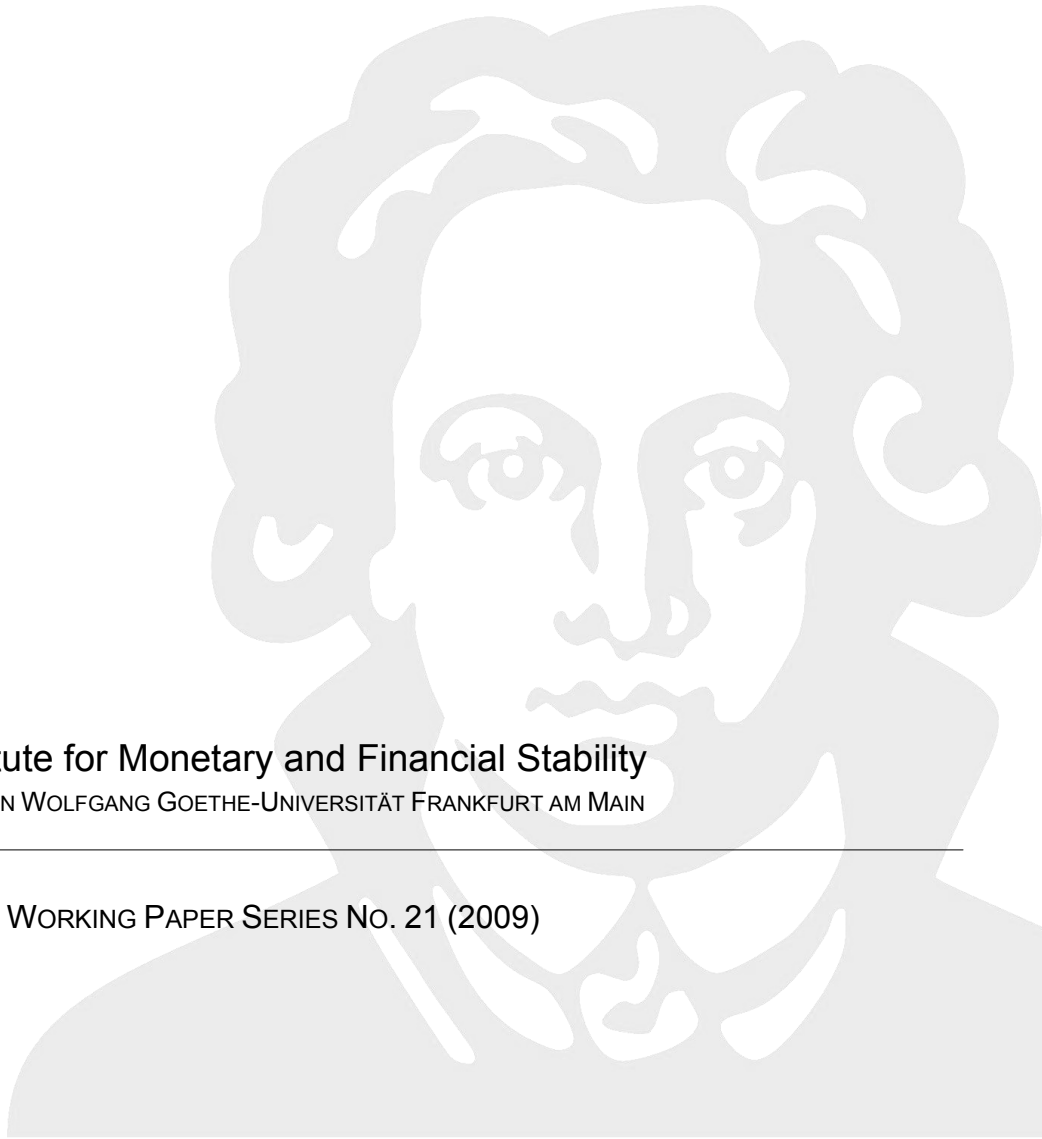
STEFAN GERLACH

The Risk of Deflation



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PROF. DR. HELMUT SIEKMANN (HRSG.)

INSTITUTE FOR MONETARY AND FINANCIAL STABILITY
PROFESSUR FÜR GELD-, WÄHRUNGS- UND NOTENBANKRECHT
JOHANN WOLFGANG GOETHE-UNIVERSITÄT
GRÜNEBURGPLATZ 1
60629 FRANKFURT AM MAIN

TELEFON: (069) 798 – 34014
TELEFAX: (069) 798 – 33913
E-MAIL: GELD-UND-WAEHRUNG@IMFS-FRANKFURT.DE

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THE RISK OF DEFLATION

Stefan Gerlach*
University of Frankfurt and CEPR

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*Institute for Monetary and Financial Stability, House of Finance, Goethe University, Grüneburgplatz 1 (Box H 12), 60629 Frankfurt am Main, Germany. Email: stefan.gerlach@wiwi.uni-frankfurt.de. I am grateful to Katrin Assenmacher-Wesche, Petra Gerlach-Kristen and Madhu Mohanty for helpful comments and to Eva Koscher for research assistance.

1. INTRODUCTION

The onset of financial instability in August 2007, which quickly spread across the world, raises a number of questions for policy makers. First, what are the roots of the crisis? Many factors have been emphasized in the debate, including the opacity of complex financial products; the excessive confidence in ratings; weak risk management by financial institutions; massive reliance on wholesale funding; and the presumption that markets would always be liquid.[1] Furthermore, poorly understood incentive effects – arising from the originate-to-distribute-model, remuneration policies and the period of low interest rates – are also widely seen as having played a role.

Second, how can a repetition of the crisis can be avoided? Much attention is being focused on regulation and supervision of financial intermediaries. The G-20, at its summit in November 2008, noted that measures need to be taken in five areas: (i) financial market transparency and disclosure by firms need to be strengthened; (ii) regulation needs to be enhanced to ensure that all financial markets, products and participants are regulated or subject to oversight, as appropriate; (iii) the integrity of financial markets should be improved by bolstering investor and consumer protection, avoiding conflicts of interest, and by promoting information sharing; (iv) international cooperation among regulators must be enhanced; and (v) international financial institutions must be reformed to reflect changing economic weights in the world economy better in order to increase the legitimacy and effectiveness of these institutions.

Third, how can the consequences for economic activity be minimized? Many of the adverse developments in financial markets – in particular the collapse of term interbank markets – reflect deeply entrenched perceptions of counterparty risk. Prompt and far-reaching action to support the financial system, in particular the infusion of equity capital in financial institutions to reduce counter-party risk and get credit to flow again, is essential in order to restore market functioning.

A particular risk at present is that the rapid decline in inflation in many countries in recent months will turn into deflation with highly adverse real economic developments.[2] This background paper considers how large the risk of deflation may be and discusses what policy can do to reduce it. It is organized as follows. Section 2 defines deflation and discusses downward nominal wage rigidities and the zero lower bound on interest rates. While these factors are frequently seen as two reasons why deflation can be associated with very poor economic outcomes, they should not be overemphasized. Section 3 looks at the current situation. Inflation expectations and forecasts in the subset of economies we look at (the euro area, the UK and the US) are positive, indicating that deflation is not expected. This does not imply that the current concerns of deflation are unwarranted, only that the public expects the

[1] See Bean (2008) and G-20 (2008).

[2] Some countries experienced deflation in 19th century because of favorable supply shocks that also led to rapid output growth. See also the Appendix.

central bank to be successful in avoiding deflation. The section also looks at the evolution of headline and "core" inflation, focusing on data from the US and the euro area. Section 4 reviews how monetary and fiscal policy can be conducted to ensure that deflation is avoided. Section 5 briefly discusses special issues arising in emerging market economies. Finally, Section 6 offers some conclusions. An Appendix discusses deflation episodes in the period 1882-1939.

