III. ECONOMIC DEVELOPMENTS AND ADJUSTMENT

Summary

An assessment of developments in key macroeconomic variables in euro-area countries over a period spanning the creation of the euro area in 1999 reveals a number of interesting features. First, Member States have had diverse experiences in terms of GDP growth and inflation. Second, a closer look at the data uncovers diversity in the components of growth and in underlying economic fundamentals. For example, some countries, such as Germany, have relied primarily in recent years on the external sector as a driver of growth, while domestic demand has been the key factor in others, e.g. Spain. Within the euro-area, Germany has experienced a steady improvement in competitiveness vis-à-vis the other 11 countries since 1999, while Greece, Spain, Ireland, Italy, the Netherlands and Portugal have lost ground. Third, potential discriminating features such as country size or "catching-up" cannot explain all of the observed divergence in economic performance. For example, among catching-up countries, both Spain and Ireland have experienced robust growth since 1999, while the Portuguese economy has stagnated. Empirical analysis of behavioural relations for private consumption and investment expenditures show that, while these differ across countries, there is practically no series break around the time of euro adoption. To the extent economic performance across countries diverged, this in part reflected disturbances or "shocks" in the determinants of these expenditures. In particular, a significant part of the divergence in performance after euro adoption reflected investment behaviour, especially investment in residential housing. Financial markets underwent increasing integration across the euro area. It is too early to determine from the data how this has affected risk-spreading and income smoothing across euro area at time of real sector shocks, and thus buffering the adjustment process. Inflation developments, also, suggest issues to be explored more deeply in the remainder of this Review. On the one hand, there was notable success in keeping area-wide inflation close to the ECB's definition of price stability, and achieving high credibility in terms of inflation expectations. On the other hand, there were significant and persistent divergences in inflation across the area, which need to be better understood.

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ECONOMIC DEVELOPMENTS AND ADJUSTMENT

1. Macroeconomic developments across the euro area – a bird's eye view

This section presents a snapshot of the evolution of the main macroeconomic indicators across euro-area countries for the period 1992 to 2005, which encompasses seven years before and after the creation of the euro area in 1999. The aim of this section is to provide an overview of the varied experiences of the twelve countries making up the euro area. From this overall view, we identify six countries that, because of their diverse experiences within the euro area, serve as useful case studies for an analysis of how economic adjustment is progressing in the euro area. These are Germany, Spain, Ireland, Italy, the Netherlands and Portugal.

The macroeconomic indicators covered below are: real GDP growth and its main components – private consumption and investment – inflation, employment, unemployment, wages, productivity, the real effective exchange rate and the current account balance. A summary of comparative macroeconomic performance is presented in the tables annexed to this chapter.

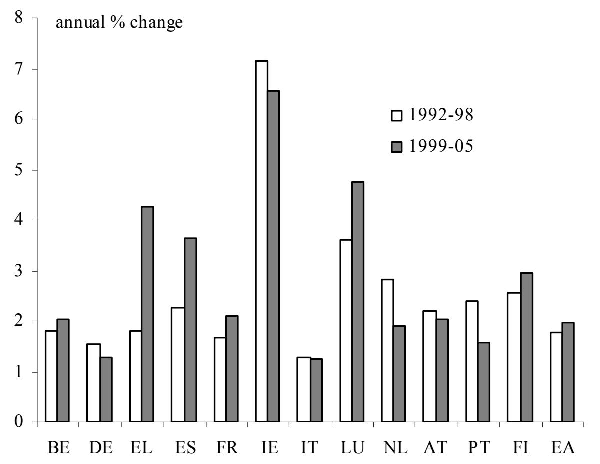
Real GDP

The relatively modest economic performance of the euro area since 1998 hides considerable differences across individual Member States. A glance at average growth rate in the period 1999 to 2005 in Graph 1.1 reveals three country groupings: Germany, Italy, the Netherlands and Portugal with growth below the euro-area average; Belgium, Austria and France with growth slightly above the euro-area average; Greece, Spain, Ireland, Luxembourg and Finland with growth appreciably above the euro-area average.

Differences in growth performance were already apparent in the pre-1999 period. A comparison of rankings prior to and after the creation of the euro area shows that the position of Ireland at the top and Germany and Italy at the bottom remained unchanged between the two periods. Among the remainder, Greece, Spain and Luxembourg improved their growth ranking by enhancing their growth performance vis-à-vis the pre-1999 period, while the Netherlands and Portugal lost considerable ground through a sharp fall in their average growth rates. The pace of economic activity in Belgium, France and, to a lesser extent, Austria shadowed the euro area quite closely during both periods.

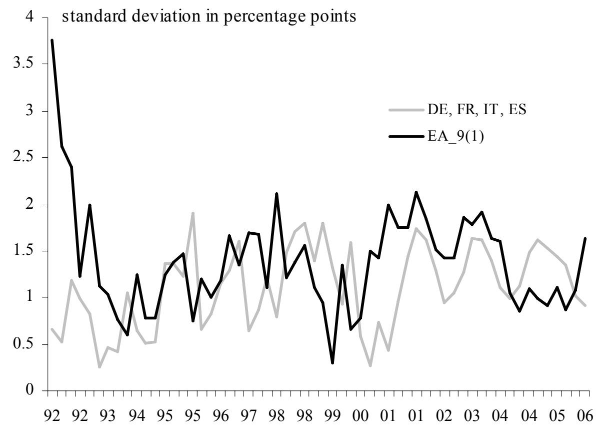
More specifically, the Greek economy accumulated a positive GDP growth differential of about 20 percentage points vis-à-vis the euro area during the period 1999-2005. This is a marked difference with the pre-1999 period when there was practically no growth divergence with respect to the euro area. For Spain, the corresponding growth gaps were 14 percentage points (1999-2005) and 4 percentage points (1992-98). The Netherlands and Portugal provide contrasting experiences to Greece and Spain. While the Netherlands significantly outperformed the euro area during 1992-98, the pace of growth decelerated after 1998. Similarly, Portugal's economic performance was weaker after the creation of the euro area compared to the pre-1999 period, with an accumulated negative GDP growth differential of about 3 percentage points vis-à-vis the euro area since 1998. A deterioration in the already-subdued growth performance between the pre- and post- 1999 periods is also visible in Italy and even more so in Germany: both countries have recorded a cumulative negative growth gap of about 5 percentage points since 1998 vis-à-vis the euro area.

Graph 1.1: Real GDP growth rate, averages 1992-98 and 1999-2005



Source: Commission Services

Graph 1.2: Dispersion of annual GDP growth rates



Note: (1) - Euro area excluding IE, LU and PT

Source: Commission Services

A calculation of the standard deviation of year-on-year economic growth rates in each quarter over the past fifteen years in euro-area Member States provides an indication of the extent to which individual GDP growth rates have converged. A decrease in the standard deviation implies that divergence is decreasing, and vice-versa. Given the relative short-time spans involved, a change larger than one standard deviation is considered as statistically significant. This indicator suggests considerable convergence of GDP growth among euro-area countries between 1992 and 1996 (Graph 1.2). However, in the subsequent two years before the creation of the euro area, during which the economies pursued different fiscal and monetary policies in order to meet the Maastricht criteria, a divergence in growth rates emerged as shown by a rising standard deviation. GDP growth rates converged in 1999 and 2000 but growth differentials increased again in the next two years. This increased divergence in GDP growth rates took place in the midst of a prolonged euro-area slowdown, to some extent reflecting the different degree of resilience of euro-area economies. The data for the last four years, however, suggest that some moderate convergence may be underway.

As noted previously, there have been marked differences in the growth performance of some euro-area economies before and after the creation of the euro area. While the process of catching-up may go some way towards explaining divergent experiences, it is not a discriminating factor in this respect. For example, while Spain, Ireland and Greece grew much faster than larger, sluggish growth, countries such as Germany and Italy, Portugal did not succeed in sustaining the pace of catching-up that was evident before 1999. Growth divergences are not perfectly correlated with country size either. For instance, the Netherlands shared a similar decelerating growth experience to Portugal, while per capita GDP growth in France has outperformed that of Italy and Germany both before and after the creation of the euro area.

Underlying the observed differences in GDP growth are divergences in the contributions of the domestic and foreign sectors to growth. For the euro area as a whole, the average contribution of domestic demand (excluding stock building) increased from 1.5 to 1.9 percentage points between 1992-98 and 1999-2005, while the average contribution of net trade diminished considerable from 0.28 to 0.08 of a percentage point. Within this overall trend, the experiences of Germany and Spain are in striking contrast. Germany witnessed a sharp rise in the contribution of the external sector and a substantial fall in the contribution of domestic demand, while Spain had the opposite experience. The Netherlands and Austria shared the same trend as Germany, although the changes were less pronounced. In Greece and Portugal the average contributions from the external sector was negative in both periods, while France and Italy joined the group with a negative contribution from the external sector in 1999-2005.

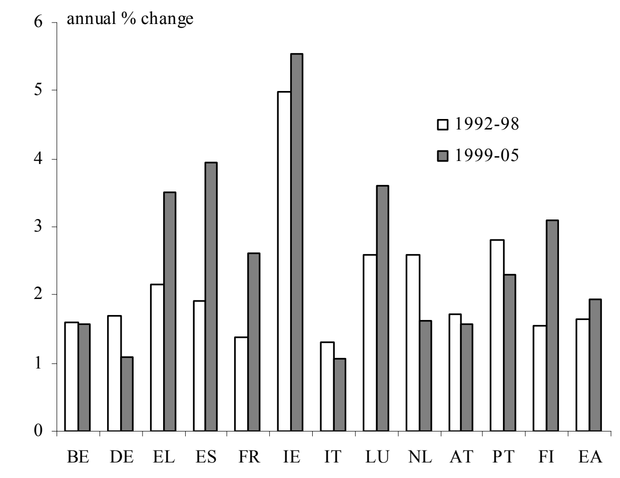
Private consumption

Graph 1.3 shows the performance of private consumption in euro-area countries before and after the start of the third stage of EMU. Since 1999, growth in private consumption has been consistently faster than in the euro-area average in some Member States. This is particularly the case of Ireland, which accumulated a (positive consumption) gap of about 30 percentage points vis-à-vis the euro area between 1999 and 2005. But Spain, Luxembourg, Greece, Finland, France and Portugal also experienced stronger consumption growth than the euro area. On the other hand, the pace of consumer spending in Germany and Italy has been very weak since 1998 with a cumulated negative growth gap of about 7% in both countries compared to average growth in the euro area. Subdued consumer spending after the start of the third stage of EMU was observed also in Austria, Belgium and the Netherlands.

Even more telling than cross-country divergences in consumption growth are the differences in the performance of private consumption before and after 1999 in some euro-area Member States. This is particularly the case for Spain, where private consumption has been booming since 1999, while it grew broadly in line with the euro-area wide average during 1992-1998. The differences in consumer spending patterns before and after the creation of the euro are striking also in such countries as Greece, Finland and France. It is noticeable that French consumer spending has outpaced the euro-area average since 1998 while, in marked contrast, private consumption growth in France was more subdued than in the euro area before the creation of the euro area. The performance of private consumption in France is also significantly different from the experience of Italy and Germany, where the negative gap vis-à-vis the euro-area average growth rate in private consumption growth widened after 1998 compared to the period 1992-1998. Private consumption growth in Belgium, Austria and the Netherlands was also weaker after 1998 compared with the pre-1999 period.

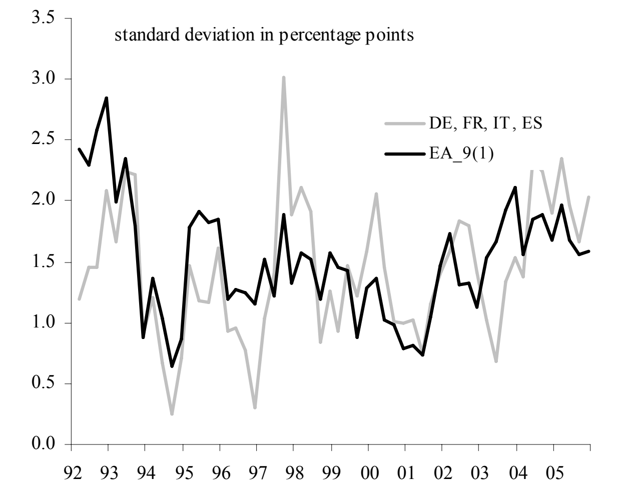
Another perspective to this issue of divergence in private consumption growth across euro-area countries is provided by looking at the standard deviation over time of the year-on-year growth rate. There is some evidence that variations in consumption growth rates have somewhat increased in recent years, particularly among the four largest euro-area Member States (see Graph 1.4).

Graph 1.3: Growth rate of private consumption, averages 1992-98 and 1999-2005



Source: Commission Services

Graph 1.4: Dispersion of private consumption growth rates



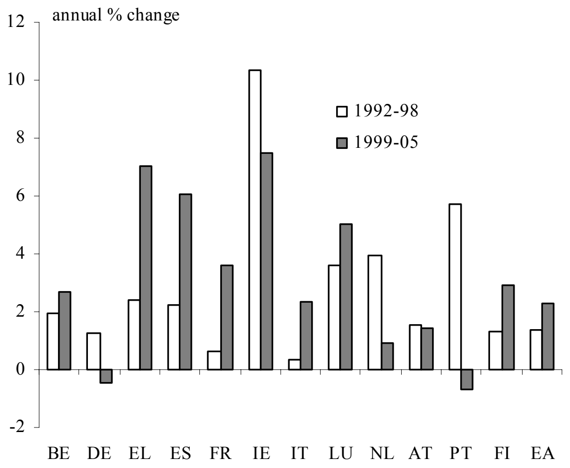
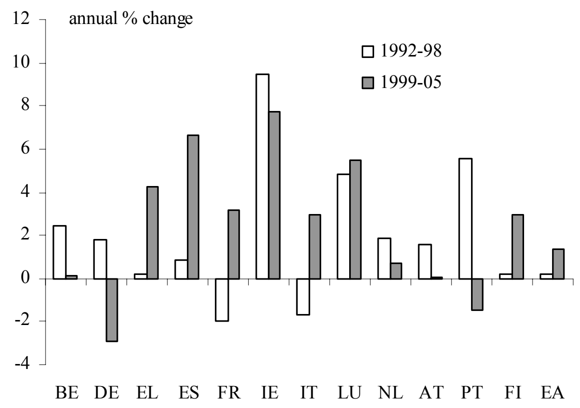
Note: (1) - Euro area excluding IE, LU and PT

Source: Commission Services

Investment

Investment spending has also been characterised by significant diversity across the euro-area Member States. Although the euro area experienced the beginning of an investment boom in 1997-98, the economic downturn in the first half of the 1990s – with euro-area investment spending registering a 6.3% drop in 1993 – meant that investment growth averaged only 1.3% for the euro area as a whole in the period 1992-98. During that period, by far the highest investment growth was observed in Ireland, with average annual investment growth of 10.3%, followed by Portugal with 5.7% and the Netherlands 3.9%. In contrast, Italy and France experienced much lower investment growth, of 0.3% and 0.6%, respectively, with investment spending in Germany growing around the euro-area average of 1.3%.

In the period from 1999 to 2005, investment growth averaged 2.3% in the euro area. This period also includes significant business-cycle movements, with high investment growth in the euro area as a whole in 1999 and 2000 followed by a protracted slowdown and a slight pick-up in investment spending in 2004 and 2005. Germany and Portugal experienced annual average declines in investment spending during the period of 0.4% and 0.7%, respectively, while investment grew very moderately in the Netherlands. Investment growth was again strongest in Ireland, at 7.5%, despite some moderation following the bursting of the ICT-bubble, while Greece and Spain also experienced very robust average annual investment growth, of 7% and 6.1%, respectively.

Graph 1.5: Growth rate of investment, averages 1992-98 and 1999-2005	**Graph 1.6: Growth rate of construction investment, averages 1992-98 and 1999-2005**
	
Source: Commission Services	*Source:* Commission Services

As a whole, investment spending has remained roughly constant as a share of euro-area GDP, around 20-21%, with some cyclical swings, including a trough in 1993 at 19.8%, and a peak in 2000 at 21.4%. In the current recovery, the investment ratio has improved slightly from 20.6% in 2002 to 20.9% in 2005. There are significant divergences across Member States, with the share of investment in GDP in Spain increasing from around 22% in 1995 to more than 28% in 2005. Similarly, the share of investment in GDP has increased by more than 5 percentage points in Ireland and Greece, to above 25% in 2005. On the other hand, in Germany, the share of investment in GDP has diminished from above 21% in the mid-1990s to around 18.5% in 2005. In the Netherlands and, in particular, Portugal, the investment rate peaked in 1999 and since been adjusting downwards.

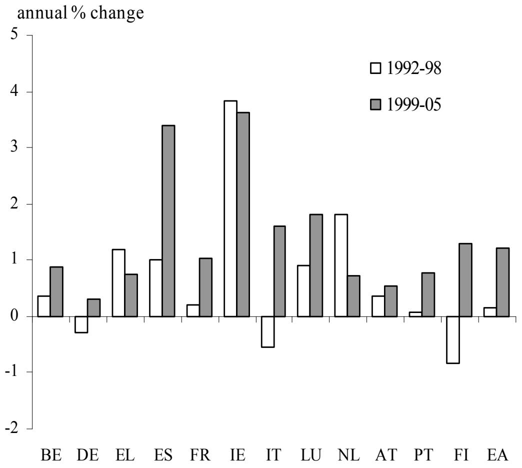
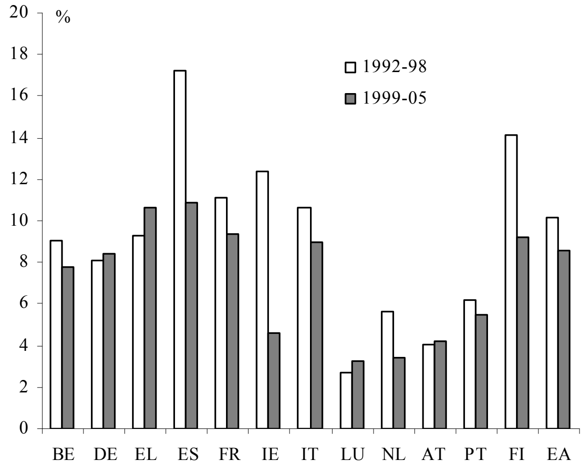
Looking at the breakdown of investment by product, a significant part of the divergence stems from construction investment, primarily due to differences in housing markets. In the period 1992-98, construction investment grew on average by 0.5% per year in the euro area. France and Italy experienced an annual average contraction of construction investment in that period of 2% and 1.7%, respectively, whereas construction investment growth averaged 1.8% in Germany, due to very strong construction activity in 1992-94, and 0.8% in Spain. The highest rates of growth during that period were seen in Ireland and Portugal, at 9.5% and 5.5%, respectively.

The positive growth rate in Germany during that period was however due to very strong growth in the wake of unification in 1990, which was followed by a period of prolonged contraction in construction. The only year with positive growth in construction investment in Germany since 1994 was 1999. As a consequence, Germany has experienced an average annual contraction of 2.3% in construction spending since 1995 (by 2.7% in the period 1999-05). In contrast with the contraction in the period 1992-98 period, construction investment averaged around 3% in France and Italy. While construction investment has continued to be strong in Ireland, Spain and, to some extent Greece, experienced strong booms in the construction sector, during which average construction growth reached 6.6% and 4.2%, respectively. Despite the downward adjustment in Germany, the growth rate of euro-area construction investment averaged 1.4% annually in the period 1999-2005.

Employment and unemployment

An examination of the data reveals a strong correlation between employment growth and real GDP growth over the whole period 1992-2005. Thus, at first glance, relative employment differences appear to be as persistent as growth differences. But an investigation of individual performance at the Member State level uncovers some interesting nuances. Spain, Ireland and Luxembourg witnessed above-average employment and output growth in both periods, while Greece was unable to sustain strong employment growth in 1999-2005 despite a robust growth performance. Italy succeeded in moving from an overall trend of job loss in the period 1992-98 to one of average employment growth in the post-1999 period despite a slowdown in growth, while Germany suffered from job loss in the period 1992-98 and the lowest average rise in 1999-2005. Austria and Portugal both improved their average employment growth despite a worsening growth performance. The Netherlands' experience of above-average growth and employment performance in 1992-98 was followed by below-average performance on both counts in the post-1998 period.

Using the change in the rate of unemployment rather than employment growth does not yield a systematically different picture. Differences in employment performance match differences in the change of unemployment rates.[1]

Graph 1.7: Growth rate of employment, averages 1992-98 and 1999-2005	**Graph 1.8: Unemployment rate, averages 1992-98 and 1999-2005**
	
Source: Commission Services	*Source:* Commission Services

Wages and labour productivity

The overall euro-area trend of declining growth in nominal wages (proxied by nominal compensation per employee) between the pre- and post- 1999 periods is shared by all participating countries apart from France, Ireland, Luxembourg, the Netherlands and Finland. Among the countries in the former category, Germany stands out in the sense that it moved from a position of wage growth above the euro-area average in the pre-1999 period to below the euro-area average in the post-1998 period. Among the other large countries, while average wage growth in Spain and Italy fell, it remained above the euro-area average, while the slight rise in average wage growth in France left it close to the euro-area average. For the smaller countries, the rising wage growth in the Netherlands took it above the euro-area average, while Portugal's average wage growth (although falling) remained above the euro-area average.

The largest deviations from the euro-area average in both periods were recorded by Greece and Portugal, while Ireland's wage growth was markedly above the average in the post-1998 period. In the case of Ireland, this is in line with strong employment growth and GDP performance. In contrast, Portugal's employment growth was relatively weak in both periods. Spain combined a surge in employment growth in the post-1998 period with a slowdown in wage growth while the Netherlands experienced rising wage pressures and slowing employment growth.

Despite the significant differences in the wage formation systems across euro-area countries, wage developments over the past 10 years appear broadly in line with cross-country differences in employment performance. Countries with relatively low employment growth also had relative low growth of hourly labour costs over the period 1992-2005. Portugal and Greece, with a relatively high wage growth and weak employment performance are the most notable exceptions. Since Greece joined the euro area only in 2001, the high wage growth may be explained by the devaluation of the Greek currency relative to the euro before the adoption of the euro.[2]

Starting from a low wage level in the mid-1990s, Ireland combined strong employment and wage growth. Greece, Portugal and Spain, all with relative low wage levels in the mid-1990s, had different price and quantity dynamics over the last 14 years. Indeed, only Spain managed to combine high wage growth with high employment growth.[3]

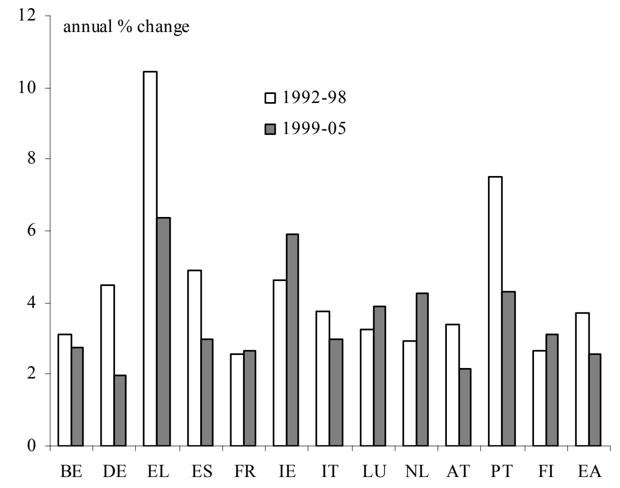
1 A notable exception is Luxembourg. The country combined strong employment growth with a sizeable increase in the rate of unemployment, reflecting its special situation as regards very low rates of unemployment in the 1990s that varied between 2% and 3% and the large inflow of cross-border commuters in response to labour supply shortages.

2 Greek producers that only serve the domestic market were less exposed to wage pressure than the graphs might suggest. However, Greek producers operating in the euro-area market were faced with the highest increase in domestic labour costs in the euro area.

3 The ranking in terms of nominal ULC is somewhat more uneven because the productivity performance has differed from wage developments in some countries.

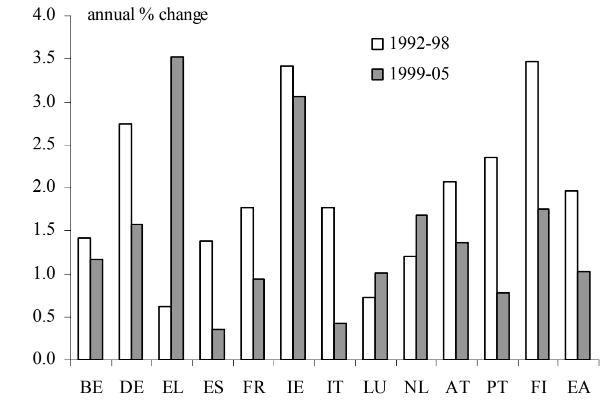
Overall and across the different indicators, employment growth is consistently linked to wage growth in those euro-area Member States with a high initial wage level.[4]

Graph 1.9: Growth rate of nominal compensation per employee, averages 1992-98 and 1999-2005



Source: Commission Services

Graph 1.10: Growth rate of labour productivity, averages 1992-98 and 1999-2005



Source: Commission Services

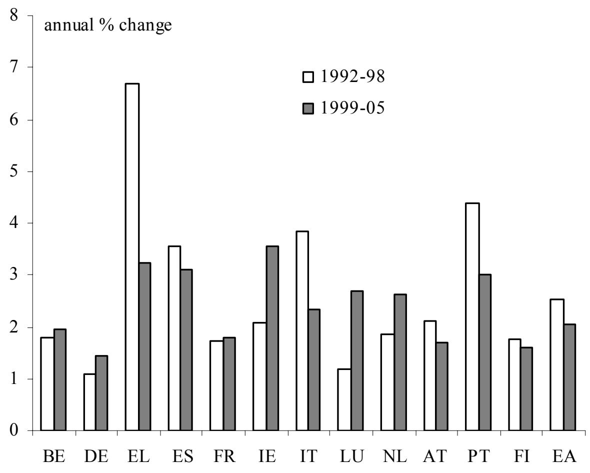
The measure of labour productivity used in Graph 1.10 is GDP output at constant 2000 prices per person employed.[5] The overall euro-area trend of declining growth in labour productivity between the pre- and post- 1999 periods is shared by all participating countries apart from Greece, Luxembourg and the Netherlands. Among the countries in the former category, the biggest decelerations took place in Spain, Italy, Portugal and Finland. Portugal stands out in the sense that it moved from a position of labour productivity growth above the euro-area average in the pre-1999 period to below the euro-area average in the post-1998 period; and this took place while average wage growth, though falling, remained above the euro-area average. Italy's deceleration was much sharper than the deceleration in nominal wage growth. Although Germany's average labour productivity growth rate diminished, it remained above the euro-area average. On the other hand, both Greece and the Netherlands succeeded in raising average growth in labour productivity from below to above the euro-area average.

