

Monetary Policy after the Great Recession



Edited by Javier Vallés

FUNCAS Social and Economic Studies

MONETARY POLICY AFTER THE GREAT RECESSION

Edited by Javier Vallés Banco de España

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Introduction and overview

In mid-2014, more than six years after the onset of the Great Recession, the economy of advanced countries is strengthening. While in many of them the problems arising from the crisis endure (high public and private debt, high unemployment, banking system restructuring, significant idle capacity), the process of normalization has begun after a long period of exceptional monetary measures. Thus, in 2014, the Federal Reserve began to reduce asset purchases and in both the US and the UK the date the markets expect the official interest rates to rise moved up.

For this reason, this is a good time to assess the role monetary policy played in the wake of the financial collapse of 2007–2008 and reflect on the challenges to be confronted in the future. Recall that the predominant paradigm before of the crisis (due to the period of Great Moderation in the previous two decades) was that monetary policy should remain passive in the face of the formation of bubbles and financial imbalances and that a liquidity trap was seen as more of a theoretical possibility than a real risk.

However, in order to stabilize the financial system, especially after the Lehman collapse, central banks of major developed economies exercised their role as lenders of last resort, generating extraordinary liquidity and lowering the official interest rates to near zero in the first half of 2009. At that time, the so-called unconventional policy measures were launched in order to restore the monetary transmission mechanism, improve access to financing, and support recovery depending on the objectives and institutional idiosyncrasies of each central bank.

Currently, due to differences in the recovery path of activity and the restructuring of the financial system, some countries, such as the US, are studying the most appropriate exit strategy to standardize the size and composition of the central banks' balance sheets, and others, such as those in the euro zone, suggest intensifying expansionary monetary policy. In any case, the central banks of developed economies had to counterbalance any benefits of keeping interest rates low longer to avoid falling into a state of secular stagnation with the risks to macroeconomic and financial stability associated with prolonged expansionary monetary policy. In this context, it is crucial that other policies play a more active role in carrying out the necessary structural reforms and repairing the balance sheets of companies, families, and governments.

Looking ahead, it seems clear that the arsenal of extraordinary measures after the crisis will teach lasting lessons on how to improve the performance of central banks, and it is possible that some of them could even become part of the regular set of instruments in "normal" times. Shedding light on these questions is the purpose of this book edited by Funcas. The person who designed the contents and has driven the coordination amongst the contributing authors is **Javier Vallés** of the Banco de España. No doubt his knowledge of the subject and experience in these matters has been instrumental in presenting a recapitulation of top international authors in this issue. It is for these reasons that Funcas must express its appreciation for his coordination and supervision. This work has constantly benefited from his dedication and deep understanding of the matter, and, more importantly, his enthusiasm, which Funcas shares, for offering the reader a broad overview of the monetary policy pursued during the crisis and the challenges that come with nascent economic recovery.

The contents are divided into four sections. The first four contributions in the introductory section describe the most relevant aspects of recent policies in the major central banks in advanced economies: the European Central Bank, the Bank of England, the Bank of Japan, and the Federal Reserve System. The particularity of this section is that all the authors have some responsibility in monetary policy implementation of their corresponding banks. The second set of articles compares the similarities and differences between the extraordinary measures undertaken by these banks and attempts to draw conclusions about the future of monetary policy. The third section presents the risks of maintaining the current expansionary monetary policy, analyzes spillovers on emerging economies, and discusses the relevance of macroprudential policy after the crisis. The final section focuses on the peculiarities of euro zone monetary policy and how to cope with the current risks of deflation.

The new monetary policies of the major central banks

The issue opens with the contribution of **Peter Praet, Philippine Cour-Thimann,** and **Florian Heider** of the European Central Bank, which reviews the monetary policy of the euro zone since 2007. To fulfill its price stability mandate, the main challenge for the ECB has been ensuring the transmission channels of interest rates that were damaged as a result of the global financial crisis and the subsequent European sovereign debt crisis. Firstly, the authors describe unconventional liquidity measures and the theoretical justification for addressing bank funding problems, mainly in interbank markets, which produced vertical dysfunctions from official interest rates to prices and real activity. Second, the ECB had to deal with the fragmentation of the euro zone, that is to say, a horizontal dysfunction in the transmission of monetary policy resulting from the fiscal weakness of member states that put stress on sovereign debt markets. In this case, unconventional monetary measures included also OMTs –outright monetary transactions– that came with conditions to maintain ongoing reform efforts. The contribution also explains the context in which forward guidance was introduced in 2013 and ends with a call to action regarding other economic policies in order to solve the remaining challenges.

After the crisis, the Bank of England besides its responsability for ensuring price stability, it also holds the responsibility and powers to manage the risks that threaten financial stability. It is therefore extremely important to analyze its recent experience in assuming these new responsibilities. The article written by Jon Cunliffe, James Benford, Oliver Burrows and Tracey Wheeler of the Bank of England discusses the link between the housing market and financial stability in the UK. After reviewing the evolution of real estate cycles and the factors behind it, with special emphasis on residential and commercial markets during the last two boom periods (1983–1989 and 1997–2007), the paper describes the credit and non-credit risks for the banking system. The second part of the paper presents the recent institutional developments in the UK to mitigate financial stability risks and their interaction with monetary policy objectives. In this context, the authors description of the current property market situation and policy implications is of great interest. Thus, this contribution documents the recent rise in real estate prices and transactions, analyzes the potential risks brought on by these developments, and reviews the most recent responses announced by the Financial Policy Committee in November 2013 and reaffirmed in March 2014

Japan is the example of developed economy that for more than two decades has tried to overcome the consequences of the asset bubble burst in the early nineties with both conventional and extraordinary expansionary monetary policies. Although in the first decade of this millennium analysts and academics criticized somehow the way the central bank carried out its policy, it pioneered the use of unconventional measures such as quantitative easing and forward guidance of interest rates which are aspects that have been incorporated into the toolbox used by other major central banks in advanced economies after the crisis. The article by Kazuo Momma and Shuji Kobayakawa of the Bank of Japan reviews the main measures taken to overcome deflation since 1999, paying particular attention to the period after the Lehman bankruptcy and culminating in the most recent period known as Abenomics. Thus, the new phase of "quantitative and qualitative expansion" which began in 2013 has conveyed the desire to double the monetary base in two years in order to achieve the goal of two percent price stability ("2-2-2") generalizing and simplifying asset purchases. The results thus far are encouraging mainly in terms of inflation and the formation of expectations by economic agents, but also in terms of economic activity.

This section closes with an article by **J. David López–Salido** of the Federal Reserve Board, which reviews the recent changes in that institution's monetary

policy. In recent years, especially after the financial crisis, the Federal Open Market Committee (FOMC) has taken very divisive steps to clarify the objectives and strategy of the Federal Reserve's policy. Recent changes in the Committee's communication—for example, providing information regarding the interest rate expectations of its members—contributes to the policy's effectiveness and therefore to improve the scenario of price stability and full employment, which constitutes its mandate. Next, the study provides the theoretical foundations to carry out unconventional policies when the interest rate has been set to zero (zero lower bound) as well as the main empirical results of the literature about the quantitative effect of these policies.

Similarities and differences between countries and policies

The first article of the second section, written by **Juan Carlos Berganza**, **Ignacio Hernando**, and **Javier Vallés** of the Banco de España, systemically analyzes the monetary policy changes in the four major central banks. It identifies the similarities and differences in assets, maturity terms and duration of the quantitative easing programs; it analyzes the development of forward guidance, which has evolved from signaling an indefinite period to a reference of specific dates; and, finally, conditioning on certain economic variables. This contribution also assesses the risks of the different exit strategies from these policies, including the lessons learned from the tapering episode between May and August 2013, advocating gradual and anticipated actions. With respect to the future design of monetary policy, some of the pros and cons of its use for financial stability are also presented.

The second article in this section, written by **Ángel Ubide** of the Peterson Institute for International Economics, compares monetary policy in normal times with that which was put in place when the interest rate was near zero. It analyzes the differences between the two policies in terms of channels of action and argues that there is little difference with respect to their ultimate impact. Moreover, he defends that asset purchases have been a learning process, making and testing instruments never used before and addressing the specific problems that each central bank was facing. Likewise, the forward guidance of monetary policy involves, in some cases, a change in the reaction function of the bank, which needs to be explained to the markets, justifying its limited success at the onset of its implementation. Based on simple indicators such as real interest rate evolution and inflation expectations, one could argue that unconventional policies have been more effective in the US and the UK than in the euro zone.

Policy risks and interrelationships

The article by **Jaime Caruana**, **Andrew Filardo**, and **Boris Hofmann** of the Bank for International Settlements presents a balance of monetary policy risks after the crisis. The authors acknowledge the importance that the central banks' actions have had on the management of the crisis, but they warn about the risks of overloaded monetary policy competence and excessive delays in its normalization. Their argument is based on the fact that many economies are going through balance sheet repairing (private and public) as a result of the financial crisis, which makes the road to recovery different from that which comes after traditional post–war cyclical downturns. Prolonged monetary accommodation delays necessary consolidation and reform measures, sharpens financial risks and vulnerability and has global implications as it contributes to the buildup of financial imbalances in emerging economies. As a longer– term challenge, they suggest that the formulation of monetary policy should be updated to integrate financial factors and the interdependence of a globalized economy.

With respect to macroprudential policy, the contribution of **José María Roldán** of the Spanish Banking Association discusses how the 2007 crisis required a radical change in the configuration of the financial system and how it has been monitored and regulated. After describing the problems with the macroprudential framework highlighted by the crisis, he describes the main institutional innovations put in place to prevent another systemic financial crisis, noting that in Europe the process of allocation of powers is yet to be concluded. Finally, he points out some of the practical difficulties in the implementation of macroprudential policies, which are still under construction, including their cost in terms of efficiency, a possible tendency to over–activism, and the difficulty to maintain their countercyclical character.

The international financial crisis has been a huge external shock for emerging economies. The third article in this section, written by **Sonsoles Gallego** and **Pilar L'Hotellerie** of the Banco de España, studies cross-border spillovers and international monetary cooperation. The first part focuses on characterizing the impact of the monetary policies of industrialized countries on emerging economies and the monetary policy reactions of these countries. It is noteworthy that the main changes after this crisis to reduce the pressure of the capital flows have been, depending on each country, the use of macroprudential measures, the management of capital flow, and even the occasional use of capital controls. The second part of the article discusses how international coordination mechanisms have worked to deal with a global crisis that has comprehensively affected the entire financial system. Although the level of cooperation in the monetary policy response has been limited, other important advances can be

seen in the development of insurance and resolution mechanisms to provide liquidity.

Economic recovery and challenges in the euro zone

The article by **Huw Pill** of Goldman Sachs discusses the peculiarities of the European Central Bank's actions in response to the financial crisis. The absence of fiscal and regulatory authority for the whole euro zone, the fragmentation of markets, and the threat of the break-up of the euro adjudicated much greater responsibility to the ECB than in the case of other central banks. The special operational framework facilitated the liquidity provision work of the ECB to restore financial market functioning; and, given the institutional fiscal gaps, it did so in the wake of the sovereign debt crisis but with the consequent moral hazard issues among borrowers. Finally, the program for OMTs in response to the sovereign debt crisis in some peripheral countries can be characterized as an operation off the ECB's balance sheet. It is a purchasing option that would generate risks if the countries concerned failed to stabilize their economies in contrast to the OMTs of other central banks.

Finally, the work of Bruegel economists **Gregory Claeys**, **Zsolt Darvas**, **Silvia Merler**, and **Guntram Wolff** closes this issue. The article is based on the present scenario of low inflation in the euro zone that, according to the authors, hinders economic recovery especially in the euro zone countries that are under stress. Possible monetary policy instruments are proposed to address the risk of low inflation, and a program to purchase a sufficiently diversified asset portfolio that does not include public debt is recommended.

In short, this book provides the reader with an overview of the monetary policy changes of the major central banks after the so-called Great Recession of 2007-2008. There is agreement amongst the analysts whose work is gathered here that these changes have been crucial for the stabilization of the financial system, to avoid a deep and prolonged recession, and to provide the economic authorities with the necessary time to address the reforms that are needed to strengthen economic recovery. In addition, within the contributions collected in this issue lies the conviction that, albeit by means of a costly learning process, the measures that have been taken in recent years will help improve the management of monetary policy in the future.

PART I

The "new" monetary policies in the advanced economies

ENSURING THE TRANSMISSION OF THE POLICY SIGNAL: A REVIEW OF THE ECB'S MONETARY POLICY FROM 2007 TO 2013

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Philippine COUR-THIMANN

Florian HEIDER

I. INTRODUCTION

The global financial crisis of 2008–2009 and the subsequent European sovereign debt crisis posed two major challenges for monetary policy. First, the sharp economic recession following the collapse of parts of the financial system and the subsequent weak recovery made it more challenging for the ECB to fulfil its primary mandate of maintaining price stability. From mid-2007 onwards, inflation exhibited considerable volatility (Figure 1).

To ensure price stability, the transmission channel from policy interest rates to real economic activity must function properly. But the crises impaired the transmission channel in both a vertical and a horizontal sense. These impairments represented the second challenge to the ECB's monetary policy. Banks' funding problems caused a vertical impairment (from policy rates to the real economy). The emergence of fault lines in the financial sector with national borders caused a horizontal impairment. Bank lending rates became very heterogeneous across certain groups of euro area countries (Figure 2).¹ In this context, the ECB had to choose the appropriate instruments to repair the transmission channel and maintain price stability.

This article explains how the ECB took up the challenges. While upholding its price stability mandate, the ECB lowered policy rates to an historic low (standard measures) and used its balance sheet (non-standard measures) to ensure the transmission of the policy rate stimulus to the real economy. The ECB's standard and non-standard measures provided both reassurance and insurance. They reassured the banking sector of ample and continued funding support. They insured the financial sector and the real economy against negative systemic liquidity shocks, a malfunctioning of the transmission channel and an unanchoring of inflation expectations.

¹ For an in-depth investigation of the fragility of the monetary transmission channel in the euro area, see Ciccarelli, Maddaloni and Peydró (2013).





Importantly, the ECB's insurance comes with conditions attached to maintain incentives for prudent behaviour and ongoing reform efforts. The liquidity provision is in the form of collateralised loans; potential asset purchases (under Outright Monetary Transactions or OMTs) come with strong conditionality. To guarantee the long-lasting effectiveness of its monetary policy, the ECB complemented its conditional insurance by actively contributing to a stronger Economic and Monetary Union and to a new financial architecture for the euro area in the form of a Banking Union.

Sections II and III of this article explain how the ECB's non-standard measures address the vertical and horizontal risks to the euro area-wide transmission of monetary policy. The fourth section explains how the ECB's interest rate policy addresses the risks to price stability. The final section offers some thoughts on the future of the ECB's monetary policy in relation to the emergence of a Banking Union.

II. ADDRESSING EURO AREA-WIDE IMPAIRMENTS IN THE TRANSMISSION OF THE POLICY INTEREST RATES

Banks perform the key role in an economy of channelling resources from savings to investments (intermediation), especially in Europe. They borrow short-term from depositors (and other funding markets) and provide longterm credit to firms and households. Through this intermediation and maturity transformation banks service both the needs of savers, who do not want to lock up their money for long periods, and of investors, who can only make repayments over time with the fruits of their work or investments.

Banks' special role in credit intermediation makes their balance sheet illiquid (with long-term assets and short-term liabilities) and exposes them to liquidity risk. A well-functioning interbank market shelters banks from liquidity risk. If a bank experiences a sudden outflow of deposits, it can normally borrow from another bank with an inflow of deposits to counteract the negative liquidity shock.

To smooth out liquidity shocks, banks borrow and lend using their accounts at the central bank. Banks have to satisfy reserve requirements and thus hold funds in those accounts. An increase in the aggregate amount of funds available to the banking system can only occur through borrowing from the central bank (or through selling assets to the central bank). By varying the interest rate for this borrowing (the policy rate), the central bank affects the cost of borrowing and lending in the interbank market. A lower policy rate therefore reduces banks' marginal funding cost, which eventually trickles through and leads to a lower cost of credit for firms and households.

Interbank markets are therefore the first step in the transmission of the policy interest rate signal to the real economy.² If interbank markets malfunction, then several adverse developments are set in motion. First, without interbank funding, a bank must liquidate assets, possibly at large discounts, triggering downward price-spirals ("fire-sales"), or it risks a default. Second, a banking sector in difficulty can no longer provide credit to the real economy.³ And third, a malfunctioning interbank market will weaken the price-finding function of financial markets and create uncertainty premia. Ensuing misalignments between market prices and the marginal cost of central bank liquidity can impair the vertical transmission mechanism of monetary policy. The lack of a tight link between policy rates and banks' funding costs can undermine a central bank's ability to act. Taken together, and given the high interconnectedness in the banking system, a prolonged and widespread shortage of funding can quickly develop into a systemic event, threaten the financial system and have adverse consequences for the real economy.

So when on 9 August 2007 interest rates in interbank markets rose significantly all over the world, it signalled the beginning of the global financial turmoil that developed into a full-blown crisis one year later with the bankruptcy of Lehman Brothers as the key trigger (Figure 3). Suddenly, banks no longer trusted each other and interbank markets malfunctioned.⁴

To insure against this negative systemic liquidity shock, support the functioning of the transmission mechanism and avert its negative consequences for the real economy, the ECB followed a two-pronged strategy. First, the ECB used standard interest rate measures. To counteract the rapid deterioration of global economic conditions, the ECB, together with the Bank of Canada, the Bank of England, the Federal Reserve, the Sveriges Riksbank and the Swiss National Bank, announced a reduction of policy interest rates on 8 October

² In addition to short-term rates, the transmission of monetary policy into economic activity also works through expectations. When a central bank lowers short-term rates, long-term rates (which ultimately matter for economic activity) normally fall, since expectations in the economy about future short-term rates would also shift down.

³ During the financial crisis, the cost of credits for corporations increased. See Santos (2011). The financial crisis also severely impacted on the real economy, e.g., it led to higher unemployment, see Chodorow-Reich (2014).

⁴ For an account of the global liquidity crisis see, for instance, Brunnermeier (2009). For a review and explanation of the ECB's response to the global liquidity crisis, see Trichet (2010). For the role of institutional factors and financial structure in shaping the ECB's response, see Cour-Thimann and Winkler (2012). For a modelling of tensions in the interbank market and of a possible break-up, see Heider, Hoerova and Holthausen (2009).



2008. This coordinated move was unprecedented and the 50 basis point cut by the ECB was the first of a series of cuts that lowered the main refinancing operations (MRO) rate to an historic low of 1% by 13 May 2009.

Second, the ECB engaged in non-standard measures. It departed from its normal provision of overall limited liquidity and instead started to offer liquidity that is only limited by the banks' quantity of adequate collateral (in so-called "fixed-rate full allotment" tender procedures). In addition, the ECB lengthened the maturity of its supply of liquidity. Normally, the maturity of the ECB's supply of liquidity via collateralised credit is one week for the MROs and three months for the longer-term refinancing operations (LTROs). In a number of consecutive steps, the ECB first extended the maturity of LTROs to six months (3 April 2008), then to one year (25 June 2009) and ultimately to three years (22 December 2011) at the height of the sovereign debt crisis (see below).

The economic rationale for the ECB's non-standard measures was to ensure the appropriate transmission of the policy interest rate signal. In the context of malfunctioning markets, the ECB essentially substituted for the lack of private sector funding of banks and addressed tensions in specific malfunctioning market segments.

The substitution had two dimensions: quantity and maturity.⁵ With fixedrate full allotment the banking system can itself determine how much liquidity it wants to hold. The first time the ECB offered liquidity using fixed-rate full allotment (on 9 August 2007, the first day of the turmoil in the money market), banks ended up borrowing EUR 95 billion. By the end of October 2008, when fixed-rate full allotment had been introduced for all refinancing operations, the "excess liquidity" held by the euro area banks over and above what was needed to fulfil the reserve requirements stood at EUR 232 billion. At the height of the sovereign debt crisis, excess liquidity surpassed EUR 750 billion (Figure 4), a staggering amount.⁶



⁵ A third, less prominent dimension is the foreign exchange dimension. The ECB provided dollars to euro area banks. This involved a swap agreement with the Federal Reserve. Such swap agreements were also made with a number of other central banks.

⁶At the time of this writing, the ECB is committed to fixed-rate full allotment until mid-2015.





With fixed-rate full allotment there can be no funding shortage as long as banks have enough eligible collateral. The broad list of eligible collateral, which was further expanded during the crisis, was therefore an important complement to the increased quantity of ECB funding. It allowed banks also to pledge certain assets that the private sector no longer accepted, e.g., nonmarketable assets and covered bonds, with commensurate haircuts (Figure 5).⁷ Moreover, the ECB's list of counterparties is large (over 2,000 banks). As a consequence, the ECB's expansion of funding reached much of the banking system across the euro area.

The second critical dimension of the ECB's non-standard measures was the lengthening of the maturity of its operations. By extending the maturity of its credit, the ECB insured banks against duration and roll-over risk. Banks no longer had to worry about replacing old credit with new credit whose availability and conditions would not be known well in advance. The response from the banks to

⁷ At the end of 2013, the collateral framework of the ECB allowed marketable assets worth EUR 14 trillion to be used. Credit from the Eurosystem was significantly over-collateralised. At the end of 2013, collateral worth EUR 2.2 trillion was backing up an average outstanding credit of EUR 700 billion.



the lengthening of maturity was tremendous. More than 1,100 banks borrowed a total of EUR 442 billion in the first one-year LTRO, more than 500 borrowed a total of EUR 489 billion in the first three-year LTRO and 800 banks borrowed a total of EUR 530 billion two months later in the second three-year LTRO. Some of the amounts borrowed were used to substitute for shorter-term liquidity.

The ECB also addressed tensions in specific malfunctioning market segments throughout the crisis. Even in 2009, in an effort to stabilise banks' funding conditions, the ECB was a catalyst for reviving the covered bond market, a major source of funding for European banks. It announced on 7 May 2009 that it would purchase covered bonds over the following 12 months, with a total nominal amount of EUR 60 billion.⁸ As with other forms of securitisation, issuance in the covered bond market had contracted sharply after October 2008. The ECB's Covered Bond Purchase Programme (CBPP) partially substituted for this loss of important private sector funding for banks and effectively served to revive the market. A second CBPP was conducted at a later stage in the crisis.⁹

The breadth and extent of the ECB's non-standard measures are visible from the expansion of the Eurosystem's balance sheet (Figure 6). Without such expansion, the lower policy rates would not have been transmitted to the real sector. Being mostly cut off from private funding, banks would have had no choice but to liquidate assets and cut credit to the real economy. But thanks to the ECB's substitution for the lack of private funding, the ECB's accommodative interest rate policy worked its way through the banking sector to the real economy.¹⁰ The policy resulted in lower bank lending rates for households and firms until the beginning of the sovereign debt crisis (Figure 2), when new challenges emerged.¹¹

III. ADDRESSING INCREASED MARKET FRAGMENTATION ACROSS THE EURO AREA

In late 2009 and early 2010, a new challenge loomed, specific to Europe. While the global financial crisis had threatened to impair the vertical transmission of monetary policy, this new challenge posed an additional risk, namely an impairment of the horizontal transmission of the policy across national borders.

⁸ Covered bonds (known as cédulas in Spain, Pfandbriefe in Germany or obligations foncières in France) are a form of securitisation whereby the underlying assets typically remain on the issuer's balance sheet and buyers have recourse against the issuer and can seize the collateral. Covered bonds constitute the largest fixed-income market after public sector bonds in the Euro area.

⁹ The second CBPP was launched in November 2011, for an amount of EUR 40 billion of purchases also spread over one year.

¹⁰ For evidence that monetary policy interest rates and central bank provision of long-term liquidity complement each other in working against a possible credit crunch for firms, see Maddaloni and Peydró (2013). For evidence that non-standard policy measures lowered bank funding volatility, see Carpenter, Demiralp and Eisenschmidt (2013).

¹¹ For additional evidence on the effectiveness of the ECB's non-standard measures in stabilising the financial sector and partly ensuring the continuity of credit to the real economy, see Giannone, *et al.* (2012), and Lenza, Pill and Reichlin (2010).



Despite the ECB's supportive monetary policy, the tightening of global financing conditions and the costs associated with rescuing banks weakened the fiscal situation of euro area countries. As creditors started to discriminate among countries in euro area sovereign debt markets, bond yields rose for governments with the weakest public finances (Figure 7).

Some governments' access to finance became increasingly restricted, affecting bank funding conditions and weakening their national banking systems. In some countries, banks' credit risk and the credit risk of their sovereign increased in parallel (Figure 8). The resulting fragility proceeded to undermine the fiscal position of the respective governments. A vicious circle between banks and sovereigns was set in motion.¹²

Government bonds play a crucial role in the transmission of monetary policy through three channels. First, government bonds serve as benchmarks for the entire maturity spectrum of the yield curve and the pricing of private assets throughout the financial system. Second, government bonds are the main collateral in European repo markets, an important segment of the interbank market. A higher price for government bonds thus alleviates the financing

¹² See, for instance, Acharya, Drechsler, Schnabl (2011).





constraints of borrowers. Third, higher government bond prices support the valuation on the asset side of the balance sheets of financial institutions, which increases their capital base and reduces the likelihood of fire-sale dynamics.

To ensure depth and liquidity in those market segments that became dysfunctional, the ECB in May 2010 established the Securities Markets Programme (SMP) to buy sovereign bonds. In line with the provisions of the Treaty on the Functioning of the European Union (TFEU), interventions were strictly limited to secondary markets. The purchases were also sterilised through liquidity-absorbing operations so as not to affect central bank liquidity conditions. The SMP, together with the European Financial Stability Facility (EFSF) set up at the same time by the heads of states and governments, were effective in preventing adverse contagion effects and fostering some stabilisation of markets.¹³

But when sovereign debt market tensions spread to Italy and Spain in the summer of 2011, fire sales occurred throughout the market for a number of sovereigns and indicators of systemic risk increased again (Figure 9).

¹³ Government bond purchases undertaken within the SMP also appeared to be effective in lowering yields, see Eser and Schwaab (2013).



As the sovereign debt crisis unfolded, the fragmentation of the interbank market that had started with the global liquidity shock in 2008 was increasingly occurring along national lines, undoing the financial integration that had followed the creation of EMU.

One visible sign of this horizontal fragmentation was the protracted decline in cross-border interbank activity that occurred between early 2011 and the second half of 2012 (see Figure 10 for the overnight segment). In contrast to the negative liquidity shock in 2008, which only had a temporary negative effect on cross-border activity, the adverse bank-sovereign nexus triggered a steady decline in cross-border activity. As explained above, when banks no longer trade liquidity with each other, then the inherent illiquidity of their balance sheets can spur deleveraging and asset fires sales. Bank illiquidity can then quickly turn into bank insolvency. Moreover, the first stage in the transmission mechanism of monetary policy is at risk. When banks no longer trade with each other across national borders within the euro area, the "singleness" of policy rate signals can be lost.

Another prominent sign of the horizontal fragmentation along national borders –but also of the ECB's supportive monetary policy response in this



context– was the uneven distribution of central bank credit across the euro area. By seeking to preserve price stability for the euro area as a whole in the context of the crisis, the ECB's monetary policy measures inevitably had uneven effects across euro area countries and this unevenness shows up visibly in the balance sheets of the Eurosystem and its constituent national central banks.¹⁴

It is, however, not always fully appreciated that the unevenness is the endogenous outcome of the implementation of the single monetary policy in a context of financial market fragmentation. It is not the result of targeted measures for specific countries or national markets. The ECB's Governing Council decides on the parameters of the refinancing operations that provide the bulk of liquidity, but it does not decide on the relative amounts that banks take up at their national central banks. As a fundamental feature of a currency area, banks are treated equally no matter where they are located. Hence, liquidity can be taken up unevenly across the national banking systems. For example,

¹⁴ The actions of central banks can have significant uneven geographical effects also in a single country context. For instance, banks in Germany and New York ended up being the net recipients of funds in amounts equivalent to a third of the central bank liquidity injected during the crisis by the Eurosystem and the Federal Reserve System respectively. See Cour-Thimann (2013a).





before the crisis, half of the Eurosystem's liquidity was provided by the Deutsche Bundesbank (Figure 11).¹⁵

During the crisis, the unevenness in the distribution of liquidity changed. Central bank credit was provided mostly by the national central banks of those countries where the bank-sovereign nexus was strongest. Central bank liquidity then largely migrated from those countries, such as Greece, Ireland, Portugal, Italy and Spain, to non-stressed countries, such as Germany, the Netherlands, Luxembourg and Finland. The migration essentially represented the reimbursement of past interbank loans that were no longer renewed as well as capital flight.

The horizontal fragmentation responsible for the imbalanced payments between stressed and non-stressed countries within the euro area shows up in

¹⁵This proportion was about twice as large as Germany's share in the ECB's capital key (27% when reweighted using only euro area countries). The capital key indicates the fractions of ownership of the ECB's capital held by the various national central banks in the EU, thus including those in non-euro area countries (e.g., the United Kingdom). The reason for this disproportionate liquidity take-up was the large size of Germany's banking system and the preference for cash in Germany.

the Target2 balances on the Eurosystem central banks' balance sheets.¹⁶ After a first moderate increase in 2008, the Target2 balances remained stable until mid-2011 when, suddenly, they soared to over EUR 1 trillion, before declining again (Figure 12).

Facing severe horizontal fragmentation (massive increases in bond yields, loss of cross-border interbank activity and extensive imbalances in crossborder payments) that undermined not only the transmission of monetary policy but also threatened the integrity of the euro area, the ECB had to act again. It did so with a combination of two forceful measures: The extension of the maturity of central bank credit to an unprecedented three years with the option to repay after one year and, later, the announcement of potentially unlimited purchases of government bonds in secondary markets, under strict and effective conditionality, the Outright Monetary Transactions (or OMTs) mentioned above.¹⁷ This announcement followed the statement of President Draghi (on 26 July 2012) that the ECB would do 'whatever it takes, within its mandate' to preserve the euro. Together, the three-year LTROs and OMTs stopped the horizontal fragmentation in mid-2012 and stimulated a process of re-integration.¹⁸

The rationale for extending the maturity of collateralised central bank credit to three years was the same as for the earlier extension during the global liquidity crisis. The ECB insured the banking sector against duration and rollover risk in funding. This way, solvent banks could stay liquid and could continue to provide credit to the euro area economy. Owing to legacy stress from the global liquidity crisis and increased pressure to recapitalise, there was a risk of large-scale bank deleveraging. The lengthening of maturity together with the ECB's other non-standard measures (fixed-rate full allotment, broadening of eligible collateral) prevented a disorderly deleveraging and gave governments and banks time to make the necessary adjustments without drastically cutting credit to the private sector.

The rationale for OMTs was to reduce the risk of adverse self-fulfilling equilibria that would have reinforced the horizontal fragmentation across euro

¹⁶ These balances are intra-system positions that reflect imbalanced payment flows between the national banking systems in the euro area. The national central banks of countries under stress and whose banking systems have seen net payment outflows exhibit Target2 liabilities. Conversely, the national central banks of non-stressed countries, whose banking systems have seen net payment inflows, exhibit Target2 claims (assets). By definition, Target2 liabilities and Target2 claims add up to zero.

¹⁷ The OMTs brought to an end the ECB's SMP, the earlier, limited and unconditional scheme for buying sovereign bonds in those market segments that were dysfunctional.

¹⁸ The two three-year operations in late 2011 and early 2012 helped to ease tensions in bank funding and thus to dampen dynamics in the vicious circle between banks and sovereigns, but only temporarily. A more lasting effect followed the announcement of the OMTs half a year later.

area countries and made the transmission of monetary policy impulses across the euro area very difficult. In a worst-case scenario, adverse equilibria could even lead to a break-up of the euro area. The fear of such equilibria became real when sovereign debt market tensions intensified further in the first half of 2012. Bond yields were integrating a 'fear premium' reflecting redenomination risk, that is, a risk that a country would leave the euro area, implying the redenomination of its assets in another currency.

Eliminating this risk, while keeping market discipline on public finances in place, required a careful design of the intervention. In this respect, the OMTs are in line with the Treaty provisions against monetary financing: They would never be used to indiscriminately push down government bond spreads.¹⁹ Importantly, a necessary condition for activating OMTs for a specific sovereign bond market is the 'strict and effective conditionality attached to an appropriate EFSF/ESM programme'.²⁰ In general, a central bank has to weigh the costs of inaction against the costs of action when pursuing its mandate in exceptional times. This then sometimes requires taking a controlled risk that nevertheless minimises the overall risk for the euro area and its individual countries.²¹

The OMTs succeeded in putting an end to any doubts about the integrity of the monetary union. They reduced that fraction of sovereign spreads which reflected compensation for the redenomination fears but also contributed more generally to the improvement in funding conditions for corporates, banks and individuals across the euro area.

IV. ADDRESSING RISKS TO PRICE STABILITY WITH THE INTEREST RATE INSTRUMENT

The previous two sections describe the ECB's non-standard monetary policy response after 2007. The non-standard measures complemented and supported the standard interest rate decisions. The aim of the measures was to achieve an effective transmission of policy rate signals to the real economy when malfunctioning financial markets impaired the transmission channel both vertically and horizontally. As for the policy interest rates, they continued to be the policy instrument to address risks to price stability.

This section examines how the ECB addressed risks to price stability with its interest rate instrument, and in particular how it engaged in forward guidance after May 2013.

¹⁹ See also Praet (2014) and Cœuré (2013).

²⁰ The ESM is the European Stability Mechanism, a permanent organisation which replaced the temporary EFSF.

²¹ See also for instance Bindseil and Winkler (2013), and Bindseil and Jabłecki (2013).


The collapse of global trade and the sharp downturn in economic activity in the aftermath of the financial crisis in late 2008 and early 2009 had led to declining prices in some parts of the world. In the euro area, in addition to the sharp reduction in the ECB key interest rates between October 2008 and May 2009 and the non-standard measures to support their effective transmission to the euro area economy, the ECB's credible pursuit of price stability –as reflected in the overall containment of the market's price for protection against inflation and deflation despite significant short-term spikes– contributed to fending off risks to price stability in the challenging crisis environment (Figure 13).

The ECB actively used its interest rate instrument, in combination with its non-standard measures. The key ECB interest rates were even temporarily raised during the first half of 2011 to address emerging upside risks to price stability, at a time when ample liquidity support to banks was continued. The complementarity between the standard interest rate measures and the nonstandard measures contrasts with the approach of other major central banks such as the US Federal Reserve and the Bank of England. Those central banks used unconventional monetary policy measures as a substitute for the standard interest rate instrument once the policy interest rates had reached a lower bound.

One feature of the monetary policy responses to the financial crisis in other parts of the world was that central bank policy rates quickly reached the zero lower bound there. The global crisis was, however, so severe that the rapid lowering of policy rates was not enough to fully counter the decline in real economic activity. The challenge of providing more accommodation when policy rates are already low led some major central banks such as the US Federal Reserve and the Bank of England to engage in "quantitative easing." By purchasing assets other than short-term government bonds, these central banks aimed to lower long-term interest rates when short-term rates could not be lowered much further.

The ECB, working in a different institutional set-up and facing different challenges, took a different approach from other major central banks in the world, not only as regards the complementary use of the interest rate instrument and the non-standard measures, but also as regards the use of "forward guidance" on the future path of its interest rate instrument. This tool had been used by other major central banks in combination with quantitative easing.

In the post-crisis environment of low policy rates but persisting risks to price stability, on 4 July 2013 the ECB announced that it "expects the key ECB interest rates to remain at present or lower levels for an extended period of time." In addition to this "easing bias," the ECB also stressed the conditionality of this forward guidance as follows: "This expectation is based on the overall subdued outlook for inflation extending into the medium term, given the broad-based weakness of the economy and subdued monetary dynamics."

The ECB's forward guidance aims to clarify how the ECB assesses the outlook for inflation and how its monetary policy strategy incorporates that assessment. A clarification became necessary since the profound financial and economic dislocations after the crisis made it harder for market participants to infer the future path of policy rates from past regularities. By the beginning of July 2013, increasing volatility in financial markets, especially money markets, had led to a withdrawal of the monetary accommodation from the latest policy rate cut of May 2013, which had brought the key ECB rate on the main refinancing operations to 0.5%. The path of expected policy rates had steepened considerably (Figure 14).

The ECB's forward guidance brought the expected path of policy interest rates back into line with a path that the ECB viewed as warranted given its assessment of the outlook for inflation. The ECB subsequently firmly reiterated





its forward guidance and further explained under which macroeconomic conditions the foreseen path of policy interest rates remained valid. At the time of writing, and despite a distinctly brighter macroeconomic outlook today, the expected interest rates were back to the low levels seen after the policy rate cut in May 2013 (which had been followed by a further cut in November 2013).

In line with the ECB's aim to provide more clarity about its objective and its assessment of economic conditions in the wake of the crisis, forward guidance also reduced uncertainty. Forward guidance reduced the distribution of possible future short-term interest rates as well as the sensitivity of money market forward rates to the release of public news about the state of the economy.²²

V. CONCLUSION AND CHALLENGES AHEAD

The euro area has come a long way since 2007. Nearly seven years after the eruption of the global financial crisis, and four years after the start of the sovereign debt crisis in Europe, much has been achieved. A meltdown of the financial

²² Evidence and further information is available in the ECB's April 2014 *Monthly Bulletin* article entitled "The ECB's forward guidance."

system was avoided. The Eurosystem's monetary policy response was swift and comprehensive. It provided the euro area's financial sector and real economy with some insurance against some possible self-fulfilling adverse scenarios with negative consequences for price stability. Moreover, the ECB has committed to keeping policy interest rates low, conditional on the outlook for inflation, and to maintaining fixed-rate full allotment for some time to come. This has made it easier to bear the necessary, but painful, adjustment costs –notably the needed deleveraging in the balance sheets of banks and other economic actors.

However, challenges remain and monetary policy alone cannot do the job. Recovery from the crisis remains slow and weak. The ECB's liquidity support to banks and contribution to reducing bank funding costs were the necessary ingredients for the "enhanced credit support." But the ECB's accommodative policy rate signals have still not fully transmitted to the real economy, and in particular to the small and medium-sized enterprises that are so vital for the euro area's economic recovery (Figure 15).

More is required from other policy areas. For a start, the ECB cannot maintain its supportive measures indefinitely: Ultimately, an exit is needed from the ECB's non-standard monetary policy measures, which were shaped by the



extraordinary circumstances of the crisis.²³ There is a delicate balancing act between providing support to the economy via banks (the counterparties in central bank operations) on the one hand, and providing appropriate incentives to the banking sector on the other hand. The ECB's exceptional standard and non-standard measures bought time, but time is not always used wisely. As with any insurance, it can foster moral hazard if not carefully designed or if unduly prolonged. Low interest rates and ample liquidity allow banks to continue to operate with impaired balance sheets while still making profits. When bank balance sheets are unsustainable from a social point of view, then an accommodative central bank policy effectively fosters a misallocation of resources.²⁴

In this light, keeping up the reform momentum in other policy areas is essential. The crisis exposed a number of serious fragilities in the economic policies of euro area countries, in the regulation and supervision of the banking sector and the global financial industry, and in the enforcement of rules and the institutional set-up of EMU. Major steps have now been taken in all those areas, but much remains to be done. The future is challenging, with a reduced room for manoeuvre for fiscal authorities and a certain reform fatigue.

Given the limits to what monetary policy can legitimately and realistically achieve, and because a strengthened economic pillar of Economic and Monetary Union is needed to ensure the viability and vitality of the euro area, the ECB took an active role in fostering reform and designing the euro area's new institutional set-up.

Extraordinary progress has been made in respect of institutional reforms. Under the fiscal compact that was ratified by the euro area and other EU countries in 2012, the rules governing sound public finances were upgraded to primary law. The surveillance of macroeconomic imbalances in Europe was strengthened. The Single Supervisory Mechanism (SSM) provides solid elements of a level playing field for the banking sector across Europe. But more needs to follow. The review of banks' balance sheets is under way. Whatever the review's results, the appropriate decisions must be taken. An effective Single Resolution Mechanism must complement the SSM.

The crisis also exposed the need for more structural reforms at the national level. Without flexible exchanges rates but with integrated capital markets,

²³ For an in-depth discussion of what the "new normal" for monetary policy in the post-crisis environment may look like, see Bayoumi *et al.* (2014).

²⁴ In particular, the ample liquidity may have made carry trades attractive for banks. Banks with funding problems located in countries with high sovereign debt yields may have contributed to the adverse banksovereign nexus by borrowing from the ECB and buying the bonds of their sovereign. See Acharya and Steffen (2012).

any deficiencies in competitiveness translate into funding problems sooner or later, with no quick fixes available to governments. There is no alternative to governments' ongoing and long-term commitment to reform labour markets and the public sector, to achieve sustainable fiscal positions, and to promote innovation and education. If these efforts are maintained then the euro area will prosper and the crisis will be seen as an event that made Europe stronger.

