Longer-term developments and cyclical variations in key economic indicators across euro area countries

The introduction of the euro at the beginning of this year constituted a milestone in the process of European economic integration. It also marked a change in the way in which economic developments are assessed in that it brought about a focus on developments in the euro area as a whole. In addition, economic developments in individual euro area countries are increasingly assessed in terms of the extent to which they are similar to those in other countries participating in Monetary Union and in the euro area as a whole. For example, in connection with recent output and price developments, concerns have been expressed about divergent developments. The evolution of such differences will have to be monitored closely and addressed as the need arises. This article is a first contribution towards a discussion of the issue of divergences and similarities in economic developments across euro area countries by analysing past patterns from the early 1970s up to 1998.

The analysis covers the longer-term developments and cyclical variations of the following indicators: real GDP, total employment, industrial production and consumer prices. Among the broad range of indicators used to evaluate the economic situation, these play an important role. Overall, taking the factors at work into account, there seems to have been a fairly high degree of conformity in economic developments across countries. As expected and as highlighted by recent experience, national differences in the development of output and prices did not cease to exist on 1 January 1999, but continued following the start of Stage Three of Economic and Monetary Union. The analysis presented in this article shows that these recent divergences are by no means unusual.

As the introduction of the euro and the particular conditions of Monetary Union mark a significant break with the past, results of this analysis can only provide limited guidance as to future developments, but may help to put them into perspective as they occur. More specifically, it is too early to draw any firm conclusions regarding the impact that Monetary Union may have on the divergence of economic developments across euro area countries in the future and how, in turn, the single currency framework might be affected by such patterns.

1 Economic developments reflect both longer-term trends and cyclical movements

The complex issue of divergences and similarities in economic developments across euro area countries may best be introduced in terms of consumer price increases and real GDP growth at the end of 1998. In accordance with the appropriate benchmark for the single monetary policy, almost all the countries in the euro area had by then either achieved, or had maintained, consumer price increases of less than 2% over the previous two years, although a few countries had shown slightly higher rates of inflation. Notwithstanding this high degree of conformity in the general level of inflation, country-specific temporary factors continue to contribute to differences across countries in the shorter-term cyclical movements around these stable rates of price increases. In addition, following a two-year recovery phase common to almost all Member States, shorter-term differences in growth performance across euro area countries emerged in the course of last year. (See Box 1 for a discussion of recent developments in real GDP and consumer prices in euro area countries.) Some concern has been voiced with regard to the recent differences in growth and inflation developments across euro area countries. The objective of the analysis below is to provide a framework for assessing these recent developments from a historical perspective, even though, owing to the changes resulting from the introduction of the euro, this does not give a clear indication of likely future outcomes. Overall, an outstanding feature of the past few years appears to have been a high degree of conformity in longer-term price developments across countries at low levels of inflation. At the same time, the degree of shorter-term differences in output developments across countries seen in the recent past is by no means unusual.

Box 1

Recent differences in real GDP growth and HICP inflation across euro area countries

As outlined in the main part of this article, some differences in output growth and consumer price inflation tend to be a standard feature of economic developments across euro area countries. With the introduction of the euro, such differences have attracted increased attention. In particular, the recent divergence in growth rates between the larger Member States has led to some discussion on whether the most recent data should be interpreted as indicating a more protracted divergence of growth patterns between euro area countries or as a usual, temporary difference in output growth.

Some differences in real GDP growth have emerged recently

On the basis of data for the fourth quarter of 1998, differences in GDP growth between individual euro area countries have emerged recently.[1] In particular, when compared with the previous quarter, real GDP growth was negative in Germany and Italy, while only a moderate slowdown was observed in Spain. France, by contrast, witnessed a rebound in output growth. Compared with the fourth quarter of 1997, differences, although relatively small, do still exist.

Several factors contributed to the recent divergence in overall GDP growth. While in most of the euro area countries domestic demand, in particular private consumption, was strong enough to sustain overall growth despite the negative impact of external factors, this has not been the case in Italy or, to some extent, Germany. In Italy the quarterly contribution to growth from private consumption in the fourth quarter of 1998 was lower than in the past two years.

As regards the contribution of exports to growth, Italy experienced a contraction in the fourth quarter of last year, while only a mild slowdown was recorded in most other euro area countries. This appears to be related to the composition of Italian exports, which is more similar to that of emerging countries. In the aftermath of the currency devaluations in South-East Asia, Italian exports saw a loss in competitiveness, which had already been observed in the course of last year. However, significantly lower imports have considerably softened the negative impact of falling exports on growth. In Germany and France, too, a considerable deceleration in the contribution of exports to growth was visible in the fourth quarter of 1998, although this was not as strong as in Italy. Since in both cases there was only a limited offsetting impact from the import side, the contribution of net exports to growth fell quite sharply.

The contribution to growth from changes in inventories fell back significantly in Germany and Italy in the last quarter of 1998, while remaining broadly unchanged in most of the other euro area countries. In general, however, it is difficult to trace this back to purely economic developments as, in most countries, changes in inventories also reflect statistical uncertainties. Overall, while in Germany the recent weakness is mostly explained by the more volatile components of aggregate demand, exports and inventory changes, in Italy the slowdown appears to be more broadly based.

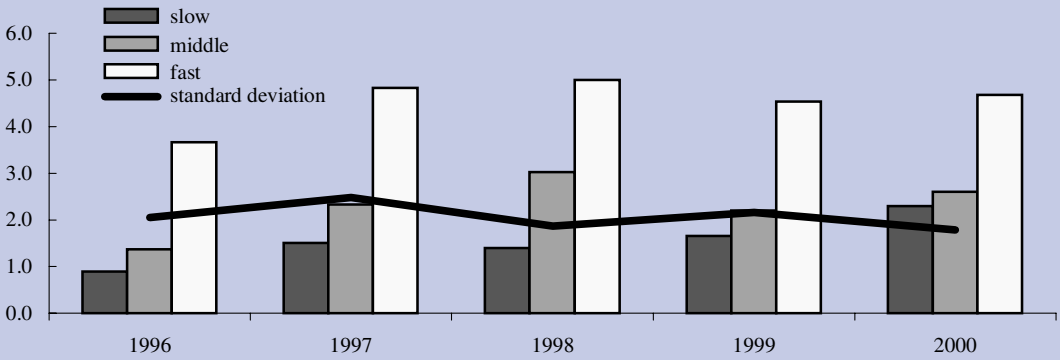
As explained in the main text of this article, the most recent increase in the differences between real GDP growth rates in individual countries is by no means exceptional from a historical perspective. At the same time, looking ahead, the spring 1999 European Commission forecast indicates that the difference between the real GDP growth rates in the countries which have recently experienced slow growth (Germany and Italy), on the one hand, and the euro area as a whole, on the other, is set to narrow considerably. Some narrowing is also expected for the difference in the real GDP growth rates between the fast growing countries (notably Spain, Ireland, Portugal and Finland) and the euro area.

1 *Given the preliminary and incomplete nature of the latest data releases in the context of the new national accounts (ESA 95), this Box is based on the old national accounts (ESA 79), except for the description of developments in the first quarter of 1999.*

In this respect it should be noted that, on the basis of data revised in accordance with the new ESA 95 definitions, the difference between quarter-on-quarter growth rates of the real GDP in Germany and Italy, on the one hand, and France and Spain, on the other, was far smaller in the fourth quarter of 1998 than previously recorded and narrowed further in the first quarter of 1999.

Average real GDP growth in groups of countries

(annual percentage changes; annual data)



Sources: Eurostat, European Commission forecasts for 1999 and 2000, ECB calculations.
Note: The composition of the groups varies each year. Countries with a real GDP growth rate close to the euro area average (±0.3 percentage point) are gathered in the "middle" group. Countries which grow faster are in the "fast" group and the remaining countries are in the "slow" group. The different bars represent the unweighted average of the real GDP growth rates in each group. The line represents the unweighted standard deviation for the 11 euro area countries.

Differences in consumer price increases move within reasonable bounds

To some extent the differences in the rates of increase in consumer prices, as measured by the HICP, reflect differences in real GDP, while at the same time efforts to fulfil the convergence criterion on price stability in accordance with the Treaty establishing the European Community have played an important role in recent years. In the recent past growth has been particularly strong in Spain, Ireland, Luxembourg, the Netherlands, Portugal and Finland. More specifically, vigorous domestic demand has generated higher than average price increases for headline HICP in these countries (except in the case of Luxembourg and Finland) and, in particular, for services prices. At the same time, wage moderation and strong productivity growth have subdued price pressures in Germany and France, for instance. In addition, temporary factors such as divergent developments in food prices, especially in seasonal food, have contributed to differences in headline HICP. From a longer-term viewpoint, structural forces reflecting different productivity developments across regions and sectors as well as price level adjustments also provide an explanation for differences in HICP rates.

According to the spring 1999 European Commission forecast, the spread between the highest and lowest HICP rates is expected to decline to 1.5 and 1.3 percentage points in 1999 and 2000 respectively, from 1.6 percentage points in 1998, while the standard deviation is expected to narrow to 0.5 and 0.4 percentage point respectively, from 0.6 percentage point in 1998. These spreads are compatible with the limits which were regarded as acceptable in the convergence criteria laid down in the Treaty establishing the European Community.

