Stefan Gerlach: Monetary policy after the crisis

Address by Mr Stefan Gerlach, Deputy Governor of the Central Bank of Ireland, at the 44th Annual Money, Macro and Finance Conference, Trinity College, Dublin, 8 September 2012.

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1. Introduction

In recent years, in particular following the collapse of Lehman Brothers in September 2008, central banks across the world have adopted a very expansionary monetary policy stance. In most economies, the main factor triggering the relaxation of policy has been the very weak outlook for economic activity stemming from a combination of balance sheet adjustments following housing bubbles, financial markets seizing up, banks facing funding difficulties, firms and households experiencing challenging borrowing conditions, and severe strains in some sovereign debt markets.

The relaxation took two forms. First, central banks responded to the crisis by cutting policy rates to an unprecedented extent and by adopting a range of "unconventional" or "non-standard" policy measures. These initially focussed on providing liquidity to financial institutions and systemically important markets but, over time as traditional monetary policy became constrained by the "zero lower bound", central banks also aimed to reduce longer-term interest rates to support the economy.[1] To illustrate, the ECB responded by increasing the size, frequency and maturity of its liquidity-providing operations and later intervened in the markets for covered and sovereign bonds. The Federal Reserve and the Bank of England also engaged in purchases of private and public financial assets. The Federal Reserve also adopted a forward guidance policy, providing additional information to market participants about the expected path of its policy rate, and explicitly targeted the level of the yield curve through large-scale asset purchases with the intent of shifting down the entire term structure of interest rates.[2]

At some future date economic conditions in the economies most exposed to the financial crisis will recover and central banks will need to tighten monetary conditions. While there is still a debate on the question of how the exit from the current highly accommodative policy stance is best conducted, here I will focus on what monetary policy might look like after the process of normalising policy has been started.

To reflect on these changes, it is useful to briefly consider the pre-crisis approach to monetary policy. Somewhat simplified, it involved central banks setting a single short-term interest rate on the basis of forecasts of inflation (relative to an explicit target or informal objective) and of economic activity.[3] With money markets functioning well and banks responding to interest rate changes, the financial system played an important but subsidiary role in setting policy. Will this approach be retained? How will monetary policy frameworks –

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[1] Stone et al. (2011) provides a useful overview of the various facilities adopted by major central banks over the course of the financial market crisis.

[2] The actions taken by the Federal Reserve and the Bank of England are largely in line with the economic literature of how central banks can further ease the monetary policy stance when faced with the zero lower bound. See, for example, Krugman (1998), Svensson (2000) and Bernanke et al. (2004).

[3] Svensson (1997) presents a simple but instructive model of the conduct of monetary policy.

the goals, information variables and tools central banks use – evolve? What changes to the framework are most likely to be adopted? Will inflation objectives be increased to allow central banks more leeway to cut interest rates if another shock occurs? How will financial stability considerations be integrated in the monetary policy process? The questions are many.

Monetary policy might change for at least three reasons. First, the economic environment in which it is set has changed dramatically. Most notably, public debts have increased sharply since 2007 and sovereign risk premiums are in some cases large. As a consequence, interactions between fiscal and monetary policy have grown stronger. Furthermore, financial systems in some countries, in particular those that experienced large housing bubbles such as Ireland, have become impaired, limiting the effectiveness of the transmission mechanism. While central banks potentially may respond simply by adjusting policy by more than they would otherwise do, it raises the question whether other policy tools, such as asset purchases, can be used to support aggregate demand. Finally, unemployment rates have risen sharply and risk putting central banks under strong pressure to pursue expansionary policies. Public debts, the state of the financial system and the level of unemployment change only slowly over time, so there are good reasons to believe that these changes will impact on monetary policy for many years to come.

A second reason why monetary policy may change stems from the adoption of unconventional policy instruments during the crisis. For instance, central banks introduced additional liquidity facilities to address funding stress in various markets, engaged in foreign exchange swaps to provide foreign currency to domestic banks, and intervened directly in a number of markets. Many of these innovations have been effective, raising the issue whether they should be used also after the crisis.

Of course, changes to the monetary policy framework need not be limited to the choice of policy instruments. The exact design of the rest of the framework – the inflation objective or target and the choice of information variables – is also likely to be reconsidered and changes are possible.

The third reason why monetary policy may evolve because of the crisis is the growing consensus that central banks need to guard against the development of financial imbalances. However, no consensus has emerged about how to best do so. One view is that central banks should “lean against the wind” when asset prices and credit are increasing rapidly. Whether that is desirable depends on several factors, in particular on what the costs might be in terms of lower economic activity. The competing view is that solely macro prudential instruments should be relied on in preventing the formation of bubbles. If so, how would they interact with monetary policy and is there a need for explicit coordination of monetary and macro prudential policy? Finally, there may a reason to use macro prudential measures but to let monetary policy play a secondary role.

In this speech I will review all three areas.

2. The monetary policy environment

What monetary policy can achieve and how it should be conducted depend crucially on the broader economic environment. This has changed in three ways since the onset of the crisis: debt-to-GDP ratios have risen markedly, unemployment has risen sharply and the functioning of the financial system has deteriorated. These factors are likely to impact on monetary policy for some time to come.

2.1. Large public debts

The most worrisome change in the economic environment in recent years is the very large expansion of public debt in some countries. That should not have come as a surprise: there is ample historical evidence that financial crises are typically followed by large increases in

public debt and, frequently, by sovereign debt crises (Reinhart and Rogoff 2010). Figure 1 shows that debt-to GDP ratios have risen sharply, and are projected by the OECD to continue to rise, in many economies.

A number of developed countries have lost access to market funding over the course of the crisis, with three euro countries (Greece, Ireland and Portugal) entering EU-IMF programs in order to obtain official external funding.[4] All three countries are currently under programmes monitored by the "Troika" consisting of the IMF, European Commission and the ECB.