2. PRELIMINARIES

As a start, it is useful to emphasize that deflation is a fall of the economy-wide price level that is sufficiently persistent to trigger expectations that prices will continue to decline for some non-negligible period of time. Because of changes in productivity and production costs more broadly, or because of changes in demand patterns, prices for some goods may always or frequently be declining. For instance, prices of traded goods are typically rising at a much slower rate than services, implying that if the central bank's inflation target is sufficiently low, traded goods prices may be falling continuously. However, while price falls in a specific sector may be associated with economic weakness in the sector in question, the broader economy is likely to be unaffected. Thus, declines in individual or sectoral prices do not constitute deflation.

Similarly, purely temporary falls in the aggregate price level may not have any lasting effects on consumers' and firms' behaviour, and on the broader economy, and therefore do not constitute deflation. By contrast, if the aggregate price level declines for some time, expectations may form that prices will continue to fall. Much in the same way as expectations of future inflation may lead firms to raise prices already now, expectations of deflation exacerbate the downward pressure on current prices and make it more difficult to design policies to return to a low, positive rate of inflation. As discussed below, this suggests that policy measures that seek to shield inflation expectations from current price developments are likely to help mitigate the macroeconomic effects of falls in the economy-wide price level.

While there are historical episodes in which deflation arose from positive supply-side developments and that tended to raise economic growth, cases of deflation are likely to be associated with pronounced macroeconomic weakness for several reasons.[3]

First, deflation may reflect particularly large and persistent declines in the demand for goods and services, triggered for instance by financial instability. If so, deflation is merely an indicator, and not a cause, of slowing aggregate demand. Monetary and fiscal policy measures that raise demand will in this case expand economy activity in much the same way as they would at a low, positive rate of inflation.

[3] Unexpected falls in the price level – which by my definition do not constitute deflation – that redistribute wealth from debtors to creditors are more likely to depress spending and lead to defaults and financial distress than unexpected increases in the price level. See Buiter (2003) or IMF (2003).

Second, deflation can induce non-linearities in the functioning of the economy. Thus, there is a risk that a contractionary shock of a given size will be more difficult to handle if it pushes the economy into deflation than if the rate of inflation remains positive. There are two reasons for why that may be the case: nominal wages may be rigid downward and there is a risk that policy-controlled interest rates reach zero, which reduces the effectiveness of the interest rate channel of monetary policy. We discuss each in turn.

2.1 DOWNWARD NOMINAL WAGE RIGIDITY

Downward nominal wage rigidity is an important reason why deflation is likely to be associated with poor real outcomes. In situations in which nominal wage growth and inflation have historically been positive, it seems unlikely that a fall in the nominal price level will trigger a decline in nominal wages. Thus, real wages will rise, reducing employment and economic activity. Since price increases vary across firms, one would expect that the fraction of firms that experience falling prices increases when the economy-wide inflation rate falls towards zero. The importance of downward nominal wage rigidity is consequently likely to rise with falling inflation.

Indeed, Fehr and Götte (2005, Fig. 3, p. 788) show that as inflation in Switzerland declined from 4.7% in 1991 to 0% in 1997, the distribution of wage changes of workers shifted towards the left and growing number of workers reported zero wage increases.[4] Though some reported wage falls, the distribution of wage changes became increasingly asymmetric over time. This evidence demonstrates that downward nominal wage rigidity does impact on the labour market's ability to adjust to shocks, in particular when inflation is very low.

However, there are reasons not to overestimate the importance of downward nominal wage rigidities. Most importantly, if productivity growth is positive, real unit labour costs can still decline even if real wages are rising, although less so than in the absence of downward nominal wage rigidity. Moreover, unit labour costs depend also on indirect taxes and social charges, which can be changed in a counter-cyclical manner to support employment.

Furthermore, downward nominal wage rigidity is not a structural feature of the economy but rather a consequence of having experienced a long period of positive inflation.[5] Indeed, the importance of downward nominal wage stickiness may decline if the economy enters deflation, as the experiences of Hong Kong suggest. The CPI in Hong Kong fell a cumulative 16.3% between May 1998 and August 2003, with the peak rate of deflation being 6.3% (Gerlach and Kugler 2007). Measured by the change in prices over twelve months, Hong Kong experienced 68 months of deflation. The deflation rate soon became fully expected by firms and workers and

[4] Buiter (2003) argues that this spike at the zero of the distribution of relative wage changes only indicates that wages are sticky, not that they are downwardly sticky. The findings of Fehr and Götte (2005) contradict this conclusion.

[5] In some countries, labor market legislation may bar wage cuts in some circumstances.

wage cuts were common. The distribution of wage changes in 2002-2004 involved a large number of wage cuts and appears symmetric (HKMA, 2008, Box 3, pp. 35-36). This suggests that any downward nominal wage rigidity disappeared as the economy experienced an extended period of deflation.[6] Nevertheless, unemployment increased in Hong Kong during this period, suggesting that the fall in nominal wages was not sufficiently large to prevent real wages from rising.

Overall, downward nominal wage rigidity is likely to worsen labour market outcomes if inflation falls towards, and below, zero.

2.2 THE ZERO LOWER BOUND ON NOMINAL INTEREST RATES

A further reason why economic outcomes are likely to be adverse in a situation of deflation stems from the fact that central banks can not reduce nominal interest rates below zero. The nominal interest rate equals the sum of the real interest rate and the expected inflation rate. If the nominal interest rate is zero, the real interest is equal to minus the rate of inflation. As deflation takes hold and turns increasingly severe, real interest rates rise, reducing aggregate demand and exacerbating the downward pressure on prices. [7]

While the zero lower bound does impose a constraint on the interest rate channel of monetary policy, its importance for the overall transmission mechanism – which operates also through yields in longer-term securities, private securities, exchange rates and asset prices – is frequently exaggerated, as is discussed in Section 4.

3. IS DEFLATION LIKELY?

There is much evidence that the expected rate of inflation plays a key role in determining the current rate of inflation. This naturally leads to the question what rates of inflation the public expects at the current juncture. Before addressing this question, suppose that expected inflation is positive. Does this imply that policy makers need not worry about deflation and that there is no need for unusual policy measures to offset this risk?

A moment's reflection indicates that the answer to this question must be "no." Inflation expectations depend on (i) the shocks impacting on the economy and (ii) the public's beliefs about how the authorities will respond if deflation threatens and how effective these responses are likely to be. Thus, positive inflation expectations may thus result even if there is strong

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[6] More anecdotally, when the present author extended his employment contract with the Hong Kong Monetary Authority in 2004 after six years of deflation, he was offered a wage cut of 2.5%.

[7] There is also a risk of a deflation trap developing. Suppose that interest rates and inflation are both zero and that for some reason the public starts to expect deflation. The expected real interest rate then rises, reducing aggregate demand and triggering deflation.

downward pressures on inflation rates if the public expect that the authorities will adopt aggressive policy measures to offset them. In sum, expectations that inflation will remain positive say nothing about whether there is a need for the authorities to adjust policy to avoid deflation.[8]

However, it can be useful to look at short-run measures of expected inflation which, since economic policies impact on inflation only with a lag, are less likely to be contaminated by expectations of future economic policy. Figure 1 shows average forecasts of inflation in 2009, made at various times in 2008 and in 2009, from the Economist poll of forecasters.[9] Inflation forecasts for 2009 were raised as headline inflation picked up in 2008 in response to shocks impacting on the prices of oil, food and other commodities. Following the collapse of Lehman Brothers in September 2008 and the sea-change it caused in financial markets, forecasts of inflation in 2009 were rapidly reduced from October onwards. By January 2009, on average, forecasters expected consumer prices to fall over the course of the year by 0.1 percent in Japan, stay constant in the US, rise by 1 percent in the UK and 1.1 percent in the euro area, that is, quite a bit below the Bank of England's inflation target of 2% and the ECB's objective of inflation "below, but close to, two percent."