Longer-term developments are reflected in the trend in a particular variable, while cyclical movements are determined as shorter-term deviations from this trend. While, in practice, it can prove difficult to distinguish empirically between trend and cycle, such a distinction is helpful, as these two phenomena frequently tend to be discussed in connection with different economic issues. For example, the extent to which trend developments in output growth diverge or narrow across countries is discussed in the context of countries "catching up" with one another, while the degree of similarity of cyclical movements across countries is discussed in connection with the issue of "synchronisation". In the case of inflation differentials across countries, in the run-up to Monetary Union patterns were discussed primarily in the context of the nominal "convergence" criteria and there was little need to distinguish explicitly between the longer-term trends and the shorter-term cyclical variations in price increases.

Mainly for presentational purposes a uniform methodology has been used to decompose each of the series reviewed below into a trend component and a cyclical component, and to determine the degree of synchronisation of cyclical developments (see Box 2 for further details on the methodology applied for this analysis). However, while different de-trending methods give rise to somewhat different results, these are not thought to impinge on the validity of the broad conclusions which can be drawn. Correlation coefficients between cyclical components are compiled for rolling 10-year periods. The coefficients refer to the end of the respective period, i.e. the latest available data for 1998 reflect the average correlation of national developments and area-wide developments over the period from 1989 to 1998. This implies that references to particular periods have to be viewed from a broader perspective, with individual results possibly reflecting a number of events and major occurrences which continue to have an impact on the data. Given the different weights that individual countries have with regard to area-wide developments, the level of correlation for the larger countries among the euro area Member States tends to be higher than that for the smaller countries. Germany, in particular, is more likely to have a higher correlation with the area-wide aggregate than other countries, as it accounts for almost one-third of area-wide developments. The correlation of developments in individual countries with those in the euro area as a whole naturally blurs the extent to which the individual euro area countries are synchronised with one another. However, it may be considered a natural basis for comparison, as monetary policy decisions are based on economic developments in the euro area as a whole, to which individual countries may contribute to different degrees.

Box 2

Methodology based on de-trending and correlation analysis

Cyclical components are commonly defined as the deviations of a series from its trend. For the purposes of this exercise, the trend series are derived on the basis of purely statistical considerations, rather than from a specific economic theory. Due to its widespread use in empirical economics, the Hodrick-Prescott (HP) filter has been applied here, in order to mechanically decompose the individual indicators into a trend movement and a cyclical component. The HP filter can best be characterised as a symmetric moving average. It minimises the following function, where Y and Y^* denote actual and trend values respectively:

$$\underset{Y^*}{Min} = \sum_{t=1}^{T}(Y_t - Y_t^*)^2 + \lambda \cdot \sum_{t=2}^{T-1}[$$

This method essentially offers a trade-off between the proximity of the trend to actual data, as captured by the first term, and the smoothness of the trend, as captured by the second term. The results of this trade-off depend on the value of the parameter λ, which typically varies according to the frequency of the data analysed. As the default settings for λ (14,400 for monthly data and 1,600 for quarterly data) tend to leave too much cyclical variation in the derived trend series, in this exercise the respective values for monthly and quarterly data were increased. The filter has been applied to the rates of growth in the indicators reviewed. Apart from the statistical consideration that the HP filter is sensitive to the stationarity properties of the data, this also reflects the fact that the economic interest of this analysis lies in growth cycles, rather than in classical business cycles, and in inflation rather than in price levels.

The correlation coefficients between the cyclical components across countries are sensitive to the de-trending method chosen. While there are a large number of alternatives, all of them typically suffer from specific shortcomings. For example, the HP filter suffers from the so-called end-point bias owing to the fact that both lagged and lead values of the series are taken into consideration when calculating the trend, thus making it less precise at the beginning and at the end of the sample. The broad inferences drawn from this exercise are deemed sufficiently robust, in the sense that they do not critically hinge on the application of the HP filter as opposed to other possible methods for de-trending the data, although the use of alternative filters would lead to slightly different results, including those for the precise timing and duration of cycles. The trends should, however, be treated with particular caution as, in common with other similar approaches, the trend derived from the use of the HP filter is assumed to be a smooth series, rather than one marked by sudden and sharp changes due to structural breaks.

Correlation analysis is used to summarise the extent to which the cyclical components exhibit co-movements across countries. A high coefficient of correlation indicates that countries tend to be in similar states of cyclical movement. The degree of synchronisation itself is determined on the basis of contemporaneous cross-correlation, while the overall linkage between cyclical movements is measured by the maximum coefficient, which emerges from cross-correlation at different lags and leads. This allows for a fairly comprehensive analysis. Developments in synchronisation over time are examined on the basis of the contemporaneous cross-correlation coefficients for rolling 10-year periods. While evidence of increasing or decreasing synchronisation may emerge, there is uncertainty as to whether this is due to generally higher or lower linkages in cyclical developments or simply to a phase shift of the cycles, effectively reducing the number of lag and lead periods during which the maximum correlation occurs. Evidence of increased synchronisation may thus be considered most convincing if the contemporaneous correlation is increasing over time and tends to be equal to the maximum correlation at a zero lag or lead.

In order to conduct the analysis over a longer time period it was necessary to select series for individual countries which covered the whole period or to join several series together. Thus, the degree of harmonisation of the data is lower than for those data which cover only the more recent periods. For example, the HICP is only available for the 1990s, and therefore the national CPI has been used. In addition, account has been taken of German unification by joining the growth rates of pan-German data to the earlier western German data series. In some cases the frequency of data was converted or data from different sources were used. Finally, GDP and employment data compiled in accordance with the new statistical framework (ESA 95) have recently become available for a number of countries. The new data may have some impact on the precise results, particularly for recent trends and cyclical patterns. However, both the availability of these data for only a relatively short period and their limited compatibility with former data restrict the possibility of conducting this analysis on the basis of the new ESA 95 data. Moreover, the overall results in terms of cyclical correlations are unlikely to change fundamentally.

2 Some empirical evidence on divergences and similarities in economic developments

Key economic indicators are reviewed

In this article key economic indicators are reviewed in terms of their longer-term developments and cyclical movements across countries, and both activity and price developments are covered. The four indicators considered are real GDP, total employment, industrial production and consumer prices. These play an important role in an assessment of the economic situation. (The broad range of indicators in the ECB's assessment of the outlook for price stability was discussed in an article in the April issue of the ECB Monthly Bulletin, entitled "The role of short-term economic indicators in the analysis of price developments in the euro area".) For all four indicators the trend components and cyclical components are derived from the respective changes on a year earlier. For the three activity indicators – real GDP, total employment and industrial production – developments tend to be closely related. Hence, for each individual country, trends in employment growth and production growth are likely to develop in line with the trend in real GDP growth. The same applies to the cyclical components of growth. Finding closely aligned trends and synchronisation in cycles for one variable across countries would hence suggest a similar finding for the other variables. Inflation patterns, as discussed below, may follow a more distinct course of development.

Real GDP and industrial production are both important measures of economic activity, with industrial production referring to output in the more cyclically sensitive sector of the overall economy. Industrial production accounts for around one-third of overall output in the euro area as a whole (and also in most individual Member States). Both for the euro area as a whole and for individual countries, this suggests that cyclical movements in industrial production and real GDP are fairly closely synchronised. However, the share of industrial output in overall activity has generally been declining over recent decades. At the same time, the services sectors, which produce largely non-tradable output, have expanded relative to industry. Hence the extent to which the longer-term trends in GDP and industrial production are similar depends on the scope and speed of structural change in the economy, which, in turn, both depend on factors such as the stage of economic development, technological progress and changes in international competitiveness. On average, the process of countries catching up with one another in respect of per capita income has been particularly pronounced in terms of narrowing productivity differentials in the industrial sectors producing tradable goods.

Similarly, employment developments are connected to developments in short-term output. Whether there is also a strong relationship between the longer-term developments in employment and output depends on the characteristics of the labour and goods markets and, in particular, on the relative degrees of flexibility within those markets. More specifically, wage flexibility and the incentives and disincentives both to look for work and to create jobs determine the extent to which and the speed with which output growth feeds through to employment growth. The more rigidities exist, the more likely it is that a pick-up in output growth will only give rise to additional employment with long lags. Hence, even if countries experience the same shocks to output, effectively leading to more synchronisation in the corresponding cyclical developments, their structural features will determine the degree to which this also gives rise to synchronised developments in employment.