[4] The use of alternative indicators such as nominal unit labour costs does not change the picture substantially.

[5] Note that for data comparability reasons, it was not possible to use the GDP per hour worked indicator of GDP since the series does not start until 1996.

Inflation

Graph 1.11: HICP inflation rate, averages 1992-98 and 1999-2005



Source: Commission Services

Inflation performance across euro-area countries in the years preceding the start of the third stage of EMU was characterised by a considerable degree of convergence towards low inflation. In the early 1990s, most Member States recorded average annual inflation rates higher than 3½%. Spain and Italy had inflation rates in excess of 6%, while Portugal and Greece registered even double-digit inflation rates. By 1998, the year when the Maastricht nominal convergence criteria were assessed, inflation across these countries had fallen to close to 1% on average, with only three countries showing annual inflation rates above 2% (of these countries only Greece recorded inflation above 2½%). The period since the creation of the euro area saw a continuation of low inflation in most countries, with inflation in the area as a whole accelerating somewhat to just above 2% on average. In fact, in spite of sharp increases in oil prices and an initial sharp depreciation of the euro, for most Member States, the euro-area period corresponds to one of unprecedented price stability. Another stylised fact of the early years of the third stage of EMU is the existence of persistent inflation differentials. Countries that displayed below average inflation in one year, tended to remain below average for several years, and vice versa (see Graph 1.11). This seems to be a specific characteristic of inflation dynamics in the euro area, while other large monetary unions, like the US, tend to display less persistent inflation differentials.[6]

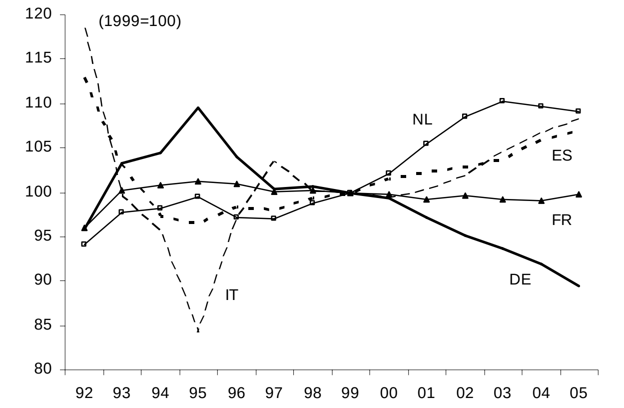
Competitiveness and the current account balance

In this sub-section, we consider below the evolution of cost competitiveness as measured by an indicator of the real effective exchange rate (REER) against the rest of the euro area. More specifically, the index of cost competitiveness used is based on nominal unit labour cost (for the total economy).[7] Under the euro, changes in competitiveness vis-à-vis the other euro-area countries can only be achieved through relative (price or) cost movements. While the large movements observed before 1999 (which were mostly the result of devaluations within the ERM) are no longer present, cumulative changes in competitiveness since 1999 have been sizeable in some cases (Graphs 1.12a and 1.12b).

6 See Chapter V for further analysis.

7 Despite a large literature on competitiveness, there is still no clear consensus on how to measure cost competitiveness. See Lipschitz and McDonald (1992) and Marsh and Tokarick (1996).

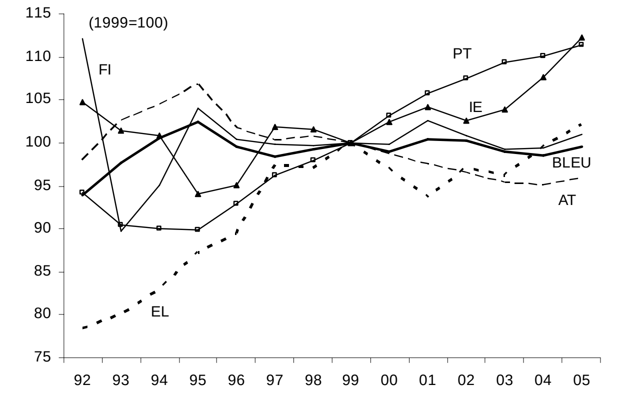
Graphs 1.12a: Real effective exchange[1] rate vis-à-vis the rest of the euro area (1999=100) – Germany, Spain, France, Italy and the Netherlands



Note: 1 - Index based on nominal unit labour costs in the total economy

Source: Commission Services

Graphs 1.12b: Real effective exchange[1] rate vis-à-vis the rest of the euro area (1999=100) – BLEU, Greece, Ireland, Austria, Portugal and Finland



Note: 1 - Index based on nominal unit labour costs in the total economy

Source: Commission Services

Three groups of countries can be distinguished. The first group includes Germany and, less strikingly, Austria, which have become more competitive since 1999. The second group comprises a set of countries – BLEU (Belgium/Luxembourg), France and Finland – where competitiveness has remained fairly stable over the period 1999-2005. The final group is characterised by deteriorating competitiveness positions, where the six remaining Member States (Greece, Spain, Ireland, Italy, the Netherlands and Portugal) witnessed a rise in their REER by at least 7% since 1999 (for Greece since 2001).

Developments in current account balances[8] (Graphs 1.13a and 1.13b) place euro-area countries in groups that are somewhat similar to those observed for competitiveness. Since 2000, Germany, the Netherlands and Austria have increased their current account surpluses considerably. The evolution of the current account mainly reflects relative developments in domestic and foreign demand (and, to a lesser extent, competitiveness developments). Improved competitiveness helped Germany to take advantage of foreign demand growth, while German domestic demand has been rather sluggish. Growth of domestic demand in the post-1999 period has also been weak in the Netherlands and Austria.

The current account deficits of Greece, Spain, Ireland and Portugal, on the other hand, have widened significantly since 1996. In the run-up to 1999, the exchange rate risk premia of Spain, Ireland and Portugal diminished. Between 1996 and 1999, real interest rates fell by more than 300 basis points in these countries, giving a boost to domestic demand. As a result of buoyant domestic demand and a lack of competitiveness, the overall current account balances of Spain, Ireland and Portugal worsened by, respectively, 7½%, 4¼% and 5¼% of GDP between 1996 and 2005.[9] For Greece, euro-area participation in 2001 led to comparable developments at a later stage.

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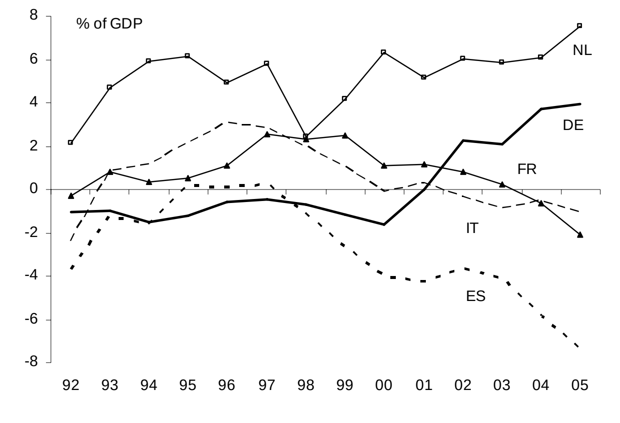
8 Note that the current account balances are aggregate balances, which do not allow a distinction to be made between intra- and extra- euro-area balances.

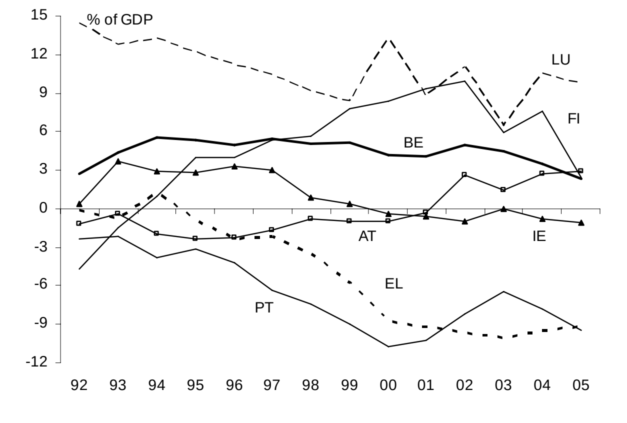
9 Note that the higher oil prices have amplified the deterioration.

Graphs 1.13a: The current account balance – Germany, Spain, France, Italy and the Netherlands



Source: Commission Services

Graphs 1.13b: The current account balance – Belgium, Greece, Ireland, Luxembourg, Austria, Portugal and Finland



Source: Commission Services

Emerging picture

Based on the above illustration of the behaviour of various macroeconomic indicators, several countries stand out as interesting cases to investigate in greater depth in order to learn more about the nature of adjustment in the euro area. These include three large countries – Germany, Spain and Italy – and three small countries – Ireland, the Netherlands and Portugal. While not comprehensive, this list of countries serves to capture key features of interest in terms of adjustment dynamics. These features include protracted divergences (for example, Germany versus Spain in terms of GDP growth and its composition, inflation, and real exchange rate developments) catching-up experiences[10] (for example, Spain versus Portugal in terms GDP growth and housing market developments) and policy interactions.

Before focussing on this set of countries (particularly in Chapter VII), we consider several key indicators – consumption, investment, inflation and financial market indicators – in greater detail in the following sub-sections.

2. A closer look at key real and financial variables

2.1 Consumption

This section analyses the behaviour of consumer spending across euro-area Member States over a period encompassing the creation of the euro area (1989 to 2004). With the help of a standard empirical model of consumer behaviour, which has an "error-correction" form, the long-run equilibrium relation between consumption and its driving forces – income, wealth and interest rates – is evaluated. This section also investigates whether the data provide support for a stable relationship among these variables or whether there is evidence that structural changes have taken place in some euro-area countries, possibly related to changes in the adjustment process in the run-up to the creation of the euro area or thereafter.

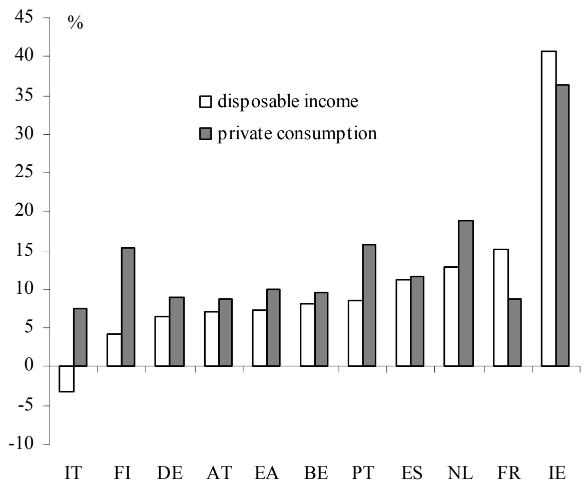
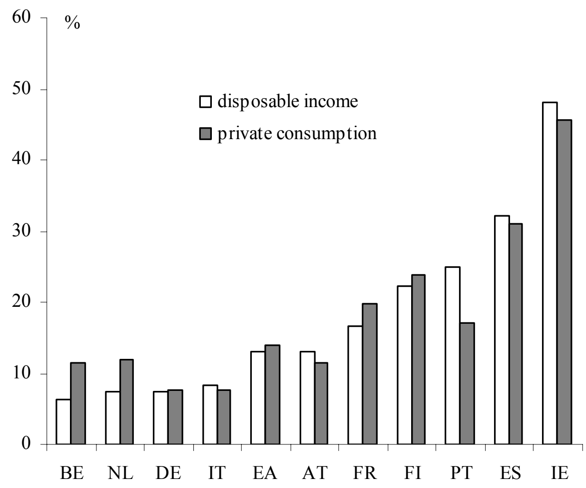
2.1.1 The factors influencing consumer spending

The facts presented in the first section of this chapter show that growth rates of consumer spending have varied both across time and among euro-area countries. Before proceeding to the empirical results, we consider the behaviour of some of the variables presumed to influence consumption behaviour.

Disposable income: Despite the growing importance ascribed to wealth effects in explaining household consumption, real disposable income remains potentially the most important variable for explaining consumer spending. As illustrated in Graphs 2.1.1 and 2.1.2, countries with relatively high rates of household income growth also tend to have high rates of consumer spending growth and vice-versa. In Germany and Italy, in particular, weak consumption growth after 1999 paralleled weak income growth. In France, on the other hand, robust consumption growth paralleled healthy income growth. Spanish consumption and income were robust before and after 1999. However, while consumption was weaker than income growth during the period 1992-1998, it has outpaced income growth since the inception of the economic monetary union. The weakness of consumption in the Netherlands and Belgium

10 Greece would also be an interesting case to study, but data limitations preclude this for the moment.

after 1999 appears to be largely explained by income developments. On the other hand, Portuguese consumption bears little relation to income both before and after 1999.

Graph 2.1.1: Private consumption and disposable income, cumulative growth 1992-1998	**Graph 2.1.2: Private consumption and disposable income, cumulative growth 1999-2005**
	
Source: Commission Services	*Source:* Commission Services

There is evidence that consumption and disposable income have been more synchronised after the creation of the euro area than during the pre-1999 period. Over the period 1992–1999, the average correlation between the annual growth rate of private consumption and disposable income was 0.58 in the euro area compared to 0.77 in the period after 1999. However, the degree of correlation has varied also across countries. In the three largest euro-area countries, it ranges from 0.93 in Germany to 0.77 in France and 0.64 in Italy.

Saving rate: With an unchanged saving rate, low consumption growth is generally associated with low income growth. However, the saving rate in several euro-area countries has been far from constant in the last fifteen years. An examination of the household gross saving rate across euro-area participants reveals various patterns. Among the four largest countries, only in France has the saving rate remained broadly unchanged over the last 10-15 years. There was a limited increase at the beginning of this decade, with a spike in 2002 that was, however, corrected in 2003. In Italy, the saving rate fell by about 10 percentage points between 1992 and 1998, partly as a result of a strongly diminishing inflation rate. However, the saving rate appears to have risen again since the beginning of this decade. A similar saving pattern is observed also in Germany, although from a markedly lower starting position. On the other hand, the saving rate has continued to decline in Spain, thus providing additional support to consumption growth on top of healthy income growth.

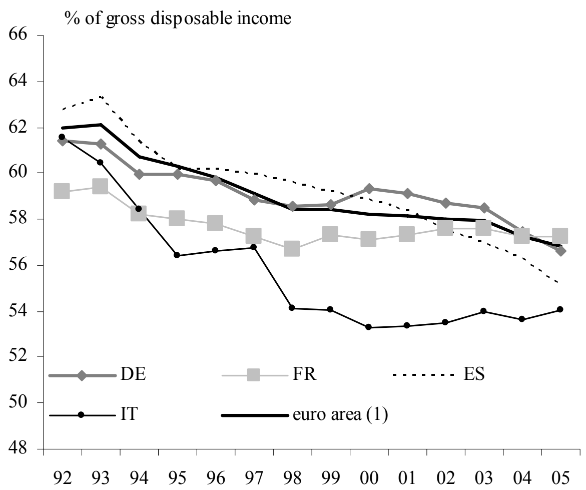
In most of the remaining euro-area Member States, household saving rates have generally shown a downward trend, the only exceptions being the Netherlands and Portugal in the early years of this decade. While household saving rates since 1999 have exhibited different patterns across euro-area countries and influenced consumption developments, it is worth noting that the level of the saving rate in several euro-area countries (and, in particular, in the four largest Member States) is currently not very different from the level observed towards the end of the previous decade when the economy was booming. This argument supports the view that the current subdued level of private consumption in some Member States has more to do with weak income growth than with the rise in the saving rate.

As the rise in the savings rate took place mainly in 2001-2002, a period of subdued economic activity in the euro area, it is difficult to reconcile with stylised business-cycle findings. For example, the permanent income hypothesis would indicate that, following a (temporary) fall in income, households would draw on their savings to smooth consumption over time. In addition, the stabilisation of inflation and a roughly constant ratio of financial assets to disposable income over the last few years would imply a levelling off of households' saving rates, but it cannot explain the recent increase.

A number of factors may have led households to increase precautionary savings. These include higher uncertainty due, inter alia, to geopolitical tensions, lack of clarity about the timing and size of some structural reforms, and/or the lingering effects of past exceptional losses in equity holdings. In some countries, it is possible that perceptions of high inflation since the euro changeover may have led households to overestimate actual inflation and accordingly reduce their consumption. All of these factors may have induced households to save more and to accumulate, in particular, liquid assets such as those included in the monetary aggregate M3. Other elements of more long-lasting consequence, which may have encouraged households to increase savings, include policy debates on pension and health care reforms. Finally, following the strong rise in house prices in some Member States, households may have been induced to save more in order to accumulate funds to cover higher down payments required for future house purchase.

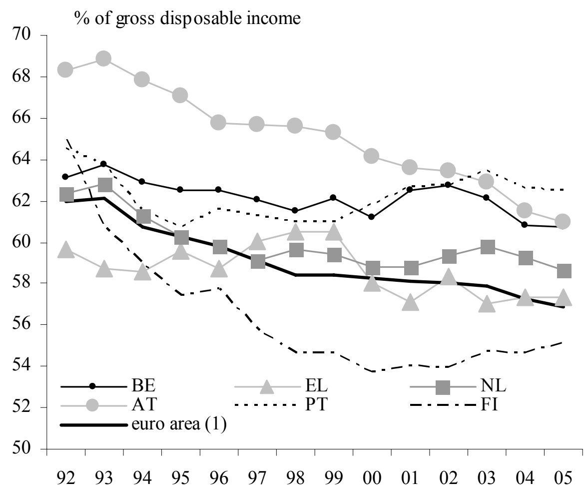
Wage share: Developments in the wage share[11] may provide another element to help understand consumption patterns across euro-area Member states. As shown in graphs 2.1.3 and 2.1.4, an overall decline in the wage share may be observed for most euro-area countries since the beginning of the 1990s. Among the four largest euro-area economies, developments in Italy and Spain stand out. In Italy, the wage share dropped by about 8 percentage points during the past decade and broadly stabilised since 2000, while in Spain the trend-decline extended to recent years. The decline in the wage share was much less pronounced in France and Germany. In the latter, however, the decline of the wage share has been sizeable during the last three years. Also among the smaller euro-area economies, the picture is far from uniform with a decline in the wage share being more evident in Austria and limited to the previous decade in Finland. By contrast, Portugal registered an increase in the wage share since the beginning of this decade, partly reflecting the sharp deceleration in GDP growth.

Graph 2.1.3: Adjusted wage share 1992-2005 – Germany, Spain, France, Italy and Euro area



Note: (1) - Euro area excluding IE, LU and PT
Source: Commission Services

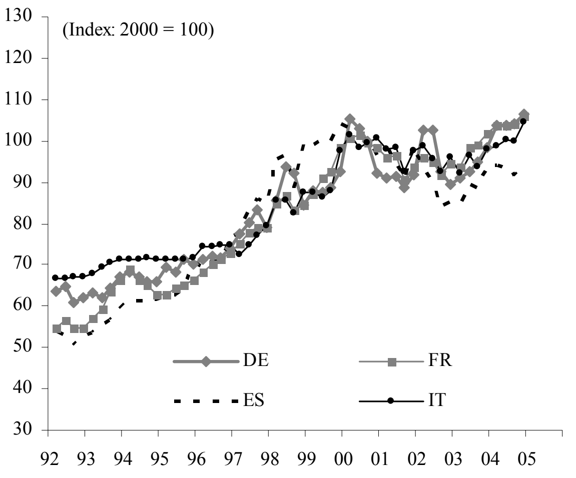
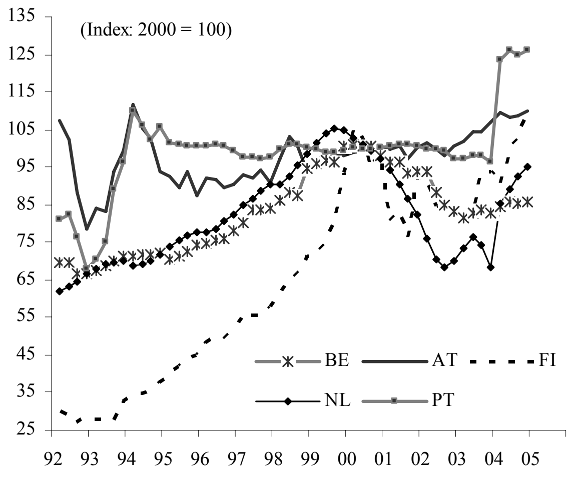
Graph 2.1.4: Adjusted wage share 1992-2005 – Belgium, Greece, the Netherlands, Austria, Portugal and Finland



Note: (1) - Euro area excluding IE, LU and PT
Source: Commission Services

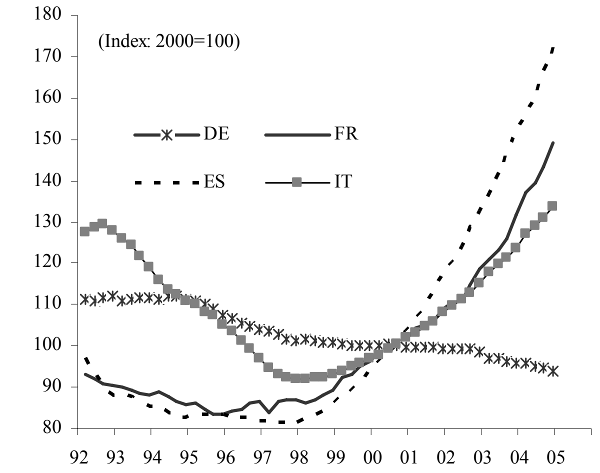
Wealth: There has been considerable research on the interaction between stock market prices and consumer spending in different countries. While the traditional view is that these effects are quite significant in Anglo-Saxon countries but remain relatively small in larger euro-area countries, most empirical analysis suggests that the stock market boom of the 1990s provided support to household spending in several euro-area countries. However, the contraction of households' financial wealth at the beginning of this decade (graphs 2.1.5 and 2.1.6), stemming from the collapse in share prices, was not reflected by any sharp decline in consumer spending growth in several countries, like Spain, France and Denmark. This could reflect the presence of offsetting influences in these countries, for example rising house prices. Indeed, due to the pick-up of residential property prices in several euro-area Member States (but not in Germany) over the past few years (graphs 2.1.7 and 2.1.8), the reduction of total household wealth since 2000 has been less marked than that of financial wealth.

[11] The graphs refer to the adjusted wage share, which is defined as compensation per employee as a percentage of GDP at market prices per person employed. The adjusted wage share reflects only changes in relative incomes and not changes in the composition of employment between employees and self-employed.

Graph 2.1.5: Real[1] net financial wealth 1992-2005 – Germany, Spain, France and Italy	**Graph 2.1.6: Real[1] net financial wealth 1992-2005 – Belgium, Austria, Finland, the Netherlands and Portugal**
	
Note: 1 - Deflated by private consumption deflator *Source:* Commission Services	*Note:* 1 - Deflated by private consumption deflator *Source:* Commission Services

There are several possible channels through which developments in housing markets may spill over into private consumption. Firstly, changes in house prices affect spending via changes in wealth and relative prices. However, positive wealth effects for landlords might well be offset by negative wealth effects for new buyers. In addition, to the extent that changes in house prices are also reflected in rents, they will also affect consumption expenditures of tenants. Furthermore, rises in imputed rents could be a source of negative income effect for owner occupiers. A second channel is linked to the existence of credit market imperfections and asymmetric information. Insofar as houses may be used as collateral, an increase in house prices allows households to obtain additional credit to (perhaps) boost their consumption. Thirdly, housing markets also constitute a transmission channel of monetary policy, in the sense that changes in monetary policy affect the structure of mortgage rates. Hence, the current disposable income of indebted households and, more generally, its allocation between current and future consumption are affected.