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UK PROPERTY MARKET: EXPERIENCE, RISKS AND POLICY RESPONSE¹

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I. INTRODUCTION

The UK property market has frequently experienced booms and busts, with five clear cycles over the past half century. Some of these episodes have coincided with particularly sharp falls in activity, partly contributed to by distress within the financial sector. Prices and transactions in UK property markets, having gone through a sharp correction in the aftermath of the 2007-8 recession, are now growing rapidly. In response to these developments, the Bank's Financial Policy Committee, in its November 2013 *Financial Stability Report*, laid out a set of actions, either already taken or in train, to mitigate potential risks to financial stability from property. It also set some further actions that could be taken.

This article reviews the links between property markets, the financial system and the economy, in light of the UK experience and considers the lessons for policy. It is organised as follows. The second section reviews the history of the residential and commercial property markets in the UK, with particular focus on developments leading up to the early 90s and late 2000s periods of instability. The third section then builds on this review to draw out a set of 'stylised' facts to capture the relationship between property markets, economic activity and financial stability. The fourth draws out the case for policymakers intervening in property markets. The fifth, reviews the latest developments in, and risks from, UK property markets and sets out the possible responses that policymakers are considering. The final section concludes.

II. UK EXPERIENCE OF PROPERTY MARKET CYCLES

The UK has a long experience with property market booms and busts. International evidence shows that booms in housing and commercial real estate (CRE) markets often occur simultaneously, and the UK is no exception. For each

¹ The article saying that the piece was finalised and prepared on the basis of data available at end-March 2014.

of these two sectors, we briefly discusses the history of booms and busts, before discussing the detail of the three most recent cycles, in the late 1980s and the 2000s, which are more relevant to the current financial system and for which we have richer data.

Pronounced cycles have been a key feature of the UK housing market since the 1960s. There have been 5 distinct periods of rapid real house price growth (not including the recent pickup). These were 1971-73, 78-80, 83-89, 1997-2003 and 2006-2007. With the exception of the penultimate period, all were



followed by a significant fall in in real house prices (Figure 1). The first two cycles which occurred in a UK mortgage market very different to today, with periodic rationing schemes that were instrumental to market developments.² The three most recent cycles, on which we focus, featured an expansion of lending and easing of credit conditions/relaxation of underwriting standards, driven to some extent by relaxations in regulation.

1. Late 1980s to early 1990s

— 1980s boom (83-89)

The period saw a prolonged boom in both residential and commercial property markets.

² See Bank of England (1989).



In the residential property market, nominal house prices increased by 145% between 1982 and their peak in 1989, with the annual rate of increase in prices peaking at 30% in early 1989 (Figure 1). The house price-to-income ratio increased from a multiple of 5.7 to 8.7 (Figure 2). Housing transactions in England and Wales increased from an average of a little over 100k per month at the start of the decade to a peak of 175k by 1988. Data collected by the OECD suggests prices rose over sixty percent relative to rents between 1982 and 1989. This period of strong growth in prices and transactions was also associated with strong growth in supply: housing starts increased from 200,000 in 1985 to around 250,000 by the end of the decade.

In the CRE market, nominal property prices increased by 50% between 1986 and 1990. As with the residential market, the annual rate of price increases peaked in early 1989, at 25% (Figure 3). There was also a substantial increase in prices relative to rents and a boom in construction. This boom in commercial real estate was matched by similar developments in many other advanced economies.

In the UK, the increase in property prices was accompanied by a large increase in property related household and corporate debt: the outstanding stock of mortgage debt increased from 20% of annual nominal GDP in 1980 to 50% in 1989 with borrowing against commercial properties relative to annual nominal GDP doubling from 5% in 1985 to 10% by 1989 (Figures 4 and 5).



Sources: Scott (1996), Investment Property Databank and Bank of England calculations.





This growth in property prices and the associated debt was in part driven by a number of special factors that were supportive of credit supply and of the demand for debt-financed purchases of property. We review these factors below.

— Factors influencing credit supply

The late 1980s boom in the UK property market was associated with a long period of deregulation in financial markets, which significantly relaxed constraints on lending.

Prior to the 1980s, lending, particularly for mortgages, had been periodically restricted through the use of rationing schemes by building societies which dominated the market. One such scheme was the 'corset', where banks were required to hold non-interest-bearing deposits at the Bank of England if growth in their deposits exceeded defined limits. Amongst other measures, the abolition of the 'corset' in 1980 helped banks compete more aggressively in the mortgage market; building societies were also given increased freedom to set interest rates competitively; and reforms allowed building societies to fund their mortgage lending on the wholesale money market.³ These changes encouraged greater competition and in doing so supported an expansion in product availability.

This increase in credit availability was evidenced by a very sharp rise in Loan-to-Value (LTV) and Loan-to-Income (LTI) for First Time Buyers (FTBs). FTB mortgages at an LTV of 90% or above increased from 10% of the flow of lending in the early 1980s to 50% by the end of the decade; over the same period, the share of FTB borrowers receiving a loan of more than three times income increased from 1% to almost 20% (Figures 6 and 7).



² Data from the FCA's Product Sales Data (PSD) are only available since 2005 Q2. Data from 1979 to 2005 Q1 are from the discontinued Survey of Mortgage Lenders, which was operated by the Council of Mortgage Lenders. The two data sources are not directly comparable. The PSD has a greater sample size as it covers all regulated mortgage lending, but the SML only covered around 50% of the mortgage market.

³ Data from both sources include loans to first-time buyers, council/registered social tenants exercising their right to buy and home movers.

⁴ The PSD include regulated mortgage contracts only, and therefore exclude other regulated home finance products such as home purchase plans and home reversions, and unregulated products such as second charge lending and buy-to-let mortgages.

Sources: CML, FCA Product Sales Data and Bank of England calculations.

³ See Bank of England (1989) and Bank of England (1992).



The supply of mortgage finance was likely supported by strong capital inflows from abroad. By 1989, the UK was running a current account deficit approaching 5% of GDP. The banking system as a whole did not attract additional sufficient flows of retail deposits to match their expanded lending base, with a number of banks, particularly smaller institutions, developing an increased reliance on wholesale funding. On the commercial lending side, a general liberalisation of finance around the world added to the competition among lenders to finance commercial property transactions. By 1991, foreign banks accounted for 43% of lending to commercial property companies in the UK and portfolio diversification had driven up cross-border investment in property.⁴

⁴ See Renaud (1995).

— Factors influencing the demand for credit and property

Alongside these changes to credit supply, a number of government polices at the time also acted to increase the demand for home-ownership and so mortgage borrowing.

In the UK, one such policy was the 'Right to Buy' policy, where social tenants renting publicly-owned housing were given the right to purchase their homes at a discount on the market value of at least 33%. This policy was introduced in 1980 and assisted around 1.3 million sales over the subsequent ten years.

Throughout the 1980s, the UK government subsidised mortgage lending by giving households tax relief on mortgage interest payments supported by a scheme, started in 1969, known as mortgage interest relief at source (MIRAS). In 1983 these tax allowances were extended from £25,000 to £30,000 and allowed married couples to pool their allowances to £60,000, with this pooling option subsequently removed with the 1988 budget. MIRAS was subsequently further phased out, through the 1990s, when the rate of relief was reduced from the borrower's marginal rate of tax down to 10 per cent and withdrawn completely by 6 April 2000.

Demographics also played a role in the growth of demand as the share of the population aged 25-29 rose sharply though the 1980s. Strong growth in activity and employment, particularly through the late 1980s, and the associated optimism around future income expectations, is likely to have increased demand for housing further. There is also likely to have been some role for market psychology and expectations, as people, having seen past rises in prices, entered the market in the expectation that price rises would continue.

In all, owner occupation rates rose from 56% to 67% in the 10 years to 1991.

Strong growth in activity also spurred demand for commercial property. Through the second half of the 1980s rents on prime commercial real estate increased by some 25%. Demand from business specialising and supporting financial services grew particularly rapidly in London, driving demand for office space.

— The 1989-92 correction

The prolonged boom in property markets was associated with the building up of risk amongst both the borrowers, who took on more debt at higher loan-to-income and loan-to-value ratios, and the lenders, whose balance sheets



became stretched by the additional lending. The proximate trigger for the correction to property prices came through the sharp increase in the Bank of England's policy rate, which rose from 7.5% to a brief peak of 15% between 1988 and 1990 as the United Kingdom sought to remain in the Exchange Rate Mechanism and defend Sterling's fixed rate to the Deutschmark.

This tightening in monetary policy brought about a sharp recession, with GDP contracting by around 2½% and unemployment rising to over 10%. Nominal house prices fell by 20% in the three years after 1989, and did not recover their previous peak until 1998. By 1992, that had left an estimated 11% of mortgagors with negative equity.⁵ Commercial property prices fell cumulatively by 40% and annual the corporate liquidation rate increased by around thereefold.

The combination of job losses and higher debt servicing costs left many mortgages unaffordable, with mortgage arrears beginning to rise from 1990 and the share of mortgages more than 6 months in arrears peaking at 3.5% by the end of 1992 (Figure 8). The lenders moved to possess properties quickly, with the possessions rate rising to 0.4% of the stock of mortgages per quarter

⁵ See Hellebrandt et al. (2009).

by the end of 1991 before falling as liquidity in the housing market dried up amid a sharp fall in prices. Over the period, an estimated 3% of UK mortgage debt –around £9bn– was written off, with around two-third of these losses falling on the banks and around one-third falling insurance companies, who had underwritten a substantial proportion of high-LTV mortgage lending.

Aggregate data directly measuring the losses on commercial real estate lending is more difficult to come by, though an examination of banks' published accounts by Davis (1993) found that much of banks' losses in the early 90s were due to their commercial property lending. Cumulative write-offs on general corporate lending, which will include lending against commercial property investments, came to 7% over the period.

2. 1997 to 2010

— Twin booms: 1997-2003 and 2005-7

The ten years from 1997-2007 also saw a prolonged rise in property prices, not least in the housing market. House prices rose 230% between 1997 and 2007 with transactions rising from an average of a little over 100k per month to a peak, in 2004, of 135k. In the CRE market, prices rose 120%. Valuations, as assessed by the house price-to-income and commercial property-to-rents ratios reached unprecedented levels. As in the 80s episode, property related credit grew sharply.

Looking at the period more closely, this rise in prices can be divided into two phases. The first, from 1997 to 2003, saw a sustained period of rapidly rising house prices, which occurred alongside a steady fall in mortgage rates as the economy adjusted to an environment of lower inflation and Bank Rate, which fell from 7.25% in 1997 to 3.5% in 2003. The period of rapid price increases came to an end in 2004 as the level of Bank Rate and mortgage rates began to rise through 2003-4. For much of this period commercial property prices rises were relatively contained. House prices did not fall back but rather levelled off as house price growth subdued.

This brief interlude of flat growth in house prices came to an end in 2005 as a fall in global real interest rates and easy borrowing conditions in global capital markets, sparked renewed momentum in UK property markets with sustained growth in both residential and commercial property prices. This period came to an end in 2007, with the onset of the financial crisis. Between 2007 and 2009 nominal house prices in the UK fell by a little over 20% and housing transactions broadly halved from 120,000 to 60,000 per month.

— Factors influencing credit supply

Mortgage lending rose from 50% of GDP in 1998 to a peak of 80% in 2007 (Figure 4). And credit to the CRE sector doubled as a share of GDP from 10% to 20% (Figure 5). To a degree this growth in credit reflected the lagged effect of previous increases in property prices, with new entrants into the property market taking on more debt with their first purchase. These increases in property prices and debt were supported by the fall in long-term interest rates globally, driven in part by the so-called 'savings-glut' as a number of emerging market, advanced economies and oil-exporters ran large current account surpluses. For the UK, which ran a persistent current account deficit over the period, a good deal of the counterpart capital inflows were intermediated through the banking sector with the funds leant onto to fund transactions in residential and commercial property markets. Banks lent in excess of the amount they could fund through their deposit base. The so-called 'Customer Funding Gap' -the difference between loans and deposits to non-bank institutionschanged from a small surplus of deposits in 1997 to an average shortfall for the major UK banks of over 20% in 2007 (Figure 9), with lenders relying on a combination of short-term wholesale funding and issuance of mortgage backed



Note: ^(*) The customer funding gap shows the gap between customer lending and customer funding where customer refers to all non-bank borrowers and depositors. Repurchase agreements are excluded from loans and deposits if disclosed.

Sources: Published accounts and Bank of England calculations.

securities to cover the difference. Much of this wholesale funding was sourced from overseas.⁶ In turn, the prolonged period of easy conditions in wholesale funding markets drove fierce competition in lending markets and a period of easing credit conditions.

Increased competition in the mortgage market was evidenced by the continued decline in spreads, relative to the corresponding risk-free interest rate. on new lending. For some products, the spread on new lending approached zero by 2007. As spreads became more compressed the focus of competition between lenders shifted to underwriting standards. Loan-to-income ratios rose sharply (Figure 6), though in contrast to the previous booms Loan-to-Value ratios for first-time buyers (FTBs) ticked down slightly (Figure 7). It is probable that, as borrowers reached the maximum LTI limits that banks were prepared to lend to them, this led some to have to raise larger deposits in order to afford their desired dwelling. There was also rapid growth in income-unverified mortgages, which by 2007 accounted for almost 50% of new mortgages. Prices of houses bought by first time buyers (who tend to be credit constrained) rose by more than the more expensive houses bought by home-movers (who tend to be less credit constrained), suggesting that easing loan-to-income constraints for first-time-buyers played a substantial role in driving house price growth over this period.

The loosening of underwriting standards was also apparent in the CRE sector. The common recollection of the episode amongst market participants was one of loose bank lending standards, with a subset of borrowers running up ever higher debt levels and, following increases in property prices, extracting equity to leverage up again and invest in more property, creating a strong positive feedback.⁷ In addition to rising leverage, some CRE investment funds appear to have taken significant liquidity risk – buying illiquid assets, yet offering relatively liquid liabilities.

— Factors influencing the demand for credit and property

On the demand side price expectations of future prices increases were likely to have again played a role. In the housing market this can be highlighted by the rising share of lending to the Buy-to-Let sector (Figure 10) despite rental yields being low, as landlords relied on capital appreciation in order to make a return. Indeed, the private rental sector (PRS) expanded from 10% in 1997 to 15% in 2007. A similar phenomenon can be seen in the CRE sector, where prices increased by more than could be explained by rents and long-term

⁶ See Bank of England (2008).

⁷ See Benford and Burrows (2013).



rates of interest. This can be seen in Figure 11, which seeks to account for the increase in prices during the period through a dividend discount model, as a function of current, and expected future, rental income and interest rates. In the model, these factors can explain only a third of the 60% increase in prices that occurred over the 2000 to 2007 period. With much of the rise unexplained, the suggestion from the model is that other factors –such as easing borrowing conditions and expectations of further price rises and, therefore capital gains–drove prices ahead of rents during the period, driving down the measured 'risk premium' on commercial property prices.

— Role of supply

Unlike the early 1990s episode, the impact of strong demand for housing on house prices during this period was exacerbated by the limited response of supply. Housing completions between 1997 and 2007 averaged 200,000 per year, only 10% more than in the early 1990s and considerably less than the levels estimated to be needed to keep up with household formation (Figure 12). The Barker Report (2004) found that, given trends in household formation, an additional 120,000 private sector homes per annum would have been required in England alone to reduce the trend in real house price growth to 1.1%. The





limited supply has been largely attributed to an unresponsive planning system and distorted incentives for local governments and property developers.

— 2007/8 bust

The correction following this boom differed substantially from the previous housing bust in the early 90s. In the earlier episode, high interest rates during the sterling crisis, the resulting weakness in the real economy and high unemployment triggered defaults and losses in the banking system. Nominal house prices fell a little under 20% in the three years that followed the 1989 peak. The 2007/8 correction was triggered by major structural weaknesses in the solvency and the liquidity of the banking system (both in the UK and abroad), bringing about a substantial tightening in credit conditions and a large shock to confidence. The consequential recession saw interest rates in most of the major advanced economics cut to their effective lower bound. In the UK, despite a much deeper fall in output, the rise in unemployment, from 5% to 8%, was much less substantial than in the previous recession, where it rose from 6% to 11%. House prices fell 20% in the 18 months following the 2007 peak.

The first major UK casualty in the crisis was Northern Rock, which had built up an unusually high reliance on wholesale funding together with a concentration in high-LTV mortgage lending. When securitisation markets together with other wholesale markets froze over in the aftermath of the US-subprime shock in the Summer of 2007, Northern Rock was left with an inventory of mortgage lending that it was unable to fund, requiring it to seek an emergency loan from the Bank of England. The bank later required an injection of public equity to stabilise its capital position.

Similar difficulties –rooted both in an unusually high reliance on wholesale funding and a weak capital position– arose with two other small-to-middling specialist mortgage lenders: Bradford and Bingley (taken partly into public ownership in September 2008) and Alliance and Leicester (ultimately taken over by Santander Group in October 2008).

The nadir of the crisis came, however, with the emergence of serious liquidity and solvency problems at a number of the UK's largest banks. Halifax Bank of Scotland and Royal Bank of Scotland –following a prolonged period of aggressive lending into property markets both in the UK and oversees and, for RBS, through an expensive acquisition of a large trading business from ABN AMRO– were both dangerously over-levered and heavily dependent on wholesale funding. Losses on property lending, including on holdings of securities tied to US sub-prime lending, caused their capital positions to deteriorate rapidly over the course of 2008. For both large injections of private (including, for



HBOS, through its acquisition by Lloyds TSB) and public capital were required to stabilise the situation.

The crisis in the banking sector brought about a dramatic reduction in credit availability, not only for residential and commercial mortgage lending but also for broader business lending. The proportion of mortgage lending at a Loan-to-Value ratio above 90% fell from around a third to under 10%. In contrast, during the 1989-92 housing market correction, the proportion of high-LTV mortgage lending to first-time-buyers was broadly unchanged.

In the CRE market, the average deposit required by lenders for lending against 'prime' commercial properties almost doubled. Combined with a 7% fall in the level of economic activity, this tightening in credit conditions drove a sharp reduction in property prices: house prices fell by a fifth, commercial property prices halved.

Defaults on mortgage exposures remained relatively low in the most recent episode. Though mortgage arrears, possessions, and write-offs on mortgage lending picked up, they remained much lower than in early 1990s (Figure 8). The sharp cut in Bank Rate to 0.5%, lender forbearance, and limited increase in unemployment compared to 1990s were undoubtedly part of the reason for this. Less than half a percent of the stock of mortgage lending –around £5bn– was written off compared to 3% in the early 90s correction. Losses on commercial real estate lending, however, were more severe, around 6% of the stock of debt –over £15bn– was written off, with some banks writing-off as much as a fifth of their UK CRE book (Figure 13). Furthermore, some borrowers entered into a period of forbearance, with the value of forborne loans accounting for around a third of major UK banks' CRE lending in 2011 and as much as half of the value of some banks' lending.

III. IMPLICATIONS FOR MACROECONOMIC AND FINANCIAL STABILITY

Section II set out a brief narrative of historical developments in UK property markets, with a particular focus on the last two cycles. Before turning to consider the impact of property market fluctuations on economic activity and the financial system, it is useful to consider explanations of property price dynamics.

1. Explaining property market dynamics in the UK

Understanding the dynamics driving property prices can help us understand how the risk of a subsequent correction might arise.

Fundamental to the value of any asset, financial or real, is the net present value, discounted by the prevailing interest rates, of the stream of services it provides. In the case of an investment in property, this is the stream of rental income from letting out residential or commercial space. As noted above, movements in UK commercial property prices in the 2000s could not be explained by current and expected rents and interest rates, leaving a large role for other factors such as investor expectations for further capital gain. On the residential side, the ratio of house prices to rents rose by some 60% in the ten years to 2007, again consistent with some role for factors such as expectations for further price increases and capital gain.

In many countries, one driver for prices getting out of kilter from rents has been the investment cycle. When prices for property in the secondary market rise, there is an incentive for owners of land to develop new properties for Part I: The "new" monetary policies in the advanced economies



sale. When property prices fall, the incentive disappears. This causes supply to rise in response to prices, as in other markets for goods and services, and is an example of *negative feedback* on prices. But there are notable differences to other markets: property is not homogeneous and lead times in construction are far longer than for many goods and services. This can cause supply to be constrained in the short term, exerting a positive impact on prices followed by an over-reaction in response to higher prices, with the eventual increase later contributing to a crash as there is an over-supply of property. These dynamics are widely thought to have played a role in the post-crisis price falls in Spain, Ireland and some regions of the US. For the UK, however, the importance of the investment cycle in the recent past has been limited by a relatively inelastic supply of new housing: despite a doubling of house prices during late 1990s/ early 2000s, housing starts remained broadly unchanged until 2003 (Figure 14). Supply began to respond from 2004 through the overall increase in housing starts, at 20%, was small compared to that seen through the 80s. That likely dampened the fall in prices post 2007.

While the investment cycle can add negative feedback to housing market dynamics, albeit with enough of a lag that it does not necessarily dampen booms as they develop, the credit cycle is an example of *positive feedback* and can exacerbate booms and busts. As property prices rise, borrowers have more equity against which to borrow, allowing them to further invest in property. If they do so, this can further push up the price of property, particularly where

supply cannot easily respond. Similarly, a loosening in credit conditions allows borrowers to borrow more against property, which can further bid up the value of property. The 2005-7 period in the UK illustrates the important influence global financial market conditions can have on property price dynamics. The fall in global long-term interest rates, together with a period of easy conditions in wholesale borrowing markets, generated a strong positive feedback loop between increasing property prices and credit growth that was sustained until credit conditions tightened dramatically with the global financial crisis and subsequent recession.

Expectations of borrowers and lenders can play an important role in these dynamics. If rising prices cause investors or occupiers to increase their demand, in anticipation of further price rises, or cause lenders to take more comfort from property collateral and so ease credit conditions, the positive feedback loop can become stronger. This reinforcing dynamic between rising prices and strong credit growth is fundamentally fragile. Should a development cause prices to fall or lenders to tighten credit conditions, the positive feedback can quickly go into reverse further driving down prices and reducing the equity available to borrowers. Expectations of falling prices cause borrowers and lenders to retrench further and deepen the feedback.

2. Implications of property market cycles for activity and financial stability

It is the interaction between property and economic and financial stability that is of primary interest to the Bank of England. This section turns to this question, first looking at the link to economic activity and then turning to the link to financial stability. The two of course overlap materially –episodes of financial instability invariably affect economic activity.

2.1. The link from property markets to economic activity

The more significant link between property to the economy is generally thought to come through the housing, rather than CRE, market. This section discusses the channels through which the respective property markets are thought to affect economic activity, and discusses some UK evidence on the scale of each channel. We split the channels into those affecting consumption, and those affecting investment.

— Property markets and consumption

House prices and consumption have been well correlated in the data across a number of periods (Figure 15), though it is not clear that there is a strong



causal link from house prices to consumption. Below, we discuss the potential explanations for the correlation and the evidence for each one.

The first channel is the 'collateral channel' through which rising/falling house prices boost/reduce the value of housing wealth against which households can borrow to consume.

A second channel comes through the 'wealth effect' where owners of property that do not intend to buy a larger property in the foreseeable future use the increased wealth following an increase in house prices to consume more. This increase in consumption may be offset in part by higher savings by those households that intend to buy a house or upsize and who are left poorer as a result of the increase in house prices.

Both the wealth and collateral channels imply a closer relationship between house prices and consumption for homeowners than for renters. Simple regressions of the changes in house prices on the non-housing consumption of owners and renters on UK data between 1995 and 2011 –a period where, for the large part, house prices were rising– suggest stronger response for owners, supporting a small collateral and wealth effect. If we assume that all of the additional sensitivity of owners relative to renters is due to collateral and wealth effects, these regressions suggest a 20% increase in house prices could add around $\frac{1}{2}$ % to the level of consumption. This is consistent with findings in Benito (2007).

The 'common factors' channel implies that a third variable, such as expectations of future income, or uncertainty around income, could be driving both house prices and consumption. The lack of evidence for very strong collateral or wealth effects in the UK, despite the association of consumption and housing booms in some episodes, points to common factors as driving the relationship between consumption and house prices. But the role of common factors appears to vary over time. For example, a stronger relationship between consumption and house prices is observed in the 1980s boom relative to the 1997-2007 boom. This is likely to be because then rising income expectations played a role boosting both house prices and consumption, but in the latter period there is no clear evidence of a large rise in income expectations, and other factors, such as the interplay between easing borrow conditions and constraints on supply, played a larger role in supporting house prices.

Housing market activity, as opposed to prices, may also have a small impact on consumption because households may be more likely to buy certain types of durable goods, such as appliances and furniture, when they move house. Although there is some evidence that the housing market can affect consumption through this channel, any effects appear to be small and not robust. Bank analysis from 2005⁸ used micro data to show that households are two to three times more likely to purchase certain durable goods when they move home. But because only a small proportion of households move at one time the impact on total durables spending was modest. More recent UK data show that although spending on household appliances and furniture fell sharply in 2009 when housing transactions fell, it recovered in 2010 even though housing transactions remained well below pre-crisis levels.

The impact of developments in the commercial property markets on economic activity has been given little attention in the literature. This is perhaps because any impact on consumption is likely to be very indirect, as the household sector's direct exposure is likely to be either highly concentrated in a small number of wealthy individuals and its indirect exposure, via pension funds, is likely to be highly obscure to most pensioners. The CRE sector is likely to have a greater impact on investment, as discussed in the next section.

- Property markets and investment

Although dwellings investment makes up a small share of economic activity in the UK (on average 4% between 1997 and 2013), it has been volatile,

⁸ See Benito and Wood (2005).



with a tendency to fall sharply during downturns in the market and therefore contribute significantly to UK economic cycles (Figure 16).⁹ This volatility arises in part because small changes in the desired housing stock require large changes in housing investment. Borrowing constraints experienced by house-builders can also put a break on housing starts during a down-turn.

Private sector construction of commercial property has accounted for roughly 3% of GDP on average in recent decades and has also been highly cyclical. Collateral effects are also likely to be an important consideration for corporate sector investment. Past work at the Bank has estimated that around 50% of SME non-CRE borrowing is secured on real estate, with a slightly smaller proportion for large companies. Moreover, even companies' ability to borrow unsecured will be affected by the value of equity in property they own, as it contributes to their overall net worth. So the value of commercial property could be an important consideration in determining credit conditions for non-CRE companies.

Taken together the decline in dwellings and commercial property investment during 2008 downturn explains over half of the peak-to-trough variation in GDP growth over the period. Dwellings investment (0.7pp) and commercial property

⁹ See Corder and Roberts (2008).

investment (0.4pp) explained around a percentage point of the 3% average annual GDP growth seen in 2005-6. In 2008-9, GDP contracted by 3% per year on average, with a combined drag on average annual growth of 2.5% from dwellings (-2%) and commercial property investment (-0.6%). Comparing the two then, GDP growth fell by 6 percentage points, with 3 percentage points of the fall accounted for by a sharp reduction in the growth rate for investment in property.

2.2. The direct links from the housing market to financial stability

The most obvious risk posed to financial stability from property is through the direct credit losses banks can face, though experience from the housing market has shown that mortgage lending can lead to a systemic crisis even when credit losses remain low. This section first discusses the direct credit risks from property markets, and then discusses the risks through non-credit channels that proved to be significant in the recent crisis.

— Credit risks

Historically, losses on domestic residential mortgages for the UK banking system have been low relative to some other countries (Figure 17). For example, the losses made by the largest UK mortgage lenders in the most recent financial crisis were equivalent to 0.6% of their mortgage loans. Together with the relatively small overhang in the supply of property (and so smaller price correction), the relatively low level of losses in part reflects the presence of full-recourse mortgages in the UK. These are powerful disincentives for borrowers to default and increase banks' ability to recover losses from those who do default. Losses in the 'bust' of the early 1990s were higher. Between 1991 and 95 the UK banking system suffered losses equivalent to an estimated 1.8% of total UK mortgage loans. And the insurance industry incurred losses equivalent to an estimated 1.1% of total UK mortgage loans, through its provision of insurance on (typically higher loan to value) mortgages originated by the banking sector. The higher losses in the 1990s reflected elevated interest rates and severe macroeconomic conditions, especially high unemployment, during this period.

Increasingly, since the deregulation of banking systems in the 70s and 80s, housing booms and busts have coincided with commercial property booms and busts, with the latter leading to losses on construction loans and other commercial lending tied to real estate that have been far higher than losses on residential mortgages. Loss rates in commercial real estate (CRE) lending typically exceed loss rates on residential property lending, in part because banks have no recourse to CRE companies beyond the underlying collateral and CRE



Notes: ¹ Cumulative losses are estimated as total write-offs incurred during the period shown on the Figure divided by the starting stock of loans.

² UK 2008-12 data covers all regulated mortgage lending in the UK and is collected by the Bank of England and Financial Conduct Authority.

³ Swedish losses based on housing credit institutions. Irish losses are from 2011 to mid-2013 at Bank of Ireland, Allied Irish Bank and Permanent TSB. US losses refer to all FDIC-insured institutions. All losses are scaled by the share of loans outstanding at the beginning of the period.

⁴ UK 1991-95 estimates losses incurred by UK banks and building societies based on Bank of England data, reported write-offs for a sample of UK building societies, and CML possessions data. These estimates are based on calculations by Bank staff and are subject to change.

⁵ Estimated losses incurred by the insurance industry on loans originated by banks and building societies. Based on data published by MIAC-Acadametrics.

Sources: Bank of England, Building Societies Association, Council of Mortgage lenders, FDIC, Financial Conduct Authority, Glas Securities, Halifax, MIAC-Acadametrics, Nordic Council of Ministers, published accounts, Statistics Sweden, and Bank of England calculations.

companies generally have no interest in owning the building beyond the financial gain (unlike households). The recent UK crisis is a relevant example, with losses having reached 6% of loans and with a further 1/3 of loans estimated to be in forbearance in 2011.

— Non-credit risks

Although eventual credit losses from the housing market were relatively small in the recent crisis, a number of UK banks whose balance sheets were dominated by mortgages became distressed, as explained in Section II. This section discusses how factors common to mortgage lending in particular can lead to risks in the financial system through several non-credit channels. *Income risk*: Mortgages tend to be priced fairly competitively and have a long contractual term. This means they can become a significant drag to banks net interest income if they are priced at levels that later prove to be unprofitable. In the UK in 2008/9 a number of banks suffered sharp declines in net interest income as Bank Rate was cut from 5.75% to 0.5% and some lenders were forced by the terms of the contracts they had written to pass on these reductions onto mortgage rates but found themselves unable to make corresponding cuts to deposit rates. The impact on some lenders income proved so serious that it led the Bank of England's Monetary Policy Committee, at its November 2012 meeting, to conclude that further cuts in Bank Rate below 0.5% were unlikely to be desirable for the foreseeable future.

Liquidity risk: Certain characteristics of mortgage lending can make it attractive for lenders to fund mortgages through wholesale funding. These include the low historical credit losses on mortgage assets, and the relative homogeneity which makes them easy to monitor and securitise. If borrowing is at short-term, however, this can leave a maturity mismatch on lenders books making it difficult for lenders to refinance if creditors become concerned about the long-term viability of their business. High reliance on short-term wholesale funding and high leverage were common to the UK mortgage lenders that required assistance following the 2007/8 financial crisis.

2.3. Indirect and medium-term links from the housing market to financial stability

In every episode in which the UK has seen a period of rapid and sustained increases in house prices, a substantial increase in household debt as followed (Figure 18). International evidence suggests that this can matter. A number of studies have found that countries that have experienced rapid credit and house price growth have tended to suffer longer and deeper recessions following crises.¹⁰ For example, work by the IMF (2011) found that, across countries, recessions associated with a housing bust involved a 10% fall in output relative to the previous path: over double the fall found for those that occurred without a bust.

Poorer macro-economic performance is likely to come in part from the wider macro-economic impact of the disruptions to credit supply that occurs when weak capital and liquidity positions within the financial system are revealed by a downturn in property markets. Where lenders attempt to shore up their capital positions by deleveraging, in an effort to shrink the denominator

¹⁰ See Crowe et al. (2013).



of their capital ratios, the actions can collectively prove to be self-defeating: the reduction in credit supply leaves the economy in a deeper recession and, consequently, the lenders bearing higher credit losses.

That forms part of motivation for the incorporation of 'buffers' within the revised capital framework (Basel 3). By ensuring that, during good economic conditions, lenders maintain a buffer of capital that can be more safely drawn down when losses occur, there is less of a risk of credit supply being curtailed when conditions turn. As explored in more detail below, Basel 3 allows for macro-prudential authorities to require an additional buffer of capital during periods of building risks in the system, which can then be released as and when risks recede.

More difficult to quantify are the macro-economic effects of an overhang of debt amongst some household following a correction in prices. Those who bought at high loan-to-value ratios at the top of the market will, following a fall in prices, be left in negative equity, suffering both a large shock to their wealth and, even without any general contraction in credit supply, greatly reduced access to credit. These high levels of debt also leave households more vulnerable to income shocks and changes in interest rates and so amplify the impact of a given change in monetary policy or income on consumption and activity as well as credit risk. Preliminary Bank analysis using micro data suggests that highly indebted UK households made much made larger adjustments in spending relative to income following the financial crisis. Initial calculations suggest this effect could account for a reduction of up to 2% in the level of consumption immediately after the crisis.

These links between the banks, the property markets, and broader economy can combine to form a vicious circle during a downturn. A downturn in the property market weakens borrowers' and banks' financial positions, bringing about a sharp tightening in credit conditions, a shock to confidence and, consequently, further weakness in the economy as borrowers retrench. Tightening credit conditions and weak property markets also together cause sharp falls in property investment further contributing to the economic downturn. Higher unemployment and broader weakness in the corporate sector further weighs on banks, again dragging on credit conditions and confidence. The recovery in credit conditions and confidence can be slow in coming and may have to wait until balance sheets are restored to health.

IV. POLICY OBJECTIVES AND INTERACTIONS

With the passing of the Financial Services Act (2012) on 1st April 2013 and the creation of the Prudential Regulation Authority (PRA) and a statutory Financial Policy Committee (FPC) as part of the Bank, the Bank of England now has a range of powers and responsibilities that are without precedent in its history. Through the PRA, it is responsible for the supervision of banks, insurance companies and large investment firms. Through the FPC, it has responsibility for macro-prudential policy and, through the Monetary Policy Committee, for monetary policy. It is also has responsibility of the supervision and oversight of Financial Market Infrastructure and is the UK's resolution authority.

The framework within which the Bank exercises these powers is defined in statute and, for financial and monetary stability, clarified through a regular exchange of letters between the Chancellor and the Bank. Within that framework, the Bank has operational independence to discharge its powers in a way that it judges appropriate to meet the objectives given to it by Parliament and the Government of the day.

The MPC's statutory objectives are to maintain price stability and, subject to that, to support the government's economic policies, including its objectives for growth and employment. The exact definition of price stability and the government's economic policies is laid out annually by the Chancellor of the Exchequer in an annual remit letter; presently it is to achieve a CPI inflation rate of 2%. The framework recognises, however, that inflation will depart from the target because of shocks and disturbances and that in such circumstances attempts to hold it there would lead to undesirable volatility in output.

The PRA's primary objectives,¹¹ set out in statute, are to promote the safety and soundness of these firms and, specifically for insurers, to contribute to the securing of an appropriate degree of protection for policyholders. The PRA Board oversees the fulfilment of these objectives and takes the most significant supervisory decisions and aims to apply a forward-looking, judgementbased supervision approach to firms that pose the greatest risk to the PRA's objectives, whilst also ensuring an appropriate supervisory regime for smaller firms.

The Bank is not responsible for market conduct which is the responsibility of the Financial Conduct Authority (FCA).

The FPC is tasked with the objectives of contributing to protecting and enhancing the stability of the financial system of the United Kingdom and, subject to that, supporting the Government's economic policies, including its objectives for growth and employment. Financial stability is further defined through an exchange of letters between the Chancellor and the FPC as to maintain and enhance the resilience of the financial system and, in doing so, contribute to avoiding serious interruptions in the vital functions which the financial system as a whole performs in our economy: notably, the provision of payment and settlement services, intermediating between savers and borrowers, and insuring against risk.

The FPC has the power to direct the micro-prudential regulators –the PRA and the FCA– to take action through the setting of designated macro-prudential instruments. These instruments currently include a general power –through the so-called 'countercyclical buffer'– to raise capital requirements on all UK lending by banks, investment firms and building societies as well as a specific power of direction to increase capital requirements on lending to identified sectors (through sectoral capital requirements). The FPC also has the power to make recommendations to the UK's micro-prudential regulators –the Prudential Regulation Authority and the Financial Conduct Authority– on a comply or explain basis and to make recommendations more broadly on financial stability as it judges appropriate.

Financial stability is relevant to all three of the policy committees and boards of the Bank of England –the Financial Policy Committee, Monetary Policy

¹¹ The PRA also has a secondary objective, subordinated to its general objectives, to facilitate effective competition in the markets for services provided by PRA-authorised firms.

Committee and Prudential Regulation Authority. The experience of the crisis has shown that a resilient financial system is a vital precondition for price stability and helps to ensure changes in monetary policy are transmitted to the economy effectively and predictably.

The way in which the three bodies divide up the work of mitigating risks to financial stability will likely evolve over time as the prevailing circumstances change. For the moment, the FPC and MPC have agreed that it is the FPC and other regulators that will form the first line of defence against financial stability risks. That arrangement is formalised in the latest exchanges of letters between those two Committees and the Chancellor. It puts the FPC, together with the regulators, in the lead on mitigating any risks from renewed momentum in property markets, leaving the MPC free to focus primarily on the task of actively managing aggregate demand to a level consistent with maintaining price stability.

That leaves the FPC with a serious of potentially difficult and contentious judgements on when, and how, to act if a boom in the property market develops. It is clear that the Committee, together with the prudential regulators, must act to maintain the resilience of the system, in particular, by ensuring the amount of capital and liquidity in the system keeps to a level commensurate to emerging threats. The micro-prudential regulators need to ensure firms' risk management and underwriting standards make firms resilient to any correction in the market further down the line.

The difficult judgement for the Committee is how far and fast it should act to check momentum building up in the property market and whether to act before a clear and direct threat to the resilience of the system is identified. We return to this question in the context of the recent developments in the UK property market, where we have seen a return to rapid growth in prices and transactions.

V. RECENT DEVELOPMENTS IN UK PROPERTY MARKETS

Since the start of 2013, there has been a sustained pick up in momentum in the housing and 'prime' commercial real estate property markets. These developments prompted the Financial Policy Committee in November 2013 to set out actions, already taken or put in train, that should act to mitigate potential risks to financial stability from rapidly increasing momentum in property markets. It also set further actions that it could take should risks increase. This section discusses recent developments and the policy actions set out by the FPC.
1. Recent developments in prices and activity

UK house prices rose by 9% in the year to March, and most surveys suggest that recent rates of increase are likely to continue at least in the next few months. The house price to average earnings ratio, a key benchmark for affordability, at seven-times-income remains around one multiple below its 2007 peak (Figure 2). Though the ratio is back to the level seen in 2003, it remains around 1½ multiples above its long-run average. Activity has also picked up sharply over the past 12 months, with loan approvals for house purchase rising over 30% in the year to February, although their level, at 70k per month, remains around 20% below their average level since 1993.

While all regions in the UK saw increases in house prices across 2013, the pace of increase was not even across the country. For the year as a whole, 10 out of the 14 regions prices grew by between 5% and 10%; in London prices increased by around 15%. By the last quarter of the year, with momentum in the market building, a total of 7 regions experienced an annoulised rate of price growth in excess of 10%.

This sharp recovery in the housing market can be attributed to a number of factors: improved confidence about the economic recovery and, therefore, income expectations; an easing of banks' funding constraints supported in part by the Bank/HMT Funding for Lending scheme; together with steps to recapitalise the banks, these improvements have brought about an easing in credit conditions. These factors appear, together, to have begun to unlock the pent up demand amongst households to move to a new property following a five-year period of unusually low turnover amongst the housing stock, with properties changing hands at a rate of only once every twenty five years (compared to the average rate, since 1980, of around once every fifteen years).

The Government has also introduced schemes aimed at helping those with low deposits gain access to the market. The Help to Buy Mortgage Guarantee scheme (HtB:MG) and Help to Buy: equity loan (HtB: EL) were introduced in 2013 in response to the lack of availability of high LTV mortgages, which had been a feature of the UK mortgage market since the crisis. Under the Help to Buy: equity loan scheme the government boosts access by providing equity loans for people buying newly built properties. Under the HtB:MG scheme the government aims to boost the availability of 80-95% LTV mortgages by providing lenders with a government guarantee to cover the majority of the losses on the high-LTV part of the loan in the case of a default. Although lending under the HtB:MG scheme, it has been small to date, many market participant have suggested that the indirect impact of the scheme on confidence may have boosted prices. The recent pick-up in demand for housing comes against a background of very low additions to supply, adding further pressure to prices. New home building fell from around from 230,000 in 2008, to 130, 000 per annum in the 2010-2012 period (Figure 11), though it has recently started to recover. The failure of house-building to keep up with demand since the crisis has been attributed to limited finance for development and uncertainty about the demand given the restrictive mortgage market, in addition to the unresponsive planning system and distorted incentives for local governments that persisted pre-crisis. The recent pick-up can be attributed to easing of finance constraints and increased demand.

