

Monetary policy in the next two years

A theory-based forecast for the ECB, Federal Reserve and Bank of England

Yannis Tenret (Master of Banking and Finance)

Duncan Van Limbergen (Master of Economics)

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Abstract

In this paper, we forecast monetary policy developments for the ECB, Federal Reserve and Bank of England in the two years to come. We start by addressing the relevance of standard monetary policy transmission channels in the current environment. We draw on theoretical perspectives, empirical work on recent unconventional measures and data on on-going developments to inform our judgment for the relevance of monetary policy in influencing aggregate demand. In particular, we focus on the heightened relevance of uncertainty and credible expectations. We come to the conclusion that, while certain transmission mechanisms may have lost some of their potency, this need not mean that monetary policy has lost its ability to influence aggregate demand.

We continue with a thorough analysis of supply-side dynamics. In order to ascertain the relative output/inflation effects of higher aggregate demand, we look at the current state of aggregate supply. Our conclusion is that, given the current output gaps, broad inflationary pressures need not be a concern. Looking at conventional measures, there appears to be additional room for expansive action on the part of monetary policy makers. This conclusion is adjusted for political feasibility, central bank mandates and country-specific attributes. Such extensions are mentioned because of their explanatory power concerning the difference in policy reactions.

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1. Introduction

We try to get a better understanding of current and future policy stances by means of conducting a basic analysis of traditional monetary policy determinants. One of the cornerstones is the well-known equation of exchange, $M \cdot V = P \cdot Y$. Given observed and forecast values for velocity, prices and output, the central bank could react accordingly by trying to adjust the money supply. This way, the central bank could try to stabilize aggregate demand, and, conversely, nominal income. The basic belief is that in a sharp recession, V and Y fall sharply, whereas P can maintain a non-deflationary level when inflation expectations are well-anchored. Evidence for the persistence of inflation, even during episodes of persistent large output gaps, is provided by Meier (2010). He gives three reasons: enhanced central bank credibility, downward rigidities and globalization. Given that velocity is hard to control and central banks have an (implicit or explicit) inflation target of P^* and a strong tendency to stabilize the output gap ($Y=Y^*$), the monetary action should take place using the money supply. In other words, considering the fall in V , the central bank can try to target higher growth for Y and P by boosting the money supply, getting nominal income in line with trend growth again.

A crucial question arises: are there circumstances in which monetary authorities lose the capability to influence aggregate demand, and thus nominal income? In this case, the stabilization of the output gap through monetary policy could not be attained, ending up in a zero-growth, deflationary world. The following section will address the issue whether monetary policy can indeed become incapable of stimulating the real economy.

The extent to which output deviates from its potential level is crucial in determining whether a central bank targeting inflation should try to stabilize nominal income by boosting aggregate demand. Consider the case where Y did not just diverge from potential output level Y^* , but Y^* itself fell. This could easily be induced by a sharp decrease of investments or the bankruptcy of a substantial amount of companies, accompanied by hysteresis effects. Another reason for this could be the combination of real sectoral shifts and adjustments costs. These developments would all imply lower potential growth. If these circumstances were to dominate, expansionary monetary policy would just end up provoking pure inflation, even in the short run. This issue is addressed in the third section.

2. The relationship between monetary policy and aggregate demand

In this section, we will address the relevance of monetary policy in the current environment. In response to critics pointing to monetary policy ineffectiveness at the lower bound, we provide an overview of the relevant monetary transmission mechanisms, integrating theory, recent empirical work and empirical data. We include an analysis of the unconventional measures recently taken. We come to the conclusion that while certain transmission mechanisms may have lost some of their potency, this need not mean monetary policy is powerless in influencing aggregate demand.

1.1. The relationship between monetary aggregates, money demand and uncertainty

Traditionally, Keynesian elements in the neoclassical synthesis have pointed to the ineffectiveness of monetary policy in stimulating aggregate demand during extreme recessions. For this, they invoked Keynes' argument of the *liquidity trap*, which implied that once policy rates fell to a certain level, the power of central banks to influence aggregate demand would be rendered impotent. Any increase in the monetary base engineered by the central banks would be hoarded instead of lent. Any rise on the monetary base would be accompanied by a rise in money demand. From an equation of exchange perspective, this would mean any rise in the monetary base is counteracted either by a fall in the money multiplier (if the liquidity preference is situated in the banking system) or by a fall in V (if the higher liquidity preference is situated in the real economy), resulting in no net effect on nominal income. In this section, we will address a first possible interpretation of the liquidity trap.

As noted in the 2005 ECB Monthly Bulletin of October, "the demand for money arises, at least in part, from a need to insure against uncertainties." (ECB, 2005, p.58). This implies that monetary indicators may be influenced by changes in other asset prices which are in turn influenced by uncertainty. Higher uncertainty can lead to a higher demand for money which, if accommodated, need not lead to future inflation. The absence of broad inflationary effects despite a monetary overhang in the Eurozone between 2001 and 2004 has been attributed to a higher demand for money, caused at least partly by higher uncertainty.

Various measures point to a rise in financial uncertainty since 2007. One of these measures is the VIX index, which measures the implied volatility of the S&P 500.



Figure 1: VIX index 2006-2010

Source: Yahoo! Finance

What Figure 1 illustrates, is that since 2007 financial uncertainty has become significantly higher. The longer historical view in Figure 2 shows the October 2008 peak to be higher than those reached in the 2001-2003 period. As uncertainty increased, money demand could have increased as well.



Figure 2: VIX index 1990-2010

Source: Yahoo! Finance

Additional evidence of an uncertainty-induced rise in money demand can be found in the rise of corporate savings since the start of 2009. The level of retained earnings kept in cash is far higher than in the period before the financial crisis. This need not be surprising. FT Alphaville lists four reasons for higher corporate cash holdings, one of which is “the desire for a safety cushion during uncertain times”¹

¹ <http://ftalphaville.ft.com/blog/2010/11/26/416891/more-on-those-record-profits/>

A recent Moody's paper quantifies these developments:¹

Cash and short-term investments by year

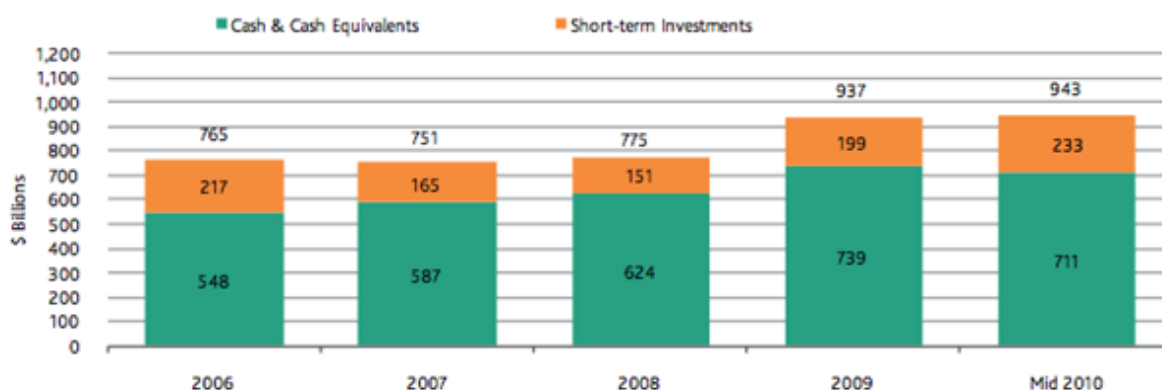


Figure 3: Cash and short-term investments by year, US corporations

Source: Moody's

The relative rise of cash and short-term investments points to a structural decline in investment expenditures on both human and physical capital, which may depress potential output, an issue we will take up a later section.

Given these developments, we might expect a sharp rise in the broader monetary aggregates, induced by a flight to safety. This was not the case, as we will see further. Some of the broad monetary aggregates even grew below trend. Observe, by illustration, M₃ growth for the Eurozone:

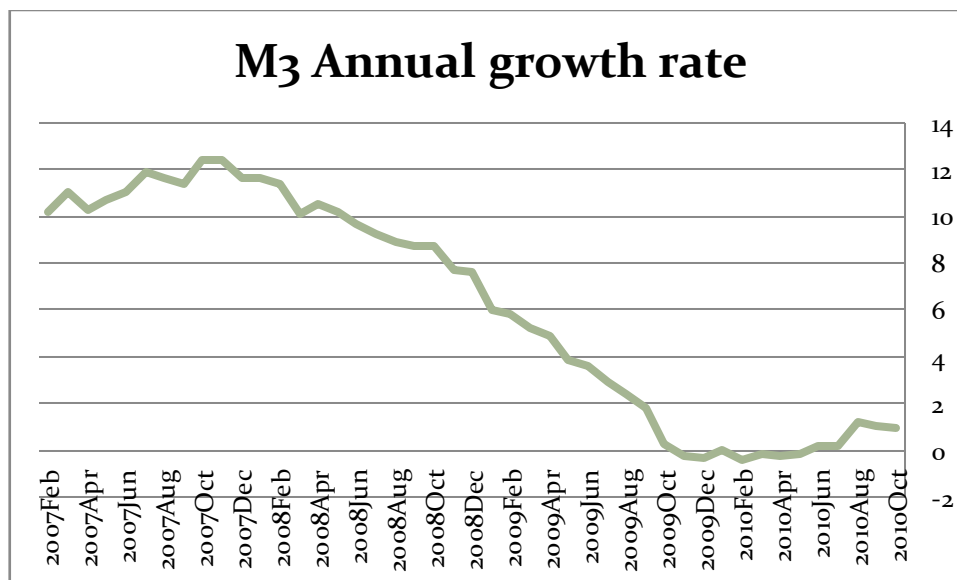


Figure 4: M₃ annual growth rate, Eurozone

Source: OECD Statistical Compendium

On the other hand, there was a spike in the monetary base, as the high uncertainty in the financial markets induced policymakers to move to a system in which long-term liquidity was freely provided. One may argue that the full allotment of any funds demanded by financial

¹ <http://ftalphaville.ft.com/blog/2010/10/29/386951/cash-hoarding-corps/>

intermediaries proves that any higher money demand, caused by higher uncertainty, was fully accommodated. This need not be the case, however. A higher monetary base need not result in more liquidity being available to the real economy. The financial crisis and the accompanying balance sheet stress caused a fall in the money multiplier, as we will see later. This implies that a higher demand for money by agents in the real economy need not be accommodated. As the ECB points out:

“[T]he way uncertainty may influence the demand for money depends on ... the impact of the uncertainty on the economic counterparts (banks, foreign investors) with whom the money holders transact.” (ECB, 2005, p.60).

If it is indeed the case that there was *a disconnect between the liquidity provided to financial intermediaries by the central bank and the liquidity provided by the banking system to the real economy*, then the actions undertaken by monetary authorities during the financial crisis might have been insufficiently expansionary. Indeed, contrary to what policy rates might indicate, the stance of monetary policy may have been too strict, not too loose. We will revisit this issue when discussing the relevance of the bank lending channel.

An important caveat implies, however. In the above analysis we have treated uncertainty as largely exogenous to monetary policy. There is, however, considerable evidence to suggest that central bank can have an impact on uncertainty. Recently, economist John Taylor noted that “QE2 will create more economic uncertainty, stemming mainly from reasonable doubts over whether the Fed will know exactly when and how to contract its balance sheet after such an unprecedented expansion.”¹ If it is indeed the case that any monetary easing is offset by a higher money demand induced by higher uncertainty, then we are in a liquidity trap scenario.

¹ <http://www.investors.com/NewsAndAnalysis/Article.aspx?id=555234>

1.2. Current policy rates and Taylor rules

Above, we have interpreted the liquidity trap-critique to mean that money demand increases along with the money supply. This is an interpretation of the concept more or less in lines with Keynes (1936). This interpretation is not in line with the conventional meaning of the liquidity trap-concept, which has been equated with the zero lower bound problem since the 1990 Japanese experience. Since then, monetary policy ineffectiveness, at which further policy rate cuts may prove to be inefficient in stimulating aggregate demand, is thought to be reached when policy rates reach zero.

In this section, we start off by comparing Taylor rule estimates for the Federal Reserve, ECB, and United Kingdom, which point to the necessity of negative real rates, which will lead to our analysis of inflation expectations and unconventional measures.

In ordinary circumstances, Taylor rules provide a reasonable approximation of the level the interest rate will be set by central banks. In the current environment, this way of forecasting central bank policy rates loses its value, as mechanical implementation of Taylor rules yields the result that policy rates should be negative for both the Fed and Eurozone.

In July of 2010, a Taylor rule estimation was published by Lloyds TSB¹. The result of their estimates point to levels for the policy rate which are not feasible from a practical point of view. The Fed would be in need of a -1.3% interest rate.

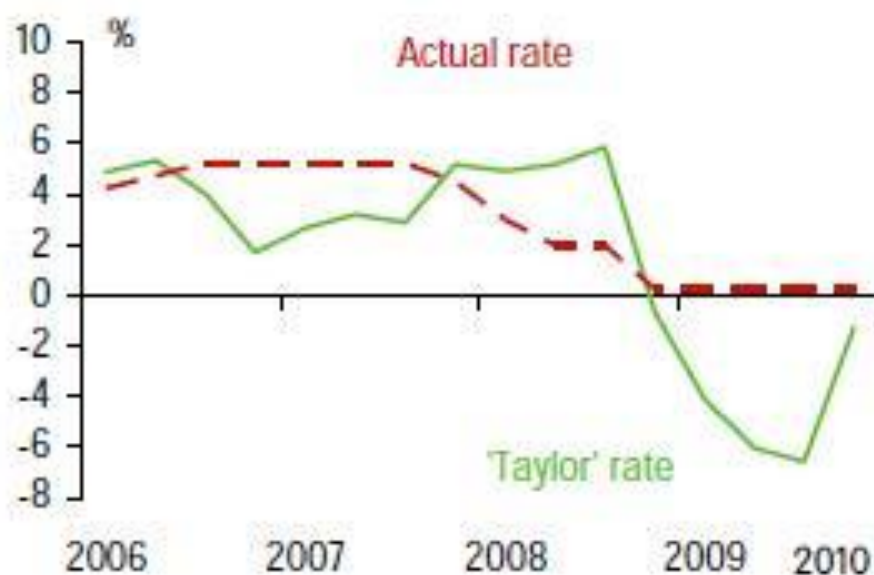


Figure 5: US Taylor Rule

Source: Lloyds TSB

¹ <http://mediaserver.fxstreet.com/Reports/c688a4c4-256e-4dad-89ba-13f72foc91d8/adfo4fe5-3599-4962-af31-45fboao6efca.pdf>

For the countries comprising the Eurozone, an interest rate of -2.1% would be optimal.

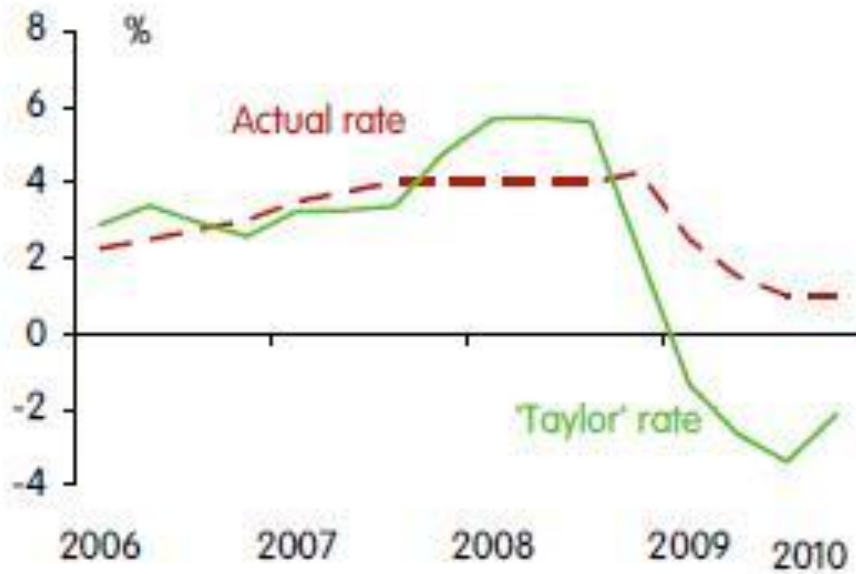


Figure 6: Eurozone Taylor Rule

Source: Lloyds TSB

The situation is different for the BoE, where the appropriate policy rate is a rather high 6%. Two explanations are provided in the article

- 1) the expected UK VAT rise
- 2) the 2007-2009 Pound Sterling depreciation, which resulted in much higher import prices.

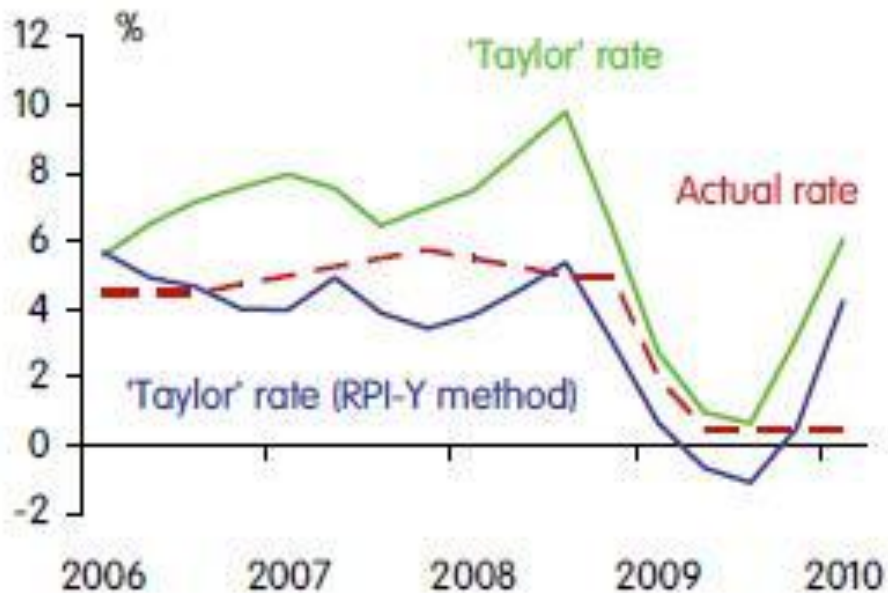


Figure 7: UK Taylor Rule

Source: Lloyds TSB

These estimates lead us to the conclusion that, especially for the US and Eurozone economies, we will need to analyze non-conventional policy measures as well.

Another reason for extending the analysis to these non-conventional measures, is the fact that previously stable Taylor rule parameter estimates may have lost some of their value. For example, the Fed only started paying interest on commercial bank reserves during the financial crisis. Also, in the current environment central bank policy rates alone do not provide a compelling estimate of the way interest rates in the economy behave. As noted in the ECB Monthly Bulletin of January 2010, “[t]he close relationship that normally exists between the main refinancing rate and money market rates has taken on a different and more complex form.” (ECB, 2010a, p.69). It is likely that these changes and other non-conventional policy measures may have caused structural changes in the way monetary policy affects the economy, rendering previous Taylor rule estimates inapplicable.

