THE DEVELOPMENT OF PRICES AND COSTS DURING THE 2008-09 RECESSION

In order to assess the inflation outlook and the risks to it, it is important to understand the relationship between inflation and the business cycle. This article looks specifically at developments during the 2008-09 recession and examines whether the responsiveness of inflation at that time was in line with historical experience. It shows that the decline in headline HICP inflation was very strong, largely as a result of the particularly pronounced collapse in commodity prices. By contrast, the reaction of HICP inflation excluding food and energy was much more limited, despite the extreme depth of the recession. The implied weak relationship with economic slack appears to be related to the presence of downward nominal rigidities in the euro area, which prevented a greater adjustment of wages in response to the recession. In addition, well-anchored inflation expectations, reflecting a credible monetary policy, helped to avert the onset of a deflationary cycle.

1 INTRODUCTION

The recession that hit the euro area economy in 2008-09 was of unprecedented depth. Real GDP declined by 5.5% from peak to trough, giving rise to a substantial widening of the output gap. In this respect, at first sight, it is not surprising that the recession coincided with a relatively sharp reduction in consumer price inflation, with the annual rate of change in the HICP declining from around 4% prior to the recession, to almost -1% at its trough. Upon closer inspection, however, it appears that much of this decline was due to the food and energy components of the HICP, which tend to be heavily influenced by external developments. The adjustment in HICP inflation excluding these components, which is more directly related to domestic demand and cost factors, was much more limited.

Against this background, this article reviews the adjustment of prices and costs during the latest recession and compares it with historical experience. Any regularities or idiosyncrasies observed in this adjustment could also provide valuable input to forward-looking assessments of inflation developments. For instance, they could help to shape the assessment of how inflation is likely to develop in response to the slowdown in real GDP growth observed in 2011.

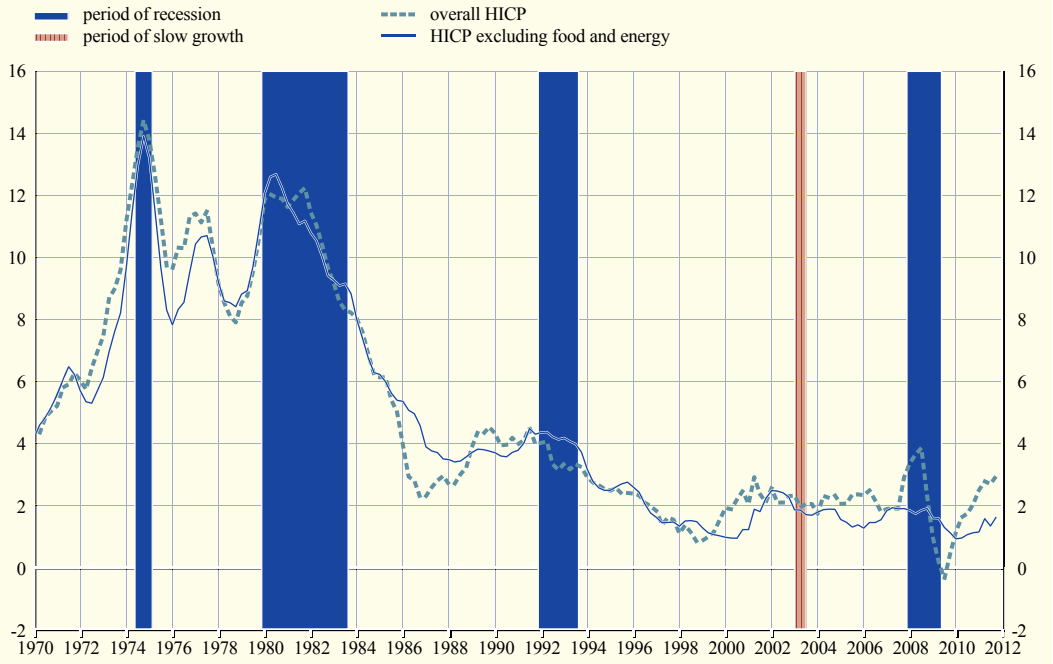
The article is structured as follows. Section 2 assesses whether the developments in euro area inflation (both overall HICP inflation and HICP inflation excluding food and energy) at the time of the 2008-09 recession are to be viewed as exceptional in the light of previous recessions. Section 3 looks at how commodity prices shaped developments in HICP inflation during the latest recession and asks why they may have had a stronger impact than in previous recessions. Section 4 then focuses on the relationship between the inflation components that are more affected by domestic factors (covered by the HICP excluding food and energy) and economic slack, and examines the role of labour costs and profits in the adjustment of inflation. Section 5 concludes and offers some implications for the current outlook.

2 DEVELOPMENT OF INFLATION DURING THE LATEST RECESSION COMPARED WITH PREVIOUS RECESSIONS

Comparing the adjustment of inflation during the 2008-09 recession with that during previous recessions is difficult for many reasons. For example, the adjustment depends on the depth and length of a recession. It may also depend on whether a recession is driven more by external or domestic factors and on the macroeconomic policies in place or adopted at the time. Chart 1 shows that inflation

Chart 1 Overall HICP inflation and HICP inflation excluding food and energy

(annual percentage changes)



Sources: Eurostat and ECB calculations.
Notes: Data prior to 1996 are ECB estimates based on non-harmonised national CPI data. The dates of the periods of recession/slow growth correspond to those identified by the Centre for Economic Policy Research (see footnote 1).

developments around the time of the recessions differed somewhat.[1] For instance, the declines in inflation during the mid-1970s and early 1980s did not occur until some time after the onset of the recession. During the 1980s recession the decline also coincided with a policy-induced secular disinflation process, which makes it difficult to separate the cyclical from the structural adjustment. Furthermore, the 2008-09 recession was unlike the others in that it witnessed very different patterns in overall HICP inflation and HICP inflation excluding food and energy. While overall HICP inflation fell by 4.7 percentage points from peak to trough, HICP inflation excluding food and energy declined by only 1.2 percentage points. Similarly, during the post-recession period (2010-11) overall HICP inflation rebounded much more strongly than HICP inflation excluding food and energy.