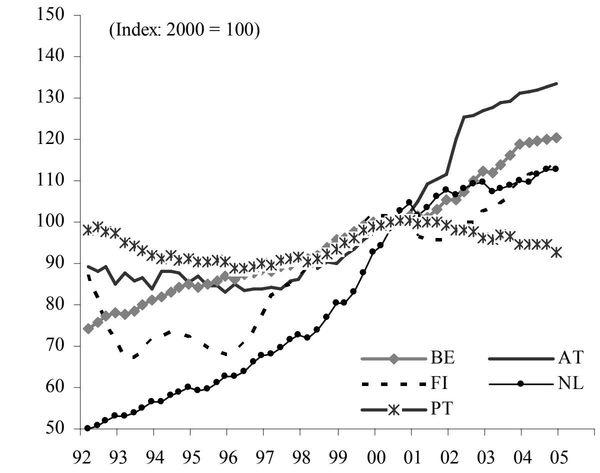
Graph 2.1.7: Real[1] house prices 1992-2005 – Germany, Spain, France and Italy



Note: 1 - Deflated by the private consumption deflator

Source: Commission Services

Graph 2.1.8: Real[1] house prices 1992-2005 – Belgium, Austria, Finland, the Netherlands and Portugal



Note: 1 - Deflated by the private consumption deflator

Source: Commission Services

Interest rates: Following the implementation of a common monetary policy, convergence in nominal interest rates has been strong in the euro area since the early 1990s. However, convergence in real interest rates is less evident as inflation differences persist across euro-area Member States. Real interest rates, both short- and long-term, are currently much higher in countries such as Germany compared, for example, to Spain. These differences are likely to have supported consumer spending - particularly on durables goods and residential investment – in those countries with relatively low real interest rates.[12]

2.1.2 Consumption equations

In order to investigate possible cross-country differences in consumption behaviour in the euro area, we carried out a panel data model for private consumer expenditure for a number of euro-area countries and for the euro area as a whole. According to standard life-cycle theory of consumption, real consumer expenditure is largely driven in the long run by real (disposable) income, real wealth and real interest rates. The wealth term, with includes both financial wealth (defined as net acquisition of financial assets less liabilities) and tangible wealth (largely represented by the value of real estates in the case of households), is intended to capture non-labour income streams, while the real interest rate denotes inter-temporal substitution effects in consumption. The short tem-dynamics of these explanatory variables explains fluctuations of consumption around its long-run equilibrium. A benchmark model of consumer behaviour can therefore be represented by a standard error-correction equation,[13] details of which are to be found in Annex B.

Expected changes in government balances may also be relevant in explaining the dynamics of private consumption. As rational agents will try to anticipate future tax changes in a Ricardian manner, a consumer faced with an improvement (deterioration) of the fiscal position is expected to raise (lower) his/her consumption, for a given constellation of the remaining variables. In order to test for the significance of these non-Keynesian effects on consumption, a variable indicating the government budget surplus/deficit (as a percentage of GDP) was also included in the estimated error-correction equation.

2.1.3 Econometric results

Quarterly data covering the period 1989Q1-2004Q4 and the variables real private consumption, real personal disposable income, real net financial wealth, real house prices, real short-term interest rates and government fiscal position as a percentage of GDP were used to set up a balanced panel for eleven euro-area countries (EA11: Euro area excluding Luxembourg). Nominal variables were deflated using the consumption price deflator (at 2000 prices) and a log transformation of the data was adopted to make the errors variance-stationary.

12 A discussion of the appropriate definition of the real interest rate for different economic agents is contained in Chapter V.

13 For a survey, see Deaton (1992).

Panel models were estimated: (1) to evaluate the long- and short- term effects assuming common dynamics across the group of countries; (2) to investigate whether the (long- and short-term) dynamics differ across countries; and (3) to test for presence of structural breaks associated with the creation of the euro area in 1999. The results of the estimated panel models and the tests of the robustness of the results are presented in Annex B. The results of the regression analysis may be summarised as follows.

For the euro area as a whole (pooled data):

(1) The speed of adjustment indicates only moderate convergence to the long run-equilibrium;

(2) In the long run, real disposable income, real financial wealth, real interest rates and the budget deficit have a significant effect on the behaviour of private consumption expenditure. The long run elasticity of consumption expenditure with respect to disposable income is 0.67, while the long run elasticity with respect to financial wealth is 0.05;

(3) In the short run, the results imply that a 1% increase in real disposable income leads to a rise in private consumption expenditure of 0.3%, while the effect of a rise of 1% in real house prices in the short run is smaller (0.05%). An improvement in the fiscal position of the government also has a small (albeit positive) effect on consumption in the short run

Allowing for country-specific differences in behaviour:

(1) The speed of adjustment ranges from quite slow in Italy, Portugal and the Netherlands to relatively rapid adjustment in Germany and France. Statistical tests suggest a change in the speed of adjustment between the two sub-periods only in France and Italy (with Portugal a borderline case at the 10% significance level) although the extent of the deviation compared to the pre-1999 period is fairly small;

(2) Country-specific long-term dynamics effects between consumption and income are detected for Spain, Ireland, the Netherlands and Portugal, while a euro-area participation effect on this relationship is present in the case of France and Finland (and perhaps Belgium). Country-specific effects of financial wealth on consumption are significant in Greece, France, Italy, the Netherlands, Austria and Finland with support for a structural break in the relationship for the post-1998 period for Belgium, Spain and Ireland. Long-run dynamics between consumption and interest rates suggests a significant country-specific effect in most euro-area countries apart from Germany, France and Portugal. There is no evidence of a specific euro-area effect on this relationship. A positive long-run effect of the budget deficit on consumption is detected in Belgium, Germany, Spain and Italy and, for the period after 1999, in Belgium, Italy, Austria, Portugal and Finland;

(3) Structural breaks in the long-term relationship between consumption expenditure and the explanatory variables – possibly related to euro-area membership – are detected in a number of cases: between consumption and disposable income in the case of France and Finland (and at the limit Belgium); and between consumption and financial wealth in the post-1998 period for Belgium, Spain and Ireland;

(4) Significant differences are found in the short-term dynamics of consumption across countries. Responses to disposable income differ significantly among Belgium, Germany, Greece, France, Ireland, Italy, the Netherlands, Austria and Finland. The size of the dynamic income term in particular varies markedly, from almost 0 in Spain and Portugal to 0.7 in Germany. As regards differences in responses to real wealth, they appear to be significant for Spain, Portugal and Finland, while Ireland, Italy, the Netherlands, Austria and Finland display the largest short-term Ricardian effects on consumption; and

(5) There is little evidence of structural breaks in the short-term dynamics for the period following the creation of the euro area. The only exceptions are: Belgium and Spain as regards differential effects on consumption stemming from the short-term dynamic of income; Ireland as regards house-prices dynamics; and Finland as far as the short-term impact of the government budget deficit is concerned.

2.1.4 Conclusions

A notable divergence in consumption patterns among euro-area countries is evident over the last fifteen years. Since the introduction of the euro, private consumption growth has been persistently stronger in countries such as Spain, France and Ireland and much more subdued spending growth has been evident in Germany and Italy. These differences reflect the influence of a large number of explanatory factors including strong wealth effects from housing in some countries as well as divergent saving-rate patterns. However, differences in the pace of expansion of real disposable income – the key driving force of consumer spending in the euro area – stand out as the prominent explanatory factor.

An estimated panel model for private consumer expenditure suggests that variations in real disposable income, real interest rates, real financial wealth and government borrowing conditions broadly explain consumption behaviour in the euro area. Indicators of consumer confidence can help to understand consumption behaviour but they appear to be highly correlated with indicators of wealth. Statistical tests show that it would be inappropriate to assume a common equation with common dynamics for all countries considered, as country-specific effects are significant for many explanatory variables.

Apart from some country exceptions, there is no overwhelming evidence of structural breaks (related to euro-area participation in 1999) in the speed of adjustment or in the short-run or long run relationships across euro-area countries.

2.2 Investment

Investment spending is typically a strongly cyclical and volatile component of GDP. The investment behaviour of firms in particular, but also the residential investment of households, depends on expected returns and the cost of capital, especially interest rates. Potential changes in adjustment behaviour of investment spending following the creation of the euro area are most likely to stem from changes in the operation of the real interest rate and competitiveness adjustment mechanisms (described in more detail in Chapters IV and V). Changes to the adjustment process can occur either directly or through the influence of business cycle conditions on profits and domestic demand. It should be noted that the period we are examining has not only witnessed the introduction of the euro but also increasing globalisation, the enlargement of the EU, the bursting of a global stock market bubble and major geopolitical shocks. Although these elements are to some extent exogenous to all euro-area Member States, differences in adjustment to such shocks may be expected since countries differ significantly, e.g. with respect to openness, export specialisation, etc.

The empirical analysis below focuses in particular on eight euro-area Member States, namely, Germany, France, Italy, Spain, the Netherlands, Ireland, Portugal and Finland. These have been selected in order to cover a mix of core and periphery countries as well as to encompass a major part of the euro-area economy. Finally, it should be noted that some of the shifts seen over the period may be partly the result of once-off adjustment to the new financial environment that has disproportionately benefited lower-income euro-area countries in the so-called periphery (as opposed to the "core" member countries).[14] Thus, observed business cycle behaviour may be influenced by this transition to the one-off change and is not necessarily indicative of the adjustment pattern in the euro area once this transition has run its course.

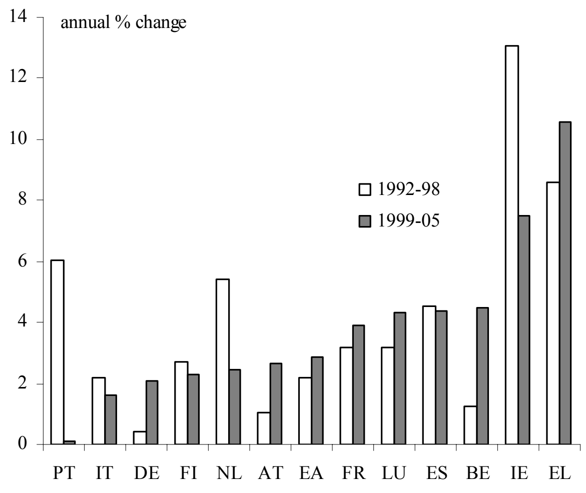
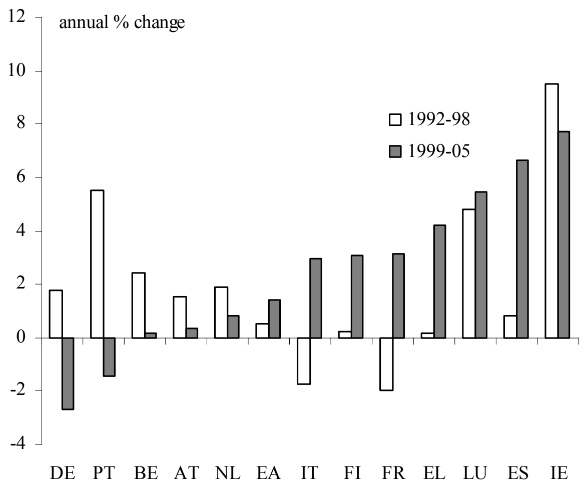
2.2.1 Recent trends and developments in investment spending in the euro area

The facts presented in the first section of this chapter show that the euro-area experienced an investment boom in the second half of the 1990's, which reached its peak at the end of the decade, around the time of the introduction of the euro in 1999. An important factor in this boom was the optimism surrounding the ICT sector. After the bursting of the ICT bubble and the ensuing global downturn, investment spending experienced a period of retrenchment. Strong divergences in investment behaviour were observed across euro-area countries. In Germany, investment declined during five consecutive years from 2001 to 2005 (a cumulative fall of 11%). Portugal and the Netherlands also experienced severe declines in total investment (investment in Portugal declined by 10% in 2002). In contrast, investment spending in Spain remained robust, growing on average by 4.9% in 2001-2005. Ireland, which saw average investment growth in excess of 15% in the second half of the 1990's, also experienced average growth of around 4.9% in 2001-2005. In France, investment briefly dipped in 2002 and has since experienced moderate growth, (around 2.5% annually), while investment spending in Italy has been flat in recent years, growing by 0.5% on average in 2001-2005.

Looking at the breakdown of investment by equipment and construction, it is striking that most of the divergence seems to be due to construction investment. For the four big euro-area countries, equipment investment boomed in the second half of the 1990's. Subsequently, equipment investment dipped in 2001 and has since recovered, although Italy experienced a renewed fall in 2005. A similar picture also holds for the four smaller countries under consideration. The significant degree of synchronisation of equipment investment is likely to be due to the importance of the global industrial cycle in influencing equipment expenditure.

In contrast, there has been significant divergence in the behaviour of construction investment. Germany has undergone a prolonged contraction in construction: the last year with positive growth in construction investment was 1998. As a consequence, Germany has experienced an average annual contraction of 2.5% in construction spending since 1995. Spain has, on the other hand, registered very strong growth in construction investment, with more than 6% average annual growth since 1997 (5.5% since 1995). Italy and France experienced more moderate developments, with average annual growth in construction investment over the last five years of 2.3% and 1.7%, respectively. For the smaller countries, there have also been divergent developments. Portugal and the Netherlands have both witnessed contractions in construction investment since 2001; the decrease was sustained in Portugal, while construction investment in the Netherlands grew slightly again in 2004 and 2005.

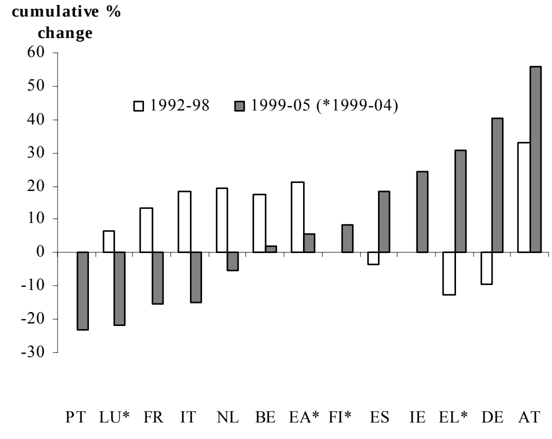
[14] See Lane (2006).

Graph 2.2.1: Rate of growth of equipment investment, averages 1992-98 and 1999-2005	**Graph 2.2.2: Rate of growth of construction investment, averages 1992-98 and 1999-2005**
	
Source: Commission Services	*Source:* Commission Services

Box 1: Differences in profitability developments by sector across euro-area Member States

This box provides a brief picture of divergences in profitability at the sector level among Member States, which may be important in determining the cross-country differences in the adjustment of investment spending in the euro area. Given limited data availability, it is not possible to obtain direct measures of returns to capital, and hence the incentive to invest. We gross value-added less the compensation of employees as a proxy measure of profits (before depreciation of capital and taxes).

Graph B1: Value added less compensation of employeed in euro-area manufacturing (2000 prices)

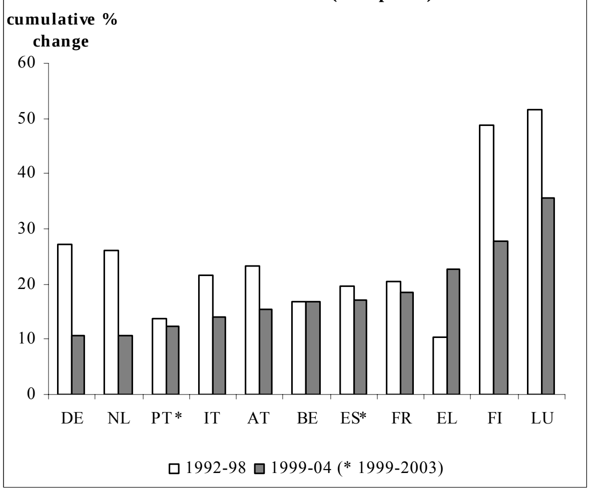


Source: Commission Services

In the manufacturing sector, between 1992 and 1998, Ireland (168%), Finland (150%) and Portugal (70%) experienced much stronger growth in this proxy measure of profits than the other euro-area Member States. At the other end of the spectrum, Germany experienced stagnation in the manufacturing sector during the same period, with a cumulative fall of 10% profits, while France experienced moderate growth of around 13.5%. For the euro area as a whole, the manufacturing sector experienced a more robust expansion of 21% in gross value added less compensation of employees.

Between 1999 and 2005, the impact of the downturn is visible, with a generally weaker development in profitability, but this masks diverging patterns in the manufacturing sector. Overall, the Austrian and German manufacturing sectors experienced the strongest growth in profitability, with German profitability expanding particularly strongly in 2004 and 2005. Greece, Spain and Ireland also saw improvement in profitability in the manufacturing sector, whereas Portugal experienced retrenchment in the manufacturing sector (a fall of 23%) – readjusting after the boom in the earlier period. France and Italy saw stagnation in this period with a drop in manufacturing profitability of around 15%.

Graph B2: Value added less compensation of employees in euro-area services (2000 prices)



Source: Commission Services

In the services sector, developments in profitability have generally been more similar across countries and over time. In the period 1992-98, Luxembourg and Finland stand out, with growth in profitability of around 50%. Germany and the Netherlands also experienced stronger growth in services sector profits in the period 1992-98, but subsequently experienced the lowest growth rate (10%) in the euro area in the 1999-2004 period. Italy experienced a more moderate slowdown in profitability. In contrast, the growth in services sector profitability was more stable in France, Spain and Belgium.

2.2.2 Modelling investment behaviour

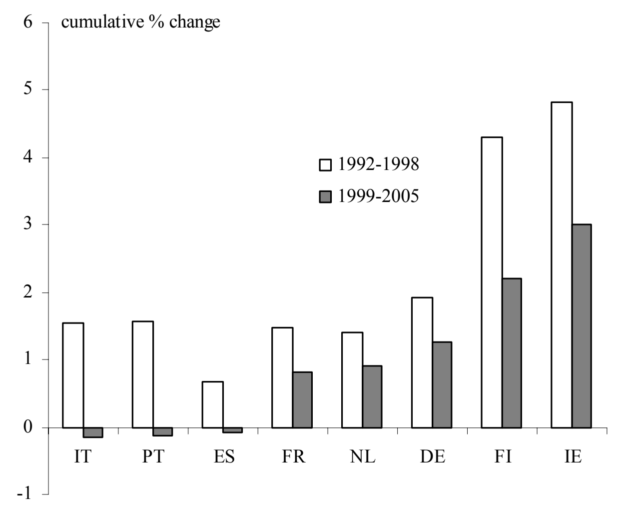
Investment is a volatile component of GDP and is traditionally difficult to model.[15] The aim is to find a parsimonious dynamic model of investment based on standard economic theory. The standard neoclassical growth model[16] determines a steady state relationship between gross investment (I), output (Y) and the real cost of capital (CK) which depends on the real interest rate (r) and the relative price of capital (PK):

$$I = \alpha + Y - CK$$

The constant term α is determined by the steady state growth rate, the rate of depreciation and the share of capital in production. This long-run relationship can be estimated and incorporated in an error correction model in order to better capture the dynamic behaviour of investment spending (see Annex C for details).

Looking more closely at the explanatory variables, one reason behind the different trends in investment spending is likely to have been the divergent behaviour of real interest rates. Countries in the periphery of the euro area, engaged in catching up in terms of GDP per capita, such as Spain, benefited from a significant drop in real interest rates. The real interest rate, as measured by using 10-year government bond yields and the rate of change of the GDP deflator, fell from around 6% in 1995 to close to zero for Spain. For countries considered to be in the core of the ERM, in particular Germany, the real interest rate has fallen by less, although these countries also benefited from the global drop in interest rates. For Germany, the real interest rate has remained above 3%. The fall in interest rates is likely to have played a part in the boom in housing markets, which has yet to cool down, and indeed may look unsustainable in some countries, e.g., Spain.

Graph 2.2.3: Cumulative growth in total factor productivity, 1992-98 and 1999-2005



Source: Commission Services

Other variables that are probable candidates for explaining some of the differences in investment include total factor productivity and the size of the labour force. In the neoclassical growth model, the desired change in the capital stock depends on growth in productivity and the labour force. Higher productivity should lead to a higher level of capital, ceteris paribus, and similarly a larger labour force should also lead to a higher desired level of capital. Strong divergences in both of these variables have been observed across euro-area countries. Among the larger countries, Spain has exhibited relatively strong growth in the labour force, in excess of 2% in recent years, whereas the size of the labour forces has barely changed in Germany and France, and Italy has recorded slightly higher growth. Among the smaller countries, Ireland stands out with around 3% labour force growth in recent years. Where productivity developments are concerned, some divergences are also apparent. For Germany and France, total factor productivity growth has fluctuated around 1%, whereas Italy has experienced declining productivity growth, with negative growth in recent years. Spain has also been characterised by declining total factor productivity, although the rate of decline has been very gradual. Ireland has also been subject to declining total factor productivity growth, from a rate of change in excess of 5% in the second half of the 1990s to close to zero in recent years. Consequently, while labour force developments may continue to fuel divergences in investment with high growth in Spain and Ireland, productivity developments would suggest some slowdown in investment in these countries.

In the estimation of the dynamic equation changes in the real effective exchange rate and the stock market are also introduced, in order to capture, respectively, changes in competitiveness and expectations about the future. Given that construction investment, as discussed earlier, has contributed significantly to differences in investment growth among the euro-area Member States, we estimate relationships for total investment spending and for non-construction investment in order to assess the extent to which construction investment influences the results.

2.2.3 Econometric results

In the empirical analysis, quarterly data are used in order to better capture the business cycle adjustment (also due to the relatively short sample available), and to provide more scope for detecting any effects of euro-area participation.

[15] See, for example, Chirinko (1993) and European Commission (2001), Chapter 3: "Determinants and benefits of investment in euro area".

[16] See, for example, Pelgrin et al. (2002).

The data from Eurostat cover the period from first quarter of 1980 to the last quarter of 2005. However, for Ireland and Portugal, quarterly data are only available for a very restricted period, in which case data from the OECD are used. In the case of Ireland, only data on housing investment are available from the OECD, whereas for Portugal no breakdown of investment into different types of capital is available. For Germany, data are only available from 1991 onwards. The series start earlier for most other countries, although stock market data or interest rate data are not always available for the entire sample period, in which case a truncated sample is investigated.

The empirical analysis of total and non-construction investment encompasses: (1) estimation of a long-run equilibrium relationship and the short run dynamics for investment for each individual country considered; (2) investigating whether the (long- and short-term) dynamics differ across countries; and (3) testing for presence of structural breaks associated with the creation of the euro area in 1999. The results of the estimated individual and panel models (for eight countries: Germany, Spain, France, Ireland, Italy, the Netherlands, Portugal and Finland) and the tests of the robustness of the results are presented in Annex C. The results of the regression analysis may be summarised as follows[17].

For total investment:

(1) Looking at the estimated long-run parameters, there are considerable differences across countries. The interest rate coefficient has the wrong (positive) sign in the case of Germany, France, Spain and Finland, although for France and Finland it is insignificant. The problem of estimating the elasticity of investment with respect to the cost of capital is well known (see e.g. Schaller (2006) for a recent discussion).

(2) The estimated panel model, more or less confirms the results obtained from the individual country models. A positive long-run elasticity of investment to output is found (1.4), with a much higher coefficient for the Netherlands, and slightly higher for Italy, Spain, Ireland, Finland and Portugal. Looking at the auxiliary variables, growth in the value of the stock market affects investment positively in Germany, Ireland and the Netherlands. Changes in competitiveness, as measured by the real effective exchange rate, only matter in the case of Finland, with the expected negative sign. As with the some of the individual country equations, a positive long-run coefficient on the real interest rate is also found for the panel-model, with no significant differences across countries. Stock-market valuations are found to support investment (with a two quarter lag), while an appreciation of the real effective exchange rate dampens investment (with a lag of three quarters).

(3) The speed of adjustment is highest for Germany and the Netherlands.

For non-construction investment:

(1) The results are more homogenous across countries than in the case of total investment. The error-correction term is significant for most countries (except Ireland) with a somewhat larger adjustment coefficient in Italy and the Netherlands.

(2) Concerning the long-run link between non-construction investment and GDP, the coefficient is much higher for Germany, whereas for the other countries the coefficient appears similar to that found for total investment. A positive coefficient on changes in the interest rate is found for Germany, Italy, the Netherlands and Ireland, possibly reflecting the pro-cyclical pattern in interest rates. Changes in stock market valuations are found to increase growth in non-construction investment in Spain, the Netherlands and Ireland. Changes in competitiveness only matter in the case of Spain, with a positive coefficient, possibly reflecting a Balassa-Samuelson type effect of a catching-up economy.

(3) For non-construction investment there is evidence of a somewhat faster adjustment compared to total investment. The long-run elasticity of investment to output is estimated to be around 1.1, with a much lower coefficient for Germany and Italy (0.3) and slightly lower for Spain (0.7). The long-run elasticity of non-construction is insignificantly different from zero. However, for France, Italy and the Netherlands, a negative long-run elasticity (-0.03 to -0.04) is found.

Regarding tests of possible effects of euro-area participation:

(1) There is some evidence of instability in the parameters of the estimated relationship, but generally such instability in equations appears before the introduction of the euro, in the mid-1990's or earlier, in particular for Ireland and Finland.

(2) For Germany and Italy, there is an indication of slower error-correction (more persistent investment) in the euro-area period in Germany, and faster in Italy and Ireland. However, such effects are not found for non-construction investment. In terms of changes in the dynamic adjustment to interest rate changes, there is evidence of some effect in France and Finland but no evidence of a structural break in the adjustment to stock market valuations or to changes in external competitiveness.

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[17] Note that the results should be treated with caution because the hypothesis of "no co-integrating relationship between the variables" could not be rejected for all countries. This is particularly the case for total investment. The results for equipment investment are more encouraging. See Annex C for details.

(3) From the panel estimation for total investment, structural shifts in the error-correction mechanism are found for Germany, Italy, the Netherlands, Ireland and Portugal, with indications of much more rapid adjustment to equilibrium in the post-1998 period for Italy and Ireland, and much slower adjustment for the Netherlands (in fact the estimated coefficient indicates divergence from equilibrium). Concerning the long-run parameters, there is evidence that the elasticity of investment to output is higher after the introduction of the euro for Italy and Ireland, and lower for the Netherlands. The only country for which a significant change in the elasticity of investment to interest rates is Ireland, with a shift to a positive (albeit small) long-run elasticity of investment to the real interest rate.

