximity to the frontier under the reasonable assumption that innovation is a more skill-intensive activity than imitation.

In keeping with this theme, Acemoglu, Aghion and Zilibotti (2002) emphasise the distinction between innovation and imitation as two alternative sources of productivity growth and the importance of growth-maximising institutions or policies evolving as a country or industry catches up with the technology frontier.[48] This line of reasoning is also supported by Aghion, Bloom, Blundell, Griffith and Howitt (2003) who show that when most firms in an industry are close to the national technological frontier, product market competition is positive for innovation.[49] This is also suggested in the paper by Aghion, Blundell, Griffith, Howitt and Prantl (2006), which presents evidence that the closer industries in an economy are to the world technology frontier, the more growth-enhancing is the threat of entry.[50] Finally, Nicoletti and Scarpetta (2003) also show that lowering barriers to entry has a positive effect in terms of stimulating TFP growth.[51]

Empirical strategy and basic regression results

The aim of the panel regression analysis presented hereafter is to build on existing work in this area by capitalising on the recent release of the EU KLEMS datasets and specifically on the increased availability of TFP data series and of substantially enhanced industry-level detail. The analysis concerns 9 EU countries plus the US over the 1980-2004 period and covers a total of 28 industries. The empirical approach is similar to that in Nicoletti and Scarpetta (2003). In the baseline specification, TFP growth rates are regressed over a measure of innovation / technology spillovers (i.e. the TFP growth rate of the leader country) and of a technology gap term (i.e. the lagged logarithm of the difference between TFP in a specific country and TFP at the frontier, with the frontier being determined by the country exhibiting the highest TFP level in that particular industry, in that particular year). Country, sector and year fixed effects control for factors that may independently affect TFP growth rates.

The basic regression results support the expectation that TFP growth is higher in a country when:[52]

- there is stronger TFP growth in the frontier economy (which reflects the impact of innovation and technology spillovers); and
- when the technology gap is larger, with the gap measured by the difference in TFP levels for the country in question relative to the global leader (which reflects the impact of adopting existing superior technologies).

[47] Vandenbussche, J., P. Aghion and C. Meghir (2006), 'Growth, Distance to the Frontier and Composition of Human Capital', *Journal of Economic Growth*, 11, pp. 97-127.

[48] Acemoglu, D., P. Aghion, and F. Zilibotti, (2002), 'Distance to Frontier, Selection and Economic Growth', NBER working paper 9066.

[49] Aghion, P., N. Bloom, R. Blundell, R. Griffith and P. Howitt (2003), 'Competition and Innovation, an inverted U Relationship', NBER working paper 9269.

[50] Aghion, P., N. Bloom, R. Blundell., R. Griffith and P. Howitt (2003), 'Competition and Innovation, an inverted U Relationship', NBER working paper 9269.

[51] Nicoletti, G. and S. Scarpetta (2003), 'Regulation, Productivity and Growth: OECD Evidence', Economic Policy, 36, pp. 9-72, April.

[52] The basic regressions are not shown here due to lack of space but can be found in European Commission (2007), op. cit.

Table 11: **The role of human capital and R&D**

	All Industries	All Industries	All Industries	All Industries	Only manufacturing sector	Only private services sector	Only ICT-related sectors
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TFP growth at the frontier	0.177*	0.176*	0.187*	0.174**	0.173**	0.438***	0.141**
	(2.02)	(2.02)	(2.19)	(2.66)	(2.40)	(3.90)	(3.16)
Technological gap	0.083**	-0.082**	-0.079**	-0.080***	-0.105**	-0.036	-0.013
	(3.16)	(3.14)	(3.06)	(3.21)	(2.80)	(1.32)	(1.41)
Human capital	-0.009	0.005	0.001	-0.006	-0.017	0.004	-0.007
	(1.40)	(1.23)	(0.17)	(0.55)	(0.69)	(0.86)	(1.01)
R&D	0.001	0.005	0.005***	-0.000	0.008	0.023	0.000
	(0.33)	(1.33)	(4.96)	(0.02)	(0.56)	(0.86)	(0.02)
Interaction TFP growth at the frontier with human capital				0.169	0.216	0.198***	0.128
				(1.32)	(1.40)	(5.39)	(1.32)
Interaction TFP growth at the frontier with R&D				0.019	0.013	0.459	0.064
				(0.54)	(0.36)	(1.71)	(1.38)
Interaction technological gap with human capital				0.018	0.015	0.002	0.014
				(0.89)	(0.41)	(0.35)	(0.99)
Interaction technological gap with R&D				0.004	0.019	-0.033	-0.005
				(0.21)	(0.64)	(0.64)	(0.46)
Country fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	No	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. obs.	2385	2385	2385	2385	1535	674	892
R^2	0.19	0.18	0.19	0.20	0.23	0.20	0.31