Real GDP growth

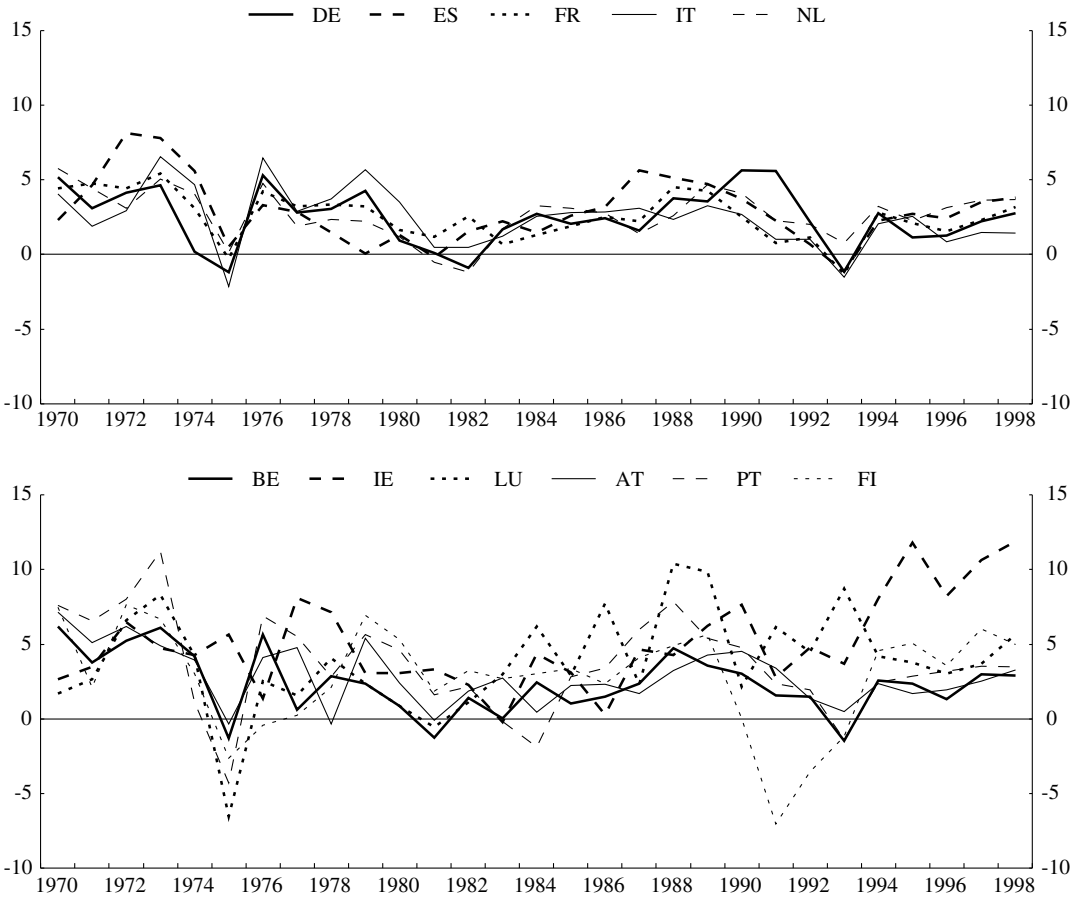
Over the period since the early 1970s real GDP growth in most euro area countries has been subject to three main economic cycles. The troughs of these cycles were in the mid-1970s, at the start of the 1980s and in the early 1990s, with the precise timing differing somewhat across countries (see Chart 1). The recession in the mid-1970s appeared to be most closely aligned across countries, whereas patterns of growth were more diverse for some countries thereafter. In particular, the period of economic recovery following the recession in the early 1980s varied across countries. While in several cases (notably in the case of Ireland) annual growth rates remained clearly positive, even during the period of weakness in the early 1990s, Finland experienced a very deep and protracted recession. In general, in a number of countries there appear to have been economic developments in the course of the 1990s which were quite different from developments in the euro area as a whole.

In terms of trend growth rates there was substantial convergence prior to the first oil price shock. In the first half of the 1970s trend growth rates were mostly in a range of between 3% and 4% (see Table 1). Growth rates generally declined thereafter and in the 1980s trend growth rates were around 2% to 2.5% in most of the euro area countries. In the 1990s, however, growth rates have become somewhat more divergent. While large common productivity shocks – such as the oil price shocks – tend to enforce a higher

Chart 1

Real GDP growth in euro area countries

(annual percentage changes; annual data)



Source: ECB calculations.

degree of similarity in trend growth rates, in the absence of such shocks other factors determining growth may come more to the fore. Differences may then reflect more clearly the different degree to which the "poorer" countries are still in the process of catching up with the "richer" ones, or the degree to which the individual countries have recovered from their most recent recessions. In some countries slower trend growth has made apparent the need for structural reforms to foster growth in the longer term. There is some evidence that those countries which embarked earlier and more decisively on such a path of reform have witnessed a comparatively strong rebound in measured trend growth rates. This accounts for some of the divergence. The countries which have been growing faster in recent years, notably Ireland, Luxembourg, Finland and the Netherlands, account for most of the recent differences in trend growth rates. In the case of Ireland, this is partly explained by a continued process of catching up with other countries. By contrast, in Italy measured trend growth in the 1990s has declined. This appears to be a continuation of a development which can be observed from the 1970s onwards. In Germany, taking account of the effect of unification, which temporarily boosted the growth rate at the beginning of the 1990s, trend growth appears to have remained broadly unchanged compared with the 1980s. Turning to other countries, in Spain, France, Austria and Portugal recent output trends appear to be more in line with those witnessed around the end of the 1980s, suggesting no significant change in the trend over the past decade. In Belgium trend growth has recovered from the relatively low levels of the 1980s.

With regard to the synchronisation of shorter-term cyclical developments in GDP growth, there appears to have been a greater degree of similarity than for trend growth rates. This may be concluded from the analysis of the correlation of cyclical components of GDP growth in individual countries with those for the euro area as a whole. For the larger countries, on average, this correlation exceeded 0.5 and moved fairly narrowly around levels of 0.7 and 0.8 during most of the period under review (see the upper half of Chart 2). This holds true, in particular, for Germany and France. A lower correlation was visible during the first half of the 1970s for Italy and the Netherlands, but the correlation increased steadily in the second half of the 1970s to match broadly the results for Germany and France. For Spain, the correlation coefficient declined in the course of the 1980s from levels of around 0.6 to close to zero. The end of the 1980s

Table 1

Trend growth rates in euro area countries

(average annual percentage changes)

	1971 to 1975	1976 to 1980	1981 to 1985	1986 to 1990	1991 to 1995	1994 to 1998
Euro area	3.7	2.7	2.3	2.5	2.4	2.3
Belgium	3.7	2.3	1.6	1.8	2.0	2.2
Germany	3.1	2.3	2.1	2.5	2.4	2.2
Spain	4.3	2.6	2.2	2.6	2.6	2.7
France	3.8	2.8	2.2	2.1	1.9	2.0
Ireland	4.6	3.9	3.3	4.2	6.9	9.2
Italy	3.9	3.1	2.5	2.1	1.5	1.3
Luxembourg	3.0	2.5	3.6	5.1	5.3	5.0
Netherlands	3.8	2.4	1.9	2.3	2.8	3.1
Austria	4.1	2.9	2.3	2.4	2.4	2.4
Portugal	5.2	3.7	3.0	3.1	2.9	2.9
Finland	3.7	3.0	2.6	2.0	2.1	3.2

Source: ECB calculations.

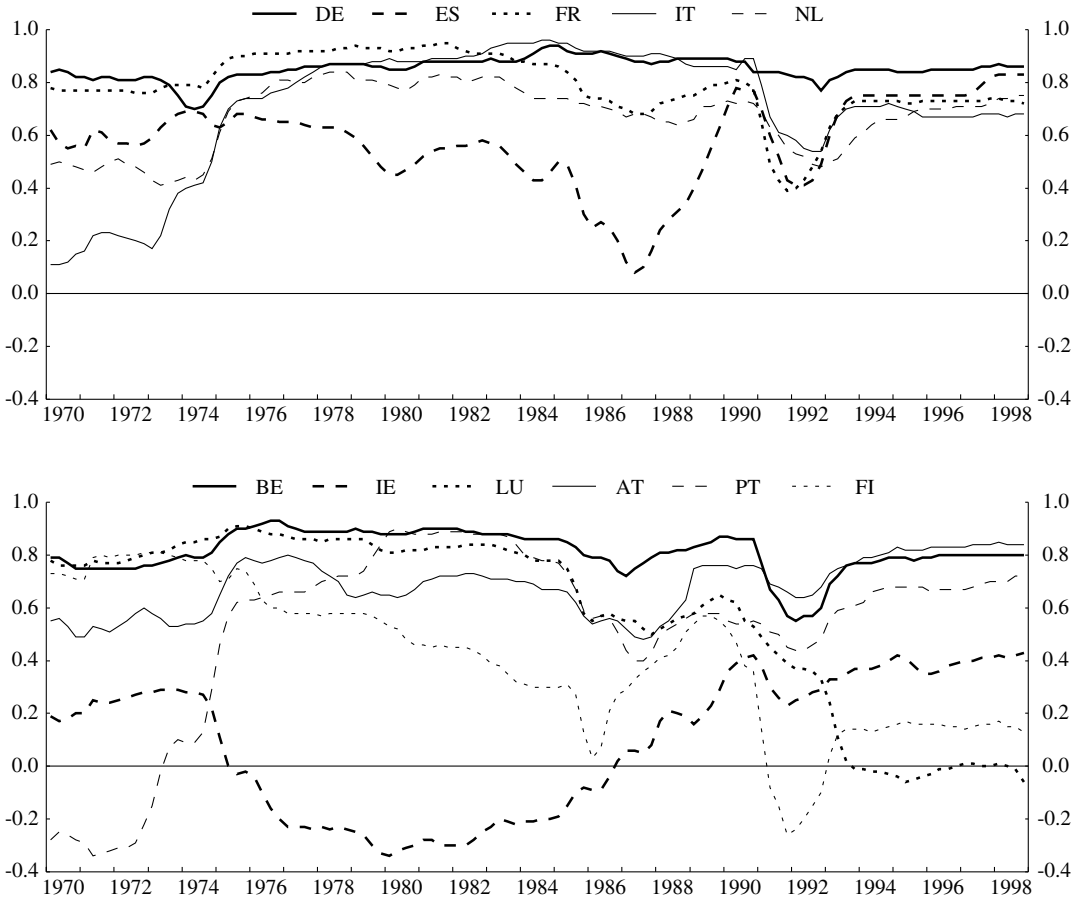
was characterised by a general increase in synchronisation of the individual countries with the euro area as a whole, which was reflected in correlation coefficients rising to above 0.8 on average. This increase was followed by a decline at the beginning of the 1990s. The fact that the correlation coefficient declined least for Germany, but fell to a similar degree for the other larger countries, suggests that it was Germany which moved out of line with the other countries but which, on account of its weight, remains more highly synchronised with the euro area as a whole. During the mid-1990s there was a general rebound in the correlation coefficients to a level of around 0.7, with a higher level being reached in the case of Germany. This is supported by results for bilateral correlation between individual countries, but is not reported here. While, on average, the correlation coefficients did not fully return to the peaks seen at the beginning and end of the 1980s, the range of correlation coefficients decreased compared with these earlier periods. In particular, the synchronisation of cyclical GDP developments between Spain and the euro area as a whole has been a more recent phenomenon. On the other hand, Italy has seen the smallest rebound in synchronisation in terms of correlation coefficients and has ranked at the lower end of the range of larger countries in recent years.