To date, this increase in momentum in prices and transactions has yet to generate a substantial rise in the growth rate of stock of mortgage debt. Though transactions at higher prices have pulled up gross mortgage lending, the increase in lending has so far been smaller than in previous cycles as lenders have kept loan-to-value ratios low –with around 15% of new mortgage lending to first-time-buyers at an LTV above 90%, compared to over 30% prior to the crisis– and some of the increase in transactions has come through an increase in cash buyers in the London market. Moreover, the impact of the increase in gross mortgage lending on the stock of mortgage has been largely offset by by an increase in debt repayments, with a pick-up in regular repayments on mortgage lending seen over the past year.

However, loan approvals for house purchase have yet to reach the levels seen during previous periods of rapid increases in mortgage debt. Through the 2000s episode, loan approvals for house purchase averaged around 100k a month, reaching 120k at the top of the market. Then, the combination of a higher level of house prices and a high level of transactions drove a rapid and substantial increase in the level of household debt as the housing stock turned over. If transactions were to grow through 2014 at the rate seen in 2013, that would take the level of transactions to the level that occured with the credit boom in this previous episode.

The recovery in the CRE market has also been segmented. Prices in the 'prime' market (loosely defined as good quality properties, in good locations –often in Central London– let to strong tenants) have risen 6% over the past year and are now at 80% of their 2007 peak (Figure 1). Around three quarters of gross investment in London last year came from foreign buyers. But prices in the secondary market (loosely defined as non-prime property, although this covers quite a wide spectrum of quality) only started to recover in the last quarter of 2013 and remain 50% below their 2007 peak. Transactions and credit availability have also recovered more quickly in the prime market and the volume of CRE deals in London has now surpassed the pre-crisis peak.

The recovery in the prime CRE market can also be attributed to the improved confidence about the economic recovery. But other factors include increased demand for CRE exposure from equity investors, particularly from overseas insurers, pension funds and sovereign wealth funds attracted by low yields in their domestic markets and the perceived relative 'safety' of the UK market. This flow of funds into 'prime' has recently started to spill over into the secondary market, translating to a small pickup in prices there. However, the speed of a prospective recovery in this market is to some extent dampened by UK banks' large legacy exposures to secondary property that they wish to divest.

2. Risks

Property markets remain in the early stages of recovery. Though some rebound would be expected given the broader recovery in the UK economy, momentum in property markets has built up very quickly. Loan approvals for house purchase are up over 30% on their level a year ago, matching the pace of change seen in the upturns in housing market activity in the early- and mid-2000s. It is probably that rising income expectations is playing some role in lifting activity.

An easing in credit conditions also appears to have unlocked pent-up demand from would-be home movers. Since 2008, monthly loan approvals for house purchase have run at around 30k per month below their average level since 1993. Cumulating up, that shortfall amounts to over 2 million 'missing' transactions, suggesting significant potential for a sustained pick up in transactions. Given the long period of subdued house-building –and limited potential for new supply to come on the market rapidly– if that demand were to come on stream quickly there is a real risk that the increase in activity would drive further substantial increases in house prices. Against such a backdrop, it is likely that expectations may also play some role in shaping the market as buyers seek to get in early to avoid having to buy at a more expensive price further down the line.

It is not clear where this story will end. On one view, as prices increase, affordability constraints may begin to bite and so act as a natural check to the building momentum in the market. Were underwriting conditions to ease, however, the period of rapid increases in house prices would be able to run for longer, likely accompanied by a substantial increase in household debt.

The steps taken in the aftermath of the crisis to stabilise the system have the left the banking system in a more resilient position than the pre-crisis period. The major UK banks now have £150bn more equity capital and their leverage

has almost halved. In aggregate their customer funding gap has closed and holdings of liquid assets have trebled. Even the largest customer funding gap amongst the group, at 15% of outstanding lending, is small and much reduced on the pre-crisis position.

For the moment, underwriting standards on mortgage lending appear, across a number of measures, to have remained robust to the latest upswing.

That reflects the retrenchment in lenders' risk appetite following the financial crisis and, more recently, the anticipation of tighter rules on underwriting with the MMR, due to come in effect on 26 April 2014. This requires lenders to fully assess borrowers' income and the affordability of the mortgage, including at higher interest rates. This should help to keep LTI ratios to a level that borrowers can afford through time and effectively bans self-certified mortgages. And the rules on interest-only loans should reduce their prevalence in the market and limit the risk that they prove unaffordable at maturity.¹² Across a variety of measures –including self-certified income and the incidence of interest-only mortgages– the incidence of loans with riskier characteristics, identified by the UK Financial Service Authority's Mortgage Market Review (MMR) as associated with loan performance problems, remains low (Figure 19).¹³

However, there are some indications that the risk characteristics on new household mortgage lending now rising.

Though the proportion of high-LTV mortgage remains low relative to historical averages, LTV ratios on new lending are rising and look set to rise further following a sharp increase in the number of new high LTV products on the market. Only some of these products are part of the Help-to-Buy Mortgage Guarantee scheme, where losses to the banks will be limited by government insurance.

Mortgages with a LTI ratio above 4.5 account for a share of 8% of new lending, back to the level seen in the run up to the crisis; for borrowing against properties in London over 16% of lending is at an LTI ratio above 4.5. Though LTI ratios were not identified by the MMR study as being strong predictor of a future default, the study was carried out on data from 2005-2010 during which

¹² The interest-only rules require lenders to either ensure the borrower has credible repayment strategy in place, or carry out a full affordability test on the interest-only loan as though it was being repaid on a capital and interest repayment basis.

¹³ These include the following risk-factors, as identified by the UK Financial Service Authorities' Mortgage Market Review: loans to borrowers with an impaired credit history; high LTV lending; where the borrower is self-employed; where the re-mortgage is for debt consolidation purpose; where the mortgage is to a social tenant exercising his right-to-buy; where the income of the mortgage borrower is self-certified; and interest only mortgages where there is a high reliance on proceeds from the sale of the property to make the capital repayment.



the largest increase in Bank Rate was just 1.25pp. That finding might not be robust were interest rates to increase significantly.

On the commercial side, the pick-up in investment in prime CRE has for the most part been driven by equity, rather than bank debt. And commercial real estate lending continues to come with conservative LTV ratios.

3. Policy response

In its November 2013 *Financial Stability Report*, the FPC warned that the recovery in the housing market could pose risks to financial stability if it was accompanied by substantial and rapid increases in house prices and a build-up in household indebtedness. The Committee set out its intention to monitor closely the housing market, including developments in house prices relative to indicators of affordability and sustainability. It has said it would keep under close scrutiny banks' exposures to more indebted borrowers, underwriting standards in both the residential mortgage market, and the related CRE and construction sectors, and the reliance of lenders on short-term wholesale

funding. The Committee re-affirmed this view in a statement following its March 2014 meetings.¹⁴

The FPC noted in November that a number of measures were already in train more likely to help to mitigate risks:

- Steps (noted above) had already been taken to strengthen banks' aggregate capital and liquidity positions.
- Measures that were put in place by the FCA to help maintain stronger mortgage underwriting standards. These constitute an important element of the implementation of the Mortgage Market Review (MMR) of April 2014.¹⁵
- The policy, introduced in response to the financial crisis, of allowing banks with increased lending to households, eligible in the Funding for Lending Scheme (FLS), to claim an offset in their capital requirements would be terminated and the terms of the FLS would be modified to remove direct incentives to expand lending to households in 2014.¹⁶
- The annual concurrent stress testing exercise for the major UK banks would focus on housing risks. The test is part of the EU stress testing exercise planned for 2014. The FPC announced in March 2014 that the UK variant of the stress test would examine the resilience of UK banks to a housing market shock, to a snap back in interest rates and a sharp rise in unemployment.
- Mortgage lenders, when carrying out affordability tests, should in future have regard to any FPC recommendation on appropriate interest rates to use in their assessment.

The Committee also set out in November the further steps that it could take to mitigate risks to financial stability from the housing market:

• Recommendations to HMT on the Help to Buy: Mortgage Guarantee scheme. These could include whether pricing and the £600,000 property price cap remain appropriate.

¹⁴ For the FPC's statement following their March meetings see http://www.bankofengland.co.uk// publications/Pages/news/2014/025.aspx

¹⁵ For more information on the rules of the MMR see http://www.fca.org.uk/firms/firm-types/mortgagebrokers-and-home-finance-lenders/mortgage-market-review

¹⁶ For more information on the FLS see http://www.bankofengland.co.uk/markets/Pages/FLS/default.aspx

- Recommendations to ensure that underwriting standards are robust. That could include recommendations to lenders on the appropriate interest rates to use in affordability their assessment
- Recommendations or directions to PRA to increase sectoral capital requirements for banks on mortgage lending to increase directly the loss-absorbing capital held against such lending.
- Raising the countercyclical capital buffer to increase loss-absorbing capital across the system to make it resilient to the broader impact on banks of a housing-induced UK economic downturn (Figure 20).
- Recommendations to the FCA and/or PRA, including on a comply or explain basis, to set limits on loan-to-value ratios, loan-to-income ratios, total debt-to-income ratios or mortgage term, in order to restrict the availability of mortgages of a particular type.
- Recommendations to HM Treasury to give the FPC a power of direction over maximum permitted value for these terms and conditions on mortgage lending.

The FPC's response to developing risks from the UK property market must depend on the nature of those risks. For example, were the stress tests to reveal that capital requirements on mortgages were insufficient to cover potential losses, steps to increase capital requirements could be a natural course of action. If the risks arise primarily from household indebtedness, action that focussed on reinforcing affordability constraints might be more appropriate.

In the past, periods of rapidly growing momentum in the market have been associated with deteriorations in underwriting standards and a high level of mortgage debt financing, followed by substantial and rapid increases in the stock of debt, which later proved to be unaffordable for a proportion of borrowers. If there were indications of a loosening in underwriting standards, including indications that borrowers were taking on debt that could later prove to be unaffordable, that would be a reason for the FPC to consider further action to reinforce them.

Moreover, even if lenders do not appreciably alter the terms on which credit is on offer, increases in the stock of credit can be driven purely by an increase in valuations. Such increases in the stock of debt could be particularly dangerous now, when interest rates are unusually low and are likely, at some point, to increase. Were the FPC to become concerned that a large number of borrowers were taking out loans that could later prove to be unaffordable



Notes: ¹ Major UK banks' core Tier 1 capital as a percentage of their risk-weighted assets. The series uses the major UK banks peer group as of 2014 and their constituent predecessors. Data exclude Northern Rock/Virgin Money from 2008.

² From 2008, the chart shows core Tier 1 ratios as published by banks, excluding hybrid capital instruments and making deductions from capital based on FSA definitions. Prior to 2008 that measure was not typically disclosed; the chart shows Bank calculations approximating it as previously published in the FSR. ³ The mean is weighted by risk-weighted assets.

⁴ The 'Basel III common equity Tier 1 capital ratio' is calculated as aggregate peer group common equity Tier 1 levels over aggregate risk-weighted assets, according to the proposed Basel III definition. The Basel III sample includes Barclays, HSBC, Lloyds Banking Group, RBS, Nationwide, Santander UK and Co-operative Banking Group.

Sources: Published accounts, PRA regulatory returns and Bank of England calculations.

over an extended period in which interest rates regained more normal levels, a recommendation on the interest rate stress test used in affordability tests could be a natural course of action.

The psychology of the UK housing market could be particularly dangerous if borrowers or lenders extrapolate from recent increases in property prices and expect further increase in the future. A 'speculative' mentality could become engendered. Past experience suggests this could be hard to counteract without an abrupt, and destabilising, downturn in the market. If accompanied by rising credit and indebtedness that could argue for a graduated and proportionate response to risks from the property market as they begin to emerge, rather than acting more suddenly, late in the cycle, once a substantial and direct vulnerability to the system has built up.

VI. CONCLUSION

With the reforms that followed the financial crisis, the Bank now has substantial, and indeed unprecedented, responsibility and consequent powers to tackle risks to stability, including those from property market. With increased powers, comes increased responsibility. The UK has a history of periods of rapid, debt-financed, growth in property prices and transactions leading to a build up of risk within the system and corrections have been accompanied by painful, sharper-than-usual contractions in economic activity, and episodes of distress within the banking system. Action since the crisis has made the system more resilient –with greater amounts of capital and liquidity and more prudent underwriting standards. However, momentum in UK property markets is building quickly again which, if sustained could bring about substantial and rapid increase in debt. It is possible that the momentum might peter out if affordability constraints begin to bite. However, were lenders to allow borrowers to take on greater amounts of debt relative to their income, momentum would likely be sustained for longer. Such rapid momentum in property market can bring about substantial and rapid increases in debt that later prove to be unaffordable, which in turn can pose direct and indirect risks to the system. The Bank's Financial Policy Committee is keeping the potential development of such risks under very close scrutiny. It stands ready to take further steps to protect stability if that proves necessary.

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MONETARY POLICY AFTER THE GREAT RECESSION: JAPAN'S EXPERIENCE

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I. INTRODUCTION

This article reviews the evolution of the Bank of Japan (BOJ)'s monetary policy since 1999, with particular focus on policy measures adopted after the Lehman shock. As a front-runner of unconventional monetary policy, the BOJ started the zero interest rate policy in 1999, followed by the introduction of quantitative easing in 2001-06 (Figure 1). After the global financial crisis, it further introduced a number of new policy initiatives; some of them jointly with other central banks, others solely for the purpose of reinforcing its efforts to combat deflation. Most recently, it embarked on a new policy framework of



quantitative and qualitative monetary easing (QQE) in April 2013, and since then there have been favorable developments in economic activity and prices.

To understand where the BOJ currently stands and what it aims to achieve through aggressive monetary easing, it is important to review its long-standing efforts to overcome deflation under various policy initiatives. This is because the experience it has accumulated since the 1990s lays out the foundation for more recent policy measures adopted after the Great Recession. Based on such motivation, this article will start with the very early years of unconventional monetary policy until the Lehman shock. It will then explain the evolution of monetary policy in 3 stages: first are the policy actions during and shortly after the crisis; second is the so-called comprehensive monetary easing (CME) in 2010-13 along with other measures in the area of lending facility; and third is a new phase of monetary easing since 2013 under the QQE.

II. PRELUDE: EARLY YEARS OF UNCONVENTIONAL MONETARY POLICY

The BOJ had already ventured into unconventional monetary policy at the end of the 1990s, well before the Lehman shock hit the global economy in 2008. In this section, we will briefly review the BOJ's experience under the zero interest rate policy (1999-2000) and quantitative easing policy (2001-06) as a prelude to what is described in later sections.

1. Zero interest rate policy (1999-2000)

In 1999, economic activity remained sluggish and business and consumer sentiment was persistently weak. This was the period when Japan's financial system was fragile and concern about the availability of funds to Japanese banks spread overseas, which led to the emergence of the so-called Japan premium.

Against this background, the BOJ recognized the need to counter the possibility of mounting deflationary pressure and prevent further deterioration in economic conditions. In February 1999, it introduced the "zero interest rate policy," which in essence consisted of 3 features. First, it encouraged the uncollateralized overnight call rate – the operating target for money market operations – to move as low as possible by providing ample funds. The amount of excess reserves that the BOJ provided to encourage the overnight rate to be close to zero percent was relatively small. This was less than 1 trillion yen with required reserves amounting to about 4 trillion yen. Second, it paid due consideration to maintaining the proper functioning of the short-term money

market in order to avoid excessive volatility that could be caused by the unprecedentedly low levels of the interest rates. It initially guided the overnight rate at around 0.15 percent and then induced a further decline in that rate by carefully monitoring market developments; by April 1999, the overnight rate had declined to as low as 0.03 percent.

Lastly, the BOJ announced that it would continue with the zero interest rate policy "until deflationary concerns subside." This effectively became the first forward guidance adopted by the BOJ. As we will see shortly, it has used such forward guidance on several occasions since then: once during quantitative monetary easing in 2001-06, another time during the CME in 2010-13, and most recently with the QQE since 2013.

While the first generation of forward guidance was not included in the policy statement released shortly after the monetary policy meeting, the BOJ's intention regarding the monetary policy conduct for the periods ahead was conveyed to the public through the governor's speeches and the attachment to the policy statement.

In October 1999, the BOJ introduced additional measures to reinforce the effectiveness of the policy by resorting to a wider range of money market operations. These included outright sales and purchases of short-term government securities (treasury bills and financing bills) and expansion of the range of government securities – adding 2-year government securities – eligible for repo operations.

Following those actions under the zero interest rate policy, the economy showed improvement, reflecting the recovery in the global economy and diminished concerns over the Japanese financial system. In light of those developments, the BOJ judged that deflationary concerns would be dispelled and the conditions for lifting the zero interest rate policy had been met. In August 2000, it discontinued the zero interest rate policy, encouraging the overnight rate to move up to around 0.25 percent.

2. Quantitative easing monetary policy (2001-06)

— Introduction of quantitative easing

The economic recovery in Japan, however, came to a pause in late 2000, largely due to a sharp downturn of the global economy. The BOJ recognized that the economy had failed to return to a sustainable growth path and faced a threat of deterioration.

In March 2001, it decided to introduce quantitative easing by changing the operating target from the overnight call rate to the outstanding balance of current accounts held by financial institutions at the BOJ. It initially aimed for a current account balance of around 5 trillion yen, and over the years it raised the balance step-by-step; in the end, this reached around 30-35 trillion yen. For reference, 30-35 trillion yen was about 5 times as much as the amount of required reserves and constituted about 7 percent of nominal GDP. The BOJ also increased the outright purchase of long-term government bonds and extended maturities of funds-supplying operations in order to facilitate its capacity to provide ample liquidity in the market.

— Banknote principle

While the BOJ traditionally purchased Japanese government bonds (JGBs) for the purpose of supplying currency consistent with the underlying development of the economy, it introduced the so-called banknote principle when it embarked on quantitative easing. This principle indicated that the JGB purchases – conducted for facilitating money market operations – were subject to the limitation that the outstanding amount of the BOJ's JGB holdings should be limited within the outstanding amount of banknotes in circulation. It was made clear that such purchases were executed for the purpose of conducting monetary policy and not for the purpose of financing fiscal deficits. The principle prevented uncertainties associated with the BOJ's actions from raising risk premiums and thus from exerting negative impacts on the economy.

— Forward guidance

On top of this, the BOJ introduced the second generation of forward guidance, in which it said that the new procedures for money market operations continued to be in place until the consumer price index (excluding fresh food, on a nationwide basis, "core CPI" hereafter) registered stably at zero percent or an increase year on year. While the previous forward guidance under the zero interest rate policy only contained a qualitative assessment of prices, this one included a numerical clarification and linked the policy duration directly to the achievement of at least zero percent inflation in a stable manner. In addition, the commitment linked the future conduct of monetary policy not with a forecast of the CPI but with an actual CPI. This was intended to remove the public's perception that a central bank had a deflationary bias after the BOJ had discontinued the zero interest rate policy early; thus, leaving little room for a flexible interpretation of the commitment.

During the course of increasing the target balance of the current account, the BOJ took important steps to enhance its transparency along with the

clarification of the meaning of its forward guidance. In October 2003, it decided to release its interim assessment of the economy between the publications of the semiannual *Outlook for Economic Activity and Prices* (Outlook Report). This in effect provided the BOJ with the opportunity to update its forecasts of real GDP and the CPI on a quarterly basis. It also decided to hold the governor's press conference on the same day after every monetary policy meeting, rather than 2 days after the meeting. In addition to those measures, the BOJ set the following 2 conditions to clarify what it meant by the core CPI registering stably at zero percent or an increase year on year.

First, the BOJ required not only that the most recent CPI data would register at zero percent or above but also that this tendency would be confirmed over a few months. The second condition was that the prospective core CPI would not be expected to register below zero percent. More specifically, many policy board members needed to forecast that the core CPI would stay above zero percent during the forecast period in the Outlook Report.

While the BOJ also said that there might be a case in which it would continue with quantitative easing even if these conditions were met, clarification of the meaning of the phrase "registers stably a zero percent or an increase year on year" in a more concrete manner effectively helped the BOJ share its thinking behind the monetary policy conduct, thereby enhancing the public's understanding of monetary policy.

— Exit from quantitative easing

In March 2006, in light of steady recovery in the economy and positive inflation, the BOJ decided to end quantitative easing and announced that it would change the operating target for money market operations from the current account balance back to the uncollateralized overnight call rate. It also decided to guide the overnight rate toward remaining effectively at zero percent.

In lifting quantitative easing, the BOJ gave full consideration to conditions in the short-term money market, given that financial institutions had been accustomed to managing liquidity under the large amounts of their current account balances held at the BOJ as well as extensive funds-supplying operations by the BOJ for prolonged periods.

Against this background, the BOJ made it clear that (i) the current account balance would be reduced toward a level consistent with required reserves at about 6 trillion yen; (ii) the reduction of the current account balance would be carried out over a period of a few months, while the purchases of JGBs would continue at unchanged amounts and frequency for some time; and (iii) the adjustment in the overnight rate would proceed at a gradual pace, thereby ensuring that an accommodative financial environment would continue for some time to come. Spelling out the course of monetary policy for the next few months was important to prevent market tension from rising.

For the BOJ, it was necessary to reduce the current account balance toward a level consistent with required reserves in order to raise the overnight call rate under a situation where the BOJ was not able to pay interest on excess reserves (i.e., the "complementary deposit facility" was not available in those days). This process was managed through short-term money market operations. Toward the end of the fiscal year (i.e., end-March 2006), the BOJ conducted money market operations with due consideration to the stability of the short-term money market. Specifically, it aimed to maintain the current account balance at around 30 trillion ven and the overnight rate moved at a substantially low level, virtually unchanged from the level observed under guantitative easing. After April 2006, the current account balance was gradually reduced by not rolling over the maturing funds-supplying operations (i.e., absorption of funds) while funds-absorbing operations were confined to very short-term operations. Lastly, it was reduced to 6 trillion ven in line with required reserves, and the eventual exit from guantitative easing did not cause instability in financial markets. This owed much to deliberate actions by the BOJ and financial institutions that adapted fund management in preparation for the reduction of their current account balances. Furthermore, the smooth exit from quantitative easing was made possible without relying heavily on the funds-absorbing operations, because the amount of JGB holdings was constrained under the banknote principle. By February 2007, the overnight rate reached 0.5 percent and was maintained at that level until the BOJ reversed its policy to cope with the Lehman shock.

III. COPING WITH THE LEHMAN SHOCK

From the summer of 2007, global financial markets were exposed to severe turmoil. The situation was aggravated significantly after Lehman Brothers filed for bankruptcy in mid-September 2008. Both Japan's economy and overseas economies started declining sharply.

Against this background, the BOJ introduced a number of measures to cope with such severe situations; some of them were coordinated with other major central banks while others were adopted as part of its own monetary policy actions.

1. Coordinated actions by major central banks

One of the most prominent features at the time of the Lehman shock was the extent of coordination by central banks around the world. Major central banks not only coordinated in terms of providing U.S. dollars in their respective economies but also made joint efforts to make their own currencies available in the United States. They even agreed to establish standing bilateral swap agreements to provide liquidity in any of their currencies in each jurisdiction. Furthermore, central banks decided to accept some sovereign bonds issued by other countries as eligible collateral under the market operations.

— Provision of U.S. dollars in major economies

Central banks strove to stabilize financial markets by aggressively providing liquidity in their respective currencies. They also provided a massive amount of liquidity in U.S. dollars in their own markets. In September 2008, the BOJ – along with 5 major central banks; namely, the Bank of Canada, the Bank of England, the European Central Bank, the Federal Reserve, and the Swiss National Bank – took coordinated measures to alleviate pressures in U.S. dollar short-term funding markets. More concretely, the BOJ concluded a U.S. dollar swap agreement with the Fed of up to 60 billion U.S. dollars and introduced U.S. dollar funds-supplying operations. Under those operations, U.S. dollar funds were provided to market participants in Japan.

As strains in the financial markets continued, the BOJ increased the aggregate amount of the swap facility from 60 to 120 billion U.S. dollars in only a few weeks after it introduced the facility, and in October 2008 it decided to provide funds at a fixed rate for an unlimited amount against pooled collateral. The swap facility expired at the beginning of February 2010 on the back of improvements in financial market functioning, and the U.S. dollar funds-supplying operations by the BOJ also came to an end, in accordance with other central banks at which operations were also terminated. However, the swap agreement and the U.S. dollar operations were reintroduced in May 2010 in the midst of European sovereign debt problems.

- Provision of foreign currencies in the United States

Along with the efforts by 6 major central banks to alleviate tensions in terms of the U.S. dollar funding, some of them took further efforts to allow the Fed to provide foreign currency liquidity to U.S. financial institutions. In April 2009, the Bank of England, the European Central Bank, the Federal Reserve, the Swiss National Bank, and the Bank of Japan announced swap arrangements

in which pounds sterling, euros, Swiss francs, and yen would be provided to the Fed via these agreements should the need arise. In the case of the BOJ, the arrangement allowed the Fed to draw the yen liquidity up to 10 trillion yen.

— Network of bilateral liquidity swap agreements

In November 2011, 6 major central banks agreed as a contingency measure to establish temporary bilateral liquidity swap arrangements. Those arrangements enabled them to provide liquidity in each jurisdiction in any of their currencies should market conditions so warrant. They judged it prudent to make those arrangements so that liquidity support operations could be put into place quickly should the need arise. Those swap lines were initially authorized through February 2013, and then extended through February 2014. In October 2013, those central banks agreed to convert them to standing arrangements; that is, arrangements that would remain in place until further notice.

— Acceptance of cross-border collateral

Central banks also took coordinated actions with a view to ensuring stability in respective financial markets. In May 2009, the BOJ decided to accept bonds issued by the governments of the United States, the United Kingdom, Germany, and France, as eligible collateral. This enabled financial institutions to manage their collateral more efficiently so that it contributed to further facilitating the BOJ's market operations.

2. Monetary policy actions

In conjunction with the coordinated actions by central banks, the BOJ took various monetary policy actions. These were mainly in 3 areas: reducing the policy interest rate, ensuring stability in financial markets, and facilitating corporate financing.

2.1. Reducing the policy interest rate

At the time of the Lehman shock, the BOJ's operating target for money market operations – the uncollateralized overnight call rate – had already been as low as 0.5 percent, but it decided to lower its target further in 2 stages: first, from 0.5 percent to 0.3 percent in October 2008; second, from 0.3 percent to 0.1 percent in December 2008.

In December 2009, the BOJ decided to introduce a new type of fundssupplying operation (i.e., a fixed-rate funds-supplying operation against pooled collateral). Before this operation was introduced, interest rates to be applied were determined by a multiple-rate competitive auction. The aim of this new operation was to encourage a further decline in interest rates on term instruments by providing ample longer-term funds at an extremely low interest rate. The interest rate was fixed at 0.1 percent, equivalent to the target policy rate at that time, for a duration of 3 months. The total amount of loans started at 10 trillion yen and was increased to 20 trillion yen in March 2010.

2.2. Measures to ensure market stability

While the BOJ's introduction of U.S. dollar funds-supplying operations as part of international coordinated efforts can be regarded as a measure to ensure market stability, it also adopted a number of actions on its own.

In October 2008, the BOJ decided to take the following measures: (i) improve liquidity in the JGB repo market by making a range of JGBs eligible for its repo operations and relaxing terms and conditions for its security lending facility; (ii) provide ample liquidity over the year-end; and (iii) introduce the "complementary deposit facility," under which the BOJ pays an interest rate of 0.1 percent on excess reserves.

Among those measures, the complementary deposit facility was intended to enable smooth and sufficient provision of funds, particularly toward the calendar year-end and the fiscal year-end, when liquidity demand heightened. The facility was also expected to increase the flexibility of the BOJ's market operations while preventing the policy rate from sharply falling below its target.

In light of continued strains in financial markets, the BOJ judged it important to continue providing ample liquidity in order to ensure stability in those markets. To put this into action, it increased the outright purchases of JGBs to supply longer-term funds. In December 2008, the amount of those purchases was increased from 14.4 trillion yen to 16.8 trillion yen per year. This corresponded with an increase in monthly purchases from 1.2 trillion yen to 1.4 trillion yen. Furthermore, in March 2009, the amount was increased from 16.8 trillion yen to 21.6 trillion yen per year (i.e., from 1.4 trillion yen to 1.8 trillion yen per month).

Owing to these actions by the BOJ, while Japan's financial markets were influenced by developments in global financial markets, they stayed relatively

stable compared to the U.S. and European markets, where intensified tensions continued despite a number of actions taken by their respective authorities.

2.3. Measures to facilitate corporate financing

While Japanese financial markets remained relatively stable compared to others, tensions – such as those created by large fluctuations in stock prices and a widening of credit spreads in the corporate bond markets – inevitably arose in Japan as well. Financial positions of small firms deteriorated and an increasing number of large firms faced worsening funding conditions in the markets. Financial conditions on the whole deteriorated, and the BOJ faced the risk that low interest rates would not exert their intended impact on the economy.

It was against that background that the BOJ took a number of actions to facilitate corporate financing: first, by using corporate debt as collateral; second, by purchasing them outright. It should be noted that the role of a central bank up until then was to indirectly support the credit extension to firms by taking corporate debt as eligible collateral for its credit extension to private financial institutions. While the outright purchase of corporate debt was an unorthodox and unprecedented measure at that time, it became increasingly difficult during the global financial crisis to draw a clear line between the central bank's traditional role (i.e., to provide liquidity) and its role during the crisis (i.e., to take credit risks directly in a time of crisis). The BOJ continued to examine the undertaking of credit risks from a number of aspects including sharing its role with the government, maintaining its financial soundness, and preserving confidence in its currency. Such viewpoints seem still valid and legitimate whenever a central bank undertakes unprecedented measures.

— Corporate debt as collateral

In October 2008, the BOJ decided to increase the frequency and size of CP repo operations, and to broaden the eligibility of asset-backed commercial paper (ABCP). In December, it broadened the range of corporate debt as eligible collateral. For example, the range of corporate bonds and loans on deeds accepted as eligible collateral was expanded to those with a BBB rating.

Furthermore, it implemented a new operation (i.e., a special funds-supplying operation to facilitate corporate financing) under which it provided funds over the fiscal year-end for an unlimited amount against the value of corporate debt taken as collateral. This operation was expanded in February 2009 by increasing the frequency (from "twice a month" to "once a week"), extending the loan duration

(from less than 3 months to 3 months), and extending the offer by 6 months until end-September 2009 (and then extended again until end-March 2010).

- Outright purchase of corporate debt

In addition to measures using corporate debt as collateral, the BOJ took unprecedented actions to purchase them outright; that is, the outright purchases of CP and corporate debt. This essentially meant that the credit risk of firms issuing corporate debt was assumed by the BOJ.

In January 2009, it initiated the outright purchases of CP (including ABCP) up to 3 trillion yen as a temporary measure until end-March 2009. Later, these purchases were conducted for an extended period.

In addition, the BOJ initiated the outright purchases of corporate bonds in February 2009. The maximum amount to be purchased was set at 1 trillion yen. The purchases were originally scheduled to last until end-September but later extended until end-December.

Those asset purchases were introduced as extraordinary and temporary measures. As financial conditions started to show signs of stabilization, such as improvement of issuing conditions in the CP and corporate bond markets, the BOJ decided to end those purchases at end-December 2009. However, as we will see shortly, the BOJ restarted purchasing those assets under the asset purchase program, and this continues under the current policy framework of the QQE.

3. Clarification of price stability

During those years, the BOJ also made efforts to clarify what it meant by price stability. As early as March 2006, the BOJ introduced the "understanding of medium- to long-term price stability." This understanding referred to the level of inflation that each member of the policy board understood as price stability from a medium- to long-term viewpoint in the conduct of monetary policy. It was agreed at the meeting that, by making use of the year-on-year rate of change in the CPI to describe the understanding, an approximate range between 0 and 2 percent was generally consistent with the distribution of each member's understanding, and most members' median fell on both sides of 1 percent.

However, this expression with reference to the "approximate range" left an impression with the public that the inflation rate could be below zero percent,

possibly leaving room for some misunderstanding that the BOJ tolerated a negative inflation rate.

In December 2009, the policy board again discussed the understanding and concluded that it was appropriate to employ clearer words to express its own thinking on price stability. Accordingly, the BOJ stated that (i) the understanding fell in a positive range of 2 percent or lower on the basis of a year-on-year rate of change in the CPI and the BOJ did not tolerate a year-on-year rate of change equal to or below zero percent, and (ii) the midpoints of most board members' understanding were around 1 percent. At the same time, given the lessons learnt from the bursting of the global credit bubble, the BOJ made clear the need to pay attention to the possible accumulation of financial imbalances – for example, in asset prices and credit aggregates.

4. Summing Up

As we have seen so far, the BOJ has implemented a wide range of policy measures – some of them jointly with foreign central banks – to address the adversity following the Lehman shock.

Given that its policy rate had already been close to zero percent well before the Lehman shock hit the global economy, the BOJ made tenacious efforts to devise ways in which liquidity would effectively be provided to the financial markets and penetrate the right sectors of the economy. It resorted to a number of unprecedented measures such as assuming credit risk in the corporate sector directly on its balance sheet.

IV. CONTINUED FIGHT AGAINST DEFLATION (2010-13)

As the world entered 2010, strains in U.S. dollar funding reemerged against the background of European sovereign debt problems. In light of this development, 6 major central banks reestablished in May 2010 the frameworks for providing U.S. dollar liquidity by reintroducing U.S. dollar liquidity swap facilities to improve liquidity conditions in the markets and to prevent the spread of strains to other markets and financial centers. The BOJ also resumed its U.S. dollar funds-supplying operations. In November 2011, the BOJ, in coordination with other central banks, took additional steps to provide U.S. dollar liquidity over the year-end to alleviate market tensions. Those central banks also lowered the pricing on these swap facilities by 50 basis points so that the new rate would be the U.S. dollar overnight index swap (OIS) rate plus 50 basis points.

As for Japan's economy, signs of improvement waned and the pace of its improvement remained slow. In those circumstances, the BOJ judged that it had become more likely that the timing of the economy's exit from deflation and the return to a sustainable growth path with price stability were delayed. Based on such judgment, in October 2010, the BOJ decided to introduce comprehensive monetary easing (CME), which resorted to a wide range of policy measures that went beyond the previous toolkit.

— Three-pronged approach to monetary policy

In explaining its overall policy framework, the BOJ extensively used the notion of the "three-pronged approach." This highlighted pursuing powerful monetary easing under the CME, ensuring financial market stability, and providing support for strengthening the foundations for economic growth.

The BOJ emphasized that it would continue to make its utmost contributions for Japan's economy to overcome deflation and return to a sustainable growth path under price stability.

1. Comprehensive monetary easing

With regard to powerful monetary easing, the CME mainly consisted of 3 pillars: reduction of the policy rate, clarification of the policy time horizon, and establishment of an asset purchase program. Those were aimed at encouraging a further decline in longer-term interest rates as well as a reduction in risk premiums.

1.1. CME's basic structure

— Lowering the policy rate

First, while there was little room for further lowering short-term interest rates, the BOJ changed its guideline for the policy rate (i.e., uncollateralized overnight call rate) from "around 0.1 percent" to "around 0 to 0.1 percent." This was intended to meet the purpose of lowering longer-term rates by allowing the overnight rate to go substantially lower than 0.1 percent. In addition, it clarified the BOJ's intention to have adopted the virtually zero interest rate policy.

— Clarifying policy time horizon: forward guidance

Second, the BOJ clearly stated that it would continue with the virtually zero interest rate policy until it judged that price stability was in sight, provided that problems such as the accumulation of financial imbalances did not materialize. The clarification of the BOJ's intention regarding the future policy influenced the formation of longer-term rates.

Another aspect of this forward guidance was that it was clearly linked to the BOJ's definition of price stability at that time. The "understanding" was used as a criterion for judging whether price stability was in sight.

— Establishing an asset purchase program

Lastly, the BOJ established a program for carrying out asset purchases. In this program, it decided to purchase a variety of financial assets including government securities, CP, and corporate bonds, as well as exchange-traded funds (ETFs) and Japan real estate investment trusts (J-REITs), and to conduct the fixed-rate funds-supplying operation against pooled collateral. The total size of the program, including the fixed-rate operation, was set at about 35 trillion yen.

The purchase of government securities – JGBs with a remaining maturity of up to 2 years – was aimed at lowering longer-term market interest rates, and that of risk assets such as ETFs and J-REITs was intended to reduce risk premiums. Through the purchase of JGBs with relatively short maturities, the program aimed to put strong downward pressure on the shorter end of the yield curve. It was conceptually different from the JGB purchases for the purpose of supplying currency in the economy.

It was for this reason that the BOJ drew a clear line between the JGB purchases under the program and those subject to the banknote principle (i.e., the outstanding amount of the Bank's JGB holdings should be limited within the outstanding amount of banknotes in circulation). The former was segregated from the assets obtained through other market operations. This continued until the QQE was introduced in April 2013, when the BOJ decided to synthesize the purchasing methods of JGBs by terminating the asset purchase program.

While the BOJ was aware that assuming credit risk might lead to a burden on taxpayers and expanding its involvement in resource allocation was of a somewhat fiscal policy nature, it judged that the benefit of new policy would outweigh its possible costs. Over the next few years, until the QQE was introduced in April 2013, the targeted total size of the asset purchase program was increased step by step and eventually reached 101 trillion yen by end-2013, almost 3 times as large as its original size. During the course of expanding the size of the program, the BOJ increased its JGB purchases, from an initial 1.5 trillion yen up to 44 trillion yen. It also expanded the range of eligible JGBs to be purchased from those with a remaining maturity of up to 2 years to those up to 3 years.

— Open-ended asset purchasing

In January 2013, it announced that the asset purchase program would be conducted on the basis of purchasing a certain amount of financial assets every month without setting any termination date. As a result of this, the total size of the program was scheduled to be increased by about 10 trillion yen in 2014. This was made defunct after the BOJ entered a new phase of monetary easing under the QQE.

1.2. CME's transmission mechanism

Under the CME, the BOJ emphasized 3 channels through which the effect of the CME would support economic recovery.

The first channel was to lower funding costs for firms and households. The BOJ aimed to achieve accommodative financial conditions through a decline in interest rates. Moreover, by purchasing risk assets it acted as a catalyst to help market participants invest more actively in these markets so that the intermediary function would be improved further.

The second was the policy duration effect. With the announcement that the virtually zero interest rate policy would be maintained until the BOJ judged that price stability was in sight, it was intended to exert significant easing effects, particularly in times when economic recovery progressed, by encouraging market participants to form stable projections about future interest rates.

The third channel was the effect on business and household sentiment. By alleviating concern about a possible economic downturn due to the slowdown in overseas economies and the appreciation of the yen, the BOJ expected that the new policy would underpin public confidence and boost the momentum for a self-sustaining recovery.

As we will see later, the transmission channels under the QQE put more emphasis on inflation expectations.

2. Lending facilities

In pursuing the CME, the BOJ implemented several measures aimed at reinforcing the transmission channel of monetary policy. Specifically, it introduced 2 types of lending facilities: one was called the Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth (hereafter Growth-Supporting Funding Facility); and the other the Fund-Provisioning Measure to Stimulate Bank Lending (hereafter Stimulating Bank Lending Facility). Those measures were established to provide loans against pooled collateral, with the aim of supporting private financial institutions' efforts in extending credits such that they particularly contributed to strengthening the foundations for economic growth.

In essence, they are complementary to each other. The former is a micro approach in which loans to specific business areas contributing to strengthening the economy's growth foundations are encouraged. The latter is a macro approach in which an increase in the total lending on a net basis is encouraged. The basic structure of these facilities is as follows.

2.1. Growth-Supporting Funding Facility: Micro approach

The BOJ recognized that the critical challenge for Japan's economy was to raise potential growth and productivity, and that it therefore should make further efforts by encouraging private financial institutions to provide funds to business sectors with growth potential.

The Growth-Supporting Funding Facility was introduced in June 2010 based on such recognition. Under this facility, the BOJ provided loans to its counterparties (i.e., private financial institutions) with the duration of 1 year; however, they could be rolled over up to 3 times, and thus the maximum duration was effectively 4 years. The loan rate was set at 0.1 percent per annum. The total amount of loans was initially set at 3 trillion yen.

The facility enables those financial institutions to access long-term funds at a low interest rate as long as they use those funds for loans and investments that contribute to strengthening the foundations for economic growth.

In the process of preparing the details of the facility, the BOJ ensured that it would not directly get involved in credit allocation to respective firms and industries. The BOJ listed 18 broad business areas, as an example, where its funds would contribute to the strengthening of the growth foundations. Those included such areas as (i) research and development, (ii) investment and business deployment overseas, (iii) environment and energy business, and (iv) medical, nursing care, and other health-related business.

After the introduction, the size of the facility was expanded and subfacilities for special purposes were added. Most recently, in February 2014, the BOJ decided to double the maximum amount of fund-provisioning under the main facility from 3.5 trillion yen to 7 trillion yen. In addition, it decided to provide funds to private financial institutions at a fixed rate of 0.1 percent per annum for 4 years instead of 1-3 years.

At the time of this writing, the amount of loans outstanding under the Growth-Supporting Funding Facility reached 4,116 billion yen. Looking at the distribution of lending activities by those financial institutions, the environment and energy business received about 1,743 billion yen, accounting for more than 25 percent of total loans, by far the largest business sector to receive loans. It was then followed by the medical, nursing care, and other health-related business, which received about 1,185 billion yen, accounting for nearly 20 percent of total loans.