To think about the relationship between fiscal and monetary policy, it is useful to start by considering the standard debt equation (Dornbusch 1996):

$b' = (r - g)*b + d$

where b denotes the debt-to-GDP ratio, r the real interest rate, g the growth rate of real GDP, d the primary (or non-interest) budget deficit (including unusual expenses such as bank support) as a fraction of GDP, and b' = db/dt the change of the debt-to-GDP ratio. Thus, the debt-to-GDP ratio will grow whenever the interest rate exceeds the growth rate of the economy – both measured either in real or in nominal terms – and unless the government is running a sufficiently large primary surplus.

The increase in debt-to-GDP ratios in a number of countries since the start of the crisis has mainly been due to slower growth of tax revenue, a rise in expenditures through automatic stabilisers and, in some countries, the cost of support packages from the financial sector, which implied a large primary budget deficit ($d > 0$). A second reason is that GDP growth has declined, which has led to a large wedge between the interest rate and the growth rate of the economy ($r >> g$).

How might debt-to-GDP ratios evolve in coming years? There is much evidence that economic growth and inflation recover only slowly in the aftermath of a financial crisis. Kannan et al. (2009) show that recessions associated with financial crises tend to be particularly severe and recoveries tend to be slower than otherwise. These effects are further aggravated when recessions are globally synchronised, as in the present situation. Helbling and Terrones (2003) highlight the longer and deeper effect of financial crises that follow the bursting of a housing market bubble, compared to other types of financial crisis. In particular, such crises last nearly twice as long (5 years) and are associated with output losses that are almost twice as large (8 per cent of GDP) as equity market crashes.[5] This loss of output is due, in part, to greater effects on consumption and on banking systems, which are typically heavily exposed to real estate.

I therefore expect nominal GDP growth to be low in many countries in the coming years, implying that the high debt-to-GDP ratios are likely to decline more gradually than otherwise.[6]

Another factor impacting on the evolution of the debt is the level of interest rates. The restructuring of the Greek public debt and concerns that other governments might also be forced to restructure their debts has led investors to demand a risk premium to hold the debt

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[4] At the time of writing, Cyprus had requested external assistance and was in negotiations with the EU-IMF Troika in order to agree a memorandum of understanding, while Spain had been granted access to EFSF funding in order to support the recapitalisation of its banking sector. EU countries outside of the euro area have also sought external support. IMF arrangements have been put in place for Romania, Latvia and Hungary, while a flexible credit line was put in place for Poland, although funds have not been drawn down.

[5] Reinhart and Rogoff (2009) find that unemployment rises for nearly five years following a banking crisis, by an average of 7 percentage points, although the peak-to-trough in output takes just 2 years.

[6] Reinhart and Rogoff (2012) find that once a debt-to-GDP ratio exceeds 90 per cent, it tends to stay above this level for an average of 23 years. They also find such debt levels are associated with a mean growth rate 1.2 percentage points below those observed in periods of lower debt. The cumulative effect of this growth rate disparity can be quite large given the length of time it tends to persist.

of the most indebted countries. While such risk premiums in principle are desirable since they provide governments with incentives to reduce debt, the fact that interest rates have risen dramatically and unexpectedly has complicated the management of the crisis in many countries.

A particular concern arises from the risk of vicious circles developing. Suppose long bond yields rise. Since treasury yields serve as reference points for many other interest rates, this would lead to a generalised increase in interest rates and therefore a slowing of the economy (Smets and Trabandt 2012). In turn, lower growth will worsen further the outlook for public debt, and risks triggering additional increases in yields. The fact that self-fulfilling prophesies are possible is one reason why it is crucial to prevent risk premiums from becoming too large.

To conclude, unfortunately there are good reasons to believe that the coming years will be marked by a combination of low growth, subdued inflation and high interest rates that will make it difficult for governments to reduce debt rapidly. What does that imply for monetary policy? Smets and Trabandt (2012) note three consequences.

First, it increases the burden of monetary policy. Large increases in deficits and debt have led fiscal policy to be tightened considerably, particularly in countries where the government has faced problems with their access to financial markets. Tighter fiscal policy slows the economy, requiring central banks to cut interest rates to maintain inflation at the desired level. Of course, large contractions in fiscal policy are particularly difficult to offset if interest rates have already been reduced to very low levels.

Second, large public debts risk ending in high inflation. In its most extreme form, there is a risk that governments finance their spending by borrowing directly from the central bank, as has been the case in number of historical episodes of hyperinflation.[7] But the effect can be more indirect. Suppose that the public comes to worry about the inflation consequences of large public debts, leading inflation expectations and long interest rates to rise. If the central bank maintains its low inflation polices, ex post real interest rates will rise, slowing economic activity and raising unemployment. It may therefore be tempted to accommodate these inflation expectations, at least partially, in order to support economic activity.

Of course, episodes of hyperinflation have little if any relevance to the current situation. Central banks typically enjoy legal protection that prevents government from using them as sources of funding. Moreover, most central banks in advanced economies conduct monetary policy with some form of explicit inflation target or, equivalently, a definition of price stability, making it difficult for them to aim suddenly for higher inflation in response to shifts in inflation expectations. Finally, central banks have spent decades building up their credibility and it seems unlikely that they would be willing to compromise this achievement. Even if they were, inflation expectations and nominal interest rates would rapidly adjust as market participants become aware of a changed inflation environment.

To my mind, the main problem with large public debts is not that they result in high average inflation rates but that deviations from the central bank's inflation objective become larger and more protracted. To understand this, suppose that inflation rose unexpectedly, warranting a tightening of monetary policy to reduce the risk that it would stay permanently above the objective or target. Since higher interest rates would reduce economic growth and tax revenues, increasing the primary deficit and worsening debt dynamics, monetary policy makers may therefore hesitate to raise interest rates in the hope that inflation would return to its previous level on its own accord. Thus, large public debt risks leading to a worsening of inflation control.