Other indicators of price expectations display a similar story. For instance, Figure 2 shows the Michigan survey of US inflation expectations for the next 12 months; these fell by from 4.3% in September to 1.7% in December. Figure 3 shows the expected rate of inflation over the next 12 months taken from the Bank of England's *Inflation Attitude Survey* and the ECB *Survey of Professional Forecasters*. These data are quarterly, and the most recent data point is for November. Since inflation and expected inflation declined towards the end of the year, it seems likely that the expected inflation rates have fallen below the rates tabulated here. But overall, the lesson we draw from these graphs is that inflation is generally expected to be positive for 2009 in these countries, with the possible exception of the US and Japan.

3.1 HEADLINE AND CORE INFLATION IN THE US AND THE EURO AREA

Another way to assess the likely path of inflation is to look at measures of "core" and headline inflation. Figures 4 and 5 show that headline CPI inflation in the US and the euro area (as in many other economies) rose sharply in the fall of 2007, reached a peak in July 2008, and declined rapidly thereafter.[10] Core inflation (defined using the CPI less the food and energy components) was more stable, implying that these movements in headline inflation reflected

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[8] By contrast, inflation expectations that are negative provide firm reasons for central banks to relax monetary policy.

[9] An obvious weakness of this survey is that it is based on a very small sample of 13 financial institutions; the main advantages are that it is freely available and monthly.

[10] The graph for the US would look similar if instead the deflator for personal consumption expenditure was used.

largely oil and food price shocks, not shocks to the underlying rate of inflation. Since movements in oil prices are best thought of as price level shocks, they are likely to have only a temporary impact on the rate of inflation. The recent fall in oil prices, which constitutes an expansionary supply shock, is thus unlikely to lead to deflation, although it may lead to a brief period of falling prices.

To explore this issue somewhat more formally, I next estimate a forecasting model for inflation in the US and the euro area on data spanning January 1999 – December 2008, and compute dynamic out-of-sample forecasts of headline inflation for the period January 2009 – December 2010.[11]

The results for the US are displayed in Figure 6 and those for the euro area in Figure 7, together with 95% confidence bands. The point forecast for inflation in the US is that it will continue to fall, reach a trough at -1.3% in May 2009, remain negative until October, and recover rapidly thereafter. These findings are broadly compatible with the inflation forecasts for 2009 presented above. However, the wide confidence bands indicate a great deal of uncertainty around those forecasts.

Turning to the results for the euro area, these suggest that inflation will continue to decline in the months ahead, reach a trough of 0.8% in April 2009, and gradually rise to 1.9% in December 2010. Also in this case are the forecasts highly uncertain and, in particular, there is some probability that inflation will turn negative for a while.

Overall, these results indicate that the decline in inflation is expected to be temporary. However, they should not be overinterpreted. They come from a very simple model and disregard a number of factors that impact on inflation, such as monetary and fiscal policy measures. Moreover, by construction, they assume that the inflation will return to its sample mean over time.

4. POLICY MEASURES TO REDUCE DEFLATION RISKS

The analysis in the previous section suggests that while inflation is declining rapidly and prices may be falling for a while in 2009, inflation will soon return. But suppose that that prediction turns out to be wrong. Can policy then be used to ensure that declining prices do not become a permanent feature of the economic landscape?

[11] In both cases I estimated a VAR model for CPI inflation, core inflation, the rate of growth of oil prices and a business cycle indicator. While there are no financial variables in the model, the financial crisis is captured indirectly by the last two variables, both of which have collapsed in recent months. As business cycle indicator I used the NAPM survey for the US and the Economic Sentiment Indicator of Eurostat for the euro area. Gerlach (2007) shows that the latter displays strong correlation with future values of estimates of the euro area output gap. On the basis of the Schwarz information criterion, I selected a VAR(1) model for the US and a VAR(2) model for the euro area.

It is useful to remember that the historical record clearly shows that episodes of deflation are best seen as evidence of serious policy failures, rather than as episodes in which policy makers were overwhelmed by a collapse in aggregate demand that was too large and too sudden for them to offset. Thus, the deflation experienced by Japan in the 1990s was largely due to a lack of consensus about what policy measures were necessary to support the financial sector and the economy more broadly. Similarly, the deflation experienced by many countries in the interwar period is also typically seen as evidence of massive policy mistakes, such as the failure of the Federal Reserve to prevent widespread bank insolvencies and the fact that many countries maintained their gold parities despite the collapse of demand following the onset of the Great Depression.[12]

But if episodes of deflation are due to policy failures, what tools can policy makers use to avoid them?

4.1 MONETARY POLICY

Since inflation – and therefore deflation – is a monetary phenomenon, it is avoidable by appropriate monetary policy actions. It is useful to distinguish between monetary policy in the "standard" case in which policy-controlled interest rates are positive, and the "non-standard" case when they have reached zero and cannot be reduced further.

4.1.1 MONETARY POLICY WHEN INTEREST RATES ARE POSITIVE

Given the costs of deflation, the best policy strategy is to prevent it from arising rather than to deal with it when it has become a fact.[13] When interest rates are positive, the central bank can reduce the risk of deflation by cutting interest rates further. In this case there is no analytical difference between preventing inflation from falling too low and preventing deflation from taking hold. Yet two points deserve being mentioned.

First, since modern macroeconomic theory holds that inflation is forward-looking and depends on expected future inflation, it becomes important for central banks facing falling prices to engender expectations that inflation will over time return to a low positive number.[14] To do so, it is helpful to adopt a formal numerical objective for inflation. Precisely how that is done – whether by announcing a target for inflation or by adopting price stability as the overriding objective for monetary policy and buttress this with numerical definition thereof – appears to be less important. The rationale for such an objective is that, if it is credible, the public will expect

[12] For a discussion of the role of the gold standard in the transmission of the Great Depression, see Eichengreen (1992).

[13] See Bernanke (2002) and IMF (2003).

[14] Woodford (2003) is the by now classic reference. See also Galí (2008).

inflation in the future even if prices are falling today, which depresses the expected real interest rate and supports demand.[15]

However, to be effective, such an objective should be adopted before the inflation rate reaches zero. If economic conditions then worsen, the central bank can demonstrate its commitment to the objective by cutting interest rates aggressively. If, by contrast, the objective is adopted when prices are already falling and policy-controlled interest rates are at zero, the public may doubt whether the central bank has sufficiently powerful tools to deliver on any announced inflation objective. The objective will thus lack credibility and the public may simply disregard it, which risks damaging the central bank's credibility.

Second, since monetary policy is likely to be less effective when policy rates have reached zero, it makes sense for the central bank to cut interest rates increasingly aggressively as the policy rate approaches zero. The argument that central banks should avoid cutting interest rates to zero since they then have no policy lever left to use if inflation falls further seems incorrect, since the likelihood that additional policy easing is needed will decline if rates are cut aggressively at an early stage of the easing process.[16] This is consistent with theoretical models that predict a stronger decline in long interest rates and therefore a greater reaction of the economy, the longer the interest rate is maintained at a low level.