Evidence of a high degree of synchronisation with euro area GDP developments is more mixed among the smaller countries (see the lower part of Chart 2). On account of their

Chart 2

Correlation of cyclical developments in real GDP growth with the euro area

(rolling 10-year correlations; quarterly data)



Source: ECB calculations.

lower weight relative to the total, developments in these countries have only a limited impact at the area-wide level. Belgium and Austria have largely followed the patterns described for the larger countries. In particular, Belgium has shown a continuously high degree of synchronisation with euro area developments. The correlation coefficient has mostly been above 0.8, and dropped at the beginning of the 1990s less significantly than in most of the larger countries. Overall, the level and pattern of correlation for Belgium are similar to those for Germany, suggesting that cyclical GDP developments are well synchronised between the two countries. A similar conclusion may be drawn for Austria, for which there is a high correlation of above 0.8 with euro area developments in the 1990s, with a comparatively small decline at the beginning of the decade. However, in earlier periods the degree of synchronisation was somewhat lower for Austria than for Belgium and most of the larger countries. There has been an overall increase in the synchronisation of cyclical GDP developments in Portugal with those in the euro area as a whole. The correlation coefficient rose steadily from negative values in the early 1970s to above 0.8 in the early 1980s. It subsequently fell and remained around a level of 0.5 in the second half of the 1980s, before increasing again to 0.7 in the mid-1990s. Compared with the aforementioned countries, the three smallest Member States, namely Ireland, Luxembourg and Finland, have all witnessed a noticeably lower degree of synchronisation in the 1990s. Their respective correlation coefficients are generally lower than 0.5. While this points to an increase compared with earlier periods in the case of Ireland, the cyclical component of GDP growth in Luxembourg and Finland has become less synchronised with that of the euro area as a whole when compared with the 1970s and early 1980s.

Overall, for a substantial group of countries the correlation of their cyclical GDP movements with the euro area as a whole appears to be relatively high, particularly for more recent periods. Ireland, Luxembourg and Finland seem to be exceptions. An important factor in explaining the extent of synchronisation is the large oil price shocks, which affected all the countries in a relatively similar way and hence imposed a more or less common cyclical development at the time. This is supported by the fact that cyclical developments across euro area countries saw their highest correlation at different leads and lags in the period up to the early 1970s, while the contemporaneous correlation tended to be highest after the shocks. The slightly lower degree of overall synchronisation in the 1990s mainly reflects the somewhat reduced synchronisation between the three largest countries, i.e. Germany, France and Italy. German unification is one important factor explaining this development, implying that this result may be a temporary phenomenon and may not properly reflect underlying developments in synchronisation. Indeed, looking at the period since 1994, it appears that the German cycle has again become more synchronised with that of other countries and that overall synchronisation is returning to the levels recorded in the second half of the 1970s, i.e. in the period between the oil price shocks. Given that the latter were common shocks, while the impact of German unification was asymmetric in nature, the recent degree of synchronisation might indicate the return of more standard relationships. Italy, however, seems to have become somewhat less synchronised with the euro area as a whole. This is due in part to the real depreciation of the Italian lira after the currency turbulence around the turn of the year 1992-93 and to the measures which subsequently became necessary to keep domestic inflationary pressures subdued and budget deficits low.

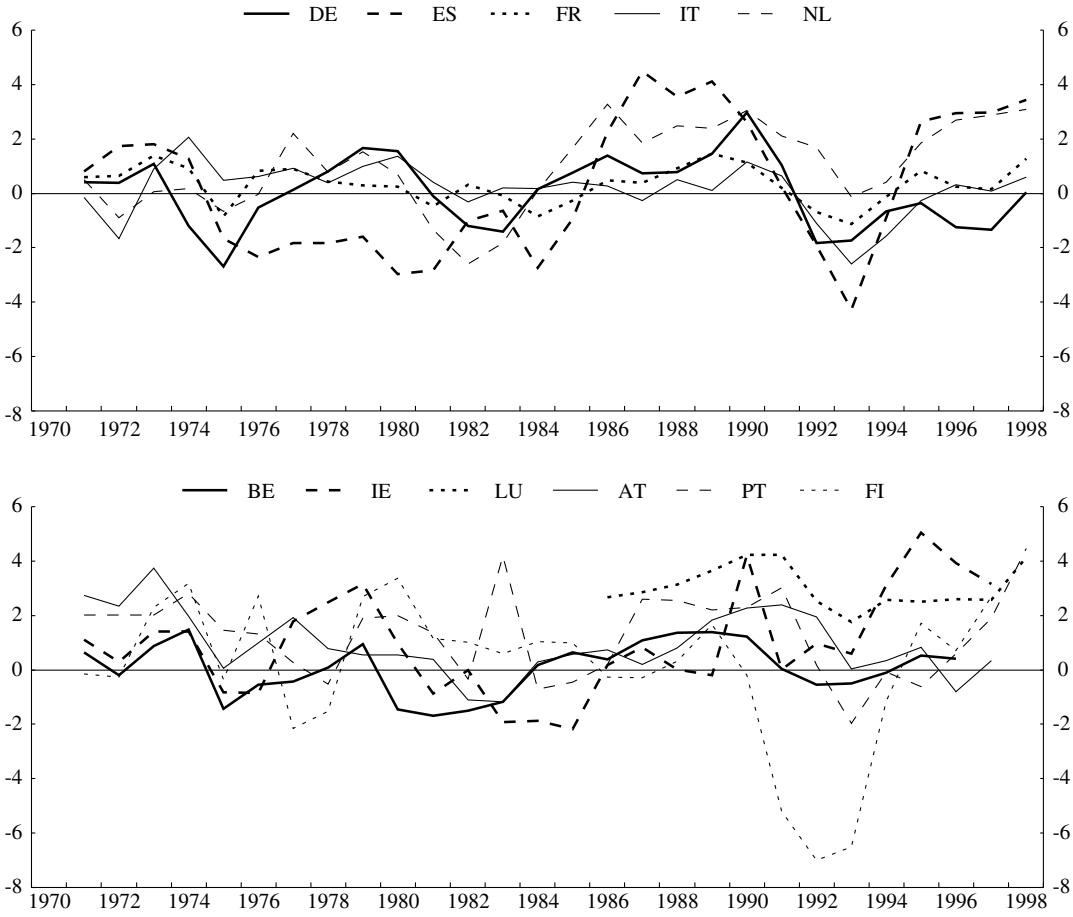
Total employment growth

As in the case of GDP, there have also been somewhat more divergent growth rates in the recent past for total employment growth. However, rather than primarily being accounted for by small countries, this divergence also derives from differences in the employment performance of the larger countries (see Chart 3).

Chart 3

Employment growth in euro area countries

(annual percentage changes; annual data)



Source: ECB calculations.

As regards trend growth, the rates ranged between 0% and 1% in most countries in the 1970s and 1980s, but became more diverse in the 1990s. On average, the trend growth rates in the smaller countries were different from those in the larger countries for most of the period under review. However, in the past decade some divergence of trends has also emerged among the larger countries, possibly reflecting the fact that some countries have successfully started to implement structural reforms, while others still have to launch the reforms necessary to reduce labour market rigidities. This would be broadly in line with the assessments of international organisations regarding the progress in structural reforms in the euro area, namely that in many countries the poor performance of employment and unemployment highlights the need for greater flexibility in the labour market.

