Box 4

DETERMINANTS OF INFLATION DIFFERENTIALS IN THE EURO AREA

Following the sharp and rapid narrowing of inflation differentials in the run-up to the start of Stage Three of EMU in 1999, inflation differentials across the euro area countries have been relatively large in the last decade, but not significantly larger than those seen in other monetary unions. When conducting monetary policy, it is important for the ECB to take into account regional and sectoral information on the source and nature of economic shocks, as well as to monitor and understand the underlying reasons for inflation differentials, even though it formulates its policy with a view to maintaining price stability for the euro area as a whole. This box discusses the main determinants of inflation differentials in the euro area since the introduction of the euro and the related challenges that need to be addressed in the future.

The table shows the annual inflation rates for the euro area countries since 1999. Three main observations can be made. First, at 1.97% on average over the period, the euro area inflation rate has been very close to the ECB's objective of keeping inflation rates below, but close to, 2% over the medium term. Second, in some countries, inflation rates have almost continuously exceeded

Inflation rates in the euro area

(annual percentage changes; 1999-2010)

	Euro area	BE	DE	IE	GR	ES	FR	IT	CY
1999	1.1	1.1	0.6	2.5	*2.1*	2.2	0.6	1.7	*1.1*
2000	2.1	2.7	1.4	5.3	*2.9*	3.5	1.8	2.6	*4.9*
2001	2.3	2.4	1.9	4.0	3.7	2.8	1.8	2.3	*2.0*
2002	2.2	1.6	1.4	4.7	3.9	3.6	1.9	2.6	*2.8*
2003	2.1	1.5	1.0	4.0	3.4	3.1	2.2	2.8	*4.0*
2004	2.1	1.9	1.8	2.3	3.0	3.1	2.3	2.3	*1.9*
2005	2.2	2.5	1.9	2.2	3.5	3.4	1.9	2.2	*2.0*
2006	2.2	2.3	1.8	2.7	3.3	3.6	1.9	2.2	*2.2*
2007	2.1	1.8	2.3	2.9	3.0	2.8	1.6	2.0	*2.2*
2008	3.3	4.5	2.8	3.1	4.2	4.1	3.2	3.5	4.4
2009	0.3	0.0	0.2	-1.7	1.3	-0.2	0.1	0.8	0.2
2010	1.5	2.2	1.1	-1.7	4.7	1.7	1.7	1.6	2.6
Average	**2.0**	**2.0**	**1.5**	**2.5**	**3.4**	**2.8**	**1.7**	**2.2**	**2.4**

	LU	MT	NL	AT	PT	SI	SK	FI	Standard deviation
1999	1.0	*2.3*	2.0	0.5	2.2	*6.1*	*10.4*	1.3	0.7
2000	3.8	*3.0*	2.3	2.0	2.8	*8.9*	*12.2*	2.9	1.1
2001	2.4	*2.5*	5.1	2.3	4.4	*8.6*	*7.2*	2.7	1.1
2002	2.1	*2.6*	3.9	1.7	3.7	*7.5*	*3.5*	2.0	1.1
2003	2.5	*1.9*	2.2	1.3	3.3	*5.7*	*8.4*	1.3	1.0
2004	3.2	*2.7*	1.4	2.0	2.5	*3.7*	*7.5*	0.1	0.8
2005	3.8	*2.5*	1.5	2.1	2.1	*2.5*	*2.8*	0.8	0.9
2006	3.0	*2.6*	1.7	1.7	3.0	*2.5*	*4.3*	1.3	0.7
2007	2.7	*0.7*	1.6	2.2	2.4	3.8	*1.9*	1.6	0.7
2008	4.1	4.7	2.2	3.2	2.7	5.5	*3.9*	3.9	0.9
2009	0.0	1.8	1.0	0.4	-0.9	0.9	0.9	1.6	0.9
2010	2.8	1.9	0.8	1.6	1.3	2.1	0.6	1.6	1.3
Average	**2.6**	**2.8**	**2.1**	**1.7**	**2.5**	**3.1**	**0.8**	**1.8**	

Notes: Standard deviation is calculated as the unweighted standard deviation of euro area countries' annual inflation rates. For 2010, the calculations are based on data available to November. The numbers in italics indicate the data for years before the country joined the euro area. The averages are calculated for the period since the country joined the euro area.

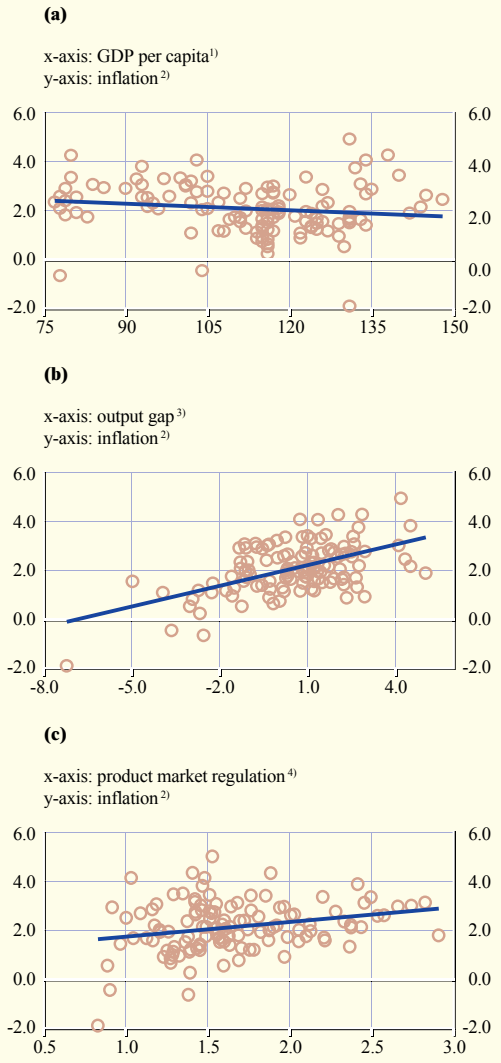
the euro area average and other countries have experienced prolonged periods of below average inflation. Third, inflation differentials have increased markedly since 2010, mainly as a result of measures undertaken by some countries to help restore their competitiveness and to consolidate their public finances. For instance, wage cuts and indirect tax increases in some euro area countries have caused their inflation rates to deviate significantly from the euro area average.[1]