4.2.2 MONETARY POLICY WHEN INTEREST RATES ARE ZERO

While the fact that policy controlled interest rates cannot be cut below zero complicates the management of monetary policy, the importance of this constraint has frequently been exaggerated. As a preliminary, note that if the rate of deflation is moderate, the zero lower bound need not imply unreasonably high real short-term interest rates. As an illustration, the average overnight interest rate in the euro area between January 1999 and October 2008 was 3.2%. In the same period, HICP inflation averaged 2.2%, resulting in an average real short-term interest rate of 1%.[17] Thus, if policy rates reached the zero lower bound, deflation rates of 1% could be accommodated without pushing real interest rates above their historical mean.[18] Of course, while it would be desirable to have even lower real interest rates during a recession, it

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[15] To further strengthen this effect, the central bank could announce a price level target above the current price level. This has the added effect of requiring the central bank not only to raise the rate of inflation if it falls too low, but also to compensate for the fact that prices may previously have fallen below the targeted rate. A price level target is a key ingredient of the *foolproof way* of escaping deflation suggested by Svensson (2001).

[16] However, pegging the overnight rate at zero makes it difficult to revive the interbank market since in that situation a bank has no financial incentive to incur the credit risk associated with interbank lending.

[17] Inflation is defined as the realized change of prices over the past 12 months.

[18] For comparison, in Japan the CPI (excluding fresh food) fell by 4.9% between September 1997 and February 2005, with a peak rate of deflation of 1.5%.

seems that the zero lower bound does not necessarily imply very high real short-term interest rates.

More importantly, the zero lower bound does not render monetary policy ineffective. First, monetary policy impacts on the economy through a range of interest rates and not only through the overnight rates that central banks control. Many observers have noted that even if overnight interest rates reach zero, longer-term interest rates are likely to remain positive. For instance, at the present stage with the policy rate in Japan being 0.1%, 10-year yields are around 1.25%. In the US, where it currently is the Federal Reserve's intention to keep the federal funds rate in the interval 0 to 0.25%, 10-year yields are around 2.5%. By purchasing long-term government bonds, central banks can reduce their yields, leading to valuation gains for bond holders and an improvement of their balance sheets, and depress other interest rates that use them as reference rates. The valuation gains may be particularly important if the bonds are held by the banking system, in which case the balance sheet effects could reduce perceptions of credit risk in the interbank market and help spur additional bank lending when the economic outlook improves.[19]

Furthermore, even in a situation in which all government bond yields have declined to zero, yields on private debt instruments will typically be positive. As emphasized by Buiter (2003), as long as some nominal yields are positive, central banks can stimulate the economy by purchasing these securities and driving yields down to zero.

Second, monetary policy also impacts through credit availability effects. Bernanke (2009) notes that concerns about credit risk may limit the willingness of banks to extend credit even in the hypothetical case in which all interest rates have reached zero. If so, the central bank can provide credit directly to borrowers. The Federal Reserve's recent purchases of commercial paper provide an illustration of how this can be done.

Of course, central bank purchases of long bonds and private assets raise a number of questions. For instance, the central bank can experience capital losses on its long bond portfolio if economic prospects improve and yields rise. Similarly, purchases of private assets raise questions about credit risk.[20] However, these issues can be overcome by the financial authorities assuming any capital losses the central bank becomes exposed to as a consequence of such operations. This indicates how important close co-operation between the central bank and the financial authorities is in the present situation.

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[19] These valuation gains are greater for longer maturity bonds, and greater the lower the level of interest rates is. To see this, note that the price, p, of an n-period pure discount security and the yield, r, are related as follows $p = (1+r)^{-n}$ (e.g. Wickens 2008, p. 267).

[20] They also raise the issue what criteria the central bank should use when determining what private asset to buy.

Third, monetary policy also impacts on the economy through the exchange rate channel, which remains effective even if the interest rate channel has become dysfunctional. For instance, by depreciating the exchange rate a central bank can stimulate the economy and raise the rate of inflation. While this is a "beggar-thy-neighbour" policy, it may be seen by other countries as appropriate if the shock triggering deflation is idiosyncratic. At the current juncture, where a number of countries are exposed to rapidly slowing demand, this strategy is of course not available. Moreover, efforts to provide macroeconomic stimulus by depreciating the exchange rate may in this case well turn out to be counterproductive if policy makers in other economies seek to undo the resulting appreciation of their currencies.

Overall, even if policy-controlled interest rates were to reach zero, monetary policy retains considerable potency.[21] Indeed, some observers worry that there is a risk that the vigorous easing of monetary policy across the world in recent months risks leading to a burst of inflation. How concerned should we be about that possibility? It is difficult to see why central bank could not withdraw the policy stimulus at the same rate as it was introduced: interest rates can be increased as rapidly as they were cut and assets purchased by central banks can be liquidated rapidly if economic conditions improve. (Moreover, to the extent that the central banks' operations have been in short-dated instruments or repos, they will naturally mature within a short time span.)

However, given the lags between changes in monetary policy and their impact on the economy, the risk remains that the measures already taken will only impact on the economy as it starts to recover on its own. Central banks must thus remain alert and ready to respond, potentially, rapidly when the economy starts to recover.

4.3 Fiscal policy

Monetary policy in most countries is geared towards maintaining low and stable inflation, although that is not always the overriding target of policy. As inflation falls towards zero, interest rates are therefore adjusted to limit the risk of deflation. Moreover, since the stance of monetary policy can be changed rapidly in response to changing economic circumstances, it is natural for it to be the first line of defence against deflation. But monetary policy cannot on its own ensure that deflation is avoided. For that, fiscal policy measures are likely to be needed. These can come in at least two forms.

First, episodes of deflation associated with instability in the banking system are likely to have particularly serious effects on output and employment. Banks that have sustained large losses and have seen their capital evaporate are likely to want to scale back their balance sheets. Perceptions of credit risk may impair their ability to participate in interbank markets, triggering liquidity problems in these markets and, in severe cases, leading to runs on the banks. Furthermore, to improve their balance sheets, banks are likely to reduce leverage by contracting

[21] This is the main message in Bernanke (2002) and Buiter (2003).

lending, which can depress aggregate demand sharply. To restore banks' creditworthiness, the infusion of public funds may become necessary. The measures taken in recent months by many countries to support banks' balance sheets will help reduce the risk of deflation.

Second, changes in government purchases or taxes that boost spending can also play an important role in staving off deflation. While it is possible to think of cases in which fiscal policy has no impact on aggregate demand – for instance, a permanent increase in government spending may be offset by one-for-one fall in permanent income and consumption; a debt financed tax cut may have no impact if there is debt neutrality – those seem unrealistic and of limited practical relevance.[22]

Overall, if deflation materializes, fiscal policy measures have a role to play in supporting the financial system and in boosting aggregate demand.

5. EMERGING MARKETS ISSUES

The repercussions of the financial crisis are increasingly felt globally, raising the question of how exposed emerging markets economies are to the risk of deflation. While it is difficult to draw any firm conclusions, some special considerations that arise for these countries are readily apparent.

First, many emerging market economies have a high commodity concentration in their exports. Since commodity prices have fallen sharply, these countries have been exposed to a highly contractionary shock, raising the likelihood of deflation. On the other hand, their initial inflation rates were relatively high (partially on account of the Balassa-Samuelson effect), allowing inflation to fall further than in the industrialized world before turning negative. Moreover, commodity prices rose sharply before falling. Thus, the decline partially offsets an expansionary shock.