2.2. Stimulating Bank Lending Facility: Macro approach

In December 2012, the BOJ established a new lending facility. Under this facility, it provided funds to financial institutions, at their request, up to an amount equivalent to the net increase in their lending.

No limit was set on the total amount of funds provided by the BOJ, and the interest rate charged by the BOJ was set at 0.1 percent per annum. Unlike the Growth-Supporting Funding Facility, there were no specific areas in which the funds should be used. As long as banks managed to increase their lending on a net basis, they were entitled to receive back-financing from the BOJ. Furthermore, loans from the BOJ could be rolled over up to 4 years at the request of financial institutions. This ensured that those institutions had access to long-term stable funding at a low cost through the BOJ.

In February 2014, the BOJ decided to enhance this facility by allowing financial institutions to borrow funds up to an amount that was twice as much as the net increase in their lending. Likewise, it decided to provide funds to financial institutions at a fixed rate of 0.1 percent per annum for 4 years.

At the time of this writing, the amount of loans outstanding under the Stimulating Bank Lending Facility reached 8,549 billion yen. Within a relatively



short period of time, this became more than twice as much as the amount of loans under the Growth-Supporting Funding Facility (i.e., 4,116 billion yen).

Looking at the quarterly flow of the BOJ's loan disbursement, loans under the main facility of the Growth-Supporting Funding Facility have been around 200 billion yen for the last several years, with credit demand consistently coming from regional banks (Figure 2). By contrast, loans under the Stimulating Bank Lending Facility have amounted to more than 3,400 billion yen of late, with significantly large credit demand coming from major banks.

The BOJ expects that these facilities will further promote those financial institutions' actions as well as stimulate firms' and households' demand for credit.

- 2 stages of transmission mechanism

In order to explain the aim of these facilities (i.e., to further strengthen the effect of monetary easing) and to facilitate a better understanding by the public, the BOJ used the notion of "2 stages" in the transmission mechanism of monetary policy. As for the first stage, where the transmission of monetary easing effects from the realm of monetary policy to the financial environment takes place, the BOJ emphasized the view that the effect of aggressive monetary easing had thoroughly permeated the financial environment. As for the second stage, the BOJ emphasized the view that there was room for a wide range of economic entities to take more advantage of accommodative financial conditions; hence, there was a rationale for the BOJ to introduce these lending facilities whereby a catalytic role in enhancing the second stage of the transmission could be played.

2.3. Measures supporting financial institutions in disaster areas

In addition to these lending facilities, the BOJ introduced a fundssupplying operation that provides longer-term funds to financial institutions in disaster areas that were hit by the Great East Japan Earthquake. The aim was to give financial support for those institutions to meet the demand for funds for restoration and rebuilding. Furthermore, the BOJ broadened the range of eligible collateral for money market operations with a view to securing sufficient financing capacity of the institutions in those areas. These were introduced in April 2011, shortly after the earthquake, and extended 3 times. In February 2014, the BOJ further extended them for a fourth time by 1 year.

3. Further clarification of price stability

Along with the enhancements of lending facilities, in 2012, the BOJ made important decisions on 2 fronts: one was to introduce the price stability goal, and the other was to issue a statement with the Japanese government.

— Introduction of the price stability goal in the medium to long term

As we saw in section III.3 Clarification of Price Stability, the BOJ continued to make efforts to clarify the meaning of price stability over the years.

In February 2012, as part of its efforts to further clarify its determination to overcome deflation and achieve sustainable growth with price stability, the BOJ decided to introduce the "price stability goal in the medium to long term." This goal was consistent with the inflation rate that the BOJ deemed consistent with price stability sustainable in the medium to long term. It was judged to be in a positive range of 2 percent or lower in terms of the year-on-year rate of change in the CPI. More specifically, the BOJ set a goal at 1 percent for the time being.

Unlike the previous "understanding of medium- to long-term price stability," which showed a range of inflation rates that each policy board member understood as price stability from a medium- to long-term viewpoint, the price stability goal was set at 1 percent for the time being to clarify the inflation rate that the BOJ's monetary policy aimed to achieve.

4. Coordination with the government

In October 2012, the Japanese government and the BOJ issued a statement titled, "Measures Aimed at Overcoming Deflation." In this document, the BOJ said that it aimed to achieve the price stability goal of 1 percent for the time being through the pursuit of powerful monetary easing, and that it would continue with this powerful monetary easing until it judged the 1 percent goal to be in sight. At the same time, the government stated that it would promptly formulate economic policy measures to counter risks of an economic downturn and to accelerate measures for realizing economic revitalization.

V. NEW PHASE OF MONETARY EASING (2013-PRESENT)

1. Run-up to the QQE

Against the background of the introduction of the price stability goal and the release of the statement with the government, the BOJ made further decisions in 2013 before the QQE was implemented.

- Introduction of the price stability target

In January 2013, the policy board reviewed the "price stability goal in the medium to long term" adopted in February 2012 and reappraised its thinking on price stability. The BOJ then decided to introduce the "price stability target." While it emphasized that the inflation rate consistent with price stability on a sustainable basis would rise as efforts by a wide range of entities toward strengthening competitiveness and growth potential made progress, it set the target, for the first time, at 2 percent in terms of the year-on-year rate of change in the CPI.

Switching from a "goal" to a "target" partly reflected an increasing public awareness that monetary policy would be sufficiently flexible even under an inflation target. Such public awareness was facilitated by the fact that major central banks came to emphasize the importance of flexibility in their inflation targeting framework, based on the experience of the global financial crisis. Under such circumstances, the BOJ judged it appropriate to use the expression "target" in order to explain its thinking on price stability.

— Joint statement with the government

At the same time, the BOJ released a joint statement and announced that it would strengthen policy coordination with the government. Specifically, it was stated that the BOJ would pursue monetary easing and aim to achieve the price stability target at the earliest possible time. As for the government, it was made clear that the government would steadily promote measures aimed at establishing a sustainable fiscal structure as well as formulate measures for strengthening the competitiveness and growth potential of Japan's economy.

2. Quantitative and qualitative monetary easing

In April 2013, the BOJ introduced the QQE at the first monetary policy meeting attended by the newly appointed governor and deputy governors. The main features of the QQE can be summarized as follows.

2.1. QQE's main features

— Commitment: forward guidance

The first feature is with regard to commitment. The BOJ made a strong and clear commitment to achieve the price stability target of 2 percent. In its statement released on April 4 after the monetary policy meeting, it said that it would achieve the price stability target of 2 percent in terms of the yearon-year rate of change in the CPI at the earliest possible time, with a time horizon of about 2 years. Furthermore, in order to clarify its intention regarding the continuation of the QQE, the BOJ said that it would continue with the QQE, aiming to achieve the price stability target of 2 percent, as long as it was necessary for maintaining that target in a stable manner.

It may well be understood that these 2 phrases in the statement constitute new forward guidance. These 2 pillars of forward guidance, however, are complementary. In other words, the QQE is state-contingent and open-ended in nature, and it is not appropriate to say that the QQE will be terminated automatically in 2 years irrespective of economic developments. The BOJ will continue with the QQE if it is judged necessary to do so in order to maintain that target in a stable manner. The aim is to set the 2 percent anchor deeply in the public's mindset and make the actual inflation rate hover around it. In terms of the Phillips curve, this means that the 2 percent inflation rate should become consistent with the average state of the economy; that is, when the output gap is zero.

— New phase of monetary easing in quantity and quality

The second feature is that the QQE has embarked on a new phase of monetary easing both in terms of quantity and quality in order to underpin the commitment specified above.

In terms of quantity, the BOJ first changed its main operating target for money market operations from the uncollateralized overnight call rate (i.e., interest rate) to the monetary base (i.e., quantity). It has then been conducting market operations so that the monetary base would increase at an annual pace of about 60-70 trillion yen. The monetary base, which was 138 trillion yen at end-2012, reached 202 trillion yen at end-2013 and is expected to reach 270 trillion yen at end-2014; hence, it will double in 2 years' time (Figure 3). Compared with other economies, the share of the monetary base relative to nominal GDP at end-2012 was 27.4 percent in Japan, whereas this was 16.1 percent in the United States and 17.7 percent in the euro area. At end-2013,





it reached 40.0 percent in Japan, 21.4 percent in the United States, and 12.7 percent in the euro area. This exemplifies how vast the amount of money the BOJ provides has become within a year (Figure 4).

As a means of increasing the monetary base, it purchased JGBs so that the amount outstanding on its balance sheet would increase at a pace of about 50 trillion yen annually. At end-2012, the amount outstanding of the BOJ's JGB holdings was 89 trillion yen. It then reached 142 trillion yen and is expected to reach 190 trillion yen at end-2014, again doubling the JGB holdings in 2 years' time.

In terms of quality, the BOJ started purchasing JGBs with all maturities including 40-year bonds. As a result, the average remaining maturity of its JGB purchases has more than doubled, extending from around 3 years to around 7 years. This is almost equivalent to the average maturity of JGBs issued.

Furthermore, the BOJ purchases ETFs and J-REITs so that their amounts outstanding on its balance sheet increase at an annual pace of about 1 trillion yen and about 30 billion yen, respectively. At end-2013, they reached 2.5 trillion yen and 140 billion yen, respectively, and are expected to reach 3.5 trillion yen and 170 billion yen at end-2014. On top of this, the BOJ also purchases CP and corporate bonds; at present, their amounts outstanding have

reached about 2.2 trillion yen and about 3.2 trillion yen, respectively, and are expected to be maintained at those levels.

— Enhancing communication

Under the QQE, the BOJ made a number of efforts to make monetary policy easier for the public to understand.

First and foremost, as we will see shortly, as one of the most important transmission channels under the QQE is a shift in expectations, it was regarded as pivotal to show the BOJ's strong determination by underpinning its commitment through bold actions.

Second, the BOJ focused on conveying a simple and clear message. For example, the QQE was designed so as to be easily memorable as a "2-2-2" approach: that is, the Bank would "double" the monetary base to achieve "2 percent" price stability target with a time horizon of about "2 years."

In addition, the BOJ chose the monetary base – the amount of money it supplies to the economy as a whole -- as the operating target for the QQE. This was partly because the monetary base was much more familiar to the public than the current account balance, which the BOJ adopted as the operating target at the time of quantitative easing during 2001-06.

The third aspect of facilitating communication is to simplify the monetary policy framework, particularly with respect to the BOJ's JGB purchases. Prior to the QQE, JGB purchases were conducted under 2 different types of operations: one conducted under the asset purchase program of the CME introduced in October 2010, and the other for facilitating market operations. While conceptually these operations are different, an argument can be made that emphasizing the total size of JGB purchases would be a much easier way to communicate the BOJ's policy intention. Therefore, the BOJ synthesized them together at the time of introducing the QQE.

Lastly, in order to implement an unprecedentedly large amount of JGB purchases and the monetary base provision in a smooth manner, the BOJ set up forums for enhanced dialogue with market participants concerning market operations and market conditions more generally. In addition, policy board members have given speeches in a number of places both at home and abroad to facilitate a better understanding and convey the BOJ's strong intention to overcome deflation.

2.2. QQE's transmission mechanism

With the QQE, there are basically 3 channels through which it affects the economy and prices (Figure 5).

First, the purchases of JGBs, ETFs, and J-REITs contain interest rates over the entire yield and lower risk premiums of asset prices. These will stimulate demand for credit through a decline in funding costs.

Second is the so-called portfolio rebalancing effect. The BOJ's massive purchases of JGBs encourage banks and institutional investors to shift their portfolios toward less JGBs and more risk-bearing assets including lending.

Third is a shift in expectations. The BOJ's clear commitment to achieving the 2 percent price stability target at the earliest possible time, underpinned by a dramatic expansion of its balance sheet, is supposed to change the expectations of markets, businesses, and households. In formulating inflation expectations, what is important is not only a forward-looking element but also an adaptive or backward-looking element. The former is underpinned by the


BOJ's commitment and actions, and the latter is reinforced by a time-series of the actual inflation rate rises as aggressive monetary easing progresses.

Comparing these channels with those explained under the CME, the QQE intends to exert its utmost effects on the expectations channel. This emphasis on a shift in expectations is one of the most important elements that make the QQE fundamentally different from the past policies of the BOJ. In a situation where inflation continues to rise, inflation expectations will maintain their uptrend due to a backward-looking element as well as a forward-looking element.

Lastly, as discussed in section IV.2 Lending Facilities, the Bank expanded lending facilities in February 2014 to support financial institutions' initiatives to increase lending. While the Bank's main engine of monetary policy is the QQE, those facilities are designed to reinforce the transmission mechanism of monetary policy.

VI. FUTURE CHALLENGES

After the global financial crisis, the BOJ maintained financial stability by resorting to a number of policy tools. Some were implemented jointly with other central banks while others were conducted on their own initiative to combat deflation. Most recently, the BOJ embarked on the QQE in April 2013. Since then, favorable developments in economic activity and prices have been observed; it is fair to say that the BOJ has made progress in addressing the long-term challenge of overcoming the corrosive deflation that had entrenched Japan's economy for nearly 15 years. However, there are still challenges.

First, the BOJ's unprecedented challenge to achieve the 2 percent price stability target still needs to be met. The BOJ is only halfway there and will steadily pursue the QQE. It is of utmost importance to meet the challenge of overcoming deflation. The BOJ will continue to be strongly committed to eliminating deflation once and for all. In this regard, it will examine both upside and downside risks to economic activity and prices, and make adjustments as appropriate. It will continue to take the stance of doing whatever it can do to achieve the 2 percent price stability target.

The second is with respect to an exit from unconventional policies. At this juncture, it is premature to discuss when and how the BOJ should exit from the QQE, but one thing for sure is that it has a variety of tools and there are many ways to exit. For example, the redemption of the JGB portfolio and the rise of the interest rate on excess reserves could be considered as being among

a number of policy tools. However, the actual combination and sequencing of these tools will surely depend on developments in the economy, prices, and financial markets at the time of the exit. In any case, the BOJ is equipped with a wide range of operational instruments and will make its utmost efforts to fulfill the mandate of the price stability target.

AN OVERVIEW OF RECENT CHANGES IN THE FEDERAL RESERVE'S MONETARY POLICY

J. David LÓPEZ-SALIDO¹

"... Regarding the Great Depression. You're right [referring to Milton Friedman and Anna Schwarz], we did it. We're very sorry. But thanks to you, we won't do it again."

Ben Bernanke, 2002.²

"Adding directly to reserves –the ultimate liquid, safe asset– adds to supply of "quality" and relieves the perceived need to reduce spending...[] Monetary policy as Mr. Bernanke implements it has been the most helpful counter-recession action taken to date."

Robert E. Lucas, 2008.³

I. INTRODUCTION

The worldwide policy response to the financial turmoil and economic downturn of the past six years has consisted of a range of elements. On the fiscal side, some countries have provided traditional fiscal stimulus in the form of discretionary increases in outlays and reductions in taxes. In addition to this general stimulus, several nations have appropriated funds to support the recapitalization of their banking systems. On the monetary side, the traditional lender-of-last-resort function of the central bank has been deployed vigorously

¹ Deputy Associate Director, Division of Monetary Affairs, Federal Reserve Board. This paper has been prepared for the special issue of *Papeles de Economía Española* on "Monetary Policy After the Great Recession". I thank the editor, Javier Vallés, for his invitation to participate in this special issue of *Papeles* as well as for his useful suggestions to an earlier draft. Some of the analysis and research described in this paper is fruit of joint work with Stefania D'Amico, Bill English, Simon Gilchrist, Chris Gust, Andy Levin, Ed Nelson, Bob Tetlow, Tack Yun, and Egon Zakrajsek who should get credit for all their valuable insights over the course of the past years; but, of course, all remaining errors are our own. Last but not least, the views expressed in this paper are solely those of the authors and do not necessarily reflect the views of the Board of Governors of the Federal Reserve System, the Reserve Banks, or any of their staffs.

² Ben Bernanke, "On Milton Friedman's Ninetieth Birthday" Speech given at the *Conference to Honor Milton Friedman, at the University of Chicago*, November 8, 2002. http://www.federalreserve.gov/boarddocs/ speeches/2002/20021108/default.htm

³ Robert E. Lucas, "Bernanke Is the Best Stimulus Right Now: A zero interest rate isn't the last weapon in the Fed arsenal," *Wall Street Journal*, December 23, 2008. http://online.wsj.com/news/articles/ SB122999959052129273

by the world's major central banks; in the United States, furthermore, discount window access was extended to a broader range of institutions. It is, however, monetary policy actions undertaken with the specific aim of providing macroeconomic stabilization, rather than principally aimed at aiding day-today financial market functioning, that we focus upon in this paper. We consider two types of actions: forward guidance on short-term interest rate policy; and nontraditional monetary policies –i.e., central bank transactions in assets outside traditional open market operations.

Both forward guidance policies and nontraditional monetary operations have been deployed on a variety of occasions by national central banks in previous decades. The role of each of these policies, however, has become a central part of the current policy debate in the United States, especially since the federal funds rate having reached its effective lower bound in late 2008. With the scope for lowering current short-term interest rates essentially exhausted, the question at issue becomes: What monetary policy can and should do at the zero lower bound? The forward-guidance approach suggests that policymakers should emphasize their willingness to keep nominal interest rates low during the initial stages of economic recovery. With aggregate demand forward-looking, such a commitment can provide a stimulus to the economy during the recession period, by lowering expected future real interest rates.

Nontraditional monetary actions have featured prominently in the early policy responses during 2009 of both the Federal Reserve and the Bank of England.⁴ As Bean (2009) observed, these central banks "have bought both government and private assets, though with different emphases, in part reflecting the different financial market structures." The Bank of England purchases have concentrated on longer-term U.K. government securities (gilts); the Federal Reserve's program of large-scale asset purchases (LSAP) began with. and predominantly consists of, purchases of mortgage-related marketable assets (agency debt and mortgage-backed securities), but has also included a \$300 billion program of purchases of long-term U.S. Treasury securities. As described in the Federal Open Market Committee's statement of March 18, 2009, the purchases of mortgage debt were designed to "provide greater support to mortgage lending and housing markets," while the Treasury purchases were designed to "to help improve conditions in private credit markets." The reference to "private credit markets" suggests that the operations in long-term Treasury debt were intended to put downward pressure not only on official long-term

⁴ Unconventional policy measures that are linked to the size of the central bank balance sheet also include those associated with liquidity provision (not only asset purchases). Both liquidity provision and asset purchases measures have been sometime described, for short, as "quantitative easing" or "credit easing" (see, e.g. Bernanke, 2009)). This paper is mostly concern with asset purchases, but Madigan (2009) presents a thorough discussion of the liquidity provision policies put in place by the Federal Reserve during the early stages of the financial crisis.

rates, but, perhaps more crucially, on rates on private corporate bonds. Similar considerations underlay the long-term U.K. Treasury securities purchases in the United Kingdom. In both countries, therefore, the nontraditional policies can be thought of as confronting the effective zero lower bound of short term interest rates (ZLB, henceforth) by turning attention to important (long-term) interest rates in the economy which remain positive, and undertaking purchases that are intended to place downward pressure on those interest rates.

The joint deployment of forward guidance and nontraditional asset purchases can be justified on the grounds that it is desirable for policymakers to deploy all tools available when they face a ZLB situation and need to stimulate the economy. Nevertheless, this paper goes beyond this particular episode by encompassing the analysis of these tools within substantial changes put in place by the Federal Reserve to its framework for monetary policymaking. These changes reflected both a response to changes in economists' understanding of the most effective way to implement monetary policy and a response to specific challenges posed by the financial crisis and its aftermath, particularly the effective lower bound on nominal interest rates. On balance, the Federal Reserve has moved closer to "flexible inflation targeting," but the Federal Reserve's approach differs in important ways from the strict implementation of that paradigm by including a balanced focus on two objectives and the use of a flexible horizon over which policy aims to foster those objectives.

The next summarizes recent changes in Federal Reserve monetary policy goals and strategy. Then, we present the theoretical elements underlying two types of unconventional monetary policy actions: *forward guidance* regarding the path of the interest rate policy; and *large scale asset purchases*—i.e., central bank transactions in assets outside traditional open market operations. The paper also surveys existing empirical evidence that supports the effectiveness of these unconventional policies. The paper ends by noticing two major challenges for the future of central banking. First, acknowledging that the benefits of policy depend on how financial markets, households, and firms understand the central bank communication regarding the course of monetary policy. And, second, new and ongoing research and experience will yield improvements in frameworks for monetary policy and financial stability policy as well as suggesting new ways to better integrate the two.

II. THE ELEMENTS OF THE MONETARY POLICY FRAMEWORK⁵

A central bank's monetary policy framework can be thought of as having four components:

⁵ This section draws on the discussion presented in English, López-Salido and Tetlow (2013).

- a) The first component is the central bank's policy goal or goals and the time period over which the central bank aims to achieve them. For instance, a strict-inflation-targeting central bank's goal would be inflation at a particular numerical level at a particular horizon (perhaps 2 percent at a horizon of two years).
- b) The second is the tool or set of tools that the central bank uses to foster those goals. The tool, at least in normal times, would likely be a target for a specific short-term interest rate, implemented through some standard set of market operations.
- c) The third is the strategy that the central bank uses when employing its tools. The strategy for employing the tool might be form of (instrument) policy rule linking changes in the instrument to changes in the objectives.
- d) The fourth is a range of communications methods that the central bank uses to convey to the public information about its decisions, intentions, and commitments. For instance, publishing a regular (inflation) report; or a release of the Minutes showing the discussion regarding the policy decision, or releasing more quantitative information regarding the anticipated trajectory for the instrument and the target variables.

The changes the Federal Reserve has made since the middle of the last decade cover all the previous four categories. First, the Federal Open Market Committee (FOMC) has significantly clarified its goals, by providing a specific numerical interpretation of its (statutory) objective of price stability.⁶ Second, with its traditional policy tool, the target level for the federal funds rate, constrained by its lower bound since late 2008, the Federal Reserve has employed nontraditional policy tools. Specifically, the FOMC has employed an augmented version of forward guidance regarding the future path of the federal funds rate as well as undertaking purchases of longer-term securities in order to put downward pressure on longer-term interest rates. Third, the Committee has made changes to its strategy for implementing policy. In particular, with the federal funds rate constrained near its effective lower bound and the effects of nontraditional policy relatively uncertain, the Committee has moved in the direction of targeting rules by communicating its desired outcomes for employment and inflation and providing assurance that it will implement the accommodation needed to achieve those objectives. Finally, the Federal Reserve has greatly expanded its communications with the public. These communications enhancements include increased information provided in post-meeting statements; an explicit

⁶ There has been a significant effort in providing information about its interpretation of its full employment objective (see e.g., Yellen (2014)).

statement regarding the Committee's longer-run goals and policy strategy; a quarterly Summary of Economic Projections which provides information on FOMC participants' projections of the most important economic variables, their judgments regarding the risks to their projections, and their assessments of the appropriate stance of monetary policy; and finally, the introduction of quarterly postmeeting press conferences by the Chairperson.

These changes to the framework reflect a number of factors. Even prior to the financial crisis, the Committee was working to improve its communications in response to results in monetary economics emphasizing that successful communications could make monetary policy more effective (Yellen (2012)). Then following the crisis, the Federal Reserve developed and implemented new tools and employed enhancements to its communication in order to provide additional monetary policy accommodation and so help to strengthen the recovery. Many of these changes developed gradually, as the Committee carefully considered their potential benefits and costs and worked to achieve consensus on particular changes. Particularly with regard to communications, it is important to realize that these changes mark a continuation of earlier developments, including the introduction of post-meeting statements in 1994, the announcement of the "balance of risks" following FOMC meetings in 2000, and expediting the publication of FOMC minutes from 2006 onward.⁷

III. TOOLS TO CLARIFY THE POLICY OBJECTIVES AND STRATEGY

In recent years, the Committee has taken a sequence of steps to improve public understanding of its policy objectives (Table 1).⁸ Of course, those objectives are ultimately provided by Congress in the Federal Reserve Act, which states that the Federal Reserve's mandate is "to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates" (Federal Reserve Act, Section 2a). In general, the Committee has judged that moderate long-term interest rates would follow if the Federal Reserve achieves its objectives of maximum employment and stable prices; hence, policymakers often refer to the "dual mandate" (Mishkin, 2007).

Following the financial crisis, with a risk of very low inflation or even deflation as well as employment far short of its maximum level, the benefits of clearer communication regarding the Committee's goals were manifest. Not only would such communication improve Federal Reserve accountability, it could also improve economic outcomes by helping to anchor inflation expectations,

⁷ For a summary of changes in FOMC communications from 1975 to 2002, see Lindsey (2003).

⁸ This section draws on the discussion presented in English, López-Salido and Tetlow (2013).

Part I: The "new" monetary policies in the advanced economies

	TABLE 1				
RECENT INNOVATIONS IN FEDERAL RESERVE COMMUNICATIONS REGARDING MONETARY POLICY GOALS AND STRATEGY					
Date	Innovation	Purpose			
December 2005	Timing of the release of the minutes shortened to three weeks	Provide more timely information on the range of participants' views			
November 2007	Summary of Economic Projections (SEP)	To provide information on the Committee's outlook for the economy			
January 2009	Addition of longer-run projections to the SEP	To provide information on the Committee's longer-run goals			
April 2011	Post-meeting press conferences	To provide more comprehensive and timely information on the decision and views of the Committee			
January 2012	Addition of federal funds rate to the SEP	To provide information on the Committee's policy expectations			
January 2012	Statement on Longer-run Goals and Policy Strategy	To provide information on the Committee's assessment of the rate of inflation consistent with its dual mandate and the longer-run normal unemployment rate			

thereby helping to avoid an undesirable further decline in inflation and allowing the FOMC to take more aggressive steps to address the crisis.

— Summary of economic projections

A first step toward greater clarity came with the introduction of the Summary of Economic Projections (SEP) in November 2007. The SEP offers detailed information on the forecasts of all FOMC participants (the seven members of the Board of Governors and the twelve Reserve Bank presidents) under each participant's assessment of appropriate monetary policy.⁹ The forecasts include four key variables reflecting the Committee's dual mandate: the growth rate of real GDP, the unemployment rate, and overall and core inflation (as

⁹ Prior to the introduction of the SEP, the Federal Reserve provided more limited forecasts in the semi-annual Monetary Policy Report to the Congress. These forecasts were considerably more modest, covering only the current year and one additional year and providing only a very brief narrative supporting the forecasts.

measured by the price index for personal consumption expenditures). Initially, the forecasts went out three years. An important benefit of the relatively long time horizon for the forecasts in the SEP was that, at least in normal times, they provided considerable information on the Committee's longerterm objectives for unemployment and inflation. Since three years is, at least in normal times, long enough for monetary policy to have significant effects on the economy, the projections for unemployment and inflation three years ahead would presumably be close to the Committee's longer-run objectives and the projection for real GDP growth would be close to participants' estimates of the growth of potential. These benefits of the SEP were subsequently enhanced by the addition, in 2009, of "longer-run" projections that were defined as "each participant's assessment of the rate to which each variable would be expected to converge under appropriate monetary policy and in the absence of further shocks to the economy." This additional information provided very clear evidence regarding participants' longer-run objectives, evidence that was particularly useful following the financial crisis, when unemployment and inflation were far from the Committee's desired levels and might be expected to take longer than three years to return to their longer-run values.

— A consensus Statement on Longer-Run Goals

The next major step in improving Committee communications regarding its objectives was the publication in January 2012 of the Committee's Statement on Longer-Run Goals and Monetary Policy Strategy.¹⁰ This statement, for the first time, offered a single, explicit numerical value for the Committee's inflation objective, stating that, "The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate." The establishment of a 2 percent longer-run goal for inflation after many years of discussion on the Committee reflected an assessment of a number of factors (Bernanke, 2012b). Most obviously, an explicit numerical inflation objective would better anchor inflation expectations and improve central bank accountability.¹¹

The Committee was less precise with regard to its longer-run employment objective. The economic rationale for this is very compelling. As it noted in the statement, the maximum level of employment is a function of a range of nonmonetary factors –such as demographics, education and training, technology, and labor market structure– that are difficult to quantify and can change over

¹⁰ The statement was reaffirmed, without material changes, in January 2013.

¹¹ The selected objective also needed to balance the welfare costs of inflation over time, see, e.g., Fischer (1981), against the need for an "inflation buffer" to reduce the risks posed by the zero bound on nominal interest rates and possible deflation following large shocks (Reifschneider and Williams, 2000). A brief summary of the literature evaluating the cost and benefits of low inflation is presented in Appendix.

time. Yet, the Committee indicated that the SEP provided information on the longer-run normal rate of unemployment, and pointed to the central tendency of those values as a way of flexibly providing information about its expectations for employment and the labor market. This more flexible approach allowed the Committee to avoid undesirable risks that could arise when different indicators of labor market conditions point in different directions, smoothing through such temporary developments and giving clear guidance about the Committee's approach.

Finally, in January 2012, the Committee included in the SEP individual participants' assessments of the path for the target federal funds rate that they viewed as appropriate and compatible with their individual economic projections, as well as qualitative information on the appropriate path for the Federal Reserve's balance sheet. This information can help the public to understand the approach that Committee participants see as appropriate in response to a shock to the economy.

— Post-FOMC statements

After each FOMC a detailed Statement is released to the public. The statement provided information on the way that the Committee would employ policy in the pursuit of two macroeconomic goals. The Committee noted that the goals of maximum employment and stable prices are generally complementary - that is, the establishment of low and stable inflation is beneficial for the attainment of maximum employment, and deviations from maximum employment can make it difficult to attain stable prices. However, for circumstances in which the two goals are not complementary, such as following significant shocks to commodity prices, the Committee stated that it would follow "a balanced approach" to promoting them and would take account of the size of the deviations of employment and inflation from their goals and the time horizons over which they were expected to return to mandate-consistent levels, when determining the appropriate stance of policy. Finally, the statement provides information on economic and financial developments, but, in light of the use of forward guidance and asset purchases to provide additional accommodation, now includes considerably more discussion of the stance of policy and the conditionality of policy going forward.

- Other communication channels

In addition to the SEP, the Statement on Longer-run Goals and Policy Strategy, and the post-FOMC Statements, the Committee has used its other communications tools to improve public understanding of its goals and policy strategy.

- a) *The Minutes*. In 2005, the Committee moved up the timing of the release of meeting minutes to provide more timely information on the reasons for Committee decisions and the range of views across participants.
- b) *Post-FOMC Press-Conference*. In 2011, the Federal Reserve introduced post-meeting press conferences four times a year. The press conferences were intended to "further enhance the clarity and timeliness of the Federal Reserve's monetary policy communication" (Federal Reserve, 2011).

All of these changes, as well as more standard communications tools, such as speeches and testimonies, have allowed the Federal Reserve to provide additional detail and nuance regarding its policy intentions and to convey more clearly the range of views across the Committee.

IV. NEW MONETARY POLICY TOOLS

The worldwide policy response to the financial turmoil and economic downturn of the past six years has consisted of a range of elements. It is, however, monetary policy actions undertaken with the specific aim of providing macroeconomic stabilization, rather than principally aimed at aiding financial market functioning, that we focus upon in this paper.¹² We will consider two types of actions: *forward guidance* on short-term interest rate policy; and *nontraditional monetary policies*—i.e., central bank transactions in assets outside traditional open market operations.

Thus, the set of changes to the Federal Reserve's monetary policy framework consists of the introduction of nontraditional policy tools and the consequent

¹² Several nations have appropriated funds to support the recapitalization of their banking systems (the initial reaction in the United States was largely through the Troubled Asset Relief Program—TARP). On the monetary side, the traditional lender-of-last-resort function of the central bank has been deployed vigorously by the world's major central banks; in the United States, furthermore, discount window access was extended to a broader range of institutions. In particular, I find useful to read Robert E. Lucas, Bernanke Is the Best Stimulus Right Now: A zero interest rate isn't the last weapon in the Fed arsenal, Wall Street Journal, December 23, 2008; and Robert E. Lucas' presentation Why a Second Look Matters, at the Council on Foreign Relations, March 30, 2009, New York. The analysis of the lending facilities put in place by the Federal Reserve at early stages of the crisis, although extremely interesting, is beyond the narrower scope pursued in this paper. Madigan (2009) is a superb description of these measures in the early stage of the financial crisis. The story of the initial phase of the crisis has been discussed extensively in many places including the two symposia published in the Journal of Economic Perspectives in the Winter 2009 and Winter 2010 issues of the journal. In addition, two important theoretical references on these issues are Holmstrom and Tirole (2011) and Schleifer and Vishny (2011). Highly recommended analyses of both the role of banks during the crisis and the current (mis-) understanding of banking crises are the books by Duffie (2010) and Gorton (2012), respectively.

increase in communications regarding their use. Late in 2008, with the federal funds rate at its effective lower bound, the 'Committee introduced two nontraditional policy tools – forward guidance regarding the federal funds rate and LSAPs. Both of these tools require communication about the Committee's possible future actions, and this communication has changed over time as the Committee has gained knowledge with these tools.

Before moving into the discussion of these two major new tools at the ZLB, it might seems appropriate to briefly glide the reader over a brief summary regarding the importance of monetary policy rules. This would help in understanding the rationale of these new tools put in place by many central banks, and pioneered by the Federal Reserve.

1. A bird's eye view to 'normal times' monetary policy rules

1.1. Simple instruments rules

Simple policy rules have attracted broad interest because they can provide a clear and easy-to-understand benchmark for adjustments to the short-term interest rate. A policy rule must satisfy the Taylor principle, that is in the event of an increase in the inflation rate by a "x" percent, the nominal interest rate will be raised by more than "x" percent (Taylor, 1999). The remaining aspects of the design and calibration of the policy rule mainly determine the variability of inflation, resource utilization, and interest rates that will be implied by the rule. Given the extent of uncertainty and disagreement regarding the true structure of the economy, the robustness of the performance of policy rules across different macroeconomic models is a critically important characteristic and the subject of considerable research. The literature on this and other topics related to simple policy rules –which was recently reviewed by Taylor and Williams (2011)– has identified several features that govern how rules perform across a range of conventional models. A general result from the literature is that a complicated rule that is optimized to perform best in a particular model may perform very poorly when evaluated in other conventional models. The literature has, however, identified a variety of simple policy rules that are robust in the sense that they perform well across a range of models. Three are the key choices that determine the implications of a simple rule for economic performance. First, what weight should be placed on the output gap? Second, how much inertia or history dependence should the rule exhibit? Third, should the arguments of the rule be current outcomes or forecasts?

— How responsive should policy rules be to the level of resource slack?

The appropriate response to the output gap depends importantly on how the policymakers choose to balance the elements of the dual mandate. For a given model, a more aggressive response to resource utilization can help stabilize both economic activity and inflation in response to adverse shifts in aggregate demand. Inflation shocks and other supply shocks, however, can introduce a tradeoff: A more aggressive response to the gap will increase the volatility of inflation even while reducing the volatility of the gap. Given this tradeoff, the choice of the coefficient on resource utilization in a simple rule essentially amounts to quantifying the term "balanced approach" in the consensus statement. Most model-based work has abstracted from difficulties in measuring resource utilization, and research has shown that allowing for realistic measurement problems tends to reduce the appropriate response to measured slack. The most categorical response to difficulties measuring the output gap would be to follow a rule that does not respond to the level of the gap at all. For example, the first difference rule responds to the change in, rather than the level of, the output gap. Generally speaking, the change in the gap mainly reflects changes in output and so is largely invariant to mismeasurement of potential output.13

— What if any history dependence or inertia should the rule embed?

Inertial interest rate rules, in which the lagged federal funds rate enters into the rule, add weight to developments that occurred more than a few guarters in the past to the current setting of interest rates (and henceforth induce a form of *history-dependence*). A relatively high level of inertia seems consistent with a large empirical literature estimating the Federal Reserve's reaction function in the post-1979 period (as pointed by the evidence in the Taylor (1999) volume). However, it bears emphasizing that the simple rules could deliver considerably better outcomes in the current environment in which the lower bound on the short-term nominal interest rate is binding if they embedded a higher degree of inertia. As we will discuss below, under certain conditions, the optimal policy response under the zero lower bound calls for taking into account past outcomes; that is, following a deep recession and long-lived period at the zero lower bound, such a policy would pledge to keep real interest rates relatively low in the future –and allow the inflation not to fall or even temporarily increase- in order to lower current long-term real interest rates and bring resource utilization, unemployment, and inflation closer to their

¹³ Perhaps the most relevant examination of this measurement issue is the paper by Orphanides (2001) and Orphanides and Williams (2007). Other researchers have shown that responding only to changes in resource utilization and not to the level may be quite costly when the policy rate is near the effective lower bound (Billi, 2011).

objectives in the near-term. Thus, a highly inertial policy rule would capture this history dependence to some degree.

Thus, rules that place a relatively high inertia to current interest rate setting. may have substantial benefits, especially in models in which expectations about future developments play an important role –that is, in models in which financial conditions, spending, and inflation depend importantly on long-term interest rates, expected income, and expected inflation.¹⁴ Even more interestingly, when monetary policy displays inertia, a change in the federal funds rate today signals (or anticipate) a persistent change in the stance of policy, and thus it will promote strong reactions of medium-term and long-term interest rates and other asset prices (this is partly the underlying rationale for 'lower for longer policies' that keep the interest rate at zero over a certain horizon).¹⁵ Yet, to obtain the benefits of history dependence, in particular, the central bank would need to convince financial market participants, households, and firms that its plans to closely follow the rule would indeed be carried out. Because inertial rules at times involve at least modest anticipated overshooting and undershooting of the unemployment and inflation goals, it might be challenging to maintain the credibility required to align expectations with the FOMC's intentions.¹⁶

- Use contemporaneous measures or forecasts in the rule?

Finally we now discuss whether the terms appearing in a rule should be contemporaneous values or forecasts of the output gap, inflation, and other variables. Because the measures of the output gap tend to evolve fairly smoothly, and because our ability to forecast movements in the gap over the medium term is limited, little is gained in moving beyond contemporaneous values or one-quarter-ahead projections of the gap. However, the well-known noisy character of headline price measures makes the situation with inflation somewhat different. The central bank may emphasize the medium-term headline inflation forecasts in order to "look through" transitory fluctuations due to volatile elements, or employ the recent average rate of core inflation as a proxy for the underlying or forecastable component of overall inflation. Research suggests that the former approach has no clear advantage over the latter for

¹⁴ Woodford (2003) studies the under which conditions an inertial rule is an approximation to an optimal rule in certain type of macroeconomic models.

¹⁵ Those reactions can deliver substantial stabilization benefits, as discussed in Levin, Wieland, and Williams (1999), Taylor and Williams (2011), and Woodford (2011). Conversely, inertia-free rules, such as Taylor (1993,1999) fall well short of attaining optimal outcomes in models containing forward-looking expectations—models such as FRB/US and the staff's DSGE models, SIGMA and EDO).

¹⁶ The magnitude of this challenge is an open to question that requires a formal analysis within a model that explain the dynamic of the economy in both normal times and under the zero lower bound episodes. This analysis has been carried out in Gust, López-Salido and Smith (2013) and English, López-Salido and Tetlow (2013).

the performance of simple rules, and may even lead to undesirable results in some cases (Taylor and Williams, 2011). If the central bank were to elevate the role of rules in its external communications, however, each of these approaches for responding to inflation would raise issues. On the one hand, tying policy only to policymakers' subjective forecasts could lead some in the public to question the credibility of the announced rationale for policy. On the other hand, tying policy to any inflation measure other than headline inflation might engender confusion about the actual goal of policy.

- Limits of simple rules: Toward a flexible inflation targeting

Academics and policymakers have frequently looked to the prescriptions of simple rules as useful benchmarks for setting the federal funds rate. Thus, the available theory and evidence on simple rules deal most fully with the implications of such rules when the policy rate is far from the effective lower bound. Unfortunately, as discussed in English, López-Salido and Tetlow (2013), several important considerations suggest that simple rules that are quite successful in normal times may be less reliable under conditions such as those that the US economy is facing nowadays.

Thus, while simple policy rules have virtues, they are obviously no without costs, and it would be useful to have a framework for evaluating when rigidly following a rule is inappropriate. The approach called *forecast-based targeting* deserves consideration as a complement to simple policy rules. Bernanke (2004) refers to this approach as "forecast-based targeting;" Svensson (2003, 2005) instead uses the term "targeting rules."¹⁷ The analysis of the performance of this approach would require the examination of the forecasts of goal variables under various alternative policy rules, and chooses the policy delivering the forecasts that "look best" under the policy objectives (e.g., Svensson, 2003), and in the current context the re-evaluation presented in Svensson (2013)). What gives the idea substance to this approach is the fact that optimal policy generally has implications for how the forecasted paths of goal variables should evolve—and some of these properties hold robustly across a range of models. This is the (theoretical) hallmark of the flexible inflation targeting approach: the emphasis on seeking policy settings that bring both inflation and resource utilization back toward their objectives in the medium term.¹⁸

¹⁷ For a critical comparison with instrument rules, see McCallum and Nelson (2005).