Notes – Estimation method: panel OLS regressions; standard errors robust with respect to heteroschedasticity and possible correlation within countries. Absolute value of t tests reported in parentheses. ***, **, * denote, respectively, statistical significance at 1, 5, and 10% level.
TFP growth at the frontier: TFP growth of the country with the highest TFP level in sector *s*, year *t* (leader country). Source EUKLEMS
Technological gap: lagged log (TFP level –log(TFP level of the leader country). Source: EUKLEMS
Human capital: share of high skill labour compensation in total labour compensation. Standardised variable. Source: EUKLEMS
R&D: R&D expenditure/gross output. Standardised variable. Source: OECD STAN

These results do not seem to be sector-specific; they also hold when the sample is restricted to the manufacturing, private services or ICT-related sectors. They do, however, appear to be sensitive to the period chosen: in the decade from 1995-2004, TFP growth was mostly driven by growth at the frontier, with a non-significant impact from the technology gap variable. This finding is consistent with the view that across Europe, growth is increasingly being driven by innovation activity and less by the adoption of existing up-to-date technologies.

In addition to the two main explanatory variables, the baseline specification was subsequently augmented to control for the impact of framework conditions. A long list of country-level variables were tested to capture the possible effect of, amongst other things, overall macroeconomic conditions; the presence of those economy-wide infrastructures which are most closely associated with the development of new technologies; the importance of ICT use; and the age structure of the population.

Confounding our prior expectations, such economy-wide variables produced results which were generally insignificant in terms of their TFP effects. In addition, there is little evidence from the regressions that ICT use has had a large role to play in determining cross-country TFP trends. The overall contribution of ICT would appear to be adequately reflected in the growth accounting results presented earlier, with the regression

analysis finding little support for additional TFP-enhancing spillover effects from an intensive use of ICT capital at the macro level.

Human capital and R&D play a role at the technology frontier

In recent years, there has been considerable interest in analysing the effects of investments in knowledge and human capital formation on the overall TFP performance of countries. With Europe lagging behind not only in terms of ICT penetration rates but also with regard to other indicators of knowledge production (such as R&D investments and the share of high-tech industries), the creation of knowledge capital has emerged as a central policy concern, with the Lisbon process being a concrete example of an ongoing policy programme aimed at boosting the pace of innovation.

Against this background, Table 11 reports the results for the basic specification augmented to take into account the role of human capital and R&D in affecting TFP growth.[53] The main message to be retained from the table is that both human capital and R&D do have a positive effect on TFP growth. R&D has a direct impact,[54] while the effect of human capital is indirect, emanating from a stronger positive impact of TFP growth at the frontier. The influence of human capital, however, is highly sector-specific, and appears to be most effective in determining the TFP performance of the private services sector.[55] However, for countries at or close to the technology frontier, policies aimed at improving the overall framework conditions for maximising the TFP benefits of human capital and R&D would be directly beneficial in facilitating the transition of their growth models to one based more on their own internal innovation capacity.

Effects of anti-competitive regulation seem to be highly industry-specific

Recent studies report that levels of regulation are potentially crucial driving forces for efficiency gains. For instance, European Commission (2007) concludes that competition is crucial for both the level and growth rate of productivity.[56]

To assess the importance of this specific determinant, Table 12 presents the results for the impact of several regulation indicators in the product, labour and financial markets on TFP performance.[57] The results suggest that, across 'all industries', the different regulatory indicators do not play a very important direct role in determining TFP growth, with non-significant results for most of the alternative specifications tested. In addition, there are some counter-intuitive effects when the analysis is restricted solely to the manufacturing, private services or ICT-related sectors, with tighter product market and financial market regulations predicted to be positive for TFP growth in some specific sectors.