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[7] See Dornbusch (1996) and Reinhart and Sbrancia (2011) for a discussion of historical episodes of debt monetisation and debt liquididation through financial repression, respectively. Eichengreen et al. (2011) highlight how high levels of government debt can pose a threat to central bank independence.

Finally, high public debt increases the perceived riskiness of government debt, which may impact on the functioning of both financial markets and of the transmission mechanism of monetary policy. Indeed, in the euro area, we have seen a strengthening of the link between banks and sovereigns over the course of the crisis through an increase in banks' holdings of domestic sovereign debt relative to foreign public debt (see Figure 2). This may impede banks' ability to provide credit to the real economy during times of stress in sovereign bond markets.

2.2. High unemployment

A second legacy of the financial crisis is a large increase in unemployment in many economies. While unemployment can rise rapidly, as illustrated by the current episode, it tends to decline slowly and will be a feature of the economic landscape in some countries for many years. Indeed the OECD forecasts unemployment in the US to decline very gradually over the next two years, falling to 7.6 per cent in 2013, while euro area unemployment is expected to continue to rise in 2012 and 2013 (see Figure 3).

This increase in unemployment is also likely to impact on monetary policy. While no central bank has an objective for the unemployment rate as a part of its strategy[8], the deviation of unemployment from the non-accelerating inflation rate of unemployment (NAIRU) plays an important role in the inflation process, as suggested by standard Phillips curve analysis. Achieving an unemployment rate equal to the NAIRU is therefore commonly seen as essential for stabilising inflation even if the central bank has no objective for unemployment.[9] Indeed, one way to think of the central bank's problem in to set interest rates to influence aggregate demand, as captured by the unemployment rate, in such as a way as to control inflation.

Of course, to the extent that it signals weak demand for goods and services and therefore low inflation pressures, high unemployment merely indicates a need for more expansionary policy. However, the NAIRU is likely to rise, perhaps sharply, after the collapse of a financial bubble. Guichard and Rusticelli (2011) conclude that the NAIRU has increased in a number of countries since the start of the crisis, particularly those that have been most affected by financial and construction sector crises. The collapse in the construction sector in Ireland, for example, has probably contributed to an increase in the Irish NAIRU.[10] In the US, various authors have highlighted the role of factors such as the housing market crisis and the extension of unemployment benefits as having possibly increased structural unemployment.[11] More generally, the increase in long-term unemployment in a number of countries indicates that the NAIRU has most likely increased in these countries (see Figure 4).[12]

An increase of the NAIRU may be problematic for two reasons. Most obviously, it makes it more difficult for central banks to determine how much slack there is in goods and labour markets and therefore the appropriate level of interest rates to set. The risk of policy errors,

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[8] A possible exception is the Federal Reserve, which has "maximum employment" as a formal objective.

[9] Of course, if the central bank did have an objective for unemployment, this would be a second reason for monetary policy to respond to it.

[10] The OECD estimates the Irish NAIRU to have increased to around 10 per cent in 2011. It is difficult, however, to accurately estimate the NAIRU in the Irish context due to the high levels of labour market openness and migration.

[11] Evans (2011), for example, considers the possibility that structural changes in the US labour market has kept unemployment at high levels, concluding that such factors have likely increased the NAIRU, at least temporarily.

[12] The literature in this area highlights the strong link between long-term unemployment and the NAIRU. See, for example, Blanchard and Summers (1987) or Ball (2009).

leading to an amplification of cyclical fluctuations and a delay in the return to stability, therefore rises. Furthermore, the public may not realise that the NAIRU has increased, leading to strong pressures for more expansionary monetary policy. Given the rise in unemployment rates after the crisis, pressures for central banks to "do more" will be common. As Dornbusch (1996) warns, monetary policy makers may come under pressure not to raise interest rates in response to rising inflation in an environment of high unemployment, be it structural or cyclical.

2.3. Financial system weakness

A third consequence of the financial crisis is wide-spread worsening of financial sector functioning. Credit risk has led to large spreads emerging in unsecured money markets and liquidity to fall abruptly, particularly at longer maturities. In the euro area, interbank markets have segmented across national boundaries, with banks in some countries effectively locked out of these markets and forced to rely on the Eurosystem for liquidity. This has contributed to increased divergence in funding costs for banks across the region. Credit risk concerns have also made it more difficult for financial intermediaries to obtain funding in bond markets, while other key funding markets have also seen a significant reduction in activity.

These developments have complicated monetary policy in several ways. Most obviously, banks' problems obtaining funding has raised the cost and reduced the availability of credit for firms, in particular small firms, and households. Data from the Eurosystem's Bank Lending Survey (BLS) have shown that credit conditions have tightened considerably since the start of the financial market crisis as a consequence of limited access to wholesale funding markets. Hempell and Kok Sorensen (2010) show that these supply constraints have affected credit growth, even when changes in loan demand are taken into account. Ciccarelli et al. (2010) demonstrate that credit supply constraints in the euro area contributed to the fall in GDP growth in the early part of the crisis and a similar effect can be observed in the US. While actions by the ECB have mitigated the impact of the most recent turmoil on credit conditions, balance sheet constraints may continue to impact on the ability of banks to provide credit in a number of euro area countries.

Tensions in the financial sector have also blunted the monetary transmission mechanism (Svensson 2010). While central banks have cut interest rate to levels unprecedented in recent monetary history, the outlook for economic activity remains weak. To further support the economy, many central banks have adopted non-standard monetary policy measures. To my mind, these are arguably less effective than interest rates changes and more difficult to calibrate in light of central banks' very limited experience using them.[13] Thus, it seems plausible that the ability of monetary policy to control demand at the zero lower bound is now lower than previously.

Problems in the banking sector may also make it difficult for central banks to exit from the currently highly accommodative monetary policy stance. For example, an increase in interest rates could damage household's balance sheet directly, and banks' balance sheets indirectly by slowing down economic growth, and increasing loan losses.[14]

The use of financial markets variables as information variables for monetary policy purposes has also become more complicated. While interest rate spreads have been used by many central banks as measures of financial market participants' growth and inflation expectations and as indicators of the likelihood of recessions, reduced liquidity and large risk premiums in many markets now make their interpretation more complicated. This makes it more difficult for central banks to judge whether the current stance of monetary policy is appropriate.