¹⁸ For example, if policymaker preferences are symmetric, so that inflation and unemployment above or below objective are equally costly, then it will tend to be best to provide additional accommodation such that the medium-term projections of inflation and employment come to lie on opposite sides of their long run objectives –i.e., when projected employment is below its objective (so that projected unemployment is elevated), then projected inflation should at some point be (temporarily) above target (see, for example, Woodford (2011) and the simulations presented in English *et al.* (2013)).

- Simple rules in the current environment

The results of the previous section describe rule performance when shocks are of the mild sort experienced during the 20 years before the financial crisis, with the result that the policy rate is almost always far enough from its effective lower bound that the bound can be largely ignored. In contrast, we now turn to discuss why the special features of an economy that has spent an extended period at the *effective lower bound* may justify deviating from the prescriptions of simple rules—even rules viewed as dependable in normal times. In doing that we move the discussion into the first unconventional policy put in place by the Federal Reserve: Forward guidance regarding the future path of the federal funds rate. In fact, the joint deployment of forward guidance and nontraditional asset purchases can be justified on the grounds that it is desirable for policymakers to deploy all tools available when they face a situation in which the federal funds rate is constrained by the zero lower bound and there is a need to stimulate the economy. We now turn the discussion of these tools.

2. Forward guidance

2.1. Theoretical foundations

As defined in Woodford (2008), "forward guidance is communication by a central bank aimed at signaling the likely future path of policy rates."¹⁹ The insights that long-term interest rate behavior reflects expectations about future policy, and that official signals about future short-term interest-rate policy can contribute to economic stabilization, are a longstanding feature of discussions of monetary policy.²⁰ In addition, in the context of New Keynesian macroeconomic models, original work by King (1994) – later also applied to the pre-crisis U.S. monetary policy by Goodfriend and King (2005) and Walsh (2008) among others, observe that the rational expectations revolution made private sector expectations of future monetary policy a major conduit through which policy actions affect aggregate demand in macroeconomic models. In particular, Goodfriend and King (2005) note that the 1994 U.S. monetary policy tightening sequence, at the onset of which the FOMC became explicit about its federal funds target rate, triggered long-rate responses related in important ways to expectations about future policy.

¹⁹ See also Woodford (2012). An insightful analysis of forward guidance in theory and practice is the compilation of papers edited by Den Haan (2013). More broadly, Svensson (2013) noted that ".. 'forward guidance' in monetary policy means providing some information about future policy settings

²⁰ These can be traced back in time quite a bit, see e.g. Radcliffe Committee (1959).

A central role for forward guidance in the context of the zero lower bound was initially emphasized by the theoretical work presented in Eggertsson and Woodford (2003). These authors argue that the output gap can be closed more easily when the central bank promises low future nominal interest rates in particular, a commitment to a short-term nominal interest rate path that generates inflation in coming periods. Higher expected inflation reinforces the impact of low nominal interest rates in producing a path of low real interest rates for the short and medium term. The forward-looking nature of the aggregate demand equation in turn implies that extra output is stimulated today by the lower path of expected future real rates. From this perspective, a policy commitment that may slightly encourage expectations of a period of modest departures from price stability, can secure major benefits in terms of short-term output stabilization. Yet, central banks that have made use of forward guidance in the recent episode have not treated higher expected future inflation as part and parcel of the low interest rate policy. On the contrary, they have reaffirmed their commitment to price stability.²¹

An obvious question that arises is what framework should be adopted in which to make such commitments. As discussed in English *et al.* (2013), a useful analytical perspective consists on using optimal control theory to derive an "optimal" policy path: That is, a trajectory of the interest rate that is obtained by minimizing a specific loss function (e.g., one that depends on the output gap, inflation gap, and perhaps other factors) subject to pre-specified economic model in which monetary policy is both well understood by the public and is fully credible. A significant difficulty with "optimal" rules derived in this setup is that such rules tend to *be very complex* and their performance may be quite sensitive to specific features of the modeling environment. A considerable body of research suggests that four robust features, that also set the seed for considerable caution about its effectiveness, characterize optimal rules that are derived in the presence of an explicit effective-lower-bound constraint.²²

a) First, an optimal rule promises that *future* policy will be more expansionary than usual after the economy no longer faces a binding effective lower bound constraint. Policymakers communicate this promise by indicating to markets that they expect to push output above potential for an *extended period* after the economy no longer faces a binding lower bound constraint. This policy takes full account of dynamic tradeoffs, including the possibility of influencing current expectations about future short rates and inflation through making promises about future policy. This accounts for *exploiting intertemporal tradeoffs*.

²¹ See the discussion in Levin, López-Salido, Nelson and Yun (2010).

²² An excellent analysis of monetary policy in the presence of a zero bound constraint can be found in Woodford (2011, 2012).

- b) As above discussed, a second element is *history dependent*, so that the extent and duration of policy stimulus in the period after the policy rises from its lower bound depends on the evolution of output and prices during the period in which policy was constrained. That is, as an economy facing an effective lower bound constraint becomes mired in a deeper recession, an optimal policy would promise even more stimulus in the future in order to reduce long-term real interest rates. Importantly, history-dependent will become less powerful if expectations regarding interest rates or inflation play little role in stimulating current output.
- c) Third, the timing and size of adjustment of the short-term interest rate after the liftoff date is a function of the evolution of economic conditions, and it is not based on a preset course.
- d) Finally, the role of expectations in such optimal policies implies that such a strategy relies on credible *commitment* and communication that allows the public to understand the policy strategy. In other words, because the benefits of the optimal policy are front-loaded –i.e., reduce long-term real interest rates– while the costs are paid later –potentially overshooting inflation and output objectives– policymakers may have a strong incentive to renege on their commitments (i.e., the policy can be *time inconsistent*). Thus, the credibility of the central bank's commitment is a critical question because the efficacy of strategies that rely on commitment hinge on whether the private sector believes that the central bank will carry through on its promises. That is, a difficulty with commitment-based strategies is that their effectiveness depends on influencing the public's beliefs about the policy as much as a few years ahead.

2.2. The Fed's Implementation

— It is not really a new tool

In certain ways, forward guidance about the policy instrument is not a new tool. As discussed by Walsh (2008), forward guidance was an important part of the Federal Reserve's accommodative policy of 2003-2004. In particular, the FOMC's August 12, 2003, statement referred to maintaining policy accommodation "for a considerable period." Signals about future policy continued in the FOMC's 2004 statements; for example, the January 28, 2004, statement included the observation that the "Committee believes that it can be patient in removing its policy accommodation," and the May 4, 2004, FOMC statement contained the passage, "policy accommodation can be removed at

a pace that is likely to be measured." Bernanke, Reinhart and Sacks (2004) also present an interesting discussion regarding the steps taken by the FOMC during 2003 and 2004. The main aim of that effort was to provide a characterization of the likely future direction of the federal funds rate that can be understood and anticipated by financial market participants and other private sector agents.

— The recent experience

Since late 2008, having brought the nominal federal funds rate down to its effective lower bound, the Federal Open Market Committee (FOMC) has taken steps to provide further monetary policy stimulus. One measure undertaken has been the provision of Committee guidance about the likely future path of the policy rate; for example, the Committee's statements from March 2009 through June 2011 indicated that economic conditions were "likely to warrant exceptionally low levels of the federal funds rate for an extended period" (see, for example, FOMC, 2009). Prior to adopting this statement language, the FOMC had referred for several months to its expectation that an exceptionally low funds rate would be in force "for some time." In August 2011, the FOMC changed the statement language from "for an extended period" to "at least through mid-2013," and then in January 2012 it changed this to "at least through late 2014."

The policymakers, however, were concerned that the use of a date –even if explicitly conditional on economic conditions– could be misunderstood by the public. As a result, the Committee in December 2012 changed the statement language to make the maintenance of a very low federal funds rate explicitly conditional on economic conditions –that is, a *state-dependent* form of forward guidance. Specifically, it indicated that the "exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6.5 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored."

An up-to-date summary of key unconventional policy actions employed by the Federal Reserve during the period is presented in Table 2 that is borrowed from Gilchrist, López-Salido and Zakrajsek (2014). A formal analysis of the possible macroeconomic benefits and costs of employing threshold-based forward guidance is presented in English *et al.* (2013). In addition, Gilchrist, López-Salido and Zakrajsek (2014) investigate the effect of monetary policy surprises during the current zero lower bound on Treasury yields and borrowing costs of businesses and households, as measured by interest rates on corporate bonds and mortgagerelated instruments. These authors compare the effects of policy surprises on

TABLE 2						
KEY UNCONVENTIONAL MONETARY ACTIONS						
Date	Type of Policy ¹	FOMC ²	Highlights			
Nov-25-2008	LSAP	Ν	Announcement that starts LSAP-I.			
Dec-01-2008	LSAP	Ν	Announcement indicating potential purchases of Treasury securities.			
Dec-16-2008	LSAP	Y	Target federal funds is lowered to its effective lower bound; statement indicating that the Federal Reserve is considering using its balance sheet to further stimulate the economy; first reference to forward guidance: " economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time."			
Mar-18-2009	LSAP	Y	Announcement to purchase Treasuries and increase the size of purchases of agency debt and agency MBS; also, first reference to extended period: " interests rates are likely to remain low for an extended period"			
Aug-10-2010	LSAP	Y	Announcement that starts LSAP-II.			
Sep-21-2010	LSAP	Y	Announcement reaffirming the existing reinvestment policy.			
Oct-15-2010		Ν	Chairman's speech at the Federal Reserve Bank of Boston.			
Nov-03-2010	LSAP	Y	Announcement of additional purchases of Treasury securities.			
Aug-09-2011		Y	First "calendar-based" forward guidance: " anticipates that economic conditions are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013."			
Sep-21-2011	LSAP	Y	Announcement of the Maturity Extension Program (MEP).			
Jan-25-2012	FG	Y	Second "calendar-based" forward guidance: " keep the federal funds rate exceptionally low at least through late 2014."			
Jun-20-2012	LSAP	Y	Announcement of continuation of the MEP through end of 2012.			
Sep-13-2012	LSAP	Y	Third "calendar-based" forward guidance: " likely maintain the federal funds rate near zero at least through mid-2015." In addition, first forward guidance regarding the pace of interest rates after lift-off: " likely maintain low rates for a considerable time after the economic recovery strengthens," and announcement of LSAP-III (flow-based; \$40 billion per month of agency MBS).			
Dec-12-2012	LSAP	Y	Announcement of an increase in LSAP-III (from \$40 billion to \$85 billion per month); first "threshold-based" forward guidance: maintain the funds rate near zero for as long as unemployment is above 6.5%, inflation (1–2 years ahead) is below 2.5%, and long-term inflation expectations remain well-anchored.			
Jun-19-2013	FG	Y	Forward guidance lays out plans to start tapering asset purchases later that year (unemployment rate below 7.5%); and end LSAP-III by mid-2014, when the unemployment rate is around 7%.			
Sep-18-2013	FG	Y	"Asset purchases are not on a preset course"			
Mar-19-2014	FG	Y	Dropped the reference to the threshold, and referenced to the Consensus Statement.			
Notes: 1 LSAP = associated with LSAP policies; FG = associated with forward guidance policies.						

 2 Y = an announcement associated with a regularly-schedule FOMC meeting; N = an intermeeting policy announcement.

market interest rates during the period of *conventional policy* actions and *during the period in which the target federal funds rate is at the zero lower bound*. They found supporting evidence that expansionary monetary policy flattens the nominal yield curve, and that expansionary monetary policy significantly reduces real borrowing costs for investment-grade firms and that policy easing during the unconventional policy period imply an effect on real corporate borrowing costs that is three times as large as during the unconventional policy regime for a commensurate movement in the 2-year Treasury yield. Monetary policy also reduces the real cost of household finance, as measured by movements in the real yields on mortgage-related instruments. Williams (2013) nicely summarizes the substantial effects of explicit forward guidance regarding the path of the federal funds rate on financial market expectations.

3. Large-Scale Asset Purchases (LSAPS)

3.1. Theoretical foundations

The rationale underlying LSAPs was predicated on the assumption that the relative prices of financial assets are to an important extent influenced by the quantity of assets available to investors. In this section we outline the main channel through which LSAPs might work.²³

- Market segmentation: Preferred habitat models

Economic theory suggests that changes in the central bank's holdings of long-term securities will affect long-term interest rates if private investors have a preference for keeping a portion of their portfolios in the form of such securities, a notion formalized by the "preferred habitat" models.²⁴ A key ingredient of these models is the presence of a form of *market segmentation* underlying that

²³ Further discussion can be found in D'Amico, English, López-Salido and Nelson (2012).

²⁴ The research literature that has advanced the notion that the expectations theory of the term structure does not completely govern the relation between short-term rates and long-term rates is the work on "preferred habitat," starting with Modigliani and Sutch (1966). These theories have received renewed attention and micro foundations in the work of Andrés, López Salido, and Nelson (2004) and Vayanos and Vila (2009). Krishnamurthy and Vissing-Jorgensen (2011) introduce a "safety premium channel," under which a segmented demand for long-term safe assets tends to lower yields on those securities. This can be thought as part of the preferred-habitat literature. Policymakers, in their communication of the likely effects of LSAPs on longer-term interest rates, have repeatedly invoked the preferred-habitat models of interest rate determination, as the canonical arbitrage-free term structure framework leaves essentially no scope for the relative supply of deeply liquid financial assets –such as nominal Treasuries– to influence their prices (see Kohn (2009) and Yellen (2011)).

financial assets are imperfect substitutes in some financial market participants' portfolios. Thus, in this framework a reduction in the stock of securities of a particular maturity in the hands of private investors creates a shortage of those assets that cannot be wholly relieved, at existing asset prices, by substitution with other types of securities or assets. This shortage thus prompts an adjustment of financial market prices. Sometimes this mechanism is referred as inducing a *scarcity effect* that may persist and spread over time, and that it could be manifested in government bond rates (prices) for a particular maturity.

If some market participants are inclined to keep a fraction of its investments in the form of long-term fixed-interest debt such as Treasury securities, on the grounds that these assets have characteristics not shared by alternative longer-term investments-namely, the absence of default risk and a high degree of marketability. Then, in light of investors' preference for longerterm government paper a reduction in the supply of long-term government debt (because of an intervention of the policymaker) relative to the supplies of other financial assets will, all else equal, lead to a decline in government bond yields in order to induce investors to decrease their holdings of such obligations; conversely, an increase in the supply of long-term government debt will boost bond yields.

— Liquidity and expectations

Krishnamurthy and Vissing-Jorgensen (2011) also refer to the "liquidity channel," under which the downward pressure on long-term rates of longterm asset purchases emerges as reserves (liquidity) become plentiful relative to long-term bonds. In addition, Krishnamurthy and Vissing-Jorgensen (2011) and Gilchrist, López-Salido and Zakrajsek (2014) also introduce an "inflation channel." under which long-term asset purchases may induce changes in the inflation expectations. The reaction of inflation expectations, however, can be viewed as a consequence of the operation of the preceding channels, rather than as a channel in its own right. There is some evidence that purchases, by suggesting that the Federal Reserve has "skin in the game" may help to make forward guidance regarding the federal funds rate more credible to market participants (see, e.g., Woodford, 2012b; Bauer and Rudebusch, 2011). Thus, the mere announcement of promises of future funds rate actions might be insufficient to successfully obtain the benefits today of the planned policy. In that case, a visible action, like the expansion of the balance sheet, may help to convince the public that the Federal Reserve will carry through on its promised degree of policy accommodation.

— Fire sales

Financial crises highlight the importance of how financial intermediation and financial frictions will amplify economic fluctuations, whereby falling asset prices deteriorate financial intermediaries' balance sheets henceforth induce a tightening of financial conditions (financial constraints in the jargon of economic models) and contribute to fire sales (i.e., forcing a reduction in the price of assets below (or substantially) its fundamental value or normal times value). The reduction in the value of assets diminishes the ability of non-financial firms to post collateral and borrow in the capital markets undermining real investment.²⁵ In addition, the deterioration of banks' net worth reduces the ability to extend credit -the so-called bank lending channel of monetary policy (e.g., Bernanke and Blinder (1988)- accounting for substantial investment reduction during the crisis. These mechanisms create a vicious cycle of circumstances that mutually reinforced and that induces waves of asset's liquidation and sudden stops in (short-term) funding that amplifies the original shock triggering the crisis. The purchase of mortgages and bonds of the government sponsored enterprises is aimed at stopping this vicious cycle, and it could potentially lead to virtuous cycle through two mechanisms. First, by reducing or avoiding fire sales asset purchases by the central bank (or other government institution) tend to minimize asset price dislocations. Second, these policies might alleviate that financial institutions would prefer speculation (carry-trade strategies) or liquidity hoarding (flight to safety and precautionary preference for liquidity) to new lending when markets are dislocated. Shleifer and Vishny (2011), and some of the references therein, surveyed the virtuous cycle that arise from government security purchases as market liquidity improves (see also Bernanke (2009)).²⁶

3.2. The Fed's implementation

- It's not really a new tool

The notion that central bank operations in longer-term debt markets can affect long-term interest rates for a given path of expected short-term interest rates has a venerable history. Central bankers in the early postwar decades frequently argued that long-term investments were not equivalent to a sequence of short-term investments, with one senior Federal Reserve official contending

²⁵ Bernake and Gertler (1989) and Kiyotaki and Moore (1997) are two of the most relevant references to this literature.

²⁶ See also the analysis in Holmstrom and Tirole (2011) and Diamond and Rajan (2011). For non-academic readers the *Epilogue* in Holmstrom and Tirole (2011) constitutes one of the best dissections of the different pieces underlying the subprime crisis.

that "any decision to borrow or lend a given dollar amount has much greater significance when it is taken in a long-term market" (Riefler, 1958).

Section 14 of the Federal Reserve Act describes in these terms the open market operations which the Federal Reserve may conduct: "any bonds, notes, or other obligations which are direct obligations of the United States or which are fully guaranteed by the United States as to the principal and interest may be bought and sold without regard to maturities but only in the open market."27 The law's wording, "without regard to maturities," helps put the recent purchase program into proper perspective. Compared with the previous decades' focus on short-term interest rate policy, LSAPs do mark a break with convention. But viewed in terms of the tools that the Federal Reserve has historically had at its disposal, and has had occasion to deploy, LSAPs might not necessarily amount to an unconventional policy. Rather, they can be seen as the latest in a series of Federal Reserve operations in longer-term securities markets. And, in common with short-term interest rate policy, the aim of these operations has been to affect aggregate demand by influencing longer-term interest rates. D'Amico et al. (2012) puts LSAPs in historical context by reviewing the Federal Reserve operations in long-term markets in the postwar period. The next section reviews the chronology of the recent LSAPs as well as the recent empirical evidence supporting its effectiveness.

— The recent experience

The FOMC provided further monetary policy accommodation by authorizing a series of Federal Reserve purchases of longer-term securities, a policy known as "large-scale asset purchases" (LSAPs). The first program of LSAPs was announced in late November 2008, from which time the Federal Reserve purchased agency debt and agency-guaranteed mortgage-backed securities (MBS). In March 2009, the purchase program was stepped up and was also broadened to include longer-term Treasury securities. The first round of purchases was completed in March 2010. The next development in the Federal Reserve's purchases policy was the FOMC's announcement in August 2010 of reinvestment arrangements, under which the Federal Reserve -by redeploying into longer-term Treasury investments the principal payments from agency securities held in the System Open Market Account (SOMA) portfolio- would maintain the elevated level of holdings of longer-term securities brought about by the first series of LSAPs. From November 2010 to the end of June 2011, the Federal Reserve undertook a second LSAP program involving the purchase of \$600 billion in longer-term Treasuries. The FOMC decided to continue to maintain the level of securities

²⁷ See http://www.federalreserve.gov/aboutthefed/section14.htm

An overview of recent changes in the Federal Reserve's monetary policy

TABLE 3 EMPIRICAL ESTIMATES OF LSAP EFFECTS							
Modigliani-Sutch (1966, 1967)	Operation Twist	time series	0 bp (±20 bp)				
Bernanke-Reinhart-Sack (2004)	Japan, U.S.	event study	400 bp (±370 bp), 40 bp (± 60 bp)				
Greenwood-Vayanos (2008)	post-War U.S. (pre-crisis)	time series	14 bp (±7 bp)				
Krishnamurthy-Vissing-Jorgensen (2011, 2012)	post-War U.S., QE1, and QE2	time series	15 bp (±5 bp)				
Gagnon-Raskin-Remache-Sack (2011)	QE1	event study, time series	30 bp (±15 bp), 18 bp (±7 bp)				
	QE1 Treasury purchases	security-specific event study	100 bp (±80 bp)				
D'Amico-King (2013)		study					
Hamilton-Wu (2011)	U.S., 1990-QE2	affine no-arbitrage model	17 bp				
Hancock-Passmore (2011)	QE1 MBS purchases	time series	depends, roughly 30 bp				
Swanson (2011)	Operation Twist	event study	15 bp (±10 bp)				
Joyce-Lasaosa-Stevens-Tong (2011)	U.K. LSAPs	event study, time series	40 bp				
Neely (2013)	effect of U.S. QE1 on foreign bond yields	event study	17 bp (±13 bp)				
Christensen-Rudebusch (2012)	QE1, QE2, and U.K. LSAPs	event study, affine no-arbitrage model	10 bp				
D'Amico-English-Lopez-Salido- Nelson (2012)	U.S., pre-crisis	weekly time series	depends, roughly 45 bp				
Bauer-Rudebusch (2013)	QE1, QE2	event study, affine no-arbitrage model	16 bp				
Li-Wei (2013)	U.S., pre-crisis	affine no-arbitrage model	26 bp				

Sources: Modigliani-Sutch (1966, Sections 3-4), Bernanke-Reinhart-Sack (2004, Table 7, Figure 6, and author's calculations), Greenwood-Vayanos (2008, Table 2), Krishnamurthy-Vissing-Jorgensen (2011, Section 4), Gagnon *et al.* (2011, Tables 1-2), D'Amico-King (2013, Figure 5), Hamilton-Wu (2011, Figure 11), Hancock-Passmore (2011, Table 5), Swanson (2011, Tables 3), Chung *et al.* (Figure 10), Joyce *et al.* (2011, Chart 9), Neely (2013, Table 2), Bauer-Rudebusch (2013, Table 6), Christensen-Rudebusch (2012, Table 8), D'Amico *et al.* (2012, Conclusions), Li-Wei (2013, Tables 3, 6). Almost all of these estimates involve author's calculations to renormalize the effect to a \$600 billion U.S. LSAP.

holdings attained under the LSAPs, and in September 2011 the Committee made further adjustments to its investment policy including a shift toward a longer average maturity for its Treasury securities portfolio, and reinvesting principal payments from agency securities in MBS rather than longer-term Treasuries. The existing open-ended purchase program did not feature a fixed expected size. The December 2012 FOMC Statement indicated that the purchases would continue until "the outlook for the labor market" improved "substantially" in a context of price stability.²⁸

We close this section by summarizing the effects of balance sheet policies. In particular, Table 3, borrowed from Williams (2013), nicely summarizes the substantial recent research literature that has tried to quantify the effects of balance sheet policies on asset pricing. An important lesson of the analyses portrayed in Table 3 is that the overall stance of monetary policy has been more stimulative than would be suggested by the level of the short-term interest rate alone. In addition, there is some evidence that purchases have provided appreciable stimulus to real activity as well helped to check disinflationary pressures (see, for instance, Chung *et al.*, 2012).

V. SOME CONCLUSIONS AND CHALLEGES AHEAD

This paper has summarized the recent changes to Federal Reserve's policy framework in recent years. These changes have moved the Federal Reserve considerably closer to a "flexible inflation targeting" framework that takes account of the consequences of their actions for the real economy as well as inflation (English *et al.* (2013) and Bernanke (2012)). First, the dual mandate has played a significant role in the communication of the Committee's policy framework and intentions. Thus, the FOMC has clearly expressed it objectives for both employment and inflation and described its balanced approach for attaining those objectives in its Statement on Longer-Run Goals and Monetary Policy Strategy. Second, the Federal Reserve has flexibility regarding the horizon over which it aims to return inflation to its longer-run goal.

While the Federal Reserve and other major central banks have made significant changes to their monetary policy frameworks in recent years, it is to be expected that these frameworks will continue to evolve. Going forward, further changes in central banks' frameworks may be needed to address issues raised by the financial crisis.

²⁸ English *et al.* (2013) provide some discussion regarding the cost and benefits of the current LSAP program.

Several challenging issues remain. The first one pertains to the ongoing efforts in improving communication in monetary policy. Adding transparency and clarity about its objectives and its outlook for the economy, central bank communications help provide the public with guidance about the future. And, as former Chairman Bernanke indicates "to the extent that we can clearly communicate what we are trying to achieve, investors can better understand our objectives and our plans, and that can make monetary policy more effective." (e.g., Bernanke, 2013c). But providing guidance might carry some risks. In particular, if communication comes with the risk of oversimplifying and confusing rather than adding clarity it might create unnecessary uncertainty. As noted by Yellen (2013) the "Federal Reserve continues to reap the benefits of clearly explaining its actions to the public. I believe further improvements in the FOMC's communication are possible, and I expect they will continue."²⁹

The second one, following the crisis and the great recession, pertains to the fact that policymakers and researchers need to consider how to address possible threats to financial stability. Traditionally, central banks have had both monetary stability and financial stability objectives. In fact, the Federal Reserve was founded in large part to address the bank runs that had occurred over the previous half century, and which had proven costly and disruptive. In contrast, its monetary policy objectives emerged clearly only over time (Bernanke, 2013a and 2013b). But, in the decades running up to the financial crisis, central banks focused most of their attention on macroeconomic stability, with financial stability playing a secondary, supporting role (Bernanke, 2011). During this period, many policymakers believed that monetary policy decisions could generally be made independent of financial stability considerations. In order for monetary policymakers to employ monetary policy to address financial stability concerns, three conditions would need to be met (Kohn, 2008): First, policymakers would need to be able to identify a building imbalance. Second, policymakers would need to judge that tighter monetary policy could help to limit the imbalances. And third, the use of monetary policy to address the imbalance would need to vield improved outcomes in terms of the policymakers' objectives for employment and inflation. These are not easy tasks, but future analysis and policymaking will help on the need to broaden monetary policy frameworks to include financial stability considerations.

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²⁹ See also Yellen (2014a).

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APPENDIX

THE COST AND BENEFITS OF LOW INFLATION

The main purpose of this section is to present a summary of academic analyses regarding the costs and benefits of an average relatively low inflation rate. The discussion focuses on changes in fully anticipated inflation –the rate of inflation to which the private economy has adjusted its long-run expectations. Rather than considering the analysis of reducing a sizeable inflation rate (a double-digit rate, for example), the note focuses on the welfare impact (as percent of GDP) of lowering inflation from a low to moderate rate of 2 percent to achieve the constant price index associated with a zero percent inflation rate. In assessing the possible benefits and costs of lower inflation there are three main channels through which steady-state inflation may distort the efficient allocation of resources: holdings of real money balances, the level and allocation of capital, and the dispersion of relative prices. In contrast, there are two main channels through which zero steady-state inflation may erigidities, and the zero lower bound on the nominal interest rate. These two features might generate a non-vertical long-run Phillips curve implying important unemployment costs of a one-time permanent reduction of even a fairly low inflation rate.

The Table A below summarizes the benefits and costs of reducing the inflation rate from two percent to zero suggested by the recent academic literature. Depending on which of these specific channels is emphasized, an upper bound for the total welfare benefits would be 2.2 percent of GDP, while an upper bound for the total welfare costs is around 1.6 percent of GDP. Thus, the net benefits could be substantial, zero, or even negative. No consensus can be extracted from the literature, and the balancing of costs and benefits requires a rich macroeconomic model that incorporates the interaction among these mechanisms along with the specification of a monetary policy strategy. In addition to allowing an evaluation of the benefits and costs of disinflation, such a model could also be used to quantify the transitional dynamic costs associated with achieving the zero inflation, which are not considered in the current analysis. In this sense, further research will be needed to empirically evaluate issues regarding the costs of reducing inflation expectations to zero and maintaining it around the new zero steady-state rate.

APPENDIX (continued)

TABLE A

THE WELFARE ANALYSIS OF REDUCING STEADY-STATE INFLATION FROM 2 PERCENT TO ZERO

Potential Benefits and Costs	Estimates (% of GDP)	Source
Benefits		
Money Demand Frictions	0.2	Lucas (2000)
	0.1	Feldstein (1997)
	0.02	Attanasio, Guiso, Jappelli (2002)
	0.3	English (1999)
	0.5	Lagos and Wright (2005)
Fiscal Considerations	1.0	Feldstein (1999)
Relative Price Distortions	0.7	Levin, Lopez-Salido, Yun (2006)
Cost		
Downward Nominal Wages	1.5	Akerlof, Dickens, Perry (1996)
	0.3	Kim and Ruge-Murcia (2009)
	1.3	Fagan and Messina (2009)
	[6,∞)	Benigno and Ricci (2011)
Zero Bound Constraint	0.2	Coenen, Orphanides, Wieland (2004)

Note: In some cases the numbers have been obtained through linear extrapolation of the original range of disinflation considered by the author/s. The row 'Lagos and Wright (2005)' corresponds to the average of the interval of their calculations – [0.39-0.65]. The number attached to Fagan and Messina is derived it by measuring the change in their Figure 14. Benigno and Ricci's number corresponds to a decline in wage inflation, not headline inflation.

PART II

Similarities and differences among the policies of the four big central banks
THE CHALLENGES FOR MONETARY POLICY IN ADVANCED ECONOMIES AFTER THE GREAT RECESSION¹

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I. INTRODUCTION

More than five years have passed since Lehman Brothers went bankrupt in September 2008 –the critical point in the international financial crisis– and the stance of monetary policy remains highly accommodative in the major central banks. Official interest rates continue to be close to zero and there are numerous unconventional actions in force. In fact, in 2013 new measures were adopted in the major advanced economies given the weak activity, uncertainty about the financial system and price stability. For example, in April 2013 the Bank of Japan changed its instrument from an overnight interest rate to the monetary base in order to achieve an inflation target of 2% and during its monetary policy meetings in July and August 2013, respectively, both the European Central Bank (ECB) and the Bank of England provided *forward guidance* as they communicated to the market their intention to keep official interest rates at low levels for an "extended period of time."

However, in 2014 the beginning of the process of monetary policy normalisation can already be felt when considering that the extension of the extraordinary measures might have more costs than benefits. In fact, in January 2014 the Federal Reserve initiated a gradual process of reducing the monthly volume of asset purchases. On the other hand, the progress of recovery in the U.S. and UK has led to bring forward the expected date, according to market expectations, for the first hike in official rates. On the contrary, in Japan and the euro area, no increases in official rates are being considered in the near future. In fact, measures to increase the expansionary nature of monetary policy in both economies are being contemplated.

¹ We are grateful for comments and feedback from Enrique Alberola, Fructuoso Borrallo, Pedro del Río and participants at an internal Banco de España seminar that took place in November 2013 and for the technical support of Sonia López and Irene Pablos. The views expressed in this article are our own, and do not necessarily represent those of Banco de España.

The potential impact of the removal of these extraordinary actions in some central banks generates someuncertainty among economic agents given its size and the time period that they have been in force. In fact, the beginning of the debate on the possible normalisation of the monetary policy stance by the Federal Reserve in May 2013 triggered a significant increase in volatility in financial markets, a sharp rise in sovereign bond yields in the United States and a shift of investment from riskier assets including significant capital outflows from emerging countries. This episode-which has had some replicas following it – foresees the complexity associated with the withdrawal of unconventional measures.

This article systematically analyses the changes since the beginning of the crisis on the monetary policy strategy of the central banks in the major advanced economies: the Federal Reserve (Fed), the Bank of England (BoE), the Bank of Japan (BoJ) and the European Central Bank (ECB). A comparison is made of the main measures adopted considering that each central bank has modulated the response depending on the depth of the crisis in each area, the different nature of their financial systems as well as on their own objectives and institutional structures. The article places a special emphasis on the theoretical support provided by academic literature on the use of these new instruments and on the available empirical evidence about the effects on financial markets and on the level of activity. An overview of the main risks of the current period of monetary expansion and the questions about the exit strategy is also made as they may affect the price stability target and question the central bank independence.

As the assessment on the effectiveness of unconventional measures and the risks associated with their use is still open, the settings of monetary policy in the future are to some extent uncertain. Also, it must be taken into account that there is no precedent for monetary actions of this magnitude, so prolonged in time and with such a vast geographical reach. In fact, according to all studies, the absence of a proper monetary policy in the earlier international crisis of a comparable size, the Great Depression of the 1930s, contributed to the lengthening of the period of low growth and high unemployment. And the assessment of the only recent precedent of some of these actions, in Japan following the bursting of its asset bubble in the nineties – is not very encouraging.

Beyond the analysis of the extraordinary monetary measures introduced in recent years, this article tries to reflect how the challenges that monetary policy has faced during the development of the global financial crisis are resulting in a review of the current paradigm of monetary policy. Arguably these challenges, while they have not weakened the belief that price stability is the best contribution that monetary policy can make to social welfare, have stimulated the creation of new instruments to respond to complex situations and, more importantly, they have shown that maintaining price stability is not a sufficient condition to preserve financial stability. Therefore, increasing importance is given to monitoring variables such as credit or the price of real estate assets and their influence on macroeconomic and financial stability. In this context, it has proved essential to define a new operational framework for macroprudential policy that addresses the financial risks of a systemic nature and an appropriate institutional design to internalise the interactions between monetary and macroprudential policies.

The rest of the article is organised as follows. The following section summarises the existing consensus as well as some disagreements over the way monetary policy was carried out in the lead-up to the global financial crisis. The third section compares the main lines of action by central banks since the beginning of the crisis as well as the supporting theoretical arguments and the empirical evidence on its effects. The fourth section describes the risks associated with the continuation of existing unconventional measures, exit strategies are discussed and uncertainties and risks associated with them are raised. The fifth section analyses the interactions between monetary and macroprudential policies. The article concludes with a brief reflection on the future of monetary policy in light of the recent changes in its management.

II. MONETARY POLICY IN THE PERIOD OF THE GREAT MODERATION

In the long period of sustained growth and low and stable inflation that preceded the Great Recession, a widely shared view about how monetary policy should be conducted, for which some authors have coined the term "Jackson Hole consensus," was conceived. This referred to the conference of central bankers and academics organised annually by the Federal Reserve Bank of Kansas, whose discussions helped forge this consensus (Bean *et al.*, 2010).

According to this view, the primary objective of monetary policy should be to maintain price stability and it should be conducted by an independent central bank, which could act without being subjected to the pressures of the political cycle. Thus, central banks –mainly those of advanced economies, but also increasingly those from emerging economies– adopted a *flexible inflation targeting strategy*. This framework provided for a commitment to keeping the inflation rate around a target not always explicit, in the medium term.

Under this general approach, however, there is room for variations. On the one hand, some central banks adopted a *formal inflation targeting strategy*,

which is the result of a set of elements: explicit recognition of price stability as the primary objective of monetary policy, public announcement of a quantitative target, analysis of a wide range of information in the decision-making process including inflation expectations, transparency in decision-making and existence of accountability mechanisms. Monetary policy schemes of other central banks –the Federal Reserve, the European Central Bank and the Bank of Japan, among others– shared many of the essential features mentioned above, but not all, for which they are not usually considered strictly as central banks that have a formal inflation targeting strategy.² In any case, the management, in practice, of these monetary policy strategies considered, in most cases, central banks having discretion to decide on how fast inflation would return to its target following a shock that would have resulted in such a deviation.

Another of the widely shared ideas is that the targets of price stability and financial stability are complementary, and in general, there are no conflicts between them. In other words, there was the conviction that the policy designed to stabilise inflation and the output would in turn help stabilise asset prices. In any case, there was a tendency to rule out using monetary policy to burst asset prices bubbles because on the one hand, there was a lack of trust on the ability of authorities to be able to identify, before the market, the existence of a bubble (i.e., an increase in the price of an asset not justified from the performance of its fundamentals) and, secondly, although it could be identified, it was considered that monetary policy instruments were too crude to prevent its development. Thus, the dominant approach to address the possible formation of bubbles, whose clearest example was the policy of the Federal Reserve in respect of the technology bubble of the early century, was a strategy of "benign neglect" and "mop up after," i.e. a passive role of the central bank with respect to the formation of the bubble and decisive action, by providing the necessary liquidity, once this has exploded to mitigate the spreading effects to the real economy (Greenspan, 2002; Blinder and Reis, 2005).

In retrospect, although several factors contributed to the prolonged period of macroeconomic stability that preceded the current crisis, known as *the Great Moderation*, there is a broad consensus on the important role played by the new regime of monetary policy (Bernanke, 2004). It is true, however, that this assessment faces the usual criticism of endogeneity: the adoption of this strategy, in many cases, is part of a prior process of a broader set of reforms aimed at achieving macroeconomic stability.

² The Federal Reserve has a dual objective: price stability and full employment. The European Central Bank (ECB) has as its primary target price stability, but in its two pillar strategy it gives a prominent role to monetary aggregates. The Bank of Japan until recently has not had an explicit inflation target.

However, the outbreak of the financial crisis contributed to the questioning of the paradigm in monetary policy that had formed in previous decades. The absence of inflationary pressures allowed the prolonged maintenance of very low interest rates but at the same time, a number of financial imbalances started accumulating, related largely to the unsustainable growth in house prices.³

Many authors have noted the importance of financial innovation and the resulting deficiencies in financial regulation and supervision in the creation of the crisis in many developed countries in the period prior to the Great Recession. So among the many factors cited is the originate-to-distribute banking model that led to less rigour in the provision of credit, the existence of institutions considered as "too big to fail," inadequate incentives of rating agencies, executives' remuneration models which favoured excessive risk-taking, growing global imbalances, the complexity of some financial innovations and the increasing interconnectivity among financial institutions.

In any case, the two main objections to the existing paradigm of monetary policy before the crisis have been its passiveness during the formation of bubbles and its inability to avoid falling into a situation of zero policy rates.

— Formation of bubbles: "Leaning against the wind" versus "Benign neglect"

The success of the Fderal Reserve's strategy after the technology bubble burst seemed to have reinforced the suitability of the *benign neglect* strategy described above in managing speculative processes in asset markets. However, the magnitude of the financial imbalances accumulated prior to the current crisis and the depth of the crisis have reopened the debate on what the response of monetary policy to the formation of a bubble should be. Although there are some principles on which there is a common vision –asset prices should not be part of the monetary policy target; central banks should not try to prick a bubble and if it bursts they must act decisively to mitigate its effects–, the role of central banks in the formation phase of the bubble is more controversial. Thus, some authors –prominently those linked to the BIS (Bank for International Settlements)– have advocated for more activist "leaning against the wind" type policies to address the emergence of financial imbalances (Borio and Lowe, 2002; Rajan, 2005; White, 2006, and Borio, 2012).

In any case, both views agree on the importance of strengthening macroprudential regulation and oversight, aimed at preserving financial stability. However, as will be seen below, given the limitations of macroprudential

³ Authors such as Taylor (2007) argue that an excesive accommodative monetary policy contributed to the accumulation of imbalances.

instruments, the possible use of monetary policy to put a break on the build-up of financial imbalances is still under debate.

- Near-zero policy interest rates (zero lower bound)

During the Great Moderation, with inflation targets of central banks in advanced economies around 2 % –somewhat higher on average in the case of targets set in emerging economies–, it was considered that the likelihood for nominal official interest rates to be near-zero –and thus using up the headroom of conventional monetary policy to counter underlying deflationary pressures or to stimulate activity– was quite low.

However, the situation experienced in Japan since the nineties until well into this century in which official interest rates were near zero and the economy was in depression provided food for thought about the possibility of getting into this type of situation. The recent crisis has proved that the probability of this phenomenon (referred to as zero lower bound) was greater than previously thought as currently official interest rates in a fair number of advanced economies have bottomed out.

This has reopened the debate on a possible change in the objectives of the central bank. Among the supporters of keeping inflation targets, some advocate for setting somewhat higher values, among other reasons to create more space for rate cuts if needed (Blanchard *et al.*, 2010 and Ball, 2013). For example, given an equilibrium level of the real interest rate, an increase in the inflation target from 2% to 4% means that a greater fall in nominal interest rates is needed to reach the zero lower bound. However, central banks unanimously oppose to such change, pointing out the greater difficulty that monetary policy would face to stabilise inflation and inflation expectations at higher levels, as well as the reputational damage associated with this change.

III. CENTRAL BANKS' POLICY MEASURES SINCE THE ONSET OF THE CRISIS

In normal times monetary policy, in general, sets a short-term interest rate. Central banks have a direct effect, through open market operations, on interest rates in money markets where banks lend and borrow and on the liquidity of the financial system. Changes in these variables end up being transmitted to the relevant interest rates for households and businesses and to prices of financial assets, the wealth of agents and the exchange rate, affecting ultimately, expenditure decisions and real activity. The global financial crisis severely damaged the monetary transmission mechanism in most advanced economies. Between Summer of 2007 and Autumn of 2008 central banks adopted a number of measures to support liquidity, which reached unsuspected limits after the bankruptcy of Lehman Brothers: they included, among others, expansion and changes of maturities of the standard lines of liquidity and collateral requirements and the introduction of new temporary liquidity facilities. And as lenders of last resort, central banks tried to avoid liquidity problems resulting in a solvency crisis. Table 1 shows liquidity provision measures taken by major central banks.