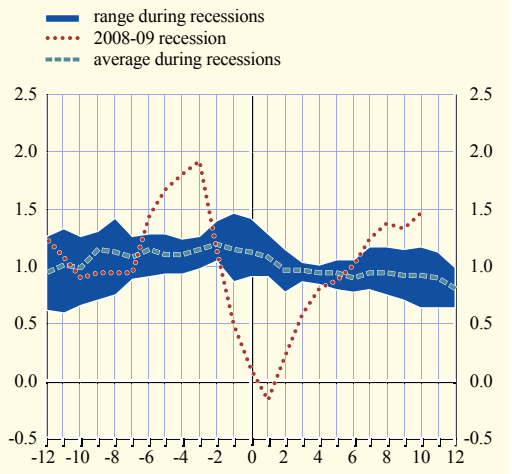
In order to account for the very different levels of inflation at the time of recessions over the past four decades, Charts 2 and 3 show inflation developments that have been normalised by dividing them by the mean of inflation at the time (three years preceding and following the trough of the recession). It is evident that the normalised movements in overall HICP inflation during the latest recession were clearly out of line with historical experience, while those in HICP inflation excluding food and energy followed a more similar pattern to those in previous recessions.

This difference in inflation developments raises a number of issues. On the one hand,

1 The dates of the recession periods referred to in this article are those identified by the Centre for Economic Policy Research. The latest recession thus started in the first quarter of 2008 and ended in the second quarter of 2009. The period from the first quarter of 2003 to the second quarter of 2003 was described as a prolonged pause in economic growth, rather than a fully fledged recession.

Chart 2 Overall normalised euro area HICP inflation before and after recessions

(normalised annual percentage changes)

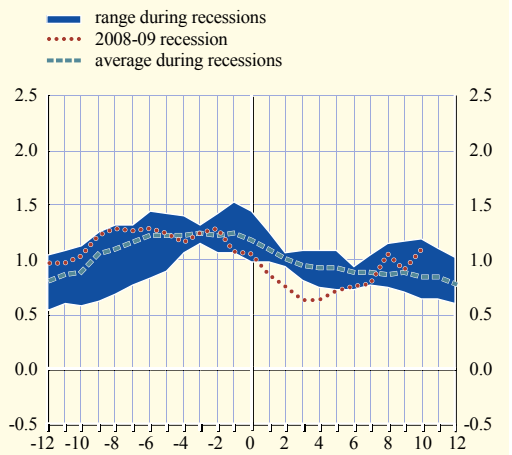


Sources: Eurostat, national data and ECB calculations.
Notes: The chart shows the average and ranges of normalised annual inflation rates for 12 quarters before and after the last quarter of each recession (0 = Q1 1975, Q3 1982, Q3 1993 and Q2 2003). For the 2008-09 recession, 0 = Q2 2009. The values have been normalised by dividing by the mean of inflation over the chart range, namely three years preceding and following the trough of output during the recessions. The average and ranges do not include the 2008-09 recession. Data prior to 1996 are ECB estimates based on non-harmonised national CPI data.

it appears that the impact of commodity prices on food and energy prices was stronger than in previous recessions, possibly reflecting the fact that the sharp movements in commodity prices coincided with particularly strong movements in the global economic cycle (see Section 3). On the other hand, it appears that the reaction of HICP inflation excluding food and energy, albeit in normalised terms slightly stronger than in previous recessions, was relatively muted given that the recession itself was much more severe than any of the others over the last four decades. On balance, it would therefore appear that the adjustment in the euro area economy was, to a relatively large extent, attributable to adjustments in quantities, e.g. reductions in the number of hours worked or persons employed, rather than adjustments in prices, for example via lower wage costs (see Section 4).

Chart 3 Normalised euro area HICP inflation excluding food and energy before and after recessions

(normalised annual percentage changes)



Sources: Eurostat, national data and ECB calculations.
Note: See notes to chart 2.

3 THE IMPACT OF COMMODITY PRICES DURING THE 2008-09 RECESSION

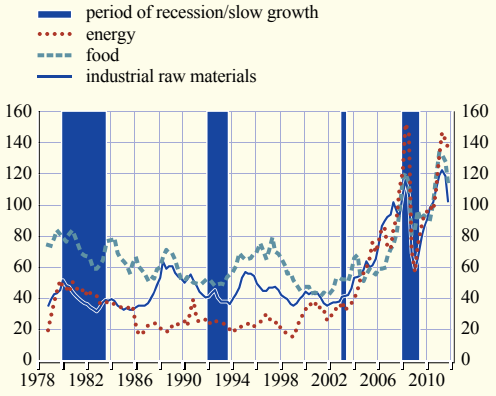
Changes in commodity prices have a direct impact on the food and energy components of the HICP, as commodities are either consumed directly or constitute significant input into the final product. In the case of the energy component, crude oil is the basis for refined energy products, such as transport fuels and heating oil. Crude oil prices also have a strong impact on gas prices and, to a lesser extent, on electricity prices.[2] In the case of the food component, food commodities, such as wheat, oilseeds, sugar, etc., are an important cost factor in the production of processed consumer food products, and commodities such as meat, have a direct bearing on the unprocessed food component.[3]

Over time, such direct impacts can vary in strength, for two reasons: i) differences in the strength of the commodity price movements themselves; and ii) differences in the strength of the pass-through of changes in commodity

2 Oil prices have an impact on gas prices, as gas can be a substitute for oil in some cases, in particular in the generation of electricity, and as many long-term gas contracts are linked to oil prices.
3 Several commodities, such as corn, soybeans and oats, are also used as animal feed and, as such, also impact on the unprocessed food component via the meat component.

Chart 4 International commodity price developments

(USD; index: 2010 = 100)



Sources: ECB, Eurostat and HWWI.
Note: The dates of the periods of recession/slow growth correspond to those identified by the Centre for Economic Policy Research (see footnote 1).

prices to consumer prices. Chart 4 shows that there were historically sharp fluctuations in international commodity prices in the second half of the 2000s. With regard to the latest recession, the sequence of a broad-based surge in prices prior to the recession, a broad-based slump during the recession, and a broad-based rebound after the recession coincided with the pronounced global economic cycle and, in particular, developments in the emerging economies, which have become increasingly important users and consumers of commodities (see Box 1 for a comparison of recent and historical patterns in oil price developments). During the price surges of 2008 and 2011, the impact on euro area inflation of the fluctuations in international commodity prices in US dollar terms was dampened somewhat by the appreciation of the euro against the US dollar.