The inflation dispersion over the past decade can in theory be attributed to various factors, including price convergence as a result of the economic catching-up process in some countries and cross-country differences in business cycles. The relationship between these factors and the annual inflation rates across euro area countries between 1999 and 2009 is shown in panels (a) and (b) of the chart.

Regarding price convergence as a result of the economic catching-up process, economic theory suggests that a country's average price level tends to be correlated with its level of economic development: the prices of both tradable and non-tradable goods and services tend to be lower in countries with lower per capita GDP, and vice versa. As income in the relatively less prosperous countries converges towards that of the relatively more prosperous ones, higher price rises in the catching-up countries are to be expected. Panel (a) of the chart points to a negative link between the euro area countries' inflation rates and their income level per capita. However, this link appears to be rather weak, indicating that catching-up phenomena have only played a minor role in explaining the inflation differentials in the euro area.

With regard to the differences in cyclical positions across countries, fluctuations in

Determinants of euro area inflation between 1999 and 2009



Sources: AMECO database; Eurostat; OECD; World Bank's World Development Indicators; Conway, P., Janod, V. and Nicoletti, G. (2005); and ECB calculations.
1) GDP per capita in purchasing power standards, relative to the EU27 average.
2) Euro area countries' annual HICP inflation net of contributions from indirect taxes and administered prices, expressed as annual percentages.
3) The output gap is defined as actual GDP divided by potential GDP. Potential GDP is calculated from a Cobb-Douglas production function that includes labour, capital and trend total factor productivity.
4) Summary indicator on a scale from 0 (least restricted) to 6 (most restricted).

1 In this context it is notable that there is a high correlation between movements in the HICP and developments in unit labour costs across countries.

aggregate demand are known to explain a substantial part of inflation developments and inflation differentials in the euro area.[2] Inflationary pressures stemming from fluctuations in demand are usually linked to the output gap, which is defined as the deviation of actual output from its equilibrium level. The link between output gap and inflation developments is known as the Phillips curve. In panel (b) of the chart, the output gap is measured as a percentage of potential GDP at market prices, estimated by the European Commission using a Cobb-Douglas production function that includes trend total factor productivity. The chart shows that low inflation rates tend to be associated with negative output gaps, as actual output is below its potential, with the economy moving along a short-run Phillips curve.[3] In this context, it is important to note that the cyclical differences in inflation observed over the past decade stemmed partly from the fact that fiscal, macro-prudential and structural policies did not live up to the requirements of a monetary union in all countries. In some countries, the conduct of fiscal policy was quite often too loose and not in line with the Stability and Growth Pact. Furthermore, inflationary pressures were stoked by rigidities in labour and product markets. Moreover, unsustainable and over-optimistic expectations regarding growth prospects in certain countries spurred a boom in asset and real estate prices. Thus, as a result of excessive growth in domestic demand, national prices and costs increased more than the euro area average in these countries, which resulted in losses in competitiveness.

In addition to the above-mentioned factors, labour and product market rigidities may contribute to inflation differentials. In fact, there are substantial differences among euro area countries in terms of the degree of flexibility in their labour and product markets, and these differences can affect both the generation of cost pressures and their transmission to consumer prices. There are various ways to measure the degree of regulation across countries. This box uses an index of product market regulation compiled by the OECD.[4] Panel (c) of the chart shows that during the period under review countries with more protected product markets (a relatively high number on the horizontal axis) had, on average, higher inflation rates than those with less protected markets (a similar relationship is also found for various indices of labour market regulation).

Quantifying the relative impact of each of these factors is challenging and requires a formal econometric framework. Nevertheless, at first glance, cyclical differences and differences in product market regulation appear to have played an important role in explaining inflation differentials in the euro area.

The experience of the past ten years can provide lessons for the future. Several countries have suffered significant losses in competitiveness in recent years owing to unsound fiscal, macroeconomic and structural policies. These problems were visible well before the financial crisis, but the crisis has dramatically exposed the consequences of countries not fully meeting their responsibilities as members of EMU. The policies that spurred over-optimistic expectations should not be repeated and it is essential that countries regain and maintain strong fiscal positions. Moreover, as discussed in this box, structural reforms could go a long way towards narrowing inflation differentials in the euro area, which in turn would enable a smoother functioning of monetary policy for the euro area as a whole. Of particular importance in this respect are the elimination of wage indexation schemes, the creation of sufficiently flexible wage-setting

2 See "Inflation differentials in the euro area: potential causes and policy implications", ECB, September 2003.
3 See the box entitled "The links between economic activity and inflation in the euro area" in the September 2009 issue of the Monthly Bulletin.
4 See Conway, P., Janod, V. and Nicoletti, G., "Product market regulation in OECD countries: 1998 to 2003", *OECD Economics Department Working Papers*, No 419, 2005, OECD.

mechanisms which allow for sector and region-specific wage differentiation and the strengthening of product market competition, especially in the more sheltered non-tradable sector. Introducing such reforms would have the additional benefit of narrowing the competitiveness gaps that have been exposed by the financial crisis and promoting closer economic convergence in the euro area.