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[13] Bernanke (2012) discusses the Federal Reserve's recent experience with unconventional policy instruments.

[14] Conversely, BIS (2012) highlights the dangers to the financial system of maintaining very accommodative monetary policy for an extended period of time.

3. The framework of monetary policy

Next I turn to the question of how monetary policy frameworks might evolve as a consequence of the crisis. The framework, or strategy, is normally viewed as consisting of four components: the goal(s) of monetary policy; any intermediate targets that are used; information or indicator variables; and monetary policy instruments.

3.1 The objectives of monetary policy

Price stability is the overriding objective of monetary policy in most advanced economies, although central banks frequently, if not typically, have a secondary objective of smoothing the business cycle. Precisely how the price stability objective is pursued varies, but in many cases a numerical definition of price stability or an explicit inflation target plays a key role. Indeed, both the Federal Reserve and the Bank of Japan, which have neither, have recently communicated what inflation rates they consider to be consistent with their mandates.

There is much agreement that price stability should remain the overriding goal of monetary policy. This reflects the view that the financial crisis was not principally caused by monetary policy but rather by weaknesses in the financial system.[15] Furthermore, high inflation is costly and there is no exploitable trade-off between inflation and growth. Moreover, price stability, while neither necessary nor sufficient for achieving financial stability, is conducive to that end (IMF 2010). Nevertheless, important questions concerning the framework remain. One of these concerns is whether financial stability should be a separate goal of monetary policy, which I discuss in the next section.

Another broad question concerns whether the design of inflation objectives should be reconsidered. Blanchard et al. (2010) suggest that there are reasons to consider aiming for higher inflation than most central banks did before the crisis. Suppose that the central bank's inflation objective is 2 per cent, that the equilibrium real interest rate is 2.5 per cent, and that inflation is at the objective and output at potential (or the unemployment rate equal to the NAIRU). If a large contractionary shock occurred, the central bank could then reduce interest rates by at most 450 basis points.[16] If the inflation target was raised by 1 per cent, the argument goes, central banks would have been able to cut interest rates by an additional 100 basis points, which, given that many central banks have reduced rates to (almost) the zero lower bound, would have enabled them to provide more stimulus.

While true, most observers do not find this argument compelling.[17, 18] Raising inflation objectives would increase average inflation rates and therefore inflation volatility and price dispersion, which is costly. Seeking to achieve more room for large interest rate cuts also presumes that there are no other policies that can be used to stimulate demand if the zero lower bound it reached. However, during the crisis central banks have shown great ingenuity in designing new policy tools, although, admittedly, uncertainty remains about their

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[15] Bean (2008) lists a number of causes, including a failure by regulatory and supervisory authorities to appreciate the risks inherent in the 'originate-to-distribute' model; opacity in risks underlying complex structured finance assets; excessive reliance on statistical models of risk based on past behaviour; overdependence on ratings by investors and a failure to observe due diligence; excessive closeness of the ratings agencies to those who were issuing debt; compensation schemes in financial institutions that stimulated risk-taking; and a focus on short-term returns.

[16] As a point of comparison, the peak rates during the last interest rate cycle were 4.25 per cent for the ECB (July 2008 - October 2008), 5.75 per cent for the Bank of England (July 2007 – December 2007) and 5.25 per cent for the Federal Reserve (June 2006 – September 2007).

[17] See Bean et al. (2010) and Kohn (2010).

[18] When asked by a journalist for his thoughts on the issue, Jean-Claude Trichet (then ECB president) described the idea of a 4% target as "plain wrong". (http://www.ecb.int/press/pressconf/2010/html/is100304.en.html)

effectiveness and how best to apply them. Nevertheless, it is difficult to argue that short term interest rates are the only policy instrument available to policy makers.

Moreover, the argument that central banks need more leeway to reduce interest rates implicitly assumes that the zero lower bound will be reached frequently. A number of authors have studied this hypothesis using simulations, concluding that an inflation objective as low as 2 per cent did not impose much constraint on monetary policy (e.g., see Reifschneider and Williams 2000). Given how rarely the zero lower bound has been reached in practice, having some extra room to cut interest rates appears to be of limited value.

Some observers might be tempted to argue that raising inflation objectives is desirable because it would help reduce the burden of the public debt. However, this would only happen if the change in policy was not known to, or perceived by, bond holders. In the current situation of high transparency, neither of those conditions holds. Indeed, raising the inflation objective is likely to trigger expectations of higher inflation and increase long-term interest rates precisely at a moment when economies remain vulnerable to contractionary shocks.[19] Moreover, if inflation objectives were changed once, they could surely be changed again. Raising them could consequently damage the credibility of monetary policy, reduce central banks' control of long term inflation expectations, potentially making longer interest rates more volatile and raising inflation risk premiums.

While there is still broad consensus that the level of central banks' inflation objectives before the crisis erupted remain appropriate, a number of authors have argued that inflation objectives could be changed in other ways. For instance, the range compatible with price stability could be broadened. As discussed in the next section, this would enable central banks to attach greater weight, temporarily, to financial stability objectives. A closely related idea is to target the average inflation rate over some period of time rather than a range that must be held at all times, as does the Reserve Bank of Australia.

Others have argued that targeting a (rising) price level may be preferable to targeting inflation.[20] Under this framework, a decline in the price level due to a contractionary shock such as a financial crash must be offset by higher inflation in the future. In contrast, under an inflation target, such a price level shock has no implications for future inflation. Price-level targeting consequently raises near-term inflation expectations and therefore reduces expected short-term real interest rates to a greater extent than is possible with an inflation target. But targeting the price level is not unproblematic. After a large contractionary supply shock, central banks would be required to run tighter monetary policy than under inflation targeting, which seems undesirable.[21]

There are several possible changes to inflation objectives and no consensus has emerged whether any would be desirable. My suspicion is that the benefits of further refinements of the inflation objective are small in practice and the potential difficulties arising from a change of the objective substantial. I would therefore not expect widespread redefinitions of inflation objectives in the near future, although of course individual central banks may decide to do so.