Box 1

OIL PRICE DEVELOPMENTS DURING THE 2008-09 RECESSION

During the 2008-09 global recession, the price of Brent crude oil plummeted from around USD 150 per barrel in mid-2008 to around USD 40 per barrel at the turn of 2009. This more or less 70% drop marked a reversal in the steep upward trend in oil prices that had started in the early 2000s. Furthermore, as soon as the first signs of a recovery in global activity emerged, oil prices started to rise again. This box discusses the nature of these recent sharp price movements in the light of past episodes of similar sharp changes in oil prices.

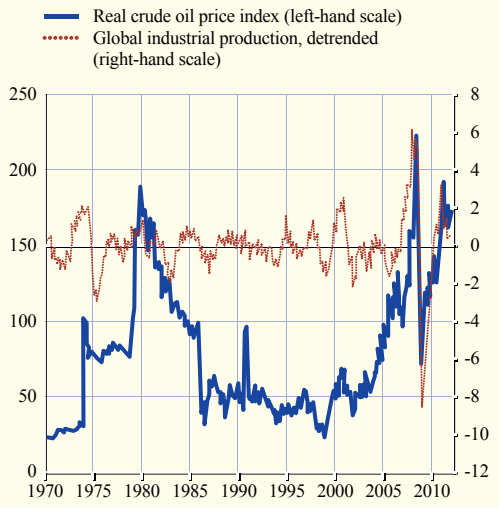
Historical experience with sharp movements in oil prices

From a historical perspective, the recent episode of rapidly rising and falling oil prices appears to have been unprecedented in terms of both the speed and magnitude of the movements (see Chart A). Although there have been periods of either faster price rises, e.g. after the Yom Kippur war in 1973, or stronger, albeit slower, price declines, e.g. during the 1980s, the latest episode stands out for the steepness of both the upward and downward path. In addition, unlike the latest episode, all comparable previous episodes can be linked directly to dramatic geopolitical developments stemming from conflicts in the Middle East, e.g. the embargo by the Organization of the Petroleum Exporting Countries (OPEC) in 1973 or the Iranian revolution in 1979.

More specifically, the main determinants of the sharp movements in oil prices up to the late 1990s were supply shocks. It can therefore be said that the movements in oil prices tended to drive the economic cycle, rather than be a consequence of it. This is highlighted in Chart A, which shows developments in real oil prices and the cyclical component of global industrial production

Chart A Real crude oil prices and global activity

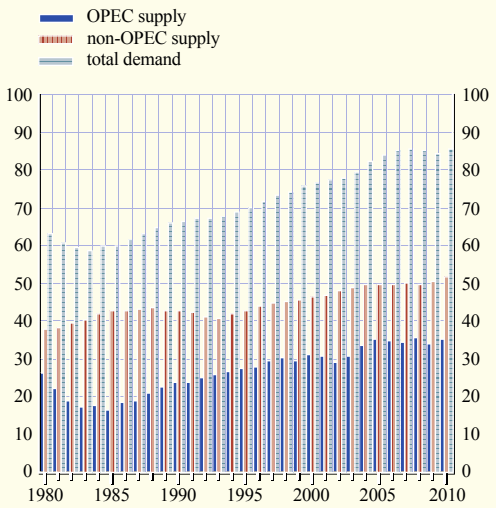
(indices: 2005 = 100; monthly data)



Sources: IMF, US Bureau of Labor Statistics, Haver Analytics and ECB calculations.
Notes: The oil price index is an average of the Dubai, Brent and WTI price indices deflated by the US consumer price index and expressed in 2005 US dollar terms (last observation refers to January 2012). Global industrial production excludes construction and refers to OECD countries and the six largest non-member countries. It is detrended using a Hodrick-Prescott filter (last observation refers to November 2011).

Chart B Oil supply and demand

(million barrels per day; annual data)



Source: US Energy Information Administration.
Note: Last observation refers to 2010.

since January 1970.[1] For example, oil prices more than tripled in the aftermath of OPEC's drastic reduction in oil supply in November 1973, which is estimated to have amounted to 7.5% of global output at the time.[2] Owing to the lack of alternative sources of oil supply and the highly oil-intensive nature of the global economy, a severe recession set in. Similarly, the oil price shock of 1979 also triggered an economic recession. However, the protracted downward path of oil prices thereafter does not appear to have been associated with developments in economic activity. In fact, the decline was driven mainly by oil supply, and in particular by a rapid expansion of production by non-OPEC countries, whose exploitation of proven, as well as new, oil fields was suddenly made economically viable by the higher oil prices of the mid-1970s (see Chart B).

The changed nature of oil price movements

The overall stability of oil prices up to the late 1990s was due mainly to the relatively stable and reliable growth of oil supply, in particular from OPEC countries. However, the continuous reduction in OPEC's spare capacity, combined with a lack of new capacity – owing to limited investment during the period of low oil prices from the mid-1980s – and a slowdown in non-OPEC production, resulted in overall supply growth consistently lagging behind growth in oil demand during the 2000s. In general, this has put upward pressure on oil prices. Therefore, since there have been no oil supply disruptions of a comparable magnitude to those previously

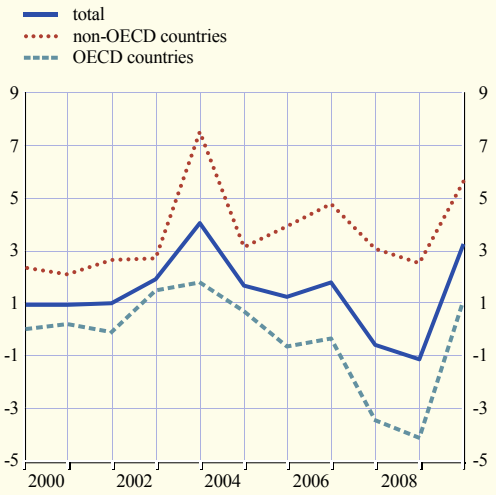
1 In order to clearly capture business cycle-related developments in global activity, as well as render such developments comparable across cycles, Chart A shows a detrended measure of global industrial production (excluding construction).
2 See Hamilton, J.D., "Historical Oil Shocks", in Whaples, R. and Parker, R. (eds), *Major Events in Economic History*, Routledge, forthcoming in 2013. The article is also available at http://dss.ucsd.edu/~jhamilto/oil_history.pdf

experienced, oil prices appear to have been more demand-driven in recent years.[3]

The sharp decline in oil prices during the 2008-09 recession was triggered by a growing number of signals pointing to a major decline in global economic activity, and then exacerbated by the eruption of the financial crisis. The index of industrial production (excluding construction) fell by about 13% during the 2008-09 recession (see Chart A). This followed the buoyant growth in both global activity and oil prices prior to the crisis, which indicates that there has been a strong link between oil price movements and the global business cycle in recent years. A key factor in this has been the more prominent role being played by non-OECD countries in driving the global business cycle and determining global oil demand in the presence of limited supply growth (see Chart C). This is also supported by the fact that the pronounced movements in oil prices very closely mirrored those in food and other commodity prices, rather than following a more idiosyncratic path (see Chart 4 in the main text).