1.3. The interest rate channel and inflation expectations

Critics of monetary policy argue that in a zero lower bound environment, central banks cannot further lower the nominal interest rate. We know, however, that it is not the nominal interest rate which is important for determining investment decisions, but the real rate. If central banks were to be able to credibly commit themselves to creating inflation, this would cause inflation expectations to rise and the real rate to drop. The importance of expectations is illustrated by the Japanese example which is, paradoxically, often invoked to point to monetary policy ineffectiveness.

The infamous Japanese recession pushed the Bank of Japan to aggressively start a form of 'quantitative easing' in 1999-2000. The result was extremely disappointing. Not only was growth irresponsive, even the money aggregate remained at a stable (low) level (in Figure 8, M2 is shown).

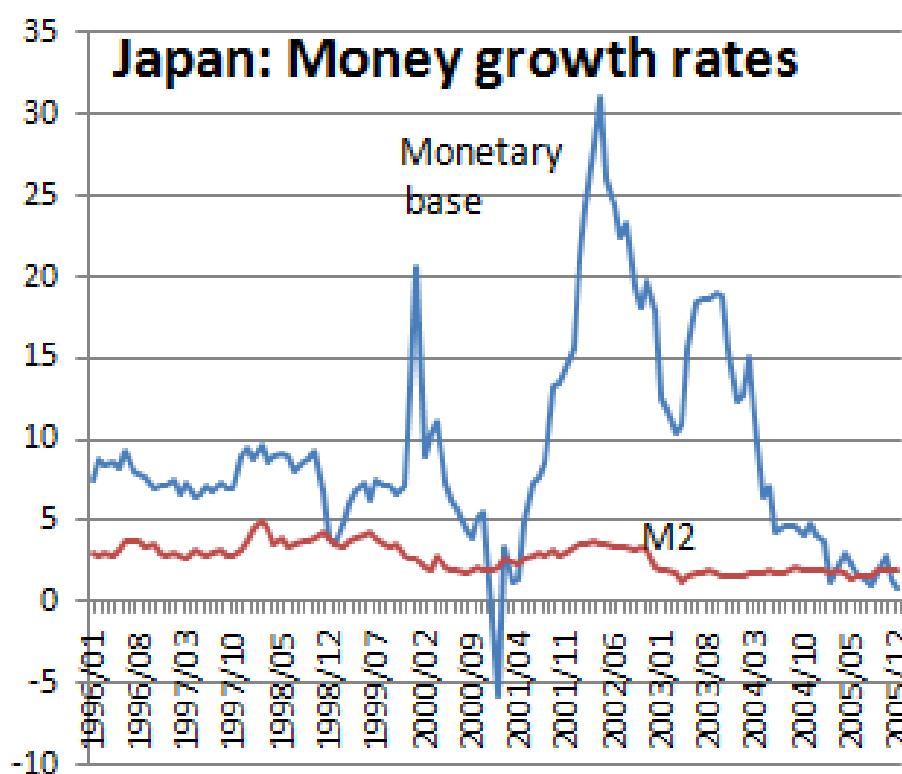


Figure 8: Japan Money growth rates

Source: Bank of Japan¹

Whether these findings are a sign of the tragic failing of QE or of the weak BoJ communication skills, are up for debate. A 2002 discussion paper by the Federal Reserve Board addresses the issue.

The BoJ was notably hard for any inflation possibility: "Indeed, the BOJ seemed to be comfortable with the prospect of sustained zero inflation, notwithstanding the fact that zero inflation on average over time will likely imply shorter periods of deflation as well as

¹ <http://krugman.blogs.nytimes.com/2010/10/29/more-on-friedmanjapan/>

inflation.” (FRB, 2002, p.15). In other words, the expectation of contractionary monetary policy once any inflationary sign popped up, immediately cancelled any expansionary QE -effect. As markets were rationally expecting a very low inflation level, the pursued transmission mechanisms weren’t triggered at all. On the contrary, a self-fulfilling prophecy of a ‘liquidity trap’ was installed. The authors of the FRB paper conclude that “the ineffectiveness of any given monetary stance may also have been hindered by headwinds from financial sector weakness, but probably not so much as to have negated the benefits of more concerted monetary easing.” (FRB, 2002, p.16) The relevance for the present situation is clear. The Japanese experience points out that monetary expansion alone need not be insufficiently accommodative; it needs to be coupled with a credible commitment to maintain the policy choice as long as necessary for central bank’s mandate to be fulfilled, an issue we now turn to.

In theory, then, the interest rate channel of monetary transmission need not lose its potency. This raises the issue: *can the Fed, BOE and ECB credibly raise inflation expectations?*

In the case of the **Federal Reserve**, we will need to address recent developments that might shed doubt on its independence. During the 2010 mid-term elections, which marked a victory for the Republican Party, several candidates from the Tea Party Movement were elected, which is highly critical of the way the Fed handles its mandate.

This is not the only issue complicating independent monetary policy making in the United States. November 15 2010, two weeks after the Federal Reserve announced another round of asset purchases, dubbed Quantitative Easing 2, several economists, investors and political strategists with strong Republican leanings published an open letter in which they argued that the plans for QE2 should be abandoned.¹ The critics cite the following reasons for opposing another round of asset purchases:

- QE2 would result in a depreciation of the dollar, which would contribute to inflation risk
- Further monetary stimulus cannot achieve higher employment
- Direct asset purchases have the potential of disrupting financial markets
- Interest rates should not remain near zero while the economy is recovering
- International opposition to further US monetary easing

The pundits argue in favor for “improvements in tax, spending and regulatory policies”, rather than additional monetary stimulus.

A final issue that may imply problems for the Federal Reserve’s independence is a proposal by congressmen Bob Corker and Mike Pence, in which they argue that the Fed should drop its dual mandate and focus solely on targeting inflation developments. Criticism of the Fed need not only be motivated by political reasons. Economist John Taylor recently also called for a reinterpretation of the Fed mandate.²

It is hard to ascertain what the effect of these institutional developments will be. While, in theory, the Fed has less independence from the political process than the ECB, one could argue that even in the American case the probability of politicians directly influencing

¹ <http://blogs.wsj.com/economics/2010/11/15/open-letter-to-ben-bernanke/>

² <http://www.investors.com/NewsAndAnalysis/Article.aspx?id=555234&p=1>

monetary policy is very low. That being said, the recent criticism might lower the credibility of a Federal Reserve trying to boost inflation expectations.

In order to ascertain current US inflation expectations, we turn to TIPS breakeven inflation rates 5 and 10 years ahead (Fig. 9). The Quantitative Easing program of the Federal Reserve seems to have credibly heightened expected inflation to 1.5% (5 year) and 2% (10 year) levels. Since the Bernanke statement of possible bond purchases, these rates accelerated towards higher (desired?) levels. The actual announcement was in line with the market prediction, since the numbers stagnated around the same 1.5% and 2% levels. Indeed, these figure hints that the Fed succeeded in raising belief that they are serious about keeping inflation at higher level.

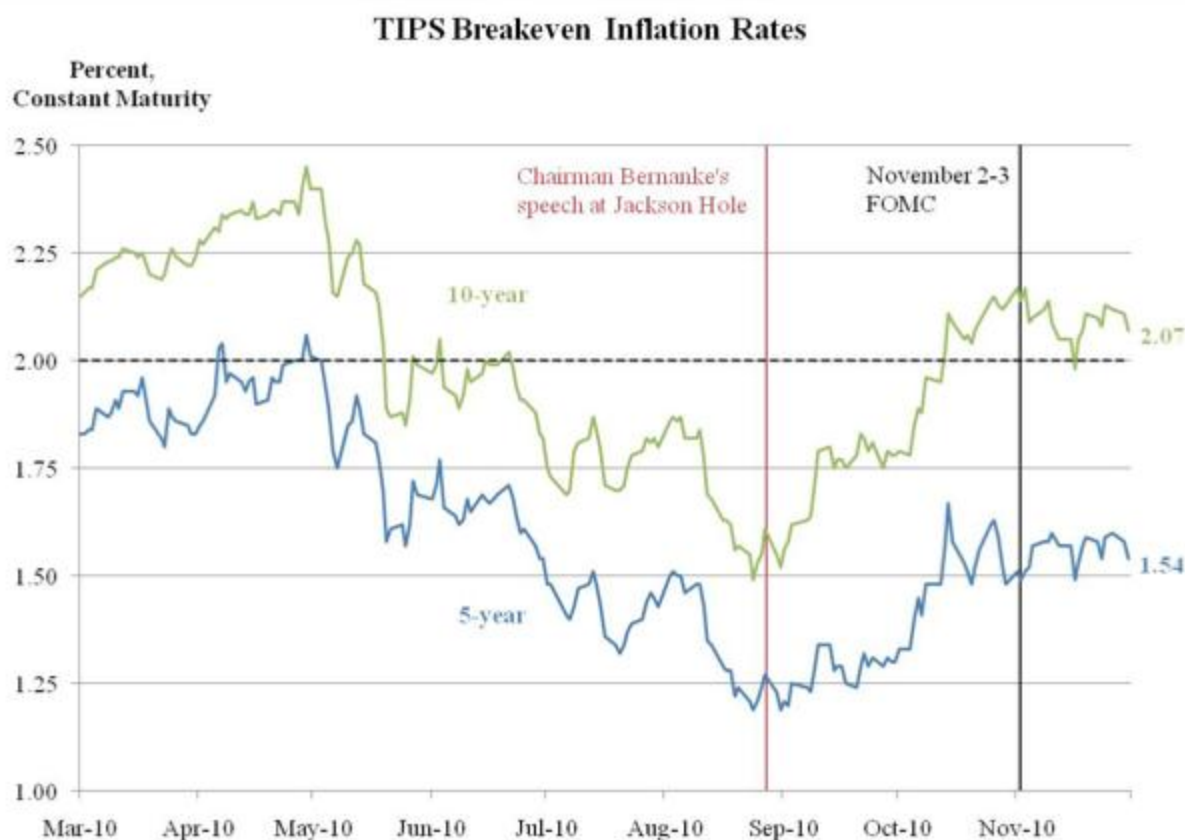


Figure 9: TIPS Breakeven inflation rates Source: James Bullard, Federal Reserve St. Louis¹

Again, we refer to the Japanese case. Since it is argued that central bank credibility goes hand in hand with successful expansionary monetary policy, the BoJ might have communicated in a suboptimal manner. Since the public needs a strong commitment to a substantial rise of the inflation number, a 'quantitative easing' program will probably fail if it isn't accompanied by credible commitments.

Two remarks apply. The first has to do with the 'rules versus discretion' debate. Since the mandate of the Fed (contrary to that of the ECB) doesn't disclose on a strict inflation rule,

¹ http://research.stlouisfed.org/econ/bullard/pdf/NBE_WashingtonDec2_2010_Final.pdf

meaningful communication is undoubtedly vital. Of course, to some extent, discretion seems to be affiliated with the Fed. But on the other hand, chairman Bernanke raised concern about the absence of an explicit inflation target. As he remarked at the 28th Annual Policy Conference (October 2003), “the announcement of the [optimal long run inflation target] should serve as a useful clarification of the long-run objective of the Fed and would thereby provide a long-run ‘anchor’ to monetary policy.” (Federal Reserve Bank of St. Louis, 2004, p.167). Bernanke later claimed “FOMC participants generally judge the mandate-consistent inflation rate to be about 2 per cent or a bit below.” (Federal Reserve meeting, Boston, October 2010).

We hereby mention the potential benefits of *accountability*, *transparency* and *credibility*, three policy traits that are widely praised in literature. The first would make the Fed responsible for attaining inflation goals (see ECB and BoE), which could remove some mystery from policy stances. The second would increase predictability of monetary policy actions and enhance the ability to form inflation expectations (Geraats, 2006). The third has the power to make the Fed more believable in the future.

Our second remark points to the difference between inflation and growth, the two objectives in the Fed’s mandate. Indeed, we find support for the stance that the Fed seems to succeed in raising inflation expectations (and thus, lowering the real interest rate). And yes, this is a necessary condition for output growth to return in the medium term run. But it certainly is not a sufficient condition. In the worst possible scenario, inflation is indeed heightened, but monetary policy is deemed impossible to engage in an exit strategy without hurting growth prospects. We would then behold a world where inflation could be 2% or higher, but growth doesn’t keep up at all. Indeed, M is successfully enlarged, along with the nominal GDP figure. In decomposing the latter, one might very well find a strong rise in P and a stagnation of Y. Therefore, the current forward looking inflation rates say nothing about the return of growth without correcting for the perception the negative effects of a future exit strategy (and other factors).

We can link the (longer term) inflation targeting practices with the already mentioned zero lower bound problem. In order to remain effective in the shorter term, monetary policymakers need to engage in unconventional policy execution. In this manner, the zero lower bound constraint does not need to be crucially problematic.

This link is pictured by making a small leap from theory to practice, evaluating the initial effects of the latest ‘Quantitative Easing’ round (QE2, November 2010). In short, we would favor a very low - even negative - real interest rate in order to boost aggregate demand. We make an evaluation using the 5-year Treasury Inflation-Protected Securities (Fig. 10), which is expected to fit the ex-ante real interest rate very well. The result is good for the Fed. Indeed, after chairman Bernanke’s announcement of a possible new round of QE, expected real interest rates declined significantly to -0.5% levels. The divergence between the nominal zero lower bound and the actual interest rates is captured very well. Monetary policy seems to remain having an essential role, due to the use of unconventional policy instruments. Additionally, we point the recent upward trend in TIPS yields following the actual QE statement. Since output and unemployment forecasts (cfr. infra) remain ambiguous and

concerning, every rise in ex-ante real interest rates will likely be accompanied by an easing of monetary policy. In other words, the option of extra stimulus remains likely in the near future.

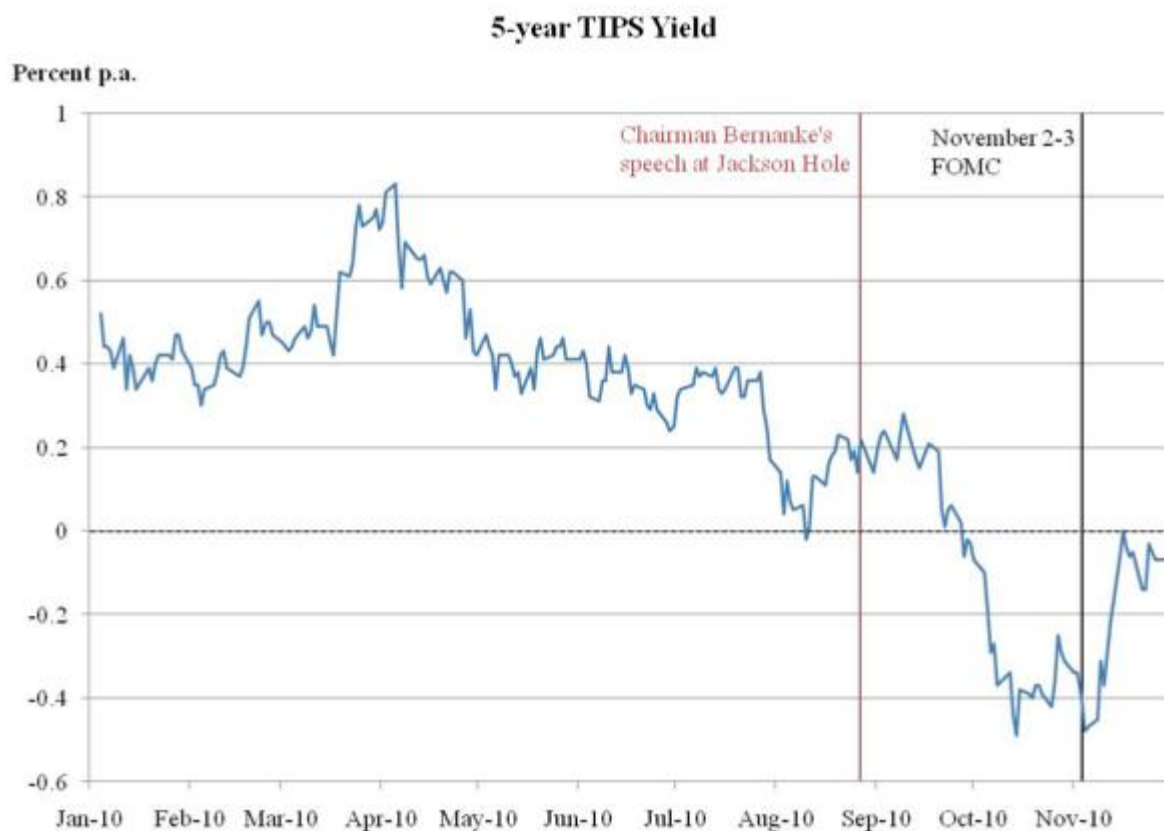


Figure 10: 5-year TIPS yield

Source: James Bullard, Federal Reserve St. Louis

It is unlikely that the ECB may credibly boost inflation expectations. The ECB interprets its mandate of providing price stability as targeting inflation of close to, but below, two percent. Historically speaking, inflation expectations became very well anchored since the introduction of the Euro currency (at around 2%). Many economists state that this credibility was the result of an intensive process of clear communication and policy transparency. Not only is the ECB very clear on its mandate of anchoring inflation at the below-but-close-to level of 2% in the near future, it also communicates very transparently when implementing policy. When the ECB (controversially) buys government bonds, for example, it tries to mitigate any effect on inflation expectations by allowing for the possibility of raising interest rates paid on bank deposits held at the ECB. This is a clear indication of the ECB's determination to move closer to an exit strategy.

Another reason, besides a loss of credibility, why the ECB may refrain from boosting inflation expectations is the asymmetric effect of its monetary policy. By this, we mean that one monetary shock can induce different real economy reactions in the same monetary union. This is due to the different economic structures of Eurozone member countries. These kind of divergences can have great impact on the viability and the "one size fits all"-policy of a central bank. Modern day Europe provides an excellent example. Many economists point out that the relatively low interest rate of in the mid-2000 years facilitated weak German growth to expand

more rapidly, while emerging countries such as Ireland were better off with a higher real interest rate. Indeed, the skyrocketing Irish growth and inflation figures helped generate a huge amount of floating money. This money eventually found its way into the real estate market, perhaps partly provoking the well-known price bubble. We will address the issue of asymmetric future intra-Eurozone developments in a following section.

Interestingly, the same asymmetry problem ought to be arising in the near future. Whilst ECB 'de facto commander' Germany could be thinking of an exit strategy in order to mitigate inflation expectations, countries such as Ireland are in deep need of an ultra-expansionary monetary policy. Since the enormous Irish fiscal contraction causes inflation and growth expectation to remain on the low side for quite some time, monetary stimulus can be appropriate in the near future. This topic could prove to be a source of serious existential doubt in the ECB and the Euro currency. We expect policymakers more to look at the average Eurozone inflation and growth. This topic will be addressed again in part 3.3.

Overall, it seems that the ECB is confident in growth and inflation to return without any more demand stimulus needed. Nonetheless will we make a small evaluation on this policy stance later, in order to ensure the ECB forecast to be trustworthy.

