Focus

II. Inflation developments in the euro area

Inflation in the euro area has picked up in recent months, with the headline rate reaching its highest level since October 2008 at an estimated 2.6% in March 2011. This is largely the result of higher commodity prices, driven by a combination of cyclical, structural and geopolitical factors. As the acceleration of inflation mainly concerns non-core items, underlying price pressures currently remain subdued. Nevertheless, the fall of core inflation during the crisis and in its aftermath seems small given the large and only gradually closing negative output gap. Analysis within a Phillips curve framework confirms that the output gap is a significant driver of core inflation in the euro area, even if its impact is not very large. Core inflation is furthermore found to be persistent and driven by expectations and lagged oil prices. Euro-area inflation dispersion has widened with the outbreak of the economic and financial crisis and the large commodity price swings that accompanied it. This section shows that the strength of the transmission from commodity prices to inflation depends on a number of factors, which vary across Member States. Price and inflation differences represent a natural feature in a monetary union only to the extent that they foster convergence or underpin the adjustment to idiosyncratic shocks. However, often in the past, persistent differences have reflected divergent competitiveness developments resulting in harmful imbalances. At the current juncture, there are some indications that national inflation patterns in the euro area have started to contribute to the adjustment to macroeconomic imbalances, but this process is only beginning. Finally, the section discusses the outlook for inflation based on the recent Commission interim forecast.

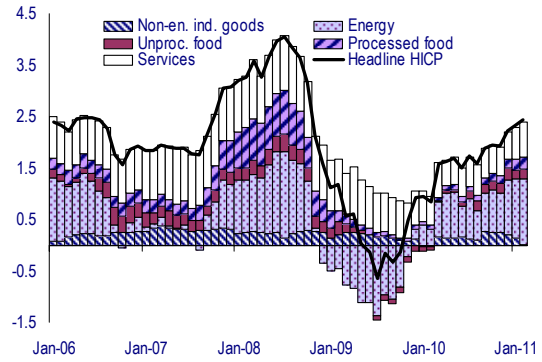
II.1. Recent price developments in the euro area

Inflationary pressures in the euro area have been building up in recent months, with the headline rate reaching an estimated 2.6% in March, the highest level since October 2008 and about twice as high as a year ago. The breakdown for February shows that the increase is largely the result of higher energy inflation, lifted by rising oil prices (Graph II.1). In recent months, the structural increase in oil prices witnessed over the past two years has been further exacerbated by unrest in the Middle East and in North African countries. At the same time, prices of other commodities — from agricultural raw materials to metals — have also been subject to significant upward pressures recently.

Looking closer at the energy component of the HICP, euro-area energy inflation increased to 17.1% in July 2008, the peak of the previous oil shock, after which it fell steadily to -14.4% twelve months later. It returned to positive territory in December 2009 and stood at 4.0% in January 2010. In February 2011, annual energy inflation was at 13.1%, up from 12.0% in January.

Developments in energy inflation largely mirror fluctuations in oil prices (Graph II.2). In the year to February 2011 the price of a barrel of Brent went up by almost 40% in both dollar and euro terms, progressing almost uninterruptedly throughout the year to reach a monthly average of USD 103.7 (EUR 76.0), about two and a half times the December 2008 level. The strongest monthly increase occurred from November to December 2010, when oil prices increased by 8% in dollar and 11% in euro terms respectively. In the first half of March, the oil price further climbed by 11% from its February level to an average of USD 114.9 (EUR 82.7).

Graph II.1: **Composition of euro-area HICP inflation (contributions to y-o-y changes — Jan 2006 to Feb 2011)**

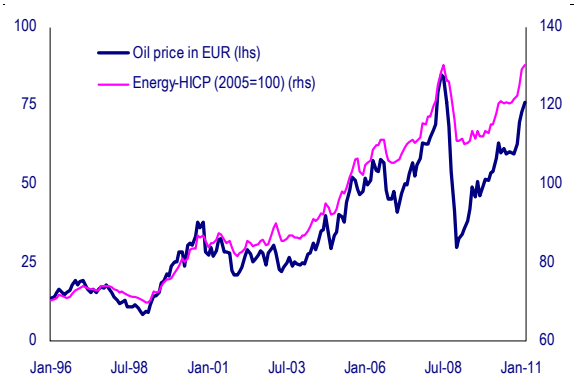


Source: Eurostat.

The oil price rebound that started at the end of 2008 reflects, to a large extent, market fundamentals and larger oil demand coming in particular from emerging market economies. Since the start of 2011, the political turmoil in the

Middle East and North Africa and concerns about supply disruptions have put further upward pressure on oil prices. The barrel of Brent passed the USD 100 mark on 1 February — for the first time since the end of September 2008 — coinciding with rising political tensions in Egypt. Prices further picked up when unrest escalated three weeks later in Libya. Political uncertainty, surrounding both the transition to a stable political situation and the possibility that the uprising may further spread across the region, is likely to maintain upward pressures on oil prices in the period ahead. The effects of the dramatic events currently unfolding in Japan are difficult to assess at this juncture.

Graph II.2: **Oil price and euro-area energy price index (Jan 1996 to Feb 2011)**



Source: Eurostat, Ecowin

While the present increase in oil prices certainly stands out, other commodities have also been affected by upward price pressures. A combination of weather-related declines in agricultural production in different parts of the world and demand pressures has driven up food commodity prices in recent months. In early March 2011, wheat prices (on the Chicago Board of Trade) were about 50% higher than twelve months earlier. Corn prices more than doubled over the same period. The outlook for the world cereals markets in 2010/2011 suggests that prices will stay high with world cereal stocks remaining much lower than at the end of last year.