With regard to the indirect interaction effects of the different forms of regulation, tighter financial market regulation appears to have consistently negative effects on TFP growth taking place at the frontier, both when all the sectors are pooled and when only individual sectors are considered in the regressions (i.e. manufacturing, private services and ICT-related sectors). In contrast, the results for product market regulations do not appear to be as robust since many of the coefficient estimates are insignificant and shift from positive to negative depending on the sector considered. As far as labour market regulations are concerned, they

[53] To facilitate the interpretation of the results, the human capital and R&D variables have been standardised in such a way as to have a zero mean and a unit standard deviation. When, for example, the human capital variable is interacted with variable *x*, the coefficient indicates the change in the coefficient of variable *x* which is associated with a one-standard-deviation increase in the human capital variable (while the coefficient of variable x indicates its impact in keeping human capital at its mean value).

[54] Column (1) shows that the direct impact of R&D is not significant. A significant impact is recovered only by eliminating sector fixed effects (as shown in columns (2) and (3)).

[55] This effect is captured by the significant coefficient on the human capital variable when interacted with the variable for TFP growth at the frontier in column (6).

[56] European Commission (2007), 'Policies in the pursuit of higher productivity: another look', Chapter 4 in 'EU Economy 2007 Review', European Economy No 8.

See also OECD (2003), 'The Sources of economic growth in OECD countries'.

[57] To facilitate the interpretation of the results, the indicators are standardised. The indicators increase with the intensity of the regulatory burden.

Table 12: **The role of regulations**

	All Industries	All Industries	Only manufacturing sector	Only private services sector	Only ICT-related sectors
	(1)	(3)	(4)	(5)	(6)
TFP growth at the frontier	0.171***	0.175***	0.398***	0.138***	0.153***
	(3.39)	(5.82)	(4.02)	(3.97)	(7.07)
Technological gap	-0.049***	-0.047***	-0.042*	-0.026***	-0.030***
	(5.09)	(5.20)	(2.26)	(5.13)	(6.95)
Product market regulation	-0.002	-0.000	0.126***	-0.008	0.008**
	(0.96)	(0.01)	(3.41)	(1.65)	(2.81)
Labour market regulation	0.008	-0.004	-0.009	0.002	0.006
	(1.45)	(0.79)	(1.46)	(0.36)	(0.95)
Financial market regulation	0.005	-0.007	-0.004	0.009	0.009*
	(1.31)	(1.43)	(0.36)	(1.73)	(2.01)
Interaction TFP growth at the frontier with product market regulation		0.016	0.416**	-0.005	-0.040
		(0.41)	(2.73)	(0.23)	(0.98)
Interaction TFP growth at the frontier with labour market regulation		0.090**	0.080**	0.069*	0.014
		(2.43)	(2.12)	(1.85)	(0.35)
Interaction TFP growth at the frontier with financial market regulation		-0.078	-0.127**	-0.063**	-0.081**
		(1.62)	(2.80)	(2.55)	(2.57)
Interaction technological gap with product market regulation		-0.007	0.064	-0.013*	0.002
		(0.90)	(1.17)	(2.07)	(0.38)
Interaction technological gap with labour market regulation		-0.004	-0.007	-0.005	0.001
		(0.48)	(0.47)	(0.81)	(0.16)
Interaction technological gap with financial market regulation		-0.003	-0.014	0.016**	0.007*
		(0.34)	(0.97)	(2.34)	(1.89)
N. obs.	6340	6340	2929	2043	2271
R^2	0.13	0.14	0.18	0.11	0.22

Notes – Estimation method: panel OLS regressions; fixed effects included for countries, sectors, and years; standard errors robust with respect to heteroschedasticity and possible correlation within countries. Absolute value of t tests reported in parentheses. ***, **, * denote, respectively, statistical significance at 1, 5, and 10 per cent level.
TFP growth at the frontier: TFP growth of the country with the highest TFP level in sector *s*, year *t* (leader country). Source: EUKLEMS
Technological gap: lagged log(TFP level)–log(TFP level of the leader country). Source: EUKLEMS
Product market regulation: indicator of the "knock on" sectoral impact of regulations in non-manufacturing sectors. Standardised variable. Source: OECD "Regimpact" indicator
Labour market regulation: indicator of anti-competitive regulations in the labour market. Standardised variable. Source: Fraser institute freedom indicators (taken with negative sign).
Financial market regulation: indicator of anti-competitive regulations in the financial markets. Standardised variable. Source: Fraser institute freedom indicators (taken with negative sign).