The issue of inflation expectations appears to be mixed for the **BOE**. On the one hand, it is obviously bound by its mandate, which specifies a 2% CPI target. On the other hand, the BOE appears to be allowing inflation expectations to stay well above this figure throughout 2011. It seems the BOE might be trying to both have its cake and eat it: forward real interest rates are lowered, stimulating growth, without there having to be an explicit change in the BOE target. Of course, a choice of delaying changes in the interest rates cannot be maintained forever: as future inflation rates in excess of the BOE's target are realized, the BOE has to account for its choice.

Furthermore, the GDP results (Fig. 11) and forecasts (cfr. *infra*) hint at an ambiguous policy reaction. While UK retrieved some momentum by surprisingly high growth in the first half of 2010, the inflation and growth forecasts are more dispersed.

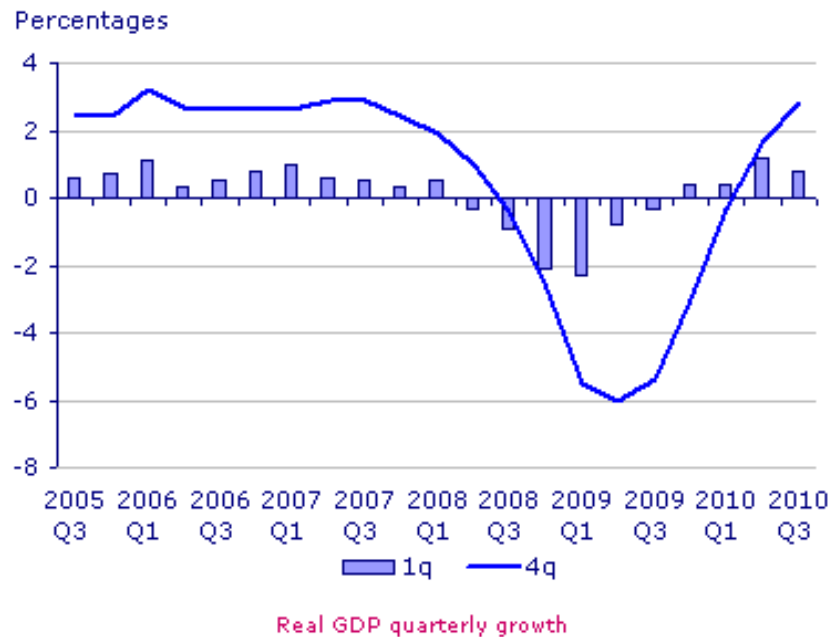


Figure 11: Real GDP quarterly growth, UK

Source: Office of National Statistics

These expected inflation figures reflect two future developments. First, various VAT hikes will take place in the near future. Second, the new Cameron government announced massive budget cuts. The extent to which these fiscal austerity measures negatively impact inflation and GDP, will crucially impact the future monetary policy. The BoE, just like the Fed, already executed a quantitative easing strategy and announced the possibility of another round of QE when deemed necessary.

The well-known BoE fan charts grant an insight on the expected inflation (Fig. 12). We note that this graph makes use of market interest rate expectations and the current monetary stance. Interestingly, the inflation number is expected to fall drastically in 2011, reaching its 2% target by the end of 2011. The reason could be the above mentioned expected fiscal cutback. We further underline the importance of the uncertainty surrounding the forecast, shown by the colored bands. It seems inflation could go either way (above or under) the main forecast, with an equal possibility. These results can also be of use when making our concluding monetary policy forecasts (cfr. infra).

Chart 3 CPI inflation projection based on market interest rate expectations and £200 billion asset purchases

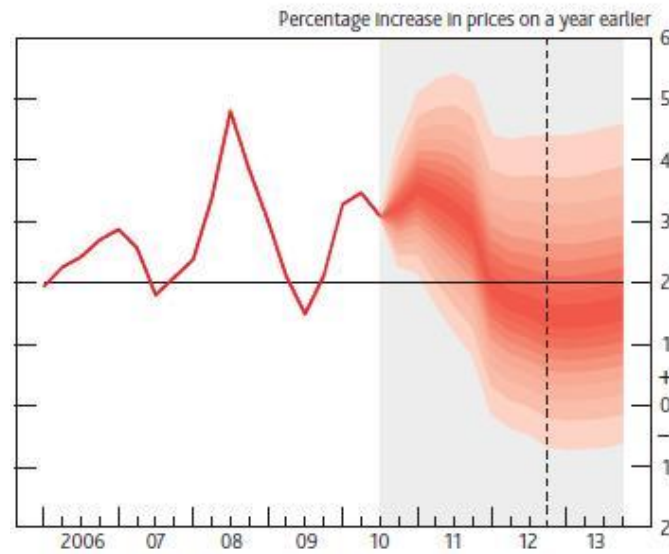


Figure 12: BoE fan chart

Source: BoE inflation report, Nov 2010

By means of ending this chapter, we connect the mentioned inflation expectations with the anticipated output growth over the long term, using the yield curve figures (December 2010). When looking at these statistics (Fig. 13), we observe the curves all to be upward sloping for all the mentioned regions. Furthermore, the steepness of the curves is greater for UK and US, indicating expectations of higher growth and/or inflation for the latter, compared to the Euro area.

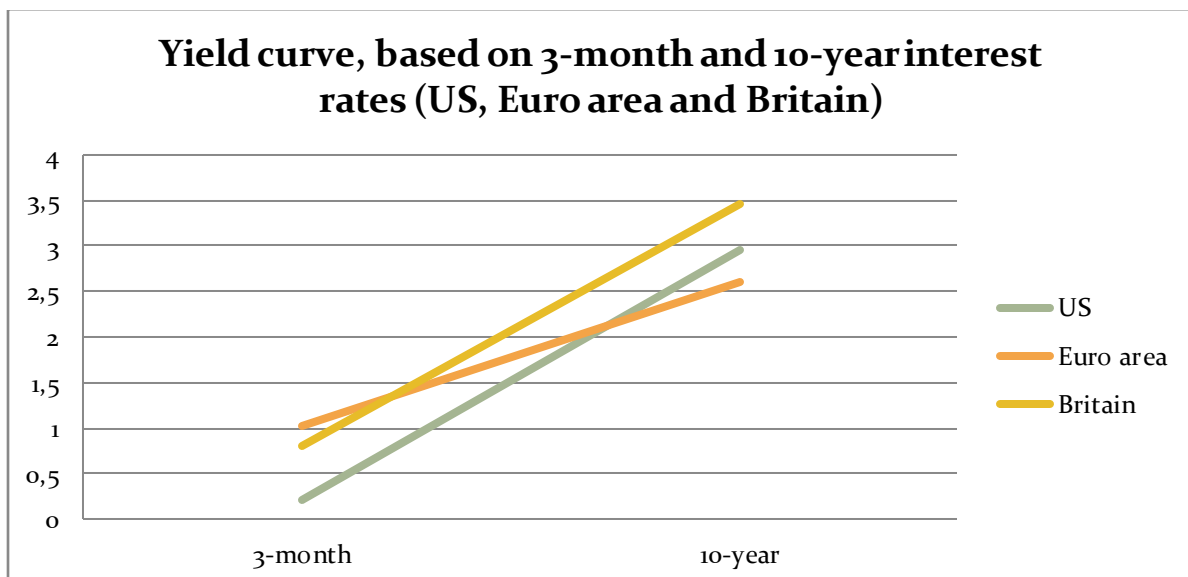


Figure 13: Yield curves (US, Eurozone, UK)

Source: The Economist, print edition (Dec 2, 2010)

In addition, the short term interest rate structure (imposed by monetary policy and 3-month interbank rates) is represented by the left hand side of the curves. As known, the Fed keeps these rates at 0%-0.25% levels. The BoE (0.75%) and the ECB (1%) balance around higher levels. Since the ECB is already thinking about an exit strategy, their rates remain the highest of the three central banks. The latter can be connected with the lower inflation expectation in the Euro area (2.6%). Indeed, the anticipated inflation is much higher for the UK and, especially the US. We consider these findings to be in line with the analysis conducted above.

1.4. Additional monetary transmission mechanisms

In the following section, we are going to analyze the relevance of various additional monetary transmission mechanisms in the current environment. We integrate theoretical perspectives, recent empirical work and real-world developments.

Exchange rate channel

In a recessionary environment, conventional wisdom states that central banks may be tempted to attempt to boost aggregate demand by lowering the value of the currency. This approach is subject to three caveats.

First, the net effect of currency devaluation need not be straightforward, and depends to the time horizon studied.

Second, currency devaluations are less likely to succeed in an environment where trade partners are pursuing a similar strategy. As the ECB points out, “central banks can take for granted neither the size nor the direction of the exchange rate response to the interest rate because this response depends on other factors, e.g. foreign monetary policy developments, that are not controlled by the central bank.” (ECB, 2004, p.49).

A final relevant factor in the current environment, especially for the Eurozone, is that “financial asset prices depend on many other factors in addition to monetary policy, and changes in the exchange rate also often dominated by these factors.” (ECB, 2004, p.46).

Because of these factors, we feel that the exchange rate effects of monetary policy are highly uncertain for the period to come. A naïve interpretation of exchange rate dynamics would expect the US dollar to depreciate against the Euro, as the Federal Reserve has decided to keep monetary conditions relaxed for a longer period. Given the concerns about the financial stability of the Eurozone, this need not be the case. If heightened uncertainty were to cause a ‘flight to safety’, then dollar appreciation, not depreciation would be the result. Given these complications, we expect any aggregate demand exchange rate effect to be modest.

Wealth and Tobin’s Q effects channel

One channel through which monetary policy can affect the real economy is through wealth effects, which concern consumer spending. There is evidence to suggest that the Federal Reserve’s second round of quantitative easing aims to work through this channel. In an op-ed the day after the QE2 announcement, Fed Chairman Ben Bernanke argued that “higher stock prices will boost consumer wealth and help increase confidence, which can also spur

pending.”¹ Higher stock prices could come as a welcome relief to American consumers, whose wealth position has been severely hit by the correction on the housing market. As we can see below, the impact of QE2 announcements is likely to have been significant.

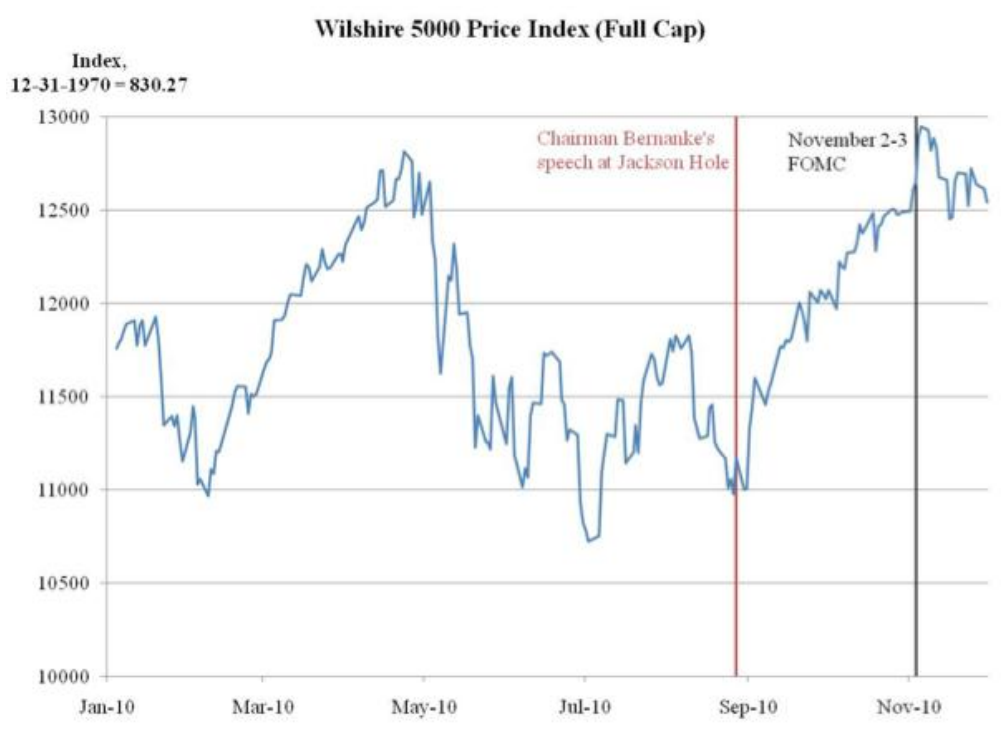


Figure 14: Wilshire 5000 price index

Source: James Bullard, Federal Reserve St. Louis

Higher stock prices could also boost corporate investment, another channel through which monetary policy could boost aggregate demand. Higher real economic uncertainty, as hypothesized above, could work to offset a higher Tobin’s Q, however.

Credit channel

Monetary policy is not only expected to work through the direct channels observed above, if we assume the Modigliani-Miller theorem, which states that the value of firm is unaffected by how it is financed, not to hold in all circumstances. In this case, we can expect four additional channels of monetary policy: a bank lending channel, a bank capital channel, a risk taking channel and a balance sheet channel.

¹ <http://www.washingtonpost.com/wp-dyn/content/article/2010/11/03/AR2010110307372.html?hpid=topnews>

Bank lending channel

The bank lending channel states that expanding bank reserves leads to a rise in bank lending. Two additional assumptions are needed for the bank lending channel to be relevant:

- 1) There needs to be a demand for loans
- 2) Banks depend to some extent on deposits for funding

This last assumption proved to be especially relevant during the height of the financial crisis, when money market funding for financial institutions became virtually impossible. This triggered the role of the central banks as the 'lender of last resort', which responded by providing a full allotment of liquidities, greatly expanding the maturity of their operations.

Despite these unprecedented measures, concerns were voiced that lending conditions for non-financial agents significantly deteriorated. Of course, any drop in loans may also have been induced by a lower demand for loans. A recent empirical study of Eurozone lending by Hempell & Sørensen (2010) disentangles loan supply and demand effects. The researchers conclude that "factors related to banks' balance sheet positions have a significant influence on the growth of loans to firms and households in the euro area." Indeed, "[f]ocusing on the 2007-9 financial crisis, (...) empirical findings suggest that strains on banks' liquidity positions and their access to market financing contributed significantly to the slowdown in corporate lending, whereas such effects were not significant prior to the crisis. This is particularly noteworthy, as the non-standard measures undertaken by the ECB already mitigated to a large extent the liquidity constraints of banks in the euro area." (Hempell & Sørensen, 2010, p.21). The main conclusion of the paper is that in normal times, cyclical and demand-side factors tend to drive real economic loan growth, but that supply-side issues (such as financial balance sheet stress) may dominate in times of heightened uncertainty. This implies that, while the bank lending channel is very relevant during crisis periods, its potency is partially offset by developments in the bank capital channel.

Bank capital channel

Reinhart & Reinhart point to the importance of the bank capital channel in their 2010 study of economic conditions in periods after adverse economic shocks. They point out that "slow growth might be a self-fulfilling prophecy produced by timid authorities who never ... dealt with the capital adequacy problems of key financial institutions." (Reinhart & Reinhart, 2010, p.38).

Going forward, regulators worldwide will apply more stringent capital requirements for the commercial banking system (BIS, 2010c). While these requirements are only gradually being implemented, we can expect forward-looking financial institutions to heighten their capital ratios in the two-year period considered in this paper. Higher capital ratios will result in

constrained credit availability, although estimates about the effect diverge sharply.¹ In any case, we can expect the bank capital to be a factor negatively impacting the monetary policy transmission mechanism in the two years to come.

Evidence for the existence of an interaction between the bank capital channel and bank lending channel is provided by Kashyap & Stein (1995). In their study of the relevance of the bank lending channel, they included a robustness check in which they cut off the sample in 1989, “because of a concern that [their] conclusions might be affected by the so-called ‘capital crunch’ that arose as capital-deficient banks struggled to meet the new Basle standards”. (Kashyap & Stein, 1995, p.187). Despite their hypothesis, they found no marked differences between the estimates of the non-capital crunch period and the entire period. This could point to a rather limited bank capital/bank lending interaction effect. For the current environment, another factor is at play however. Negative bank balance sheet developments may also cause for further disruptions in the transmission of monetary policy. This concern may be especially relevant for the Eurozone, where sovereign debt concerns are high. High uncertainty surrounds these developments, which may in itself be a factor for restraint on the part of economic actors, leading to further aggregate demand failures that might negatively impact growth.

Risk taking channel

In the risk taking channel, monetary policy works by lowering the rates on risk-free assets, causing economic actors to rebalance their portfolio’s towards more risky assets. We find a recent analysis of the risk taking channel in Bekaert, Hoerova & Lo Duca (2010). They point out that “[t]o earn excess returns in a low interest rate environment, [investment managers’] strategies may shift to highly risky, tail-risk sensitive and illiquid securities.” (Bekaert, Hoerova & Lo Duca, 2010, p.20). They perform a VAR analysis to assess the interaction between monetary policy and uncertainty, as measured by the VIX index. The researchers find that monetary easing leads to a decrease in risk aversion after about 6 months.

In light of this formal evidence, market comments about potential adverse effects of monetary easing in the current environment are not without a theoretical base. Critics point out that the current policy stance of the Federal Reserve is triggering strong inflows in specific asset classes, for example commodities and emerging markets. These are examples of the risk taking channel of monetary policy working in a perverse way, for two reasons:

- 1) These asset movements need not be sustainable. In this case, corrections to these prices may result in adverse wealth, financial accelerator or Tobin’s Q effects.
- 2) Higher commodity prices can be interpreted as adverse supply shocks negatively impacting potential output.

¹ For a negative perspective regarding the short-term costs of higher capital requirements, see the interim report of the Macroeconomic Assessment Group (BIS, 2010a). A more optimistic view, focusing on the long-term effects can be found in BIS (2010b).

Financial accelerator

The balance sheet channel, or financial accelerator, implies that expansionary monetary policy can increase access to credit by raising the value of borrower collateral. Lending conditions are not only made easier by a lower risk free rate, the external finance premium is also positively affected. As boosting financial asset prices seems to be an explicit objective of the Fed (as outlined above), the financial accelerator channel seems to be an important factor impacting the transmission of monetary policy. Going forward, developments concerning borrower capital originating in the real or financial sector will determine the relevance of this channel. As with the risk taking channel, the possibility of negative shocks seems especially important.

Direct asset purchases

In response to the economic crisis, central banks responded with non-conventional asset buying programmes. These programmes were expected to heighten the prices and liquidity of the assets in question, lowering their yields. As these were unprecedented events, empirical estimates on the effects of these actions for the BoE, Fed and ECB were initially not available. The Bank of Japan, on the other hand, already pursued direct asset purchases between 2001 and 2005 (Wieland, 2009).

Since then, several studies have been published which attempt to estimate the market effects of these unconventional measures for the economies under review here. We report some of their results here, with the important caveat that research into the effects of direct central bank asset purchases is still in its infancy. According to Meier (2010), “empirical studies have found central bank asset purchases to have had a positive effect on asset prices, while broad money growth has remained very subdued and medium-term inflation expectations have shown no signs of becoming unhinged.”