Chart C Growth in oil demand

(annual percentage changes)



Source: International Energy Agency.
Note: Last observation refers to 2010.

Looking ahead, there are very few reasons to expect that there will be a slowdown in global oil demand growth. In fact, owing to the rapid growth of the emerging economies, in particular Asia, oil demand is forecast by the International Energy Agency to rise steadily until 2016, despite the current high price levels.[4] By contrast, oil supply growth is likely to be constrained, at least in the medium to long term, owing to geological constraints on the further expansion of non-OPEC capacity and the fact that significant investment is required to expand OPEC's currently limited capacity. Moreover, it will still be some time before alternative sources of energy and fuel, which are becoming more economically viable given the current high oil prices, constitute a significant share of the energy and fuel supply. Both these factors imply that the recent strong co-movement of oil prices with the global business cycle may continue. However, developments on the supply side will also continue to play an important role, particularly given the current and expected tight situation in terms of global oil supply and demand.[5]

3 There were several notable oil supply disruptions during the 2000s, including the one following the general strike in Venezuela in 2002-03 and the supply disruption in the wake of the US attack on Iraq in 2003. However, a much smaller share of the global oil supply was affected on these occasions than during earlier supply disruptions. See reference mentioned in footnote 2.
4 International Energy Agency, *Oil Market Report*, December 2011.
5 See also Kaufmann, R., Karadeloglou, P. and di Mauro, F., "Will oil prices decline over the long run?", *Occasional Paper Series*, No 98, ECB, October 2008.

With regard to oil prices, the relatively strong impact that they had on the energy component of the HICP at the time of the 2008-09 recession was attributable not only to the large fluctuations in crude oil prices, but also to the much higher level at which they started compared with previous episodes of price changes. The fact that the impact of oil price changes on the HICP depends on the oil price level reflects the fact that the impact of oil price increases on consumer

prices for liquid fuels is cushioned by relatively stable distribution margins, and in particular by the excise duties on fuel, which are set as a fixed amount per litre. For example, if oil prices are at €20 per barrel, a 10% increase in crude oil prices is estimated to lead to an average increase in the energy component of the HICP of approximately 1.6%. However, if oil prices stand at €100 per barrel, the impact rises to around 4.2%.[4] This explains why the impact of the surge and slump in oil prices on the energy component of the HICP at the time of the 2008-09 recession was so strong, even though the developments in terms of annual percentage changes were less exceptional (see Chart 5).

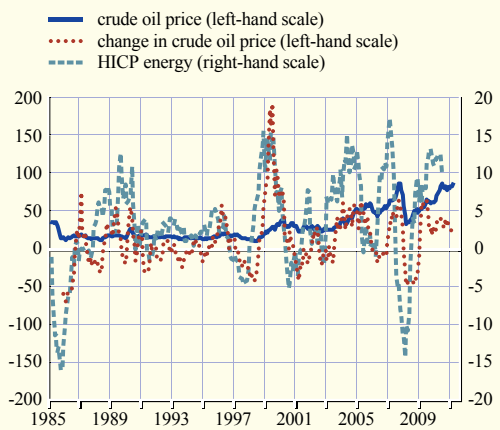
The level of oil prices also has implications for the weight of energy in the HICP basket. The above-average price trend of energy products, together with rising energy consumption, has translated into a steadily growing share of energy in total consumption. As a result, the weight in the HICP basket in 2011 was over 10%, which is almost double what it was in the 1970s. Mechanically, this implies that any given percentage increase in energy prices will have a greater impact on overall HICP inflation than in previous decades.

With regard to food prices, developments in international commodity prices have historically not played a large role in determining consumer prices. One explanation for this is that the Common Agricultural Policy (CAP) influences the prices of certain commodities that are produced in the EU, via intervention prices, price supports, import tariffs and quotas.[5] As a result, prices within the EU have traditionally been higher than international prices and the CAP has cushioned the transmission of global food price shocks to HICP inflation. Chart 6 shows that, until 2006, there was considerably more volatility in the index of international prices than in the index of EU prices. However, since international prices for various commodities exceeded the CAP intervention prices in 2006, EU and international prices have moved more in line with each other. This suggests that the CAP no longer dampens prices to the same extent and that the impact of

4 For more details, see Task Force of the Monetary Policy Committee of the European System of Central Banks, "Energy markets and the euro area macroeconomy" (Section 3.2), *Occasional Paper Series*, No 113, ECB, June 2010.
5 See Ferrucci, G., Jiménez-Rodríguez, R. and Onorante, L., "Food price pass-through in the euro area – the role of asymmetries and non-linearities", *Working Paper Series*, No 1168, ECB, April 2010.

Chart 5 Crude oil prices and energy inflation

(EUR per barrel; annual percentage changes)



Sources: Eurostat and Datastream.

Chart 6 International and EU prices for food commodities

(index: 2008 = 100)

Sources: European Commission's Directorate General for Agriculture and Rural Development, HWWI and ECB calculations.

more volatile international food commodity prices played a greater role in determining food price inflation during the 2008-09 recession.[6]

Commodity prices also influence HICP inflation through indirect effects, which refer to the impact of higher input costs on HICP inflation excluding food and energy along the production chain, and second-round effects, which embed the impact of commodity prices in wage setting or inflation expectations. Indirect effects and second-round effects take considerably longer to feed through than direct effects. Consequently, their impact may depend on the duration of the commodity price movements. At the time of the 2008-09 recession, the movements were very sharp in both directions, but also extended only over a relatively short horizon, both on the way up and down. Therefore, this may have mitigated the overall response in terms of indirect effects.