Looking at the pattern of synchronisation from the 1970s onwards, a number of euro area countries witnessed cyclical developments that are highly correlated with those of the euro area as a whole. On average, the synchronisation of cyclical employment developments tended to be somewhat higher than that of cyclical GDP developments. More precisely, there was a clear tendency for cross-correlation coefficients between cyclical developments in total employment growth in individual countries and those of the euro area to become more stable and less widely spread

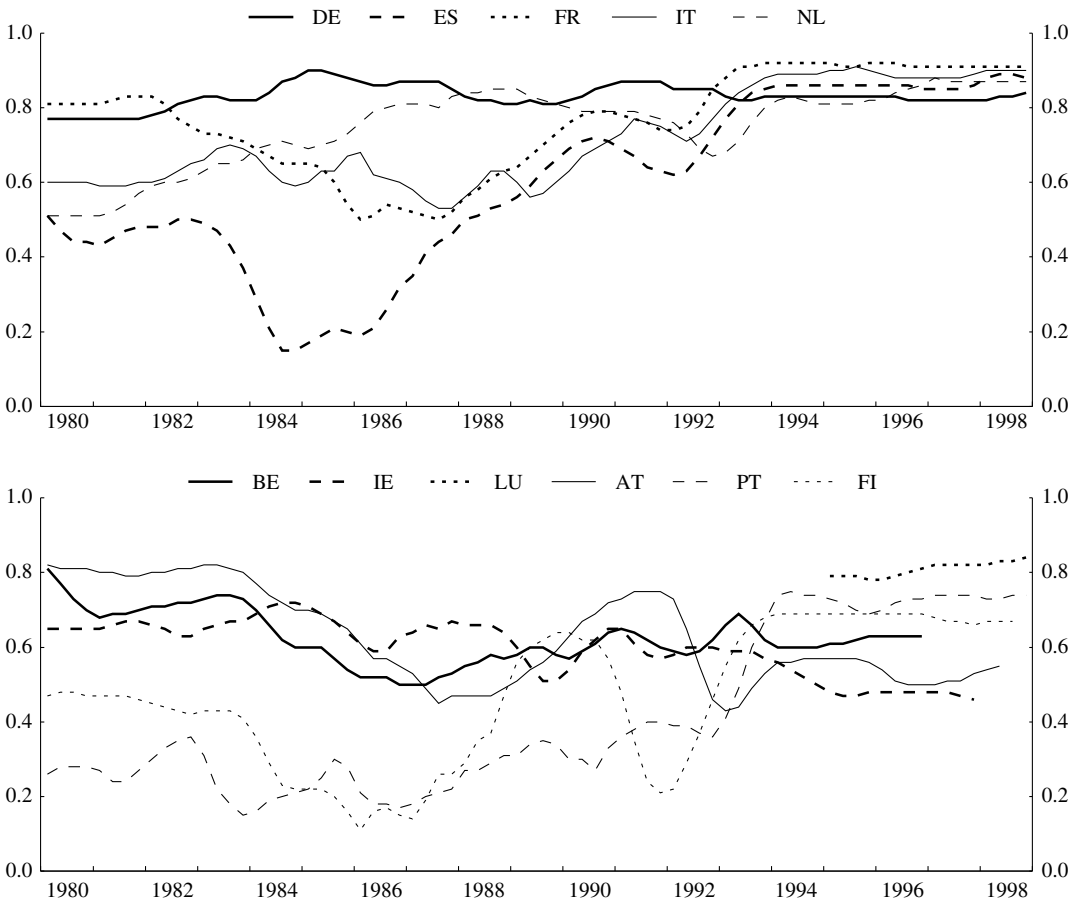
in the 1990s. This tendency is particularly conspicuous for the correlation of cyclical employment in the five largest countries with that of the euro area as a whole (see the upper half of Chart 4). For this group of countries the correlation coefficients have remained in a narrow band between around 0.8 and 0.9 since the mid-1990s, while they moved between 0.5 and 0.8 at the beginning of the sample period, and between 0.2 and 0.9 during the mid-1980s. In Germany cyclical employment growth remained highly correlated with that of the euro area as a whole throughout the period, partly as a result of its high weight in total area-wide employment. However, at the end of the period the correlation coefficients were slightly lower in Germany than in the other four countries shown, in particular France, where the correlation has exceeded 0.9 since around 1993. Within this group of countries, the most significant change in the degree of synchronisation has occurred in Spain, where the cyclical employment developments were hardly correlated at all with those of the euro area as a whole in the mid-1980s, but have reflected steadily increasing synchronisation since then. By the mid-1990s the correlation coefficient was well in line with those of the other four larger countries.

The tendency towards more stable patterns of synchronisation with the euro area as a whole and fewer differences between countries is also noticeable, albeit to a lesser extent, for smaller countries (see the lower part of Chart 4). This holds true, in particular, for Portugal and Finland. In these countries

Chart 4

Correlation of cyclical developments in employment growth with the euro area

(rolling 10-year correlations; quarterly data)



Source: ECB calculations.

the change in the degree of synchronisation, as expressed by an increase in the correlation coefficient from below 0.5 on average, was marked at the end of the 1980s. Conversely, correlation coefficients have tended to decline somewhat over the 1990s in Ireland and Austria. In Belgium the correlation of the cyclical components of employment growth with those of the euro area as a whole remained broadly stable at around 0.6, after having decreased from 0.8 during the first half of the 1980s.

Industrial production growth

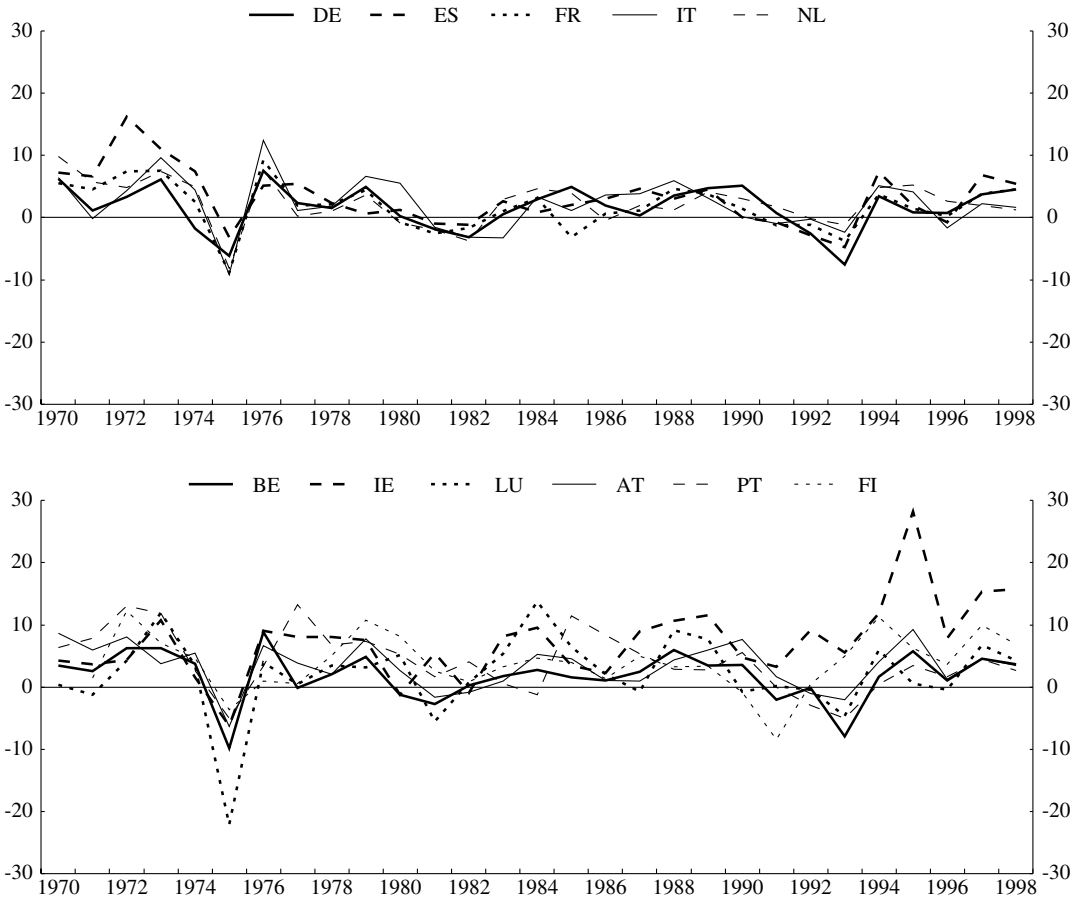
While some of the trend and cyclical patterns observed in respect of overall GDP growth may be identified for industrial production, there are also certain differences. These are likely to be accounted for by sectoral change and greater international exposure, both of which are typical of the industrial sector in developed economies.

Since the 1970s the trend rate of growth of industrial production has, on average, slowed down in all countries and tends to be somewhat lower than the trend rate of growth of GDP. This reflects the secular process of structural change towards more services-oriented economies. As in the case of real GDP, growth rates have also become somewhat more divergent in the 1990s, after broadly converging during the 1980s (see Chart 5). In particular, the four largest countries, i.e. Germany, France, Italy and Spain, experienced convergence to broadly

Chart 5

Industrial production growth in euro area countries

(annual percentage changes; annual data)



Source: ECB calculations.