Second, fixed exchange rate regimes are more common in emerging markets economies than in advanced economies. If the exchange rate is fixed, the entire burden of adjustment to a shock will fall on the nominal price level.[23] This suggests that the risk of deflation is greater in economies with fixed exchange rates. Interestingly, China, Hong Kong SAR and Argentina (before the abandonment of the currency board regime), which all managed or fixed the exchange rate against the US dollar, have all experienced periods of deflation in the last two decades.

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[22] See the discussion in Buiter (2003).

[23] Gerlach and Gerlach-Kristen (2006) demonstrate that the rate of inflation in Hong Kong SAR, which has maintained a peg to the US dollar for more than a quarter century, has been higher and more volatile than inflation in Singapore, which has used a managed float.

Third, while considerable progress has been made in the last decade or two, the credibility of monetary policy is generally lower in emerging markets economies than in advanced economies. As a consequence, expectations of future inflation may be relatively sensitive to the current rate of inflation. If headline inflation turns negative, this could engender expectations of further price falls and raise the likelihood that deflation will take hold. This suggests that it may be beneficial to clarify the objectives for monetary policy by adopting an inflation target or a numerical definition of price stability.

Fourth, while financial institutions in emerging markets countries had less direct exposure to structured financial products than banks in advanced economies, they are directly exposed to the rapid downturn in the industrial economies and to the process of global deleveraging. Furthermore, in some transition economies foreign banks play a dominant role in the domestic banking system. This provides a direct channel of transmission, and exposes emerging markets economies to the risk that if the foreign banks were to experience difficulties, they could withdraw from the market leaving the host country with a much reduced banking system at a time of great economic stress.

Fifth, the degree of downward nominal wage rigidity is likely to be lower in emerging markets economies (although there may be large variations between countries), many of which have a large informal sector. If so, the onset of deflation may tend to raise real wages by less than otherwise, which in turn may support employment and economic activity.

6. CONCLUSIONS

The main policy conclusions to draw from this paper are four.

First, past episodes of deflation are best seen as reflecting policy mistakes or an inability to forge a political consensus about how policy should be conducted.[24] The economics of stopping a deflation is straightforward and calls for aggressive easing of monetary and fiscal policy, and, when it is associated with financial instability, measures to support the financial system.

Second, the rise of inflation between mid-2007 and mid-2008 and its subsequent decline appear to have been largely due to fluctuations in food and oil prices, and not to changes in the underlying rate of inflation. While it seems highly unlikely that the world economy will slip into generalized deflation in the coming year, some economies may experience a few months or quarters of falling prices, to a large extent because of the collapse of oil and food prices. That said, it makes good sense for policy makers to review their contingency plans in this area and to consider the potential benefits of adopting an inflation target or a numerical definition of price stability well before the economy risks slipping into deflation.

[24] Historically, many cases of deflation reflect beneficial supply shocks.

Third, the interest rate channel of the monetary transmission mechanism does not become ineffective simply because short-term policy-controlled interest rates reach zero. It remains operational as long as some interest rates – including those on long-term government debt and private securities – are positive. Furthermore, monetary policy also remains effective if some market participants are unable to borrow at the prevailing level of interest rates because of perceptions of credit risk. The central bank can then, in theory, purchase debt issued by these borrowers and expand aggregate demand.

Fourth, monetary policy may be unable to stop deflation if it takes hold, and fiscal policy measures to shore up the banking system and to expand aggregate demand may become necessary. While it is possible to think of situations in which fiscal policy is ineffective, those are not likely to be of much practical relevance.

Appendix: Deflation and output growth, 1882 – 1939

It is difficult to assess the risk and the consequences of deflation because very few economies, with the notable exceptions of Japan and Hong Kong SAR, have experienced a prolonged period of falling prices since the end of the Second World War.[25] Any broad analysis must therefore be based on data from before 1939. Table I shows the mean inflation rate and output growth rate for ten countries using data in the period 1882 to 1939. Deflation is defined as a decline of the CPI lasting at least two years. Moreover, given that the deflation episodes in the interwar period may have been different from those before the First World War, the table presents results for the two subperiods 1882–1913 and 1923–39. In interpreting the results it should be kept in mind that historical data were of lower quality than modern data and that the structure of the economy has evolved fundamentally over the last century. In particular, services, which are cyclically more stable and less likely to experience falling prices, are much more important in modern economies.

Evidently, periods of declining price levels were quite common before the First World War. More strikingly, output growth was positive in these periods, although not as high as in periods of rising prices. By contrast, in the 1923 – 1939 period, deflation episodes were associated with falls in real output. However, this finding appears to be entirely due to the occurrence of the Great Depression, which was characterized severe financial turmoil, exacerbated by insufficiently aggressive monetary policy. Income growth rates were also positive in the second subsample if the years 1930–33 are disregarded. Overall, this suggests that episodes of deflation are particularly worrisome if they coincide with periods of financial instability.

It is interesting to hypothesize why periods of declining prices were generally not associated with severe recessions. One possibility is that deflation episodes have historically occurred at times of relatively favourable aggregate supply movements. Another explanation is that prices did not fall long or far enough to engender extrapolative expectations of further price decreases and thus to raise expected real interest rates.

[25] This Appendix draws on material prepared by the author and published in BIS (1999, pp. 77-80).

Table 1: Average annual growth rates in percent

	Deflation periods		Non-deflation periods	
	Inflation	Output growth	Inflation	Output growth
		1882-1913		
Belgium	-4.2	1.6	1.5	2.1
Canada	-4.7	1.1	1.1	4.6
Denmark	-3.5	2.8	1.8	3.0
France	-1.1	2.1	0.2	1.6
Germany	-2.0	4.0	1.8	2.6
Italy	-1.2	1.3	1.4	2.2
Japan	-3.7	1.8	4.4	2.7
Sweden	-2.8	2.0	2.2	3.3
United Kingdom	-3.0	1.4	1.0	1.9
United States	-3.7	-1.2	1.4	4.4
Average	*-3.0*	*1.7*	*1.7*	*2.8*
		1923-1939		
Belgium	-5.6	-1.1	8.7	2.6
Canada	-6.2	-8.6	0.6	6.6
Denmark	-5.0	2.3	3.0	3.5
France	-5.8	-1.9	10.2	3.7
Germany	-6.4	-2.2	1.6	7.1
Italy	-5.4	1.1	6.1	3.4
Japan	-6.7	0.9	5.7	6.6
Sweden	-3.0	2.7	1.5	4.2
United Kingdom	-3.1	0.6	1.9	4.1
United States	-4.2	-3.8	1.8	7.3
Average	*-5.1*	*-1.0*	*4.1*	*4.9*
		1923-1939, excluding 1930-1933		
Belgium	-3.8	1.3	9.6	2.7
Canada			0.6	6.6
Denmark	-5.8	3.0	2.9	3.5
France	-6.1	-1.8	11.1	4.4
Germany			1.6	7.1
Italy	-5.5	3.1	6.1	3.4
Japan	-4.2	0.5	6.3	7.9
Sweden	-3.3	5.9	1.5	4.2
United Kingdom	-2.3	1.8	1.9	4.1
United States	-1.6	1.1	1.8	7.3
Average	*-4.1*	*1.9*	*4.4*	*5.1*