The Federal Reserve Bank of New York estimates the effects of asset purchases by the Fed (FRB of NY Staff Report, 2010). By conducting both event studies and time series analysis, they come to the conclusion that the Fed asset purchases in lowering rates. Surprisingly, this was not only the case for the assets purchased directly, but also for securities that were not included in the programs. According to the authors, “[w]hile the effects are especially noticeable in the mortgage market, they appear to be widespread, including in the markets for Treasury securities, corporate bonds, and interest-rate swaps.” (FRB of NY Staff Report, 2010, p.31). Their event study showed that lower yields appeared to be primarily a reflection of lower risk and term premiums, rather than through the expectation of lower future short-term interest rates. This might be a promising result, as lower future short-term interest rates could be a reflection of lower future growth expectations.

Gerlach-Kristen & Kugler (2010) adopt a cross-country perspective in estimating the effects of asset purchases, including the Eurozone, Switzerland, the UK and the US. Interestingly, they not only estimate the effect of announcements on financial markets, but also to what extent

central banks responded to the crisis in financial markets. In this regard, they find “that the response to money market pressures appears to have become stronger during the crisis.” (Gerlach-Kristen & Kugler, 2010, p.2). They also evaluate the relative importance of asset purchase and liquidity programmes:

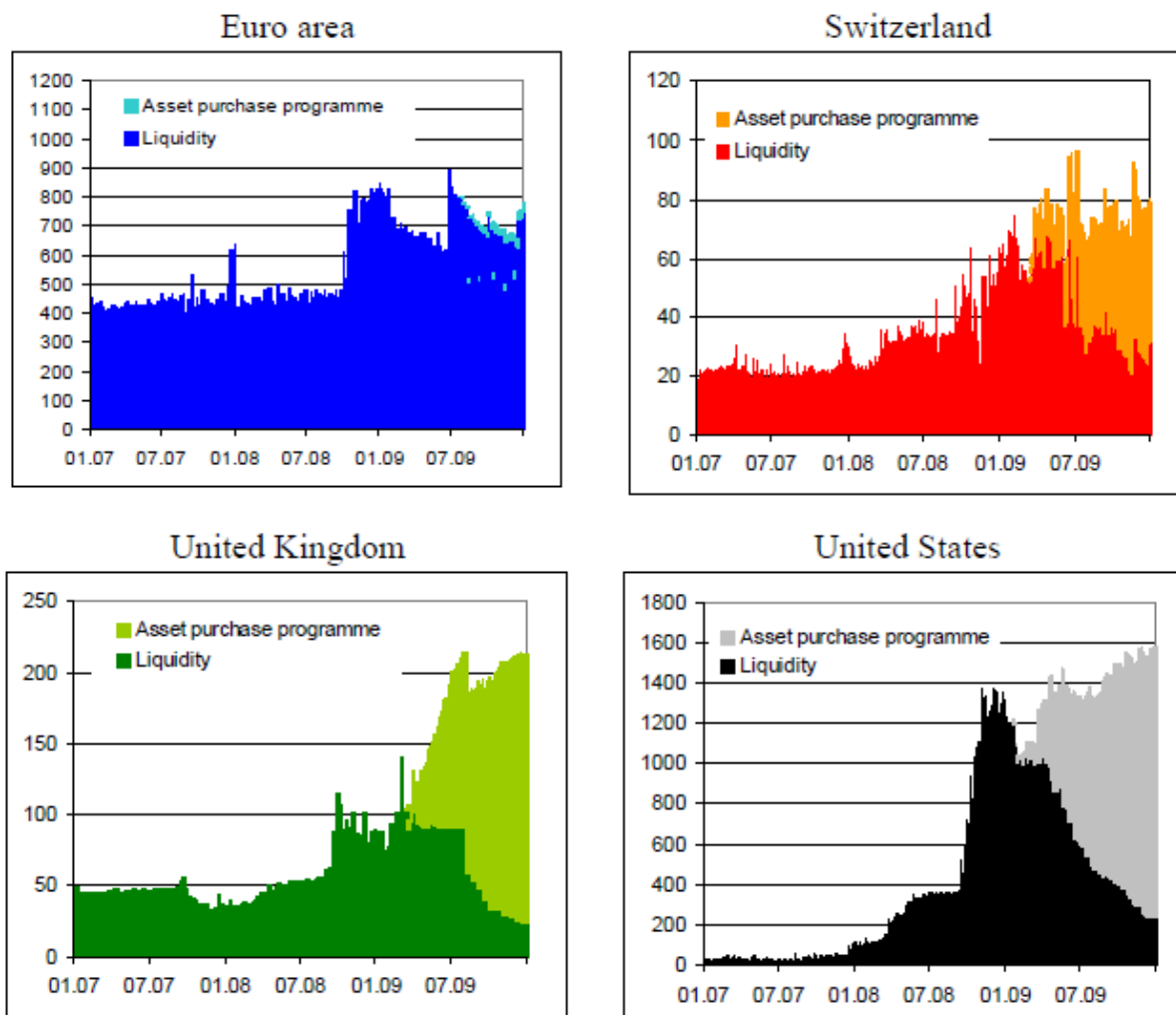


Figure 15: Asset purchase and liquidity programmes
Source: Gerlach-Kristen & Kugler (2010, p.9)

Regarding the responses of financial markets to central bank liquidity measures, the study shows that the effects seem to have changed over time: “an increase in the outstanding amount of liquidity reduced money market spreads only after the bankruptcy of Lehman Brothers” (Gerlach-Kristen & Kugler, 2010, p.30). They also conclude that “asset purchase programmes ... seem to have helped reduce money market spreads.” (Gerlach-Kristen & Kugler, 2010, p.30).

An analysis of the effect of the first four months of UK asset purchases is provided by Meier (2009). He describes the results of these actions as ‘moderately encouraging’. In the UK as in the US, purchases have succeeded in pushing yields downwards and improving specific market liquidity.

Meier also notes “[i]t remains, in any event, too early to tell whether these effects will prove strong enough to ultimately generate the desired increase in aggregate demand.” (Meier, 2009, p.44).

In order to formalize the effect of these asset purchases, G. Rudebusch (Federal Reserve, San Francisco) adjusted recent estimates of monetary policy stances for unconventional measures (Fig. 16). The red line suggests to what extent the Federal funds rate ought to be lowered in order to reach inflation and growth objectives. Needless to say, this result does not bear much realistic implications since it is negative, in line with our previous Taylor rule discussion. Interesting for our current discussion is the correction made in order to evaluate the effects of the Fed’s unconventional policy. It becomes clear that the zero lower bound problem less of an issue. However, the Fed would still need a significant negative interest rate in order to react in an optimal manner.

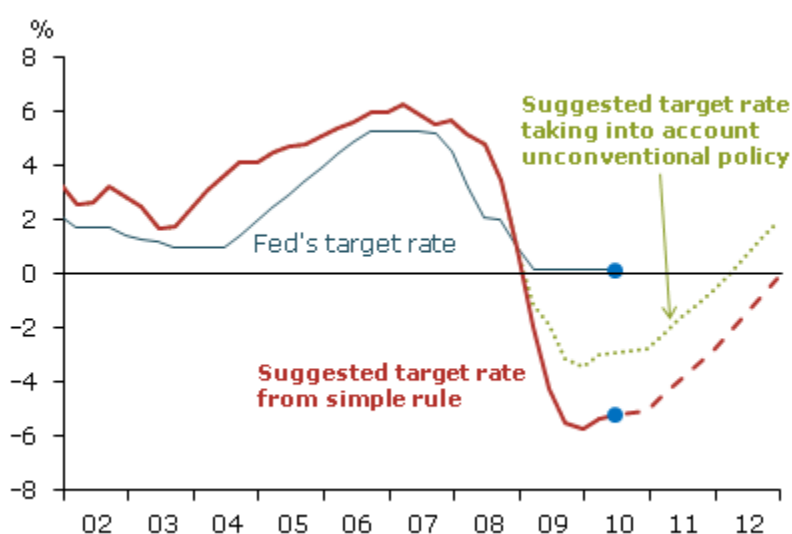


Figure 16: Funds rate rule adjusted for unconventional policy
 Source: Glenn Rudebusch, Federal Reserve San Francisco

Summary

In this last section, we have evaluated the extent to which monetary policy can influence aggregate demand and various transmission mechanisms in the current environment. As was to be expected, the results varied across the channels. Our final assessment is that, while for certain transmission mechanisms the evidence would appear to be mixed, monetary policy does not appear to be rendered impotent in light of expected developments. That being said, much will depend on the type of shocks hitting the economy in the years to come and the degree to which policy makers themselves find monetary stimulus desirable. This issue, which depends on the level of potential output, is addressed in the following section.

3. The interaction of aggregate demand with the supply side

In the previous section we have argued that there are no compelling theoretical reasons why unconventional policy measures should not be able to stimulate aggregate demand, although caveats apply to the transmission of specific channels. Now we turn to the question what effects higher aggregate demand can have in the current environment. In this section, we will address the relative influence higher aggregate demand could have on both inflation and real growth.

This leads us to consider potential output for the UK, US and Eurozone-economies, as the level of the natural output rate determines the extent to which higher aggregate demand is inflationary. This consideration is important. As Reinhart & Reinhart (2010) put it: “A ubiquitous pattern in policy pitfalls has been to assume negative shocks are temporary, when these were, in fact, subsequently revealed to be permanent (or, at least, very persistent). Misperceptions can be costly when made by (...) central bankers who attempt to restore employment to an unattainably high level. Many past policy mistakes across the globe and over time can be traced to not recognizing in a timely basis that such changes have taken place.” (Reinhart & Reinhart, 2010, p.37)

Reinhart & Reinhart are referring here to the 1970’s oil shock experiences, which were examples of negative supply side shocks insufficiently recognized by authorities at the time (Orphanides, 2001). Some economists argue that, similarly, the onset of the last recession was not only driven by demand-side factors. For the United States, they point to the collapse of the housing bubble as an adverse supply-side shock. It is argued that recovery requires re-allocation of the resources currently deployed in the housing and construction sectors. Consistent with a Real Business Cycle-perspective, this would imply a lower potential output level. For the potential output of the world economy, economists point to the oil price peak which manifested itself just before the 2007 correction. As they have in the past, resource scarcities could have adverse supply-side influences. A recovering economy could be faced by ‘speed limits’, faster than expected inflationary pressures, a perspective recently evaluated by Dwyer, Lam & Gurney (2010) and Meier (2010).

Even if we assume the last recession to be caused by an adverse demand shock, we can still assume potential output growth to be below the previous trend. As Reinhart and Reinhart put it, “[a] sustained stretch of below-trend investment and depreciation of human capital prompted by elevated and lengthy spells of unemployment could hit the level and growth rate of potential output.” (Reinhart & Reinhart, 2010, p.38). The phenomenon described here, hysteresis, provides an additional theoretical reason pointing to lower potential output levels.

Using OECD statistics and forecasts for the US, Eurozone and UK, we will evaluate the current monetary measures in light of the mentioned parameters. The OECD forecasts should also reveal the nature of possible future monetary action. We perform separate analyses for every

region. Additionally, country-specific and idiosyncratic factors we believe to play a significant role in policy stances are cited for each of the three central banks.

3.1. United States

We start off by considering the US case. As Fig. 17 shows, inflation tended to be negative during the outbreak of the economic crisis (second half of 2008). Not only was the Federal Reserve confronted with deflation, it also faced an enormous decrease in the output gap (Fig. 22). The deflationary trend persisted for a year, since aggregated prices did not rise above zero levels until 2009Q3. A small, but positive inflation number was accompanied by an increase in the output gap of the same magnitude.

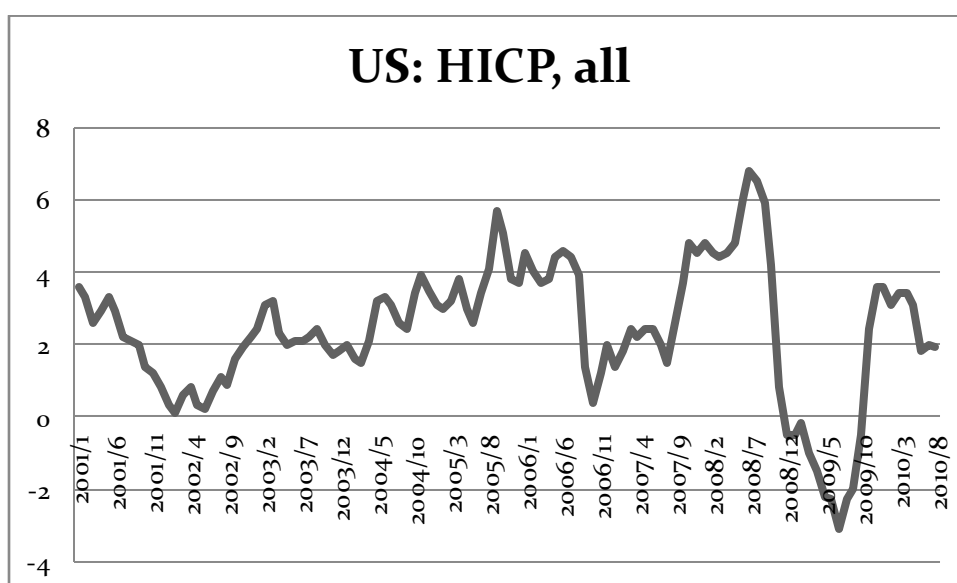


Figure 17: HICP, United States

Source: OECD Statistical Compendium

Given these harsh trends in P and Y, we now turn to velocity. As known already, velocity had a tendency to steadily decrease by a small percentage since the 1980's. To get a better insight, we look at the velocity of the US money supply (Fed statistics). Fig. 19 reveals that after stabilizing in the beginning of the 2000's, velocity fell once again (mid-2007). We make the assumption that this negative tendency goes hand in hand with the eruption of large uncertainty in the financial sector, causing lending facilities to tighten and the interbank market to dry up. The real economy started suffering too, manifested by a fall in private consumption (Fig. 18). This is, especially in the US, a major blow.

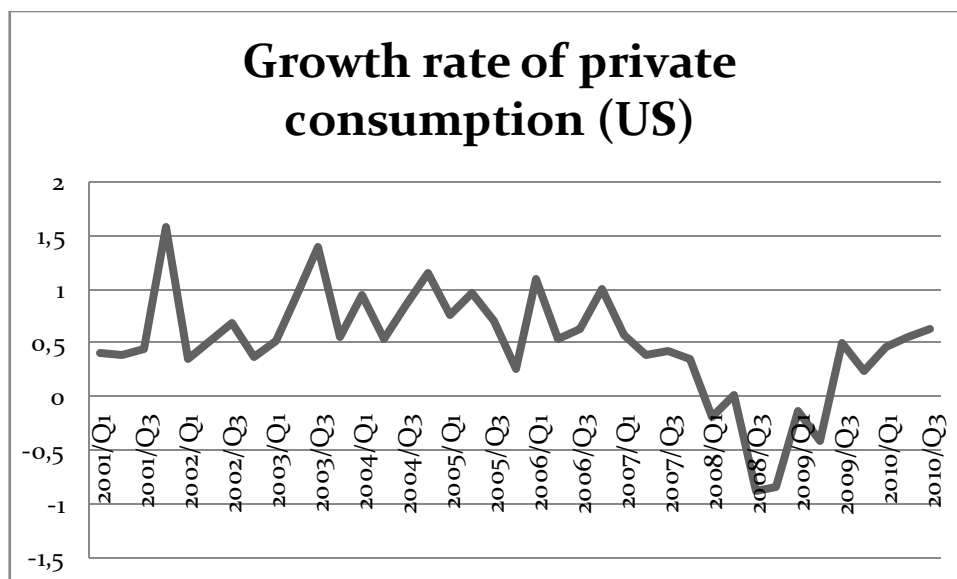


Figure 18: Growth rate of consumption, United States Source: OECD Statistical Compendium

Eventually, stagnation kicked in at the start of 2009. One could argue that velocity is located far below trend growth, since technological and institutional shocks can't account for a fall in velocity of this magnitude.

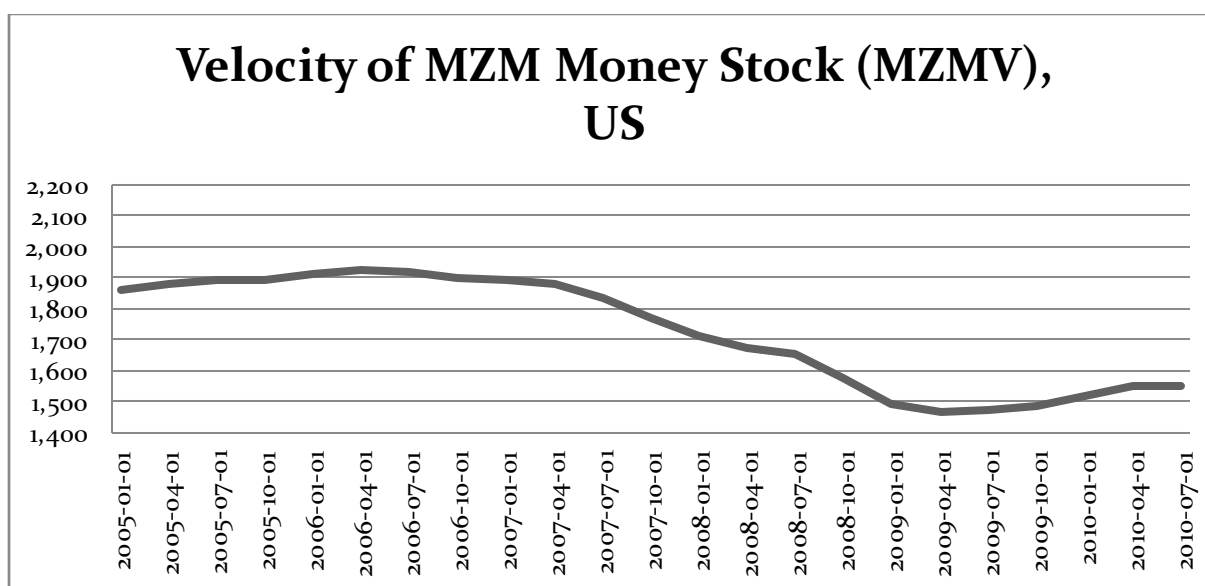


Figure 19: Velocity of money stock, United States Source: OECD Statistical Compendium

How did the Fed react to these sharp decreased in V, P and Y? In the light of monetary easing, we take a look at the monetary base and the total money supply M₃. One would expect that the Fed is obligated to react strongly in order to compensate for the mentioned evolutions. Their modus operandi will be expanding the monetary base to very high levels. This way, money supply is heightened to match the increase in money demand (and correspondingly,

bring interest rates down). As we observe in Fig. 20, the US monetary base was indeed hiked to enormous levels in September 2008 (the fall of Lehman Brothers marks the outbreak of a deep crisis). After certain stagnation, the monetary base was inflated once again at the end of 2009, when the Fed announced 'Quantitative Easing'. The statistics did not yet contain the second round of QE (November 2010), which enlarged the base once again.