(4) For non-construction investment, there is little evidence overall from the individual country models (apart from the case of Ireland) of a change in the dynamic adjustment behaviour after 1998. From the panel model for non-construction investment, evidence of considerably faster adjustment to equilibrium in the post-1998 period is found for Germany, Italy and Ireland. Concerning the long-run parameters, the estimated elasticity of investment to output is somewhat lower for Germany, Italy and Ireland in the post-1998 period, whereas the elasticity with respect to interest rates is more positive for Germany, Italy and the Netherlands.

2.2.4 Conclusions

There is evidence of considerable differences across the countries considered in the response of total investment to changes in its determinants, while the results are more homogeneous in the case of non-construction investment. This supports the earlier hypothesis (from an inspection of the data) that much of the observed divergence in investment performance originated in construction investment. While the empirical results should be treated with due caution due to the well-documented problems of measuring certain explanatory variables, such as the cost of capital, variations in output appear to be consistent in explaining investment performance.

Overall, while there are differences for some countries, no overall robust evidence emerged of structural changes in the adjustment behaviour of investment growth as a result of the creation of the euro area. This would seem to be in line with other studies that have examined whether investment in the current business cycle recovery has been weaker than would have normally been expected (see e.g. Orellana et. al (2005) for a discussion of this issue). Barrel (2006) investigated whether investment spending in major EU economies was lower than would be predicted with investment equations from standard macro-econometric models and found that there was no evidence of investment being inexplicably low, indicating that investment was behaving more or less in line with fundamentals. For Germany, the Deutsche Bundesbank (2004) also found no evidence of a structural break in investment for Germany.

2.3 Inflation

Over the last few years, considerable attention has been devoted to the subject of inflation differentials in the euro area. Most of the analysis has attempted to identify the possible sources of such differentials.[18] However, relatively little attention has been paid to the possible consequences for macroeconomic adjustments within the euro area stemming from the presence of persistent inflation differentials among Member States. This issue is explored in some detail throughout this Review, through an assessment of both the main arguments put forward in the economic literature on this topic and the empirical evidence available so far.

This section seeks to set the scene for such analysis by providing a general characterisation of emerging inflation trends across euro-area Member States. To obtain a comprehensive picture, this is done by examining developments in the three most commonly used summary measures of inflation – the GDP deflator, the private consumption deflator and the HICP. The analysis is organised in the following manner. The focus in sub-section 2.3.1 is on investigating how these indicators are empirically related to each other and whether they yield a similar broad picture in terms of overall inflation trends within countries. In sub-section 2.3.2, the focus shifts to examining inflation divergence across euro-area Member States during the periods preceding and following the start of the third stage of EMU. Given that the degree of exposure to the external environment has been recently identified as a potentially important source of inflation dispersion in the euro area,[19] the analysis is complemented here by econometric results on the exchange-rate pass through at the level of import prices across Member States (reported in Box 2).

2.3.1 Co-movement between the GDP deflator, the private consumption deflator and the HICP[20]

Due to differences in coverage and statistical methodology, it is unlikely that the three general inflation indicators considered here would exhibit a close positive relationship at all times. On the other hand, there are several reasons why the broad price trends described by these indicators might be expected to be rather similar over the medium term. One of these is that consumption-based price measures (like the HICP), by definition, focus on the prices of

18 See, for example, Angeloni and Ehrmann (2003), ECB (2003d, 2005c), Bråten and Orellana (2005b), and the references therein.

19 See, for instance, Honohan and Lane (2003, 2004), Campa and González Minguéz (2006) for evidence pointing in such direction.

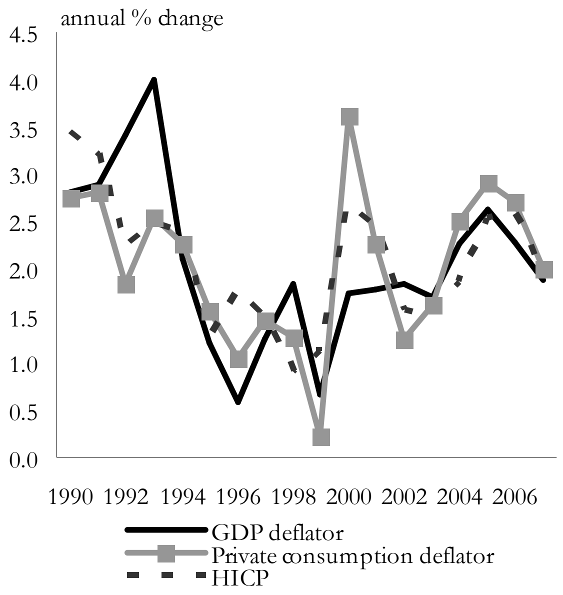
20 Note for some countries, the HICP was not available for some of the early years of the sample. The national CPIs were used instead to complete the data series.

goods and services that are at the very end of the production process in the economy. The prices of all other goods and services – such as investment goods – have an intermediate character and their evolution is one of the factors that will determine consumer price developments. Thus, consumption-based price measures can be considered to capture overall inflationary price pressures in the economy quite well. Looking at the GDP deflator, it can be recalled that consumption is generally the single most important national expenditure component, typically accounting for between 50 and 70% of GDP. This means that developments in consumption prices tend to have a sizable impact on price developments as described by the GDP deflator.

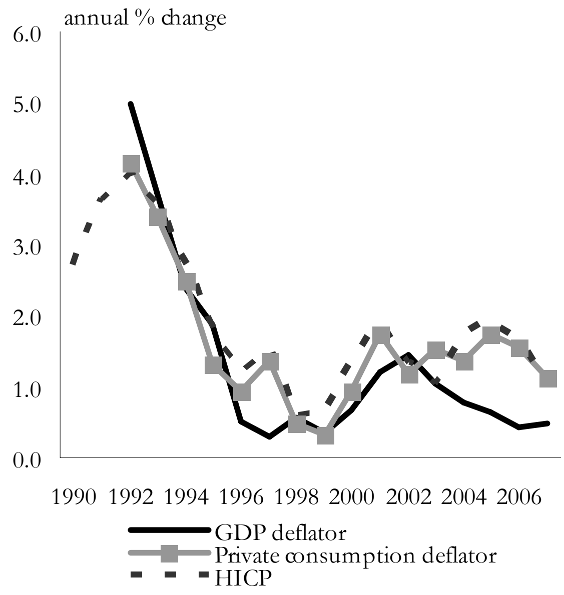
Indeed, the data since the early 1990s show for that most euro-area countries these three price indicators have followed each other rather closely (graphs 2.3.1-2.3.3). The countries where differences between the indicators appear to be more marked are Belgium, Ireland, Luxembourg and Finland. However, there do not seem to be systematic differences between the three indicators in any case considered over the full sample period.

Graph 2.3.1: GDP deflator, private consumption deflator and HICP: Belgium, Germany, Greece and Spain

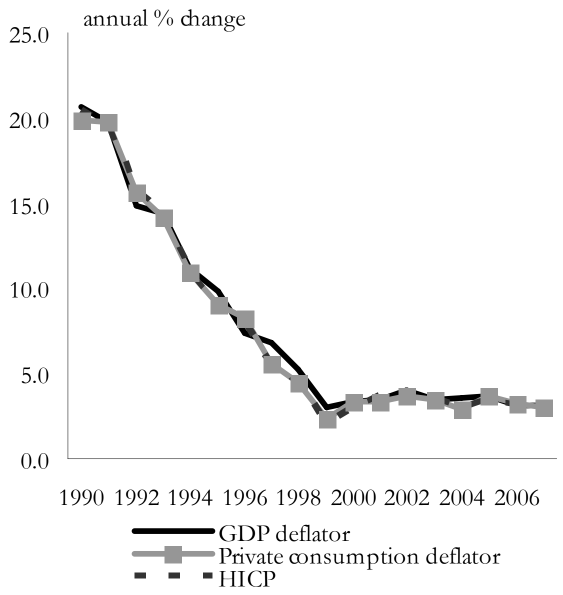
Belgium



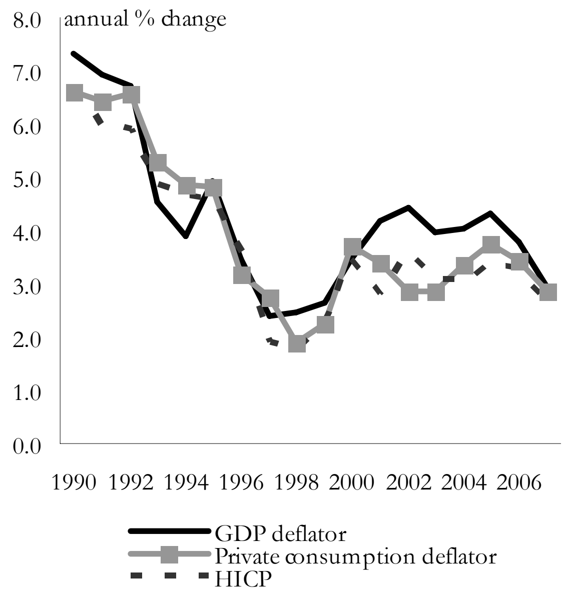
Germany



Greece



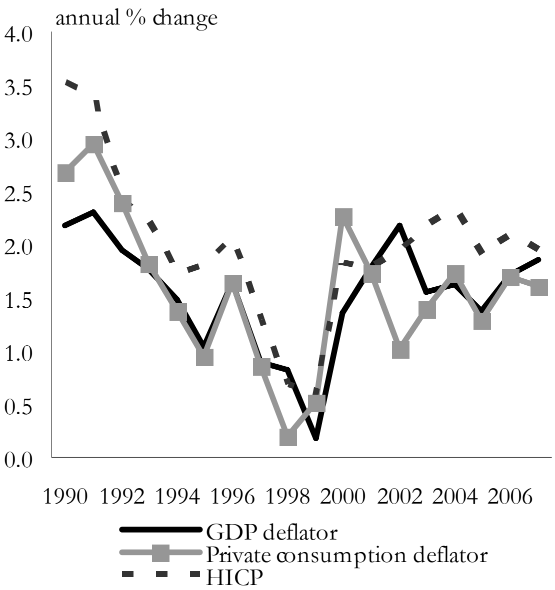
Spain



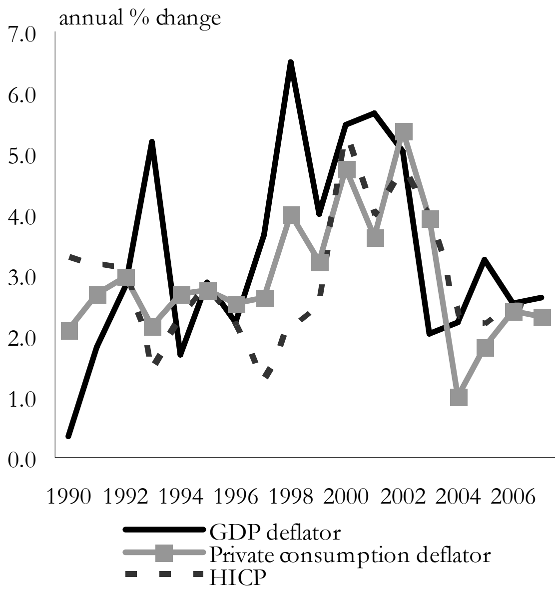
Source: Commission Services

Graph 2.3.2: GDP deflator, private consumption deflator and HICP: France, Ireland, Italy and Luxembourg

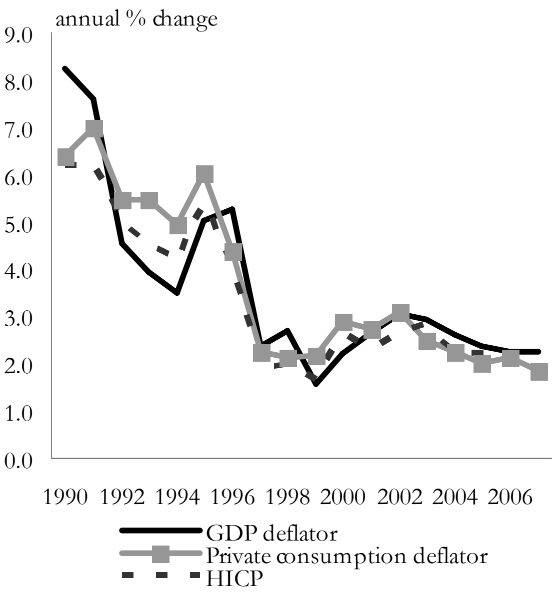
France



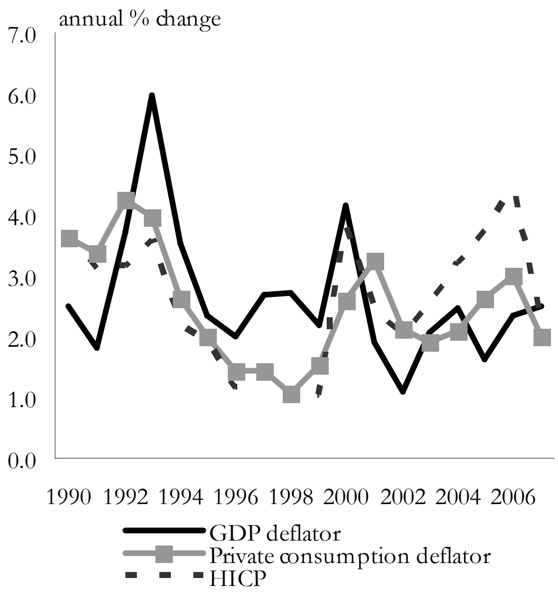
Ireland



Italy

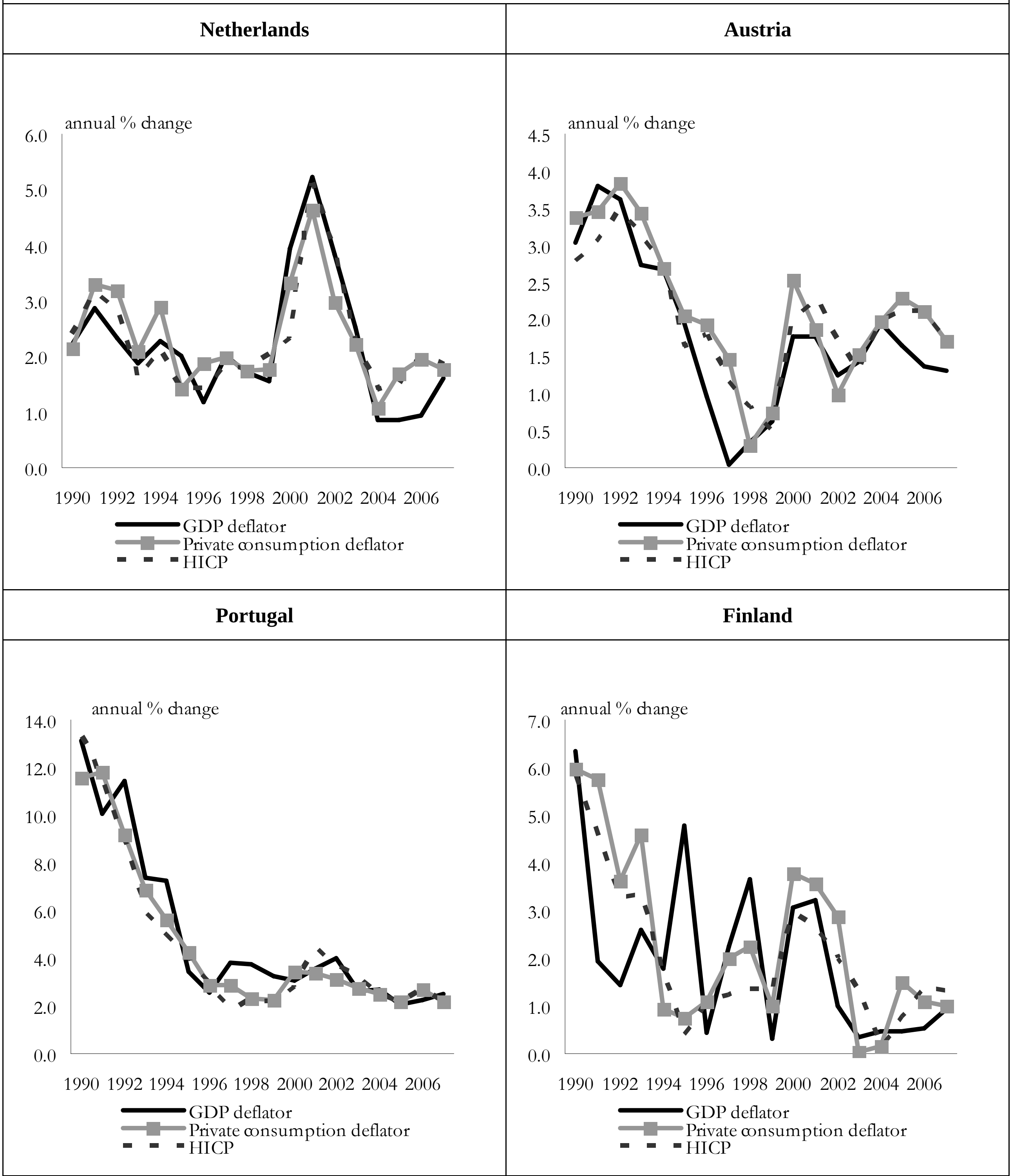


Luxembourg



Source: Commission Services

Graph 2.3.3: GDP deflator, private consumption deflator and HICP: The Netherlands, Austria, Portugal and Finland



Source: Commission Services

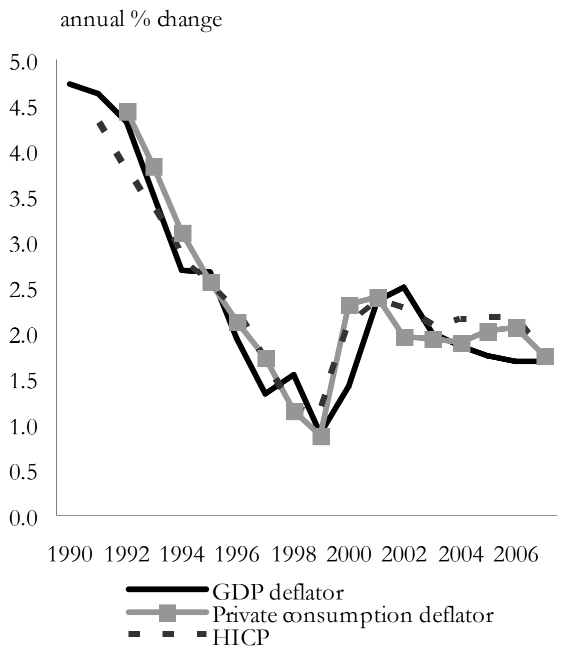
The broad picture that emerges from these data is one where the annual rate of increase in the three indicators followed a broad downward trend over much of the 1990s. This reflects the progress made in all these countries towards convergence to low inflation levels, required for participation in the third stage of EMU.

The dis-inflationary trend was generally interrupted around the time of the creation of the euro area. Thereafter, the various price indicators display an inverted "u" trajectory. In response to a sequence of inflationary shocks – such as surging oil prices, the initial euro depreciation, the effects on food prices of diseases among animals and increases in administered prices and indirect taxes – inflation began to increase somewhat during the early years following the creation of the euro area. Although inflation generally subsided from 2002 onwards, in most cases it has not yet returned to the low levels that prevailed at the start of the third stage of EMU.

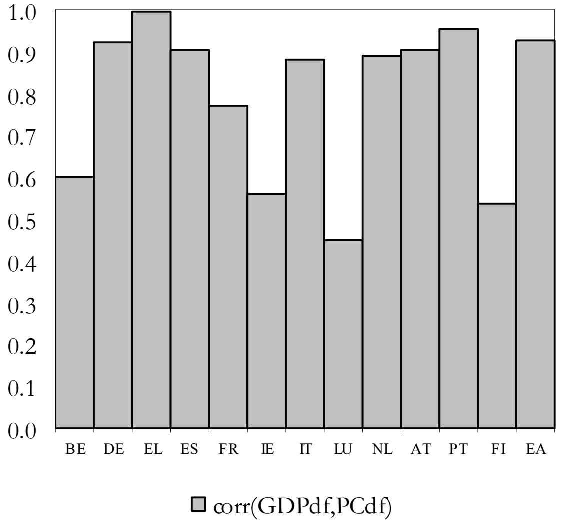
Shifting the spotlight to the period since the establishment of the euro area, some differences between the three price indicators become more apparent. For instance, it is interesting to note that in some countries (e.g. Germany, Luxembourg, the Netherlands and Austria) consumer prices have, for the past few years, been growing at a faster pace than the GDP deflator, while the opposite has been the case for Spain. Whether these differences contribute to, or are a reflection of, differences in GDP growth performance between these countries is a question that remains to be settled and is touched upon elsewhere in this Review.

The data for the euro area as a whole are presented in Graph 2.3.4. As was the case for most individual countries, the three price indicators give the same overall picture, with no single indicator being systematically higher or lower than the others over the full sample period.

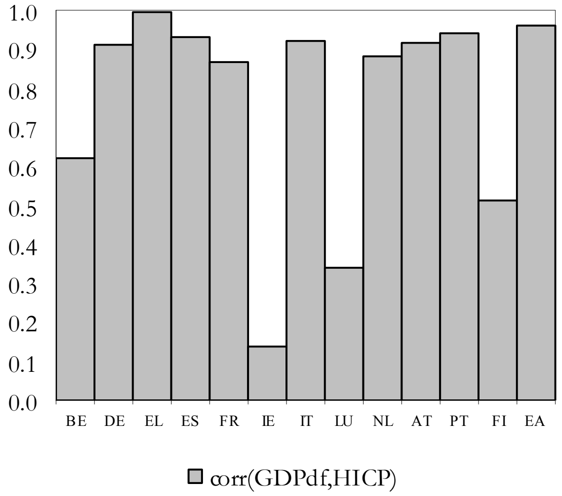
Graph 2.3.4: Inflation in the euro area – selected price indicators



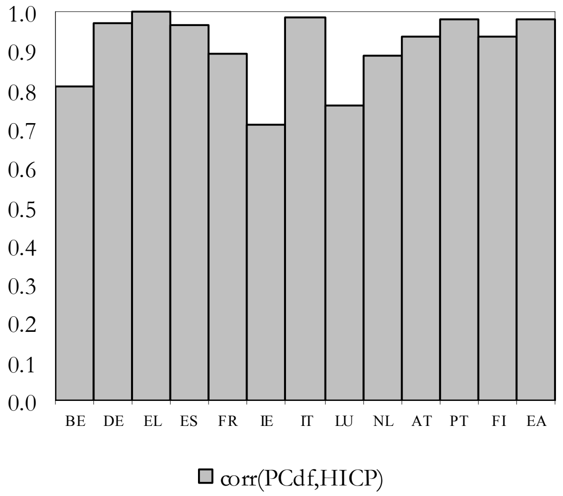
Graph 2.3.5: Correlation between selected inflation indicators in the euro area – the GDP deflator and the private consumption deflator



Graph 2.3.6: Correlation between selected inflation indicators in the euro area – the GDP deflator and the HICP



Graph 2.3.7: Correlation between selected indicators in the euro area – the private consumption deflator and HICP



Source: Commission Services

Correlation coefficients may also be used to assess how closely linked the three price indicators considered here are. Graph 2.3.5 shows that contemporaneous correlations between the GDP deflator (GDPdf) and the private consumption deflator (PCdf) are in most cases between 0.8 and 1, indicating a high degree of co-movement between these two price indicators. For the euro area as a whole, the coefficient is 0.93. However, for Belgium, Ireland, Luxembourg and Finland, the contemporaneous correlation coefficient is considerably lower.

Regarding the correlations between the GDP deflator and the HICP, Graph 2.3.6 shows that these are not distinctly different in magnitude from those between the GDP deflator and the private consumption deflator (0.96 for the euro area as a whole). Only for Ireland and Luxemburg are the correlation coefficients noticeably lower.

As expected, a tighter link is found between the private consumption deflator and the HICP. Correlation coefficients are above 0.9 in most cases (0.98 for the euro area as a whole). The notable exceptions are once again Ireland and Luxembourg, where the correlation is 0.7.

The correlation coefficients reported here thus support the impression that the three price indicators considered here are closely linked and tend to move together over time. Hence, foreshadowing the discussion in Chapter V on the appropriate inflation rate series to use in defining real interest rates, the finding here is that using any one of these price indicators should indicate broadly the same evolution over time, although not necessarily identical levels at any given point in time.

2.3.2 Inflation dispersion

As might be expected from the analysis in the previous section, a fairly similar picture emerges for developments in inflation dispersion across euro-area Member States using any one of the three price indicators. Indeed, all these indicators suggest considerable inflation convergence over much of the 1990s. For instance, the spread between the Member State with the highest and that with the lowest inflation rate narrowed from around 20 percentage points at the beginning of the decade to less than 5 percentage points in 1999 (Graph 2.3.8). Similarly, measured by the standard deviation – a measure of dispersion less affected by outliers –, inflation dispersion across euro-area Member States dropped from around 5-6 percentage points at the beginning of the decade to less than 2 percentage points in 1999.