For industrial metals, price increases over the last 12 months range from +15% for zinc to over 40% for copper and nickel. China remains a dominant factor behind this surge. Aluminium, copper, nickel, steel and iron ore prices were all driven up by either Chinese demand or production cutbacks (in the case of aluminium). Steel prices also soared following devastating floods in Australia, which hit supply.

At the same time precious metals have also reached or come close to new peak price levels, in many cases driven by safe haven purchases against the background of a still fragile economic recovery marked by high uncertainty. Over the past year gold and silver prices climbed by 25% and 95% respectively and these metals are currently trading at all-time highs.

While upstream price pressures have intensified, core inflation, which excludes the most volatile price components (i.e. energy and unprocessed food) and provides an approximate measure of underlying price dynamics, has so far remained subdued and below historical averages. Headline HICP excluding energy and unprocessed food stood at 1.1% in February. Core inflation is at the current juncture subject to diverging forces. On the one hand, the indirect impact of recent energy price increases, already visible in producer prices, can be expected to gradually feed through. Upward pressures could be exacerbated if second-round effects were to materialise. On the other hand, the large negative output gap should weigh on prices and wages. However, the early bottoming-out of core inflation in 2010 despite a still large and only slowly closing negative output gap is a puzzle. This particular aspect is examined in more depth in the next sub-section.

II.2. Stabilisation of core inflation despite a still large estimated output gap

The economic and financial crisis of 2007-2009 has resulted in a large output gap that is only gradually closing. According to the Commission's autumn 2010 forecasts, the output gap of the euro area reached a trough of -3.8% in 2009 and is projected to remain sizeably negative for some time, reaching -1.6% in 2012. For comparison, the OECD Economic Outlook of November 2010 sees the euro-area output gap at -4.9% in 2009 and -2.7% in 2012. ([13]) Yet, euro-area core inflation area has been remarkably stable. From a peak at 2.7% in March 2008 it has fallen to a trough of 0.8% in April 2010 and since then gradually climbed back to 1.1% in February 2011.

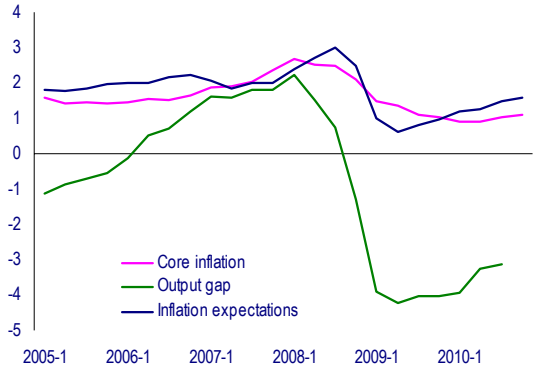
The relative stability of core inflation in the face of a large negative output gap may hold interesting lessons about inflation dynamics in the euro area. Recent studies ([14]) examining why core

([13]) It should be stressed, however, that contemporaneous estimates of the output gap are notoriously fraught with uncertainty and subject to often substantial revisions.

([14]) e.g. Meier, A. (2010), 'Still minding the gap — Inflation dynamics during episodes of persistent large output gaps',

inflation has not fallen further during the crisis or in its aftermath point to downward nominal wage and price rigidities in addition to well-anchored inflation expectations as possible factors that prevent core inflation from falling below a low positive value.

Graph II.3: **Core inflation, expectations and the output gap (in %) (1)**

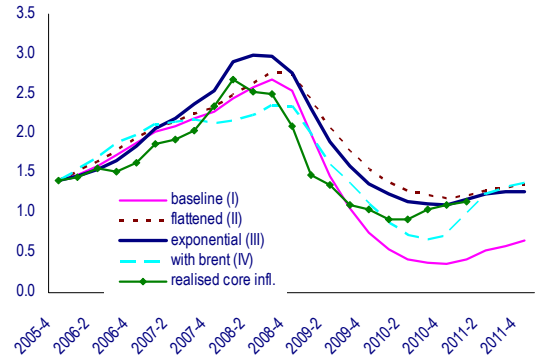


(1) Inflation and expectations: percentage annual change; output gap: percent of GDP.
Source: Eurostat, DG ECFIN, Consensus forecast.

As the above-mentioned studies lack either a euro-area focus or a rigorous econometric analysis, this section opts for an estimated Phillips curve framework to further examine the relationship between euro-area core inflation and the output gap and inflation expectations (see Box II.1 for a more technical discussion). The chosen framework allows to answer two specific questions. First, can observed inflation expectations help better understand inflation dynamics? Second, can a simple linear Phillips curve account for euro-area inflation dynamics, in particular in the light of the large negative output gap observed at present? If prices rise more strongly in reaction to a boom (positive output gap) than they fall in reaction to a bust (negative output gap), this should be reflected in a Phillips curve that is asymmetric with respect to the output gap. ([15])