The manner in which economic agents in the various economies are financed determined the nature of these measures. For example, the importance of capital markets as a funding mechanism in the case of the U.S. and UK prompted the Federal Reserve and the Bank of England to intervene directly in the markets, while the greater relative importance of banking systems in financial intermediation explains the actions of the Bank of Japan and the ECB which were aimed at providing liquidity to banks.

Also the bilateral *currency swaps* of the Federal Reserve and the ECB with other central banks played a major role in the acute phase of the crisis. One lesson learned through the crisis, therefore, is that financial markets are so globalised that it is not enough to provide liquidity in its own currency.

These programs were effective because they brought panic movements to a halt among creditors of different types of financial institutions and restored the functioning of markets, significantly reducing the risk of a lack of liquidity. In fact, when markets were returning to normal (already back in 2009 for both the U.S. and UK), most of these programmes were abolished as borrowing from central banks ceased to be attractive to financial institutions. Currently only some programs offered by the ECB survive given the ongoing crisis in the euro zone which has remained dysfunctional in some segments of the financial system.

The extraordinary liquidity provision, which was instrumental in the early stages of the crisis, was accompanied by a reduction in official interest rates by major central banks in order to support activity. Thus, in late 2008 and early 2009, policy rates in general reached, as can be seen in Figure 1, the lower limit of 0%.

But once the major central banks had used up their usual instruments downwards and the recovery of the economy remained weak, it became necessary to resort to new unconventional instruments among which three

	TABLE 1		
	MAIN EXTRAORDINARY MEASURES O		
	Program	Announcement	Duration
Federal Reserve*	Provision of liquidity to banks and other find	ancial institutions	
	Term Auction Facility (TAF) Primary Dealer Credit Facility (PDCF) Term Securities Lending Facility (TSLF)	Dec-07 Mar-08 Mar-08	Dec-07 to Apr-10 March-08 to Feb-10 March-08 to Feb-10
	Provision of liquidity directly to porrowers a	<u>na investors</u>	
	Commercial Paper Funding Facility (CPFF)	Oct-08	Oct-08 to Feb-10
	Market Mutual Fund Liquidity Facility	Sept-08	Sept-08 to Feb-10
	Money Market Investor Funding Facility	Oct-08	Oct-08 to Oct-09
	Term Asset-Backed Securities Loan Facility (TALF)	Nov-08	Mar-09 to June-10**
ECB	Auction at fixed rate with full allotment Extension of the maturity of the longer-	Oct-08	Oct-08 to mid-2015
	term refinancing operations (LTROs) to 6 months and then to 12 months Broadening of the list of eligible collateral	Apr-08/Jun-09	
	in refinancing operations Two extraordinary LTROs due at 36	Oct-08	
	months and with a prepayment option after 1 year Reducing the cash reserve ratio from 2%	Dec-11/Feb-12	
	to 1%	Dec-11	Jan-12 to
Bank of Japan	Easing of the Securities Lending Facility	Oct-08	
	Introduction of the Complementary	Oct-08	
	Increase in the frequency and size of repo	Oct-08	
	Provision of subordinated loans to banks	Mar-09	
Bank of England	Special Liquidity Scheme	Apr-08	Apr-08 to Jan-12
	Discount Window Facility	Oct-08 Mar-08	Uct-U8 to Mar-08 to
	Extended Collateral Term Repo	Dec-11	Jun-12 to
Notes: (*) Other programs and liquidity facilities were Maiden Lane LLC and Maiden Lane II and III. (**) Date of last transaction but loans not yet due. Sources: U.S. Federal Reserve, European Central Bank, Bank of England, Bank of Japan.			

Part II: Similarities and differences among the policies of the four big central banks



can be highlighted: i) purchases of financial assets and changes in the balance sheets of central banks; ii) changes in communication policy including that known as *forward guidance*; and, iii) credit facilities to the banking system. In the following subsections this set of unconventional measures are described and it is explained how they have helped, first, to avoid the financial collapse and then to support the sluggish recovery in all developed countries.

1. Purchases of financial assets and changes in the balance sheets of central banks

Beyond the extraordinary measures to provide liquidity, central banks began to implement in the early stages of the crisis quantitative easing programs (also known as "QE") that have followed on from each other with specific features, but in all cases have caused their balance sheet to expand. The assets that have been acquired have depended on the different circumstances under which each of these institutions operates and the targets pursued by these programs, supporting the recovery of activity or the re-establishing the monetary transmission mechanism affected by malfunctions in some segments of the financial markets. The different asset purchase programs by major central banks launched since the beginning of the crisis are shown schematically in Table 2.

These programs differ in the type of assets, maturity and duration. As a result of these differences, the impact thereof on the amount and composition

			TABLE 2		
		MAIN FINAN	ICIAL ASSETS PURC	HASE PROGRAMS	
	Program	Announcement date	Duration	Description / Volume	Balance sheet expansion?
Federal Reserve*	Large-Scale Asset Purchases	Nov-08	Dec-08 to Jul-10	Purchase of GSE agencies' debt for \$100 billion	Y
	(LSAP) 1		Jan-09 to Jul-10	Purchase of mortgage- backed securities (MBS) guaranteed by the GSEs for \$ 500 billion	Y
	LSAP 1- Extension	March-09	March-09 to March-10	Additional GSEs agencies'debt purchases for \$ 100 billion (finally just \$ 75 billion) *	Y
			Jan-09 to Jul-10	Purchases of additional mortgage-backed securities (MBS) guaranteed by the GSEs for \$750 billion	Y
			March-09 to Oct-09	Purchases of federal public debt for \$ 300 billion	Y
		Aug-10		Reinvestment of maturing debt of the GSEs, MBS and federal public debt in federal public debt	Ν
	LSAP 2	Nov-10	Nov-10 to June-11	Purchases of federal public debt for \$ 600 billion	Y
	Maturity Extension Program (MEP)	Sep-11	Sep-11 to Jun-12	Recomposing of the portfolio of federal public debt: replacement of \$ 400 billion in securities with a residual maturity of less than three years for securities with a residual maturity between 6 and 30 years	Ν
		Sep-11	Sep-11 to	Reinvestment of maturing debt of the GSEs agencies and MBS in MBS/ reinvestment of maturing federal public debt in federal public debt	Ν
	MEP extension	June-12	June-12 to Dec-12	Recomposing of the portfolio of federal public debt: replacement of \$ 267 billion in securities with a residual maturity of less than three	N

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MAIN FINANCIAL ASSETS PURCHASE PROGRAMS					
	Program	Announcement date	Duration	Description / Volume	Balance sheet expansion?
Federal Reserve*				years for securities with a residual maturity between 6 and 30 years	
	LSAP 3	Sep-12	Sep-12 to Dec-13	Purchases of mortgage- backed securities (MBS) guaranteed by GSEs amounting to \$ 40 billion per month	Y
		Dec-12	Jan-13 to Dec-13	Purchases of federal public debt in the amount of \$ 45 billion per month	Y
		Dec-13	Jan-14 to	Gradual reduction of monthly purchases of MBS and federal public debt (<i>tapering</i>)	Y
Bank of Japan	Comprehensive Monetary Easing (CME)	Oct-10	Oct-10 to Apr-13	Announcement of purchases of public debt (JGBs) with residual maturity up to 2 years, commercial paper, corporate bonds, Exchange trade funds (ETFs), mutual funds in real estate assets (J-REITs). Initial size of the purchase program amounted to 5 billion yen. 8 extensions of this asset purchase program (Mar-11, 5 trill Yen, Aug-11, 10 trillion Yen; Get-12, 10 trillion Yen; Apr-12, 5 trillion Yen; Sep-12, 10 trillion Yen; Oct-12, 11 trillion Yen; Dec-12, 10 trillion Yen;	Y

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	TABLE 2 (continued) MAIN FINANCIAL ASSETS PURCHASE PROGRAMS						
	Program	Announcement date	Duration	Description / Volume	Balance sheet expansion?		
Bank of Japan		Jan-13	Did not start	From Jan-13 asset purchases will not have a set end date and a monthly amount shall be established	Y		
	Quantitative and Qualitative Monetary Easing (QQME)	Apr-13	Apr-13 to	End of the CME. Monetary base increased by 60-70 trillion Yen annually through purchases of JGBs (extension of average maturity to 7 years), ETFs and J-REITs. Duration of the program until an inflation rate of 2% is maintained in a stable manner.	Y		
ECB	Covered Bond Purchase Program (CBPP)	May-09	Jul-09 to Jun-10	Covered bonds purchase program amounting to € 60 billion	Y		
	Security Market Program (SMP)	May-10	May-10 to Sep-12	Purchases of sovereign debt of peripheral countries totalling € 218 billion (nominal value)	Y**		
	Covered Bond Purchase Program (CBPP)-2	Oct-11	Nov-11 to Oct-12	Covered bonds purchase program amounting to € 40 billion (€16.4 billion were finally acquired)	Y		
	Outright Monetary Transactions (OMT)	Aug-12		Purchases of government bonds from countries in the euro area in order to safeguard the proper transmission of monetary policy and the single monetary policy. Conditional on the adoption of programs by the country.	Y**		

TABLE 2 (continued) MAIN FINANCIAL ASSETS PURCHASE PROGRAMS Balance Announcement sheet Program date Duration Description / Volume expansion? Mar-09 to Feb-10 Bank of Asset Purchase Jan-09 Following Government Y Facility (APF) -1 England approval, creation of the APF in Jan-09. Purchases during 3 months of a total of £ 75 billion. mainly of public debt (residual maturity period between 5 and 25 years). Increase of £ 50 billion Y in asset purchases in May-09 Increase of £ 50 billion in Υ asset purchases in Aug-09 (extended to include bonds with a residual maturity period greater than 3 years) Increase of £ 25 billion Υ in asset purchases in Nov-09 Asset Purchase Oct-11 Oct-11 to Oct-12 Increase of £75 billion in Υ Facility (APF)-2 asset purchases in Oct-11 Increase of £50 billion in Υ asset purchases in Feb-12 Increase of £50 billion in asset purchases in Jul-12 Y Maintains £ 375 billion in assets (public debt almost entirely with token presence of corporate bonds and commercial paper) Notes: (*) In the FOMC meeting of Nov-09 it was decided that total purchases of GSEs agencies' debt were to be limited to \$ 175 mm due to its limited availability. (**) Sterilised by fixed interest rate deposits at the ECB. Sources: U.S. Federal Reserve, European Central Bank, Bank of England, Bank of Japan.

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of the balance sheet of the individual central banks has varied over time. As can be seen in Figure 2, the balance sheet of the Federal Reserve and the Bank of England increased the most during this period. The size of the balance sheet in both cases multiplied almost fivefold since August 2007.



⁴ Includes "reserve balances", "clearing balances" and "excess balances".

Sources: U.S. Federal Reserve, European Central Bank, Bank of England, Bank of Japan.

Asset purchase programs have succeeded in reducing nominal interest rates of targeted assets, have helped to sustain the activity and, in some cases, reduce the risk of deflation. Thus, according to the literature review conducted by the FMI (2013c), the first Fed program (LSAP-1) resulted in a cumulative reduction of between 90 and 200 b.p. in 10-year Treasury bonds interest rates, the effect was greater than that found in asset purchase programmes in the UK. In any event, the effects of the different programmes on prices and asset yields have been documented as progressively reducing its effect over time (Bauer, 2012, and Krishnamurthy and Vissing-Jorgensen, 2011). In addition, some authors (Cúrdia and Ferrero, 2013) consider that these effects depend on the central bank carrying out a *forward guidance policy* (see the next subsection).

The effects of asset purchase programs have discoursed mainly through two channels. Firstly, according to the so called *portfolio – balance channel*, the increase in demand of the asset acquired by the central bank causes an increase in its price and therefore reduces its yield. Also, by reducing the risk price, the demand for other riskier assets such as corporate bonds or shares increases, bringing their price up. Thus financing costs are reduced and a positive wealth effect occurs, encouraging spending and nominal demand. Second, the so-called *signalling channel*, considers the impact of asset purchases on the perception that the monetary policy stance will remain loose for a prolonged period, which affects expectations on short-term interest rates and long-term asset returns, favouring aggregate demand. This channel is related to the mechanism of managing expectations which will be discussed later and, according to Woodford (2012a), would have been more relevant for reducing the long-term interest rate than the portfolio balance channel in the case of the U.S.

On the other hand, asset purchases programmes are associated with an increase in non-required reserve of financial institutions at the central bank and, therefore, an increase in the monetary base. However, since the beginning of the crisis, the money multiplier has been sharply reduced and, therefore, the increase in the monetary base has not moved more than a small amount to the monetary aggregates (Figure 3).

Although recent studies also find significant effects of the above mentioned quantitative measures on GDP growth and inflation of the four areas analysed, the difficulty in estimating these effects is widely recognised in the literature given the changes that have occurred in the historical relationships between these variables and the absence of counterfactuals that would allow for a better analysis to be performed. Although the extension of extraordinary expansionary measures carries a risk of disanchoring inflation expectations, this does not



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seem to have been the case in the current situation (Figure 4). Moreover in the case of the euro zone, the marked downward trend of inflation since mid-2013 has led to a decline in inflation expectations and in the U.S. and UK, these expectations have remained firmly anchored. Finally, in Japan the launch of the QQME program in 2013 has succeeded in raising long-term expectations, although they are still far from the target of the Bank of Japan, while those for the short-term are affected by changes in indirect taxation.



Given the alleged limitations on the effectiveness of asset purchases policies, the situation of persistent weakness of demand, has led to some scholars and analysts to the possibility of introducing additional instruments. An example is Turner (2013) who suggested a fiscal stimulus financed by permanent increases in the amount of money (*"overt money finance"* or *"helicopter money"*). This boost to aggregate demand, through an increase of government spending or a cut of taxes, does not generate an increase in public debt. Turner argues that this is a more direct and effective channel than earlier monetary policy actions by not acting via the decisions of the private sector which are now highly

constrained by problems of excessive debt. This is a similar proposal to that advocated by Bernanke (2003) to stimulate nominal spending in Japan in the nineties. According to its proponents, the increase in public deficit is monetised; there is no Ricardian effect on consumption and investment decisions as future taxes will not rise; and the ratio of public debt will be reduced due to the increase in nominal spending.

Undoubtedly, the great risk of this proposal is for agents to believe that the helicopter drop can be repeated in the future generating higher inflation expectations and thus removing their possible positive effect on aggregate demand (Sargent and Wallace, 1981).

2. Guidance of expectations through communication (forward guidance)⁴

After the crisis, and given the weakness in demand, once official interest rates reached levels close to zero and there were growing doubts about the marginal effectiveness and risks of non-conventional quantitative measures, the incentives of central banks to use these communication tools increased. Central banks have chosen to offer guidance on future monetary policy to economic agents (*forward guidance*, by its English name)⁵ in addition to the immediate actions that have been taken.

Classic Keynesian theory considered that monetary policy was ineffective when interest rates were close to zero. It was thought that in this situation, increasing liquidity through open market operations did not result in a strengthening of the activity. But the Japanese experience of the late last century and beginning of this century as well as deflationary fears in the United States at the beginning of the last decade led to the development of new research on economic policy options under such circumstances. These studies, corroborated by more recent studies, support the effectiveness of central bank announcements on the future path of interest rates as a way to influence agents' expectations (Woodford, 2012a).

As discussed in the following paragraphs, the nature of this commitment has evolved in the big four banks, in general, from the signalling of an open-

⁴ See Lopez and Rio (2013). This section heavily draws on this article of the *Economic Bulletin of the Banco de España* which widely supports this section.

⁵ Usually this guidance refers to the path of official interest rates nevertheless the Bank of Japan went on in April 2013, to use the monetary base as the main instrument of monetary policy, rather than the official rate, and its strategy of forward guidance refers to that instrument.

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Central Bank	Forward guidance type	Date of decision	Figure	Announcement
Bank of Japan (BoJ)	Contingent	February 2012	A	"Until that price stability is in sight with a 1% inflation target"
	Contingent	April 2013	В	"The Bank will continue with quantitative and qualitative easing for the time necessary to maintain price stability in the 2% target, with a time horizon of about two years"
U.S. Federal Reserve (Fed)	Indefinite	December 2008	С	"For some time"
	Indefinite	March 2009	D	"For an extended period"
	Set period	August 2011	Е	"At least, until mid- 2013"
	Set period	January 2012	F	"At least, until the end of 2014"
	Set period	September 2012	G	"At least, until mid- 2015"
	Contingent	December 2012	Н	"While the unemployment rate remains above 6.5%, the inflation forecast over a horizon of one to two years does not exceed 2.5% and long-term inflation expectations remain well anchored"
	Contingent with a higher qualitative valuation	December 2013	Ι	"More labour market indicators will be evaluated and it is possible for interest rates to be maintained for quite some time after the unemployment rate is below 6.5%, especially if expected inflation remains below the target of 2% "

ANNOUNCEMENTS MADE BY THE CENTRAL BANKS

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FIGURE 5 (continued) ANNOUNCEMENTS MADE BY THE CENTRAL BANKS					
<u>Central Bank</u> U.S. Federal Reserve (Fed)	Forward guidance type Contingent with qualitative valuation	Date of decision March 2014	<u>Figure</u> J	Announcement "To determine how much time official interest rates are to remain in the current range of 0-0.25%, a number of indicators on the labour market are taken into account, as well as inflationary pressures, inflation expectations and financial developments "	
Bank of England (BoE)	Contingent	August 2013	K	"At least until the unemployment rate falls to 7% subject to three knockouts related to inflation and financial stability"	
	Contingent with a higher qualitative valuation	February 2014	L	"There is still idle capacity to absorb before increasing the official rate. The official interest rate path in the coming years will depend on economic developments, although the rise in rates will be gradual and will remain below 5%"	
European Central Bank (ECB)	Indefinite	July 2013	М	"For an extended period of time"	
Note: Contingent: conditioned on economic variables.					
Sources: U.S. Federal Reserve, European Central Bank, Bank of England, Bank of Japan.					

ended period of time to specific dates and finally conditioning to certain economic variables (Figure 5).

The Federal Reserve began to take steps in this direction in December 2008. Thus, it used an indefinite variant of *forward guidance*, in its assertion that it would maintain the reduced interest rate "for some time" (or an "indefinite" period of time as shown in Figure 5). In March 2009, the commitment to maintain the reduced interest rate was increased to "over an extended period of time." Since August 2011, the management of expectations went on to refer to defined time periods ("determined" in Figure 5), as the Federal Reserve began to commit to keeping a reduced interest rate until a specific date (mid-2013, although it was subsequently extended until mid- 2015). However, commitments linked to specific dates have a time-inconsistency problem because the central bank will have an incentive to readjust its plans if economic conditions change, failing to meet its initial announcement (Rajan, 2013). It is in this sense that asset purchases (with the interest rate risk) can increase the credibility of the commitment, given the potential financial costs to the central bank that could be added to the strictly reputational costs.⁶ There is also the risk mentioned by

⁶ Krugman (1998) has referred to this behaviour in which future policy is inconsistent with future inflation targets as "a commitment to being irresponsible."

Woodford (2012a) that agents interpret the promise that official interest rates will remain low for a long period of time as the path of economic recovery being weaker than expected, which would make part of the expansionary effects that are sought via agents' expectations disappear.

Contingent strategies, in which the monetary authority explicitly determines the future movements of official interest rates to changes in certain variables – for example, the inflation path or the unemployment rate – have the appeal, *a priori*, of preserve some flexibility to react to unexpected events, while reducing the risk of loss of credibility due to acting in a different manner to that announced. This type of contingent strategies were adopted by the Federal Reserve and the Bank of England ("contingent on quantitative valuation" in Figure 5).

Thus, in December 2012 the FOMC committed to keep the official interest rate at its current extraordinarily low level (0% -0.25%) as long as the unemployment rate continues to be above 6.5 %, the inflation forecast does not exceed 2.5% at the 1–2 years horizon (i.e., half point above the target) and long-term expectations of inflation remain well anchored. Meanwhile, the MPC of the Bank of England announced in August 2013 that it would maintain the official interest rate and would not reduce the amount of the APF asset purchase programme as long as the unemployment rate would not be below 7% and three conditions on inflation and financial stability were met (known as "knock-out conditions"), which probably reflects the greater importance of this target in the current responsibilities of the Bank of England. What this means is, that these were necessary conditions for central banks to reconsider their monetary policy decisions, but were not sufficient to increase the official interest rate. Additionally, by making the interest rate path explicitly contingent on the economic developments, the threshold numbers for these variables could have been interpreted as additional instruments of monetary policy⁷ while it may be a source of volatility in financial markets if these commitments are reviewed very frequently.

However, a short period of time has been sufficient to show the design and communication problems in both proposals. In particular, in 2014 unemployment rates in both countries reached the thresholds values much earlier than expected, in a context in which employment markets have shown peculiarities that create a significant uncertainty about the future evolution of unemployment rates and its relationship with other macroeconomic variables (Figure 6). Thus, in the U.S., the Federal Reserve expected, at the time of introducing the contingent *forward*

⁷ For example, if the numerical threshold for the unemployment rate is reduced, this means, while everything else remains constant, that the official interest rate would remain at a lower level over a longer period of time and, therefore, would mean a looser monetary policy.

guidance, that the unemployment rate would be close to the threshold of 6.5% during the second half of 2015, however the decline has been much faster than it was expected. This rapid decline in the unemployment rate was not due to an increase in the employment rate but to the significant and unexpected drop in the participation rate. In the case of the UK, the evolution of the unemployment rate has been closely linked to productivity rate so that since the crisis began, it has shown a great and unexpected weakness. However, the more recent buoyant activity in the UK was accompanied by a significant rise in employment and a poor response of productivity, so that the unemployment rate rapidly approached its threshold value.

This rapid convergence to the thresholds values has prompted a reformulation of existing commitments and both central banks have reintroduced qualitative elements in their strategies to highlight that official rates will remain at their current



levels even after thresholds are reached ("contingent on qualitative valuation" in Figure 5). Thus, the Fed announced after its meeting in December 2013 that it sees appropriate to maintain the official rate at its current level for a prolonged

period of time once the unemployment rate falls below 6.5%, especially if expected inflation was still being maintained below 2% (official target). And at its meeting in March 2014, it abandoned the 6.5% threshold for the unemployment rate and changed the conditionality to a qualitative valuation that includes indicators of labor market conditions, inflation pressures, inflation expectations and financial stability. For its part, the Bank of England in its *Inflation Report* of February 2014 removed the unemployment rate as the single reference for the degree of idle capacity, expanding the set of benchmarks. At the same time it has reformulated its commitment stating that it is necessary to reabsorb the spare capacity in the economy before raising the official rate and that when this occurs, it will be gradual and will not reach the average of the previous step to the crisis (5%).

These two experiences illustrate the complexity of the formulations of *forward guidance* based on quantitative references, especially if the margin of uncertainty surrounding the projection of the reference variables is very high, as in the current situation. Central banks must be able to convey to the public a credible commitment to achieve desired effects with these policies, and maintain, at the same time, the flexibility to adapt to changes that may occur in economic conditions, without compromising its objectives. In this sense, empirical evidence suggests that the stronger the commitment, the greater the impact on market expectations and economic decisions, but also the greater the risk to the monetary authority in terms of credibility. Additionally, conditionality should not include too mony technical details, as they may be subject to interpretation problems and generate confusion among agents. This challenge is heightened the longer the *forward guidance* is extended towards the future.⁸

The ECB has also used the management of expectations, but for an indefinite period of time and with a more vague wording than in the case of the Federal Reserve or the Bank of England. In particular, the ECB, at its meeting in July 2013, announced that its Governing Council "expects interest rates to remain at current levels or lower for an extended period of time. This perspective is based on the anticipation of a stable overall inflation rate in the medium term, given the weakness of the real economy and weak monetary dynamics." The adoption by the ECB of this forward guidance policy for the future development of interest rates broke with the principle previously established by the institution and maintained to date of *no pre-commitment*. But the ECB has stressed that it does not involve a change in its reaction function.

For its part, the Bank of Japan is the only bank among the major central banks that had adopted an "Odyssean" *forward guidance* policy prior to the

⁸ Among other reasons, because it is increasingly difficult to compromise, to lengthier periods, the decisions of future members of decision-making bodies of monetary authorities (Goodhart, 2013).

crisis. Thus, during the first stage of quantitative easing, in 1999, it undertook to keep official interest rates at low levels until the end of the deflation period. In early 2012 it again committed to keep official interest rates at minimum levels and continue with asset purchases until the inflation target (1% at the time) was in sight. In January 2013 the Bank of Japan increased its inflation target to 2% and announced that it would carry out an aggressive monetary policy consisting of a policy of virtually zero interest rates and purchases of financial assets for as long as it deemed appropriate to achieve it. Therefore, the *forward guidance* of the Bank of Japan is contingent but regarding the achievement of an inflation target, without making a reference to other variables, and the main instrument of monetary policy becomes the monetary base instead of the official interest rate.

Forward policy guidance can be transmitted to the economy through three main channels: i) interest rate curve, since the announcement of the expected official interest rate path affects the long term interest rates, the most relevant ones for the financing conditions of agents; ii) reduction of the uncertainty on monetary policy decisions in the future, which may reduce the term premium, volatility and risk premiums; and, iii) reduction in real interest rates when official interest rates are at the zero bound through lower nominal interest rates and higher inflation expectations, provided this is not interpreted as an indication of a worsening economic outlook.

Empirical evidence (Campbell *et al.*, 2012; Swanson and Williams, 2012; Woodford, 2012a; *Femia et al.*, 2013; Moessner, 2013; Raskin, 2013; Filardo and Hofmann, 2014), which is much more scarce than that concerning asset purchase programmes, suggests in general that the *forward guidance* policy, especially that with a more definite character, affects both the level and volatility of interest rates and future short and long term interest rates both in normal times and in times of crisis, especially in cases where it serves to signal deviations from the central bank's "traditional" reaction function. These effects have varied across countries and periods of time, while they appear to be decreasing over time. However, evaluating the *forward guidance* policy is complicated by the difficulty of separating the multiple factors that can affect both agents' expectations as well as financial conditions. Moreover, its implementation has coincided with other elements of unconventional monetary policy, such as asset purchases, and the most recent modalities have just being put in place, so a full assessment is still premature.

In the case of the Federal Reserve, it has been widely discussed whether the use of a *forward guidance* policy signals a change in formulating the usual reaction function. Thus, the adoption of an explicit threshold for the unemployment rate together with the inflation rate places at the same level of priority both components within the reaction function of the central bank, which has been interpreted as a modification of such a rule. Previously, despite the dual mandate of the Federal Reserve, there was a perception among economic agents that more weight was given to the inflation target as seen from commonly-used Taylor rules.⁹ This interpretation is corroborated by Yellen (2012a, b), the new Chairman of the Fed, using FOMC forecasts and a macro-econometric model of the U.S. economy, showing that in the present circumstances the optimal interest rate path that minimises deviations of the unemployment rate and the inflation target (Figure 7) is more expansive than even a modified Taylor rule placing more weight on unemployment. According to Yellen "this accommodative policy will be adequate even if the recovery is stronger" and thus compensates for the period in which the weak activity could not be mitigated by additional reductions in the nominal interest rate.



However, under the current formulation, the Fed's forward guidance policy ignores the explicit commitment to offset past deviations of interest rates as it is a forward looking rule. An alternative that does take into account past deviations, thus coming closer to the optimal rule developed by Eggerston and Woodford (2003) and Woodford (2012a), is the setting of a nominal GDP target. Under this rule the interest rate is kept to a minimum until the nominal GDP reaches the level it stood at if the official rate set by the central bank had

⁹ The inflation target (1.5) has a greater weight than the activity / employment target (0.5) in the parameters commonly used in the Taylor rule.

not been restricted by the ZLB. Thus, the agents expect inflation and / or growth to be above its trend in the future which currently raises inflation expectations and reduces real interest rates; and the central bank is not concerned in seeing how the highest nominal GDP is divided between real income and prices. In fact, an attractive feature is that the Federal Reserve explicitly recognises its dual mandate giving equal importance to both targets.

But in practice there are voices that warn of the various risks in implementing conditioned rules as those mentioned (Mishkin, 2012, and Goodhart, 2013). On the one hand, there are significant measurement problems: a difficulty in separating the cyclical part from the structural and in identifying when the trend deviation (onset of the crisis, for example) occurs. On the other hand, it raises of credibility issues for the central bank: inflation expectations could deteriorate in the long run given the temporary increases on the inflation rate and generate also greater volatility. A subordination of monetary policy to other targets such as growth that are beyond the control of the central bank also takes place. Finally, revisions to the nominal GDP which may be of a significant amount, occur periodically.

3. Credit facilities to the banking system

Along with asset purchase programs and strategies of managing expectations, some central banks have implemented specific interventions in order to stimulate activity by means of greater dynamism in bank lending. Thus, the Bank of England, together with the UK Treasury launched a program called Funding for Lending Scheme (FLS) in July 2012 with the purpose of reducing the financing costs of banks and providing incentives to increase the credit supply (lending) to the non-financial sector. With this scheme, the Bank of England provides banks with long-term funds that can be used to finance the expansion of its loan portfolio to households and businesses, with both the cost and the amount of funding available to banks being a function of the net credit that they offer. This programme was expanded in April 2013 providing greater incentives for financial institutions to increase funding to small and medium enterprises. the sector with the greatest difficulties in obtaining financing, and extending the life of the programme until January 2015. Additionally, in November 2013, the Bank of England announced that from February 2014 the programme would not be available for granting mortgage loans and would apply only to loans to of SMEs.

Similarly, the Bank of Japan since June 2010 has carried out a series of initiatives to encourage lending to the real economy (*Loan Support Program*).

The two most important are known as the *Growth– Supporting Funding Facility* (introduced in June 2010 and expanded and extended in March 2012), which is aimed at financing investments in specific economic sectors to increase economic growth and productivity (microeconomic approach) and the *Stimulating Bank Lending Facility* (introduced in December 2012), which provides unlimited funding to financial institutions by twice the amount corresponding to the net increase in bank credit granted to the private sector (macroeconomic approach). In the monetary policy meeting of February 2014, the Bank of Japan approved an extension of the above initiatives until June 2015.

However there is considerable uncertainty about the effects of existing programmes specifically designed to boost bank lending. The costs of bank funding in the UK have fallen, but it is difficult to discern to what extent it is a direct result of this program or it is a consequence of the improvement of the international financial environment since the beginning of the program.

IV. RISKS OF CURRENT MEASURES OF MONETARY EXPANSION AND EXIT STRATEGIES

Although the central banks of the major developed economies have acquired a huge role, the recovery in many of these economies is not yet consolidated and the levels of unemployment and spare capacity remain significant. Perhaps for this reason, some of the public opinion places great expectations on the possibility of continuing to use monetary policy to solve these problems. However, the maintenance and adoption of new measures of unconventional monetary policy involves a number of side effects and poses some risks, which may even cause central banks to deviate from its primary target of price stability, questioning their independence.¹⁰

1. Risks associated with unconventional monetary expansion measures

— Financial stability

The available evidence on the various asset purchase programs indicates that they have significantly reduced risk premia, affecting yields and prices where they have operated, although these effects have been decreasing over time. Meanwhile, *forward guidance* strategies in signalling the commitment to

¹⁰ See Rajan (2013) and Caruana *et al.* (2014) in this issue for a balance of risks.

keep interest rates exceptionally low for an extended period of time have helped to reduce the term premia.

But as a result of these policy actions, some agents in certain markets may be taking an excessive risk, even encouraging the formation of new bubbles, without this reduction in funding costs translating into an improvement in real investment. Thus, the above is seen in the increase in high-risk corporate debt issues in advanced economies, particularly in the U.S., and a decline in their yields. Similarly, the prolonged period of low interest rates is making intermediaries like insurers and pension funds take on more risky investments than in the past in order to achieve a minimum level of investment returns.

In addition, the liquidity provided by the central bank in some countries has turned it into a major player in the interbank market, which could cause some banks to postpone their necessary deleveraging and recapitalisation. In that case, once systemic risks have been eliminated, liquidity measures in place to support the recovery of these financial institutions could be masking a problem of solvency. Therefore, the actions of central banks may be causing some distortions in the allocation of resources in the financial sector and the continuity of these actions to avoid potential financial turmoil may yet jeopardise the financial stability objective.

— Fiscal dominance

Following the financial crisis, the average public debt in developed economies has reached 100 % of the GDP despite fiscal consolidation efforts initiated in 2010; public accounts are not yet on a sustainable path. In this context, the continuation of current unconventional monetary policies or the implementation of additional measures may delay the search for fiscal sustainability. Technically with zero interest rates there is no distinction between money in circulation and short term government titles. This situation reduces the cost of financing government debt and the increase in the balance sheet of central banks through buying government bonds facilitates the work of the national treasuries. There is therefore a risk of monetising debt affecting the price level path and, which may therefore, lead to a situation of fiscal dominance. Also, it is assumed that *forward guidance* announcements do not respond to future surges in inflation. All this therefore may affect the credibility of the central bank to ensure price stability.

As a result, monetary conditions might be delaying the essential policies to restructure bank balance sheets and restore the sustainability of public finances. More generally, current monetary policy may be "buying time" through a reduced financing cost without being exploited by other economic policymakers to address the structural problems such as high unemployment rates or an unbalanced sectoral composition. In this sense, the crisis in the euro zone, beyond the required changes in its institutional design, is an example of a situation where the action of the central bank cannot be a substitute for other policies to restore growth.

— Distributional effects

Monetary policy has differential effects between economic agents and sectors. Given the existence of financial frictions, the decisions of central banks alter the price of financial assets, which are unevenly distributed among the agents. But additionally, unconventional policies can generate distributional effects which are far more relevant. These are likely to be more pronounced after a financial crisis like the present and in the presence of high indebtedness.

Forward guidance policies, in order to be able to maintain interest rates at low levels, contribute to mitigate the negative wealth effects arising from the crisis, but for savers that means a significant loss of income. Similarly, assets purchases by the central bank may favour the holders of such instruments bought by the central bank (see Brunnermeier and Sannikov, 2012). This is the case, for example, with the purchase of mortgage-backed securities or public debt. These effects, therefore, must be incorporated into the overall assessment of the maintenance of existing policies.

— Global effects

The consequences of expansionary monetary policies have surpassed the borders of the countries that have carried them out.¹¹ The appetite for a higher risk is not limited to investments in developed countries but is a global phenomenon. So, coinciding with the asset purchase programmes by the Federal Reserve, financial flows in emerging economies above the expected values have occurred. These flows supported growth between 2009 and 2011, which in some cases, was above that implied by its fundamentals and generated financial vulnerabilities by reducing risk premiums, increasing asset prices and the credit supply.

To the extent that some of these economies were in a more advanced cyclical position, capital flows and consequent variations in the exchange rate made the management of monetary conditions more complex these in countries. Hence, the need shown by some of these countries to use macroprudential measures and control their capital flows while accommodating their monetary policies to those of developed countries.

¹¹ See Gallego and L'Hotellerie (2014) in this issue for an assessment of international *spillovers*.

In general, central banks do not internalise the consequences of their policies on other economies as they focus on domestic objectives. But one cannot say that the actions taken in recent years by the central banks of advanced countries have pursued a competitive devaluation. Quite the contrary, the evidence shows that accommodative monetary policy in advanced economies has helped to sustain a higher growth in emerging economies, particularly through trade and the maintenance of favourable financial conditions (IMF, 2013d). However, as is the case in advanced countries, emergins market economies cannot be sustained indefinitely under high global liquidity conditions but must pursue policies that ensure a more sustainable growth.

2. Exit strategies

In the baseline scenario for the coming years developed economies start to show a sustained recovery and financial stress disappears. In that case central banks should gradually remove the extraordinary stimulus measures that have remained in place for an extended period. The design of exit mechanisms constitutes a formidable challenge, given the magnitude of the current monetary stimuli, the induced effects on financial markets and other countries, and the lack of theoretical foundations and empirical evidence which makes it possible to anticipate the consequences of alternative strategies.

Probably the biggest challenge will be the restructuring of central banks' balance sheet in terms of size, composition and average maturity. In most cases, it should be taken into consideration that these operations have represented a notable lengthening of asset the side of the central bank balance sheet which has increased the maturity mismatch between assets and liabilities and the consequently interest rate risk. In that sense it seems crucial that central banks communicate clearly the intended path of withdrawal of monetary stimuli, and in particular, under what circumstances asset sales will occur. The macroeconomic and financial situation suggests that the Bank of England or the Federal Reserve will be, within the major central banks, the first to move towards the normalisation of monetary policy.

It was in 2013 when this discussion was launched in the U.S. The publication of the minutes of the FOMC in May 2013 led the markets to take up a stance on a possible gradual reduction in the rate of monthly purchases of assets (a process known as *tapering*) starting in September and, in parallel, advance the calendar for raising the official interest rates, a move not desired by the Federal Reserve, which serves as an example of the difficulty and importance of adequately communicating the steps that are to be taken. However, somehow surprisingly, the FOMC decided in September not to start the *tapering* process. Subsequently, in light of improved economic data and the resolution of certain tax uncertainties, after a remarkable effort and communication, so that financial markets could distinguish the process of gradual reduction of asset purchases from the process of interest rate raise, the FOMC decided at its December meeting, to reduce monthly purchases of assets (by 10 billion dollars, divided equally between government bonds and mortgage-backed securities of GSEs) from January 2014, which has been considered by many analysts as the first step in changing the monetary cycle. In subsequent meetings, further reductions by addition 10 billion dollars were approved.

Thus, in the baseline scenario, reductions of similar magnitudes in each of the FOMC meetings would occur during 2014 until purchases ceased completely in the last guarter of the year, which would mean that the Fed's balance sheet would reach a size five times the value at the beginning of the crisis. The majority view within the FOMC has shifted to a more gradual reduction of balance by passive means (suspending partially or totally the reinvestment of payments of the principal of assets in the portfolio) rather than an active one (selling of assets in the portfolio). Excess bank reserves, which could be around 3 trillion (16% of GDP) at the end of 2014, would remain much higher in the coming years than those existing prior to the financial crisis (about USD 30 billion). Therefore, the FOMC introduced in September 2013 a new instrument known as overnight reverse repo facility, that could become essential in the exit strategy. It allows money market funds, the GSEs and other institutions besides the banks, to maintain bank reserves at the Federal Reserve in exchange for an interest rate and collateral in the form of assets that the Fed has in its portfolio following the purchases made after these years. In this situation of such excess of bank reserves, the interest rate at which the Federal Reserve offers this instrument (which should equal the remuneration of reserves to which only the banks have access) should set a floor for all types of interbank market interest rates and could be replaced as the official interest rate on federal funds that might not work well in the current high liquidity environment (Gagnon and Sack, 2014).

3. Questions and risks of the exit strategy

As commented above, given the lack of experience of changing the monetary cycle in a complex environment like the present one and, above all, the difficulty of correctly measuring the degree of recovery of both the financial sector and the real economy, communication by central banks on how they will proceed to tighten monetary policy will be essential. To reduce uncertainty and, above all, to prevent recovery from being aborted, it is expected that the introduction of the measures will be gradual and anticipated by economic agents. The main risk is to avoid a sudden and unexpected increase in long term interest rates, which can affect financial stability and more generally capital flows and global exchange rates. In this regard, it should be noted that despite the significant deleveraging of companies and households that began in 2009 in developed economies, its debt ratio is still in many countries above the levels presiling during the previous expansion period in 2002. In the phase of monetary normalisation, the still high level of debt will cause many agents to be more sensitive to a rise in interest rates than in the past. Furthermore, a significant increase in interest rates may lead some banks and financial institutions to suffer losses in their fixed income portfolio. The rise in interest rates may also increase the risk of credit and portfolio delinquency. It is important, therefore, to previously secure the necessary recapitalisation of financial institutions and the normal functioning of markets where central banks have been intervening, including the interbank market, to avoid tensions before the sale of assets and liquidity absorption.

Precisely the announcement in May 2013 by the Fed that it was discussing the decline of the asset purchase process had a great influence on economic agents' expectations, affecting both the valuation of diverse financial assets in the U.S. (the interest rate on 10 year bonds rose more than 1% in just over three months) and in markets globally. The reduction in the chances of tapering –linked to the new assessment by the Federal Reserve on the labor market recovery– and the changes in the Fed's communication strategy were key factors to calm the markets and reverse the expected changes on the official interest rates (see Figure 8).



But it was in emerging countries where "tapering talk" had a significant and immediate effect. The reversal of capital flows by investors who had entered in those markets with the expectation of continued global liquidity, produced a clear worsening of their financial conditions. Between May and August 2013, debt spreads increased, currencies depreciated, and asset prices and the volume of reserves dropped. The first analysis of this period (e.g. Eichengreen and Gupta, 2013 and Aizenman *et al.*, 2014) indicate that the effects were greater in countries that accumulated external vulnerabilities in terms of currency appreciation and deteriorating current account during the previous period with better financing conditions, although the liquidity and market depth and the size of investors' holdings appear to be also relevant explanatory variables.