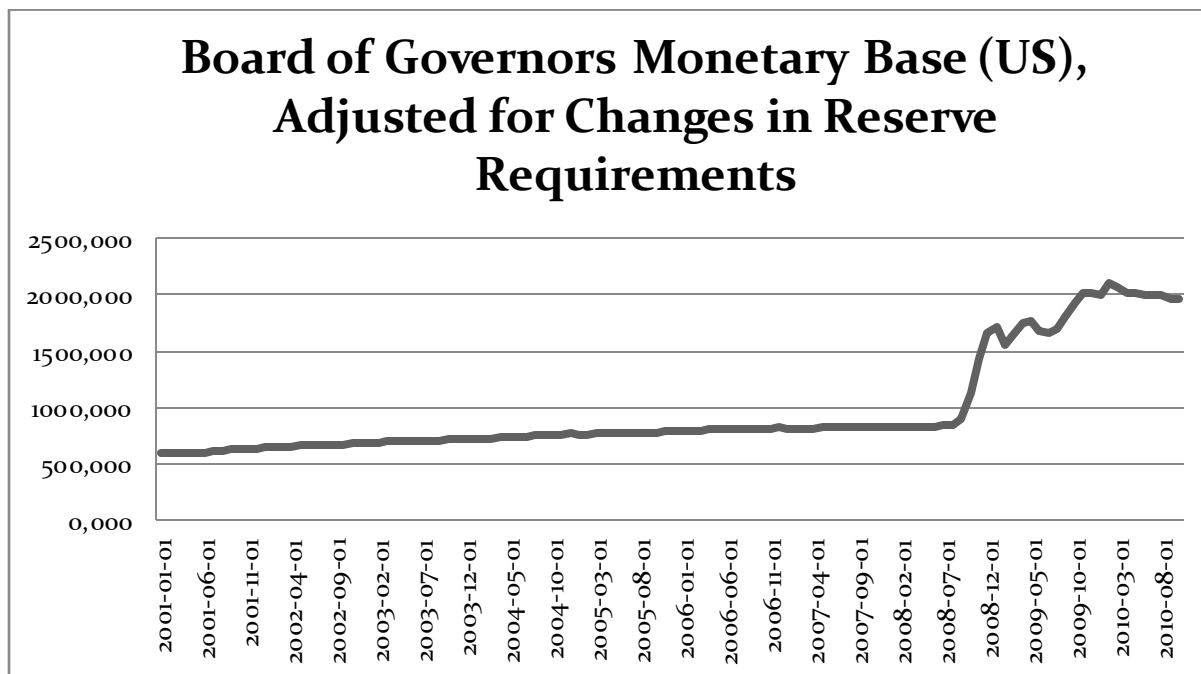


Figure 20: Monetary base, United States

Source: OECD Statistical Compendium

Looking only at these figures would lead one to think that the Fed reacted swiftly and in an expansionary manner, making up for the fall of P, V and Y. Of course, one should not only look at the monetary base (m), but also at the money supply (M, which ultimately affects the real economy).

The M₃ money supply (Fig. 21) reveals a clear break at the end of 2008, showing that M₃ growth slowed down at the outburst of crisis. The question is whether this slower M₃ growth is crucial in our analysis, in a way that it would lead the Fed to think the monetary base needs to expand even more. It is clear that the monetary base multiplier took a massive blow, to which the Fed seemed to respond nicely to keep M₃ on 'normal' track. However, should the M₃ growth be kept on this so-called 'normal' track?

An interventionist central banker may be inclined to target much higher M₃ growth, in order to compensate for the fall in V. This is in line with the theory mentioned above, which states that M should be expanded in crisis times (Fisher equation). We can link the 'quantitative easing' school with these observations, who support a further increase in the monetary base in order to expand M₃.

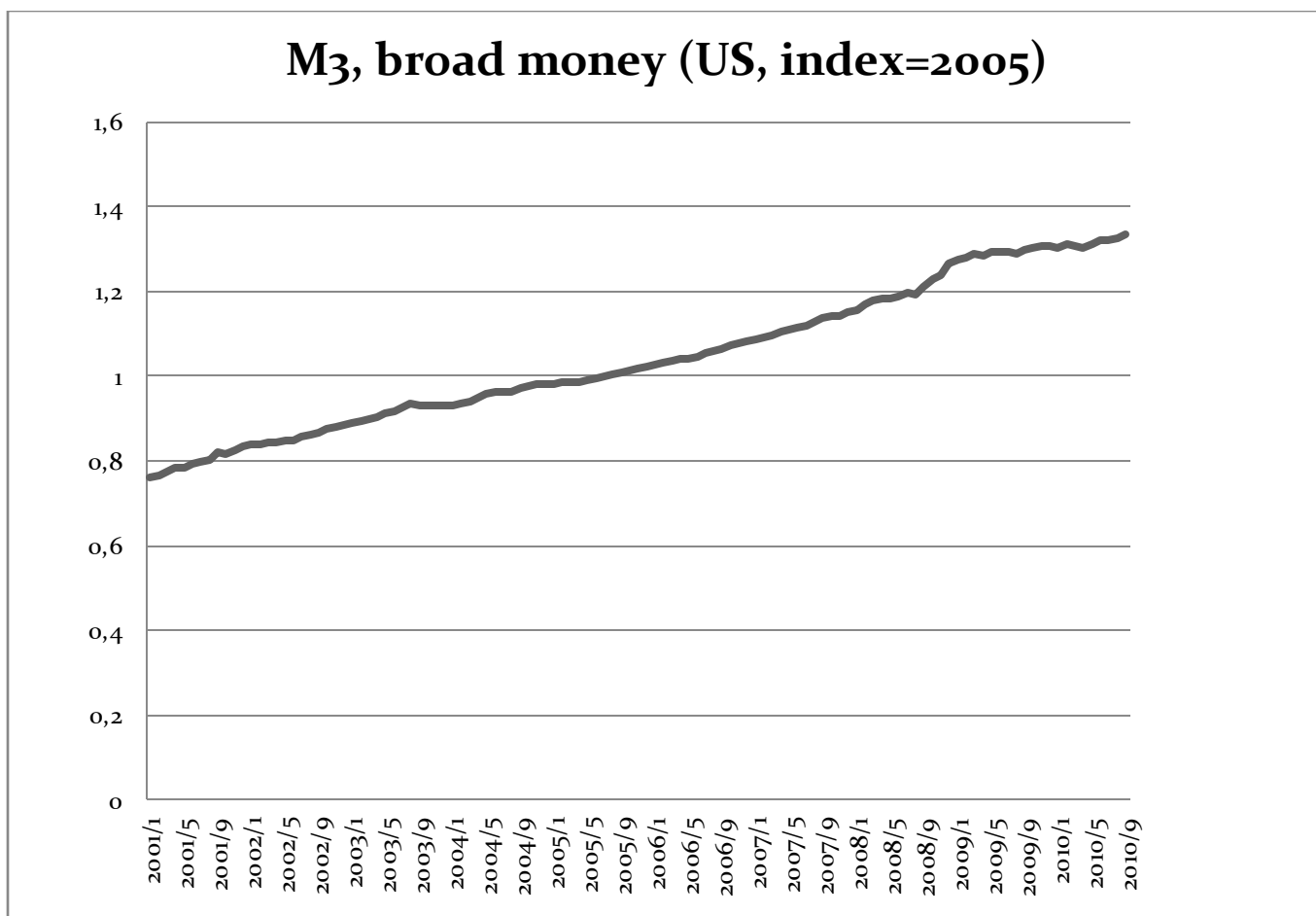


Figure 21: M3, United States

Source: OECD Statistical Compendium

We now return to our critique of expansionary monetary policy. It could very well be that Y did not sink to very low levels (compared to potential output Y^*), which makes a further hiking of the monetary base totally unnecessary. On the contrary, if potential output itself fell significantly, using monetary stimulus to boost aggregate demand further would be insupportable for a central bank targeting current inflation. Higher aggregate demand would not boost real income and only result in higher inflation, a situation corresponding to a vertical AS-curve.

To get a better insight, we need to take a closer look at current output gap measures. This statistic points to a crucial issue which complicates monetary policy: the reliability of real-time data. As argued in the literature, current estimates of the output gap are prone to revision later. Indeed, some authors even argue that certain episodes of monetary policy mismanagement have been caused by unreliable real-time estimates of potential output.

First, we turn to the OECD calculated output gap (Fig. 22). These figures seem to reveal a strong worsening of the output gap since 2008Q4. The gap remains in very bad shape until recent available information (2010Q3). The OECD forecasts the gap will remain negative until 2011Q4. Some interesting clues are revealed here. Most notably, the potential output level did

not seem to fall as much as the actual output level, leaving the possibility of expansionary policy wide open. One could even argue the ‘normal’ M3 growth rate was far too small to compensate for the big hits taken by V. In this respect, the Fed was spot on when activating QE and should not rule out even more expansionary policies, such as setting a higher inflation target and/or hiking M3 further above current levels. Of course, one should remain nuanced about the effectiveness of these propositions, since they encounter large difficulties and uncertainty (cfr. supra/infra).

Output gap of the total economy (United States)

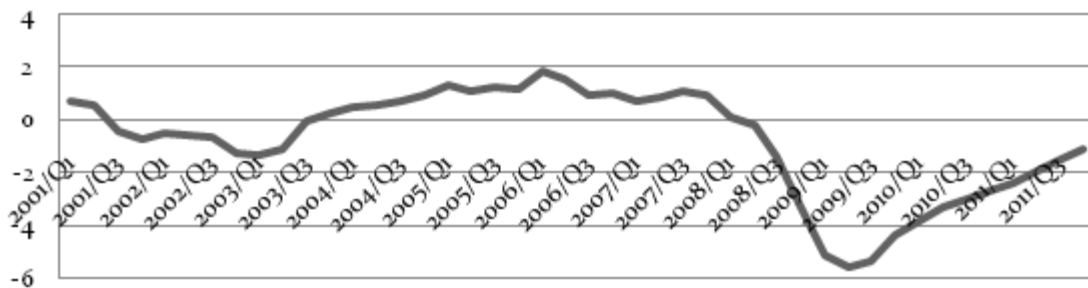


Figure 22: Output gap, United States

Source: OECD Statistical Compendium

In the light of the output gap, one can also consider the NAIRU (Fig. 23, natural rate of unemployment, u^*) and the actual unemployment rate (u , Fig.23). Starting from 2008Q3, this rate starts to surge again, with also the prospects for upcoming quarters looking rather dark. This implies a more limited scope for monetary policy to intervene more heavily. Nuance is appropriate however: there was only a modest increase in the NAIRU (4.9% to 5.3%), meaning potential output did not suffer extremely hard and that, therefore, there was additional room for monetary easing.

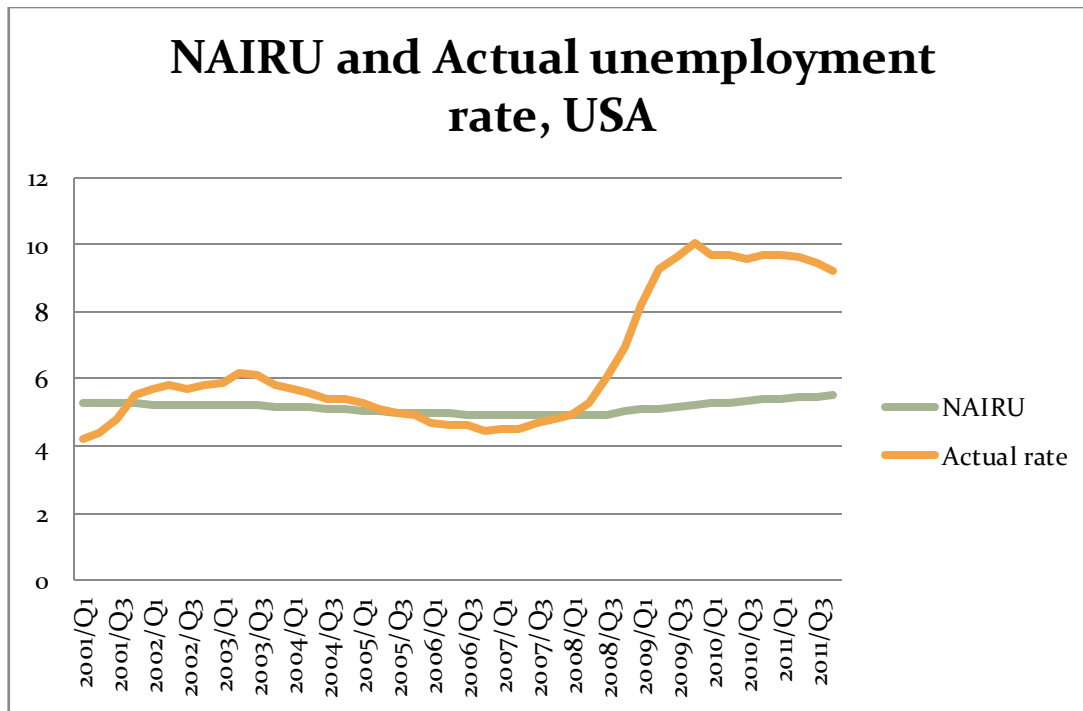


Figure 23: NAIRU and Actual unemployment rate, U.S.

Source: OECD Statistical Compendium

The official unemployment rate in the US is currently below but close to 10%, one of the key drivers behind the demand for active (monetary) intervention. A last remark is directed at the unemployment forecasts, indicating a possible 2%-point fall in the upcoming 2011 year. Since ambiguous fiscal policy seems to have had a low impact on the real economy, a significant degree of monetary stimulus is possibly explaining the (lagging) real economy recovery. We hereby explicitly mention the Fed's mandate of inflation and growth targeting. At numerous occasions, Fed chairman Bernanke hinted at keeping an eye on the official unemployment rate. Since the lagged effects of QE could be strongly beneficial on the unemployment rate, the possibility of further easing would diminish.

We hereby repeat that, since fiscal policy will possibly tighten in the near future, monetary action can go beyond the stringent normal-day policy and take on the expansionary role of (absent) fiscal stimuli.

3.2. United Kingdom

We now turn to the UK. First of all, it is worth noting UK inflation did not take an as severe hit as its US counterpart. These figures, as presented in Fig. 24, decreased over the same period, but the UK did not go into deflation. Furthermore, inflation retook a (high) 3% level by the beginning of 2010. As mentioned before, the UK inflation forecasts reveal a lower inflation number of around 2% in 2011 and 1.5% in 2012. In addition, we refer to the BoE fan charts (cfr. supra). The HICP inflation is expected to remain relatively high due to the tax hikes announced by the Cameron administration. These inflation figures are not anticipated to get in line with the 2% growth target before the beginning of 2012. In 2012, we observe a lower-but-close-to-2% HICP inflation, again not completely in line with the BoE target. These remarks lead one to an ambiguous appraisal of future BoE policy stances. Indeed, higher inflation would require a less expansionary policy. The problem is that these expected price hikes may be caused by fiscal austerity and higher tax rates instead of substantial output growth.

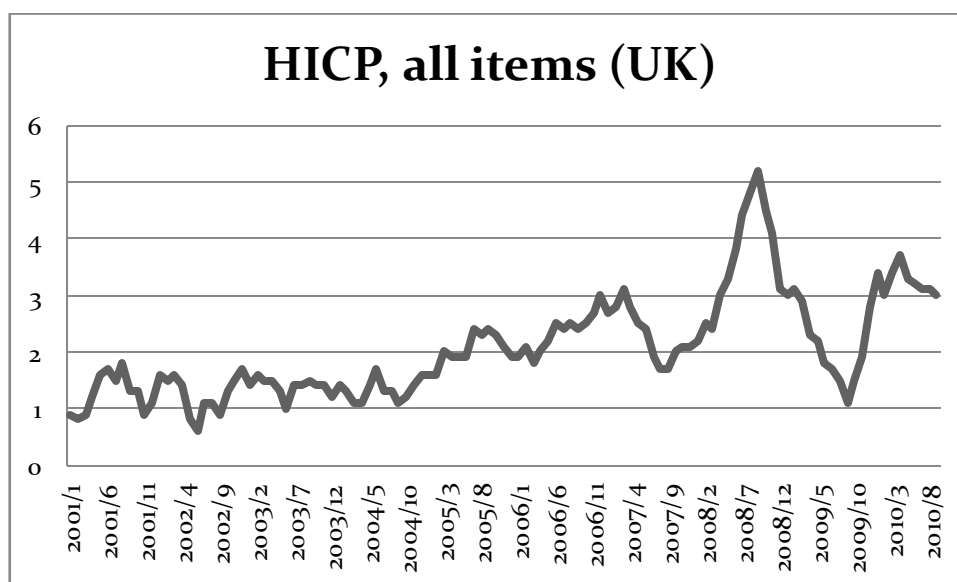


Figure 24: HICP, United Kingdom

Source: OECD Statistical Compendium

When comparing growth figures with these of US, the output gap reveals an even sharper recession and slower recovery (Fig. 29). The estimates also remain darker for the UK. Considering these evolutions, one would be eager to induce the BoE to engage in taking the same measures as the Fed.

The sharper fall in output gap may be attributed to the remarkable decline in labor productivity which was much higher in the UK than in the US, as shown in Fig.25 . Since 2008Q3, productivity took large hits, and remained at a low level until 2010Q3 (most recent statistics). The OECD forecasts a strong increase in 2011, casting doubt on current and future policy implications. On the one hand, lowering interest rates and expanding monetary policy was fully supportable since the central bank had to react swiftly to a large, but *temporary* drop in productivity (and to a bigger extent, output). On the other hand, an exit strategy might have to be implemented faster than first expected. If productivity will indeed increase by a large amount, too loose policy will lead inflation expectations to get out of hand. Of course, one should not only look at productivity measures. Several factors - explaining the drop in Y - have to be taken into account, especially in these extraordinary times.