The econometric analysis of the euro-area Philips curve confirms that the output gap is a relevant driver of inflation in the euro area. Its impact is, however, not very large, and there is some evidence that it has decreased over time: the euro-area Phillips curve has flattened. ([16]) As far as inflation persistence and the role of expectations are concerned, the analysis concludes in favour of a so-called hybrid Phillips curve, which includes both past inflation and inflation expectations. The estimation results do not make it possible to conclude firmly in favour of either linearity or non-linearity of the Phillips curve. Both a linear specification and one where inflation depends on an exponential function of the output gap seem to describe the behaviour of euro-area core inflation over the past two decades reasonably well. Finally, there is some evidence that crude oil prices impact core inflation with a lag of four quarters. ([17])

Graph II.4: **Simulation of core inflation with different model specifications**



Source: Eurostat, own calculations

To illustrate these points, four specifications of the estimated euro-area Phillips curve retained from the quantitative analysis are subjected to a simulation exercise (Graph I.4). ([18]) This makes it possible to examine how different specifications can explain the behaviour of core inflation during the period of accelerating price dynamics in 2006-2008Q1 and the subsequent crisis, in particular the bottoming-out of core inflation in 2010. These

International Monetary Fund Working Paper, No 10/189; Schumacher, D. and N. Kojucharov (2010), 'The puzzling behaviour of core inflation', *Goldman Sachs European Weekly Analyst*, No 10/32.

([15]) An important strand of the literature examines the issue of asymmetry. See e.g. Laxton, R, D. Rose and R. Tetlow (1993), 'Monetary policy, uncertainty and the presumption of linearity', *Bank of Canada Technical Report*, No 63; Buchmann, M. (2009), 'Nonparametric hybrid Phillips curves based on subjective expectations: Estimates for the euro area', *European Central Bank Working Paper*, No 1119.

([16]) This is a widespread empirical observation also outside the euro area.

([17]) While the pass-through of oil prices to headline inflation is quite fast (see Box I.3), energy price variations are by definition excluded from core inflation. Oil prices can nonetheless impact core inflation indirectly, via their impact on intermediate costs and through second-round wage effects.

([18]) In contrast to an examination of model fit (where the differences across the model specifications are minor), the simulation uses for the lagged core inflation term the simulated value for the previous quarter, while actual values (forecast values after 2010Q4) are used for the other elements (i.e. for inflation expectations, the output gap and oil prices). In this way, simulated core inflation is not systematically 'pulled back' to the actual value through its autoregressive term, which allows the inflation dynamics implicit in each of the specifications to be judged better.

Box II.1: **Estimation of a euro-area Phillips curve**

This box presents estimations of the Philips curve for the euro area. Two aspects are of particular interest for the empirical analysis of the euro-area Phillips curve against the backdrop of recent extreme realisations of the output gap and the relative stability of core inflation. First, is the Phillips curve linear or convex? Second, what role do inflation expectations play for euro-area inflation dynamics?

Phillips curves - Estimation output (endogenous variable: core inflation)

	I Baseline	II Flattened	III Exponential	IV With oil price
Sample period	*1991q1 - 2010q4*	*2000q1 - 2010q4*	*1991q1 - 2010q4*	*1991q1 - 2010q4*
Core inflation lagged one quarter	0.830***	0.881***	0.799***	0.776***
Inflation expectations	0.164*	0.143**	0.179***	0.199***
Output gap	0.071***	0.038***		0.033*
EXP (output gap)			0.057***	
Constant			-0.072	
Oil price change lagged four quarters				0.002***
R^2	0.97	0.88	0.97	0.95
J statistic	0.046	0.09	0.049	0.030

Estimation by GMM. Dependent variable: core inflation. Instruments: First lag of output gap; first and second lags of inflation expectations; short-term interest rates and their first lag; change in the rate of capacity utilisation; oil price change; fifth lag of oil price change (the latter two for panel IV only).

*, **, *** denote significance at 5, 2 and 1% confidence level

Source: Commission services

The first aspect is addressed by estimating different functional forms of the Phillips curve explicitly. This is more restrictive than estimating Phillips curves non-parametrically, which is the subject of a recent strand of the literature. However, the latter approach would overly complicate the analysis of the other issues of interest here.

To analyse the role of inflation expectations, observed expectations from Consensus forecasts are used, thus avoiding any assumptions about the way expectations are formed. This approach has been followed only in a small minority of analyses of the Phillips curve so far.[1] Most empirical studies of the Phillips curve use inflation expectations that are derived from actual realisations of inflation under different assumptions concerning expectation formation.

In the same vein, no assumption is imposed about the role of past realisations of inflation (which could reflect adaptive expectations, indexation or 'sticky information') in the Philips curve.

Finally, in line with the analytical focus of this exercise, the output gap is chosen as the driving variable. In the New-Keynesian Phillips curve, the driving variable is the marginal cost. While the debate on the most appropriate way of modelling (unobservable) marginal cost in empirical analyses is ongoing, the performance of the output gap as a good proxy for the marginal cost in the euro-area Phillips curve is well documented.

Given the aim to better understand its dynamics, core inflation is used as a dependent variable in this analysis. In the empirical literature, different concepts of inflation ranging from the GDP deflator and headline consumer price inflation to various measures of core inflation have been used.