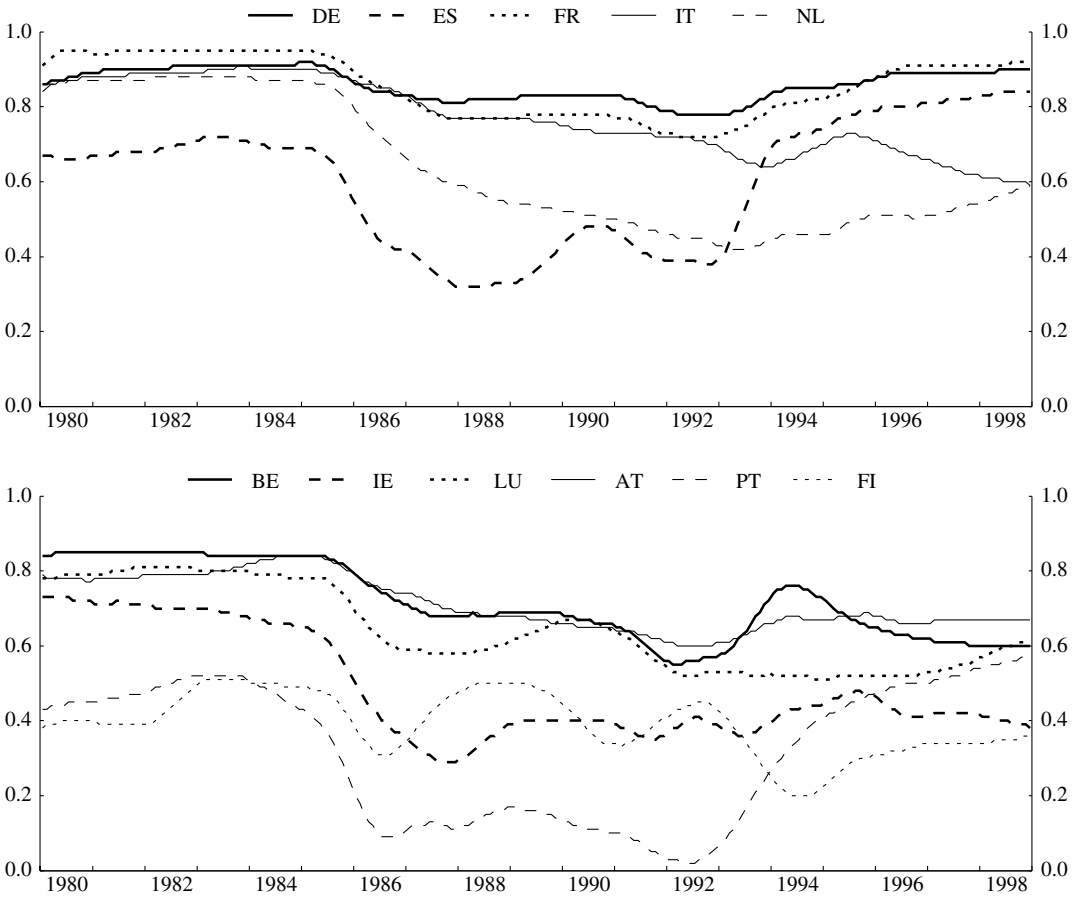
uniform trend growth rates at the beginning of the 1980s in connection with the second oil price shock. While some divergence in trend growth remained in the smaller countries during that period, some convergence in trend growth rates can be observed for these countries at the beginning of the 1990s. More recently, Ireland and Finland have both witnessed considerably higher trend growth rates than the majority of euro area countries. While Italy experienced less of a decline in output growth in connection with the general economic slowdown in the early 1990s, it also appears to have recovered less strongly during the mid-1990s; thus there has been some divergence in terms of lower trend growth than in other countries in recent years.

With regard to the synchronisation of cyclical movements in industrial production growth, the evidence points, as a whole, to decreasing rather than increasing synchronisation of production cycles since the early 1980s. This is a consequence both of less synchronisation during the second half of the decade and of the fact that the earlier degree of synchronisation has not been reached again in the 1990s. Among the larger countries, only in Germany and France has the synchronisation of cyclical components in industrial production growth with those in the euro area as a whole been at both a high and a broadly stable level (see the upper half of Chart 6). The correlation coefficient was between 0.8 and 0.9 on average over the period under review, with a phase of temporarily lower correlation between the

Chart 6

Correlation of cyclical developments in industrial production growth with the euro area

(rolling 10-year correlations; monthly data)



Source: ECB calculations.

mid-1980s and the mid-1990s. Italy showed similar patterns of synchronisation with the euro area as a whole up to the early 1990s, but has since become less synchronised. The correlation coefficient for Italy has been gradually falling in recent years and at the end of the sample period was the lowest among the larger countries. For Spain and, to a lesser extent, for the Netherlands, the correlation of industrial production with that of the euro area as a whole has increased in the course of the 1990s from a relatively low level of around 0.4 at the end of the 1980s. In the case of Spain this reflects a higher degree of synchronisation with France and Germany in the more recent period. For the Netherlands, this nevertheless implies a significantly lower degree of synchronisation with the euro area as a whole compared with the situation in the early 1980s, when the correlation coefficients were comparable with those of the three largest countries, namely Germany, France and Italy.

Synchronisation patterns for the smaller countries partly resemble those for the larger countries (see the lower half of Chart 6). In particular, coefficients of correlation with the euro area as a whole for Belgium and Austria were broadly stable over the reference period, falling somewhat from around 0.8 at the beginning of the period to around 0.6 towards the end. The pattern for Luxembourg is similar, but the correlation was lower in the early 1990s and has only recently regained levels comparable with those of Austria and Belgium. Overall, for the countries mentioned, the correlation coefficients remained well above 0.5. This has not, however, been the case for Ireland, Portugal and Finland. In particular, Portugal showed a low degree of synchronisation with the euro area as a whole between the mid-1980s and the early 1990s, but has since seen a steady increase to correlation levels of 0.6. For Finland, synchronisation with the euro area as a whole is characterised by a correlation coefficient that has remained at around 0.4, with no clear tendency to increase or to fall over the sample period. The same holds true for Ireland, even though the changes in the correlation coefficient are less pronounced and synchronisation was noticeably higher in the first half of the 1980s. Except for Finland and Ireland, production developments in the smaller countries seem to be fairly well synchronised with individual large neighbouring countries, but not necessarily with other Member States. This may partly be explained by specific supply patterns between intermediate goods industries in one country and final goods industries in other countries. For instance, judging from the bilateral correlation coefficients, not reported here, Luxembourg appears to have witnessed developments fairly well synchronised with France, but not with Germany, while Austria and also Portugal have witnessed developments quite well synchronised with Germany, but not with France.

Overall, for most countries during most of the period under review, the degree of synchronisation with the euro area as a whole remained relatively high in terms of correlation coefficients, broadly matching those for the respective GDP developments in magnitude. The extensive negative effects on output of the increase in oil prices are likely to have brought about much more uniformity in cyclical developments in industry than in services and thus in overall GDP. This implies a "spurious" synchronisation in cyclical production developments in the 1970s and early 1980s, which would not be expected in the absence of such shocks. This may explain why there has been less of a rebound in the degree of synchronisation of production developments in the 1990s than in that of GDP developments. However, the level of cyclical synchronisation has risen again in the 1990s as a result of the broadly similar timing of the recessions early in the decade.

Consumer price increases

Reflecting the convergence criteria laid down in the Treaty establishing the European Community and the conduct of consistent monetary policies prior to the start of

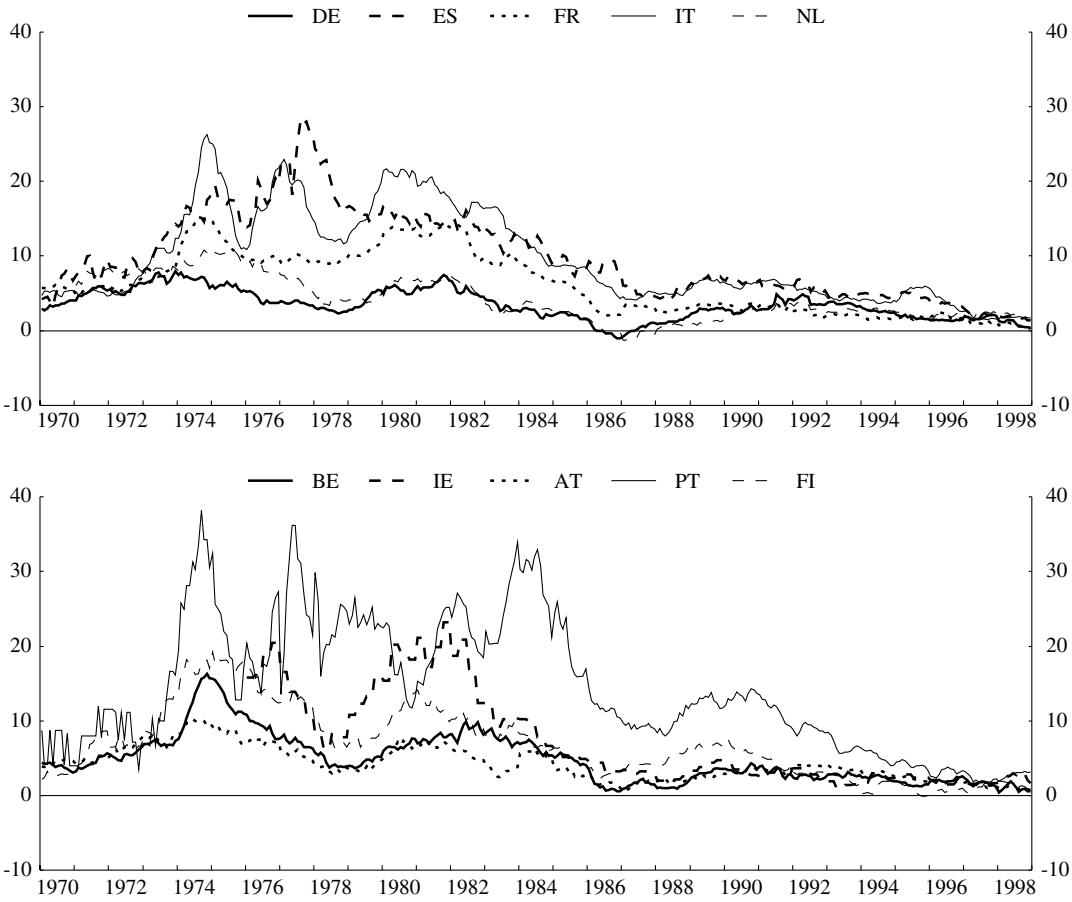
Monetary Union, consumer price increases in euro area countries have broadly converged at a low level consistent with price stability (as defined by the Eurosystem). At the end of 1998 inflation in all Member States stood close to or below 2%. Looking back over the preceding decades, the state of convergence at the end of the 1990s indicates the successful completion of a longer-term process aimed at achieving price stability in many euro area countries (see Chart 7). Remaining differences may partly be linked to differences in longer-term productivity developments and may thus also reflect the catching-up process.