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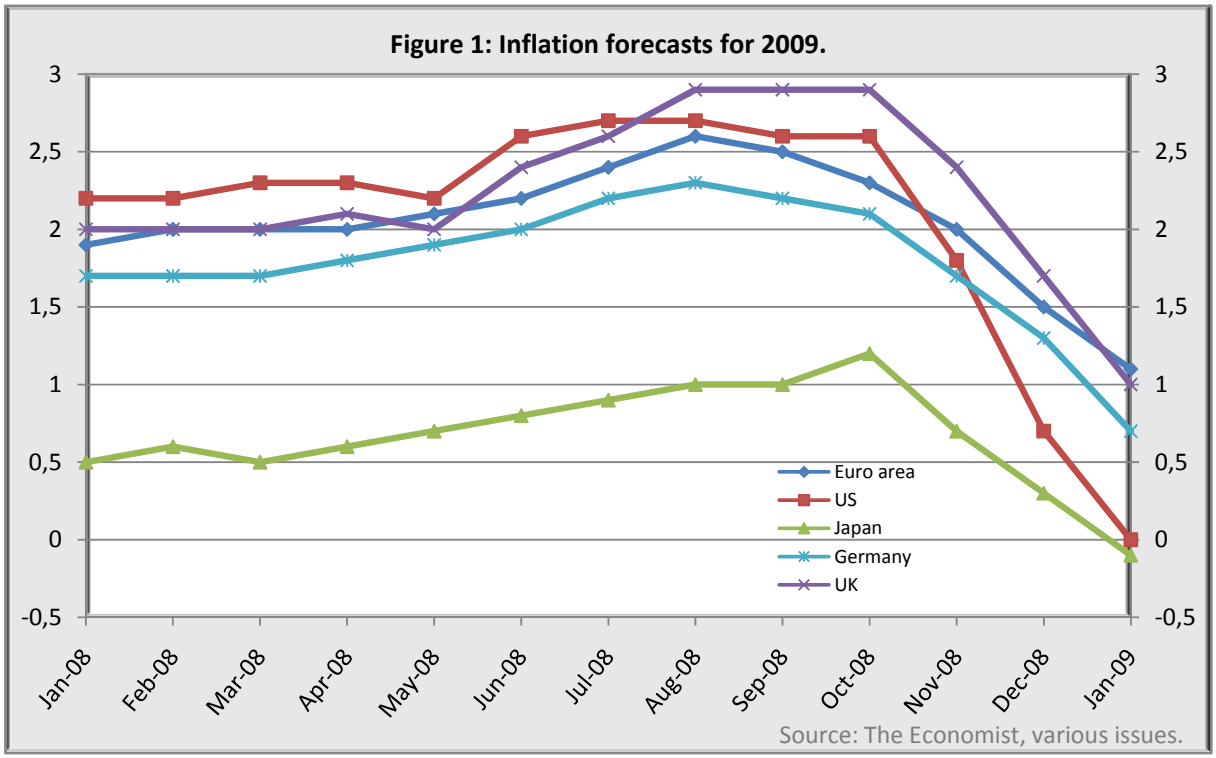
Figure 1: Inflation forecasts for 2009.
3
2,5
2
1,5
1
0,5
0
-0,5
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Euro area
US
Japan
Germany
UK
Source: The Economist, various issues.

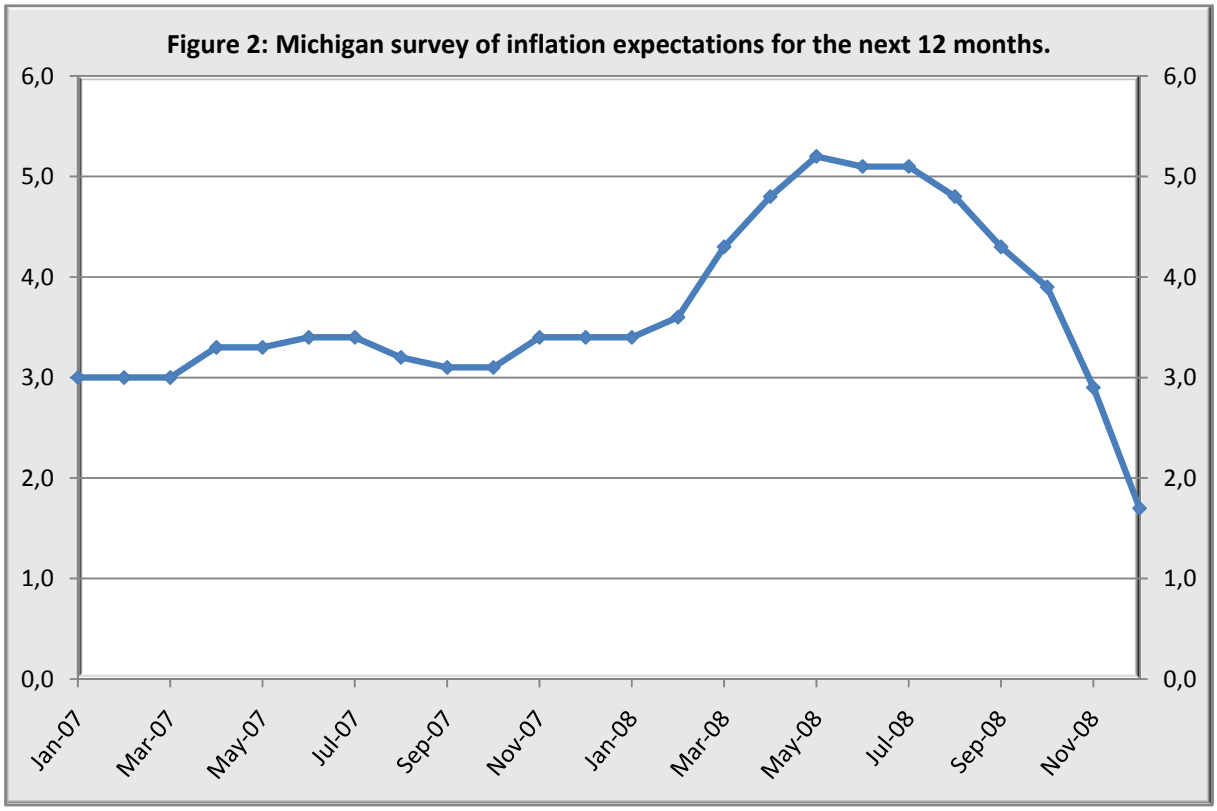
Figure 2: Michigan survey of inflation expectations for the next 12 months.
6,0
5,0
4,0
3,0
2,0
1,0
0,0
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08