In the light of the above considerations, the baseline specification of the euro-area Phillips curve is as follows:

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f \overline{F}_t \pi_{t+1} + \lambda mc_t \qquad (1)$$

This is the hybrid (new-Keynesian) Phillips curve formulated by Galí and Gertler[2] with the important modification that the (rational) expectations operator E(.) is replaced with average observed expectations F(.).[3]

Data are quarterly and cover the period 1990q1 to 2010q4. Core inflation (i.e. HICP excluding energy and unprocessed food) is from Eurostat while inflation expectations are from Consensus Forecasts and the output gap from the Commission.

[1] Paloviita, M. (2008), 'Estimating open economy Phillips curves for the euro area with directly measured expectations', *Bank of Finland Research Discussion Paper*, No 16/2008 and Henzel, S. and T. Wollmershaeuser (2008), 'The new Keynesian Phillips curve and the role of expectations: Evidence from the IFO World Economic Survey', *Economic Modelling*, No 25(5), pp. 811-832 are recent examples.

[2] Galí, J. and M. Gertler (1999), 'Inflation dynamics: A structural econometric analysis', *Journal of Monetary Economics*, No 44(2), pp. 195-222.

[3] See Henzel and Wollmershaeuser (2008), op cit.

(Continued on the next page)

Box (continued)

In addition to specification (1), two extensions are examined.

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f \overline{F}_t(\pi_{t+1}) + \lambda EXP(mc_t) + c \qquad (2)$$

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f \overline{F}_t \pi_{t+1} + \lambda mc_t + \sum_i \beta_i OIL_{t-i} \qquad (3)$$

(2) is a non-linear version of the Phillips curve using the exponential function[1] of the output gap and adding a constant to account for the possible asymmetric effect of the output gap. Specification (3) is the baseline specification extended with lagged crude oil prices. Results are summarised in the table.

[1] This follows the specification suggested in Laxton, R, D. Rose and R. Tetlow (1993), 'Monetary policy, uncertainty and the presumption of linearity', *Bank of Canada Technical Report*, No 63. Quadratic and cubic functional forms were also tested but were not found to be statistically superior and are not reported here.

four specifications are (see also the table displayed in Box II.1): (I) a linear Phillips curve (labelled baseline in Graph II.4), (II) the same linear Phillips curve estimated over a shorter sample to reflect its flattening with respect to the output gap, (III) a non-linear (exponential) Phillips curve and, finally, (IV) an extension of the baseline linear model with lagged crude oil prices.

As shown in Graph II.4, all model variants track the main developments of core inflation since late 2005 reasonably well, though all feature the turning points in 2008 and 2010 with a delay. This notwithstanding, each model does rightly indicate a bottoming-out of core inflation in 2010. The undershooting of the baseline model (I) indicates the relevance of the flattening of the Phillips curve. The non-linear specification overshoots actual core inflation at the peak in early 2008, and it behaves very like the flattened linear model in the downturn. The version augmented with lagged oil prices falls below actual core inflation but displays the strongest upturn.

On balance, the simulation demonstrates that the stabilisation of core inflation in 2010 can be captured reasonably well by a simple Phillips curve relationship, which explicitly takes observed inflation expectations into account. The simulation further suggests that either a flattening of the (linear) Phillips curve or its convexity contributed to the stability of core inflation during the crisis. ([19]) However, as none of the model variants is precise concerning the timing of the trough, additional factors are likely to have been at work. These might include possible underestimations of the output gap (i.e. an output gap that is in reality less negative than currently estimated) after a major crisis which forced structural adjustments leading to e.g. a higher than usual depreciation of the capital stock.

With respect to 2011, all specifications would predict a gradual further normalisation of core inflation. This corroborates the assessment in the Commission's interim forecast of March 2011 that core inflation will continue to increase slowly. The output gap will continue to exert a downward pull on core inflation for some time, while inflation expectations and the indirect effect of oil prices will not only prevent core inflation from falling but on balance push it higher.

([19]) Whether the true model behind euro-area inflation dynamics is linear and 'flattened' or convex cannot be decided on the basis of this simple analysis.

II.3. The contribution of the oil price surge to inflation differentials within the euro area

Member State inflation differentials

Inflation picked up across the whole euro area, albeit to a different extent. Annual inflation rates increased in ten euro-area Member States in February, with fifteen Member States witnessing inflation rates at or above 2%, ten of which with rates higher than 3%. Estonia recorded the highest rate (5.5%), followed by Greece (4.2%) and Luxembourg (3.9%). Belgium, Portugal, Slovakia and Finland all had an inflation rate of 3.5%. Ireland closed the ranking with an annual inflation rate of 0.9%, after having re-entered positive territory in January 2011 for the first time since March 2009, i.e. after 22 months. As discussed further in the remainder of this section, these divergences reflect a range of factors including country differences in terms of growth, tax policy and the impact of higher commodity prices.

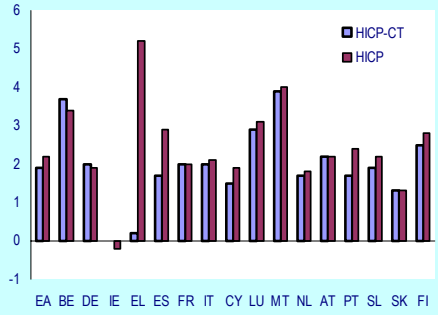
Box II.2: **Developments in the harmonised index of consumer prices at constant tax rates**

Developments in the harmonised index of consumer prices at constant tax rates (HICP-CT) provide a somewhat different picture of inflation patterns in some countries. The HICP-CT, which has been released monthly by Eurostat since August 2009, makes it possible to examine the theoretical impact of changes in indirect taxes (e.g. VAT and excise duties) on overall inflation by measuring the change in prices 'at constant tax rates'. Prices at constant tax rates for each individual month are computed by subtracting the taxes applicable in that month and adding the taxes according to the rates in force in the previous December. In effect, the difference between HICP and HICP-CT growth rates points to the theoretical impact of tax changes on overall HICP inflation, assuming instantaneous pass-through of tax rate changes to the price paid by the consumer. The latter assumption may not hold. The difference between headline and constant-tax HICP measures should therefore be seen as an indication of the upper limit of the impact of changes in tax rates.