3.2 Intermediate targets and information variables

The practice of gearing monetary policy directly to the achievement of price stability has led central banks to abandon intermediate targets or, in some cases, to replace them by model-

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[19] See Bean et al. (2010) and Kohn (2010).

[20] See Svensson (2009), Woodford (2003), Vestin (2006). The Bank of Canada has also explored the idea, see Carney (2009).

[21] Kohn (2010) also fears that compared to a simple inflation target, price level targeting could leave the general public "perplexed".

based forecasts of inflation. Nevertheless, in setting monetary policy, central banks continue to rely on information variables, that is, variables that are viewed as containing important information about financial and economic conditions but are not fully captured in the forecasting models used.

One consequence of the crisis has been that central banks focus much greater attention on the state of the financial sector, since weaknesses in it has been a drag on aggregate demand and has blunted the monetary transmission mechanism.[22] Since macroeconomic models typically incorporate few, if any, financial variables from the sector (IMF 2010), much of this analysis is conducted using a range of financial variables. To mention but a few, central banks look at variables such as the spread between secured and unsecured interbank rates as a proxy for credit risk in the banking sector, the level of trading in various money market sectors, and activity in key credit markets.

While the role of the financial sector in the models used for forecasting and analysis will increase over time, the use of information variables to capture the state of the financial sector, which has increased sharply during the crisis, will surely continue, with the range of indicators relied on depending on country-specific features of the financial system.

3.3 The instruments of monetary policy

The most notable change brought by the crisis has been a number of innovations in the way in which central banks implement monetary policy. This raises the question of whether central banks will retain some of the new instruments after the crisis has abated. Furthermore, what will be the lasting impact of the crisis on the functioning of money markets and how will this effect central banks' operational frameworks?

Before the crisis, central banks implemented money policy largely by setting a short-term policy rate or by influencing short-term interbank rates (Stone et al. 2011). Of course, changes in short-term interest rates do not on their own have much of an impact on aggregate demand, which is much more sensitive to long-term interest rates. However, long term interest rates are influenced by market participants' expectations of future monetary policy. It therefore becomes important for the central bank to influence these expectations. This can be done in many ways, in particular by the central bank being transparent about its objectives and how it views the macro economic outlook. It is for this reason that many central banks publish forecasts for inflation and economic activity. Some central banks in smaller economies also publish forecasts for their own policy rates.

During the crisis central banks have undertaken a wide range of operations. While there is no single way to categorise them, Stone et al. (2011) distinguishes between operations whose main intent is to maintain financial stability, in particular through the smooth provision of liquidity to the banking system, and those that aim at providing macroeconomic stimulus.[23]

There is much agreement that the new liquidity enhancing policies have been successful in reducing stress in interbank markets, as evidenced by spreads between LIBOR and Overnight Indexed Swap rates or T-bill yields. These policies involved extending the frequency and maturity of market operations, broadening the range of counterparties involved, and adopting a much wider definition of acceptable collateral. Since these operations have been generally over-collateralised, the credit risk has been negligible (Bean et al. 2010).[24] A number of central banks engaged in large foreign exchange swap operations in order to provide the domestic banking system with foreign currency. Finally, some central

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[22] See Kohn (2009), Svensson (2010) and Woodford (2010).

[23] See Borio and Disyatat (2009) for another classification.

[24] Furthermore, haircuts on collateral are adjusted in line with credit quality.

banks undertook operations aimed at improving the functioning of specific dysfunctional market segments.

After the collapse of Lehman Brothers, central banks cut interest rates sharply, in many cases to the zero lower bound.[25] With interest rate policy exhausted, central banks attempted to ease further monetary policy by undertaking asset purchases, in particular of sovereign debt. The Bank of England and the Federal Reserve purchased both public and private debt, while the Fed also adopted a policy of forward guidance on policy rates.[26]

Which of these innovations will be retained after the crisis has subsided? A number of observers have argued that at least some those aiming at improving the provision of liquidity to banks may remain in use. One reason for that is that the financial system will remain under stress in many countries for some considerable time. For example, banks that hold large quantities of domestic sovereign debt could be exposed to renewed funding stress if there was a further deterioration in the euro area sovereign crisis. To ensure that banks can fund themselves if strains in interbank markets return, it is desirable to retain some of these tools.

In addition to retaining greater flexibility in liquidity management, IMF (2010) argues in favour of requiring banks to hold greater liquid reserves to help them absorb better liquidity shocks. It also argues that the stigma associated with banks' borrowing from the central bank needs to be reduced and that many of the fund-absorbing tools adopted during the crisis should be maintained. This is particularly important in the near future since central banks will need to absorb large amounts of liquidity during the process of normalising monetary policy.

During the crisis central banks also intervened in a number of dysfunctional markets on an emergency basis.[27] It seems unlikely that these interventions will continue after the crisis has abated. Nevertheless, the fact that these interventions occurred and were perceived as successful suggests that central banks will be less hesitant to intervene if these markets were to face renewed stress. Perhaps the greatest lesson for monetary policy makers from the crisis is that in an emergency, they should think more expansively of their role in ensuring market functioning.

During the crisis central banks engaged in large scale asset purchases, in particular of government bonds, which were undertaken to depress long-term interest rates. While the evidence indicates that yields declined, the transmission mechanism of such purchases is poorly understood. Given the paucity of episodes in which large scale asset purchases have been used, it is likely to remain so (Stone et al. 2011). A further reason why central banks are unlikely to be keen to engage in asset purchases in normal times is that they unavoidably raise concerns about fiscal dominance and increase risk on the central bank's balance sheet. It therefore seems plausible that after the crisis central banks will only engage in such operations if policy rates have already been reduced to the lower bound.