appear to increase TFP growth at the frontier, irrespective of the sectoral breakdown used in the sample. Since the theoretical literature does not provide a clear-cut answer regarding the link between labour market regulation, innovation and TFP, a note of caution is required in interpreting the positive relationship between stricter labour market regulation and TFP growth. In particular, the limited time variation of the sample used in the regressions makes it difficult to disentangle the short-term transitional effects of labour market reforms, introduced by many EU countries since the early 1990s, from the long-run impact of those reforms on TFP growth rates.[58]

In overall terms, given the lack of any evidence of a direct impact from the regulatory indicators at the level of 'total industries' and the

[58] On the one hand, stricter labour market regulation, notably employment protection legislation, may, by limiting the room for re-adjustment of the labour force in the event of redundancies, hinder the incentives for firms to engage in risky innovation projects, thus reducing TFP growth at the frontier. On the other hand, stronger protection of employment may increase training and investment in skills, which are generally complementary to innovation and TFP growth.

Table 13: **Industry-specific models**

	ICT-producing manufacturing		Retail and affiliated industries		Utilities	
	Only ICT-producing manufacturing	Only remaining industries	Only retail and affiliated industries	Only remaining industries	Only utilities	Only remaining industries
	(1)	(2)	(3)	(4)	(5)	(6)
TFP growth at the frontier	0.007	0.168**	0.152**	0.194**	0.086	0.190***
	(0.05)	(2.34)	(2.61)	(2.37)	(0.47)	(4.08)
Technological gap	0.010	-0.082**	-0.034***	-0.0544***	-0.022	-0.048***
	(0.67)	(3.28)	(4.26)	(4.03)	(0.84)	(4.92)
Interaction TFP growth at the frontier with R&D	0.130***	0.016				
	(3.50)	(0.38)				
Relative contribution of private consumption to GDP growth			0.004***	0.001		
			(5.08)	(1.80)		
Product market regulation					-0.010*	0.004
					(2.00)	(0.063)
Interaction TFP growth at the frontier with product market regulation					0.032	0.043
					(0.33)	(1.32)
Interaction technological gap with product market regulation					-0.115	0.005
					(1.06)	(0.90)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	No	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes
N. obs.	141	2497	836	5030	684	5656
R^2	0.56	0.18	0.17	0.14	0.22	0.13

Notes – Estimation method: panel OLS regressions; fixed effects included for countries, sectors, and years; standard errors robust with respect to heteroschedasticity and possible correlation within countries. Absolute value of t tests reported in parentheses. ***, **, * denote, respectively, statistical significance at 1, 5, and 10 per cent level.
TFP growth at the frontier : TFP growth of the country with the highest TFP level in sector *s*, year *t* (leader country). Source: EUKLEMS
Technological gap : lagged log (TFP level)–log(TFP level of the leader country). Source: EUKLEMS
R&D : R&D expenditure/gross output. Standardised variable. Source: OECD STAN
Human capital: share of high skill labour compensation in total labour compensation. Standardised variable. Source: EUKLEMS
Relative contribution of private consumption to GDP growth: GDP growth due to private consumption/GDP growth. Source AMECO.
Product market regulation: indicator of the "knock on" sectoral impact of regulations in non-manufacturing sectors. Standardised variable. Source: OECD "Regimpact" indicator.

robustness issues / counter-intuitive results for some of the indirect interaction effects, it is clear that more research is needed to get a better understanding of the role of the regulatory environment in explaining cross-country TFP growth differentials. In particular, more industry-specific regulatory indicators may be needed to better understand the effects of a more competition-friendly regulatory environment on TFP trends.

Part of the problems experienced with the regulatory regressions may be linked to the need to use a lower level of disaggregation than the broad sectoral aggregates which were used for the analysis in Table 12. This is attempted in Table 13 which presents results for sectors defined at a finer level of industry disaggregation. The aim is to identify the key TFP growth determinants in those broad industry groupings that explain the bulk of the euro-area-US TFP differences over the past decade.