Evidence from various models typically implies that a 10% increase in oil prices leads to a cumulative impact on HICP inflation excluding food and energy of only around 0.2 percentage point over a three-year horizon. This impact is estimated to be more or less equally split between indirect effects and second-round effects. In this respect, the more limited reaction of HICP inflation excluding food and energy at the time of the 2008-09 recession, compared with previous recessions, may be due to the fact that indirect effects and second-round effects appear to have declined since the mid-1980s,[7] as a result of changes in the structural features of the economy, in particular a lower energy intensity, of the greater anchoring of inflation expectations, and of changes in wage and price-setting behaviour. These issues will be discussed in the following section.

4 THE LIMITED RESPONSIVENESS OF THE HICP EXCLUDING FOOD AND ENERGY DURING THE 2008-09 RECESSION

Given the depth of the 2008-09 recession, as measured by the economy-wide output gap, the responsiveness of the inflation components that are more affected by domestic factors (covered by the HICP excluding food and energy) was muted. In this respect, Chart 7 shows that the combinations of HICP inflation excluding food and energy and the output gap observed in recent years are different to those observed in the period from 1990: even at the deepest point of the recession, HICP inflation excluding food and energy did not move much below 1%.

In this respect, it is important to note that, compared with previous recessions, the 1990s recession marked an initial change in the relationship between inflation and economic

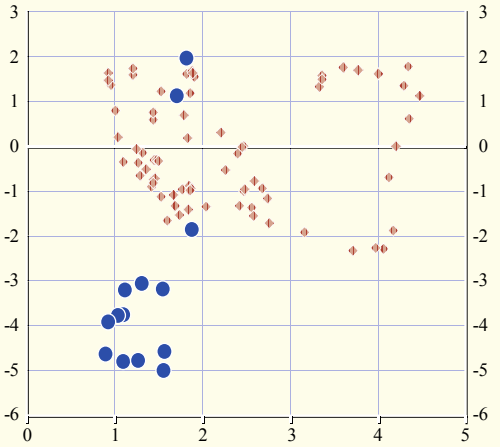
6 This is likely to be a permanent change, owing to the fact that food commodity prices are likely to remain high and that price intervention measures are being phased out of the CAP.

7 See Task Force of the Monetary Policy Committee of the European System of Central Banks, op. cit. According to evidence from a small-scale structural model, the average estimate of the impact of a 10% increase in oil prices on the HICP excluding energy declined from 0.29 percentage point to 0.20 percentage point when based on rolling samples that start between the first quarter of 1971 and the third quarter of 1995 and end between the fourth quarter of 1979 and the fourth quarter of 2000, compared with rolling samples that start between the first quarter of 1980 and the first quarter of 2001 and end between the first quarter of 1988 and the first quarter of 2009.

Chart 7 Euro area HICP inflation (excluding food and energy) and output gap

(annual percentage changes; percentages; quarterly data)

x-axis: year-on-year HICP excluding food and energy
y-axis: output gap as a percentage of potential output



Sources: Eurostat and OECD output gap estimates.
Notes: The overall sample is for the period from 1990 to 2011. The blue dots are combinations of HICP inflation excluding food and energy and the output gap from 2008 to 2011.

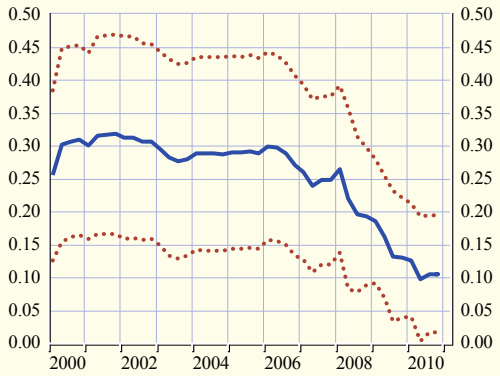
slack, i.e. a break in the so-called Phillips curve. In particular, the role of the output gap or the unemployment rate in explaining inflation (taking into account supply influences stemming from commodity price shocks or tax changes) appears to have declined during that period. According to the literature, this decline can be attributed to several concomitant factors, such as globalisation, which reduces the scope for increasing prices in the presence of foreign competition, and sound monetary policies in many countries.[8] Chart 8 suggests that the role of these indicators may have declined even further during the 2000s, as the recursive estimates of the coefficient of economic slack in a Phillips curve-type equation for HICP inflation excluding food and energy declined, in particular at the time of the 2008-09 recession.

There are several reasons why weak disinflationary pressures may arise, even in the presence of significant changes in economic activity. One of the main reasons is labour market rigidities. On average, labour costs account for around 27% of euro area firms' total production input costs. Therefore, rigidities in the adjustment of these costs can explain a substantial part of any lack of responsiveness of inflation. Labour costs are ultimately determined by the combination of wages and productivity. The growth rate of unit labour costs actually increased until the end of 2008, when economic activity reached its lowest point in the recession, and this, owing to a relatively smaller fall in employment, translated into productivity losses (see Chart 9). Only after the subsequent economic recovery had led to improvements in labour productivity and wage growth had settled at lower levels did unit labour cost growth fall, reaching a trough in 2010 and edging into positive territory again in 2011. These dynamics therefore had a somewhat "counter-cyclical" effect on inflation. The fact that HICP inflation excluding food and energy

8 For a country comparison, see, for example, Laxton, D. and N'Diaye, P., "Monetary Policy Credibility and the Unemployment-Inflation Tradeoff: Some Evidence from 17 Industrial Countries," *Working Paper Series*, No 02/222, IMF, 2002. For evidence on the United States, see Atkeson, A. and Ohanian, L.E., "Are Phillips curves useful for forecasting inflation?", *Quarterly Review*, Vol. 25, No l, Federal Reserve Bank of Minneapolis, Winter 2001, pp. 2-11. For evidence on the euro area, see Fischer, B., Lenza, M., Pill, H. and Reichlin, L., "Monetary analysis and monetary policy in the euro area 1999-2006", *Journal of International Money and Finance*, Vol. 28, No 7, Elsevier, November 2009, pp. 1138-1164.