A final question concerns what money markets will look like in the aftermath of the crisis. The crisis brought a significant reduction in money market activity, due to a combination of perceptions of credit risk and large amounts of excess liquidity arising from central bank crisis measures. Going forward it appears likely that there will be a shift towards secured interbank activity. This raises the question whether central banks should change their operational target, which is generally a short-term unsecured rate, to a secured rate.

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[25] In the textbook, that bound is given by zero. In practice, however, the bound may arise at low but non-zero interest rate.

[26] While the ECB also purchased of government bonds, this was done in order to improve the functioning of the monetary transmission mechanism in the euro area.

[27] There has been a growing literate on the "market-maker of last resort" function of central banks in recent years. See, for example, Buiter and Sibert (2007).

Furthermore, would it make sense for central banks to move further out the money market curve and target, for example, a three-month interbank rate, as the SNB currently does? Again, I would suggest that this will be a function of how money markets look after the crisis, in particular the extent to which longer-term interbank rates are affected by credit risk premiums.

4. Financial stability considerations

Before the onset of the crisis, there were two main views about how central banks should deal with asset price bubbles.[28] The first was that in setting interest rates, central banks should lean against large and sustained increases in asset prices, in particular housing prices.[29] This view was based on evidence that booms, in particular those associated with rapid credit expansion, have tended to precede financial crashes, and the proposition that tighter monetary policy would reduce asset price and credit growth.

While conducting monetary policy in this way would push inflation below the objective and slow the economy, these effects are believed to be of limited significance relative to the benefit of avoiding a financial crisis. Moreover, the occasional deviations of inflation from target resulting from this policy can be dealt with by simply extending the policy horizon. Indeed, since the objective of this policy is to prevent inflation from falling below the objective when the bubble bursts, it was seen as fully compatible with a price-stability oriented policy strategy, although one that operates with a longer policy horizon.

The competing view is that central banks should not attach any special significance to asset prices, unless they are accompanied by inflation pressures that, in any case, would warrant higher interest rates. Instead, monetary policy should respond vigorously to the consequences of the collapse of an asset price bubble (Greenspan 2002). This approach reflects the opinion that it is difficult to determine in real time whether the economy is undergoing a boom and to predict an asset price bust and, furthermore, that in order to slow an asset price boom, monetary policy has to be tightened so much that economic growth is severely affected.

The financial crisis has led to a broad rethinking of these issues. Given how costly the financial crash has been, it is not surprising that there is now greater support for the view that central banks have a role to play in preventing asset price bubbles. However, doubts remain whether monetary policy should play the primary role. While rapid and sustained growth in credit and asset prices play crucial roles in financial crashes and could be mitigated by tighter monetary policy, the size of the interest rate increases needed to slow a bubble would be so large that the consequences for inflation and economic activity would be too severe.[30] Moreover, in the specific case of the euro area, monetary policy is particularly blunt instrument to address national risks to financial stability.

Rather, the view that with objectives for both price stability and financial stability policy makers need two (sets of) tools has gained widespread acceptance. Under this view, monetary policy is used to ensuring price stability and macro prudential tools are used to safeguard financial stability.[31]

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[28] See Kohn (2006, 2008).

[29] See Borio and White (2003), ECB (2005) and White (2006, 2009).

[30] See Assenmacher-Wesche and Gerlach (2009), Bernanke (2010), and Dokko et al. (2009).

[31] Bank of England (2011) contains a discussion of possible macro prudential instruments.

4.1 Monetary and macro prudential policy

The combined use of monetary and macro prudential policy raises a number of questions regarding whether they may interact. Since macro prudential policy aims at influencing the behaviour of the financial sector, which plays a central role in the monetary transmission mechanism, one would expect them to do so.[32] But what can monetary policy do to deal with financial stability risks?

Too little focus was attached to financial sector developments before the crisis, which is best seen as reflecting weaknesses in financial regulation and supervision (IMF 2010). While central banks responded effectively by increasing the resources devoted to monitoring and analysing vulnerabilities in the financial sector, more work on understanding macro-financial linkages is needed. In particular, a better quantitative understanding of how financial factors impact on forecasts for inflation and economic activity, and how they influence the effect of interest rates changes on the economy is desirable. That process of integrating the financial sector and variables in macroeconomic models is currently underway. A further conclusion arises from the fact that the financial system is opaque. The experiences of the last decade suggest that financial regulators' and supervisors' ability to prevent excessive risk taking in the financial sector is limited. A particular worry is that it can be overwhelmed by a virtual explosion of financial activity if interest rates are reduced to very low levels, as central banks will be required to do from time to time for price stability reasons.

While first-best policy in the ideal world calls for monetary policy to be focussed solely on price stability, it might be used to support macro prudential policies on second-best grounds. The use of monetary policy would then be tied directly to difficulties managing macro prudential policy. Central banks that felt that the macro prudential regime was effective would thus continue to focus monetary policy solely on price stability, whereas monetary policy makers operating in a less favourable environment might consider attaching some weight to asset market developments in setting interest rates. However, the use of monetary policy on second best grounds must recognise that any benefits this policy may bring in terms of greater financial stability will come at a cost of weaker control of inflation and economic activity. Since there consequently is a trade-off between financial and macroeconomic stability, central banks should move interest rates in response to perceived risks to financial stability less than they would do in the absence of such a trade-off.

Since monetary policy and macro prudential policies both impact on aggregate demand and risk taking in the financial sector, the issue arises of whether they should be set separately or in some form of coordination. However, this issue should not be overemphasised. For instance, a tightening of macro prudential policy will restrict bank lending, leading aggregate demand to slow. To ensure that inflation stays at the objective, the central bank will thus relax monetary policy even in the absence of any formal coordination mechanism. Furthermore, financial cycles appear of longer duration than business cycles suggesting that macro prudential policy is likely to be changed much less frequently than monetary policy. In practice, macro prudential policy may be best thought of as providing a backdrop to monetary policy (Beau et al. 2011). Given that changes in macro prudential policy changes can have large impacts on the behaviour of financial institutions, it seems likely that they will be announced with long lead times in order to prevent abrupt adjustments in the financial sector.