For now, the gradual withdrawal of stimuli by the Fed launched in January 2014 is taking place as the recovery of the U.S. economy strengthens. As noted above, in addition to changing communication of *forward guidance* and a possible sale of assets, the Fed has other instruments that can still be used, such as interest rates on excess reserves or reverse repos for signalling policy stance changes for a smooth transmission to money markets and long term interest rates. This scenario of gradual monetary tightening, which would continue in the following years in other advanced economies, is also expected to involve a moderate reduction in financial flows to developing countries and tighter financing conditions as the investors' portfolio is recomposed at the global level. In addition, the episode that ran between May and August 2013 may have helped to reduce the positions of investors and convince them that movement of asset prices can be in both directions, so that future adjustments could be less extreme.

But there is a risk of alternative scenarios in which a rapid adjustment of interest rates and capital flows occurs. In 2014 the Bank of Japan is engaged in an ambitious new phase of quantitative easing and the ECB is considering the adoption of new unconventional measures since it faces deflationary risks in the euro area. In this situation in which there is no synchronisation between the major central banks, the withdrawal of unconventional measures in one country can have *spillover* effects through financial markets tensions.

To prevent these risks from materialising, additional efforts for transparency and communication of central banks are key in order to mitigate the overreaction of markets to the emergence of new economic data. Also, it must be taken into account that macroeconomic conditions in emerging market countries are now generally more stable than those that caused previous currency crises. But concerns about the potential disorderly reaction of financial markets to a possible financial tightening could lead to a situation of financial dominance in which monetary policy could be constrained by potential market strains.

On the other hand, central banks may incur in costs when carrying out the sale of a portion of its assets, the ECB being an exception, since its assets are mainly short term. Currently, holdings of these securities, in a proportion of total government bonds outstanding at the end of 2013, were of 17.9%, 27.0% and 16.4 %, in the case of the Federal Reserve, the Bank of England and the Bank of Japan, respectively. The IMF has estimated potential losses for these three central banks associated with an increase in interest rates under alternative scenarios defined in terms of the evolution of long-term rates and its asset holding strategies in the future (IMF, 2013c). The Bank of England is the bank which may suffer the highest losses due to their larger portfolio of bonds and proportionally longer term. But in the case of the Federal Reserve (Carpenter et al., 2013, Christensen et al., 2014, and JP Morgan, 2013), the possibility of entailing operating losses is guite small. However, it is very difficult to estimate the magnitude of potential losses as they also depend on the pace of economic recovery and therefore on the monetary policy response itself, which will affect the cost in the payment of bank reserves. In any case, the risk that any of these central banks would temporarily incur in losses should not weaken its independence in monetary policy management.

V. MONETARY POLICY AND THE FINANCIAL STABILITY OBJECTIVE

1. The need for a macroprudential policy and its main instruments

As pointed out in Section II, during the period prior to the global financial crisis an economic policy strategy that gave an important role to monetary policy was consolidated. In particular, the academic literature and the international economic institutions tended to support the use of a monetary policy strategy aimed at achieving an inflation target, as the best way to achieve macro-financial stability. In addition, the protracted period of low macroeconomic volatility during the Great Moderation appeared to endorse this approach in the management of economic policies.

However, the outbreak of the crisis clearly revealed that maintaining price stability is not a sufficient condition for achieving macro-financial stability. In fact, as already mentioned, the protracted period of low interest rates could contribute to the accumulation of imbalances in asset markets, whose sharp correction generated intense effects on activity, as is well known from the experience of previous financial crisis. Actions of central banks after the outbreak of the crisis through the provision of extraordinary liquidity managed to avoid the collapse of the financial system, but did not prevent the high market volatility from significantly eroding growth and employment.

In any case, the crisis highlighted the need for adequate instruments to address macro-financial risks and resulted in major efforts, both in academia and among policy makers, to define an operational framework for the so-called macroprudential policy.¹² This goes beyond the traditional micro-prudential guidance for the supervision of banks individually. The regulatory measures of capital and liquidity requirements, and ongoing monitoring of compliance with regulations and risk management procedures ensure that banks are solvent. However, the solvency of individual institutions does not ensure the stability of the financial system as a whole, making it necessary to monitor systemic risks, and this is the purpose of macro-prudential policy. In any case, unlike the objective of price stability, there is no clear definition of financial stability and there are no numerical measures for it. Therefore, given the elusive nature of the concept of financial stability, problems to specify targets for the institutions responsible for preserving it and to make them accountable for their decisions are easily understood.

In order to prevent *ex-ante* the occurrence of systemic risks and help generate buffers so as to mitigate the *ex-post* impact of these risks should they materialise, various instruments have been used, some of which had already been used at the microprudential or monetary level. There are different classifications of macroprudential instruments. For example, Blanchard *et al.* (2013) grouped them into three categories: (1) those designed to affect the behaviour of lenders, (such as dynamic provisioning, countercyclical capital buffers or leverage ratios) and which increase its resilience in times of stress; (2) those intended to limit risk taking by borrowers (limits on loan-to-value or debt-to-income ratios); and (3) those intended to manage capital flows. The above wide array of instruments is a reflection of the variety of potential sources of risk. The relative importance of the different instruments can vary at the same time as different financial distortions. Different variants of these instruments were being used before the crisis in some countries, but its use has spread exponentially thereafter.

2. The interaction between monetary and macroprudential policy

While there is broad consensus on the need for macroprudential regulation and supervision to pursue the objective of financial stability, there is

¹² See Roldán (2014) in this issue for a description of the macroprudential policy after the crisis.
no unanimity on the extent to which monetary policy decisions should take into account, in some way, this objective or about which is the optimal institutional design for managing macroprudential policy.¹³ According to Tinbergen's separation principle, which states that for each policy objective there must be an instrument whose management allows to come close to meeting the objective, monetary policy through interest rate management pursues price stability.¹⁴ while the responsibility to preserve the stability of the financial system through macroprudential instruments should lie within the macroprudential authority.

However, as the current crisis has highlighted, interactions between monetary and macroprudential policy decisively influence the configuration of the operational framework of the latter, requiring the consideration of coordination mechanisms between institutions carrying both responsibilities (IMF, 2013a). The close link between monetary and macroprudential policy is manifested in the effects of actions that one can generate on the objectives of the other. Indeed, monetary policy measures may have implications for financial stability through multiple channels –affecting incentives for risk taking, the ability to repay its debts, capital flows, among others–, and in turn, the management of macroprudential tools can influence the evolution of activity and prices –for example, by affecting the cost of taking up loans (credit cost) or limiting the ability to grant funding generally or in a specific sector.

In principle, both policies can be designed to offset the indirect effects of the other policy on its targets. Moreover, in certain circumstances, both policies may be complementary, reinforcing each other. For example, a credible monetary policy may require less aggressive policy moves to achieve its goals and thus ease the burden of macroprudential policy to counteract the side effects of monetary measures.

In stylised macroeconomic models in which it is assumed that macroprudential instruments can completely correct financial distortions, the optimal management of both policies does not vary substantially in the presence of the effects induced by the other policy. But this result does not hold when taking into account the limitations in the functioning of both policies and the existence of restrictions at the institutional level. These limitations are more evident in the case of macroprudential policy, since there is a high uncertainty about its effects, so that a potential mismanagement can have significant costs. In addition in the case of some macroprudential instruments it may be difficult

¹³ IMF (2013a) and Smets (2013) offer reviews of the current debate on the interaction of monetary and macroprudential policies. Kohn (2013) analyses the above interaction in the case of the UK.

¹⁴ This separation principle does not strictly apply to central banks, including the Fed, with a dual purpose. In these cases, this principle should be interpreted to mean that monetary policy should deal with macro objectives whereas macroprudential instruments should focus on financial stability.

to change them frequently and sometimes their management may be subjected to considerable pressure due to having a direct effect on financial institutions. In this context, as noted in the next subsection, the use of monetary policy for financial stability purposes cannot be ruled out.

In this line, Stein (2013, 2014) argues that in certain circumstances it may be appropriate to use monetary policy instruments for financial stability purposes, to complement macroprudential instruments – that may not be fully effective in the presence of regulatory arbitrage and do not affect all segments of financial markets. Stein (2013) notes that, for example, in a hypothetical situation in which credit vields are abnormally low compared to other assets (credit overheating) and there is a search for yield through longer term assets (maturity transformation) but at the same time, economic conditions support a reduction in interest rates, the use of an unconventional monetary policy such as the purchase of assets to flatten the interest rate curve might be justified given the difficulty of macroprudential instruments to promptly reduce the risks of financial instability. On the other hand, Stein (2014) argues that in a situation where risk premiums (including, in particular, term premia in government securities or the risk premium on high-yield bonds) have abnormally low values it may be optimal to maintain a less accommodative monetary policy to the extent that the reversion to normal values of these premia can generate episodes of financial instability that can eventually affect the level of unemployment. Woodford (2012b) presents a theoretical model from which a similar conclusion is reached: in the presence of a substantial risk to financial stability (in this case, a high level of leverage), monetary policy should be less expansive. This type of results highlights the desirability for central banks, in addition to adequately characterising financial cycles and extending their forecast horizons, to routinely perform analysis on risks for economic stability derived from financial vulnerabilities. Based on the above type of analysis, the optimal monetary policy could be a rise in the central bank interest rates above that required by the traditional Taylor rule. In this regard it should be noted that the ECB, since before the crisis, has defended its strategy based on two-pillars in which a specific follow up is carried out on the monetary and financial situation.

However, using monetary policy for financial stability purposes (i.e., a *leaning against the wind* strategy) may involve non-negligible costs. In this line, Galí (2014) finds that if the speculative component of the asset price (bubble), which has a positive correlation with the interest rate, is sufficiently large in relation to the fundamental component, which has a negative correlation with the interest rate, the optimal policy may be to lower the central bank interest rate to try to reduce the size of the bubble.¹⁵ Meanwhile, Svensson (2013) notes

¹⁵ And this line, Galí and Gambetti (2014) find evidence of prolonged episodes in which a persistent rise in share prices in response to an exogenous tightening of monetary policy is appreciated.

that a monetary policy tightening beyond what would be required to stabilise inflation could, under realistic assumptions, achieve a reduction in household debt at the cost of a substantial contraction in nominal GDP, so that it would lead to a further increase in the debt to GDP ratio.

On the other hand, when monetary policy is faced with certain restrictions such as the maintenance of the exchange rate in small economies or the existence of a monetary union which entails a common monetary policy for economies potentially facing cyclical divergences, the effects of monetary measures on financial stability might be important. Under these circumstances, the potential benefits of macroprudential instruments can be accentuated.

Ultimately, important interactions between both policies make it advisable to establish mechanisms to facilitate coordination among those responsible for them (Turner, 2014). It might be expected that the results of the independent management of these policies be inferior to that of a coordinated guidance. Therefore, the configuration of the institutions responsible for the new macroprudential policy and its connection with the central banks is a key aspect for the future of macroeconomic policy.

Finally, an additional dimension of considerable importance to the design of the management of monetary and macroprudential policies is the growing presence of cross-border spillover effects. Economic policy decisions of systemic economies generate significant effects in other countries. In fact, during the crisis unconventional measures taken by central banks in advanced economies in a context of depressed domestic demand have generated significant capital flows to emerging market economies. Monetary policy in these economies has faced a dilemma between braking economic overheating or moderating capital inflows. In this context, these economies have adopted a set of broad macroprudential measures that have proved useful in managing this situation (Brookings Institution, 2011, and IMF, 2013b). More recently, as discussed above, the start of the tapering talk in May 2013 sparked significant capital outflows from emerging economies, especially from those seen as most vulnerable. Monetary authorities in these economies attempt of to mitigate such outflows through foreign exchange interventions and macroprudential measures.

VI. THE FUTURE OF MONETARY POLICY

The nature and depth of the recent global financial crisis forced central banks to come up with innovations in their array of instruments. The set of unconventional policies introduced since 2007 has managed to dispel some

extreme risks for financial instability, to counteract deflationary pressures, restore the operation of certain financial markets and ultimately support economic recovery. This paper has analysed these policies by placing them in the context of the consensus built around monetary policy management during the period known as the Great Moderation.

The central banks of the major advanced economies have been conducting an ongoing evaluation of the costs and benefits of the various measures of unconventional monetary policy. The balance of this type of analysis has been gradually tilting towards a lower marginal profit and a greater potential cost for the extension of the current set of measures or, at least some of them. Thus, the design of exit strategies is one of the main challenges facing central banks at present (or that is expected they face in the near future). In this context, the recent debate on the gradual process of withdrawal of extraordinary monetary stimuli is framed to prevent episodes of instability in financial markets such as those experienced with the "tapering talk" between May and August 2013 or with the redefinition of forward guidance strategies in 2014 by the Bank of England and the Federal Reserve.

But beyond the immediate actions to undo unconventional actions, it seems clear that the current crisis will have implications on how to make monetary policy. Although there is still a great uncertainty about the duration of the exit phase and the configuration of new strategies, the behaviour of central banks following the financial crisis and the evolution of the academic and institutional debate on this subject, allows to guess some features that will likely characterise how monetary policy is carried out in the future.

Firstly, the importance of the "lender of last resort" role played by central banks has been established. Despite the financial development and the existence of payment means as a substitute for money in recent decades, in the presence of a possible financial panic it is essential to have appropriate mechanisms to provide liquidity. That was the purpose of many of the extraordinary measures of central banks in 2007 and 2008 to restore confidence in the financial system. Some of these measures were taken in a coordinated way –liquidity swaps between different central banks–, as given the growing global interdependencies, this crisis has highlighted the need to offer liquidity in currencies other than their own.

From the experience gained in the use of a broad array of unconventional measures following the global financial crisis, two lessons on instruments available to central banks are derived. On the one hand, the weight given to the communication policy of the central bank in achieving its objectives has increased. In a situation where official interest rates have stood at their lower limit, the influence which the central bank can have in signalling how future

interest rates will be (forward guidance) has been shown in respect of how it affects economic agents' expectations about the inflation and real interest rates. On the other hand, it is expected that some of the unconventional instruments actually are going to be integrated into the regular set of instruments of monetary authorities, as it has been acknowledged that in order to act on certain segments of the economy or markets, specific instruments are more effective than to resort exclusively to changes in central bank interest rates. But there is also some resistance for central banks to intervene in specific sectors or segments, trying to limit monetary policy ending up having excessive distributional effects, thus limiting the effectiveness in achieving its objectives (Posen, 2013).

In any case, the management of these instruments to achieve the long term objectives of the central bank can be matched by an increase in financial fluctuations in the short term, as has been the case with any of the announcements on asset purchases made by the Federal Reserve. The uncertainty on the modelling of economic agents' behaviour represents a factor of additional support for this strengthening of the communication policy and the broadening of the array of instruments. For example, recently the IMF has again recalled the inherent difficulty in estimating the output gap and has revealed that its relationship with inflation has tended to weaken in recent years (IMF, 2013b).

Another principle that has taken hold in the wake of the crisis has been *the need for appropriate institutions to prevent fiscal policy from interfering with monetary policy in achieving its objectives.* The solvency of the public sector is essential to prevent a situation of tax dominance, in which monetary policy is limited by its potential impact on public accounts. The magnitude reached by public debt in the balance sheets of some central banks and its gradual sales process seem to indicate that this interaction is to remain relevant in the coming years.

In addition, the current problems of sustainability of the public debt in many developed countries, which have resulted in several episodes of financial instability, highlight the importance of mechanisms to ensure the sustainability of public finances in the long run. In this sense, the shortcomings of the institutional design of the euro area in this field, which have been at the root of the sovereign crisis in the area, have led to significant changes in its governance rules.

Finally, the global financial crisis has led to a broad consensus on *the need* for macro-prudential regulation and supervision to address financial risks of a systemic nature. In addition, it has also contributed to reopen the debate around the role of monetary policy in relation to financial stability. Although there is still no general agreement about the appropriate institutional design

to manage macroprudential policy -as the one that was forged in the past two decades around inflation targeting as a strategy for monetary policy management- it does seem clear that, given its interaction with monetary policy. coordination between both policy makers would be beneficial. The experience accumulated on the effectiveness of different institutional frameworks that have taken effect in recent years is still insufficient, but regardless of the operating scheme that will be implemented for macroprudential policy, monetary policy decision-making should take into account the implications of its own actions for financial stability, and in specific situations where the effectiveness of macroprudential tools is limited, it would be desirable that monetary policy reacts to counteract developments threatening financial stabilty. In this context, it is necessary to pierce the "financial veil" that has dominated the recent macroeconomic analysis, which was based on monetary models abstracting from financial intermediation (King, 2012), carrying out a regular monitoring of financial fragility indicators and improving the representation of the financial sector in the macroeconomic models used by central banks.

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UNCONVENTIONAL MONETARY POLICIES – RECENT EXPERIENCES, IMPACT, AND LESSONS

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Since 2007, several central banks have reached the zero bound of interest rates. It's striking that, since then, no two central banks have followed the same strategy in the so called "unconventional policies" sphere. Due in part to the idiosyncrasies of the economies, and in part to the political constraints the central banks have been operating under, central banks have deployed a very different arsenal of tools, including asset purchases, forward guidance, lending schemes, liquidity injections, and exchange rate intervention and pegs. This has given monetary policy a multidimensional character: Central banks have operated on the size of their balance sheets, on their composition in terms of assets, quality, duration, and currency denomination, on the part of the yield curve that they have tried to affect, on the range of counterparties, and on the amount and detail of information about their reaction function and policy intentions that they have chosen to disclose. This paper describes some of these strategies and discusses their effectiveness and lessons for the future.

The main conclusions are: (1) at the ZLB, central banks have eased less than optimal due to fears about both central bank loses and inflation; (2) however, non-conventional policies are not very different from conventional policies, and have been broadly successful when tried with conviction; (3) the "insurance" channel of non-conventional polices is critically important to their effectiveness – at the zero bound, monetary policy must be bold and open ended in order to restore risk aversion to normal levels and provide markets with an outlook based framework to appropriate price assets; (4) the "cost" argument against non-conventional policies is very weak; if anything, central banks should change their arrangements (for example, increase their capital to protect against losses) to manage these costs and be able to be as effective with non conventional policies as they are with conventional policies; (5) central banks should target a bit higher inflation target, to soften the implicit lower bound in real interest rates; (6) forward guidance should focus on what the central bank can control, its reaction function, and shy away to a large extent from interest rate paths; (7) as slack is being absorbed in a recovery, the best way for monetary policy to preserve financial stability is to avoid generating one way bets and time inconsistent policies. Thus guidance should be softened as the economy approaches the steady state.

¹ All views expressed here are my own and do not represent, in any way, those of D. E. Shaw & Co.

I. INTRODUCTION

In normal times –defined as interest rates above zero and financial intermediation operating via well-functioning arbitrage– the "conventional" operation of monetary policy involved managing the short term interest rate. Because inflation expectations don't immediately react one to one to changes in interest rates, central banks also control real interest rates. This interest rate changes would be expected to be transmitted along the yield curve and into private rates, and achieve a constellation of interest rates that would, in principle, deliver the central bank's growth and inflation forecast via its impact on credit, asset prices, and the exchange rate.

The crisis broke this conventional operation of monetary policies along several lines. First of all, short term interest rates hit zero, depriving the central bank of the "conventional" instrument. Second, the transmission of short term interest rate changes along the yield curve and into private rates was disrupted as some markets ceased to operate and others changed their nature as they became informationally sensitive. Third, Knightian uncertainty increased sharply due to the lack of model to base economic forecasts, generating extreme risk aversion. And fourth, mistrust about the solvency of banking intermediaries became widespread, introducing counterparty risk as a main element of asset pricing. The combination of these failures had created a self-amplifying vicious circle of declining asset prices and force liquidations that had to be arrested.²

The policy response had to address all four failures of the system: Find an alternative instrument to the short term interest rate; fix the transmission mechanism of interest rates, mostly via liquidity injections, and create markets in some assets; restore confidence in the future by providing insurance and minimizing the occurrence of bad equilibria; and restore the solvency of the banking system to eliminate counterparty risk.

Most major central banks introduced at some stage unconventional measures. The Fed, ECB, and Bank of England (BoE) acted along all the dimensions, as they were at the center of the crisis. The Bank of Japan (BoJ) already had many of the unconventional policies in place, having been at the zero bound for a long period of time, and kept its policy framework mostly unchanged until mid 2013, when it launched QQE. The actions of the Swiss National Bank and Bank of Canada were more limited, as they were in the periphery of the crisis and mostly had to react to the contagion effect. Denmark had a brief period of negative interest rates to contain large capital inflows resulting from fears of euro break up. Restoring the solvency of the banking

² See Ubide (2008) for a detailed discussion of the dynamics of a credit crisis.

system was mostly a government policy, and will not be discussed here. Table A.1 in the appendix describes the chronology and nature of the measures undertaken by the different central banks, differentiating between actions affecting quantities, interest rates, and guidance.

II. THE CONSENSUS VIEW ON MONETARY POLICY AT THE ZERO LOWER BOUND (ZLB) PRIOR TO THE CRISIS

The intellectual consensus before the crisis on the risk of deflation and of hitting the zero lower bound, and how to deal with it was largely based on the Japanese experience. The theoretical research devoted to it was scarce (Benhabib, Schmitt-Grohe and Uribe (2001), Eggertson and Woodford (2003), and Reifschneider and Williams (2000) provide some earlier research on this issue; Bernanke (2002) is a good guide of how central bankers looked at it from the distance, and provides a good benchmark to assess the difference between what he proposed as a theorist and what he was able to deliver as a central banker and practitioner). The studies related to the BoJ experience suggested that QE had not had a major impact, beyond its signaling effect, mostly because the BoJ leadership had not been very enthusiastic about it, putting more emphasis on the moral hazard it created for fiscal consolidation and the need for supply reforms to lift potential growth. As QE was presented as "temporary," it had little effect (see, for example, Ugai (2007), Krugman (1998, 2000) and Eggertsson and Woodford (2003)).

In addition, the ZLB was seen mostly as an intellectual curiosity that would only happen following a policy mistake (as the Japanese situation was assessed to be).³ A key reason behind this assessment was the "curse of the Great Moderation" - because all the research was based on the Post War period, when shocks were "small" and non-persistent, all the conclusions in the literature were limited to a specific subset of possible macroeconomic paths. This "curse of the Great Moderation" explains why the crisis was essentially "impossible" based on the economic projections performed with models estimated with data available until 2007 (see Potter, 2011) and why the economics and central banking profession had to improvise as events unfolded. This also explains why markets, lacking a model and a set of credible outlooks to base its risk management on, overshoot while preparing for the worst possible scenario. Macroeconomic expectations became unanchored. This was compounded by the incentive structure of analysts and pundits – who looked wiser the gloomier they were and the most catastrophic scenarios they could imagine; it had been clear that risk management failures had been a failure of imagination,

³ See Bernanke (2000) and Ito and Mishkin (2006).

of imagining a Lehman type of scenario, and thus there was a premium in considering the implausible.

The policy prescription that arose from the pre-crisis literature was that, facing the possibility of hitting the ZLB, policy should be eased aggressively precisely to avoid hitting the ZLB (the opposite of the strategy of "keeping the powder dry" advocated in some places) and then keep rates low for longer than a standard policy rule would suggest in order to avoid a relapse into the ZLB (see, for example, Reinhart (2004)). The underlying assumption was that policy at the ZLB would be less efficient and its impact largely unknown (and, based on the Japanese experience, possibly very small).

At the same time, even though the consensus in the literature had long shifted away from linking inflation to money growth, when the moment came to expand the central bank balance sheets by large amounts the monetarist critique suddenly reappeared (see, for example, the caution expressed in Bullard (2010)) and worries about high inflation became a central part of the debate. Ironically, skepticism about unconventional policies came from both sides, because they may not work and because they may work too well, generating a reluctant intellectual consensus to embark in nonconventional policies at the beginning of the crisis. This skepticism was central to explain the central bank actions during the crisis, as we discuss below.

III. THE OPERATION OF MONETARY POLICY. IS THERE ANY DIFFERENCE BETWEEN CONVENTIONAL VERSUS NON CONVENTIONAL

At all times, central banks operate by changing the monetary base (currency and bank reserves) to affect some interest rate. This can be done in two ways: Buying from and selling bonds to the public or borrowing from and lending money to the public. The difference between the two options is a time dimension – buying and selling make the impact "permanent," lending and borrowing make the impact "transitory." Of course, both can be equivalent by choosing the appropriate time horizons and techniques.

In normal times monetary policy operates via changes in the short term interest rate, which shifts the term structure of real interest rates. These changes in real interest rates affect the economy via two main channels: Asset prices and credit conditions. The asset price channel is well understood: Changes in real interest rates shift asset prices and affect investment and consumption decisions. The credit channel assumes that changes in real interest rates affect some financial frictions –adverse selection and moral hazard– that influence borrowing and lending decisions. This effect is more pervasive during downturns, as "good" borrowers become more risk averse and borrow less while "bad" borrowers gamble for resurrection. Banks know this worsening of the pool of borrowers and become more reluctant to lend. By easing financial conditions and raising asset price levels, central banks can improve the solvency of borrowers and reduce these frictions, thus softening the tightening of lending standards.⁴ Thus monetary policy can affect both asset valuations and attitudes towards risk.

The only difference between conventional and unconventional monetary policy is that unconventional policy has to operate via changes in longer term interest rates. This adds an extra dimension because real long term interest rates are a combination of average expected short term rates, the term premium, and expected inflation. Unconventional policies, both asset purchases and forward guidance, operate by potentially affecting some or all of these three elements. Expected short term rates are affected by changes to the policy reaction function, either via explicit forward guidance or via the signaling effect of asset purchases. Term premia are affected mostly by the scarcity and duration effect of asset purchases, although forward guidance can contribute via its impact on reducing term premia in the front end of the curve.⁵ Inflation expectations are affected by the overall message that monetary policy offers, including asset purchases, guidance, and commitment to achieve the monetary policy goals.

IV. THE CONCEPTUAL DEBATE ON ASSET PURCHASES

In principle, asset purchases should not affect asset prices beyond the assets being purchased, because the price of an asset should only depend on its own risk adjusted expected returns. There are, however, a few additional channels through which asset purchases may have an impact beyond affecting its own price:⁶

1. Signaling channel – because it takes time to implement a program of asset purchases, it credibly commits the central bank not to change direction

⁴ See Bernanke and Gertler (1995) NBER seminal paper, and Cicarelli (2010) ECB WP 1228 for an analysis of its impact in the euro area.

⁵ There is an increasing body of literature that argues that conventional monetary policy also affects term premia via its impact on risk taking (see, for example, Gilchrist, Lopez Salido and Zakrajsek (2013)).

⁶ There is an additional channel through which asset purchases may affect the economic outlook, namely the exchange rate. But this is not specific to asset purchases, it is just a reflection of changes in relative interest rates.

of policy at a minimum during the time it takes to implement the purchases. Thus purchases can be both a complement to forward guidance (reinforcing it) and a substitute (the length of the ECB's LTROs at fixed rate was considered as a subtle way to signal rates on hold during that period).

2. Scarcity/portfolio rebalancing channel – by becoming a dominant player and reducing the supply of a particular asset, asset purchases create a situation where investors will bid up the price of the asset. If the price is high enough, investors may opt to shift to other assets and rebalance their portfolio. Typically the central bank buys the safest assets, with the intention to force private investors to shift towards riskier assets. This channel typically requires some segmentation –as described, for example, in preferred habitat models– whereby some agents (for example pension funds, insurance companies or sovereign wealth funds) are constrained in the assets they can hold and thus arbitrage is limited (see Bernanke, Reinhart and Sack (2004) and Vayanos and Vila (2009)). In principle, bond purchases would affect only the risk free component of asset prices while lending would affect the term premium of all assets that can be posted as collateral.

3. Duration channel – by buying long maturity bonds in large amounts, the central bank makes investors' portfolios safer because there is less overall exposure to interest rate risk. Ceteris paribus, this would increase the price of risky assets.

4. Insurance channel. The central bank communicates that it is ready to ease policy as much as needed to achieve its objectives. This changes the overall level of risk of the economy and reduces the tails in the scenarios used for risk management, thus improving the demand outlook, boosting asset prices, softening lending standards, and lifting inflation expectations and reducing real rates. This channel has been largely overlooked in the debate and yet it is likely the most powerful and unique to nonconventional policies.

An additional point of debate is the discussion about whether asset purchases operate via stock or flow effects. The stock theory argues that asset purchases operate via adjustments to the price of the asset once the new supply/demand balance is known (in other words, when the announcement of new asset purchases is made, markets reevaluate the new supply/demand equilibrium and fix the price accordingly; all the impact is on announcement). The flow theory argues that asset purchases operate by injecting money in the system with each purchase, money that then is channeled into another asset (in other words, the announcement has no impact, while each purchase has an impact). The economic theory and empirical evidence sides mostly with the stock theory,⁷ although the flow could have some impact at the micro level and carry information about the total final stock of purchases (for example in the case of tapering of QE3). It's noticeable that the critics of asset purchases belong mostly to the flow camp, arguing that the money just goes to inflate stock prices, bypassing the real economy, and when asset purchases end, stock prices will deflate to the pre-asset purchase level.

TABLE 1								
DIFFERENT APPROACHES TO ASSET PURCHASES								
	Fed	ECB	Bank of Japan	Bank of England	Swiss National Bank			
Modality	Purchases (QE)	Purchases (SMP, OMT) Lending (LTROs)	Purchases (Rinban, APP, QQE) Lending	Purchases (QE) Lending (FLS)	Purchases			
Assets purchased	Private Gov bonds	Private Gov bonds	Private (REITs, ETFs) Gov bonds	Gov bonds	Foreign bonds			
Sterilized	Unsterilized	Sterilized	Unsterilized	Unsterilized	Unsterilized			
Quantity	Fixed quantity (QE1, QE2) Open ended (QE3)	Open ended	Fixed quantity (Rinban, APP) Open ended (QQE)	Fixed quantity	Unlimited			
Term	Long term (QE1, QE3) Twist	Short term	Short term (Rinban, APP) Long term (QQE)	Long term (QE) Short term (FLS)	Unknown			
Source: Own elaboration.								

The modality of asset purchases matters to understand the channel through which policy works and its likely impact. As Table 1 shows, the difference central banks have adopted many different strategies, combining purchases and lending, private and public assets.

The Fed has focused mostly on asset purchases, with different strategies: QE in fixed quantity along the curve (QE1 and QE2); QE in fixed quantities

⁷ This is what Chairman Bernanke said at the April 25, 2012 FOMC Press Conference, in response to a question: "There's some disagreement, I think, about exactly how balance sheet actions by the Federal Reserve affect Treasury yields and other asset prices. The view that we have generally taken at the Fed in which I think–for which I think the evidence is pretty good is that it's the quantity of securities held by the Fed at a given time, rather than the new purchases, the flow of new purchases, which is the primary determinant of interest rates." http://www.federalreserve.gov/mediacenter/files/FOMCpresconf20120425.pdf

at selected maturities (Operation Twist); QE Open Ended (QE3). The ECB has focused mostly on lending (LTROs), creating an endogenous supply of liquidity; asset purchases were small and sterilized (SMP). The BoJ did both purchases and lending. On purchases, to the long standing Rinban operation it added the Asset Purchase Program (fixed quantity, short maturity JGB purchases), and then QQE (open ended, longer maturity JGB purchases). Lending programs are mostly fixed quantity and targeted at specific sectors. The BoE also did both purchases (QE in fixed quantities, purchasing longer term gilts from non banks, and no tapering at the end) and lending (the FLS, fixed quantity and targeted). The Swiss National Bank focused on foreign exchange intervention and then the EURCHF floor, as they had not enough domestic bonds to do QE and fight deflation.

Why so many different strategies? Because it was a process of learning by doing and testing instruments that had not been used before, addressing specific problems and navigating the different constraints each central bank faced. A key worry of all central banks when they started to expand their balance sheets was to ensure the public and markets understood they would be ready to exit and contain inflation in an effective manner. For example, the "small" size of the Fed initial packages and its combination with a discussion of exit strategies (which dampened their impact); the ECB's insistence on the self-absorbing nature of LTROs, as an explanation of why it was a better policy than QE; the BoE's decisions on QE on a three month horizon basis. As more information was collected about the impact of these new policies, central banks become bolder in their application (Fed and BoJ moved, for example, to open ended QE). Another worry was that despite the fact that central banks do not need capital to operate, there was concern about eventual loses that could potentially impact the independence of the central banks. For example, the Fed's debate on the cost/benefit of QE^{,8} the BoE's decision to obtain an explicit indemnity from the Treasury for its QE program; the ECB's request for a commitment from the governments to be recapitalized if any loses were to arise from the SMP program; the BoJ's long standing reluctance to buy JGBs of maturities longer than 2 yrs for fear of heavy losses were interest rates to increase sharply; or the tremendous pressure on the Swiss National Bank because of the accounting loses derived from its fx intervention to defend the EURCHF peg. There was also a worry about interfering with credit allocation, which explains why CBs mostly shied away from private asset purchases once the acute phase of the crisis was over. In fact, BoJ's ETF and REIT purchases are designed specifically not to interfere with market pricing.

⁸ See Carpenter et al. (2013).

V. FORWARD GUIDANCE: RATIONALE AND VARIATIONS

The key argument in favor of forward guidance is that central banks don't have superior knowledge about how the world works, but should be able to explain how they think, and this is the key to successful monetary policy. That implies setting clear goals, commit to achieve the goals, adopt clear policy actions to achieve the goals, and provide full accountability as regards the achievement of the goals.⁹

A simple policy rule can, during tranquil times, provide a good approximation to a goal oriented monetary policy strategy. But it is very likely to be a very incomplete, if not erroneous, description of a goal oriented policy at the ZLB for two reasons. First, it would fail to describe the policy intentions completely, because interest rates can't go below zero (for example, the rule described in Taylor (1999) would have suggested interest rates in the US at -5 percent in 2009, see Ruddebush (2009)) and large shocks very likely generate big and time varying changes in the deep parameters of the reaction function – for example the neutral real interest rate. Forward guidance, with a fuller and more complete description of the policy strategy, is a way to overcome these shortcomings. Second, forward guidance is necessary because the policy prescription at the zero bound –namely to cut rates aggressively and then keep interest rates "lower for longer" than a standard policy rule would prescribe-basically implies shifting to another reaction function, or at least shift to a different loss function for a given reaction function because of the asymmetric nature of risks at the ZLB, and the central bank needs to educate markets (and, when operating by committee, its own committee members) on the new strategy.

Forward guidance was already used in normal times pre-crisis, in speeches, statements and monetary policy reports. The Fed introduced it after cutting rates to 1 percent in August 2003, as a replacement to the biases it had been used to signal the likely direction of rates: "In these circumstances, the Committee believes that policy accommodation can be maintained for a considerable period." As the Fed became more convinced the next move in rates would be up, this guidance shifted in January 2004 into "the Committee believes that it can be patient in removing its policy accommodation" and in May 2004 into "the Committee believes that policy accommodation can be removed at a pace that is likely to be measured." In other words, the Fed provided guidance about the timing of the beginning of the rate hiking cycle and about its pace. The Bank of England provided guidance with the Inflation Report's inflation forecasts under constant and market rates (with BoE watchers focusing on the difference between the two to assess whether the BoE agreed or not with market pricing).

⁹ See Evans (2014) for an elaboration.

TABLE 2									
DIFFERENT APPROACHES TO FORWARD GUIDANCE									
	Fed	ECB	Bank of England	Bank of Japan	Bank of Canada				
Instrument	Fed funds rate	Refi and depo rate	Bank rate	Monetary base	Interest rate				
Calendar guidance	Yes	No	No	No	Yes				
Qualitative guidance	Yes	Yes	Yes	No	No				
Thresholds	Inflation and unemployment	None	Unemployment rate with inflation and financial stability knockout	Inflation with financial stability knockout	None				
Objective	Maintain well anchored inflation expectations	Prevent increase in short term interest rates	Maintain well anchored inflation expectations	Increase inflation expectations	Maintain well- anchored inflation expectations				
Shift to different reaction function?	Yes – low for longer	No	Yes – low for longer	Yes – new policy regime	Yes – low for longer				
Source: Own elaboration									

Part II: Similarities and differences among the policies of the four big central banks

The ECB became fond of its "traffic light" (essentially variations of the word "vigilance") system to preannounce interest rate increases.

As with asset purchases, central banks started using forward guidance timidly and were not very successful initially. For example, despite some verbal guidance from the Fed ("some time"), markets were consistently pricing the return to positive rates about 6-12 months after cutting rates to zero. Markets had no history to base their outlook on, and thus were using past historical experience as a guide. Table 2 shows the different strategies adopted by the different central banks.

The *Bank of Canada* introduced in April 2009 an innovation via calendar guidance, suggesting rates on hold until a specific moment in time (the second quarter of 2010). Once the Bank of Canada hiked rates (in April 2010, a quarter before the time implied by the calendar guidance), the new guidance focused on two elements: The likely gradual pace of rate hikes, by stressing the large amount of slack in the economy and the long time it would take to absorb it; and

the likely lower end point of the hiking cycle, by stressing that the neutral rate was lower than in the past and that interest rates would be below neutral when slack was reabsorbed and inflation at target because of persistent headwinds.

The *Fed* started with some fuzzy temporal guidance in December 2008, signaling low rates for "some time," which then became low rates for an "extended period" in March 2009. As the euro area crisis got deeper, the Fed shifted to calendar guidance in August 2011, signaling rates on hold until at least late 2013. This calendar guidance was modified twice, first in January 2012 (rates on hold until late 2014) and then in September 2012 (rates on hold until mid 2015). Dissatisfaction with calendar guidance led, in December 2012, to the adoption of state contingent guidance defining an "area of inaction" based on macroeconomic variables: The unemployment rate above 6.5 percent, inflation between one and two years ahead below 2.5 percent. and inflation expectations well anchored. As the economy approached the point where the thresholds were about to be breached, the guidance reverted to a more qualitative stance - rates on hold "well past" the moment when the unemployment rate will cross 6.5 percent. In March 2014, the Fed replaced the thresholds with qualitative guidance (similar to that adopted by the BoE, see below) about the likely timing of the lift off, the pace of rate hikes, and the terminal point. This guidance was supplemented by the "dots chart" in the SEP. Therefore, the Fed has used a belt and suspenders approach, with calendar and state contingent language combined with explicit rate guidance.¹⁰

The *ECB* has used more vague forms of forward guidance. It was first used in the Summer of 2012, with ECB President Draghi now famous "whatever it takes," intended to neutralize the "redenomination risk," and was crystalized in the launching of the conditional OMT program. There were no details about how it would work, but it successfully contained the increase in periphery spreads (the "insurance" channel). The ECB adopted interest rate guidance in July 2013 by stating that rates would stay on hold or lower "for an extended period of time," but providing little information about the underlying state contingent rule underneath the "extend period." In March 2014 the ECB expanded the forward guidance by introducing the concept of "slack" as an argument to keep rates low even as the recovery takes hold (see Praet (2014)). Implicitly, this tried to break with the past reaction function where increases in the PMIs to above average levels would lead to rate increases.

The *BoE* adopted a state contingent guidance in August 2013, with an unemployment threshold (7 percent) and inflation knockout (inflation not

¹⁰ The SEP, however, remains an imperfect instrument as it reveals discrepancies around a modal forecast, not uncertainty around a baseline case, and it is not based on a homogeneous set of forecasts.

higher than 2.5 percent 18-24 months out) and an innovation, a financial stability knockout (based on a decision by the Financial Policies Committee). The intention was to stress the large amount of slack and thus that a period of rapid growth would not lead, as in the past, to increases in interest rates. As the unemployment rate approached 7 percent, the BoE moved in February 2014 to qualitative guidance –a late lift off and an eventually gradual hiking process due to the large amount of slack, and guidance on a lower neutral rate– aided by the inflation forecasts in the Inflation Report. As in the Fed's case, a belt and suspenders approach to guidance.

The BoJ had been using forward guidance as a key policy tool for a long time, and introduced two variations during the crisis. During 2010-13, the BoJ's strategy was defined as "comprehensive monetary easing," with two main elements: Forward guidance on interest rates (rates at zero until inflation reached 1 percent inflation) supported by JGB purchases with maturity up to 3 years via its Asset Purchases Program (APP). In April 2013, the BoJ shifted its strategy to QQE (qualitative and quantitative easing), comprising: A change in the instrument from interest rate to base money growth, an increase in the maturity of the JGBs purchases (average maturity now between 6 and 8 years), forward guidance linked to asset purchases, and a higher inflation rate with a temporal dimension (2 percent inflation to be reached in 2 years). In addition to this time-defined guidance, the BoJ added an open ended second layer of guidance – the BoJ would continue to do QQE for as long as needed to maintain



2 percent inflation in a "stable" manner, with "stable" likely to be a function of medium term inflation expectations.

Forward guidance at the zero bound is effective for two main reasons. *First,* because the central bank considers that the time horizon over which rates will be on hold is longer than it has been standard in the past and/or can be communicated with standard tools (for example, the inflation forecast published in the BoE's Inflation Report was effective to communicate rates on hold over two years, but not beyond); and second, because the central bank considers that the past is not a good guide for the future, and wants to communicate it is jumping to a different reaction function because the trade between inflation and growth has changed. When clearly communicated, the anchoring effect of the central bank guidance has been very powerful. If, however, the guidance merely reflects the fact that weaker conditions warrant rates on hold for longer it can backfire, as the public could interpret it as the central bank acknowledging a weaker outlook but doing nothing about it (see Woodford 2012 for an elaboration of this point). Figure 1 shows how the Fed guidance was effective in this regard: The amount of rate increase priced over the subsequent 36 months remained high until mid 2011, but dropped significantly when the Fed introduced the calendar based guidance.





a given level of inflation, that will lead to the first rate hike, thus generating an easier policy stance. English, Tetlock and Lopez Salido (2013) show that the threshold guidance has allowed the Fed to approximate an optimal control rule, which is welfare improving with respect to an inertial Taylor Rule, and better filter the signal from the noise as far as the direction of monetary policy (for example by neutralizing the impact of hawkish dissenting commentary). Figure 2 shows that uncertainty about the future path of rates, measured from options markets, had fallen to the lowest levels ever in April 2013.