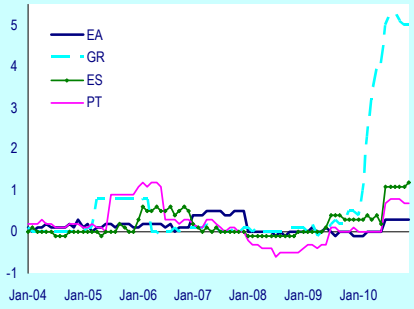
HICP-CT inflation rates for January 2011 (latest available data) indeed reveal noteworthy discrepancies in some peripheral Member States, where the observed headline inflation rates reflect tax measures and thus hide to some extent an ongoing, and necessary, adjustment.

HICP-CT and HICP inflation

Y-o-y changes in January 2011 (in %)



Differences between HICP and HICP-CT inflation, euro area, Greece, Spain, Portugal (in pp, Jan 2004-Jan 2010)



Source: Commission services

For the euro area as a whole, the discrepancy between the two indices has never exceeded 0.5 pp and was 0.4 pp in January 2011, when constant-tax inflation stood at 1.9%, for a headline inflation of 2.3%. In Greece, the gap between the two series has started to widen from February 2010 onwards, reflecting increases in VAT rates and excise duties. In January annual HICP-CT inflation stood at 0.2%, 4.7 pp below the HICP inflation rate of 4.9%, making Greece the euro-area Member State with the smallest price growth.[1] For Spain and Portugal the wedge has become more visible from July 2010 onwards. Since then the Spanish HICP rate has exceeded the constant tax inflation rate by about 1.1 pp. In January, the HICP-CT rate (1.8%) was 1.2 pp below the headline figure (3.0%). Portugal's inflation rate has exceeded the constant tax equivalent by around 0.7 pp since July 2010. The January HICP-CT inflation rate of 2.1% compared to a headline HICP rate of 3.6%. Dispersion measures have generally been lower for HICP-CT inflation than for HICP inflation. This has in particular been the case since 2009, suggesting that some of the recent observed inflation dispersion can be traced back to indirect taxes.

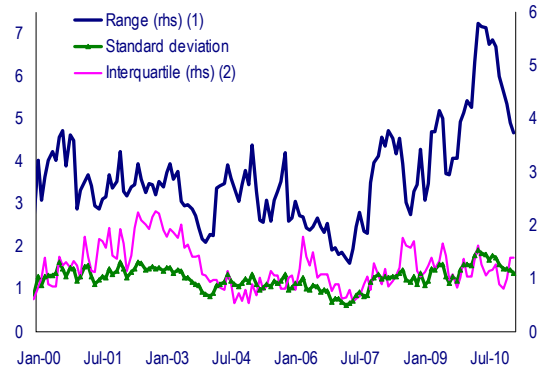
[1] HICP-CT data for Ireland are not available.

Price and inflation differentials are a natural occurrence in a currency union where national monetary and exchange rate policies cannot be employed to adjust to shocks. To the extent that these differentials reflect a country's longer-term convergence towards the rest of the area or medium-term adjustments to idiosyncratic shocks, they can play an important stabilisation role and may help reduce heterogeneities, thus eventually improving the efficiency of area-wide economic policies.

After a phase of substantial convergence in the run-up to the euro's introduction, euro-area inflation differentials have increased again and remained relatively high since the launch of the single currency. Moreover, there is substantial evidence that the inflation differentials observed

over the past decade have not always contributed to economic convergence within EMU, and their persistence and size warrant permanent monitoring. ([20])

Graph II.5: **HICP inflation differentials between euro-area Member States (various measures, Jan 2000 to Feb 2011)**



(1) Difference between the lowest and the highest inflation rate in the euro area.
(2) Difference between the first and the third quartile.
Source: Commission services.

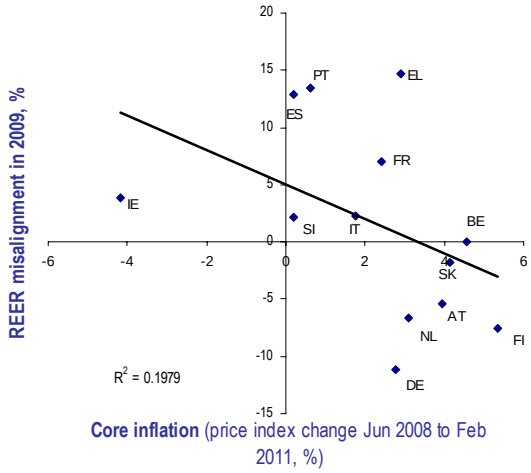
Euro-area inflation dispersion — measured by either the range, the interquartile range or the standard deviation — has increased markedly with the outbreak of the economic financial crisis and the large oil price swings that accompanied it (Graph I.3). In the course of 2010, differentials contracted somewhat, but currently remain above their pre-crisis period or historical averages.