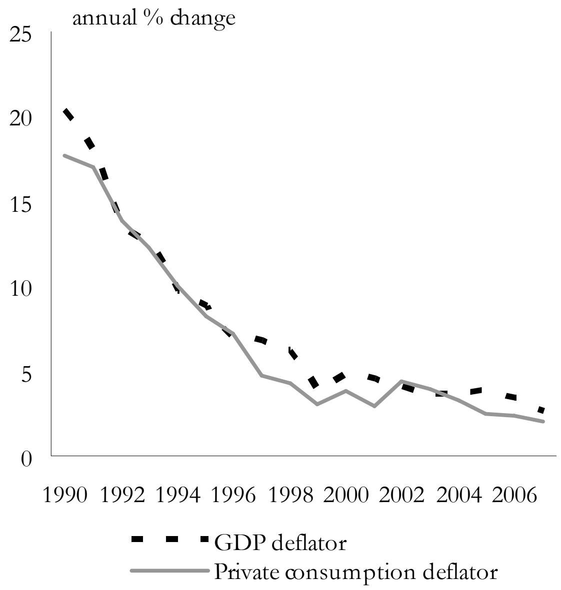
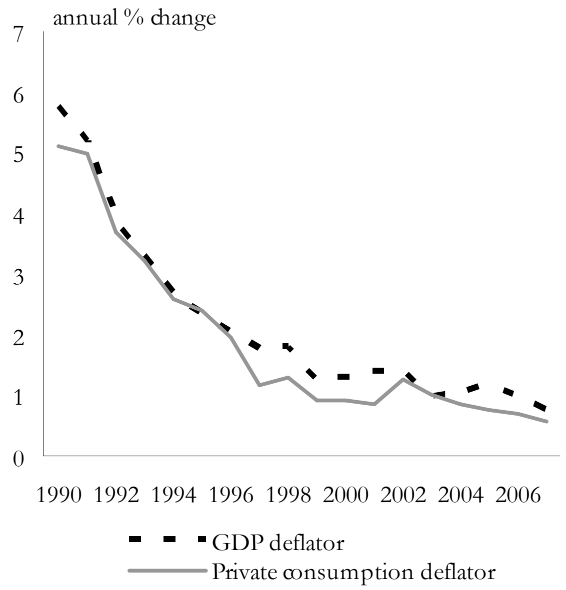
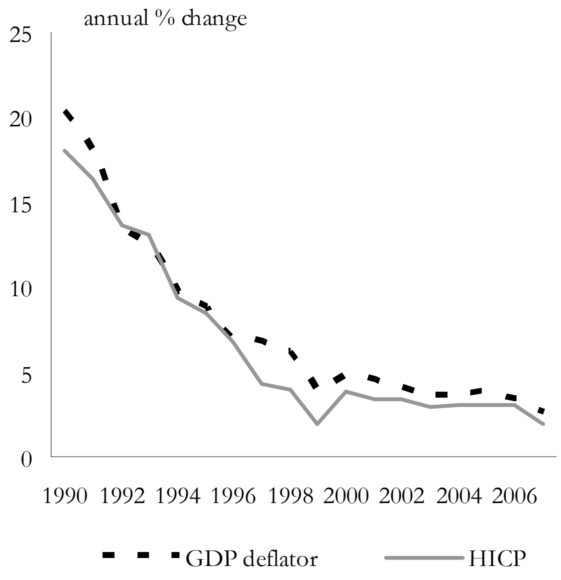
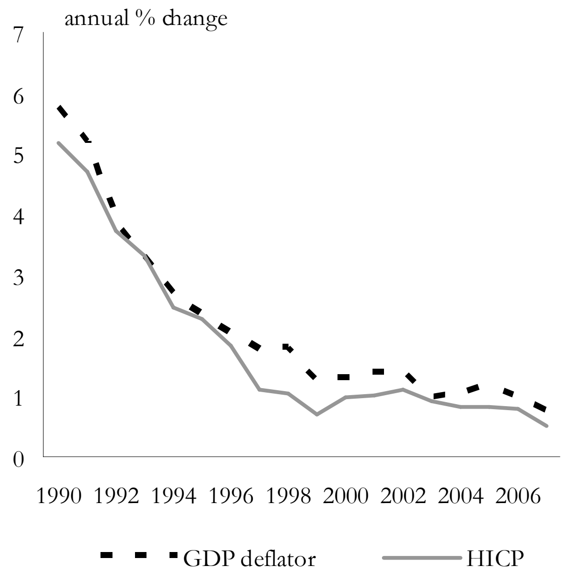
However, progress towards convergence paused as the euro area came into being in 1999. Since then, inflation divergence increased somewhat in the first two years of the euro area and gradually subsided thereafter.

One systematic difference between the inflation indicators considered here is that the lowest inflation rate is in many cases given by the GDP deflator (Graph 2.3.9). This means that the spread between the Member States with the highest and lowest inflation rates is also generally larger when measured using the GDP deflator.

Given that the picture in terms of price developments and inflation dispersion is fairly similar across the three indicators analysed here, the remainder of this section focuses on the HICP, which is a natural choice for analysing inflation developments in the euro area. This price indicator has the advantage of being the most comparable price measure across the EU Member States, thus minimising the possible differences in inflation developments among countries due to cross-country variation in statistical methodology.[21] Note also that, in addition to being an indicator that sums up all inflationary price developments in the economy, a consumer price index is also the most well-known price measure among private economic agents and, consequently, also the price indicator most often referred to in national nominal contracts in product, labour and financial markets.

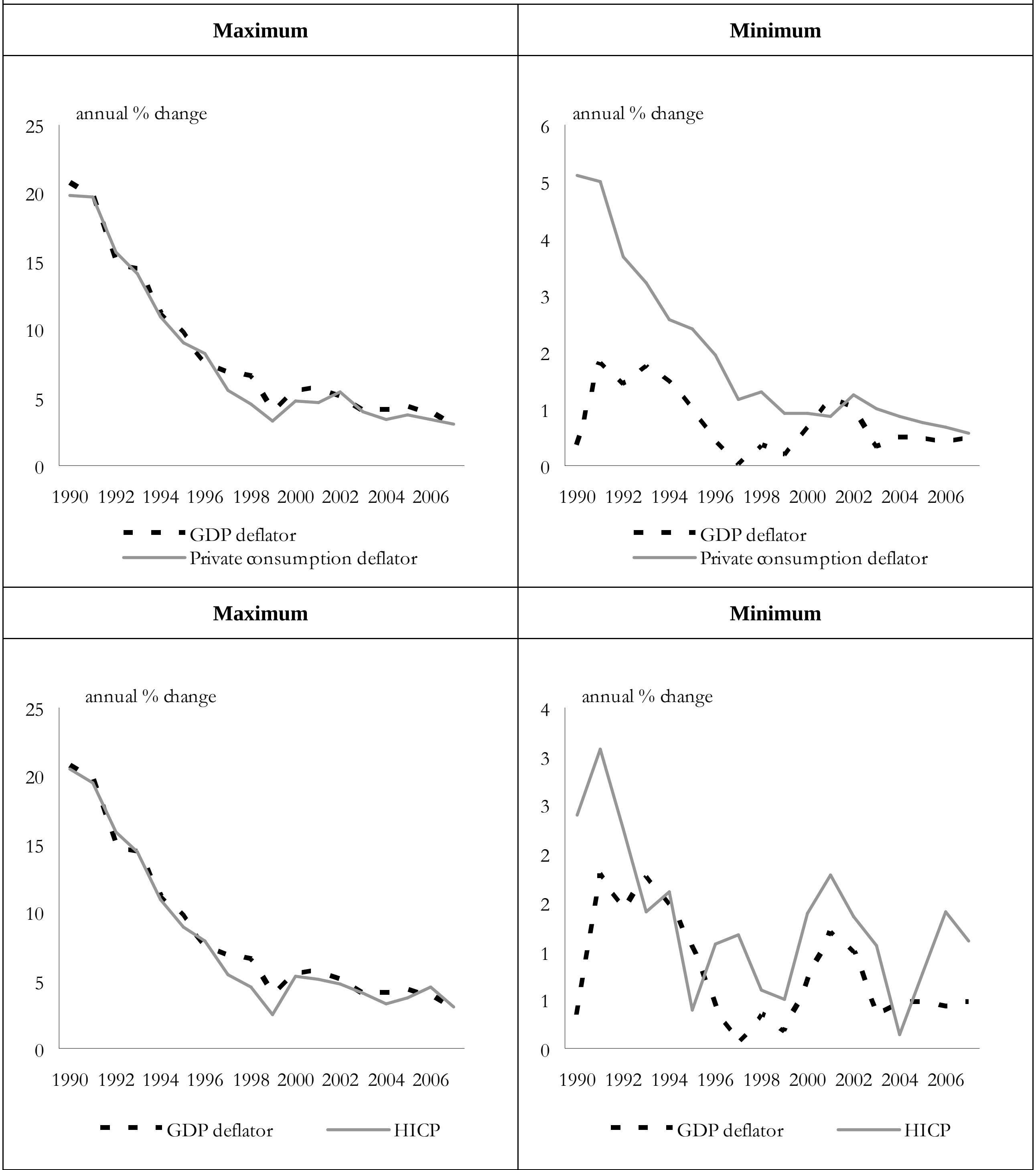
[21] This was also a key argument in the choice of the HICP for examining progress in inflation convergence as well as in the quantification of the monetary policy objective of the ECB.

Graph 2.3.8: Inflation dispersion for selected deflators – range and standard deviation

Range	Standard deviation
	
Range	**Standard deviation**
	

Source: Commission Services

Graph 2.3.9: Inflation dispersion for selected deflators – maximum and minimum



Source: Commission Services

Looking specifically at the country level, the table below provides data on inflation differentials relative to the euro area since 1998. A feature that stands out from these data is that some countries, such as Belgium, Germany, France and Austria, have persistently recorded below-average inflation rates, while others, like Greece, Spain, Ireland and Portugal, have registered above-average inflation rates for most of the period since 1998. Another feature that stands out is that these differentials have an asymmetric character. The countries with above-average inflation have registered differentials at least twice as large as those of the countries with below-average inflation. A further noteworthy aspect of the data in the table is that, among the countries with persistently above-average inflation, Ireland and Portugal had closed the differential by 2005, while Greece and Spain retained inflation differentials somewhat above 1 percentage point, roughly unchanged compared to the level in 1999. Indeed, the finding that, unlike other large monetary unions, the euro area is characterised by persistent inflation differentials has been also documented in the now large body of literature looking at this issue (see for instance ECB (2003d), ECB (2005c), Braten and Orellana (2005) and the references therein).

Table 1: HICP inflation differentials in the euro area

	BE	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI
1999	0.0	-0.5	1.0	1.1	-0.5	1.4	0.6	-0.1	0.9	-0.6	1.1	0.2
2000	0.6	-0.7	0.8	1.4	-0.3	3.2	0.5	1.7	0.2	-0.1	0.7	0.8
2001	0.0	-0.5	1.3	0.4	-0.6	1.6	-0.1	0.0	2.7	-0.1	2.0	0.3
2002	-0.7	-0.9	1.6	1.3	-0.4	2.4	0.3	-0.2	1.6	-0.6	1.4	-0.3
2003	-0.6	-1.1	1.3	1.0	0.1	1.9	0.7	0.4	0.1	-0.8	1.2	-0.8
2004	-0.2	-0.3	0.9	1.0	0.2	0.2	0.2	1.1	-0.7	-0.1	0.4	-2.0
2005	0.3	-0.3	1.3	1.2	-0.3	0.0	0.0	1.6	-0.7	-0.1	-0.1	-1.4
Avg. 1999-2005	-0.1	-0.6	1.2	1.1	-0.3	1.5	0.3	0.6	0.6	-0.3	1.0	-0.4

Source: Commission Services

The literature also suggests that examining the causes of inflation divergence is not a straight-forward task since the sources of inflation differentials tend to vary across countries and across time. For instance, there is evidence indicating that for some countries part of the differential is due to benign structural factors, such as catching up in income and price levels. There is also evidence that divergence in cyclical positions and in the exposure to the external environment plays an important role.[22] In addition, some evidence suggests that rigidities in labour and product markets may account for part of the differentials, particularly for their protracted nature. The latter points to a potential additional benefit from structural reforms that increase the flexibility of euro-area economies: such reforms could limit the scope for long-lasting inflation differentials by increasing the capacity of national economies to adapt to an ever changing economic environment.

22 Box 2 provides some empirical evidence on the latter at the level of import prices.

Box 2: The impact of euro-area membership on exchange-rate pass through

Exchange rate pass-through (ERPT) is the extent to which changes in the exchange rate are transmitted to domestic inflation, instead of being absorbed in profit margins or mark-ups. It is quantified as the elasticity of the local currency prices (of imports, or at later stages in the distribution chain) with respect to the exchange rate.

In this box, we restrict the analysis of ERPT to import prices. We follow the approach taken by Campa and González Minguéz (2006), but with some differences, specifically regarding data frequency, sample period, and the choice of foreign prices and trading partners. This approach is based on equation (1):

$$\Delta\ln(UVI^{ij}_{t}) = c^{ij} + \Sigma\, a_m^{ij}\, \Delta\ln(ER^{ij}_{t-m}) + \Sigma\, b_m^{ij}\, \Delta\ln(FP^{ij}_{t-m}) + v^{ij}_{t} \quad (1)$$

where the superscripts indexed by i and j refer, respectively, to a sector and to an importing Member State, while Σ is the sum over m = 0 to 1. The variables in the equation are: UVI = import unit value index of sector j in country i, denominated in local currency; ER = exchange rate for sector j of country i, expressed in terms of units of local currency per unit of foreign currency; and FP = a foreign price index of sector j in the countries of origin of these imports, expressed in foreign currency.

Equation (1) is estimated by ordinary least squares and the short-run and long-run ERPT elasticities are derived for each of the sector/Member State[1] combinations. Short-run exchange rate pass-through estimates are given by the estimated coefficients a_0^{ij}. Long-run coefficients are given by $\Sigma\, a_m^{ij}$ (summed over m = 0 to 1).

Exchange rates and foreign prices are calculated as sector-weighted averages vis-à-vis eight main trading partners.[2] Unit value indices are used instead of import prices, since no price data are available for extra-euro-area imports.[3] We focus on the latter as this is the part of Member States' imports that has continued to be exposed to exchange rate fluctuations since the creation of the euro area. Series for unit values in Eurostat's NICE domain start only in 1995. Due to methodological changes, the series cannot be correctly linked to indices available for the period prior to 1995. As a result, our sample contains only 44 observations (1995Q1-2005Q4) and consequently the conclusions below must be treated with caution. The need for caution is reinforced by the results of the unit root tests of the quarter-on-quarter changes in the variables: while all exchange rates and all foreign prices (except for capital goods) are stationary, we could not reject the null hypotheses of a unit root for about half of all unit value series.

As commodities are subject to a world price, imports of commodities have a very high degree of ERPT. It is therefore more interesting to analyse groupings of less homogenous goods, where ERPT might be less stable over time. As unit values indices are available according to the Broad Economic Categories (BEC), we have combined them with national account deflators as proxies for foreign prices and have chosen the following sector breakdown of the BEC: total, capital goods, consumer goods and consumption goods. The latter category comprises consumer goods including cars and fuels.

Given the ERPT estimates obtained according to the methodology described above, we wish to test whether euro-area participation has changed the degree(s) of ERPT. Membership of the euro area might lead to reduced ERPT for two main reasons.[4] The first is the reduced share of the individual Member State's imports that is exposed to exchange rate fluctuations. The second reason is the convergence of Member States' inflation rates towards lower inflation, observed in the run-up to 1999. Member States that have experienced substantially lower inflation rates since 1998 might, as a result, experience lower ERPT.

In view of the small sample size and the fact that adjustment to the euro area is a gradual process (as opposed to an abrupt structural break), we do not use a Chow test alone on a fixed breakpoint to assess whether euro-area membership has changed ERPT. Instead, we perform a two-stage process: first, CUSUM and CUSUMSQ statistics are calculated and charted. These statistics suggest then possible breakpoints. If these are in the 1998-2001 period, a Chow test is applied on the suggested breakpoint.[5]

Out of the thirty-two equations (four sectors for eight Member States), CUSUM and CUSUMSQ suggest possible breakpoints in the 1998-2001 period for only ten cases. Chow tests applied to these ten cases yield only six equations with a statistically significant structural break.[6] However, in five out of the six cases, ERPT in the second sub-sample is higher than in the first. These results hence reject the hypothesis of lower ERPT as a result of euro-area membership.[7]

1 The eight euro-area Member States concerned are Belgium, Germany, Greece, Spain, Ireland, Italy, the Netherlands and Portugal.

2 The exchange rates used are the geometrically weighted averages of the bilateral exchange rates against eight trading partners. Foreign prices are the geometrically weighted averages of the appropriate deflators (GDP, GFCF, consumption) of the eight trading partners. In both cases, the weights used are the shares of the trading partner's exports in the Member State's imports of the appropriate product category from all eight trading partners taken together. The eight trading partners are chosen according to their weight in extra-euro-area imports and the availability of series for the appropriate deflators. The eight trading partners are: the United Kingdom, United States, Japan, Switzerland, Czech Republic, Poland, Norway and Denmark.

3 Unit values are seasonally adjusted indices for extra-euro-area imports. The raw indices were taken from Eurostat's NICE domain. Unit value indices have well-known drawbacks. Unit values are calculated as the value of the products divided by their quantity, which is proxied by the weight of the products in terms of tonnage. For some products, where the decline in weight does not match a decline in quantity, unit values would yield a distorted picture of price developments. Unit values also do not correct for changes in quality.

4 Bråten and Orellana (2005a) point to an effect that might work in the opposite direction, namely the change in product composition. In the euro area, commodities represent a higher proportion of trade exposed to exchange rate changes than in the past. Given that the euro prices of commodities tend to quickly reflect exchange rate changes, this change points to an increase in measured ERPT.

5 Possible breakpoints that are situated outside this period are unlikely to be related to euro-area membership.

6 Statistically significant structural breaks were found for Belgium in consumption goods (2000q4), Spain in capital goods (2000q2), Ireland in total goods (1998q3), Italy consumer in goods (2000q1), Italy in capital goods (1998q2) and Portugal in consumer goods (2000q2).

7 The results are in line with the findings of Campa and González Mínguez (2006) and Campa, Goldberg and González Mínguez (2005). These authors find little evidence in favour of the existence of a statistically significant structural break in the transmission of exchange rate movements into import prices across euro-area countries. They also note that: "Tests for structural break are known to have very low power, especially in short samples like the recent history of the creation of the euro. A wider decline in pass-through may be taking place, but it is too early to ascertain whether this change is taking place and too early to determine the structural explanations for such declines."

2.3.3 Conclusions

This section has reviewed emerging inflation trends in the euro area as depicted by the three most commonly used price indicators, the GDP deflator, the private consumption deflator and the HICP. The broad picture that has emerged is one where the annual rate of increase in these three indicators followed a downward trend over much of the 1990s. This reflected the progress made in all these countries towards convergence to low inflation levels, which was required for participation in the third stage of EMU. As a result, and despite important differences in coverage and statistical methodology, a fairly similar picture emerges for developments in inflation dispersion across euro-area Member States from all these price indicators: one of considerable inflation convergence over much of the 1990s. However, the dis-inflationary trend was generally interrupted at the time of the creation of the euro area. Thereafter, the various price indicators display an inverted "u" trajectory. In response to a series of inflationary shocks – like surging oil prices, the initial euro depreciation, and increases in indirect taxes – inflation first increased during the early years of the euro area. Partly reflecting differences in exposure to these common shocks, coupled with differences in initial conditions, inflation dispersion also increased in the early years of the third stage of EMU. Although inflation generally subsided from 2002-3 onwards, in most cases it has not yet returned to the same low levels that prevailed at the start of the third stage of EMU. The same observation also holds for inflation differentials.

2.4 Financial markets

This section provides a short overview of financial market integration across the euro area. It focuses on developments in the money, bond and equity markets. It also discusses developments in the banking sector with a focus on lending behaviour and private sector indebtedness.[23]

2.4.1 Financial integration

According to the European Central Bank, the market for a given financial instrument is considered fully integrated if all economic agents with the same relevant characteristics acting in that market face a single set of rules, have equal access and are treated equally (ECB, 2005b). It is further proposed that financial integration can be measured by two broad indicator types, namely price-based and quantity-based indicators. While price-based indicators measure discrepancies in the prices of identical financial products, quantity-based indicators are used to assess the extent to which investors have internationalised their portfolios.

The importance of financial market integration stems from the well-documented finance-growth nexus. Here, the theoretical literature and a growing body of empirical literature identify a smooth functioning financial system as a prerequisite for economic growth.[24] The more efficiently the financial system can intermediate savings, the more savings will be available to support productive investment. In this respect, an efficient financial system can improve investment performance along three lines:

(i) Portfolio diversification. The opportunity to share risks via the financial system may induce savers to allocate a higher fraction of their savings to riskier projects, which tend to be more profitable on average.

(ii) Enhanced quality of investment. The availability of financial intermediaries may allow an enhanced evaluation of projects, thereby raising the profitability of investment.

(iii) More long-term projects. The availability of a liquid financial market allows a larger proportion of savings to be invested in projects of longer-term duration, which are typically more productive than shorter-term projects.

Against this background, financial integration works to advance the efficiency of financial systems, via two channels. First, benefits will emerge from scale effects through the increase in the number of actual and potential counterparts for financial transaction. An increase in the breadth and depth of the financial market reduces transaction costs and translates into lower cost of capital for borrowers and higher returns for investors. Second, financial integration improves efficiency of intermediation by intensifying competition among financial intermediaries. In addition, deeper financial integration also increases financial stability, which is crucial to a well-functioning monetary policy.

2.4.2 The money market[25]

The introduction of the euro has led to significant money market integration. The national money market, which is broadly defined as the market for inter-bank short-term debt or deposits, was denominated in a single currency from 1 January 1999 onwards. As a consequence, the market for unsecured inter-bank deposits integration is characterised by full convergence in nominal short-term interest rates across the euro area. Following the

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23 Given the complexity of the issue, this section is not exhaustive and a more sophisticated discussion can, for example, be found in reports issued by the European Central Bank (2005b), the European Commission (2001), and "EMU after five years" (European Commission, 2004a).

24 See, for example, Levine (2004) and King and Levine (1993a, b and c). See also Gianetti et al.(2002) for a discussion of the finance-growth linkage for the euro area.

25 See Chapter V for a discussion of various definitions of the real interest rate.

implementations of a common monetary policy, nominal short-term interest rates had already converged towards the average for the 12 euro-area countries prior to 1999. This average rate fell from 11.29% in 1992 to 3.09% in 1998[26] and reached 2.96% in 1999. During the period 1992-1999, one can distinguish two groups of countries in terms of their evolution relative to the latter average. A first group – Austria, Belgium, Finland, France, Germany, and the Netherlands – recorded nominal short-term interest rates that diminished gradually and remained generally below the average over the whole period, before converging to the common nominal short-term interest rate in 1999. A second group – Greece, Spain, Ireland, Italy, and Portugal – registered nominal short-term interest rates generally above the average until 1999. For instance, both Italy and Spain experienced a fall in nominal short-term interest rates by 9.1 percentage points, while Portugal and Greece recorded falls of 11.9 percentage points and 9.6 percentage points respectively. Germany, the Netherlands, Austria, France and Belgium experienced drops in nominal short-term interest rates ranging from 5.7 percentage points in Austria to 6.8 percentage points in France. With the creation of the euro area and the emergence of the ECB as the ultimate provider of liquidity for all Member States, nominal short-term interest rates converged to a single rate (averaging 2.96%) in 1999 and have fallen since then to an annual average of 2.19% in 2005.

2.4.3 Bond market developments

Full financial integration implies that the Law of One Price holds, that is, assets with identical risks and returns should be priced equally regardless of where the transaction takes place across the euro area. As an immediate consequence, financial integration in the euro area should be characterised by a convergence of bond yields, largely driven by elimination of exchange rate risk. Second, financial integration should lead to an increasing correlation between different bond yields, as they react to more common shocks. Finally, the return on bonds in a large area should be less volatile, as specific local conditions should offset one another via the diversification mechanism.

Indeed, convergence in euro-area benchmark yields began well ahead of the third stage of EMU in 1999, as Member States reduced inflation rates and consolidated budgets in order to meet the Maastricht criteria. Before the introduction of the euro, yield spreads on government bonds were determined by: (i) expectations of exchange rate fluctuations; (ii) different tax treatments of bonds issued by different countries; (iii) credit quality; and (iv) liquidity. In the run-up to the introduction of the euro, investors progressively discounted the elimination of the exchange rate risk for the Member States most likely to participate in the euro area. Coupled with the elimination of different tax treatments in the course of 1990, the relevant yield spreads had become tightly compressed to about 30 basis points in excess of the 10-year (German) benchmark towards the end of 1998. This compression of yield spreads contrasted sharply with the situation at the beginning of 1992, when several euro-area Member States had yield spreads between 400 and 700 basis points above the German benchmark.