Column (1) shows that for the ICT-producing industry (i.e. electrical and optical equipment) the basic variables behave somewhat differently from prior expectations. The frontier and technology gap variables are non-significant. This result is consistent with the existing evidence which suggests that labour productivity in the 'high tech' sectors is not converging across

countries, in contrast with what is observed for most other sectors. Interestingly, the results change drastically when the same specification is tested on 'total industries' excluding the ICT-producing manufacturing industry (column (2)).

Regarding retail and wholesale trade services (column (3)), the results indicate a significant role for cyclical factors in providing a direct explanation for observed differences in TFP growth between the US and the EU Member States (as suggested by the strongly significant positive coefficient for the relative contribution of private consumption to GDP growth). Due to its construction as a residual term, TFP growth also captures productivity improvements associated with the better exploitation of scale economies, which are likely to be a relevant factor in explaining productivity dynamics in this group of service industries. It is worth noting that a similar positive impact of cyclical factors is not observed in the other sectors (column (4)).

Finally, regarding the 'network' industries, product market regulations are shown to have a significant negative impact on this grouping of industries but not on the rest of the economy. This could be related to the deregulation drive which has been a feature of those industries over the last two decades, with the more pro-competitive environment created yielding significant benefits in terms of overall TFP trends. However, these latter benefits are likely to be skewed more towards one-off static efficiency gains than permanent dynamic effects.

3. Summary and policy implications

Over the last decade many euro-area Member States have experienced a slowdown in their productivity performances relative both to previous time periods and to other developed OECD economies, most notably the US. Our analysis has shown that most of the euro-area-US differences are not to be found in investment patterns but are mainly driven by developments in TFP. At the sectoral level, the deterioration in the euro-area's relative performance mostly reflects the insufficient contribution to TFP growth of the high technology part of the manufacturing sector and of the private services sector. The analysis actually shows that a small group of industries is responsible for most of the euro area's productivity weakness, namely electrical and optical equipment; wholesale and retail trade; financial services; and other business services. On a more encouraging note, there is one area of the economy where the euro area has managed to consistently outperform the US in TFP terms over the recent years, namely the 'network' industries.

Analysing econometrically the determinants of TFP growth, a relatively clear finding is that, whilst there is a generalised tendency toward catching up across countries in terms of TFP level, it seems to be weakening over time, especially in the post-1995 period. For the ICT-producing manufacturing sector this process of catching-up is particularly weak. In contrast, TFP growth appears increasingly associated with innovation and technological spillovers from countries positioned at the 'technology frontier'. TFP growth is also likely to benefit more from innovation at the technology frontier if there is more intensive use of R&D and human capital.

The regression analysis suggests that the TFP trends in those specific industries where euro-area-US differences are concentrated can be attributed to a relatively wide spectrum of factors. Whereas the relative under-performance of the euro-area's ICT producing manufacturing industry (mainly semiconductors) is linked to issues of R&D intensity, the divergences in the retail and wholesale trade industries relate to cyclical factors and the better exploitation of scale economies. Finally, with regard to the euro-area out-performance in the network industries, there is evidence to suggest that these are mainly linked to one-off static efficiency gains associated with the sustained deregulation drive which occurred in these industries over the last two decades.

Regarding the policy implications that can be derived from the analysis, two tentative points can be made:

Firstly, the TFP patterns which have emerged over recent decades, especially since the mid-1990s, indicate a growing need for a more intensive use of R&D and high-skilled human capital in frontier economies. Rather than an increase in the resources devoted to R&D and higher education (in itself necessary, provided

that their efficiency and effectiveness is secured) what seems to matter most is the provision of adequate framework conditions to facilitate the reallocation of these scarce knowledge-intensive resources towards those industries which can deploy them most productively.

Secondly, the highly diverse range of factors which the present analysis has highlighted as potential contributors to the ongoing euro-area-US TFP differences, may suggest a need to adopt a more targeted, industry-level approach to structural reform efforts. In this context, the present focus section should be seen more as an attempt to raise questions and to indicate avenues for further research than as providing clear policy recommendations.