Coordination may be particularly important in a situation in which monetary and macro prudential policy are in conflict. Since asset price booms are typically associated with rapid growth and rising inflation pressures, they may warrant both tighter macro prudential and monetary policy. As noted by Beau et al. (2011), a conflict between the two policies is most likely to arise in the case of positive supply shocks, which tend to reduce inflation pressures

[32] See Beau, Clerc and Mojon (2011).

and thus permit a relaxation of monetary policy, and increase asset prices and raising the risk of a bubble forming. To the extent that such events are rare, the coordination problem may be of limited practical significance.

5. Concluding remarks

Public debt and unemployment are likely to remain very high, and the current problems in the financial sector will persist, for some years to come, making for the most hostile environment for monetary policy since the 1970s. While the conduct and framework of policy will be permanently altered by the crisis, it is difficult to judge precisely how they will evolve. I see three likely changes.

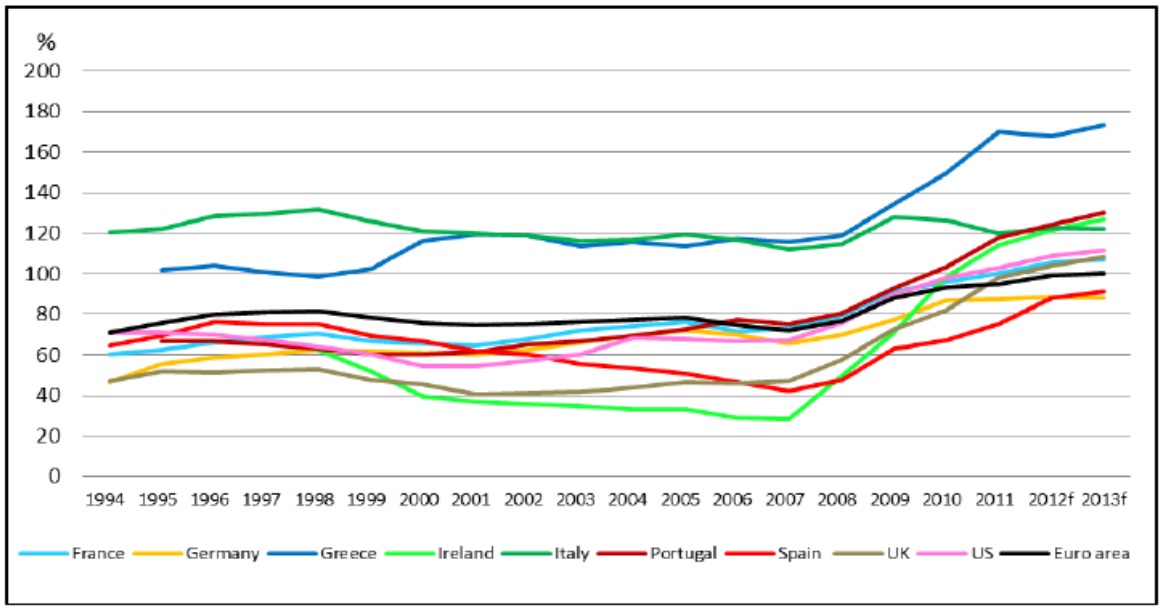
First, central banks will attach much greater significance to the state of the financial system in conducting policy than before the crisis. Policy makers will continue to look at various measures of tensions in the financial markets and of banks' funding situation. And forecasting models will incorporate the financial sector in increasingly realistic ways.

Second, monetary policy makers will be concerned that macro prudential policies may be inadequate, in particular if interest rates have to be reduced to low levels for macroeconomic reasons. But they will not lean against the wind, except in rare circumstances. Instead, they will press for macro prudential policy action.

Third, they will conduct monetary operations in much the same as before the crisis. But they have been forced to think in innovative ways about how to interact with money markets and they have adopted a broad range of new instruments. While some of these innovations will no doubt be discontinued, others will become part of monetary policy makers' tool box.

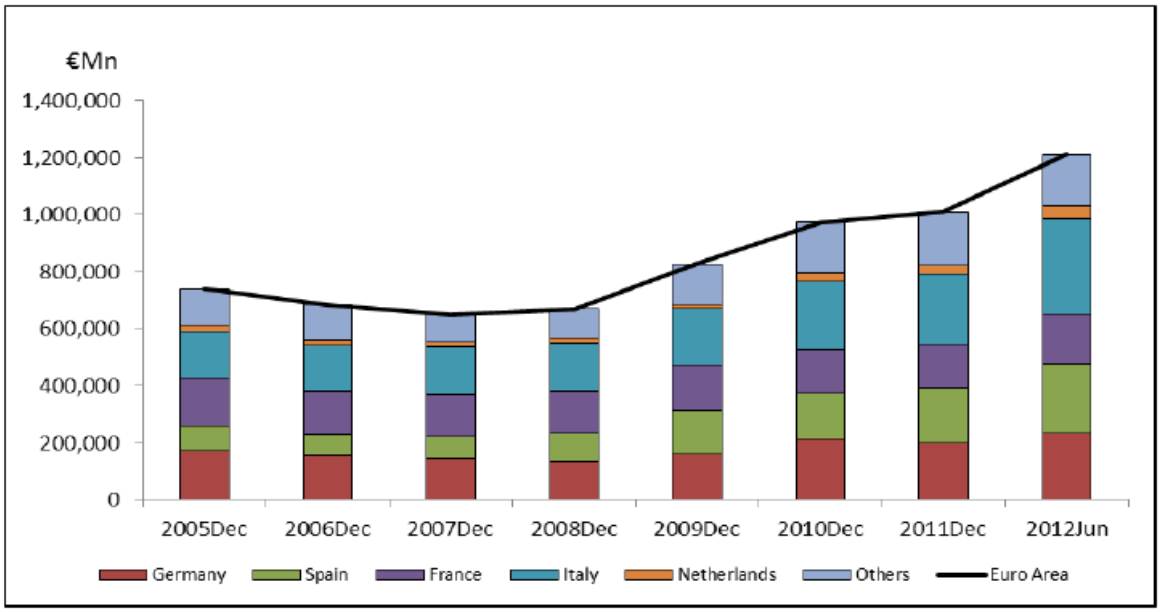
But much will remain the same. Central banks will continue to focus on stabilising inflation rates at the same low levels as before the crisis, although perhaps some central banks with explicit inflation targeting may adopt a longer time horizon for policy, effectively targeting an average inflation rate. And movements in short-term interest rates will once again be the main tool of monetary policy.