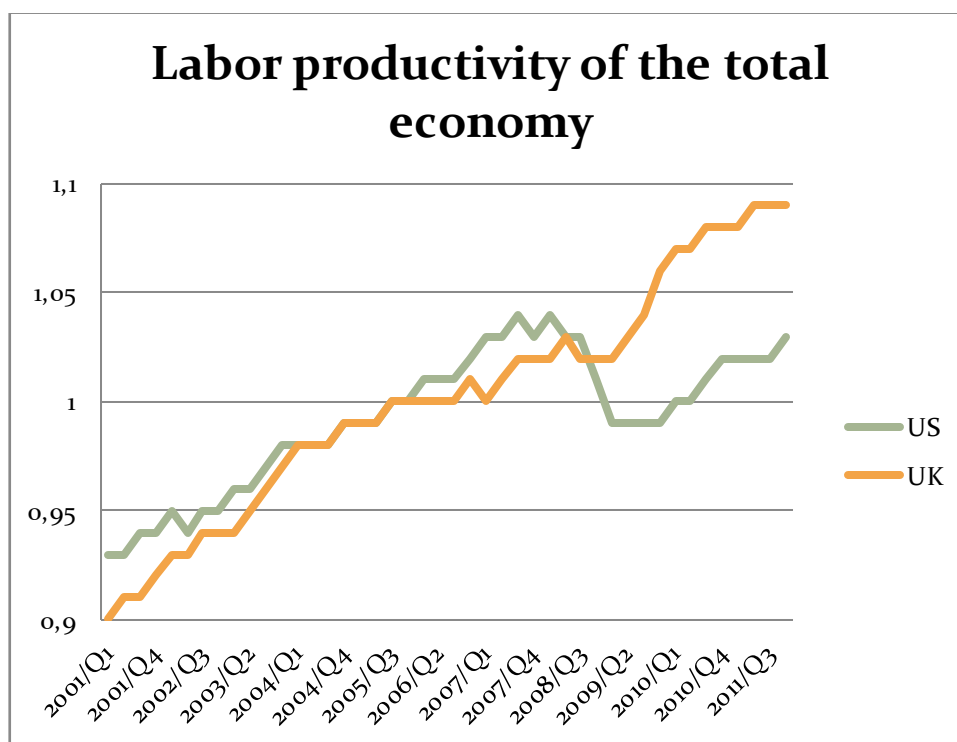


Figure 25: Labour productivity, UK and US

Source: OECD Statistical Compendium

When looking at the M3 money supply, we observe that the stable growth ended abruptly in September 2008, when M3 rose more strongly before declining again. This volatile path lasted almost two years, until M3 was kept steady in the second half of 2010. Again, we raise the same questions as with the US case. Is the targeted M3 growth too low? Does the output gap leave some room for possible further monetary easing? An answer has to be found in studying the deviation of actual output from potential output levels (Fig. 28).

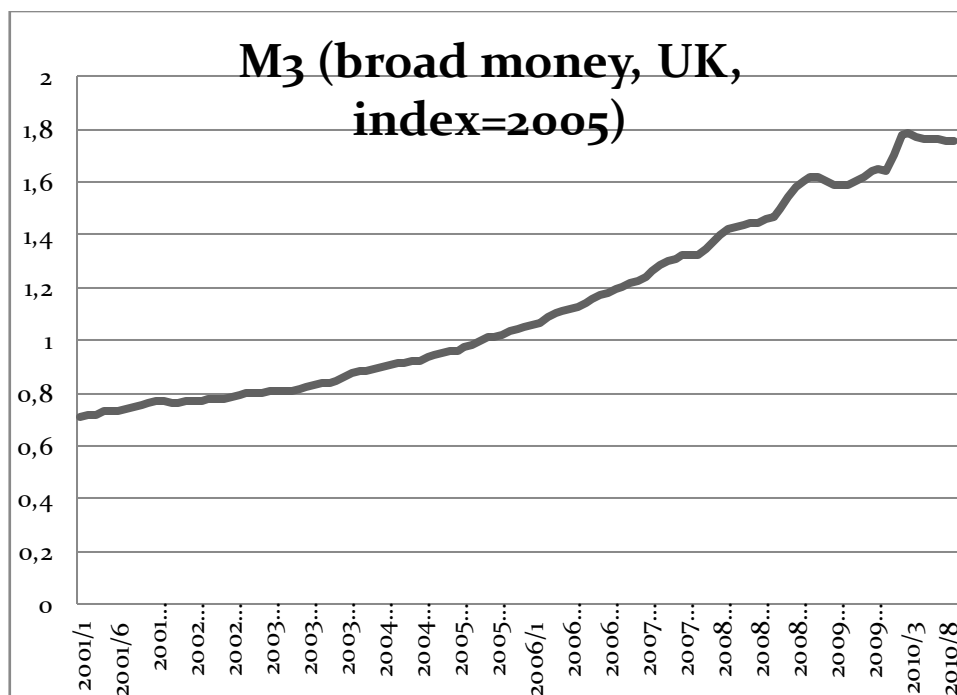


Figure 26: M3, United Kingdom

Source: OECD Statistical Compendium

Around February 2009, the BoE started expanding its balance sheet enormously (Fig. 26). These observations underline our predictions about monetary policy. This mentioned stimulus lasted for more than a year until April 2010. The same story applies to the UK case: were these massive base money hikes still not large enough? One would suspect the monetary base multiplier fell so deep that doubt arises about monetary policy ineffectiveness.

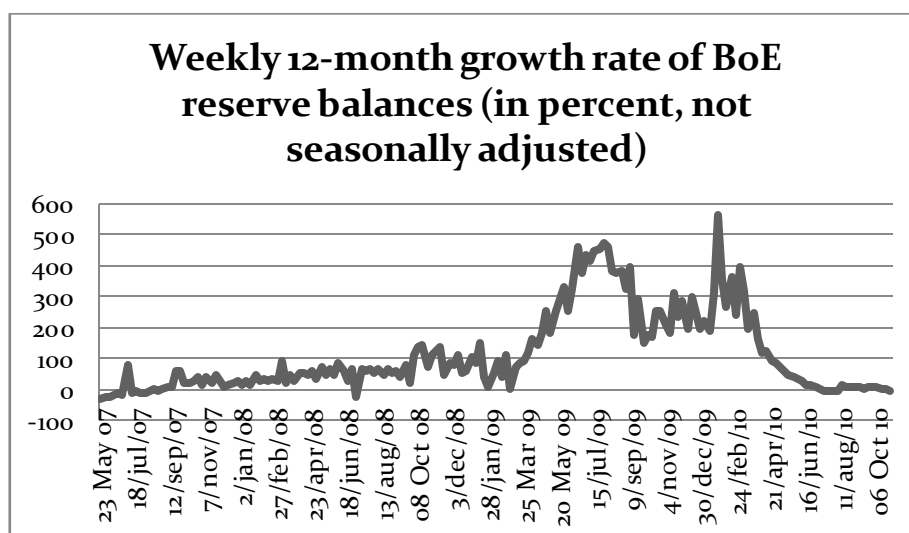


Figure 27: Weekly 12-month growth rate of BoE reserve balances

Source: OECD Statistical Compendium

It is clear that after years of a steady rise in the level of output gap, this level fell to an enormous -6% (lasting more than a year). Furthermore, the projections reveal this gap to stay in horrendous shape, again pointing out some possible policy implications. Not only was M3 money growth far below a 'smoothing target', the future possible monetary easing is certainly

a recommended option. An interventionist central banker would point out there is a big space between Y and Y^* , which would be filled by (monetary) stimulus. An important remark is that the temporary productivity slowdown doesn't account for much of the resulting output gap. It seems the gap remains at a very low level, while meanwhile productivity is expected to rise again. The implemented fiscal austerity measures could play a role here.

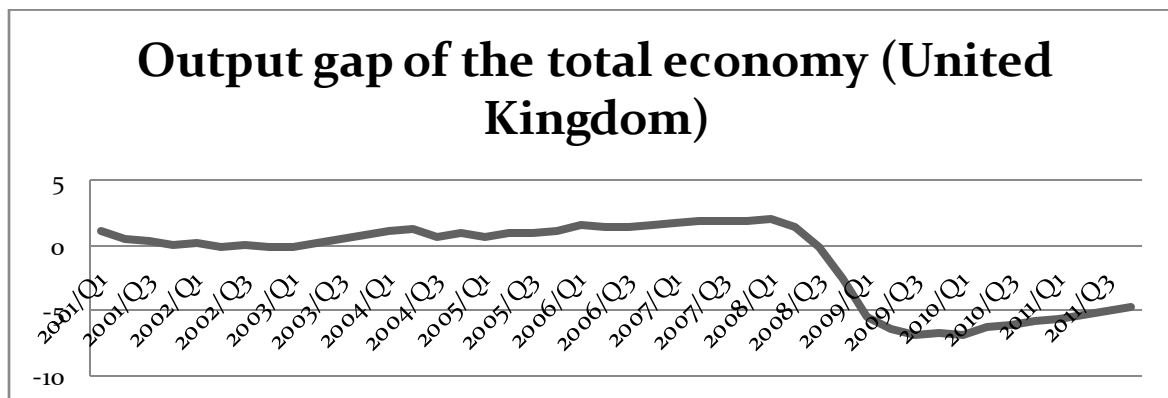


Figure 28: Output gap, United Kingdom

Source: OECD Statistical Compendium

To evaluate the UK output gap case further, we consider the difference between actual unemployment and the natural rate of unemployment (Fig. 29, statistics and predictions (2010Q4 - 2011Q4)). We observe a sharp and lasting divergence in late 2008 of a small 3%. Again, room for stimulus is introduced. One should note, however, that this difference isn't nearly as big as in the US, and thus a differentiated reaction could be expected. Since fiscal tightening is anticipated, the closing of the gap could lie in the hands of the BoE. We repeat the remarks already made in the first part of the paper, the option of further monetary easing is wide open when deemed necessary by the BoE. Since medium-term inflation expectations currently lie below their target and unemployment is expected to stay high, another round of QE is a possibility.

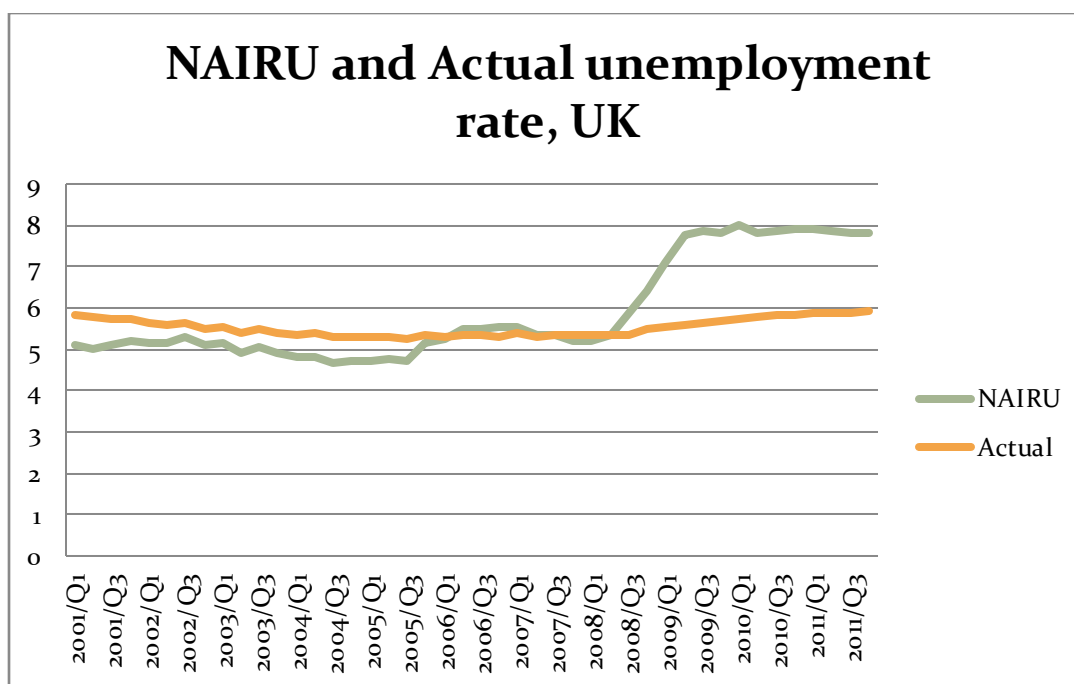


Figure 29: NAIRU and Actual unemployment rate, UK

Source: OECD Statistical Compendium

To finish our appraisal of the UK monetary policy stance, we mention the international effects of BoE policy. Since the UK is a small and open economy, we believe the exchange rate reaction to be crucially important. In a world where most colleague central banks are moving towards long lasting and strong stimulus, the BoE might be seduced to take on the same strategy. If it would not, exchange rate appreciation and a shortfall in competitiveness could send the UK in a double dip recession. Even if the inflation target would be realized and the output gap shortened, it would still be optimal to engage in stimulus action to keep the exchange rate on competitive levels.

We take a look at the real effective exchange rate (Fig. 30) to get a better insight. At the end of 2007, we notice a substantial depreciation of the currency vis-à-vis the main trade partners. This depreciation is quantified at an enormous 20% level. As this benefits the export-based economy and possibly prevented an even bigger fall in output, the currency rate channel possibly benefited the UK. There is another side to this story. Going back to the inflation statistics (cfr. infra: fan charts), the price hike in imported goods could largely be driven to the exchange rate movements.

Indeed, the process of “importing inflation” can help the central bank reach the inflation target goal. In the future, a close eye on the exchange rate movements (ergo, the different international monetary policies) is expected to make up for a substantial part of BoE’s policy, even though the BoE cannot be deemed an ‘exchange rate targeting’ CB.

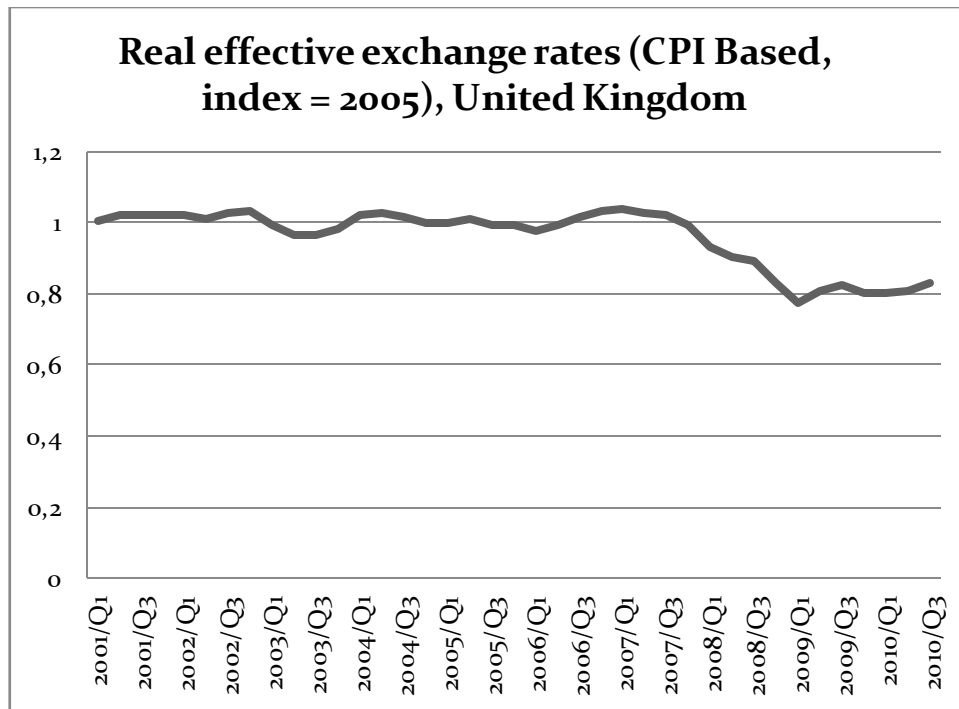


Figure 30 Real effective exchange rates, UK

Source: OECD Statistical Compendium

3.3. Euro area

The region covered last is the Euro area. To begin with, we cover the inflation statistics (Fig. 31). As we know, the ECB targets a lower-but-close-to 2%-rule in HICP growth. In the period just before the outbreak of the economic crisis, we observe a growth rate of 4% in the Euro area. This figure then plummets to small deflationary numbers (-0.5% in the second half of 2009). In 2010, the rise commenced to almost 2%, in line with the targeted number. Taking a first glimpse, it seems ECB did well in controlling the inflation rate of the whole Euro area, by limiting deflationary trends and getting the HICP back in line to a number below but close to 2%.

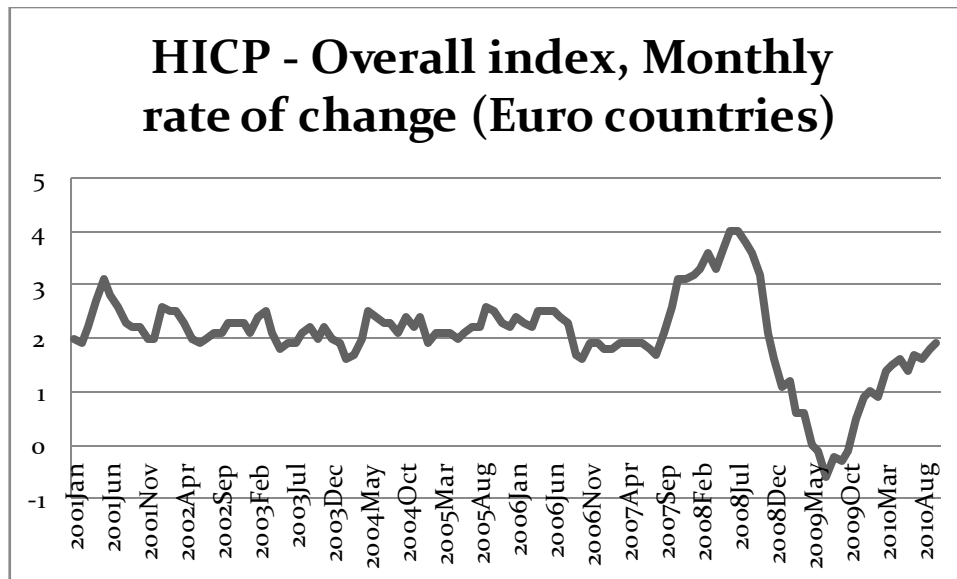


Figure 31: HICP, Eurozone

Source: OECD Statistical Compendium

When looking at the inflation projections made by professional forecasters (Fig. 32) the inflation number seems to stabilize. For the 2011-2012 period, the vast majority of respondents indicate an expected HICP growth between 1% and 1.9%. Of course, the difference between these bounds is highly important to ECB policymakers. Whereas a 1% rise in inflation is not in line with the ECB target and possibly a danger to anticipated growth, its undesirability is greatest for specific member countries which might be faced with deflation. Especially in these countries, deflation could have an enormous backlash and harm the viability of the Euro zone as a whole. We will address this topic after the following evaluation of the $M*V=P*Y$ decomposition.

2010 Q4 inflation forecasts

	2010	2011	2012	Sep. 2011	Sep. 2012	2015
Mean point estimate	1.5	1.5	1.6	1.5	1.7	1.9
Standard deviation	0.2	0.3	0.3	0.3	0.3	0.3
Number of replies	61	61	51	50	43	48
Probability distributions	2010	2011	2012	Sep. 2011	Sep. 2012	2015
<-1.0%	0.0	0.0	0.1	0.0	0.1	0.2
-1.0 to -0.6%	0.1	0.1	0.2	0.2	0.3	0.3
-0.5 to -0.1%	0.2	0.7	1.2	0.8	1.3	1.2
0.0 to 0.4%	0.5	2.2	2.9	3.0	3.6	2.5
0.5 to 0.9%	2.7	9.4	9.2	9.4	8.6	6.8
1.0 to 1.4%	32.9	29.8	24.0	29.4	22.1	16.0
1.5 to 1.9%	57.2	38.3	34.0	34.9	32.6	28.1
2.0 to 2.4%	5.1	13.9	19.1	16.0	20.8	26.6
2.5 to 2.9%	0.9	4.0	6.8	4.8	7.2	11.1
3.0 to 3.4%	0.3	1.2	1.9	1.2	2.6	4.7
3.5 to 3.9%	0.1	0.3	0.4	0.2	0.6	1.9
>4.0%	0.0	0.0	0.1	0.1	0.2	0.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Figure 32: 2010 Q4 inflation forecasts, Eurozone
Source: ECB Survey of Professional forecasters

An interesting statistic is, just like for the UK, the labour productivity of the total economy (Fig. 33). Again, we face a sharp decline in productivity around 2008Q3. This phenomenon is temporary, according to the OECD projections, with productivity gaining its initial 2008Q1 value again in the beginning in 2011. Again, we look at the policy reaction. The expectation is that monetary policy reacts aggressively in order to restore Y.