Although euro-area yield spreads relative to the (euro-area) benchmark have slightly fluctuated since 1999, they have remained within a very tight range by previous standards. Broadly speaking, the evolution of spreads can be split into four phases: (i) a modest widening of spreads for several countries from 1999 to early 2001; (ii) a strong and further compression in spreads from 2001 to mid-2003; (iii) stable and very tight spreads from mid-2003 to end of 2004; and (iv) a moderate widening of the spread of Italian, Greek and Portuguese bonds since the start of 2005. As previously mentioned, in light of the elimination of exchange-rate risk and different tax treaties, credit and liquidity risk remain the two main determinants of euro-area spreads. Since 1999, the loss of direct control over monetary policy resulted in downgrades in long-term "domestic" currency ratings for some euro-area government bonds. However, credit risk in euro-area government bonds overall declined in the early years after the creation of the euro area, stimulated by strong growth and sustained budgetary consolidation efforts. As a result, euro-area credit ratings converged toward the highest grade.[27] However, the subsequent economic slowdown was accompanied by an easy fiscal stance in many euro-area Member States, resulting in a reversion of the earlier trend in ratings from mid-2004 onwards, with downgrades for Italy, Greece, and Portugal.[28]

Recently, investor discrimination between euro-area government bonds on the basis of underlying budgetary performance (hence, implied credit risk) has been limited. The spreads on euro-area non AAA rated issuers (i.e. Greece, Italy, Portugal, and Belgium) have been compressed toward the benchmark and the reaction of spreads to the rating downgrades has been modest and has emerged with a considerable delay. Also, the absolute level of yields in the government bonds of downgraded Member States had declined despite their reduced credit ratings. These developments raise the concern that financial markets are not playing their role in terms of disciplining governments in their conduct of budgetary policy. Part of the explanation is that there has been little incentive for investors to diversify away from the EU, given that budgetary expansion in the euro area has been less than in the US and Japan.

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26 If Greece is excluded from the euro-area average, the nominal short-term interest rate is 2.96% in 1999 rather than 3.08%.

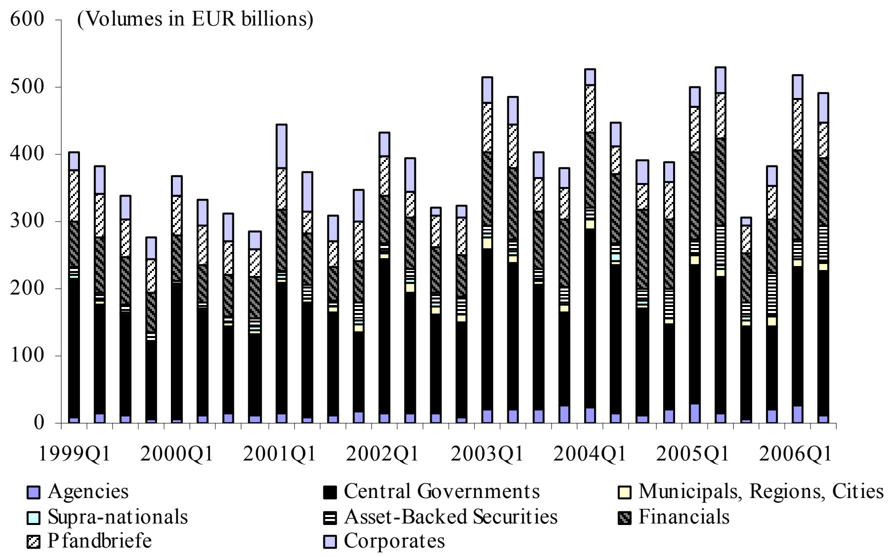
27 Austria, France, Germany, Luxembourg, and the Netherlands had already been assigned the highest credit quality (Aaa by Moody's and AAA by S&P and Fitch) before 1999. Ireland, Spain, and Finland were upgraded in 2001/2002 and Belgium had been upgraded to AA by Fitch in mid-2002. All rating agencies improved the ratings for Italy and Greece from 1999 to 2004.

28 Italy was downgraded to AA- by S&P in July 2004. Greece was downgraded by both Fitch and S&P to single –A at the end of 2004 and Portugal was assigned a negative outlook by S&P and finally downgraded to AA- at the end of July 2005.

Also, credit premiums tend to be small as long as default risks remain within reasonable ranges, but rise rapidly with the perception of serious financial difficulties. As long as there is no significant breach of the Stability and Growth Pact, which would have a sufficient impact on risk of debt default, the limited discrimination between euro-area borrowers with regards to credit risk is likely to remain.

Greater liquidity and depth of the euro-denominated bond market has also been reflected in higher issuance rates. The increase in the latter was particularly strong in 1999, with a growth rate of 18.9% relative to 1998.[29] The early months of 1999 were also characterised by high corporate activity, which forms part of the notable changes in the composition of bond issuance relative to the pre-1999 situation. For once, there was a sharp rise in non-sovereign issuance in 1999 with the combined issuance of the corporate and financial sectors more than quadrupling vis-à-vis 1998. The following year (2000) marked a decline in total bond issuance by 7%, partly due to reduced government borrowings and decline in market sentiment caused by rising interest rates and oil prices. This trend was reversed in 2001, when bond issuance increased again by 13% attributable to higher activity in the first months of the year, which was largely driven by corporate and financial issuers. Issuance volumes stayed constant in 2002, with the first quarter of 2002 marked by high government issuance activity in contrast to subdued private sector issuance following the Enron scandal. Since 2002, first quarter gross issuance has stabilised at high levels albeit with a changing composition. While 2003 was marked by an increase in issuance of 20% across all issuer categories – except for supranational institutions, corporations, and asset-backed securities – the first quarter of 2004 was characterised by heavy issuance in the central government section which was again reversed in the first quarters of 2005 and 2006.

Graph 2.4.1: Issuance activity in euro since 1999



Source: Commission Services and ECB

2.4.4 Equity market developments

Like other financial market segments, equity market integration across the euro area has advanced albeit at a slower and less evident pace. In theory, various factors and developments could have led to greater stock market integration.

- In a broad sense, efforts of the EU Member States to adhere to the Maastricht criteria have led to greater nominal and real convergence, and hence greater business cycle synchronisation. In theory, this real business cycle synchronisation can bring about higher cross-country correlations in expected corporate earnings.
- The introduction of the euro has improved transparency, standardised pricing in financial markets, and reduced investors' transaction and information costs.

[29] See European Commission (2001) for bond issuance data pre-1999.

- Several legal restrictions were abolished in the run-up to the establishment of the euro area, e.g. the previous restrictions on the foreign currency composition of assets held by institutional investors, which were required to hold assets primarily in domestic currency.
- Broadening investment opportunities across the participating Member States could have affected market expectations long before 1999, thereby leading to greater integration of stock markets as the probability of a monetary union became greater.
- As noted previously, the introduction of the euro eliminated intra-EU currency risk, thereby reducing the overall exchange rate exposure of EU stocks.

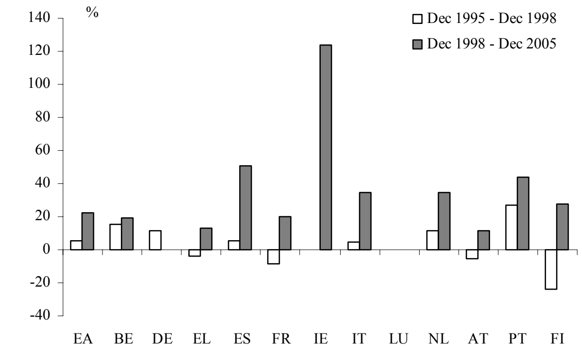
In practice, it proves, nonetheless, difficult to isolate the impact of the euro on equity markets from that of other unrelated developments, such as the relaxation of controls on capital movements and foreign exchange transactions, improvements in computer and telecommunication technology which have lowered the costs of cross-border information exchange and financial transactions, and the expansion of multinational operations of major corporations along with greater stock market consolidation as a global phenomenon. The majority of empirical studies address equity-market integration by asking two related questions: (i) How strongly are European equity markets integrated and (ii) How much of equity market integration is attributed to euro-area membership?

Fratzscher (2001) tested for financial integration by applying the uncovered-interest-rate-parity condition to asset prices for 16 OECD countries. He found that European stock markets were highly integrated from 1996 onwards and further confirmed that on reduced exchange rate uncertainty and the convergence of interest and inflation rates have had a significant impact on European financial integration. More specifically, the reduction of exchange-rate uncertainty seems to explain much of the high degree of volatility in financial integration in the 1990s, in particular in the periods of low integration during the ERM crisis in 1992-1993 and 1995 as well as the rapid increase in integration since 1996 in the run-up to the introduction of the euro. Hardouvelis et al. (2004) found that in the second half of the 1990s stock markets converged towards full integration, as forward interest rate differentials vis-à-vis the German benchmark and inflation differentials against the three best-performing states shrank towards zero. Supporting evidence of the role that participation in the euro area played in equity market integration comes from non-member experiences. The UK, for instance, does not show significant signs of increased integration with the other European stock markets. Bartram et al (2006) provide evidence of greater equity market integration across the euro area, albeit only for large equity markets such as France, Germany, Italy, the Netherlands and Spain. Recently, there has also been supporting evidence that integration in EU equity markets has been mainly evident in more sectorally-correlated movements in equity prices across the Member States. This is corroborated by ECB (2004a), which suggests a possible shift in asset allocation from country-based to sector-based strategies from 2001 onwards – based on an assessment of dispersion of monthly equity returns.

2.4.5 Credit developments

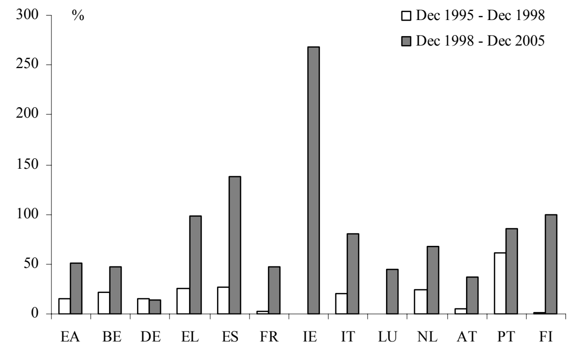
Falling inflation and convergence in real short-term interest rates associated with euro-area membership are also reflected in a surge of private sector credit growth in the euro area. Here, the effective elimination of exchange rate risk has been a major contribution on both the demand (as private sector agents revised their income expectations upwards) and the supply side (as banks were able to refinance domestic credit operations abroad at a significantly reduced risk). Total debt-to-GDP, as an indicator for financial deepening, has increased since the introduction of the euro in 1999, notably in Spain, Italy, Portugal, the Netherlands, and Finland. Among the euro-area countries, Ireland registered the biggest change in the debt-to-GDP ratio between 1999 and 2005, amounting to 124%. Conversely, Germany, Austria, and France exhibited very moderate increases in the debt-to-GDP ratio. These developments are also reflected in the nominal growth rates of total credit. While total credit was growing slowly in the larger Member States like Germany and France, smaller Member States like Greece, Portugal, Spain and especially Ireland experienced a surge in lending activities in the private sector in anticipation of euro-area membership. Thereafter, credit grew by 270% in nominal terms between 1999 and 2005 in Ireland and by almost 100% and 140% in Greece and Spain, respectively.

Graph 2.4.2: Change in total debt-to-GDP ratio in the euro area, 1992-1998 and 1999-2005



Source: Commission Services (1992-1998); ECB (1998-2005)

Graph 2.4.3: Nominal credit growth rates in the euro area, 1992-1998 and 1999-2005

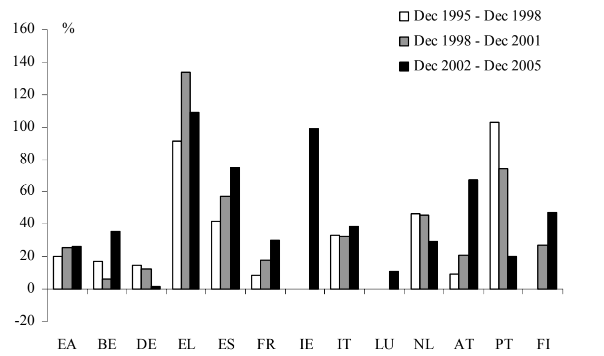
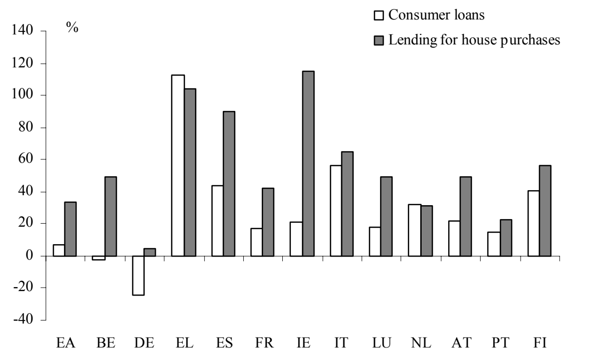


Source: Commission Services (1992-1998); ECB (1998-2005)

2.4.6 The household sector

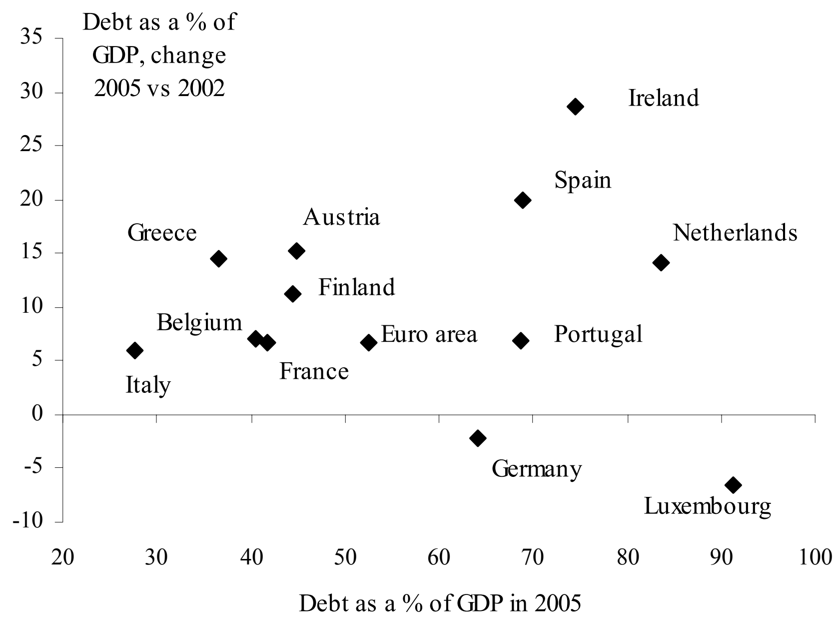
Credit developments were most pronounced in the private sector. Households, in particular, appear to have revised their permanent income expectations upwards. The resulting increased credit demand was willingly met by the banking sector, partly as the effective elimination of the exchange rate allowed them to refinance domestic credit operations abroad. The heterogeneous pattern of credit growth across the euro area is strongly reflected in the household sector: While Belgium, France, and Luxembourg experienced moderate increases and household lending effectively diminished in Germany in the last three years, Greece, Ireland, Spain and Portugal experienced a rapid increase in household credit. Analogous to overall credit, household lending booms in these countries started between 1 and 4 years prior to euro-area accession and peaked in the accession year.[30] In Portugal, for example, nominal credit growth grew by 103% between 1995 and 1998. Nonetheless, credit growth experience differs across these countries. The interplay of various factors (pro-cyclical fiscal policy resulting in an increase in debt levels, a drop in domestic demand as private sector agents re-assessed their financial position in combination with a weak external outlook, an increase in interest rates, low productivity despite high lending) eventually drove the Portuguese economy into recession. Part of the explanation is the strong bias of credit towards the household sector, whereas in Ireland corporate loans were the major source of expansion in these years. However, in the last three years, Ireland appears to have experienced yet a second peak in credit growth. In contrast to the earlier convergence experience, this time household loans – which have grown by almost a 100% in nominal terms – have taken over the role as the major force behind credit expansion. Household credit was primarily driven by the expansion in loans for housing purchases. Between 2002 and 2005, Ireland witnessed an increase in loans for house purchases amounting to 115% in nominal terms. Similar developments have been observed for Greece and Spain.

[30] Data for Ireland are only available from 2002 onwards for the same source.

Graph 2.4.4: Growth rates of nominal credit to the household sector in the euro area, 1995-1998, 1998-2001 and 2001-2005	**Graph 2.4.5: Lending to households – growth rates 2002-2005**
	
Source: Commission Services (1992-2001); ECB (1998-2005)	*Source:* Commission Services (1992-2001); ECB (1998-2005)

As a consequence of increased household lending, there has been a steady accumulation of household sector debt in the euro area since the introduction of the euro in 1999. The debt-to-GDP ratio is currently above 60% in Germany, Ireland, the Netherlands, Ireland, and Luxembourg, and continues to increase rapidly in several Member States, for example, Ireland and Spain. In contrast, Germany and Luxembourg have been experiencing negative growth rates. In the light of the strong pace growth of housing loans in some countries, high levels of indebtedness run the risk of leaving households vulnerable to adverse shocks, such as changes in interest rates, income or the value of house prices. Such shocks could induce households to re-assess their debt exposure and lead to a period of balance-sheet consolidation, which could depress economic activity, as witnessed in the case of Portugal.

Graph 2.4.6: Household debt as a percentage of GDP in 2005 and change between 2002 and 2005

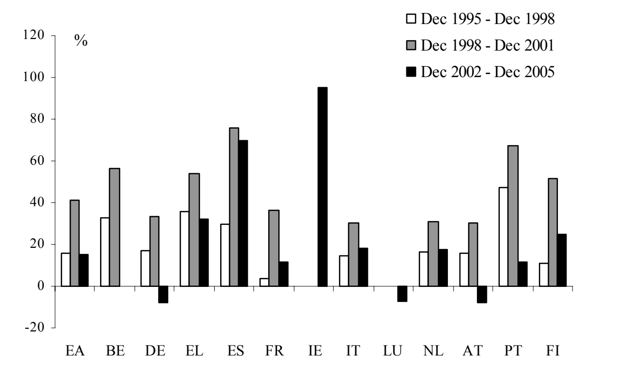


Source: Commission Services and ECB

2.4.7 The corporate sector

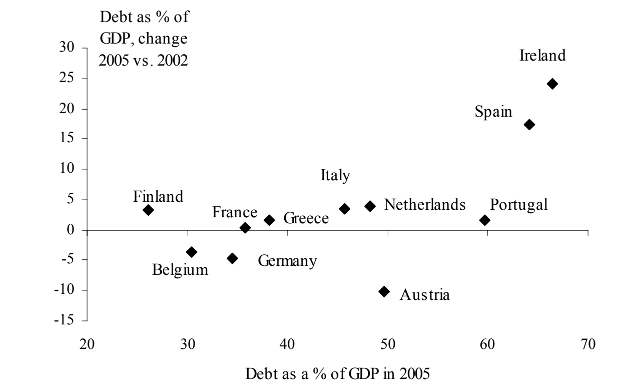
Compared to pre-1999 credit growth rates, credit growth in the corporate sector increased after the creation of the euro area. A surge in debt-financed investment in the late 1990s followed by the equity price correction in 2000 resulted in a sharp drop in the corporate sector's net financial wealth and triggered a phase of balance-sheet consolidation. In this context, the pace of debt accumulation in the euro area has slowed since 2001. Compared to the household sector, changes in corporate debt have, however, been less pronounced in recent years.

Graph 2.4.7: Growth rates of nominal credit to the corporate sector in the euro area



Source: Commission Services (1992-2001), ECB (1998-2005)

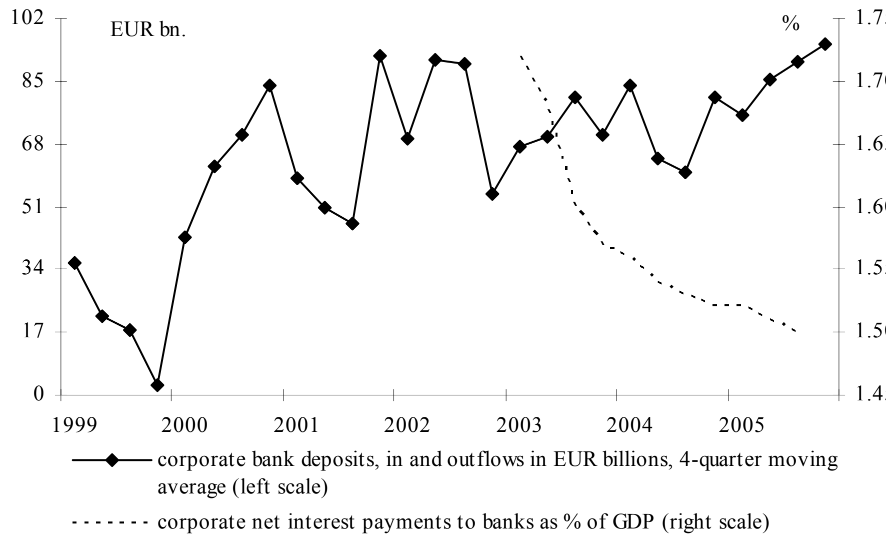
Graph 2.4.8: Corporate debt-to-GDP ratio in 2005 and change in corporate debt between 2002 and 2005



Source: Commission Services (1992-2001), ECB (1998-2005)

Balance-sheet consolidation has also involved a process of debt restructuring, amid historically favourable financing conditions (see above). Outstanding debt has been refinanced at lower interest rates and longer maturities. In this context, it is notable that the amount of net interest paid to banks has declined from about 1.8% of GDP in 2003 (when the data series begins) to about 1.5% in 2005, while the share of longer-term debt obligations (i.e. outstanding loans and debt securities issuance with maturity of more than one year) has risen from about 64% in 2001 to about 68% in 2005. Companies have also accumulated substantial cash balances, amid a strong recovery in profitability. Inflows to corporate bank deposits have been rising at record rates, in stark contrast to the period before 2000 when inflows fell to zero.

Graph 2.4.9: Corporate bank deposits and net interest payments to banks (euro area)



Source: Commission Services and ECB

3. Closing remarks

As documented in this chapter, economic developments in the early years of monetary union have been marked by significant and persistent divergences in key macroeconomic variables, including growth, inflation, intra-euro-area real effective exchange rates, and current account balances. Several findings emerge from this discussion that are very helpful in understanding the adjustment process in the euro area, and feed into the analysis in later chapters.

First, the basic behavioural relationships of consumption and investment differ across countries, but show practically no series break around the time of euro adoption. To the extent economic performance in countries diverged, this in part reflected disturbances or "shocks" in the determinants of these expenditures. Such divergences are clearly evident in the consumption and investment data, and their pattern is already suggestive about the way in which adjustment challenges emerged and were resolved. In particular, a significant part of the divergence in performance after euro adoption reflected the behaviour of investment. Within investment, residential housing played a prominent role.

These results suggest a need to probe how events in the run-up to euro adoption influenced investment behaviour. One major strand in developments clearly reflects the aftermath of German unification. This involved an extended period of sluggish investment, and extended real exchange rate adjustment. A second element is related to the strong and sustained expansion of residential investment in some countries, which may have reflected both real sector and financial influences.

Second, the counterpart to such trends can be seen in financial market developments. On the one hand, balance-sheet restructuring after German unification dampened corporate demand for credit. Financial markets responded to this adjustment, accommodating in particular a lengthening of corporate debt maturities. On the other hand, some euro-area economies experienced a sizable decline in risk premia and easing of consumer borrowing constraints. This triggered a strong expansion in household borrowing, and a shift of resources to non-traded goods and in particular housing investment. Here, financial market shifts were drivers of real sector developments, and capital flows drove changes in current account positions.

More generally, financial markets underwent increasing integration across the euro area. It is too early to determine from the data how this has been affecting risk-spreading and income smoothing across the euro area at a time of real sector shocks, and thus buffering the adjustment process. The literature indicates that this had a trivial impact in the 1970s and 19890s, compared with the scope of smoothing in the United States. During the 1990s this process began to lift off in the EU, and it is likely that it accelerated after adoption of the euro.

Third, inflation developments, also, suggest issues to be explored more deeply in the remainder of this Review. On the one hand, there was a striking success in keeping area wide inflation close to the ECB's target range, and achieving high credibility in terms of inflation expectations. On the other hand there were significant and persistent divergences in inflation across the area, which need to be better understood. How far do they reflect price level shifts that were consistent with inter-country adjustment? And how did they relate to underlying wage and productivity behaviour? These are issues that must be explored in order to shed light on the efficiency of the adjustment process.