Chart 8 Recursive estimates of the coefficient of economic slack in a standard Phillips curve

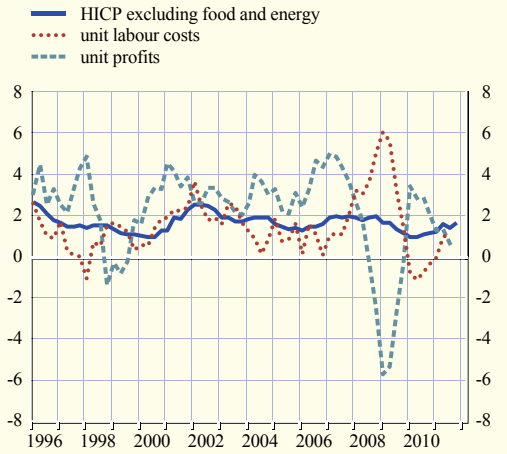
(elasticity; quarterly data)



Sources: ECB calculations.
Notes: The recursive estimates use HICP inflation excluding food and energy as the dependent variable and the OECD output gap estimate as the regressor. The sample for the estimates always starts in 1988. The dotted red lines refer to 95% confidence intervals.

Chart 9 HICP inflation excluding food and energy, unit labour costs and unit profit growth

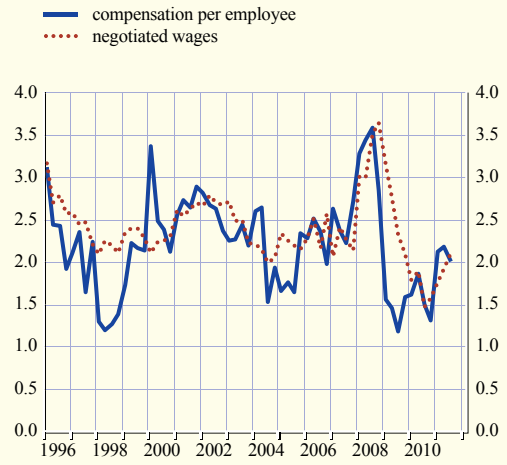
(annual percentage changes)



Sources: Eurostat and ECB calculations.

Chart 10 Compensation per employee and negotiated wages

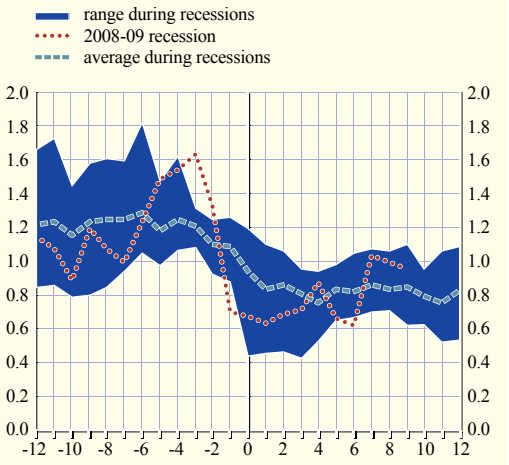
(annual percentage changes)



Sources: Eurostat and ECB calculations.

Chart 11 Normalised compensation per employee before and after recessions

(normalised annual percentage changes)



Sources: Eurostat and ECB calculations.
Notes: The chart shows the average and ranges of normalised annual rates of change for 12 quarters before and after the last quarter of each recession (0 = Q1 1975, Q3 1983, Q3 1993 and Q2 2003). For the 2008-09 recession, 0 = Q2 2009. The values have been normalised by dividing by the mean over the chart range, namely three years preceding and following the trough of output during the recessions. The average and ranges do not include the 2008-09 recession. Data prior to 1996 are based on data from the ECB's area-wide model database, which uses non-harmonised sources.

nevertheless remained relatively stable at the time of the recession was due to countervailing developments in unit profit growth, which closely followed those of real activity.

Focusing on wage developments, growth in compensation per employee moderated from 3½% at the start of the 2008-09 recession (which is the highest it has been since the start of EMU in 1999) to around 1½% in autumn 2009 (see Chart 10). This decline was in line with historical experience (see Chart 11, which has been computed using the same methodology as in Charts 2 and 3). This may be surprising, given the exceptional depth of the recession, but can be partly explained by the fact that cost adjustments were made in terms of "quantities", such as reductions in the number of hours worked or persons employed, rather than in terms of wage rates.[9] Box 2, which compares developments in inflation and labour costs in the euro area and the United States, suggests that, in the latter economy, the importance of "quantity" adjustment was even greater in the 2008-09 recession than in previous recessions.

With regard to the euro area as a whole, there is a variety of factors that may have prevented a stronger downward wage adjustment during the 2008-09 recesssion, despite the very weak labour market conditions. For instance, in some euro area countries, wages are indexed to past inflation developments and therefore showed less adjustment.[10] A number of countries also maintain a legal minimum wage, which tends to provide a lower bound for the downward adjustment of wages, in particular for sectors and professions with low productivity growth. There also appeared

9 For a comparison of the labour market developments in Germany and the United States, see, for instance, Burda, M. and Hunt, J., "What Explains the German Labor Market Miracle in the Great Recession?", CEPR Discussion Paper, No 8520, August 2011.

10 See Babecký, J., Du Caju, P., Kosma, T., Lawless, M., Messina, J. and Rõõm, T., "Downward nominal and real wage rigidity – survey evidence from European firms", *Working Paper Series*, No 1105, ECB, November 2009.

to be a more general reluctance to lower the level (rather than the rate of growth) of wages. Survey evidence from the ESCB's Wage Dynamics Network during the 2008-09 recession has shown that, when faced with declines in demand, firms tended to reduce their labour costs primarily by reducing their labour input in terms of the number of employees or hours worked, rather than via wage reductions. Only 1.5% of the firms surveyed during the summer of 2009 responded that they had reduced basic wages in response to the recession, and only 8.6% indicated that flexible wage components, such as bonuses, had been reduced. At the same time, the incidence of wage freezes was reported to have increased considerably after the recession, with the number of firms having implemented a wage freeze jumping from 7.6% in the five years prior to the recession to 37.1% by the summer of 2009. With regard to the macroeconomic data, the stronger adjustment in the flexible wage components than in the basic wage rates is reflected in the somewhat different patterns of growth in compensation per employee and negotiated wages (see Chart 10). Growth in negotiated wages moderated more slowly than that in compensation per employee, reaching a trough more than one year later. This delay may be explained not only by labour market rigidities, but also by the average length of contractual wage agreements (around 18 months) in the euro area: inevitably wage growth tends to lag economic developments, depending on the depth of the recession and the remaining duration of the contracts.