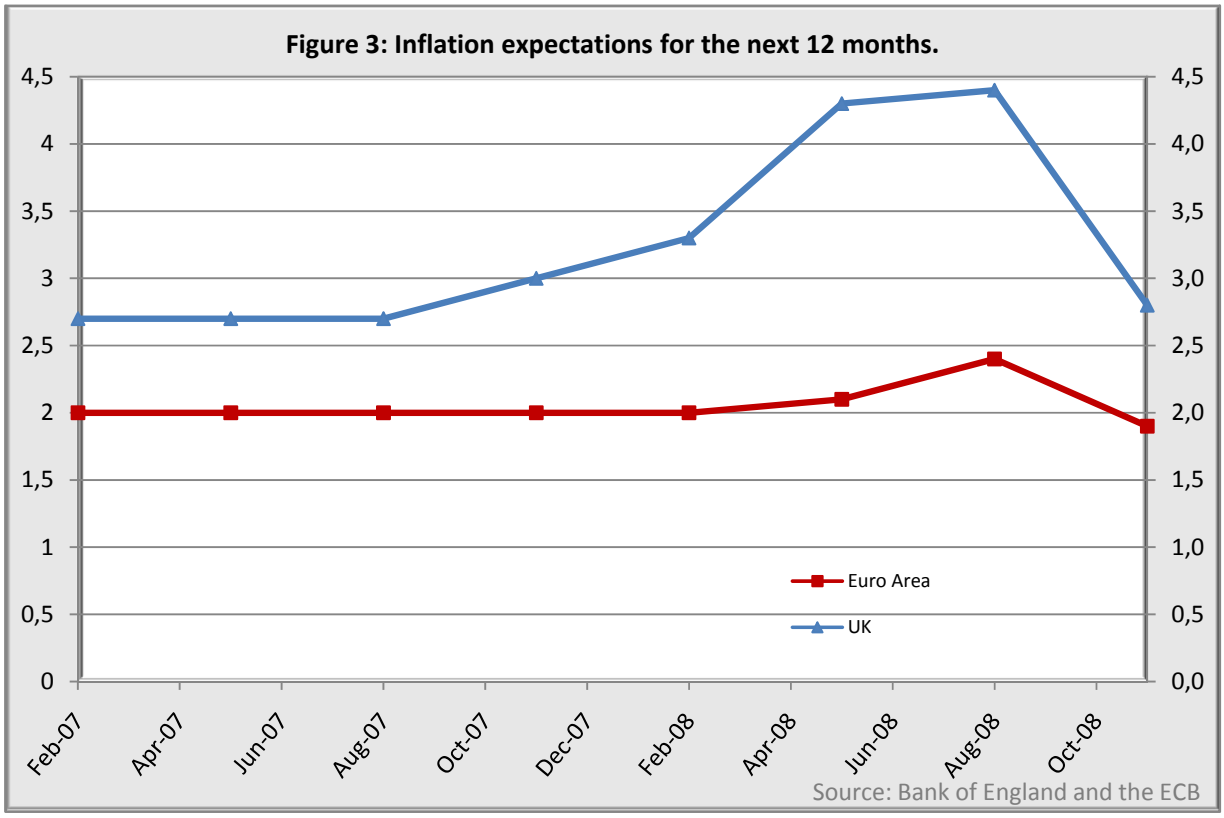
Figure 3: Inflation expectations for the next 12 months.
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
4,5
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
Euro Area
UK
Feb-07
Apr-07
Jun-07
Aug-07
Oct-07
Dec-07
Feb-08
Apr-08
Jun-08
Aug-08
Oct-08
Source: Bank of England and the ECB

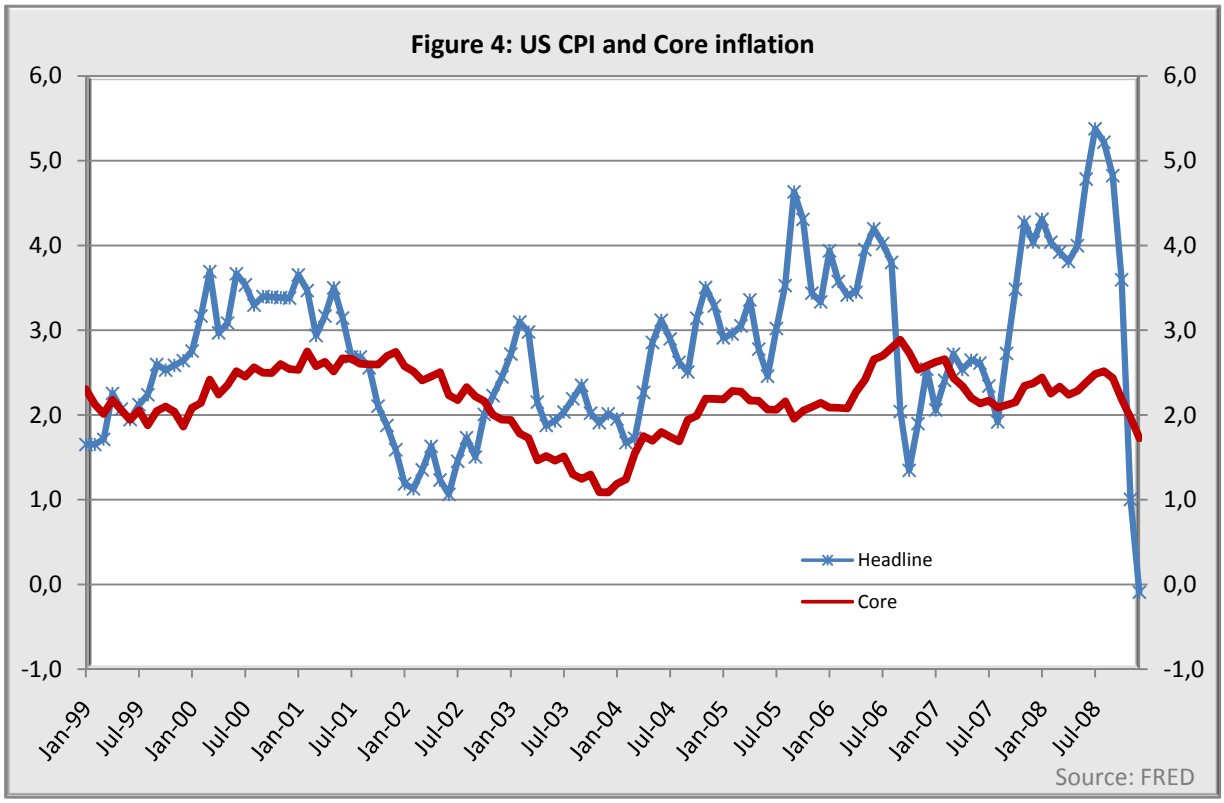
Figure 4: US CPI and Core inflation
6,0
5,0
4,0
3,0
2,0
1,0
0,0
-1,0
Headline
Core
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Source: FRED

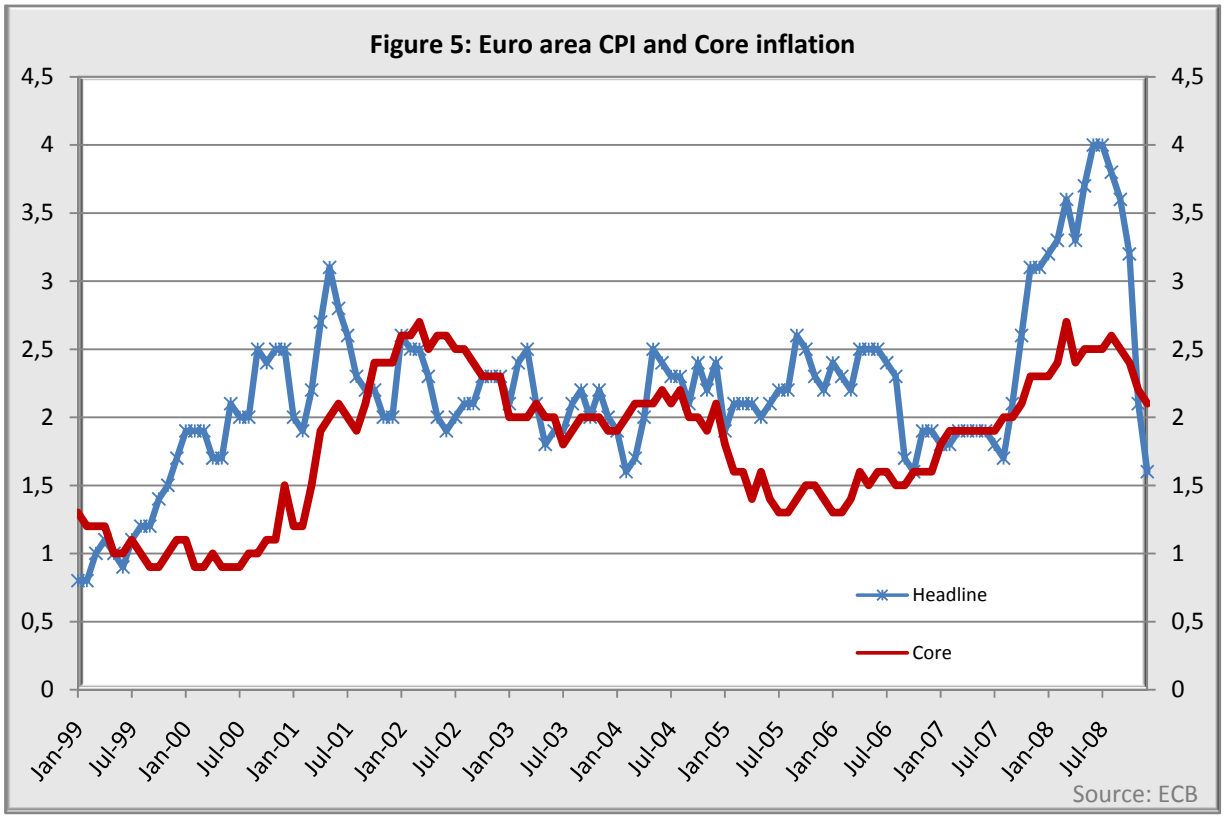
Figure 5: Euro area CPI and Core inflation
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
Headline
Core
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Jan-02
Jul-02
Jan-03
Jul-03
Jan-04
Jul-04
Jan-05
Jul-05
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Source: ECB