IV. Recent DG ECFIN publications

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Roel Beetsma (University of Amsterdam, CEPR and CESifo) and Heikki Oksanen (European Commission, Directorate General for Economic and Financial Affairs)
Pension Systems, Ageing and the Stability and Growth Pact
http://ec.europa.eu/economy_finance/publications/economic_papers/2007/economicpapers289_en.htm

EUROPEAN ECONOMY. ECONOMIC PAPERS. No. 290.
Douglas Koszerek, Karel Havik, Kieran Mc Morrow, Werner Röger and Frank Schönborn (European Commission, Directorate General for Economic and Financial Affairs)
An overview of the EU KLEMS Growth and Productivity Accounts
http://ec.europa.eu/economy_finance/publications/economic_papers/2007/economicpapers290_en.htm

EUROPEAN ECONOMY. ECONOMIC PAPERS. No. 291.
A. Melander, G. Sismanidis and D. Grenouilleau (European Commission, Directorate General for Economic and Financial Affairs)
The track record of the Commission's forecasts - an update
http://ec.europa.eu/economy_finance/publications/economic_papers/2007/economicpapers291_en.htm

EUROPEAN ECONOMY. ECONOMIC PAPERS. No. 292.
Christian Dreger (coordinator of the study), Konstantin Kholodilin, Kirsten Lommatzsch, Jirka Slacalek (German Institute for Economic Research (DIW Berlin) and Przemyslaw Wozniak (Center for Social and Economic Research (CASE Warzaw)
Price convergence in the enlarged internal market
http://ec.europa.eu/economy_finance/publications/economic_papers/2007/economicpapers292_en.htm

EUROPEAN ECONOMY. ECONOMIC PAPERS. No. 293.
C. Martinez-Mongay, L.A. Maza Lasierra and J. Yaniz Igal (European Commission, Directorate General for Economic and Financial Affairs)
Asset Booms and Tax Receipts: The case of Spain, 1995-2006
http://ec.europa.eu/economy_finance/publications/economic_papers/2007/economicpapers293_en.htm

3. Regular publications

Euro area GDP indicator (Indicator-based forecast of quarterly GDP growth in the euro area)
http://europa.eu.int/comm/economy_finance/indicators/euroareagdp_en.htm

Business and Consumer Surveys (harmonised surveys for different sectors of the economies in the European Union (EU) and the applicant countries)
http://europa.eu.int/comm/economy_finance/indicators/businessandconsumersurveys_en.htm

Business Climate Indicator for the euro area (monthly indicator designed to deliver a clear and early assessment of the cyclical situation)
http://europa.eu.int/comm/economy_finance/indicators/businessclimate_en.htm

Key indicators for the euro area (presents the most relevant economic statistics concerning the euro area)
http://europa.eu.int/comm/economy_finance/indicators/key_euro_area/keyeuroarea_en.htm

Monthly and quarterly notes on the euro-denominated bond markets (looks at the volumes of debt issued, the maturity structures, and the conditions in the market)
http://europa.eu.int/comm/economy_finance/publications/bondmarkets_en.htm

Price and Cost Competitiveness
http://europa.eu.int/comm/economy_finance/publications/priceandcostcompetiteveness_en.htm