Annex A: Table of macroeconomic indicators

Table A1: Macroeconomic indicators - euro-area countries

		BE	DE	EL	ES	FR	IE	IT	LU	NL	AT	PT	FI	EA
GDP	1992-98	1.8	1.5	1.8	2.3	1.7	7.2	1.3	3.6	2.8	2.2	2.4	2.5	1.8
	1999-05	2.0	1.3	4.3	3.6	2.1	6.5	1.2	4.8	1.9	2.0	1.6	2.9	2.0
	Difference	0.2	-0.3	2.5	1.4	0.4	-0.6	0.0	1.2	-0.9	-0.1	-0.8	0.4	0.2
	Std. Dev	0.2	0.2	1.8	1.0	0.3	0.4	0.0	0.8	0.6	0.1	0.6	0.3	0.1
Private consumption	1992-98	1.6	1.7	2.2	1.9	1.4	5.0	1.3	2.6	2.6	1.7	2.8	1.5	1.7
	1999-05	1.6	1.1	3.5	3.9	2.6	5.5	1.1	3.6	1.6	1.6	2.3	3.1	1.9
	Difference	0.0	-0.6	1.3	2.0	1.2	0.6	-0.2	1.0	-1.0	-0.1	-0.5	1.6	0.3
	Std. Dev	0.0	0.4	1.0	1.4	0.9	0.4	0.2	0.7	0.7	0.1	0.4	1.1	0.2
Investment	1992-98	2.0	1.3	2.4	2.2	0.6	10.3	0.3	3.6	3.9	1.5	5.7	1.3	1.3
	1999-05	2.7	-0.4	7.0	6.1	3.6	7.5	2.3	5.0	0.9	1.4	-0.7	2.9	2.3
	Difference	0.7	-1.7	4.6	3.9	2.9	-2.8	2.0	1.4	-3.0	-0.1	-6.4	1.6	0.9
	Std. Dev	0.5	1.2	3.3	2.7	2.1	2.0	1.4	1.0	2.1	0.1	4.5	1.1	0.7
Inflation	1992-98	1.8	1.1	6.7	3.5	1.7	2.1	3.8	1.2	1.9	2.1	4.4	1.7	2.5
	1999-05	2.0	1.4	3.2	3.1	1.8	3.6	2.4	2.7	2.6	1.7	3.0	1.6	2.0
	Difference	0.2	0.3	-3.5	-0.5	0.0	1.5	-1.5	1.5	0.8	-0.4	-1.4	-0.2	-0.5
	Std. Dev	0.1	0.2	2.4	0.3	0.0	1.0	1.1	1.1	0.6	0.3	1.0	0.1	0.3
Unemployment	1992-98	9.0	8.1	9.3	17.2	11.1	12.4	10.6	2.7	5.7	4.0	6.2	14.1	10.1
	1999-05	7.8	8.4	10.6	10.8	9.4	4.6	9.0	3.3	3.4	4.2	5.4	9.2	8.5
	Difference	-1.2	0.3	1.4	-6.4	-1.8	-7.8	-1.7	0.5	-2.2	0.2	-0.7	-4.9	-1.6
	Std. Dev	0.9	0.2	1.0	4.5	1.3	5.5	1.2	0.4	1.6	0.1	0.5	3.5	1.1
Employment	1992-98	0.4	-0.3	1.2	1.0	0.2	3.8	-0.6	0.9	1.8	0.4	0.1	-0.8	0.2
	1999-05	0.9	0.3	0.7	3.4	1.0	3.6	1.6	1.8	0.7	0.5	0.8	1.3	1.2
	Difference	0.5	0.6	-0.5	2.4	0.8	-0.2	2.2	0.9	-1.1	0.2	0.7	2.1	1.1
	Std. Dev	0.4	0.4	0.3	1.7	0.6	0.1	1.5	0.6	0.8	0.1	0.5	1.5	0.7
Compensation per employee	1992-98	3.1	4.5	10.5	4.9	2.6	4.6	3.8	3.3	2.9	3.4	7.5	2.7	3.7
	1999-05	2.7	2.0	6.4	3.0	2.6	5.9	3.0	3.9	4.2	2.1	4.3	3.1	2.6
	Difference	-0.4	-2.5	-4.1	-1.9	0.1	1.2	-0.8	0.6	1.3	-1.2	-3.2	0.4	-1.2
	Std. Dev	0.3	1.8	2.9	1.4	0.1	0.9	0.5	0.4	0.9	0.9	2.3	0.3	0.8

Note: For the periods 1992-98 and 1999-2005, the figures for all variables, except unemployment, are average annual growth rates for the periods concerned. Unemployment is expressed as the average rate for the periods concerned.

Source: Commission Services

Annex B: Analysis of consumer expenditure – details of econometric results

B1. Model and econometric results

According to standard life-cycle theory of consumption, real consumer expenditure is largely driven in the long run by real (disposable) income, real wealth and real interest rates. The wealth term, with includes both financial wealth (defined as net acquisition of financial assets less liabilities) and tangible wealth (largely represented by the value of real estates in the case of households), is intended to capture non-labour income streams, while the real interest rate denotes inter-temporal substitution effects in consumption. The short term-dynamics of these explanatory variables explains fluctuations of consumption around its long-run equilibrium. A benchmark model of consumer behaviour[31] can therefore be represented by a standard error-correction equation of this form[32]:

DlnCONS=a+b*lnCONS(-1) + c*lnRDY(-1) + d*lnRW(-1) + e*lnRHP(-1) + f*RR(-1) + g*DlnRDY + h*DlnRW + k*DlnRHP + l*DRR

where: **D** is the first difference operator; **ln** is the natural log operator; **CONS** is real private consumption; **RDY** is real (personal) disposable income; **RW** is real (net) financial wealth; **RHP** is the real price of housing; and **RR** is the 3-month real interest rate.[33] In the above equation, the parameter *b* represents the speed of adjustment towards long-run equilibrium of consumption, while the ratios *(-c/b), (-d/b), (-e/b)* and *(-f/b)* measure the long-run effects on consumption of real income, real financial wealth, real house prices[34] and the real interest rate, respectively. The remaining parameters explain the short-term dynamics of consumption. The coefficient on income is boosted when there are liquidity constraints on the availability of credit, since this implies that consumption is closely tied to the receipt of income. In contrast, the ability to consume out of wealth – in particular, tangible wealth – is enhanced when there are no liquidity constraints, since wealth can be used to smooth consumption over time. Hence, we should expect the short-term and long-term dynamics in consumption equations to be influenced by the existence of liquidity constraints.

In addition to the explanatory variables already mentioned, uncertainty and the situation regarding government public finances are two additional variables which may to be taken into account by consumers when they assess their income and wealth patterns. Higher uncertainty, for instance, will induce the consumer to choose a higher level of (precautionary) saving for a given configuration of income and wealth, thus reducing the level of consumption. To capture the effect of uncertainty on consumption, a consumer confidence indicator is often used as proxy for uncertainty in standard consumption equations. When added to the above specification of the consumption equation, confidence effects (as measured by the DG ECFIN Consumer Surveys indicator) turned out to be significant. However, the inclusion of confidence effects also led to insignificance of a number of other variables, including short-term wealth effects,[35] for both financial and tangible wealth. Overall, the consumer confidence indicator provided very little additional independent information about consumer behaviour and it was therefore excluded from the analysis. Expected changes in government balances may also be relevant in explaining the dynamics of private consumption. As rational agents will try to anticipate future tax changes in a Ricardian manner, a consumer faced with an improvement (deterioration) of the fiscal position is expected to raise (lower) his/her consumption, for a given constellation of the remaining variables. In order to test for the significance of these non-Keynesian effects on consumption, the variable DEF indicating the government budget surplus/deficit (as a percentage of GDP)[36] was included in the estimated error-correction equation.[37]

Quarterly data covering the period 1989Q1-2004Q4 and the variables real private consumption (CONS), real personal disposable income (RDY), real net financial wealth (RW), real house prices (RHP), real short-term interest rate (RR) and government fiscal position as a percentage of GDP (DEF) were used to set up a balanced panel for eleven euro-area countries (EA11: euro-area excluding Luxembourg). Nominal variables were deflated using the consumption price deflator (at 2000 prices) and a log transformation of the data was adopted to ensure that the errors are variance-stationary. In a first step, a panel model was estimated for the set of 11 euro-area countries to provide a

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31 For a survey, see Deaton (1992).

32 This is an extension of a model developed in Al-Eyd and Barrell (2006).

33 Additional lags may be considered for the variables in order to capture the short-term dynamics.

34 Housing wealth is, by definition, the (average) house price multiplied by the housing stock. Without a measure of housing stock, it was not possible to scale the effects of house prices in the long-run regression. Thus, the (long-run) marginal propensity to consume out of housing wealth could not be calculated.

35 We find that confidence is Granger-caused by wealth, but does not Granger-cause wealth.

36 In this context, an increase in the level of the DEF variable means either a higher government surplus or a lower government deficit. In both cases, one would expect a positive (long run) effects on consumption.

37 According to the standard life-cycle model of consumption, the age-composition of the population is likely to have an impact on aggregate consumption patterns as individuals are expected to save when young (and working) and dis-save when old (and retired). Due to the lack of quarterly data, the impact of demographic changes was not considered in this analysis.

basis to evaluate the long- and short- term effects assuming common dynamics across the group of countries. In a second step, since there are good reasons to presume that (long- and short-term) dynamics differ across countries, a series of pooled regressions were carried out, relaxing in turn the restrictions on the dynamics of the speed of adjustment, the long-run structure of common coefficients and ultimately the dynamics involving only short-term effects in order to check for significant country-specific effects. With the help of a dummy variable which takes on a value of 0 before the creation of the euro area (1999) and 1 for the subsequent years, we test for presence of structural breaks in the estimated pooled regressions.

The results of the balanced panel estimation for the aggregate of EA_11 are shown in Table B1 below. The error-correction-model (ECM) value (speed of adjustment) is highly significant, revealing a strong co-integrating relation between consumption, income and wealth although the value of -0.082 for the speed of adjustment indicates only moderate convergence to the long run-equilibrium. Examining the long run-relationships, the results show that the long-run elasticity of consumption expenditure with respect to disposable income is 0.67 (the ratio of the income coefficient to the error correction coefficient), while the long-run elasticity with respect to financial wealth is 0.05. Lower real interest rates and an improvement of the budget deficit both have long-run effects on consumption, on average. The short-term effect of a 1% increase in income is a rise in consumption of 0.3% while the effect of a rise of 1% in real house prices in the short run is smaller (0.05%). Note also that an improvement in the fiscal position of the government also has a small (albeit positive) effect on consumption in the short run.

Table B1: Panel results for consumer expenditure (1989Q1 – 2004Q4)

Dependent variable: DLNCONS = First difference of log of consumption
Method: Pooled EGLS (Cross-section SUR)
Sample time period: 1989Q1 - 2004Q4

Variable	*Estimate*	*Std. error*	*t-statistic*	*Probability*
Constant	0.1614	0.0279	5.78	0.000
LN(CONS)(-1)	-0.0822	0.0112	-7.37	0.000
LN(RDY)(-1)	0.0543	0.0104	5.24	0.000
LN(RW)(-1)	0.0039	0.0017	2.34	0.020
RR(-1)	-0.0011	0.0002	-6.81	0.000
DLN(RDY)	0.3223	0.0281	11.46	0.000
DLN(RDY)(-3)	0.1288	0.0258	5.00	0.000
DLN(CONS)(-1)	-0.1324	0.0327	-4.05	0.000
DLN(RHP)	0.0502	0.0154	3.27	0.001
DEF(-1)	0.0005	0.0002	3.48	0.001
D(DEF)(-1)	0.0025	0.0006	4.49	0.000

Weighted Statistics

R-squared	0.42	Mean dep. var.	0.60
Adjusted R-squared	0.40	S.D. dep. var.	1.30
S.E. of regression	1.01	Sum squared resid.	651.75
Durbin-Watson stat.	2.01		

Unweighted Statistics

R-squared	0.35	Mean dep. var.	0.006
Sum squared resid	0.04	Durbin-Watson stat	2.080

Implicit long-run effects:

LN(RDY)(-1)	0.66
LN(RW)(-1)	0.05

Note: All variables are expressed in averages across countries. The Akaike and Schwarz information criteria are used to determine the appropriate lag structure.

Source: Commission services

The first part of Table B2 presents the pooled mean group estimates when we allow for cross-country differences in the error-correction term. The model appears consistent with different ECM values across countries ranging from a slow speed of adjustment found in Italy, Portugal and the Netherlands to a relatively rapid adjustment found in Germany and France. The second part of the table presents the results of tests for a structural break in the speed of adjustment before and after the creation of the euro area across euro-area countries. The reported coefficients should be interpreted as deviations from the estimates shown in the first part of the table. Statistical tests suggest a change in the speed of adjustment between the two sub-periods only in France and Italy (with Portugal a borderline case at the 10% significance level), although the extent of the deviation compared to the pre-1999 period is fairly small.

Table B2: Pooled mean group estimates: speed of adjustment (1989Q1 – 2004Q4)		
Variable	***Estimate***	***t-statistic***
BE - LN(CONS_BE(-1))	-0.108	-4.12
DE - LN(CONS_DE(-1))	-0.124	-4.70
EL - LN(CONS_EL(-1))	-0.110	-3.65
ES - LN(CONS_ES(-1))	-0.090	-3.68
FR - LN(CONS_FR(-1))	-0.155	-5.39
IE - LN(CONS_IE(-1))	-0.097	-4.50
IT - LN(CONS_IT(-1))	-0.037	-1.57
NL - LN(CONS_NL(-1))	-0.073	-3.35
AT - LN(CONS_AT(-1))	-0.119	-4.33
PT - LN(CONS_PT(-1))	-0.066	-2.49
FN - LN(CONS_FN(-1))	-0.108	-4.81
Structural break (1999)		
FR - D_FR(-1)*LN(CONS_FR(-1))	**0.002**	**2.57**
IT - D_IT(-1)*LN(CONS_IT(-1))	**-0.002**	**-3.01**
PT - D_PT(-1)*LN(CONS_PT(-1))	**-0.003**	**-1.65**

Note: Figures in bold are significant at the 10% level at least
Source: Commission services

Table B3 presents country-specific long-run elasticities of consumption with respect to disposable income, wealth, the interest rate and the government budget deficit by relaxing in turn the restrictions on the dynamics linked to the error-correction term. In addition, the table also contains the results of the tests of whether structural breaks emerged also in the long-run dynamics of these variables before and after the creation of the euro area. Country-specific long-term dynamics between consumption and income is detected in Spain, Ireland, Netherlands and Portugal, while a euro-area participation effect on this relationship is present in the case of France and Finland (and perhaps Belgium). Country-specific effects of financial wealth on consumption are significant in Greece, France, Italy, Netherlands, Austria and Finland with support for a structural break in the relationship for the post-1998 period for Belgium, Spain and Ireland. Long-run dynamics between consumption and interest rates suggests a significant country-specific effect in most euro-area countries apart from Germany, France and Portugal. There is no evidence of a specific euro-area effect on this relationship. Finally, a positive long-run effect of the budget deficit on consumption is detected in Belgium, Germany, Spain and Italy and, for the period after 1999, in Belgium, Italy, Austria, Portugal and Finland.

Table B3: Pooled mean group estimates: short-run dynamics (1989Q1 – 2004Q4)

Variable	*Estimate*	*t-statistic*	*Variable*	*Estimate*	*t-statistic*
BE--LN(RDY_BE(-1))	0.0196	0.98	BE--LN(RW_BE(-1))	-0.0033	-0.44
DE--LN(RDY_DE(-1))	0.0174	0.56	DE--LN(RW_DE(-1))	0.0085	1.00
EL--LN(RDY_EL(-1))	0.0428	0.95	**EL--LN(RW_EL(-1))**	**0.0146**	**2.43**
ES--LN(RDY_ES(-1))	**0.0618**	**3.03**	ES--LN(RW_ES(-1))	0.0001	0.01
FR--LN(RDY_FR(-1))	0.0225	1.15	**FR--LN(RW_FR(-1))**	**-0.0152**	**-3.15**
IE--LN(RDY_IE(-1))	**0.0594**	**3.53**	IE--LN(RW_IE(-1))	0.0010	0.21
IT--LN(RDY_IT(-1))	0.0175	0.58	**IT--LN(RW_IT(-1))**	**0.0485**	**4.79**
NL--LN(RDY_NL(-1))	**0.0933**	**3.41**	**NL--LN(RW_NL(-1))**	**0.0130**	**2.31**
AT--LN(RDY_AT(-1))	0.0515	1.17	**AT--LN(RW_AT(-1))**	**-0.0177**	**-2.38**
PT--LN(RDY_PT(-1))	**0.0728**	**2.91**	PT--LN(RW_PT(-1))	0.0072	1.07
FN--LN(RDY_FN(-1))	0.0094	0.40	**FN--LN(RW_FN(-1))**	**0.0101**	**2.32**
BE--D_BE(-1)*LN(RDY_BE(-1)	**0.0011**	**1.60**	**BE--D_BE(-1)*LN(RW_BE(-1))**	**0.0010**	**1.91**
DE--D_DE(-1)*LN(RDY_DE(-1)	0.0005	0.88	DE--D_DE(-1)*LN(RW_DE(-1))	-0.0002	-0.29
EL--D_EL(-1)*LN(RDY_EL(-1))	0.0009	0.51	EL--D_EL(-1)*LN(RW_EL(-1))	0.0001	0.17
ES--D_ES(-1)*LN(RDY_ES(-1))	0.0002	0.23	**ES--D_ES(-1)*LN(RW_ES(-1))**	**0.0014**	**1.95**
FR--D_FR(-1)*LN(RDY_FR(-1)	**0.0010**	**1.79**	**FR--D_FR(-1)*LN(RW_FR(-1))**	**0.0016**	**3.06**
IE--D_IE(-1)*LN(RDY_IE(-1))	0.0005	0.95	**IE--D_IE(-1)*LN(RW_IE(-1))**	**0.0021**	**2.34**
IT--D_IT(-1)*LN(RDY_IT(-1))	-0.0002	-0.44	**IT--D_IT(-1)*LN(RW_IT(-1))**	**-0.0019**	**-3.25**
NL--D_NL(-1)*LN(RDY_NL(-1)	-0.0003	-1.06	NL--D_NL(-1)*LN(RW_NL(-1))	0.0009	1.57
AT--D_AT(-1)*LN(RDY_AT(-1)	0.0003	0.76	**AT--D_AT(-1)*LN(RW_AT(-1))**	**0.0013**	**2.24**
PT--D_PT(-1)*LN(RDY_PT(-1))	-0.0020	-1.27	PT--D_PT(-1)*LN(RW_PT(-1))	-0.0006	-1.07
FN--D_FN(-1)*LN(RDY_FN(-1)	**0.0006**	**1.77**	FN--D_FN(-1)*LN(RW_FN(-1))	-0.0005	-0.59
Variable	*Estimate*	*t-statistic*	*Variable*	*Estimate*	*t-statistic*
BE--RR_BE(-1)	**-0.0009**	**-3.00**	**BE--DEF_BE(-1)**	**0.0006**	**2.37**
DE--RR_DE(-1)	0.0003	0.45	**DE--DEF_DE(-1)**	**0.0013**	**1.63**
EL--RR_EL(-1)	**-0.0012**	**-2.55**	EL--DEF_EL(-1)	0.0006	1.44
ES--RR_ES(-1)	**-0.0013**	**-4.02**	**ES--DEF_ES(-1)**	**0.0008**	**1.78**
FR--RR_FR(-1)	0.0000	-0.01	FR--DEF_FR(-1)	0.0003	0.67
IE--RR_IE(-1)	**-0.0012**	**-3.47**	IE--DEF_IE(-1)	0.0002	0.20
IT--RR_IT(-1)	**-0.0018**	**-5.31**	**IT--DEF_IT(-1)**	**0.0013**	**4.98**
NL--RR_NL(-1)	**-0.0014**	**-3.21**	NL--DEF_NL(-1)	0.0010	1.40
AT--RR_AT(-1)	**-0.0017**	**-3.40**	AT--DEF_AT(-1)	0.0000	-0.07
PT--RR_PT(-1)	-0.0006	-1.27	PT--DEF_PT(-1)	0.0009	1.40
FN--RR_FN(-1)	**-0.0021**	**-5.63**	FN--DEF_FN(-1)	-0.0003	-0.84
BE--D_BE(-1)*RR_BE(-1)	-0.0002	-0.25	**BE--D_BE(-1)*DEF_BE(-1)**	**-0.0068**	**-2.40**
DE--D_DE(-1)*RR_DE(-1)	0.0007	0.91	DE--D_DE(-1)*DEF_DE(-1)	0.0006	0.81
EL--D_EL(-1)*RR_EL(-1)	0.0002	0.21	EL--D_EL(-1)*DEF_EL(-1)	0.0002	0.23
ES--D_ES(-1)*RR_ES(-1)	-0.0011	-0.71	ES--D_ES(-1)*DEF_ES(-1)	-0.0015	-0.70
FR--D_FR(-1)*RR_FR(-1)	0.0009	1.58	FR--D_FR(-1)*DEF_FR(-1)	0.0003	0.51
IE--D_IE(-1)*RR_IE(-1)	0.0003	0.19	IE--D_IE(-1)*DEF_IE(-1)	0.0010	0.86
IT--D_IT(-1)*RR_IT(-1)	0.0002	0.18	**IT--D_IT(-1)*DEF_IT(-1)**	**0.0023**	**3.65**
NL--D_NL(-1)*RR_NL(-1)	0.0027	1.50	NL--D_NL(-1)*DEF_NL(-1)	0.0001	0.11
AT--D_AT(-1)*RR_AT(-1)	0.0007	0.63	**AT--D_AT(-1)*DEF_AT(-1)**	**-0.0026**	**-1.84**
PT--D_PT(-1)*RR_PT(-1)	-0.0003	-0.17	**PT--D_PT(-1)*DEF_PT(-1)**	**0.0015**	**1.82**
FN--D_FN(-1)*RR_FN(-1)	-0.0005	-0.38	**FN--D_FN(-1)*DEF_FN(-1)**	**0.0009**	**1.78**

Note: Figures in bold are significant at the 10% level (at least).
Source: Commission services

Table B4 shows the basic pooled mean group estimates (suffix M refers to mean), where we allow for a common error-correction and long-run relationship but introduce idiosyncratic terms in the short term dynamics. The coefficients of the long-run are not markedly changed compared to the original estimates shown in Table B1. The ECM values of -0.098 implies a broadly similar time-span for convergence and the long-term elasticity of consumption with respect to income, financial wealth, the interest rate and the budget deficit are almost the same.

Nevertheless, the short-term dynamic terms suggest significant differences in the dynamics of consumption across countries. Income differences are significant in Belgium, Germany, Greece, France, Ireland, Italy, the Netherlands, Austria and Finland. The size of the dynamic income term in particular varies markedly, from basically 0 in Spain and Portugal to 0.7 in Germany. As regards differences in real wealth, they appear to be significant in Spain, Portugal and Finland while Ireland, Italy, the Netherlands, Austria and Finland display the largest short-term Ricardian effects on consumption. Note that there is little evidence of structural breaks emerging in the above short-term dynamics for the period following the creation of the euro area. The only exceptions are represented: by Belgium and Spain as regards differential effects on consumption stemming from the short-term dynamic of income; by Ireland as regards house-prices dynamics; and Finland as far as the short-term impact of the government budget deficit is concerned.