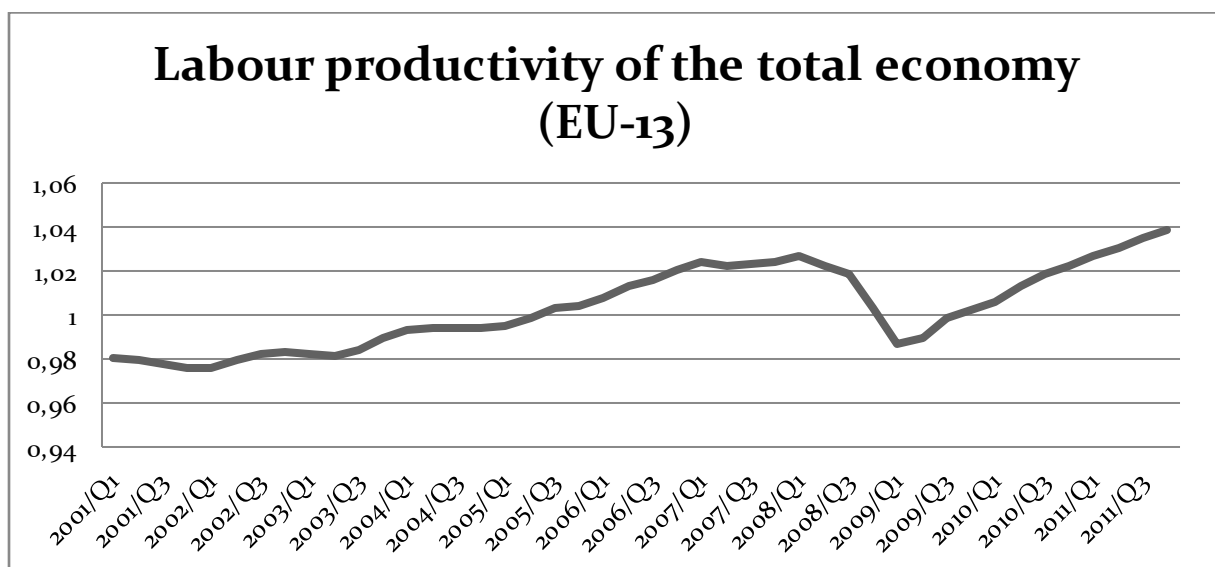


Figure 33: Labor productivity, Eurozone

Source: OECD Statistical Compendium

The sudden plummeting of productivity, of course along with other factors, seemed to have certainly harmed the output gap. In 2008Q3, the gap fell to a shocking -5% level. The gap doesn't seem to close very fast, with a figure of -4% still at the end of 2010. OECD projections indicate a continuing tightening of the gap in 2011, but still remaining far beyond the desired 0%. This figure clearly shows that it was not Y^* that took sharp hits, but Y fell to such an extent that extensive policy reaction might have been appropriate. The room for (monetary) stimulus appears quite large and seems to last for a long amount of time.

Of course, the ECB is not mandated to react to output shocks and fulfill a stabilization role. The ECB clearly states on its site “[t]he ECB’s monetary policy strategy comprises a quantitative definition of price stability, and a two-pillar approach to the analysis of the risks to price stability”. (ECB, 2010b)

However, in the last couple of years, a significant amount of evidence evolved, casting doubt on this one-sided policy stance: “First, subjective measures of economic growth play an important role in the ECB’s policy decisions. They are frequently referred to in the Governing Council’s discussion of the economy in the Editorials of the Monthly Bulletins and are statistically highly significant in the estimated reaction functions. The use of such subjective measures of economic conditions is sensible since they are strongly correlated with future output gaps. ... Second, interest rate changes are more closely tied to economic activity than to inflation” (Gerlach, 2007, p. 24).

Indeed, the measurement of future output gaps seems to play an important role in ECB policy stance, which is the reason why we put emphasis on those in our appraisal of the (actual and expected) monetary reaction.

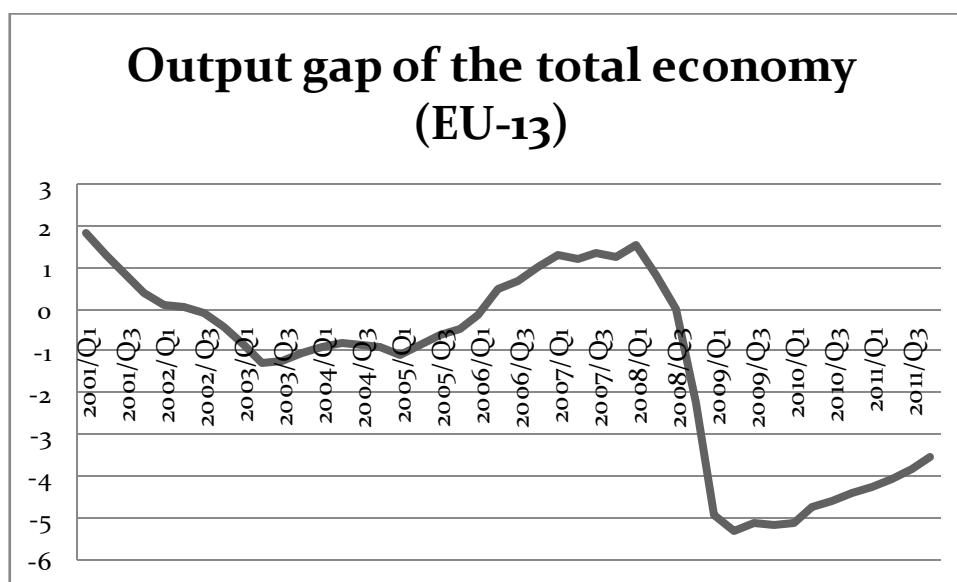


Figure 34: Output gap, Eurozone

Source: OECD Statistical Compendium

In line with the mentioned (temporary) fall in P and strong reduction of Y far below Y^* , we expect the ECB to accommodate by expanding its base money aggressively. In case of a decrease in velocity, we would expect this reaction even more. We find the ECB expanded its balance sheet (Fig. 35) at the end of 2008.

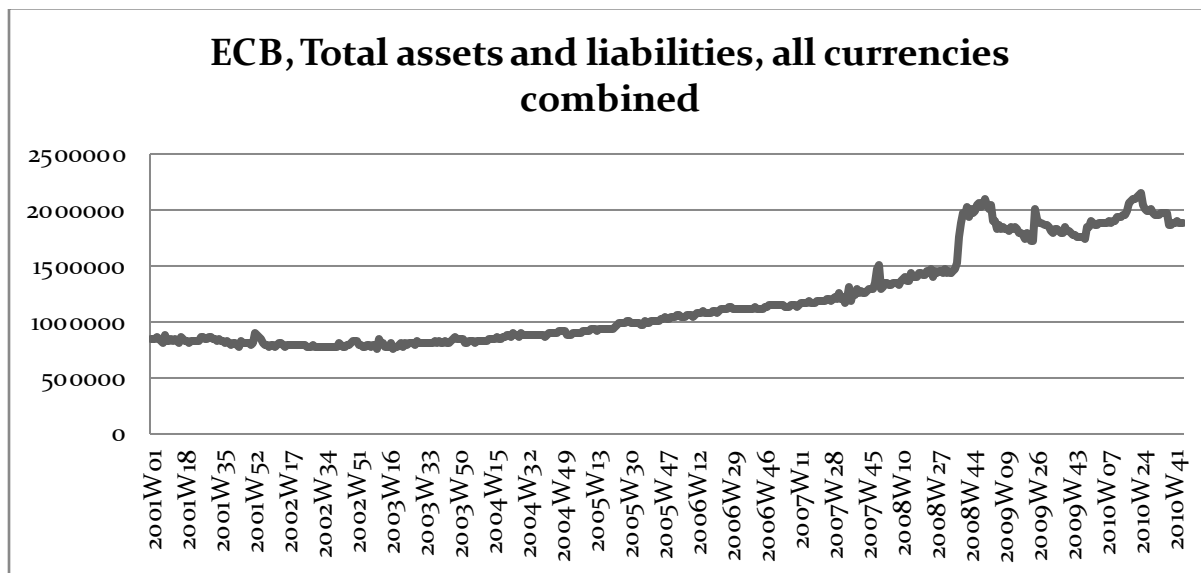


Figure 35: Total assets and liabilities, ECB

Source: ECB Monetary and Financial statistics

An alert reader might deem this monetary reaction to be on the late side. We hereby mention the possible second-round effects of price and wage dynamics in the Eurozone (which are much bigger and outspoken than in UK or US). Indeed, BoE and Fed are able to react in a more activist way because of this. For the Fed also, its double mandate is also important. One could point to Gerlach (2007) in order to counter the last statement. It is our belief the Fed and the ECB can be regarded as interchangeable in normal times, but not completely in extraordinary times (such as the currently evaluated timespan). In these times, the different mandate could indeed be a source of different policy reactions.

Indeed, the ECB seemed to react in a much more prudent way, lowering the monetary base in 2009 again. While there was a short spike in mid-2010, moderation appears to be the norm for the ECB policy reaction, in sharp contrast with the Fed and BoE. The ECB did not engage in a kind of 'quantitative easing' program, but rather seemed to be at ease with the economic evolutions. As mentioned before, ECB took action by lowering interest rates to a 1% level (main refinancing operations) and loose credit conditions. When compared to the Fed, however, these evolvments weren't nearly as unconventional and the road to an 'exit strategy' seems to be much more stable and easy for Europe. Also, inflation risks weren't augmented nearly as much as in the UK or the US.

When putting these observations in the light of the Fisher equation exercise, we immediately observe monetary policy was not in line with output gap objectives at all. Whereas M₃ (Fig. 36) rose steadily until 2008Q4, the decline was noticeable in 2009 and much of 2010. Instead of keeping M₃ on this growth track - or rather, trying to expand M₃ aggressively in order to compensate for the enormous output loss - the base money hikes were never big enough to be able to do so. Instead, the base money multiplier fell promptly and the monetary base growth was completely inadequate to compensate for these movements. While actual and future (predicted) output gaps are vast, expansionary policy was not exercised.

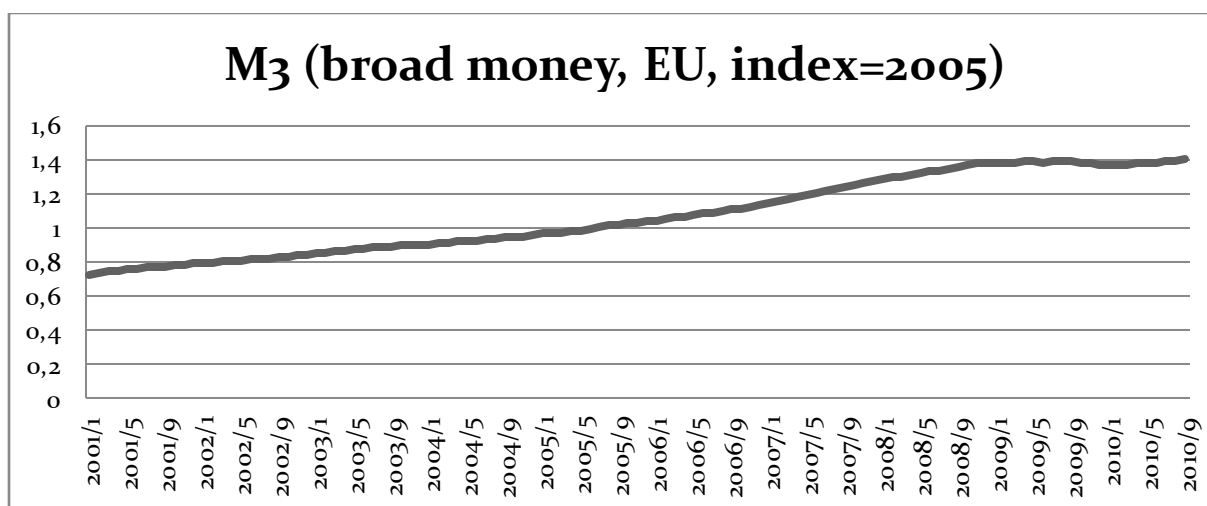


Figure 36: M₃, Eurozone

Source: OECD Statistical Compendium

When turning to the real GDP forecasts, made by professional forecasters in 2010 Q4 (Fig. 37), we observe these projections to aim at a 1% - 1.9% growth. This seems like a fairly good result and in favor of the ECB policy stance, but contrasts with the large output gap (estimated by OECD). There are two reasons for this. First, it is clear the ECB doesn't want to engage in extraordinary measures that would ultimately lead to a (probably, bumpy) track towards an exit strategy. This strategy will inevitably be accompanied by large uncertainty and volatile inflation expectations, which is intolerable for the ECB. Second, it seems stabilizing the output gap is not the main concern right now, no matter how much room there was/is for further stimulus.

2010 Q4 real GDP growth forecasts

	2010	2011	2012	2011 Q2	2012 Q2	2015
Mean point estimate	1.6	1.5	1.7	1.3	1.6	1.8
Standard deviation	0.1	0.3	0.3	0.4	0.3	0.3
Number of replies	61	61	53	50	44	46
Probability distributions	2010	2011	2012	2011 Q2	2012 Q2	2015
<-1.0%	0.1	0.3	0.5	0.4	0.4	0.2
-1.0 to -0.6%	0.1	0.4	0.6	0.6	0.6	0.6
-0.5 to -0.1%	0.3	1.3	1.4	1.6	1.7	1.3
0.0 to 0.4%	1.0	3.7	3.8	5.1	4.7	4.0
0.5 to 0.9%	3.5	11.6	10.0	14.7	11.1	8.6
1.0 to 1.4%	25.6	32.4	23.1	33.3	23.6	18.8
1.5 to 1.9%	57.7	30.7	33.6	27.1	30.8	29.5
2.0 to 2.4%	10.2	13.7	17.5	12.0	17.3	21.6
2.5 to 2.9%	1.1	4.0	6.1	3.6	6.5	9.3
3.0 to 3.4%	0.2	1.3	2.3	1.2	2.7	3.8
3.5 to 3.9%	0.1	0.4	0.7	0.4	0.7	1.7
>4.0%	0.0	0.2	0.4	0.0	0.1	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Figure 37: 2010 Q4 real GDP growth forecasts, Eurozone
Source: ECB Survey of Professional forecasters

We also take into account the unemployment rate and NAIRU estimations and predictions. Fig. 38 reveals the NAIRU rose by almost one percentage-point in the period of 2009 - 2010. Two remarks apply. First, the natural rate of unemployment was and is bigger than in US and UK. Second, the NAIRU level for the Eurozone grew remarkably faster in the same period, nearly twice as fast. In addition, the actual unemployment rate increased from 8% to more than 10%. The space between u and u^* seems not that large and consists less as a source for stimulus, compared to UK and US. An important remark needs to be added to this analysis. The evolutions can also be largely due to fiscal policy and different (country-linked) supply side factors. Also, the intra-Eurozone differences make the ideal, uniform ECB policy reaction much more ambiguous.

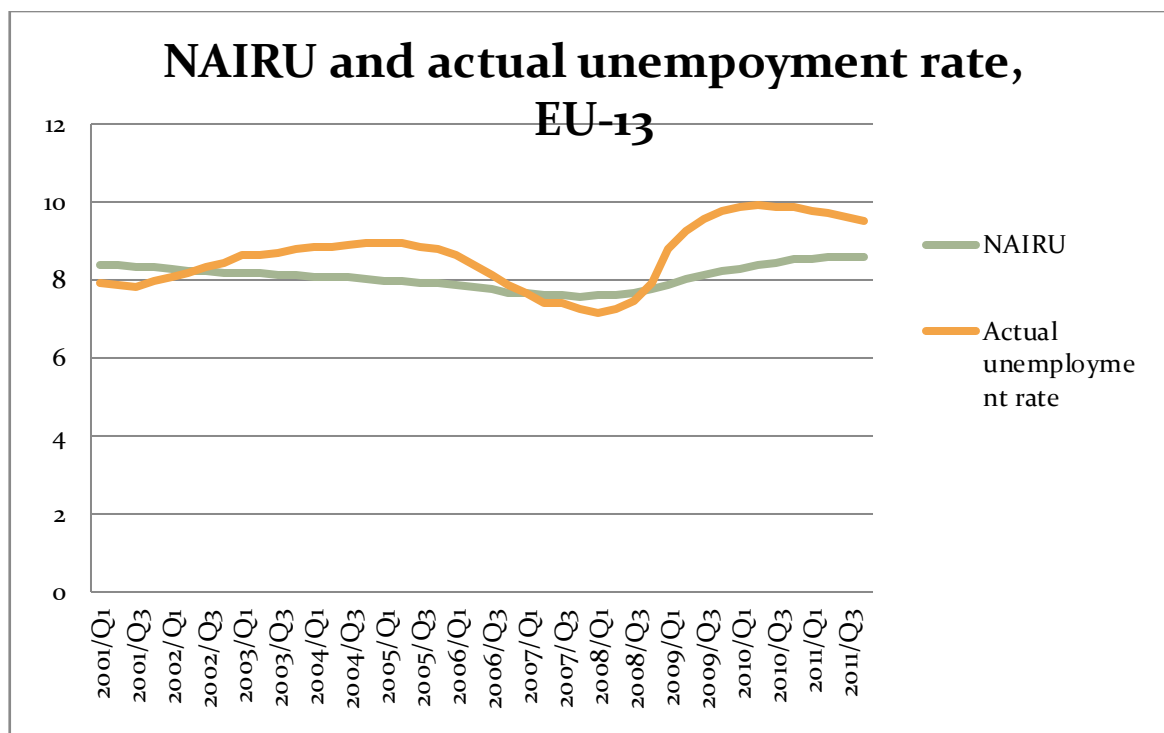


Figure 38: NAIRU and Actual unemployment, EU-13 Source: OECD Statistical Compendium

The vast difference between the expected monetary policy (given by the mentioned statistics and as proclaimed in monetary policy handbooks) and the actual ECB reaction leads us to take some more elements into consideration. Two kinds of aspects make the ECB policy somewhat more complicated to discuss. The first aspect has to do with the *role of Germany* as the de facto leader of the ECB. This complicates the ECB policy process, especially since country-based differences across the Eurozone are vast and numerous. The second was already mentioned by Gerlach (2007), namely the importance of confidence indices.