V. Key indicators for the euro area

1 Output		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
Industrial confidence [1.1]	Balance	-4.7	-7.3	2.3	6.1	4.9	4.8	2.7	1.7	2.5
Industrial production [1.2]	mom % ch	2.1	1.3	4.0	0.0	0.7	1.2	-0.8	--	--
		2004	2005	2006	06Q2	06Q3	06Q4	07Q1	07Q2	07Q3
Gross domestic product [1.3]	Qtr. % ch	2.0	1.5	2.8	1.0	0.6	0.8	0.8	0.3	0.7
2 Private consumption		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
Consumer confidence [2.1]	Balance	-13.9	-13.8	-9.0	-1.9	-1.8	-3.7	-5.6	-6.1	-8.0
Retail sales [2.2]	mom % ch	1.5	1.2	2.0	0.7	0.4	0.0	0.2	0.3	--
		2004	2005	2006	06Q2	06Q3	06Q4	07Q1	07Q2	07Q3
Private consumption [2.3]	Qtr. % ch	1.5	1.5	1.9	0.4	0.5	0.4	0.0	0.5	--
3 Investment		2004	2005	2006	06Q2	06Q3	06Q4	07Q1	07Q2	07Q3
Capacity utilization [3.1]	%	81.6	81.3	83.0	82.5	83.6	83.9	84.4	84.8	84.3
Gross fixed capital formation [3.2]	Qtr. % ch	1.9	2.8	5.4	2.7	0.8	1.7	1.9	-0.2	--
Change in stocks [3.3]	% of GDP	0.1	0.2	0.2	0.0	0.3	-0.5	0.2	-0.2	--
4 Labour market		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
Unemployment [4.1]	%	8.9	8.9	8.3	7.8	7.4	7.4	7.3	7.2	--
		2004	2005	2006	06Q2	06Q3	06Q4	07Q1	07Q2	07Q3
Employment [4.2]	Ann. % ch	0.9	0.9	1.5	1.6	1.6	1.6	1.8	1.7	--
Shortage of labour [4.3]	%	2.4	2.3	3.8	3.1	4.4	5.0	5.0	6.1	6.6
Wages [4.4]	Ann. % ch	2.3	2.6	2.7	2.9	2.7	2.4	2.3	2.5	--
5 International transactions		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
Export order books [5.1]	Balance	-13.2	-15.6	-1.1	5.0	4.0	4.0	3.0	2.0	1.0
World trade [5.2]	Index	146.2	157.0	172.3	184.0	187.4	189.9	186.1	--	--
Exports of goods [5.3]	Bn. EUR	1149.0	1242.5	1396.4	126.1	124.3	129.9	131.0	--	--
Imports of goods [5.4]	Bn. EUR	1078.0	1225.1	1405.6	121.0	124.7	126.2	126.6	--	--
Trade balance [5.5]	Bn. EUR	71.0	17.4	-9.1	5.1	-0.4	3.7	4.3	--	--
		2004	2005	2006	06Q2	06Q3	06Q4	07Q1	07Q2	07Q3
Exports of goods and services [5.6]	Qtr. % ch	6.9	4.4	7.9	1.5	1.1	3.1	0.8	0.8	--
Imports of goods and services [5.7]	Qtr. % ch	6.7	5.1	7.7	1.3	1.8	1.7	1.0	0.5	--
		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
Current account balance [5.8]	Bn. EUR	61.9	8.6	-12.7	6.9	3.8	4.5	0.6	--	--
Direct investment (net) [5.9]	Bn. EUR	-66.9	-208.8	-136.5	-37.4	0.1	-7.2	-22.6	--	--
Portfolio investment (net) [5.10]	Bn. EUR	72.1	141.3	276.3	70.6	30.2	21.9	46.2	--	--
6 Prices		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
HICP [6.1]	Ann. % ch	2.2	2.2	2.2	1.9	1.8	1.7	2.1	2.6	3.0
Core HICP [6.2]	Ann. % ch	2.1	1.5	1.5	1.9	1.9	2.0	2.0	2.1	--
Producer prices [6.3]	Ann. % ch	1.9	3.5	4.4	2.3	1.8	1.8	2.7	3.3	--
Import prices [6.4]	Index	97.2	104.8	112.9	114.3	116.0	--			
7 Monetary and financial indicators		2004	2005	2006	Jun-07	Jul-07	Aug-07	Sept-07	Oct-07	Nov-07
Interest rate (3 months) [7.1]	% p.a.	2.0	2.1	2.9	4.1	4.2	4.5	4.7	4.7	--
Bond yield (10 years) [7.2]	% p.a.	4.1	3.4	3.8	4.6	4.5	4.3	4.2	4.3	--
ECB repo rate [7.3]	% p.a.	2.0	2.0	2.8	3.9	4.0	4.0	4.0	4.0	4.0
Stock markets [7.4]	Index	2804.6	3207.1	3793.3	4470.2	4449.0	4220.6	4284.4	4430.8	--
M3 [7.5]	Ann. % ch	5.8	7.4	8.5	11.0	11.7	11.6	11.3	12.3	--
Credit to private sector (loans) [7.6]	Ann. % ch	6.0	8.1	11.0	10.8	11.0	11.2	11.0	11.2	--
Exchange rate USD/EUR [7.7]	Value	1.24	1.24	1.26	1.34	1.37	1.36	1.39	1.42	--
Nominal effective exchange rate [7.8]	Index	109.8	109.7	111.4	115.3	115.9	115.5	116.4	117.5	119.3