Box 2

ADJUSTMENT OF PRICES DURING AND AFTER RECESSIONS: A COMPARISON OF THE EURO AREA WITH THE UNITED STATES

This box compares the developments in inflation at the time of the latest recession with those during previous recessions, focusing on the euro area and the United States. It also compares the labour cost developments in both economies, as they are one of the key components of domestically generated inflation.

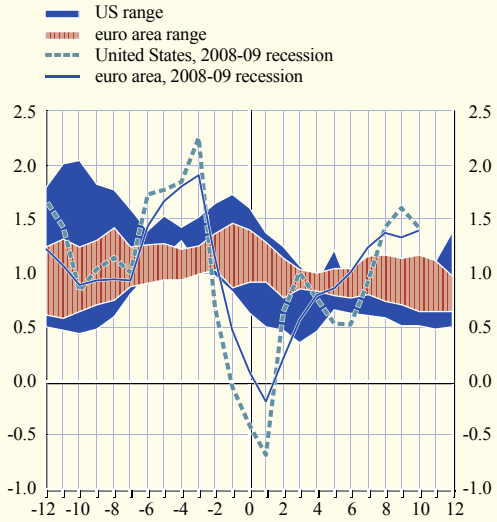
Inflation in the United States followed a similar pattern to that in the euro area during the latest recession

Similar to the picture for the euro area presented in Section 2 of the main text, the behaviour of headline inflation in the United States at the time of the latest recession was distinctly different to that during previous recessions (see Chart A). As with the euro area, the historically strong movements in headline inflation were attributable primarily to commodity price developments, as the developments in inflation excluding food and energy remained broadly in line with the developments observed during previous recessions (see Chart B). At the same time, however, the euro area and the United States differed in that prices for shelter had a very significant impact in the latter. In fact, contrary to the broadly stable developments observed during previous recessions in the United States, shelter prices fell substantially during the latest recession and were in negative territory for most of 2010. Thereafter, they started to recover relatively quickly, returning to close to their pre-crisis levels in the third quarter of 2011. This pronounced cycle was linked to the strong correction in the US housing market that started in 2007, with prices falling at rates not seen in the previous four decades.

While the responsiveness of inflation at the time of the latest recession was very similar across the euro area and the United States, it is worth noting that, traditionally, there has been greater

Chart A Headline inflation

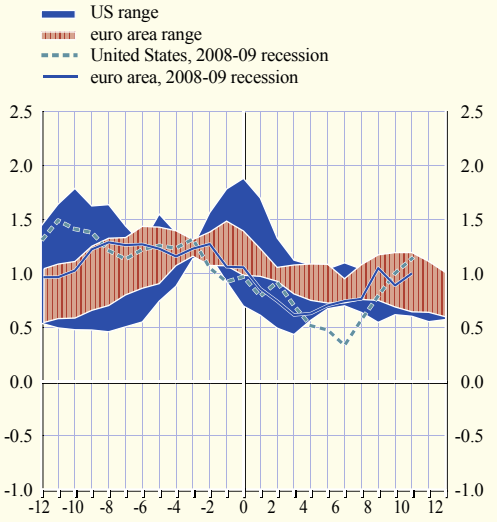
(normalised annual percentage changes)



Sources: US Bureau of Labor Statistics, National Bureau of Economic Research and ECB calculations.
Notes: The chart shows the normalised annual inflation rates for 12 quarters before and after the last quarter of each US recession (0 = Q1 1975, Q4 1982, Q1 1991, Q4 2001 and Q2 2009). Results for the euro area are as reported in Charts 2 and 3.

Chart B Inflation excluding food and energy

(normalised annual percentage changes)



Sources: US Bureau of Labor Statistics, National Bureau of Economic Research and ECB calculations.
Notes: The charts show the normalised annual inflation rates for 12 quarters before and after the last quarter of each US recession (0 = Q1 1975, Q4 1982, Q1 1991, Q4 2001 and Q2 2009). Results for the euro area are as reported in Charts 2 and 3.

variation in inflation developments in the latter. This also applies to periods of recession and is reflected in the wider ranges for both headline inflation and inflation excluding food and energy in the United States than in the euro area. This may be due, inter alia, to the fact that developments in energy prices tend to have a somewhat larger impact on inflation in the United States, in line with the higher energy intensity of the US economy, owing to lower taxes on energy products, and the empirical finding that inflation reacts more swiftly and strongly to changes in economic slack in the United States.[1] In general, prices seem to change more frequently in the United States, which may be related to greater competition in the retail sector and some services.[2]

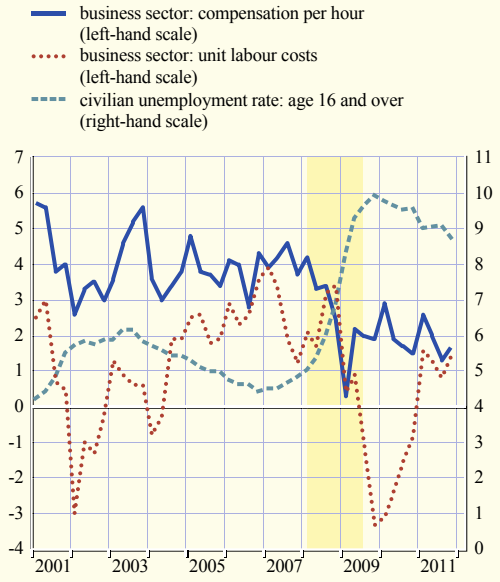
Labour costs appear to have responded more quickly to economic conditions in the United States than in the euro area

In both the euro area and the United States, the latest recession initially led to some upward pressure on unit labour cost growth, before a moderation in wage growth and improvements in productivity triggered a marked decline half way through the recession period (see Charts C and D). However, while in the United States, unit labour costs had already moved into negative territory in the second half of 2009 and in 2010, and remained below their pre-crisis growth rates thereafter, in the euro area, the initial lack of adjustment in wages and labour costs during the recession

1 For more details, see the box entitled "Inflation in the euro area and the United States: an assessment based on the Phillips curve", *Monthly Bulletin*, ECB, June 2011.
2 For a more profound analysis, see "Price Changes in the Euro Area and the United States: Some Facts from Individual Consumer Price Data", Dhyne, E. et al., *Journal of Economic Perspectives*, Vol. 20, No 2, spring 2006.