The dominant role of Germany in the ECB monetary policy became very clear during the years 2009-2010. Numerous German fiscal and monetary policymakers took up the role as spokesmen of the Eurozone and the German bond yield is – once again – of extreme importance when comparing different EU member states. The Frankfurt-based ECB seems to be largely influenced by the German philosophy of keeping inflation expectations low and stable. This could explain why Germany (and hence, the ECB) did not engage in big monetary easing programs and started mentioning the ‘exit strategy’ explicitly around October 2010.¹

The already mentioned troubles concerning a symmetric monetary shock with asymmetric effects are captured by Fig. 39. This graph shows the HICP inflation for three Eurozone countries (Ireland, Germany and Greece). The difference between inflation rates in these three countries, all making use of the same currency (and hence, the same exchange rate) is enormous (2010Q3).

¹ <http://www.ft.com/cms/s/0/3ced22d2-d1fb-udf-965c-00144feabdco.html#axzz17pAMZTUC>

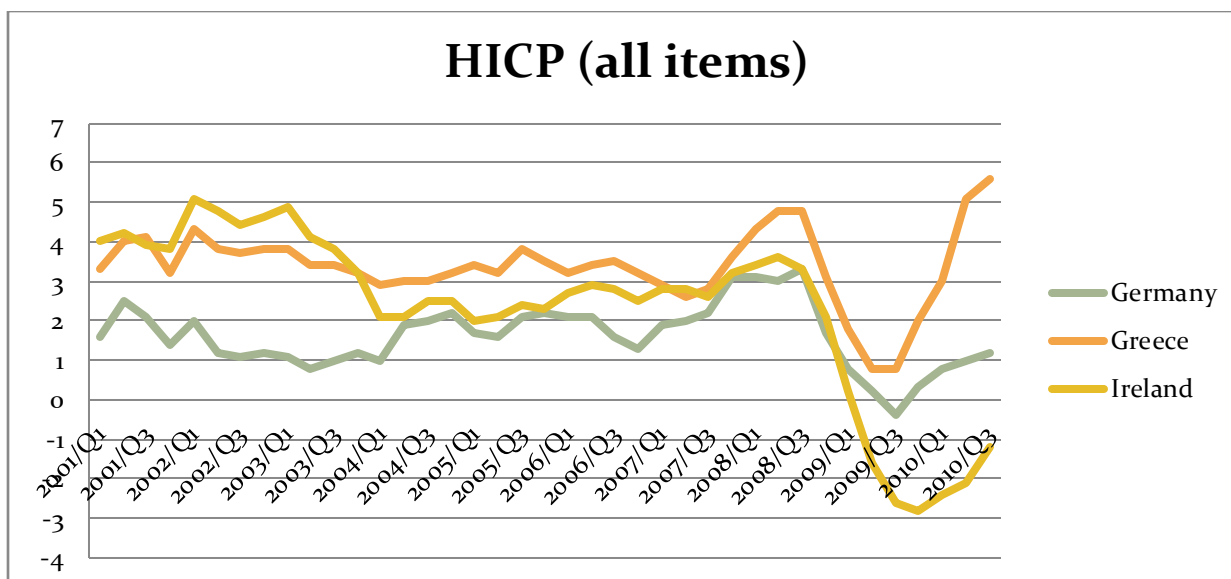


Figure 39: HICP, Germany, Greece, Ireland

Source: OECD Statistical Compendium

Germany reveals a stable inflation rate of 1%, in line with the current ECB policy measures. Ireland, on the other hand, faces a sharp deflationary trend (-3% by the beginning of 2010, going back to -1% just yet) because of the strong recession that hit the Irish much more than the average Eurozone country. The remarkable 5.5% result of Greece is caused by the big tax hikes in the context of the Greek fiscal contraction. It is immediately clear that uniform monetary policy in these kind of circumstances is a very hard task. While Germany could prefer a faster approach towards an exit strategy in the near future, Ireland would face horrendous consequences in the light of an interest rate hike. As the ECB itself points out, “if there are structural inflation differences in the euro area, this could potentially create economic problems in countries or regions with below-average inflation, especially if these countries had to structurally operate with negative inflation rates.” (ECB, 2004, p.53).

The second remark focuses on the strong, determining role of confidence indicators on ECB policy. We will examine whether the ECB’s fairly moderate reaction is perhaps induced by the confidence indices. Producer confidence (Fig. 41) and consumer confidence (Fig. 40) already started falling in the second half of 2007. The sharpest fall was at the end of 2008, leading to an absolute low in mid-2009. This is in line with the sharp decrease in output and monetary growth (although lagged, as already explained). By the start of 2010, both confidence indicators seem to show a strong recovery. The index grew ever since. Although these numbers are still far from those in normal times for producer confidence, it might explain why the ECB did not find it necessary to react as sharp as first expected.

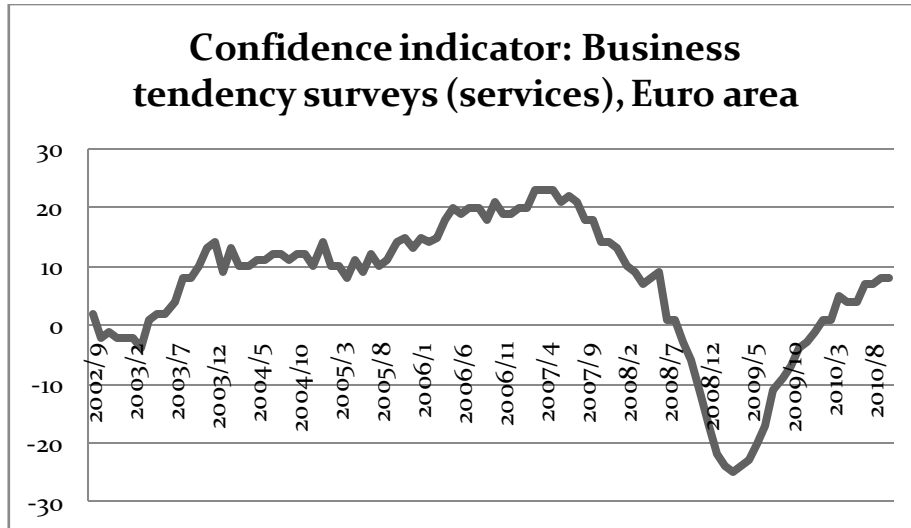


Figure 40: Business confidence, Eurozone

Source: OECD Statistical Compendium

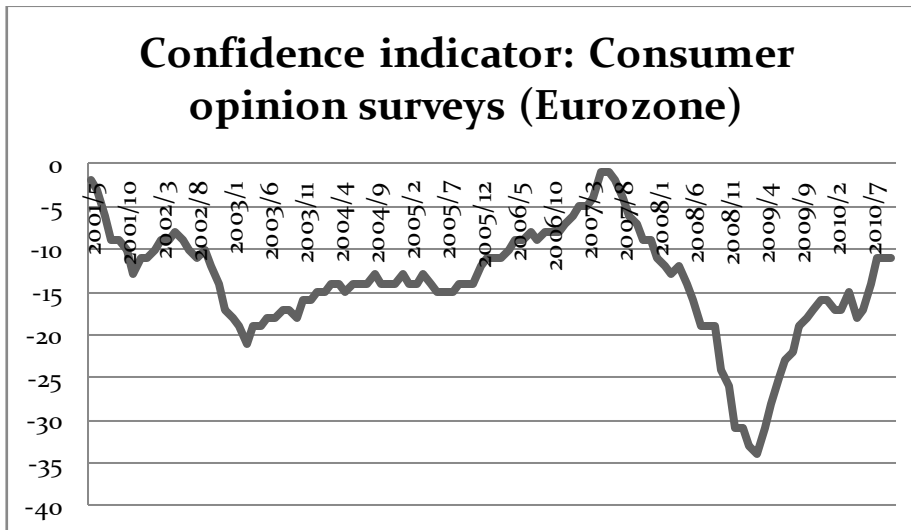


Figure 41: Consumer confidence, Eurozone

Source: OECD Statistical Compendium

4. Conclusion: the expected policy given the mandates

In order to conclude, we summarize the theoretical and statistical findings. This way, it should be possible to engage in forecasting the monetary policy of the Fed, ECB and BoE in the next eight quarters.

First of all, evidence was presented casting doubt on the alleged ineffectiveness of monetary policy in deep recessions. We found that lower bound and liquidity trap problems - which would render policymakers unable to boost output - need not be troubling. A crucial issue is uncertainty, especially in financial markets. Uncertainty can lead to higher liquidity preference and money demand which, if concentrated in the financial sector, can complicate monetary policy. While financial market shocks were a feature of the last years, we expect them to be less of an issue in the two years to come. An important exception is the possibility of a sovereign debt shock in the Eurozone. If significant haircuts on government bond holders or even an outright Eurozone exit were to take place, financial market uncertainty would no doubt return, probably even leading to a double dip recession. Given the current political consensus, we find this course of events unlikely, however.

The issue of inflation expectations is interesting in the current environment. In ordinary circumstances, credible low inflation expectations make monetary policymaking easier. In a zero-lower bound environment, they constrain policymaker discretion: with nominal rates at (or near) zero, real rates cannot go below minus the inflation rate that market participants expect central banks to allow. Because of this, we have taken a look at the political and institutional environment in which policy makers have to operate at the moment. We concluded that creating inflation expectations to depress real yields further does not appear to be a politically viable option for the US and ECB, while the situation for the UK is mixed: there, despite its explicit mandate, inflation expectations are highest.

Our analysis of the transmission channels concluded that monetary policy ineffectiveness need not be a problem, although unintended side-effects could once again become an issue (for example, in the risk taking channel). The biggest problem appears to lie in the interaction of the bank capital and bank lending channel: higher capital requirements may cause banks to curtail their lending, which would imply that the money multiplier will be lower in the years to come. Central banks appear to expect this, however. The choice of paying interest on reserves appears could be construed as a silent recapitalization of the commercial banking system. With government debt levels at a historic high, the burden of recapitalization may have come to lie on central banks, which were previously only responsible for the liquidity, not the solvency of the banking system. It would seem that in the current environment, central banks have to lean against the wind more heavily and creatively in order to reach their mandates.

This leads us to the issue of the exit strategies. Possible (inflationary) dangers in the long run

persist and policymakers currently face an enormous task on reflecting when and how an exit strategy would prove to be optimal, considering the scope of the measures taken. While the balance sheets of central banks have expanded massively, we do not expect them to return to normal levels in the two years to come. This will depend on specific circumstances, which we have analyzed in the second section.

In case of the **Fed**, quantitative easing programs seemed to have partially offset a further fall in money supply and output. The output gap is expected to become smaller in the near future and inflation is not yet expected to increase enormously. Quite on the contrary, recent worries about deflation and remaining high unemployment lead one to think we have not yet seen the end of the monetary stimulus packages. Since inflation seems to be implicitly targeted at a 1.5% - 2% level, a strong focus on getting medium-run expectations in line looks most likely. An important remark is formulated regarding the double mandate of the Fed. If unemployment would remain at unwanted high levels and growth doesn't pick up, further easing programs are certainly expected. This leads us to the conclusion that an exit strategy seems far away: the Fed will keep its rates low for an extended period and it will not offload its balance sheet on the financial markets.

The **BoE** policy looks to be very much influenced by the implemented fiscal austerity measures and the focus on a competitive exchange rate. Indeed, no fiscal stimulus is anticipated and various future tax hikes are already installed. This could lead output to grow slower and inflation to rise above targeted levels. In addition, a certain degree of inflation could also be 'imported' because of the sharply depreciated exchange rate. The relative importance of the inflation target for the BoE is crucial. If these developments would indeed lead to supply-shock-alike effects, the 'hawkish' nature of the BoE board is of crucial importance. We expect a hawkish, anti-inflationary stance of the BoE, which will lead to output growth carrying the burden.

When it comes to the **ECB**, we were surprised by the enormous room left to engage in significant monetary stimulus. Indeed, Euro stimulus was never exercised as intensive as in the UK, let alone as in the US. The ECB appears to be quite quick in looking towards an exit strategy. This road will be far less bumpy than for the Fed, as conservative German influences in the Euro are significant. These influences have attributed to an inflation-averse policy stance and a refusal of 'quantitative easing'-like programmes.

A uniform conduct of policy seems to become increasingly hard given the sharp differences in inflation and growth figures (and outlooks). We therefore expect the ECB to concentrate more on the 'core European' countries such as Germany and France, probably raising interest rates when deemed optimal for them. Considering the forecasts, this could already take place in mid-2011.

Both the monetary union and its member countries could face harsh times in the near future. In our baseline interest rate path for the Eurozone, we assume that there will be no sovereign debt shocks or Eurozone exits. If these or other fat tail-events were to take place, we do not feel we can provide a reasonable forecast of policy stances.

In summary, we forecast the following policy rate developments.

	2011Q1	2011Q2	2011Q3	2011Q4	2012Q1	2012Q2	2012Q3	2012Q4
Fed	0-0.25%	0-0.25%	0-0.25%	0-0.25%	0.5%	0.5%	0.5%	0.75%
ECB	1%	1%	1.25%	1.25%	1.25%	1.5%	1.5%	1.75%
BoE	0.5%	0.5%	0.75%	0.75%	0.75%	1%	1%	1%

5. Sources

Bank of England (2010). *Quarterly Bulletin*, 50(3).

Bank of England (2010). *Inflation Report*, November 2010.

Bank for International Settlements (2010a). *Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements*. Interim report.

<http://www.bis.org/publ/othp10.pdf>

Bank for International Settlements (2010b). *An assessment of the long-term economic impact of stronger capital and liquidity requirements*. <http://www.bis.org/publ/bcbs173.pdf>

Bank for International Settlements (2010c). *The Basel Committee's response to the financial crisis: report to the G20*. <http://www.bis.org/publ/bcbs179.pdf>

Bekaert, G., Hoerova, G. & Lo Duca M. (2010). *Risk, Uncertainty and Monetary Policy*. NBER Working Paper No. 16397.

Bernanke, B. (2010). What the Fed did and why: supporting the recovery and sustaining price stability. November 4 2010. <http://www.washingtonpost.com/wp-dyn/content/article/2010/11/03/AR2010110307372.html>

Bernanke, B. (2010). Monetary Policy Objectives and Tools in a Low-Inflation Environment. October 15 2010. <http://www.federalreserve.gov/newsevents/speech/bernanke20101015a.htm>

Bullard, J. (2010). *The U.S. Economic Situation and Recent Monetary Policy Developments*. Presentation for the National Economists Club, December 2 2010. http://research.stlouisfed.org/econ/bullard/pdf/NBE_WashingtonDec2_2010_Final.pdf

Dwyer, A., Lam, K. & Gurney, A. (2010). *Inflation and the Output Gap in the U.K.* HM Treasury Economic Working Paper No. 6.

ECB (2004). The ECB's monetary policy strategy. In *The monetary policy of the ECB*, Chapter 3, 41-70.

ECB (2005). *Money Demand and Uncertainty*. Monthly Bulletin of October, 57-73.

ECB (2010a). *The ECB's Monetary Policy Stance During the Financial Crisis*. Monthly Bulletin of January, 63-71.

ECB (2010b). Monetary Policy – Strategy. <http://www.ecb.int/mopo/strategy/html/index.en.html>

Federal Reserve Bank of New York (2010). *Large-Scale Asset Purchases by the Federal Reserve: Did They Work?* Staff Report no. 441.

Federal Reserve Bank of St. Louis (2004). Panel Discussion: Inflation Targeting. *Federal Reserve Bank of St. Louis Review*, 86(4), 165-168.

- Federal Reserve Board (2002). *Preventing Deflation: Lessons from Japan's Experience in the 1990s*. FRB International Finance Discussion Paper No. 729.
- Financial Times (2010). ECB sticks to its plan for 'exit strategy'. October 7 2010.
- FT Alphaville (2010). Cash-hoarding corps. October 29 2010.
<http://ftalphaville.ft.com/blog/2010/10/29/386951/cash-hoarding-corps/>
- FT Alphaville (2010). More on those record profits. November 26 2010.
<http://ftalphaville.ft.com/blog/2010/11/26/416891/more-on-those-record-profits/>
- Gerlach, S. (2007). Interest rate setting by the ECB 1999-2006: words and deeds. *International Journal of Central Banking*, 3(3), 1-45.
- Geraats, P. (2006). Transparency of monetary policy: theory and practice. *CESifo Economic Studies*, 52, 111-152.
- Gerlach-Kristen, P. & Kugler, P. (2010). Central Bank Liquidity Measures: An International Perspective. Working paper.
http://wwz.unibas.ch/fileadmin/wwz/redaktion/makro/Papers/CB_Liquidity_Measures.pdf
- Hempell, H.S. & Sørensen, C.K. (2010). *The Impact of Supply Constraints on Bank Lending in the Euro Area – Crisis Induced Crunching?* ECB Working paper No. 1262.
- Kashyap, A. & Stein, J. (1995). The impact of monetary policy on bank balance sheets. *Carnegie-Rochester Conference Series on Public Policy*, 151-202.
- Keynes, J.M. (1936). *The General Theory of Employment, Interest and Money*. London: Macmillan.
- Krugman, P. (2010). More on Friedman/Japan. October 29 2010.
<http://krugman.blogs.nytimes.com/2010/10/29/more-on-friedmanjapan/>
- Lloyds TSB (2010). Economics Weekly 5 July 2010. *Lloyds TSB Corporate Markets Economic Research*. <http://mediaserver.fxstreet.com/Reports/c688a4c4-256e-4dad-89ba-13f72foc91d8/adfo4fe5-3599-4962-af31-45fboao6efca.pdf>
- Meier, A. (2009). Panacea, Curse, or Nonevent? Unconventional Monetary Policy in the United Kingdom. IMF Working Paper.
- Meier, A. (2010). *Still Minding the Gap – Inflation Dynamics during Episodes of Persistent Large Output Gaps*. IMF Working Paper.
- Orphanides, A. (2001). Monetary Policy Rules Based on Real-Time Data. *The American Economic Review*, 91(4), 964-985.
- Reinhart, C.M. & Reinhart, V.R. (2010). *After the Fall*. NBER Working Paper No.16334.
- Rudebusch, G. D. (2010). The Fed's Exit Strategy for Monetary Policy. FRBSF Economic Letter, June 14 2010. <http://www.frbsf.org/publications/economics/letter/2010/el2010-18.html>

Taylor, J.B. & Ryan, P.D. (2010). Refocus The Fed on Price Stability Instead of Bailing Out Fiscal Policy. October 30, 2010.

<http://www.investors.com/NewsAndAnalysis/Article.aspx?id=555234>

Wieland, V. (2009). Quantitative Easing: A Rationale and Some Evidence from Japan. NBER International Seminar paper. Most recent version on

http://www.volkerwieland.com/docs/Wieland_Japan_QE.pdf

WSJ Real Time Economics (2010). Open Letter to Ben Bernanke. November 15 2010.

<http://blogs.wsj.com/economics/2010/11/15/open-letter-to-ben-bernanke/>