Number	Indicator	Note	Source
1	**Output**		
1.1	Industrial confidence indicator	Industry survey, average of balances to replies on production expectations, order books, and stocks (the latter with inverted sign)	ECFIN
1.2	Industrial production	Volume, excluding construction, wda	Eurostat
1.3	Gross domestic product	Volume (1995), seasonally adjusted	Eurostat
2	**Private consumption**		
2.1	Consumer confidence indicator	Consumer survey, average of balances to replies on four questions (financial and economic situation, unemployment, savings over next 12 months)	ECFIN
2.2	Retail sales	Volume, excluding motor vehicles, wda	Eurostat
2.3	Private consumption	Volume (1995 prices), seasonally adjusted	Eurostat
3	**Investment**		
3.1	Capacity utilisation	In percent of full capacity, manufacturing, seasonally adjusted, survey data (collected in each January, April, July and October).	ECFIN
3.2	Gross fixed capital formation	Volume (1995 prices), seasonally adjusted	Eurostat
3.3	Change in stocks	In percent of GDP, volume (1995 prices), seasonally adjusted	Eurostat
4	**Labour market**		
4.1	Unemployment	In percent of total workforce, ILO definition, seasonally adjusted	Eurostat
4.2	Employment	Total employment, domestic concept, seasonally and working day adjusted	Eurostat
4.3	Shortage of labour	Percent of firms in the manufacturing sector reporting a shortage of labour (unfilled job openings) as a constraint to production, seasonally adjusted	ECFIN
4.4	Wages	Wages and salaries. Labour cost index, industry and services (excluding public administration), nominal, working day adjusted	ECFIN
5	**International transactions**		
5.1	Export order books	Industry survey; balance of positive and negative replies, seasonally adjusted	ECFIN
5.2	World trade	Volume, 1998=100, seasonally adjusted	CPB
5.3	Exports of goods	Bn. EUR, excluding intra euro-area trade, fob	Eurostat
5.4	Imports of goods	Bn. EUR, excluding intra euro-area trade, cif	Eurostat
5.5	Trade balance	Bn. EUR, excluding intra euro-area trade, fob-cif	Eurostat
5.6	Exports of goods and services	Volume (1995 prices), including intra euro-area trade, seasonally adjusted	Eurostat
5.7	Imports of goods and services	Volume (1995 prices), including intra euro-area trade, seasonally adjusted	Eurostat
5.8	Current account balance	Bn. EUR, excluding intra euro-area transactions; before 1997 partly estimated	ECB
5.9	Direct investment	(net) Bn. EUR, excluding intra euro-area transactions	ECB
5.10	Portfolio investment	(net) Bn. EUR, excluding intra euro-area transactions	ECB
6	**Prices**		
6.1	HICP	Harmonised index of consumer prices	Eurostat
6.2	Core HICP	Harmonised index of consumer prices, excluding energy and unprocessed food	Eurostat
6.3	Producer prices	Without construction	Eurostat
6.4	Import prices	Import unit value index for goods, 2000=100	Eurostat
7	**Monetary and financial indicators**		
7.1	Interest rate	Percent p.a., 3-month interbank money market rate, period averages	Ecowin
7.2	Bond yield	Percent p.a., 10-year government bond yields, lowest level prevailing in the euro area, period averages	Ecowin
7.3	ECB repo rate	Percent p.a., minimum bid rate of the ECB, end of period	Ecowin
7.4	Stock markets	DJ Euro STOXX50 index, period averages	Ecowin
7.5	M3	Seasonally adjusted moving average moving average (3 last months)	ECB
7.6	Credit to private sector (loans)	MFI loans to euro-area residents excluding MFIs and general government, monthly values: month end values, annual values: annual averages	ECB

7.7	Exchange rate USD/EUR	Period averages	ECB
7.8	Nominal effective exchange rate	Against 13 other industrialised countries, double export weighted, 1995 = 100, increase (decrease): appreciation (depreciation)	ECFIN

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Recent economic developments and short-term prospects	*H. Cigan, L. González, G. Mahieu, M. Vesterlund and C. Walkner*
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The international role of the euro	*H. Temprano Arroyo and J. Wadefjord*
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