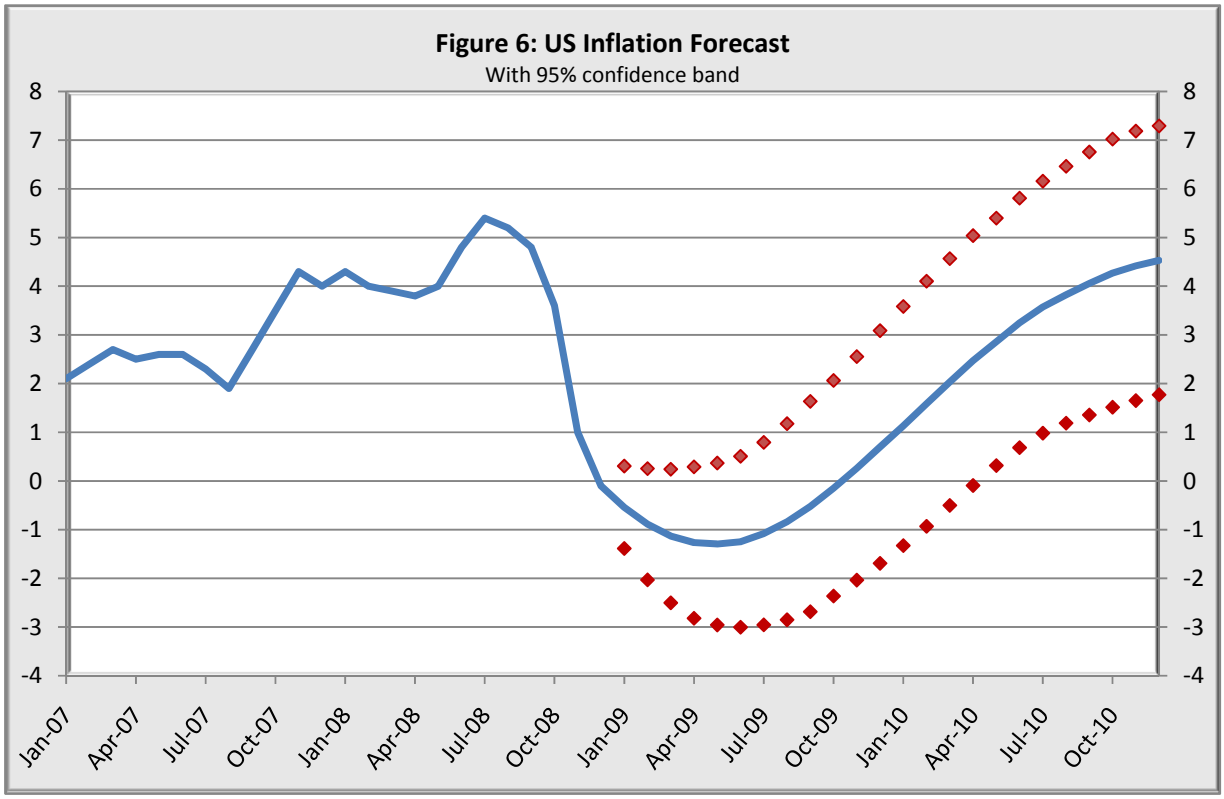
Figure 6: US Inflation Forecast
With 95% confidence band
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10

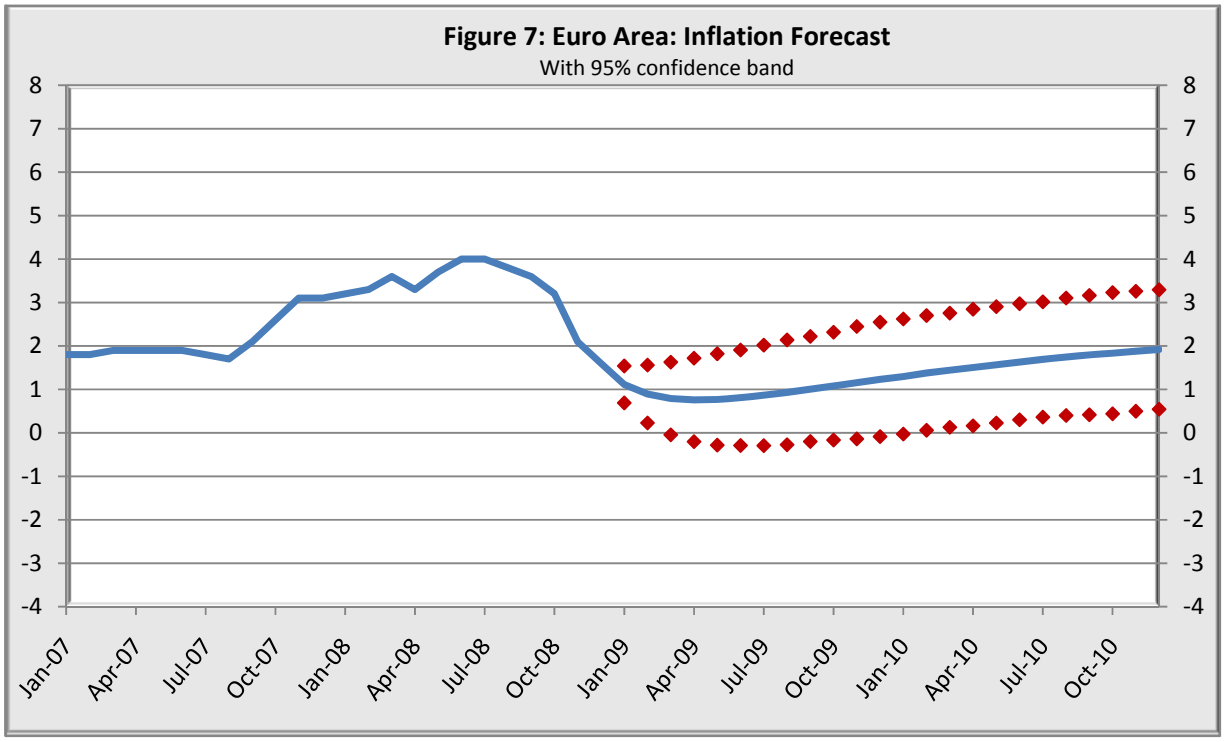
Figure 7: Euro Area: Inflation Forecast
With 95% confidence band
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10

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