At the current juncture, there are some indications that national inflation patterns, once adjusted for tax changes or the effect of commodity prices, reflect mostly growth differences and therefore have started to contribute to the adjustment to macroeconomic imbalances (see Box II.2 for a discussion of the importance of tax changes), but this process is only beginning. Core inflation at the Member State level since mid-2008 has responded to competitiveness imbalances, as shown in graph II.6. ([21])

The inflation dispersion measures are lower for core inflation than for headline inflation, suggesting that non-core items, and in particular energy, are major drivers of the observed differentials.

([20]) See European Commission, 'EMU@10, Successes and challenges after 10 years of Economic and Monetary Union', European Economy, No 2, 2008.
([21]) Competitiveness imbalances here signify the estimated over- or undervaluation of the real effective exchange rate. See also Quarterly Report on the Euro Area, 2009, Vol. 8, No. 1, p. 40.

Graph II.6: **Core inflation since mid-2008 against the estimated misalignment of the REER in 2009**



Source: Commission services

The impact of oil price developments on Member States' inflation

Energy price developments are a major driver of cross-country inflation differentials. Although the oil price surge is a global event, it has impacted energy and headline inflation at the level of Member States in an asymmetric manner. In February 2011, fourteen Member States experienced energy inflation in the two-digit range. Greece headed the ranking with an annual price increase of 25.9%, followed by Cyprus (19.8%) and Spain (19.0%). Annual energy inflation in Slovakia, which was actually negative until December 2010, rebounded in January and reached 10.3% in February. The lowest energy inflation rates were observed in the Netherlands (7.5%), Estonia (8.6%) and Italy (9.9%).

It is noteworthy that the cross-country dispersion of energy inflation, which is generally considerably higher than for headline inflation, increased substantially with the 2008 oil price rally. Energy is the HICP sub-index which has experienced the fastest average growth of all main euro-area HICP categories since 1999. It is also the most volatile category and has reached the most extreme values, covering a range of over 31 pp from -14.4% (July 2009) to +17.1% (July 2008). This extreme volatility is also visible at Member State level: since the introduction of the euro, annual energy inflation has climbed as high as 37.9% (Greece in May 2010, largely reflecting the increase in excise duties on fuel) and fallen as low as –23.2% (Belgium in July 2009) (see Table I.1). In five euro-area Member States, the difference between the highest and the lowest

annual energy inflation rate has exceeded 50 pp. The volatility of annual energy inflation as measured by the standard deviation (Table II.1) was highest in Slovakia, followed by Greece, Cyprus and Luxembourg.

Table II.1: **Miscellaneous statistics on annual energy inflation (in %, Feb 1996 to Jan 2011)**

	Mean	Median	Maximum	Minimum	Range	Std Dev
EA	*4.0*	*3.3*	*17.1*	*-14.4*	*31.5*	*6.4*
BE	4.4	3.5	31.5	-23.2	54.7	9.9
DE	4.5	4.1	17.8	-11.4	29.2	6.1
EE	8.8	9.4	30.0	-8.0	37.9	8.5
IE	4.9	4.6	20.0	-13.4	33.4	6.8
EL	5.7	2.7	38.0	-19.5	57.5	12.4
ES	4.1	3.5	21.3	-15.8	37.1	7.8
FR	3.2	1.9	18.4	-17.5	35.9	7.3
IT	3.0	2.9	16.6	-14.6	31.1	6.0
CY	7.6	8.0	35.3	-21.5	56.8	11.7
LU	4.7	4.8	26.8	-23.6	50.4	11.1
MT	7.1	6.3	29.2	-12.0	41.2	8.9
NL	5.2	4.8	18.2	-13.3	31.4	5.6
AT	3.4	3.4	20.0	-15.8	35.8	7.2
PT	4.0	3.8	14.7	-12.4	27.1	5.7
SI	7.4	8.4	24.9	-11.9	36.8	7.5
SK	12.3	6.1	72.0	-1.8	73.8	16.6
FI	4.0	3.3	21.4	-14.0	35.4	7.0

Source: Commission services.

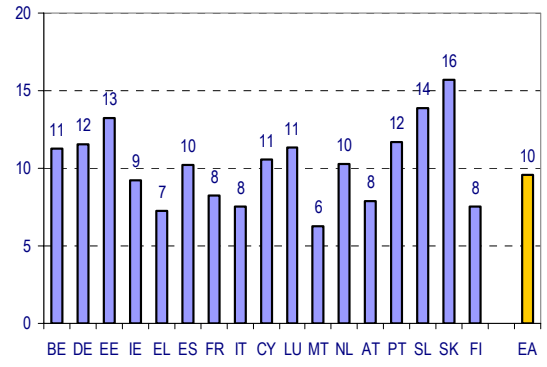
Determinants of energy inflation differentials

The differentiated impact of oil price fluctuations on euro-area Member States' headline inflation reflects, to some extent, different weights of energy products in the respective HICP baskets. As a result, even a symmetric rise in energy inflation affects households across the euro area and Member States' headline inflation in a differentiated manner. On average, euro-area households devote around 9.6% of their outgoings to energy items. The bulk of this is spent on 'fuels for personal transport', followed by 'electricity' and 'gas'. In 2010, households in Malta (6.3%) and Greece (7.2%) spent proportionally the least on energy, while Slovak (15.7%) and Slovenian (13.9%) households spent the most (Graph II.7). The respective consumption baskets also differ in that some sub-items (e.g. 'gas' or 'heat energy') carry zero weight in some countries.