Given that there has not been a stable relationship between activity developments and inflation over the past few decades, consumer price developments tend to exhibit a more independent pattern. With regard to the longer-term development of consumer price increases, some differences across countries may be expected as a consequence of the catching-up process mentioned above. While countries expanding from lower levels of productivity tend to have lower overall price levels, the different speeds of productivity growth experienced while countries are in the course of catching up with one another may give rise to higher overall price increases in the faster growing countries than in others. Given that prices for tradable (industrial) goods are largely determined in international markets, this naturally hinges on the extent to which prices for non-tradable goods and services increase more rapidly in the course of the catching-up

Chart 7

Consumer price increases in euro area countries

(annual percentage changes; monthly data)



Source: ECB calculations.

process. In this respect, the narrowing of productivity differentials is most noticeable in the industrial sectors, but the concomitant higher wage increases in those sectors may feed through to the more sheltered services sectors. Differences in the longer-term developments in consumer prices also depend on the particular monetary policy and exchange rate regime operating at the time, with different inflation trends depending on the orientation of national monetary policy in the long term. For a number of countries, the de facto ties of their exchange rates to the Deutsche Mark have provided a common anchor for price developments over the past decade (or, in some cases, even longer).

The trend rate of increase in consumer prices was lower at the beginning of the 1970s and in the 1990s than in the intervening period. Throughout the period trend inflation was lowest in Germany, Austria and the Netherlands. In these countries, in particular, the increase in the trend rate of inflation in the 1970s and 1980s was more limited than in other countries. Indeed, in the course of the 1970s trend inflation rates appeared to diverge significantly, largely in response to the oil price shocks of 1973 and 1979. As a result, at the end of the 1970s trend inflation rates varied from below 5% to well above 20%. From the 1980s onwards there was a general trend towards lower inflation, which was particularly evident in those countries where inflation had been highest, although the process of disinflation occurred at different speeds. In the course of the 1980s trend inflation converged to below 5% in a number of countries, including Germany and France. In the 1990s the expansionary effects of fiscal policies and the excessive wage increases in connection with German unification led to a temporary increase in trend inflation, but at levels which remained below those seen in previous decades. This temporary increase spilled over into several smaller neighbouring countries, but did not affect trend inflation rates in others.

As with the longer-term developments, cyclical components of consumer price developments may be affected by the orientation of monetary policy and changes therein, and could thereby exhibit more common patterns. However, given that fluctuations and variations in inflation tend to increase with the level of inflation, the latter may be seen as an important factor in determining the extent to which a common cyclical pattern in price movements becomes visible across countries. While the cyclical component of consumer price inflation is expected to be much more clearly discernible in periods of relatively high inflation rates, it may become very small when the rates of increase in consumer prices are low enough to be regarded as consistent with price stability. This is currently the case in the euro area. Typically, more temporary country-specific factors may then dominate developments and it becomes increasingly difficult to disentangle cyclical movements from pure "noise" caused by all kinds of relatively small shocks to the price level (e.g. indirect tax changes, differing seasonal patterns, liberalisation measures, administrative price changes, and asymmetric effects caused by differences in the composition of the basket of consumer goods and services).

For the larger euro area countries, synchronisation of the cyclical element of price increases with that of the euro area as a whole was characterised by relatively high correlation coefficients ranging from 0.8 to 0.9 during the first half of the 1980s (see the upper part of Chart 8). While the correlation of the cyclical element of price developments remained relatively stable at this level in France, Italy and the Netherlands, it rose to this level over the same period from 0.7 and from just below 0.4 in Germany and in Spain respectively. During the second half of the 1980s the correlation with the euro area as a whole rose further to just below 1.0 in Germany, while it fell back to below 0.5 in Spain. During the first half of the 1990s the correlation coefficients remained high, at around 0.9, in Germany, France, Italy and the Netherlands, while they gradually increased again in Spain. Whereas in Spain this increase

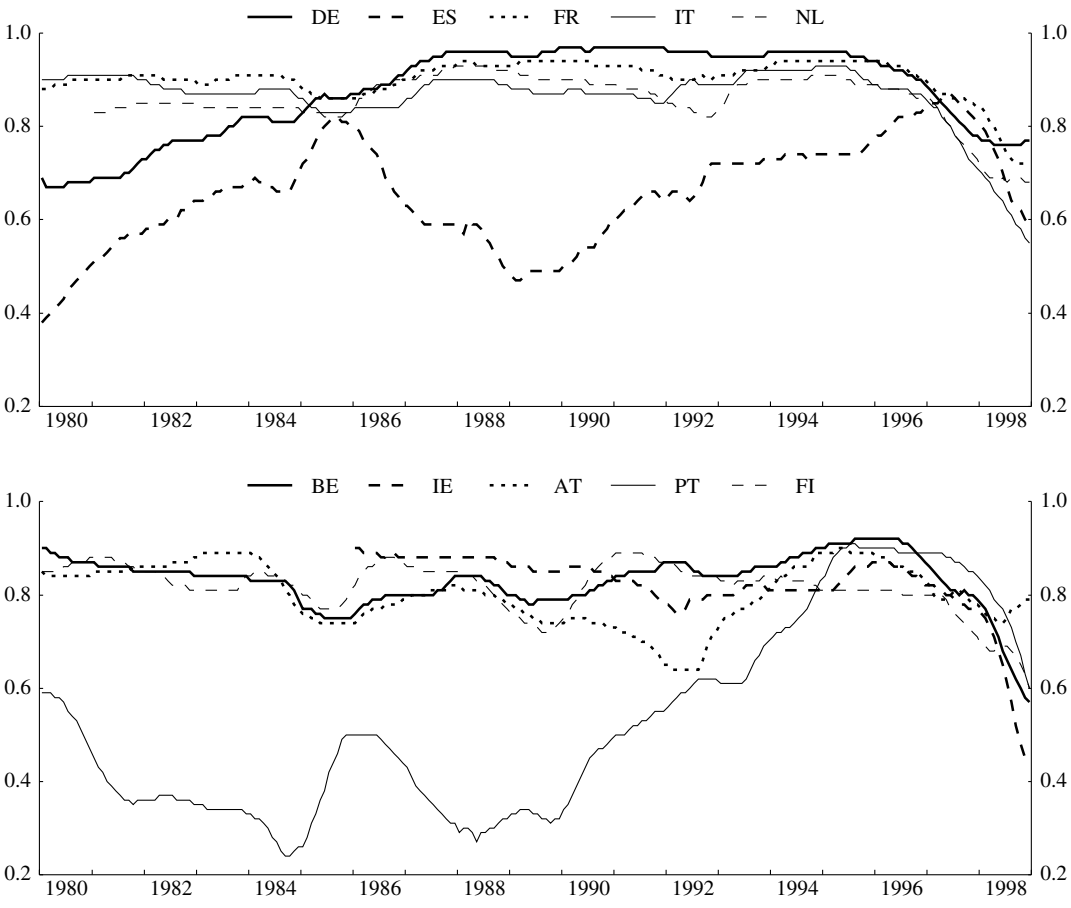
in synchronisation continued until early 1997, in the other larger countries it fell from mid-1995 onwards, so that in early 1997 the correlation coefficients stood at around 0.8 for all of the larger countries. In the past two years the overall degree of synchronisation has decreased, with correlation coefficients falling in all of these countries. In Germany, the Netherlands and France there appears to have been some stabilisation in the correlation with the euro area as a whole, which stood at between 0.7 and 0.8 at the end of 1998.