Table B4: Pooled mean group estimates: short-run dynamics (1989Q1 - 2004Q4)

Variable	Estimate	t-statistic	Variables structural breaks	Estimate	t-statistic
C	0.1530	5.45	C	0.1661	5.01
LN(CONSM(-1))	-0.0986	-8.05	LN(CONSM(-1))	-0.1040	-6.88
LN(RDYM(-1))	0.0710	6.39	LN(RDYM(-1))	0.0736	5.15
LN(RWM(-1))	0.0052	2.87	LN(RWM(-1))	0.0062	2.97
RRM(-1)	-0.0010	-5.77	RRM(-1)	-0.0010	-5.45
DEFM(-1)	0.0007	4.39	DEFM(-1)	0.0008	4.25
BE--DLN(CONS_BE(-1))	0.1025	0.86	BE--D_BE(-1)*DLN(CONS_BE(-1))	0.3473	1.50
DE--DLN(CONS_DE(-1))	-0.0922	-1.48	**DE--D_DE(-1)*DLN(CONS_DE(-1))**	**0.2690**	**1.95**
EL--DLN(CONS_EL(-1))	-0.1453	-1.27	EL--D_EL(-1)*DLN(CONS_EL(-1))	-0.1309	-0.48
ES--DLN(CONS_ES(-1))	0.0578	0.49	ES--D_ES(-1)*DLN(CONS_ES(-1))	0.1143	0.48
FR--DLN(CONS_FR(-1))	**-0.4352**	**-4.98**	FR--D_FR(-1)*DLN(CONS_FR(-1))	0.0596	0.27
IE--DLN(CONS_IE(-1))	**-0.4367**	**-4.79**	IE--D_IE(-1)*DLN(CONS_IE(-1))	-0.2332	-0.94
IT--DLN(CONS_IT(-1))	**0.2199**	**2.31**	**IT--D_IT(-1)*DLN(CONS_IT(-1))**	**-0.4269**	**-2.09**
NL--DLN(CONS_NL(-1))	**-0.2486**	**-2.22**	**NL--D_NL(-1)*DLN(CONS_NL(-1))**	**0.5453**	**2.30**
AT--DLN(CONS_AT(-1))	**-0.2280**	**-2.63**	AT--D_AT(-1)*DLN(CONS_AT(-1))	0.4105	1.43
PT--DLN(CONS_PT(-1))	**-0.2126**	**-2.26**	PT--D_PT(-1)*DLN(CONS_PT(-1))	-0.1595	-0.71
FN--DLN(CONS_FN(-1))	-0.1309	-1.22	FN--D_FN(-1)*DLN(CONS_FN(-1))	-0.1747	-0.67
BE--DLN(RDY_BE)	**0.3586**	**2.38**	**BE--D_BE(-1)*DLN(RDY_BE)**	**-0.5422**	**-1.70**
DE--DLN(RDY_DE)	**0.6822**	**12.46**	DE--D_DE(-1)*DLN(RDY_DE)	-0.0771	-0.66
EL--DLN(RDY_EL)	**0.4287**	**2.73**	EL--D_EL(-1)*DLN(RDY_EL)	0.3931	1.10
ES--DLN(RDY_ES)	-0.0255	-0.27	**ES--D_ES(-1)*DLN(RDY_ES)**	**0.6119**	**2.00**
FR--DLN(RDY_FR)	**0.4254**	**3.26**	FR--D_FR(-1)*DLN(RDY_FR)	-0.1610	-0.66
IE--DLN(RDY_IE)	**0.1938**	**2.12**	IE--D_IE(-1)*DLN(RDY_IE)	-0.0287	-0.15
IT--DLN(RDY_IT)	**0.3164**	**3.36**	IT--D_IT(-1)*DLN(RDY_IT)	0.0747	0.37
NL--DLN(RDY_NL)	**0.2610**	**2.25**	NL--D_NL(-1)*DLN(RDY_NL)	-0.2150	-0.80
AT--DLN(RDY_AT)	**0.2188**	**2.66**	AT--D_AT(-1)*DLN(RDY_AT)	-0.0696	-0.24
PT--DLN(RDY_PT)	0.0906	0.76	PT--D_PT(-1)*DLN(RDY_PT)	-0.0199	-0.07
FN--DLN(RDY_FN)	**0.3196**	**4.14**	FN--D_FN(-1)*DLN(RDY_FN)	-0.0265	-0.09
BE--DLN(RDY_BE(-3))	**0.1841**	**1.63**	BE--D_BE(-1)*DLN(RDY_BE(-3))	-0.0449	-0.19
DE--DLN(RDY_DE(-3))	0.0452	0.88	DE--D_DE(-1)*DLN(RDY_DE(-3))	-0.1023	-0.88
EL--DLN(RDY_EL(-3))	0.0079	0.05	EL--D_EL(-1)*DLN(RDY_EL(-3))	-0.1264	-0.39
ES--DLN(RDY_ES(-3))	0.0731	0.83	ES--D_ES(-1)*DLN(RDY_ES(-3))	-0.0132	-0.05
FR--DLN(RDY_FR(-3))	**0.5121**	**3.79**	FR--D_FR(-1)*DLN(RDY_FR(-3))	-0.0038	-0.02
IE--DLN(RDY_IE(-3))	**0.2426**	**2.56**	IE--D_IE(-1)*DLN(RDY_IE(-3))	0.2390	1.31
IT--DLN(RDY_IT(-3))	-0.0313	-0.34	IT--D_IT(-1)*DLN(RDY_IT(-3))	0.2447	1.14
NL--DLN(RDY_NL(-3))	**0.2219**	**2.37**	NL--D_NL(-1)*DLN(RDY_NL(-3))	-0.2694	-1.28
AT--DLN(RDY_AT(-3))	**0.1475**	**2.99**	AT--D_AT(-1)*DLN(RDY_AT(-3))	-0.1382	-0.59
PT--DLN(RDY_PT(-3))	-0.1023	-1.12	PT--D_PT(-1)*DLN(RDY_PT(-3))	-0.0849	-0.39
FN--DLN(RDY_FN(-3))	-0.0239	-0.34	FN--D_FN(-1)*DLN(RDY_FN(-3))	0.1022	0.46
BE--DLN(RPH_BE)	-0.0507	-0.64	BE--D_BE(-1)*DLN(RPH_BE)	-0.0216	-0.14
DE--DLN(RPH_DE)	-0.0123	-0.10	DE--D_DE(-1)*DLN(RPH_DE)	0.3052	1.22
EL--DLN(RPH_EL)	-0.1200	-1.52	EL--D_EL(-1)*DLN(RPH_EL)	-0.0299	-0.20
ES--DLN(RPH_ES)	**0.0832**	**1.73**	ES--D_ES(-1)*DLN(RPH_ES)	-0.2491	-1.37
FR--DLN(RPH_FR)	0.0182	0.54	FR--D_FR(-1)*DLN(RPH_FR)	-0.0283	-0.35
IE--DLN(RPH_IE)	-0.0038	-0.09	**IE--D_IE(-1)*DLN(RPH_IE)**	**0.2208**	**2.39**
IT--DLN(RPH_IT)	0.0406	0.98	IT--D_IT(-1)*DLN(RPH_IT)	0.0728	0.60
NL--DLN(RPH_NL)	0.0058	0.10	NL--D_NL(-1)*DLN(RPH_NL)	0.1069	0.94
AT--DLN(RPH_AT)	0.0977	1.43	AT--D_AT(-1)*DLN(RPH_AT)	0.0111	0.07
PT--DLN(RPH_PT)	**0.3918**	**3.49**	PT--D_PT(-1)*DLN(RPH_PT)	-0.2346	-0.94
FN--DLN(RPH_FN)	**0.1292**	**4.10**	FN--D_FN(-1)*DLN(RPH_FN)	-0.0571	-0.54
BE--D(DEF_BE(-1))	-0.0022	-0.93	BE--D_BE(-1)*D(DEF_BE(-1))	0.0015	0.20
DE--D(DEF_DE(-1))	0.0004	0.29	DE--D_DE(-1)*D(DEF_DE(-1))	0.0040	1.28
EL--D(DEF_EL(-1))	0.0006	0.35	EL--D_EL(-1)*D(DEF_EL(-1))	-0.0006	-0.11
ES--D(DEF_ES(-1))	0.0015	0.74	ES--D_ES(-1)*D(DEF_ES(-1))	-0.0075	-1.35
FR--D(DEF_FR(-1))	-0.0025	-1.28	FR--D_FR(-1)*D(DEF_FR(-1))	0.0062	1.49
IE--D(DEF_IE(-1))	**0.0075**	**3.12**	IE--D_IE(-1)*D(DEF_IE(-1))	-0.0059	-0.93
IT--D(DEF_IT(-1))	**0.0036**	**2.68**	IT--D_IT(-1)*D(DEF_IT(-1))	0.0023	0.82
NL--D(DEF_NL(-1))	**0.0059**	**2.22**	NL--D_NL(-1)*D(DEF_NL(-1))	-0.0032	-0.47
AT--D(DEF_AT(-1))	**0.0047**	**1.73**	AT--D_AT(-1)*D(DEF_AT(-1))	-0.0015	-0.21
PT--D(DEF_PT(-1))	0.0004	0.29	PT--D_PT(-1)*D(DEF_PT(-1))	-0.0016	-0.35
FN--D(DEF_FN(-1))	**0.0029**	**2.41**	**FN--D_FN(-1)*D(DEF_FN(-1))**	**-0.0066**	**-2.35**

Note: Figures in bold are significant at the 10% level at least
Source: Commission Services

Annex C: Analysis of investment expenditure – details of econometric results

The standard neoclassical growth model[38] determines a steady state relationship between gross investment (**I**), output (**y**) and the real cost of capital (**CK**) which depends on the real interest rate (**r**) and the relative price of capital (**PK**):

$$I = \alpha + Y - CK$$

The constant term α is determined by the steady state growth rate, the rate of depreciation and the share of capital in production. This long-run relationship can be estimated and be incorporated in an error correction model in order to better capture the dynamic behaviour of investment spending:

$$\Delta \ln I_t = k + \gamma (ECM_{t-1}) + \sum_{i=0}^{3} (\alpha_i \Delta \ln I_{t-i-1} + \lambda_i \Delta \ln Y_{t-i} + \chi_i \Delta r_{t-i-1}) + \varepsilon_t$$

in which the error-correction term (ECM) is the deviation from the long-run relationship. In the estimation of the dynamic equation, changes in the real effective exchange rate (**Q**) and the stock market (**S**) are also introduced, in order to capture, respectively, changes in competitiveness and expectations about the future. Given that construction investment, as discussed earlier, has contributed significantly to differences in investment growth among the euro-area Member States, we also investigate a model for total investment spending and a model of non-construction investment in order to assess the extent to which construction investment influences the results.

The data from Eurostat cover the period from first quarter of 1980 to the last quarter of 2005. However, for Ireland and Portugal, quarterly data are only available for a rather short period, in which case data from the OECD are used. In the case of Ireland, only data on housing investment are available from the OECD, whereas for Portugal no breakdown of investment into different types of capital is available. For Germany, data are only available from 1991 onwards. The series start earlier for most other countries, although stock market data or interest rate data are not always available for the entire sample period, in which case a truncated sample is investigated.

First the long-run equilibrium relationship is estimated after which the dynamic relationship is estimated, testing for structural breaks in the dynamic adjustment of investment following the creation of the euro area. In order to compare the results across Member States and test the robustness of the results obtained through the country estimations, a panel model of the eight countries is also estimated.

The evidence concerning the determination of a co-integrating relationship for total investment, is somewhat mixed (Table C1(a)). For Germany, France, Ireland and the Netherlands one co-integrating relationship was found, while for the other countries the hypothesis of no co-integration could not be rejected. Looking at the estimated long-run parameters, there are considerable differences across countries. The estimated interest rate coefficient has the wrong (positive) sign in the case of Germany, France, Spain and Finland, although for France and Finland it is insignificant. The problem of estimating the elasticity of investment with respect to the cost of capital is well known (see for example Schaller (2006) for a recent discussion).

Concerning the relationship between investment and output, there are also differences, with the strongest link in Spain and the weakest in Germany.

Looking at non-construction investment, a co-integrating relationship is obtained for all the countries except Italy. A negative coefficient on the real interest rate is found for all countries except France (Table C1(b)). Concerning the long-run link between non-construction investment and GDP, the coefficient is much higher for Germany, whereas for the other countries the coefficient appears similar to that found for total investment.

Key to abbreviations in tables below:

D= the first difference operator

I= investment

Y= output

R= real interest rate

S= Stock market

Q= real effective exchange rate

Note: all variables are in natural logarithms except the real interest rate.

38 See for example. Pelgrin et. al. (2002).

Table C1: Tests for co-integrating relationships

1a: Total investment

	DE		IT		ES		NL	
	Estimate	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Constant	19.69		10.55		11.34		-1.24	
Y	0.39	6.34	1.74	6.09	1.84	16.50	0.76	8.10
R	0.02	5.16	-0.03	-2.08	0.03	2.93	-0.02	-3.68
	FR		**IE**		**FI**		**PT**	
	Estimate	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Constant	-9.11		1.41		-3.00		-5.35	
Y	1.59	11.97	0.76	8.96	1.12	14.19	1.34	34.59
R	0.01	0.82	-0.06	-5.98	0.00	0.06	-0.01	-3.84

1b: Non-construction investment

	DE		IT		ES		NL	
	Estimate	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Constant	-17.06		9.52		5.87		1.74	
Y	2.12	15.53	1.60	13.5	1.31	13.12	0.96	5.31
R	-0.01	-1.25	-0.03	-3.87	-0.01	-1.39	-0.03	-2.92
	FR		**IE**		**FI**			
	Estimate	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**		
Constant	-14.88		0.20		-1.46			
Y	1.99	77.75	0.81	20.92	0.90	10.56		
R	0.01	2.18	-0.03	-6.64	-0.02	-3.29		

Source: Commission services

Estimating the dynamic error-correction model for countries, the error-correction term is significant for most countries, with the strongest adjustment in Germany and the Netherlands, and smallest (and most insignificant) in Portugal and Ireland. Concerning the other dynamic patterns there are some differences, notably for Ireland a higher number of lags of investment growth is needed. Generally, changes in the interest rate are not significant, except for Germany (a positive coefficient and Ireland (a negative coefficient). Looking at the auxiliary variables, growth in the value of the stock market affects investment positively in Germany, Ireland and the Netherlands, and, somewhat strangely, negatively in Finland. Changes in competitiveness, as measured by changes in the real effective exchange rate, are only found to matter in the case of Finland, with the expected negative sign.

Table C2a: Results of error-correction models – total investment - results for Germany , Italy, Spain and the Netherlands

	DE		IT		ES		NL	
	Estimate	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Constant	-0.01	-2.08	-0.004	-2.24	-0.001	-0.20	-0.01	-2.97
ECM	-0.38	-3.27	-0.09	-2.70	-0.09	-2.54	-0.27	-3.33
DI(-1)	-0.56	-3.60			0.34	3.30	-0.36	-3.41
DI(-4)	0.11	1.19						
DY	1.16	4.86	0.91	4.17	1.16	4.71	1.95	3.92
DY(-1)	1.18	2.48					1.48	2.63
DY(-2)			0.67	3.23				
DR	0.01	2.52						
DS							0.06	2.01
DS(-4)	0.05	2.38						
DQ(-1)			0.15	2.88				
EMU*ECM	0.29	2.02	-0.20	-1.96				
EMU*DI(-1)	0.67	2.44						
EMU*DY			2.12	4.00				
EMU*DQ					0.37	2.77		
R^2	0.51		0.47		0.55		0.59	
DW	1.82		2.01		2.11		1.99	

Source: Commission services

Table C2b: Results of error-correction models – total investment - results for France, Ireland, Finland and Portugal

	FR		IE		FI		PT	
	Estimate	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**	**Estimate**	**t-statistic**
Constant	-0.004	-2.80	-0.01	-2.56	-0.002	-0.62	-0.01	-2.83
ECM	-0.07	-3.57	-0.05	-1.46	-0.10	-2.10	-0.03	-1.68
DI(-1)	0.20	2.97					0.63	7.12
DI(-2)	0.26	2.71						
DI(-4)	0.21	2.74	0.36	4.65	0.55	6.31		
DI(-5)			-0.26	-3.10				
DI(-6)			0.28	3.60				
DY	1.85	9.51	0.98	5.77	2.11	5.43	1.89	8.25
DY(-1)							-0.69	-2.38
DY(-2)	-0.70	-2.70	0.40	2.59				
DR(-4)			0.00	-2.45				
DS					-0.10	-3.18		
DS(-2)			0.08	2.64				
DQ(-3)					-0.30	-3.08		
EMU*ECM			-0.20	-2.56				
EMU*DI(-1)							-0.31	-2.40
EMU*DI(-2)	0.38	1.93						
EMU*DI(-4)	-0.36	-1.90			-0.52	-1.92		
EMU*DY					-1.26	-2.66		
EMU*DR(-1)	-0.01	-2.25						
EMU*DR(-3)					-0.02	-3.35		
EMU*DS					0.09	2.39		
R^2	0.70		0.60		0.75		0.74	
DW	2.06		1.97		2.54		1.99	

Source: Commission services

Once again, the results obtained by looking at non-construction investment (Table C3) are more homogenous across countries. The error-correction term is significant for most countries (except Ireland) with a somewhat larger adjustment in Italy and the Netherlands. A positive coefficient on changes in the interest rate is found for Germany, Italy, the Netherlands and Ireland, possibly reflecting the pro-cyclical pattern in interest rates. Changes in stock market valuations are found to increase growth in non-construction investment in Spain, the Netherlands and Ireland, but negatively in the case of Finland. Changes in competitiveness only matters in the case of Spain, with a positive coefficient, possibly reflecting a Balassa-Samuelson type effect of a catching-up economy.

Table C3a: Results of error-correction models – non-construction investment - results for Germany, Italy, Spain and the Netherlands

	DE		IT		ES		NL	
	Estimate	**t-stat**	**Estimate**	**t-stat**	**Estimate**	**t-stat**	**Estimate**	**t-stat**
Constant	-0.003	-1.47	-0.01	-2.62	-0.0004	-0.12	-0.28	-2.34
ECM	-0.12	-3.90	-0.18	-4.02	-0.05	-1.88	-0.16	-2.36
DI(-1)	0.18	1.87			0.34	3.65	-0.58	-5.97
DI(-2)	0.34	3.43						
DY	1.32	3.73	1.54	4.51	0.84	3.12		
DY(-2)			1.14	3.46				
DY(-3)							2.12	2.38
DR	0.01	1.95						
DR(-1)							0.01	2.17
DR(-3)			-0.004	-2.05				
DS							0.18	3.08
DS(-1)					0.08	3.39		
DS(-4)	0.06	2.47						
DQ					0.37	3.18		
EMU*DY			2.63	3.10				
EMU*DR	0.01	2.77						
R^2	0.69		0.43		0.49		0.51	
DW	2.05		2.14		2.14		2.12	

Source: Commission services

Table C3b: Results of error-correction models – non-construction investment - results for France, Ireland and Finland						
	FR		**IE**		**FI**	
	Estimate	**t-stat**	**Estimate**	**t-stat**	**Estimate**	**t-stat**
Constant	-0.003	-1.91	-0.01	-1.06	-0.005	-0.83
ECM	-0.09	-3.74	-0.06	-1.49	-0.14	-1.99
DI(-1)	0.16	2.23	0.85	5.61		
DI(-2)	0.55	6.18				
DI(-4)					0.20	1.91
DY	1.61	7.39			1.68	3.26
DY(-1)						
DY(-2)	-0.50	-2.00				
DR(-1)	-0.003	-2.18				
DR(-3)			0.005	1.63		
DS					-0.07	-2.43
DS(-2)			0.14	3.01		
EMU*ECM			-0.63	-4.13		
EMU1*DY			2.26	6.39		
EMU1*DY			0.96	2.85		
EMU1*DR			-0.01	-3.22		
EMU1*DI			-1.02	-5.52		
EMU1*DI(-4)			0.29	3.40		
R^2	0.66		0.64		0.34	
DW	1.99		1.88		2.20	

Source: Commission services

The estimated panel model, more or less confirms the results obtained from the individual country models (table C4). For total investment, there is overall evidence of co-integration, with a significant and negative coefficient on the error-correction term, with a significantly stronger error-correction mechanism in the case of the Netherlands and a slightly slower adjustment in Spain compared with the overall result. A positive long-run elasticity of investment to output is found (1.4), with a much higher coefficient for the Netherlands, and slightly higher for Italy, Spain, Ireland, Finland and Portugal.

As with the some of the individual country equations, a positive long-run coefficient between investment and the real interest rate is also found for the panel-model, with no significant differences found across countries. Stock-market valuations are found to support investment (with a two-quarter lag), while an appreciation of the real effective exchange rate dampens investment (with a lag of three quarters).

For non-construction investment there is also found to be evidence of co-integration, with a somewhat faster adjustment mechanism. The long-run elasticity of investment to output is estimated to be around 1.1, with a much lower coefficient for Germany and Italy (0.3) and slightly lower for Spain (0.7). The long-run elasticity of non-construction investment has the right sign, but is insignificant. However, for France, Italy and the Netherlands, a negative long-run elasticity (-0.03/-0.04) is found.

Table C4a: Panel model results for total investment

Dependent Variable: DI = First difference of log of total investment
Method: Panel EGLS (Cross-section SUR)
Sample (adjusted): 1992Q2 - 2005Q4
Cross-sections included: 8
Total panel (unbalanced) observations: 416

Variable	**Estimate**	**Std. error**	**t-statistic**	**Probability**
C	-0.69	0.16	-4.26	0.00
I(-1)	-0.10	0.02	-4.90	0.00
Y(-1)	0.14	0.03	4.76	0.00
R(-1)	-0.001	0.00	-2.36	0.02
DI(-1)	-0.04	0.05	-0.82	0.41
DI(-2)	0.09	0.04	2.31	0.02
DI(-4)	0.16	0.04	4.34	0.00
DY	1.41	0.11	13.09	0.00
DY(-1)	0.20	0.12	1.59	0.11
DR(-2)	0.002	0.00	3.06	0.00
DR(-4)	-0.003	0.00	-3.72	0.00
DS(-2)	0.02	0.01	3.46	0.00
DQ(-3)	-0.14	0.04	-3.85	0.00
ES*I(-1)	0.01	0.00	4.25	0.00
NL*I(-1)	-0.53	0.15	-3.58	0.00
IT*Y(-1)	0.002	0.00	3.30	0.00
NL*Y(-1)	0.46	0.13	3.62	0.00
IE*Y(-1)	0.01	0.00	3.83	0.00
FI*Y(-1)	0.01	0.00	3.61	0.00
PT*Y(-1)	0.01	0.00	4.37	0.00
DE*EMU*I(-1)	-0.001	0.00	-3.34	0.00
IT*EMU*I(-1)	-0.32	0.13	-2.52	0.01
NL*EMU*I(-1)	0.33	0.18	1.88	0.06
IE*EMU*I(-1)	-0.39	0.10	-3.87	0.00
PT*EMU*I(-1)	-0.001	0.00	-1.87	0.06
IT*EMU*Y(-1)	0.28	0.11	2.52	0.01
NL*EMU*Y(-1)	-0.28	0.15	-1.88	0.06
IE*EMU*Y(-1)	0.34	0.09	3.85	0.00
IE*EMU*R(-1)	0.01	0.00	2.53	0.01
	Weighted Statistics			
R-squared	0.59	Mean dependent var		0.68
Adjusted R-squared	0.56	S.D. dependent var		1.50
S.E. of regression	0.95	Sum squared resid		351.53
F-statistic	20.11	Durbin-Watson stat		1.98
Prob(F-statistic)	0.00			
	Unweighted Statistics			
R-squared	0.9998	Mean dependent var		0.01
Sum squared resid	0.1689	Durbin-Watson stat		1.99

Source: Commission Services

Table C4b – Panel model results for non-construction investment

Dependent Variable: DI = First difference of log of non-construction inv.
Method: Panel EGLS (Cross-section SUR)
Sample (adjusted): 1992Q2 - 2005Q4
Cross-sections included: 7
Total panel (unbalanced) observations: 380

Variable	Estimate	Std. error	t-statistic	Probability
C	-0.88	0.12	-7.58	0.00
I(-1)	-0.21	0.03	-6.58	0.00
Y(-1)	0.24	0.03	7.01	0.00
R(-1)	0.0004	0.00	0.38	0.71
DI(-1)	-0.13	0.05	-2.70	0.01
DI(-2)	0.06	0.05	1.22	0.22
DI(-3)	0.02	0.04	0.38	0.70
DI(-4)	0.11	0.04	2.54	0.01
DY	1.33	0.15	9.04	0.00
DY(-1)	0.51	0.16	3.15	0.00
DY(-2)	0.66	0.13	5.21	0.00
DY(-3)	0.76	0.17	4.39	0.00
DY(-4)	0.62	0.18	3.49	0.00
DR(-4)	-0.003	0.00	-2.10	0.04
DQ(-3)	-0.14	0.06	-2.47	0.01
DE*I(-1)	0.20	0.05	3.68	0.00
ES*I(-1)	0.11	0.03	3.54	0.00
NL*I(-1)	-0.29	0.09	-3.18	0.00
IE*I(-1)	0.003	0.00	2.35	0.02
DE*Y(-1)	-0.17	0.04	-3.79	0.00
IT*Y(-1)	0.002	0.00	2.51	0.01
ES*Y(-1)	-0.09	0.02	-3.52	0.00
NL*Y(-1)	0.23	0.07	3.19	0.00
FR*R(-1)	-0.01	0.00	-4.67	0.00
IT*R(-1)	-0.01	0.00	-4.60	0.00
NL*R(-1)	-0.01	0.00	-2.56	0.01
DE*EMU*I(-1)	-0.54	0.10	-5.35	0.00
IT*EMU*I(-1)	-0.35	0.14	-2.59	0.01
IE*EMU*I(-1)	-0.37	0.11	-3.30	0.00
DE*EMU*Y(-1)	0.44	0.08	5.36	0.00
FR*EMU*Y(-1)	0.001	0.00	2.10	0.04
IT*EMU*Y(-1)	0.29	0.11	2.57	0.01
IE*EMU*Y(-1)	0.31	0.09	3.31	0.00
DE*EMU*R(-1)	0.01	0.00	3.26	0.00
IT*EMU*R(-1)	0.02	0.01	2.93	0.00
NL*EMU*R(-1)	0.01	0.00	2.49	0.01
FI*EMU*R(-1)	-0.004	0.00	-1.85	0.07
	Weighted Statistics			
R-squared	0.55	Mean dependent var		0.47
Adjusted R-squared	0.51	S.D. dependent var		1.40
S.E. of regression	0.97	Sum squared resid		323.09
F-statistic	11.78	Durbin-Watson stat		2.04
Prob(F-statistic)	0.00			
	Unweighted Statistics			
R-squared	0.9995	Mean dependent var		0.01
Sum squared resid	0.3901	Durbin-Watson stat		2.05

Source: Commission services

To investigate whether participation in the euro area has affected the behaviour of investment spending, two types of tests were used. First, the stability of parameters in the estimated dynamic error-correction model for individual countries was investigated using the so-called CUSUM and CUSUM of Squares tests. The tests find evidence of instability in the parameters of the estimated relationship, but generally such instability in equations appears to predate the introduction of the euro – in the mid-1990's or earlier, in particular for Ireland and Finland.

Second, changes in the coefficients in the dynamic equation were tested using a dummy variable, which takes a value zero before the first quarter of 1999 and one afterwards. For Germany and Italy, there is an indication of slower error-correction (more persistent investment) in the euro-area period in Germany, and faster in Italy and Ireland (Table C2a). However, these effects are not found for non-construction investment. In terms of changes to the dynamic adjustment to interest rate changes, there is evidence of some effect in France and Finland. Concerning the adjustment to stock market valuations or changes in external competitiveness, there was no overall evidence suggesting changes in the adjustment coefficients.

From the panel estimation for total investment, structural shifts in the error-correction mechanism are found for Germany, Italy, the Netherlands, Ireland and Portugal, with indications of much more rapid adjustment to equilibrium in the post-1998 period for Italy and Ireland, and much slower adjustment for the Netherlands (in fact the estimated coefficient indicates divergence from equilibrium). Concerning the long-run parameters, there is evidence that the elasticity of investment to output is higher after the introduction of the euro for Italy and Ireland, and lower for the Netherlands. The only country for which a significant change in the elasticity of investment to interest rates is Ireland, with a shift to a positive (albeit small) sign of the long-run elasticity of investment to the real interest rate.

For non-construction investment, there is little evidence overall from the individual country models of a change in the dynamic adjustment behaviour after 1998. A structural shift in the error-correction term is only found in the case of Ireland for which there is also some evidence of changes in some of the other short-run adjustment parameters, with in particular a stronger relationship between investment growth and output growth. From the panel model for non-construction investment, evidence of considerably faster adjustment to equilibrium in the post-1998 period is found for Germany, Italy and Ireland. Concerning the long-run parameters, the estimated elasticity of investment to output is somewhat lower for Germany, Italy and Ireland in the post-1998 period, whereas the elasticity with respect to interest rates is more positive for Germany, Italy and the Netherlands.