In addition, global energy market developments (in particular crude oil prices) impact on domestic energy inflation in a differentiated manner across countries. Box I.3 presents estimates of the direct effect of changes in oil prices on energy inflation in the euro area as a whole and in individual Member States. The estimations show that the size and length of the pass-through varies across Member States, explaining much of the observed dispersion of energy inflation. For the euro area, the results suggest that an EUR 1 increase in the oil price raises quarterly energy inflation immediately by 0.37 pp. In addition, the oil price increase still impacts energy inflation four quarters later. These long lags are likely to result from indexed prices or contracts, which are common practice for items such as natural gas. They are visible in most Member States. In the case of Greece, Cyprus or Estonia, however, the impact seems to be more short-lived and over after one quarter.

A number of factors can explain the different pass-through at Member State level. First, structural characteristics, such as the energy intensity, play a role. These reflect different production structures as well as differences in energy efficiency and energy dependency (the share of imported energy). Second, energy taxes also affect energy prices and intra-euro area inflation differentials.([22]) Finally, both energy price levels and inflation rates are affected by the functioning of the markets for electricity and gas. Discrepancies may exist as regards the degree of competition on energy markets, the existence of regulated tariffs, the capacities for cross-border trade, and the level and design of support schemes for renewable energy.

Graph II.7: **Weight of energy in the HICP basket, euro-area Member States (in %, 2010)**



Source: Eurostat.

([22]) The level of excise duties on fuels differs across Member States (and fuel categories). Because they are calculated on volumes of energy rather than values, excise duties drive a wedge between the percentage change in the price of the taxed item and the percentage change in its after-tax price. The effect is, however, smaller the higher the initial price.

Box II.3: The effect of changes in oil prices on euro-area energy inflation

This box presents a simple analysis of the pass-through of changes in oil prices to energy inflation in the euro area and individual Member States. Using an auto-regressive distributed lag model,[1] quarterly energy inflation (q-o-q percentage change) is regressed on level changes in euro-denominated Brent oil prices and a number of its lags. The results are reported in the table below.

Oil price pass-through to energy inflation
Estimation results

	EA	BE	DE	EE	IE	EL	ES	FR	IT	CY	LU	MT	NL	AY	PT	SI	FI
Constant	0.44	0.42	0.61	1.78	0.68	0.69	0.60	0.37	0.22	1.15	0.53	1.39	0.83	0.36	0.43	0.90	1.02
	3.03	*1.79*	*2.92*	*4.53*	*2.76*	*1.68*	*2.82*	*2.09*	*1.96*	*2.88*	*1.56*	*3.22*	*2.72*	*1.96*	*1.77*	*3.36*	*3.74*
Δ_Oil price	0.37	0.47	0.35	0.17	0.32	0.63	0.48	0.37	0.27	0.42	0.58		0.26	0.39	0.30	0.44	0.46
	14.96	*12.18*	*10.53*	*3.11*	*8.24*	*9.47*	*14.15*	*12.92*	*14.36*	*6.43*	*10.88*		*6.34*	*13.00*	*8.43*	*13.29*	*11.13*
Δ_Oil price (-1)	0.10	0.27		0.22	0.21	0.15	0.22	0.28	0.16	0.44	0.38	0.44		0.23			0.26
	3.72	*3.60*		*4.06*	*5.06*	*2.26*	*3.18*	*4.70*	*8.17*	*6.80*	*4.03*	*6.31*		*4.03*			*3.62*
Δ_Oil price (-2)	0.07	0.38	0.09				0.09	0.11	0.07					0.08			0.21
	2.37	*4.93*	*2.42*				*2.29*	*3.40*	*3.23*					*2.25*			*2.84*
Δ_Oil price (-3)	0.08	0.20	0.08		*0.09*			0.08	0.06				0.24		0.12		
	2.94	*4.10*	*2.44*		*2.33*			*2.63*	*3.20*				*5.65*		*3.10*		
Δ_Oil price (-4)	0.05	0.16	0.07				0.08		0.08		0.11			0.08			0.11
	2.16	*3.03*	*2.02*				*2.44*		*4.32*		*2.03*			*2.63*			*2.82*
Lags of dep. variable		*1,2*					*1*	*1*			*1*		*1,4*	*1*	*3*	*4*	*1,2*
# of obs.	55	55	55	40	56	58	55	56	55	58	55	58	55	55	56	40	55
adj. R^2	0.85	0.82	0.68	0.44	0.67	0.65	0.83	0.83	0.88	0.66	0.76	0.41	0.58	0.82	0.61	0.83	0.79

(1) Data are quarterly and cover the period from Q1 1996 to Q1 2009. Inflation is measured as quarter-on-quarter percentage changes in the price index. Oil price changes are expressed as quarterly changes in euro-denominated levels. Contemporaneous oil price changes and six lags were included in the original specification. Insignificant regressors were dropped from the model. Numbers in italic refer to t-values. The Slovakian energy price index exhibits no evident relationship with oil prices under this particular specification; results are consequently not reported.
Source: Commission services