Figure 1: Gross Debt-to-GDP Ratios for Selected Countries (1994-2013[f])



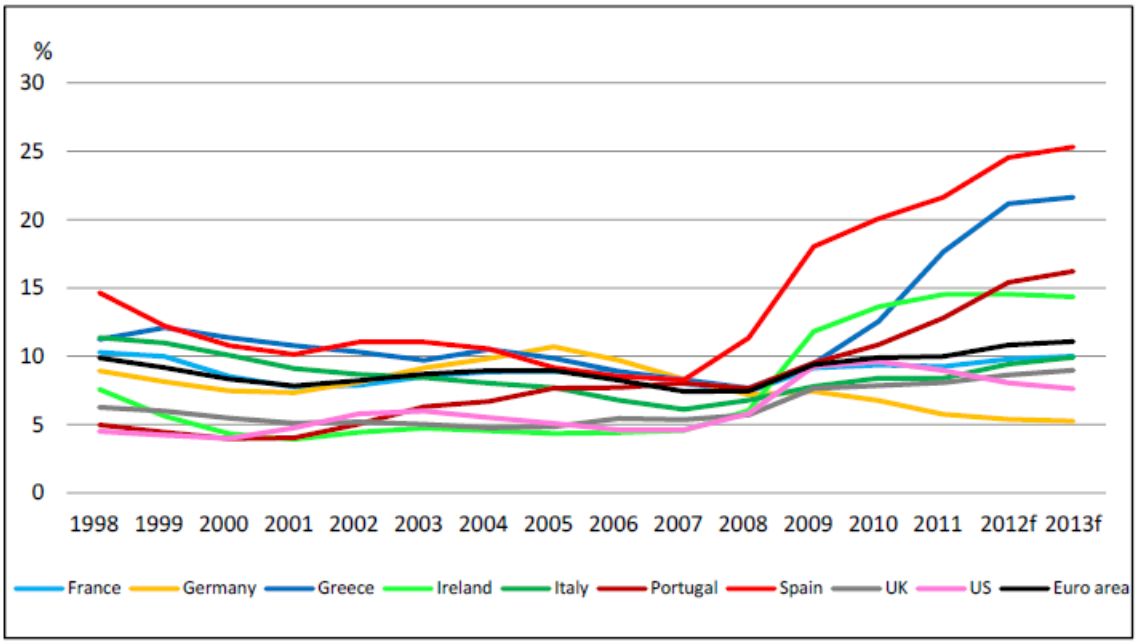
Source: OECD

Figure 2: Euro Area MFIs' Holdings of Domestic Government Securities



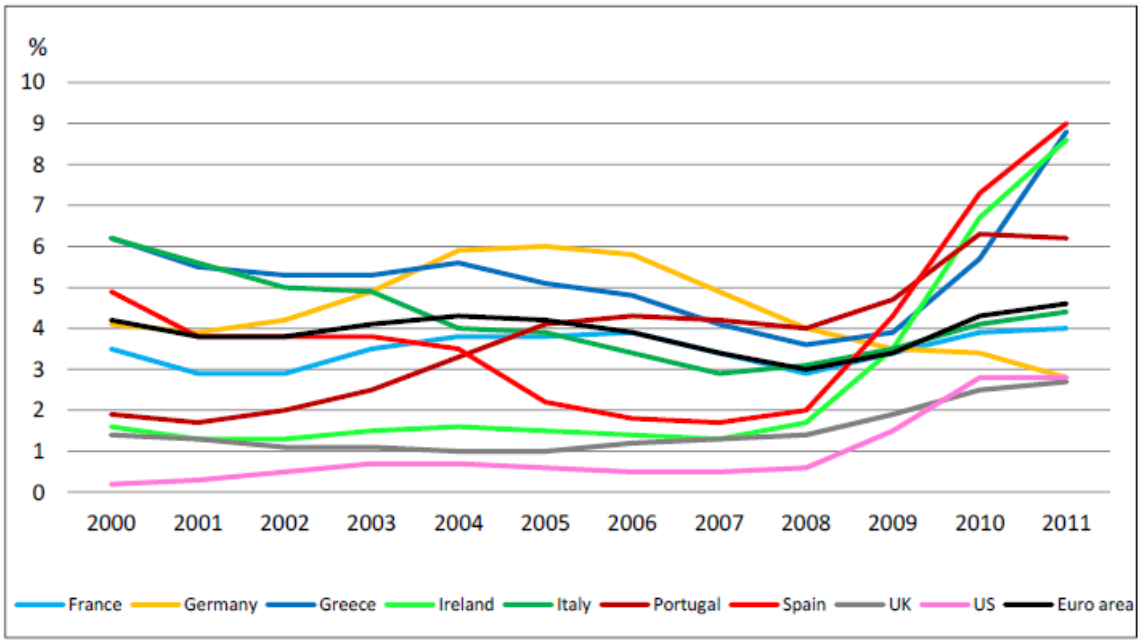
Source: ECB

Figure 3: Unemployment Rates for Selected Countries (1998-2013[f])



Source: OECD

Figure 4: Long-term Unemployment Rates for Selected Countries (2000-2011)



Source: Eurostat