Chart C US unemployment rate and labour costs

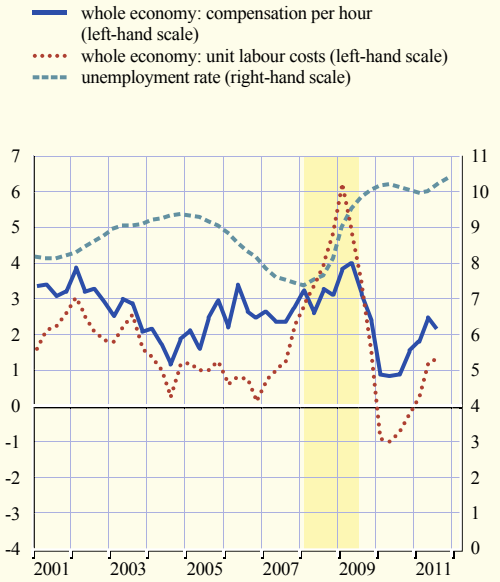
(annual percentage changes; percentage of the labour force; seasonally adjusted)



Sources: US Bureau of Labor Statistics and National Bureau of Economic Research.
Note: The shaded area indicates the latest recession period.

Chart D Euro area unemployment rate and labour costs

(annual percentage changes; percentage of the labour force; seasonally adjusted)



Sources: Eurostat, Centre for Economic Policy Research and ECB calculations.
Note: The shaded area indicates the latest recession period.

pushed unit labour costs up to very high levels for some quarters before they declined briefly and to a lesser extent than in the United States. The main factors behind these developments appear to be the degree of the adjustment and its timing, bearing in mind that the peak-to-trough decline in real GDP growth was comparable between the two economic areas. Indeed, the charts indicate that there was a greater delay in the deceleration of wage growth in the euro area than in the United States and that the increase in the unemployment rate was much more modest. A simple cross-correlation analysis between labour costs and the unemployment rate versus real GDP developments confirms a more coincident relationship between labour market developments and economic activity in the United States than in the euro area, especially in terms of labour costs. This is in line with the notion that, compared with the euro area, inflation excluding food and energy in the United States typically reacts more quickly to changes in economic slack, owing to the greater labour market flexibility in the United States than in the euro area, although, during the latest recession, the extent and nature of the flexibility (e.g. number of hours worked and persons employed) varied substantially across the euro area countries.

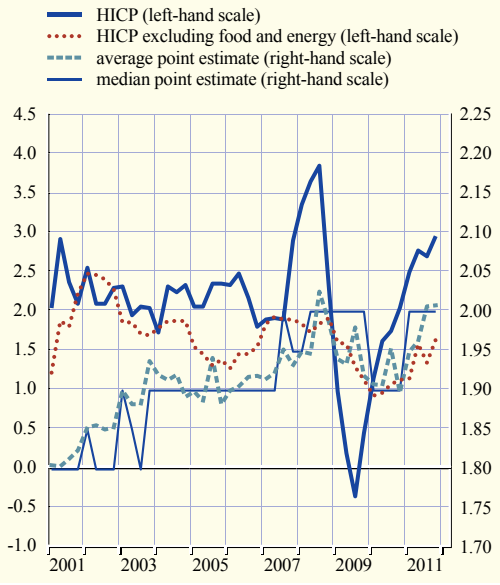
To sum up, in both the euro area and the United States, developments in headline inflation during the latest recession were not in line with historical experience. At the same time, in both economies, the developments in inflation excluding food and energy were broadly in line with historical experience. Finally, it appears that labour costs in the United States adjusted more quickly to the economic conditions than in the euro area, and that the adjustment was due to both lower wage growth and gains in productivity on the back of a greater number of lay-offs at an earlier stage.

Finally, a low responsiveness of inflation to changes in economic slack can also be due to price and wage-setters' inflation expectations being firmly anchored. Expectations can be an important determinant of actual inflation: if agents believe that inflation will remain below, but close to, 2% over the medium term (and that monetary policy measures will be appropriate for meeting that objective), the risk of a self-sustaining deflationary process is low.

Chart 12 depicts the developments in long-term inflation expectations in the euro area, derived from the ECB Survey of Professional Forecasters, over the period from the first quarter of 2001 to the fourth quarter of 2011. It shows that long-term inflation expectations in the euro area have remained stable in recent years. From 2004 the median point forecast was between 1.9% and 2.0%, despite the strong movements in prices as of 2006 and the depth of the recession that followed the collapse of Lehman Brothers in 2008. The mean and median point forecasts were broadly in line with the ECB's quantitative definition of price stability and, overall, they displayed remarkable stability.

Chart 12 Inflation expectations (five years ahead), HICP inflation and HICP inflation excluding food and energy

(annual percentage changes)



Sources: ECB Survey of Professional Forecasters and ECB calculations.

5 CONCLUSION

This article has reviewed the developments of consumer prices in the euro area during the 2008-09 recession. Compared with previous recessions, overall HICP inflation experienced a sharp decline, but this was the result of the greater impact of commodity price developments on the food and energy components of the HICP, rather than a response to the exceptional changes in economic slack. In fact, the more domestically generated parts of inflation, as measured by the HICP excluding food and energy, were relatively resilient given the severity of the recession. This resilience was in line with the weakening relationship between the degree of economic slack and inflation that has been observed over the last two decades. Nominal rigidities in the labour markets, especially as headline inflation approached zero, and a stronger anchoring of inflation expectations may have played an important role in dampening fluctuations in price and wage inflation over the economic cycle. In the United States, developments in inflation excluding food and energy were also broadly in line with those during previous recessions. However, the labour cost adjustment in the United States was quicker to reflect the economic conditions than in the euro area as a whole, and was the result of both lower wage growth and gains in productivity.

The findings on past inflation adjustments can help to determine the outlook for euro area inflation. In particular, they can help to explain why the currently available inflation forecasts and projections for 2012 from private and international organisations remain elevated, despite the slowdown in growth observed in 2011.

In fact, HICP inflation excluding food and energy is projected to remain broadly stable over the projection horizon. While domestic price pressures stemming from slow growth in domestic demand and contained labour cost developments are expected to be weak, they are expected to be broadly offset by the upward impact of foreseen increases in indirect taxes and administered prices.[11]

11 See the box entitled "ECB staff macroeconomic projections for the euro area", *Monthly Bulletin*, ECB, March 2012.