The first column of the table shows the results for the euro area as a whole. Changes in the oil price have contemporaneous as well as lagged effects on euro-area energy inflation: an EUR 1 oil price increase translates into an immediate increase of 0.37 pp in the q-o-q energy inflation rate. Furthermore, energy inflation is still affected up to four quarters after the initial oil price change. Estimating the model on a shorter sample (until Q4 of 2007) suggests that the direct pass-through was stronger in pre-crisis years in the euro area.[2]

The regressions at Member State level suggest that the speed and magnitude of the pass-through varies quite substantially across Member States. In the case of Greece, for example, the immediate effect of an EUR 1 rise in the oil price is strongest, raising quarterly energy inflation by 0.63 pp. Greece is followed by Luxembourg (0.58 pp), Spain (0.48 pp) and Belgium (0.48 pp). Analogously, the immediate pass-through is smallest for the Member States currently witnessing the lowest energy inflation rates, i.e. Italy (0.27 pp) and the Netherlands (0.26 pp). In the case of Malta, oil price changes only seem to affect inflation with a one-quarter delay.

The table also shows that the dynamic impact of an oil price change differs throughout the euro area. While in the case of Greece and Estonia most of the impact of an oil price increase affects energy inflation instantaneously, energy inflation in Belgium, Germany, Spain, Italy, Luxembourg, Austria and Finland is still affected four quarters later by oil price movements — even if the magnitude of the coefficients is often relatively low. A possible explanation for the long lags has to do with the composition of the energy basket and in particular the relative importance of 'gas' and 'heat energy' — subcategories in which the pass-through is generally slower. Indeed, gas prices are often indexed to the oil price or periodically revised.

[1] Applying the same methodology as in QREA Vol. 7 No 1 (2008).
[2] The coefficient on the contemporaneous variable was 0.5, while the lagged oil price was insignificant.

II.4. The short-term outlook for euro-area inflation

A look at producer prices indicates that upstream price pressures intensified in the months to January (latest observation), with inflation climbing to 6.1%. While this increase was broad-based across sub-categories, annual energy inflation stood out, after increasing to 12.5% in January following a 3.0% monthly price increase. Surveys also suggest that producer price pressures will continue to build up over the months

ahead. ([23]) However, labour cost indicators remain subdued, reflecting the overall still weak labour market conditions across the euro-area economy.

The recent increase in inflation has translated into a rise in survey- and market-based inflation expectations. Long-term inflation expectations, as measured by the difference between German nominal and inflation-linked long-term government bond yields (maturity 2016), have picked up since November, when they averaged 1.54%. ([24]) In January they averaged 1.85% and further climbed to 1.96% in February. In early March they stood at 2.05%. This level remains lower than in the pre-crisis period (in 2007 long-term inflation expectations averaged 2.12%), suggesting that inflation expectations remain overall well anchored, thus keeping underlying inflationary pressures in check. The recent increase nonetheless highlights the need to closely onitor expectations and to prevent second-round effects.

Survey data suggest that consumers in the euro area expect prices to rise in the short term too: the balance statistic in ECFIN's Consumer Survey rose from 20.9 in January to 25.7 in February, substantially exceeding the average level of the series since 1999 of 15.5. ([25])

Recent commodity price developments have prompted an upward revision of inflation forecasts released by the end of 2010. The political uncertainty in the Middle East and in North African countries and the repercussions of the earthquake in Japan on 11 March are likely to substantially complicate oil price forecasts in the period ahead — and thus the conditioning assumptions underlying (energy) inflation forecasts.

The euro-area inflation projection in the Commission's interim forecast, released on 1 March 2011, has been revised up markedly compared to the autumn forecast of November 2010. HICP inflation is now projected at 2.2% (up 0.4 pp relative to the previous forecast) in the euro area. On a quarterly basis, the interim forecast projects a peak in headline inflation in the first quarter of 2011 at 2.3% in the euro area and a gradual decrease towards 2% by the end of the year. This profile reflects the diminishing effects of pass-through from both the surge in commodity prices at the turn of the year and statistical base effects exerting downward pressure on inflation for most of 2011. It is also noteworthy that the inflation profile is partly affected by the impact of planned increases in indirect taxes and administered prices in some euro-area Member States.

Despite the recent upward revisions to headline inflation forecasts, the underlying inflation trends identified in the 2010 autumn forecast remain valid. The lingering slack in the economy and the overall weak labour market conditions are expected to keep the underlying inflationary pressures contained. Nevertheless, core inflation is expected to rise slowly in line with the pick-up in activity and possibly due to higher imported inflation from emerging-market economies. In contrast, the headline rate may prove to be volatile in the course of 2011, driven by changes in commodity prices linked to the outlook for advanced economies, geopolitical tensions and base effects.

The ongoing necessary correction of imbalances within the euro area and the differences in the speed of recovery, notably regarding the closure of the national output gaps, are likely to keep inflation dispersion high in the period ahead. This should not be a cause of concern, in so far as it reflects the rectification of previous divergence processes. As far as core inflation is concerned a gradual normalisation can be expected.

([23]) The Commission's monthly industry survey asks participants about the expected change in their selling prices over the next three months.

([24]) Inflation expectations derived from financial instruments should be analysed with care as they may be distorted by changes in liquidity and risk premia.

([25]) Question 6 in the Commission's monthly consumer survey asks participants about their expectations regarding price developments over the coming 12 months.