While Spain showed a noticeably lower degree of synchronisation compared with the other larger countries, with regard to the smaller countries this was essentially the case for Portugal. Up to the early 1990s the coefficient of correlation with the cyclical inflation developments of the euro area as a whole fluctuated at around 0.4 in Portugal, compared with around 0.8 for the other smaller countries (see the lower part of Chart 8). Since 1990, however, the correlation coefficient for Portugal has increased towards the level of the other smaller countries. On average, the smaller countries recorded only marginally lower degrees of synchronisation with the euro area than the larger countries. The process of increasing overall synchronisation of the smaller countries with the euro area as a whole was accomplished in the mid-1990s. However, as with the larger countries, the correlation of the smaller countries with the euro area as a whole declined from that point onwards. In Austria the tendency towards a lower level

Chart 8

Correlation of cyclical developments in consumer price increases with the euro area

(rolling 10-year correlations; monthly data)



Source: ECB calculations.

of synchronisation came to a halt in early 1998, following similar tendencies in France, Germany and the Netherlands. As mentioned earlier, statistical noise may play a larger role at low levels of inflation, making it more difficult to disentangle cycle from noise. All other things being equal, this leads to lower levels of correlation.

Overall, a pronounced reduction in the degree of synchronisation is seen when focusing on the 1990s, as compared with the 1970s and 1980s. This is due to the asymmetric effects of the German unification shock and, given that levels of inflation in the early 1990s were still relatively disparate, to the different policy responses needed to achieve convergence in inflation rates necessary prior to the establishment of Monetary Union. In the past few years synchronisation appears to have stabilised or increased again somewhat between a number of countries and the euro area as a whole. However, with prices increasing at rates consistent with price stability, and given the associated difficulties in identifying a clear cyclical pattern, it is unlikely that earlier levels of cyclical synchronisation will be repeated. Instead, it is probable that differences in inflation rates will reflect a number of country-specific patterns, as indicated above.

3 Interpreting the results of the analysis

Key economic indicators were analysed in terms of the degrees to which their longer-term developments are similar and their cyclical movements are synchronised across euro area countries. When interpreting the results of this analysis, a distinction should be made between the evolution and the level of these degrees. Overall, while the degree of synchronisation may vary over the period under review, it may be seen as being high in absolute terms, taking into account that there had been all kinds of economic shocks and – at times – pronounced differences in policy regimes across countries.

Looking to the past, there have always been differences in the longer-term developments in real GDP growth across euro area countries. While the trend growth rates have in most cases declined over time, for some countries they tend to be higher in more recent periods relative to the early part of the period covered. The different trends also extend to the patterns for longer-term growth in employment and industrial production. For industrial production the tendency of declining trend growth was more pronounced across countries than for GDP, owing to the fact that services sectors have generally expanded more rapidly. While inflation trends in the early part of the sample period were very different across countries, there has been a process of convergence in recent years, so that all countries now have rates of consumer price increases at relatively similar low levels. This reflects a shift towards a common orientation of monetary policy in terms of price stability. The degree of synchronisation in cyclical movements across countries in the indicators considered, after adjustment has been made for the differences in trends, shows some variation over the period under review. In particular, the degree of synchronisation can be attributed in part to the types of shocks that occurred and the economic policies pursued. Overall, there appears to have been a fair degree of synchronisation in activity variables, while, as price developments have converged towards price stability, the cyclical fluctuations in the inflation series have become, as might have been expected, more idiosyncratic and related to country-specific factors. The evidence shown does not suggest that there have been significant and protracted divergences over time or that recent divergences are in any sense abnormal.

In general, there may be a variety of reasons for differences in economic developments across countries. Differences in longer-term developments may arise for two reasons: first,

countries may be at different stages of economic development – such that differences in developments may reflect a process of countries catching up with one another – and, second, there may be differences in demographic features. In addition, longer-term developments have to be seen against the background of country-specific institutional structures and can therefore reflect both differences in these structures and changes to them. Turning to differences in cyclical developments, these may relate to different mixtures of shocks, the economic mechanisms that propagate these shocks and the economic policies pursued in response. In the case of similar propagation mechanisms and a neutral stance of economic policies, there may be differences when shocks are mainly country-specific in nature. Differences may also arise if, in the face of similar propagation mechanisms, economic policies react differently to common shocks. Finally, even if countries were exposed to similar shocks and economic policies were to react in the same way across countries, differences in cyclical patterns (as well as in longer-term developments) could emerge because country-specific structures give rise to different propagation mechanisms. In this respect, changes in the institutional structure may also have a temporary impact on cyclical patterns.

Looking forward, the analysis of longer-term developments and cyclical movements in the previous section is based on historical data and can therefore provide only limited guidance as to future patterns. Significant in this context are the introduction of the single monetary policy and the implementation of the Stability and Growth Pact, which requires national fiscal policies to operate within well-defined boundaries. Monetary and exchange rate policy is no longer conducted at the individual country level but has been replaced by the single monetary policy for the euro area as a whole. From this perspective, cyclical variations should, in principle, become less volatile and less divergent insofar as, in the past, these were accounted for by differences in monetary and exchange rate policies across euro area countries. Moreover, the process of monetary and economic integration may lead to (and may require) more flexibility in institutional and behavioural structures and may thus contribute to the easier absorption of shocks in individual countries. Again, this would give rise to a higher degree of similarity in economic developments. In terms of prices, the introduction of the single currency may add to difficulties in identifying purely cyclical movements in consumer price increases. As comparability and transparency increase with regard to the prices being charged for similar goods and services in the individual Member States, an increase in competition may lead to one-off declines in price levels, and may thereby temporarily blur the cyclical pattern of price increases.

Nonetheless, some important causes of differences in economic developments across euro area countries may remain. These are differences in various structural features of the individual economies, which may give rise to differences in their longer-term growth potential. In addition, as countries which are in the process of catching up with one another may witness different rates of productivity growth, this may be reflected in sustained differences in inflation rates across countries. Another cause of differences may derive from country or region-specific institutional properties, which may (at least temporarily) lead to different economic reactions to the same shock. Moreover, in the face of increased openness and trade integration, it has been suggested that a tendency towards country-specific specialisation might emerge, which could lead to some divergence between countries as asymmetric shocks occur. However, to the extent that the linkage between industries increases across national boundaries as part of the process of growing integration in the European Union and the euro area, the degree of synchronisation between national developments may well see some increase. With euro area countries continuing to be influenced by different factors, it is important to ensure the necessary capability of

individual economies to absorb and respond to shocks. Particular importance is therefore attached to the implementation of reforms in the goods and labour markets, which are aimed at increasing overall economic flexibility and which would increase the degree of flexibility of national economic policies to react to country-specific events.

Given the complexity of the issue, the analysis presented in this article is primarily intended to be illustrative, but the caveats should nevertheless be clearly recognised. First, the exercise is backward-looking and can thus provide only limited guidance as to likely outcomes in the future. Second, the structures of the economies considered changed significantly in the period under review. These changes include major adjustments to economic policy frameworks. For example, the integration of economies has increased over time in the course of the completion of the Single Market, and there has been a tendency towards greater independence of monetary policy from government intervention as well as an increasing focus on price stability as the primary objective of monetary policy. Moreover, the overall degree of exchange rate stability increased prior to the start of Monetary Union, in terms of both actual stability in exchange rates and the close alignment of exchange rate developments in a growing number of countries. Third, to some extent the choice of the variables to be considered determines the results. For instance, an analysis of output developments could be conducted at a more detailed level, either considering the patterns of regional integration or examining the evidence at a more disaggregated sectoral level. Thus, the results here may be understood to be illustrative of some of the factors at work at a more macroeconomic level, rather than as an attempt to draw conclusions about the process of integration in a far wider sense.

Overall, there are no grounds to expect differences in economic developments across euro area countries to disappear entirely as a result of the introduction of the single currency. However, it is too early to assess whether this could pose a challenge to the successful conduct of monetary policy. The divergences observed recently do not appear to be unusual. Moreover, perfectly synchronous developments across euro area Member States may even be seen as a potential problem, if synchronicity increases the amplitude of the cyclical movements of the euro area as a whole, while some cyclical divergence would average out and thus lead to smoother developments at the area-wide level.

4 Concluding remarks

Against the background of recent discussion concerning divergent trends and cyclical movements in key economic indicators, this article has addressed the divergences and similarities in economic developments across euro area countries from the early 1970s up to 1998. This period was characterised by a variety of shocks, common and asymmetric, as well as differences and changes in national policy regimes. Taking this into account, overall, the euro area countries did indeed experience a considerable degree of synchronisation in their cyclical movements and fairly similar patterns in longer-term developments. With the introduction of the single monetary policy for the euro area as a whole and the disciplining effects of the Stability and Growth Pact on fiscal policy, as well as the co-ordination of national policies at various levels, the overall policy environment has changed profoundly. At this stage, the precise consequences of this change for future patterns of synchronisation in cyclical movements and the degree to which longer-term developments are similar across countries cannot yet be assessed. As it is only a few months since the introduction of the single currency, sufficient time has yet to elapse in order to evaluate its impact. In this context, this article has reviewed past

patterns and may be considered to provide a background to this topic. In the meantime, divergences in economic developments across Member States will have to be monitored closely.