In the BoE case, despite the tremendous forecasting mistake of the unemployment rate, the threshold guidance prevented a massive increase in market interest rates when growth accelerated, which would have happened if markets had followed the pre crisis rule based on the relationship between PMIs changes or quarterly GDP growth and interest rates.¹¹ The acceleration in job creation and the decline in the unemployment rate in 2013Q3 and Q4 was the fastest in recent history. The threshold system allowed the BoE to communicate clearly the difference between levels and rate of growth (as, despite the fast rate of growth, the level of GDP is still below pre-crisis levels), to provide insurance against a situation of inflation stickiness due to fees and regulated prices, and to also generate discipline and unity of message inside the MPC, at a time when discrepancies could have been very damaging. This allowed the BoE to move to the second phase of guidance, transitioning from signaling what it would not do (raise rates until threshold crossed) to what it would do (raise rates gradually), while rates barely moved.

In the ECB case the effectiveness has been more limited, although it has successfully stabilized short term rates. Differently from Fed and BoE, the ECB has not sent clearly a message of shifting to an easier reaction function. It has just confirmed that the inflation outlook has weakened and therefore the expected rate path should be coherent with this weakness. In other words, the ECB's guidance did not ease policy, it just prevented, by signaling an easing bias, a tightening from the global sell off in interest rates resulting from the Fed tapering and from the increase in money market rates stemming from the repayment of the LTROs. The ECB's guidance has been passive easing (intended to offset an undue tightening), rather than active easing intended to increase the amount of accommodation (to some extent, this is the same concept as the ECB's decision to use self-reabsorbing LTROs rather than QE).

As the exit approaches and central banks move into the new phase of "fuzzy" forward guidance (providing information on the macro forecast, the likely timing of the lift off, the pace of hikes, and the neutral rate), a question

¹¹ See Broadbent (2013) for an elaboration of this point.

arises: Why not providing the full rate path? The reason is that "fuzzy" guidance approximates better the concept of guidance being a conditional forecast, not a promise. A very precise guidance could look like a promise. At the depth of a crisis it makes sense, because of the need to lower risk aversion (the "insurance" channel of policy) and the "certainty" that rates will be at zero during that period. When the economy is recovering, there is less need to commit and less certainty. Thus the degree of fuzziness must be proportional to the cyclical situation. It has become clear that central banks are not better forecasters than the consensus, and thus this "fuzzy" guidance is a good balance between providing useful information and avoiding losing credibility as detailed forecast go awry. In addition to the terrible unemployment rate forecasting performance of the Fed and the BoE, the experience of central banks who publish interest rate paths shows a large forecast error beyond 4 guarters ahead. The noise to signal ratio is high, thus raising the question of whether more transparency is alwavs welfare improving. Given this experience, it may be better just to try to describe the reaction function -what the central bank can control- and let markets insert their own forecast. In addition, this fuzzy forward guidance can be very effective with corporates and households. What corporates want to know in order to hire and invest is not the precise path of interest rates, but that the central bank is ready to do what it takes to deliver strong growth and that average interest rates over the next few years won't be too high. Again, the insurance channel of monetary policy.

The interaction between asset purchases and guidance has only recently been properly understood. The impact of the Bernanke's comments in May 2013 about the possibility of tapering QE3 later in the year revealed that asset purchases were a very important complement to forward guidance. As markets sold off due to the tapering talk and aggressively brought forward the beginning of the rate hiking cycle, it became clear that the Fed's sequencing strategy -first taper, then reinforce forward guidance as needed- was wrong, and that forward guidance had to be reinforced first to replace the positive impact on guidance of asset purchases (see the sharp increase in uncertainty about the future path of rates, Figure 2). To make it simple, markets believe that for as long as central banks are buying assets they won't think about rate hikes – and therefore the period during which asset purchases are undertaken is taken as a "quarantee" of rates on hold (the signaling channel of asset purchases). Once asset purchases are over, the uncertainty about guidance increases, no matter how strong the language – because the central bank can always change its mind. In fact, the Fed seems to have recognized this and, in the post threshold guidance, anchored the timing of the first hike as a "considerable time" after the end of QE.

VI. HAS UNCONVENTIONAL POLICY BEEN EFFECTIVE?

There is a strong debate about whether or not unconventional policies have been effective. The skeptics argue that they have just inflated asset values and that once the money flow ends asset values will deflate. In this view, only structural policies work and there is little that cyclical policies can do to offset the impact of a financial crisis [see, for example Hall (2013) Jackson Hole paper]. The prevailing view is that they have worked, in a rather conventional way, by lowering real interest rates, and have contributed to softening the impact of the crisis. Precise measurement of the impact of specific policies always has the problem of a counterfactual, and there are different ways to define "effectiveness."

The simplest way to assess effectiveness is to look at the evolution of long term real interest rates –the main instrument of non conventional monetary polic – and of inflation expectations – the main objective of monetary policy. Figure 3 shows the evolution of 10 year real interest rates (defined as 10 yr rates minus 10 yr expected inflation from inflation swaps) in the US, UK and the euro area (the euro area constructed as the GDP weighted average of euro area individual rates). It seems clear that, by this metric, the Fed and the BoE have eased policy aggressively, while the ECB has been very cautious. In fact, during 2010-2011 the stance of policy tightened in the euro area, while it was eased in the US and the UK.







In terms of ensuring the stability of inflation expectations at mandate consistent levels, there have been different degrees of success. The Fed and the BoE have been successful in maintaining inflation expectations well anchored around levels compatible with their mandate, while the ECB seems to have failed and allowed medium term inflation expectations to shift lower, as markets expect a very long period of below target inflation (see Figure 4, which shows the term structure of forward 1yr inflation across the main central banks). The BoJ's objective was a bit different, aiming not at stabilizing but at increasing inflation expectations. The preliminary evidence shows a successful increase in inflation expectations to above 1 percent (see Figure 5), even if it is difficult to assess the true extent of it because of the distortionary impact of the consumption tax hike.

IMF (2013) provides a very detailed summary of the wide literature that evaluates the precise impact of non conventional policies on asset prices, growth, and inflation, using mostly event studies or econometric analyses. The main conclusion is that policies aiming at restoring the functioning of disrupted markets (for example TALF, QE1, fx swaps, LTROs) have been very effective, with market functioning broadly restored. The assessment of policies aimed at lowering long term interest rates is more varied, with estimates for the cumulative impact on long term rates of the different bond purchasing programs showing declines in the range of 90-200bps in the US, 45-160bps in the UK and around 30bps in Japan. Asset purchases have also been successful



via the "insurance" effect, reducing tail risks- as evidenced by the normalization of stock market uncertainty implicit in the VIX index (see Figure 6), the lower probabilities of large exchange rate swings implicit in fx option risk reversals, the lower probability of deflation implicit in the skewedness of inflation forecasts. As far as the impact on growth and inflation IMF (2013) suggests that the evidence is also positive, showing that growth in the US and the UK increased by an average of about 2 percentage points over 2 years (with a range between no impact and about 8 percentage points), while the impact on inflation was about 1.5 percentage points, with a similarly wide range.

There has been plenty of debate about QE being an attempt at debasing currencies, and achieve competitive devaluations. The reality is that there are many factors which affect exchange rates and the broad trends have not validated this view (see Figure 7). The sharp depreciation of sterling happened before QE started and reflected a downward reassessment of the sterling equilibrium rate. The USD has moved in a broad range, but it is now about 20 percent stronger than in 2008 in real effective terms. The Euro was at risk of breaking up, and thus monetary policy was just a minor contributor to its evolution. The only case where there has been an intentional targeting of the currency is the yen, but that was a correction of a sharp overvaluation.



Overall, the evidence points increasingly towards very little difference between conventional and unconventional policies. For example, Glick and Leduc (2013) and Rosa and Tambalotti (2014) show that the impact of unconventional policies, once they are properly calibrated in terms of conventional policy equivalents, has been very similar to the impact of conventional policies in terms of their effect on asset prices, including the dollar.

VII. LESSONS LEARNED

The depth of the crisis and the variety of policy responses has generated a fertile ground for experimentation and learning. There are a few lessons that can be drawn for the future. The first one is that the difficulties experienced during the crisis and the current low levels of inflation suggest that at the ZLB central banks ease less than optimal (the amount of QE that would have been needed to achieve the level of the fed funds suggested by applying Taylor (1999) would have been in the 5-6tr range) and therefore the recovery takes longer than it should, potentially damaging potential growth via hysteresis effects. It also seems clear that the odds of hitting the zero bound are much bigger than it was thought when inflation targeting was designed 20 years ago. And there is the possibility that we could be entering a long period of higher productivity growth and low wages due to technological progress and robotics and wider income inequality.

Central banks should prepare for a situation where unconventional policies may well become the norm, rather than the exception, and adapt their policy frameworks accordingly. Central banks should explain in detail to the public that there is little difference between conventional and unconventional policies, that they are legal and within the mandate, and strengthen the institutional settings to be able to operate free from political interference. In Ubide (2014) we argue that this would require increase central bank capital levels to avoid worries about losses, explain in much more detail the reaction function to increase effectiveness, and aim for a somewhat higher level of inflation to reduce the odds of reaching the zero bound and facilitate the reduction in real rates.

The second lesson is that there is a tension between the value of clear and transparent communications and the low predictability of key macro variables, such as inflation and unemployment. This communication challenge suggest a dual strategy: First, move towards a monetary policy strategy based on simple, well defined, and clearly accountable objectives, such as the Fed's statement of long term policy goals (see FOMC (2012)) and the new BoJ QQE strategy. The imprecise ECB's definition of price stability remains a bit of an anachronistic outlier. Second, describe the reaction function and its deep parameters as the main communication tool, while de-emphasizing the macro forecast as

"illustrative" – an example of an outlook that the central bank sees plausible and "likes" (achieves the mandate objectives in a balanced manner), rather than the best possible forecast. This would also imply focusing less on the baseline forecast and more on the possible alternative paths – something the Riksbank, for example, has been doing for a long time and that the BoE now has started to introduce in the Inflation Report – as a way to educate markets on the likely reaction of the central bank to changes in the macro outlook.

The third lesson is that the debate on the interplay between monetary policy, conventional or not, and financial stability remains wide open and it's likely to intensify as the period of low interest rates continues. Conceptually, monetary policy should address the residual macro risks that regulation, micro and macro prudential can't address. But defining these residual risks is challenging. Assessing asset mispricing is complex and there is no obvious reason why central banks should know better than markets. In addition, because innovation and financial development are an integral part of economic growth, one should caution against Type II errors in bubble spotting. Macro measures of leverage, such as credit/GDP, have given plenty of false signals, and monetary policy is difficult to calibrate for such a slow moving variable (Stein (2014)). Leverage should be taken care of by regulation and macroprudential policies, including horizontal assessments and stress tests.

A useful way to think about monetary policy and financial stability is in terms of stabilizing the "macro Value at Risk (VaR)." VaR is a function of leverage and uncertainty. When uncertainty is within "normal" levels, monetary policy should focus on stabilizing inflation and maximizing GDP growth while macroprudential, supervision and regulation should focus on ensuring that credit, broadly defined, does not become excessive as a share of GDP and underwriting standards remain proper. A crisis typically leads to an increase in uncertainty to "abnormal" levels, and the main objective of policy should be the stabilization of uncertainty and risk aversion (see Ubide (2009)). Kocherlakota (2014) and Stein (2014) have recently argued along similar lines using a meanvariance approach, suggesting that policy makers should care not only about the level of inflation and unemployment and also about their variability. The "insurance channel" of non conventional policies aims at lowering uncertainty and restoring risk taking – via open ended QE combined with threshold based forward guidance that "insure" the delivery of economic outcomes.

Thus promoting risk taking via the insurance channel is an integral part of monetary policy at the ZLB. The key therefore is the open ended nature: The most successful strategies –LTROs, OMT, QE3, QQE, Swiss National Bank's floor– all were unlimited (the BoE's QE could also be considered unlimited, as it was reviewed at every meeting based on the inflation forecast). There is some logic to it. When a central bank starts an easing cycle, markets immediately price the whole easing cycle, and they can do it because there is past experience and a notion of neutral rate that serves as guidance. With QE there is no such guidance, markets don't know who to calibrate the amount of easing they should be pricing. If, however, QE is open ended and based on economic outcomes, if credible markets can price those outcomes.

The unanswered question is how to assess if the stance of policy could be becoming excessively loose from this standpoint. The provision of "certainty" should be proportional to the distance to the growth and inflation targets. The closer to the targets, the less need to focus on stabilizing risk aversion and the less insurance is needed. As the economy normalizes, policy should be wary of offering one way bets or using time inconsistent policies as part of the "insurance channel." Systemic crises happen when paradigms are broken, and monetary policy should avoid creating those situations.¹² Monetary policy at the ZLB is selling an option to the markets, an economic put. But it is critical that this insurance is properly priced. If the policy that the central bank adopts is time inconsistent, it may backfire later on, as the economy will not be ready to withstand the increase in volatility that the time inconsistent policy may generate when the central bank reneges from its promises. The current Fed stance is a potential example. Because of its aggressiveness, the Fed's stance of policy is both fully believed by markets (the market is priced along the dots and moves when the dots change, as the market reaction to the March 2014 meeting shows) and potentially time inconsistent if the dots represent an approximation to an optimal control strategy. Time will tell.

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¹² In Ubide (2009), I argue that the crisis was initially caused because three paradigms, which were essential for asset pricing, were broken: (1) house prices can't decline; (2) securitized assets are informationally insensitive; and (3) repo has no counterparty risk. A fourth broken paradigm was added later, namely (4) the euro area break up risk.

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		TABLE A.1		
THE CHRONOLOGY AND NATURE OF THE MEASURES UNDERTAKEN BY THE DIFFERENT				
PANEL A:		CENTRAL BANKS		
Important Ann	ouncement	s by the Federal Reserve		
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News	
25/11/2008	QE1	LSAPs announced: Fed will purchase \$100 billion in GSE debt and \$500 billion in MBS.		
01/12/2008	QE1	First suggestion of extending QE to Treasuries.		
16/12/2008	QE1	First suggestion of extending QE to Treasuries by FOMC.	The Fed cuts the federal funds rate from 1% to 0.00-0.25%; expects low rates "for some time."	
28/01/2009	QE1	Fed stands ready to expand QE and buy Treasuries.		
18/03/2009	QE1	LSAPs expanded: Fed will purchase \$300 billion in long-term Treasuries and an additional \$750 and \$100 billion in MBS and GSE debt, respectively.	Fed expects low rates for "an extended period."	
12/08/2009	QE1	LSAPs slowed: All purchases will finish by the end of October, not mid-September.		
23/09/2009	QE1	LSAPs slowed: Agency debt and MBS purchases will finish at the end of 2010:Q1.		
04/11/2009	QE1	LSAPs downsized: Agency debt purchases will finish at \$175 billion.	Fed defines "low rates of resource utilization, subdued inflation trends, and sable inflation expectations" as conditions for the "extended period."	
10/08/2010	QE1	Balance sheet maintained: The Fed will reinvest principal payments from LSAPs in Treasuries.		
27/08/2010	QE2	Bernanke suggests role for additional QE "should further action prove necessary."		
21/09/2010	QE2	FOMC emphasizes low inflation, which is "likely to remain subdued for some time before rising to levels the Committee considers consistent with its mandate."		
12/10/2010	QE2	FOMC members "sense" is that "[additional] accommodation may be appropriate before long."		
15/10/2010	QE2	Bernanke reiterates that Fed stands ready to further ease policy.		
03/11/2010	QE2	QE2 announced: Fed will purchase \$600 billion in Treasuries.		

TABLE A.1 (continued)				
ТНЕ	CHRONOLO	DGY AND NATURE OF THE MEASURES UNDERTA	KEN BY THE DIFFERENT	
PANEL A:		CENTRAL BANKS		
Important Ann	ouncements	by the Federal Reserve		
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News	
22/06/2011	QE2	QE2 finishes: Treasury purchases will wrap up at the end of the month, as scheduled; principal payments will continue to be reinvested.		
09/08/2011			Fed expects low rates "at least through mid 2013."	
21/09/2011	Maturity Extension Program	Maturity Extension Program ("Operation Twist") announced: The Fed will purchase \$400 billion of Treasuries with remaining maturities of 3 years or less; MBS and agency debt principal payments will no longer be reinvested in Treasuries, but instead in MBS.		
25/01/2012			Fed expects low rates "at least through late 2014."	
20/06/2012	Maturity Extension Program	Maturity Extension Program extended: The Fed will continue to purchase long-term securities and sell short-term securities through the end of 2012. Purchases/sales will continue at the current pace, about \$45 billion/month.		
22/08/2012	QE3	FOMC members "judged that additional monetary accommodation would likely be warranted fairly soon"		
13/09/2012	QE3	QE3 announced: The Fed will purchase \$40 billion of MBS per month as long as "the outlook for the labor market does not improve substantiallyin the context of price stability."	Fed expects low rates for a "considerable time after economic recovery strengthens" and "at least through mid-2015."	
12/12/2012	QE3	QE3 expanded: The Fed will continue to purchase \$45 billion of long-term Treasuries per month but will no longer sterilize purchases through the sale of short-term Treasuries.	The Fed expects low rates to be appropriate while unemployment is above 6.5 percent, inflation is forecasted below 2.5 percent and longer term inflation expectations well anchored.	
22/05/2013	QE3	"If we see continued improvement, and we have confidence that that is going to be sustained, in the next few meetings we could take a step down in our pace of purchases,"		

	TABLE A 1 (continued)					
THE	CHRONOL	OGY AND NATURE OF THE MEASURES UNDERTA	KEN BY THE DIFFERENT			
PANEL A:		CENTRAL BANKS				
Important Anr	ouncements	by the Federal Reserve				
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News			
19/06/2013	QE3	"Taper shock" as Bernanke says Fed could begin to reduce its \$85 billion a month of bond purchases by the end of the year if the economy continues to improve.				
18/09/2013	QE3	FOMC decides NOT to start tapering QE3				
18/12/2013	QE3	"Tapering" begins, reducing the speed of asset purchases: beginning in January, asset purchases will slow by \$10 billion per month, split evenly between MBS and Treasuries.				
19/03/2014	QE3		Fed replaces thresholds with new guidance: rates on hold for a "considerable time" after end of tapering, hiking process will take a "balanced approach", rates will be below neutral when slack has been absorbed and inflation at target.			
PANEL B:						
Important Anr	ouncements	by the European Central Bank				
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News			
28/03/2008	LTRO	LTRO expanded: 6-month LTROs are announced.				
15/10/2008	FRFA	Refinancing operations expanded: All refinancing operations will be conducted with fixed-rate tenders and full allotment; the list of assets eligible as collateral in credit operations with the Bank is expanded to include lower-rated (with the exception of asset-backed securities) and non- euro-denominated assets.				
07/05/2009	CBPP/ LTRO	CBPP announced/LTRO expanded: The EB will purchase €60 billion in euro-denominated covered bonds; 12-month LTROs are announced.	ECB lowers the main refinancing rate by 0.25% to 1% and the rate on the marginal lending facility by 0.5% to 1.75%.			
10/05/2010	SMP	SMP announced: The ECB will conduct interventions in the euro area public and private debt securities markets; purchases will be sterilized.				

TABLE A.1 (continued)					
THE	CHRONOL	DGY AND NATURE OF THE MEASURES UNDERTA	KEN BY THE DIFFERENT		
PANEL B:		CENTRAL BANKS			
Important Ann	ouncements	by the European Central Bank			
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News		
30/06/2010	CBPP	CBPP finished: Purchases finish on schedule; bonds purchased will be held through maturity.			
07/04/2011	Rate hike		ECB raises main refinancing rate for the first time since 2008, by 0.25% to 1.25%.		
07/07/2011	Rate hike		ECB raises main refinancing rate by 0.25% to 1.5%.		
06/10/2011	CBPP2	CBPP2 announced: The EB will purchase €40 billion in euro-denominated covered bonds.			
08/12/2011	Rate cut/ LTRO	LTRO expanded: 36-month LTROs are announced; eligible collateral is expanded.	ECB lowers the main refinancing rate by 0.25% to 1% and the rate on the marginal lending facility by 0.25% to 1.75%.		
05/07/2012	Rate cut		ECB lowers main refinancing rate by 0.25% to 0.75%, a record low.		
02/08/2012	OMT	ECB President Mario Draghi indicates that the EB will expand sovereign debt purchases. He proclaims that "the euro is irreversible."			
06/09/2012	OMT	OMTs announced: Countries that apply to the European Stabilization Mechanism (ESM) for aid and abide by the ESM's terms and conditions will be eligible to have their debt purchases in unlimited amounts on the secondary market by the ECB.			
02/05/2013	Rate cut		ECB lowers the main refinancing rate by 0.25% to record low of 0.5%.		
04/07/2013	Forward Guidance		The ECB "expects the key ECB interest rates to remain at present or lower levels for an extended period of time."		
07/11/2013	Rate cut		ECB lowers the main refininacing rate by 0.25% to new record low of 0.25%.		

TABLE A.1 (continued)						
THE	THE CHRONOLOGY AND NATURE OF THE MEASURES UNDERTAKEN BY THE DIFFERENT					
PANEL B:		CENTRAL BANKS				
Important Ann	ouncements	by the European Central Bank				
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News			
13/02/2014	Forward Guidance		The ECB "firmly reiterates its forward guidance: rates at present or lower levels for an extended period of time.			
13/03/2014	Forward Guidance		ECB introduces concept of "slack" to suggest rates on hold even afer recovery takes hold.			
PANEL C:						
Important Ann	ouncements	by the Bank of England				
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News			
19/01/2009	APF	APF established: The BOE will purchase up to £50 billion of "high quality private sector assets" financed by Treasury issuance.				
11/02/2009	APF	The BOE views a slight downside risk to meeting the inflation target, reiterates APF as potential policy instrument.				
05/03/2009	APF	QE announced: The BOE will purchase up to £75 billion in assets, now financed by reserve issuance; medium- and long-term gilts will comprise the "majority" of new purchases.	The BOE cuts policy rate from 1% to 0.5%; the ECB cuts policy rate from 2% to 1.5%			
07/05/2009	APF	QE expanded: The BOE will purchase up to £125 billion in assets.				
06/08/2009	APF	QE expanded: The BOE will purchase up to £175 billion in assets; to accommodate the increased size, the BOE will expand purchases into gilts with remaining maturity of 3 years or more.				
05/11/2009	APF	QE expanded: The BOE will purchase up to £200 billion in assets.				
04/02/2010	APF	QE maintained: The BOE maintains the stock of asset purchases financed by the issuance of reserves at £200 billion; new purchases of private assets will be financed by Treasury issuance.				
06/10/2011	APF	QE expanded: The BOE will purchase up to £275 billion in assets financed by reserve issuance; the ceiling on private assets held remains £50 billion.				

TABLE A 1 (continued)						
THE						
PANEL C:	CENTRAL BANKS PANEL C:					
Important Ann	nouncements	by the Bank of England				
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News			
29/11/2011	APF	Maximum private asset purchases reduced: HM Treasury lowers the ceiling on APF private asset holdings from £50 billion to £10 billion.				
09/02/2012	APF	QE expanded: The BOE will purchase up to £325 billion in assets.				
05/07/2012	APF	QE expanded: The BOE will purchase up to £375 billion in assets.				
07/08/2013	Forward Guidance		The MPC will not raise rates at least until the unemployment rate crosses 7 %, subject to the following conditions: the CPI forecast does not exceed 2.5%, medium-term inflation expectations are sufficiently well-anchored, and financial stability is not impaired. "Despite the sharp fall in unemployment, there remains scope to absorb spare capacity further before raising the Bank Rate. When the Bank Rate does begin to rise, the appropriate path is expected to be gradual. Even when the economy has returned to normal levels of capacity and inflation is close to target, the appropriate level of Bank Rate is likely to be materially below the 5% level set on average prior to the financial crisis.			
PANEL D:		hudha Darla of Janaa				
Important Ann	Important Announcements by the Bank of Japan					
02/12/2008	SFSOs	The BOJ will operate a facility through the end of April to lend an unlimited amount to banks at the uncollateralized overnight call rate and collateralized by corporate debt.	interest Kates/Guidance News			

TABLE A.1 (continued)				
THE CHRONOLOGY AND NATURE OF THE MEASURES UNDERTAKEN BY THE DIFFERENT CENTRAL BANKS PANEL D:				
Important Ann	ouncements l	by the Bank of Japan		
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News	
19/12/2008	Outright JGB/CFI purchases	Outright purchases expanded: The BOJ Increases monthly JGB purchases (last increased October 2002) from \neq 1.2 trillion to \neq 1.4 trillion; they will also look into purchasing commercial paper.	The BOJ lowers the target for the uncollateralized overnight call rate from 0.3% to 0.1%.	
22/01/2009	Outright CFI purchases	Outright purchases announced: The BOJ will purchase up to ¥3 trillion in commercial paper and ABCP and is investigating outright purchases of corporate bonds.		
19/02/2009	Outright CFI purchases	Outright purchases expanded: The BOJ will extend commercial paper purchases and the SFSOs through the end of September (previously end of March) and will purchase up to ¥1 trillion in corporate bonds.		
18/03/2009	Outright JGB purchases	Outright purchases expanded: The BOJ increases monthly JGB purchases from ¥1.4 trillion to ¥1.8 trillion.		
15/07/2009	Outright CFI purchases/ SFSOs	Programs extended: The BOJ extends the SFSOs and outright purchases of corporate paper and bonds through the end of the year.		
30/10/2009	Outright CFI purchases/ SFSOs	Status of programs: Outright purchases of corporate finance instruments will expire at the end of 2009 as expected, but the SFSOs will be extended through 2010:Q1; ample liquidity provision past 2010:Q1 will occur through funds- supplying operations against pooled collateral, which will accept a larger range of collateral.		
01/12/2009	FROs	Facility announcement: The BOJ will offer ¥10 trillion in 3-month loans against the full menu of eligible collateral at the uncollateralized overnight call rate.		
17/03/2010	FROs	Facility expansion: The BOJ expands the size of the FROs to ± 20 trillion.		
21/05/2010	GSFF	GSFF announcement: The BOJ will offer ¥3 trillion in 1-year loans to private financial institutions with project proposals for "strengthening the foundations for economic growth."		

TABLE A.1 (continued)					
THE	THE CHRONOLOGY AND NATURE OF THE MEASURES UNDERTAKEN BY THE DIFFERENT				
PANEL D:		CENTRAL BANKS			
Important Ann	ouncements	by the Bank of Japan			
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News		
30/08/2010	FROs	Facility expansion: The BOJ adds ¥10 trillion in 6-month loans to the FROs.			
05/10/2010	CME	APP established: The BOJ will purchase ¥5 trillion in assets (¥3.5 trillion in JGBs and Treasury discount bills, ¥1 trillion in commercial paper and corporate bonds, and ¥0.5 trillion in ETFs and J-REITs).	The BOJ sets the target for the uncollateralized overnight call rate at around 0 to 0.1%.		
14/03/2011	CME	APP expanded: The BOJ will purchase an additional ¥5 trillion in assets (¥0.5 trillion in JGBs, ¥1 trillion in Treasury discount bills, ¥1.5 trillion in commercial paper, ¥1.5 trillion in corporate bonds, ¥0.45 trillion in ETFs, and ¥0.05 trillion in J-REITs).			
14/06/2011	GSFF	GSFF expanded: The BOJ makes available another ¥0.5 trillion in loans to private financial institutions for the purpose of investing in equity and extending asset-based loans.			
04/08/2011	CME	(¥2 trillion in JGBs, ¥1.5 trillion in Treasury discount bills, ¥0.1 trillion in commercial paper, ¥0.9 trillion in corporate bonds, ¥0.5 trillion in ETFs, and ¥0.01 trillion in J-REITs); 6-month collateralized loans through the FROs are expanded by ¥5 trillion.			
27/10/2011	CME	APP expanded: The BOJ will purchase an additional ¥5 trillion in JGBs.			
14/02/2012	CME	APP expanded: The BOJ will purchase an additional ¥10 trillion in JGBs.			
13/03/2012	GSFF	GSFF expanded: The BOJ makes available another ¥2 trillion in loans to private financial institutions, including ¥1 trillion in U.Sdollar-denominated loans and ¥0.5 trillion in smaller-sized (¥1 million- ¥10million) loans.			
27/04/2012	CME	APP expanded/FROs reduced: The BOJ will purchase an additional ¥10 trillion in JGBs, ¥0.2 trillion in ETFs, and ¥0.01 in J-REITs. The BOJ also reduces the availability of 6-month FRO loans by ¥5 trillion.			

TABLE A.1 <i>(continued)</i> THE CHRONOLOGY AND NATURE OF THE MEASURES UNDERTAKEN BY THE DIFFERENT CENTRAL BANKS PANEL D:					
Important Ann	ouncements by	the Bank of Japan			
Date	Program	Asset Purchases/Lending News	Interest Rates/Guidance News		
12/07/2012	CME	APP expanded/FROs reduced: The BOJ will purchase an additional ¥5 trillion in Treasury discount bills and reduced the availability of FRO loans by ¥5 trillion.			
19/09/2012	CME	APP expanded: The BOJ will purchase an additional ¥5 trillion in JGBs and ¥5 trillion in Treasury discount bills.			
30/10/2012	CME/SBLF	APP expanded/SBLF announced: The BOJ will purchase an additional ¥5 trillion in JGBs, ¥5 trillion in Treasury discount bills, ¥0.1 trillion in commercial paper, ¥0.3 trillion in corporate bonds, ¥0.5 trillion in ETFs, and ¥0.01 trillion in J-REITs. Through the SBLF it will fund up to 100 percent of depository institutions' net increase in lending to the nonfinancial sector.			
20/12/2012	CME	APP expanded: The BOJ will purchase an additional ¥5 trillion JGBs and ¥5 trillion in Treasury Discount bills.			
04/04/2013	QQE: Quantitative and qualitative monetary easing	The 2x2x2x2 strategy: the BOJ announces that it will achieve 2 percent inflation in 2 years by doubling the monetary base by December 2014 and doubling the duration of the JGBs it purchases. APP is terminated and will be absorbed into aforementioned JGB purchases.	QQE will continue for as long as needed to achieve 2 percent inflation in a sustained manner		

PART III

Balance of risks and the interactions with other policies

POST-CRISIS MONETARY POLICY: BALANCE OF RISKS

Jaime CARUANA Andrew FILARDO Boris HOFMANN

I. INTRODUCTION

Central banks have played a crucial role during the crisis. The most obvious successes included calming funding markets during phases of financial panic by supplying ample central bank liquidity to funding markets and, possibly more significantly, by making clear that they stood ready to do whatever was necessary to promote orderly financial intermediation. Nevertheless, despite the very accommodative monetary and fiscal policy stance, growth has been rather uneven and disappointing. It has not prevented the global economy, and certain economies in particular, from suffering chronic malaise. Concretely, the regions at the epicentre of the crisis, the United States and Europe, have faced weak growth and persistent unemployment in a context of high legacy debt.

There is no doubt that these crisis-related factors have acted as potent headwinds in the global recovery process. But the chronic malaise is not just a legacy of the crisis. It also has its origins in the pre-existing structural problems in various economies. The boom phase preceding the crisis masked the debilitating nature of the structural deficiencies, be they labour market restrictions, unsustainable fiscal positions, poor regulatory regimes etc. The masking of the symptoms of these deficiencies led some policymakers to "kick the can" instead of taking the opportunity to implement necessary structural reforms. The extent of the pre-existing and crisis-related challenges varies across economies depending on initial conditions, the economies' flexibility and capacity to adapt, the impact of the crisis, and the repair and reform efforts taken already.

What should central banks do in such an environment? Some argue that more monetary policy accommodation is required given the lacklustre performance of the global economy. The main arguments brought forward to support this view include concerns about scuttling the nascent recovery, secular stagnation that drives down the equilibrium interest rate, unemployment hysteresis and debt deflation. For those that favour this position, the priority of monetary and fiscal policy should be to stimulate demand. This article does not focus on fiscal policy; suffice it to say that in many economies it is still not adequately sustainable. The alternative view is that every crisis is different and requires a different response. We are confronted with a crisis in which the balance sheets of families, firms and governments have severely deteriorated, and if they are not repaired stimulus measures will be less effective. In the wake of a balance sheet recession, structural reforms and balance sheet repair are needed in order to foster a stronger and sustainable recovery. The priority here is on removing the impediments that prevent growth and make stimulus less effective.

Every crisis requires a certain degree of accommodative monetary policy, but if it is extraordinary and persistent it can affect the incentives of economic agents and policymakers to take on the necessary repair and reform measures. In turn, the effectiveness of monetary policy depends on the adoption of these measures. In the end, monetary accommodation can only be as effective as the structural reforms and the policies to repair private and public sector balance sheets that accompany it.

Taken together, this view suggests that there are growing risks from prolonged monetary policy accommodation, in particular risks of delayed structural adjustment and reform, credit-asset price bubbles, disruptive international spillovers, and even inflation overshoots and real resource misallocations associated with the risk-taking channel of monetary policy. Eventually, these risks may overshadow the benefits of short-term monetary stimulus, which are more uncertain in this type of balance sheet crisis.

At the same time, there is a longer-term dimension to the challenges central banks face in this crisis. It has fostered new, more subtle forms of risks to central bank independence and action. Central banks also need to draw lessons from the crisis for their monetary policy frameworks. One lesson is that central banks should be more proactive leaning against booms and should continue to be prepared to fully use their lender of last resort authority during periods of acute financial market dysfunction. However, during the subsequent stages of a balance sheet recession, the policy mix should become less reliant on monetary policy and more on repairing balance sheets and implementing reforms to correct the misallocations of resources generated during the boom phase. Another lesson is that central banks need to consider ways to better incorporate global monetary policy spillovers in their policy frameworks. Finally, central banks have to continue improving the design of their communication strategies.

The remainder of this paper addresses these issues associated with the post-crisis monetary policy balance of risks. Section II reviews the critical role central banks played in navigating the international financial crisis. In Section III, we discuss the monetary policy balance of risks in a balance sheet recession.

Section IV considers longer-term post-crisis risks and challenges to central banks. Section V concludes.

II. ACTIONS AND ACHIEVEMENTS

Since 2007, the global economy has been hit by a number of significant adverse financial developments as the international financial crisis has progressed.



The tipping point came in September 2008, when Lehman Brothers filed for bankruptcy and what many had hoped would be merely a year of manageable market turmoil escalated into a full-fledged global financial crisis. Financial markets seized up as investor uncertainty and risk aversion increased dramatically, reflected, for example, in a sharp rise in the VIX implied stock market volatility index (Figure 1, panel A).

The outbreak of the euro area sovereign debt crisis in 2010 dealt another significant blow to the global economy. This phase of the crisis was triggered by rising concerns about the sustainability of fiscal positions and solvency of banking sectors in many euro area countries, which led to a seizing-up of bond markets for a number of euro area governments and to an abnormal cross-country dispersion of sovereign bond yields and credit conditions (Figure 1, panel A). In particular, euro area-wide financial uncertainty and fragility rose as the breakup of the euro came to be perceived by markets as a distinct possibility.

This new phase had a significant impact on the real economy (Figure 1). Real output growth, which had started to slow worldwide in the second half of 2007, contracted sharply in the advanced economies in 2008/09 as the crisis intensified and slowed markedly in the emerging market economies (EMEs). Inflation rates also dropped, reflecting to a large extent the collapse of commodity prices as global demand for these resources dried up. While the euro area went into recession, the global economy slowed down, but continued to grow.

Central banks around the world responded to the economic fallout from the different bouts of financial turmoil by cutting policy rates and keeping them low, and by expanding their balance sheets (Figure 2). The central banks in the core advanced economies have further aimed at enhancing the effectiveness of their policies through forward guidance, signalling their intention to keep policy rates low well into the future.¹

The expansion of central bank balance sheets in the initial phase of the crisis was driven by central banks' need to act as lenders of last resort in order to counteract the seizing-up of the markets. Among other things, central banks provided extensive liquidity in domestic currency, made use of swap arrangements to offer foreign currency to domestic institutions and intervened in fixed income markets. Later on, they focused on providing additional monetary stimulus and enhancing monetary transmission at the zero lower

¹ Specifically, the Federal Reserve, the Bank of England and the ECB have all implemented different approaches to forward guidance since 2008. See Filardo and Hofmann (2014) for a more detailed analysis.



bound. In particular, the Federal Reserve, the Bank of Japan and the Bank of England launched large-scale programmes to purchase longer-term private and public sector debt securities. The ECB focused on addressing impairments in the euro area monetary transmission process by putting in place additional longer-term refinancing operations (LTROs) and asset purchase programmes targeted at illiquid segments of private sector and government bond markets. As a consequence of these balance sheet policies, the size of core advanced economy central banks' balance sheets increased to unprecedented levels, essentially doubling since 2007 to a level of about USD 10 trillion by the end of 2013 (Figure 2, panel B). Moreover, the maturity of central bank assets lengthened markedly. Outside the major advanced economies, central bank balance sheets ballooned during the financial crisis mainly as a consequence of the accumulation of foreign exchange reserves as central banks leaned against currency appreciation pressures, which resulted not least from the search for yield against a backdrop of persistently low interest rates.

In sum, central banks responded to the crisis with unprecedented lender of last resort operations and monetary accommodation. These measures were accompanied and reinforced by governments via rescue packages for ailing financial institutions and large fiscal stimulus measures. In retrospect, the agility and decisiveness of central banks' and governments' responses played a critical role in containing the different acute phases of the financial crisis. Likewise, the measures taken by the ECB in response to the outbreak of the sovereign debt crisis were largely successful. In particular, so-called "redenomination risk" and yield dispersion in the euro area receded significantly after late summer 2012 when the ECB announced its Outright Monetary Transactions (OMT), showing its determination to act when necessary.

III. THE BALANCE OF RISKS IN A BALANCE SHEET RECESSION

While central banks have played a critical role in navigating the different phases of the crisis, they face a difficult macrofinancial landscape six years on. In the core advanced economies, financial and economic fragility remains high.

These economies are still facing the legacy of the crisis in the form of high private and government indebtedness, as a consequence of the pre-crisis credit financial booms and governments' crisis response, which has led to soaring public debt. Some emerging market and advanced economies which were not initially exposed to the crisis are experiencing financial booms reminiscent of those in the core advanced economies before the crisis. As a consequence, indebtedness has continued to increase globally. Since 2007, total global debt (Figure 3) has risen by almost USD 40 trillion to a level of more than USD 140 trillion (close to 250% of GDP).

At the same time, original expectations of a strong and self-sustaining recovery have not been met, in particular in the major advanced economies. With notable differences between countries, economic activity has remained below its pre-crisis trajectory in the United States, the euro area and the United Kingdom (Figure 4). In addition, trend growth in output has flattened,



in particular in the euro area and the United Kingdom, and unemployment rates have remained stubbornly high, especially when compared with previous cyclical recoveries.

This raises the question of the balance of risks faced by central banks in this phase of the recovery, when they are not confronted with the collapse of the markets, but rather chronically weak growth. In this debate, central banks are confronted with two opposing risks: Exiting from monetary accommodation prematurely and staying very accommodative for too long.



Why can there be a risk of keeping monetary policy too accommodative for too long when the economy has fallen significantly below its pre-crisis trajectories and unemployment rates remain elevated? Part of the reason flows from the fact that many economies are in a balance sheet recession that followed a financial crisis, which differs in important ways from standard postwar business cycle recessions.²

In a balance sheet recession, the pre-crisis trend overestimates the sustainable post-crisis path of GDP. The financial boom that led to the recent crisis boosted the real economy in unsustainable ways. At the same time, the

² The term balance sheet recession was first introduced by Koo (2003) to explain the causes of the Japanese lost decade. For a more detailed discussion of the concept of balance sheet recession in the context of the international financial crisis, see Borio (2012) and Caruana (2012).

boom concealed structural weaknesses and misallocations of resources, which were only fully revealed in the subsequent busts. The weak growth that tends to follow financial crises is not just, or even primarily, a question of deficient demand. Financial booms typically leave in their wake not only too much debt, but also too much capital and labour in the wrong sectors. To return to a trajectory of sustained growth, countries therefore have to deleverage and to reallocate labour and capital across sectors within national borders and across them.

Therefore, the ability of monetary policy to foster a quick and robust recovery in a balance sheet recession is less potent than often thought, since impaired balance sheets sap the effectiveness of monetary policy. When the problem is too much debt and agents are in the mood to retrench, it is unrealistic to expect monetary policy to rekindle strong growth via low interest rates. When financial institutions are weak, it is equally unrealistic to expect them to effectively transmit monetary impulses via lending. Indeed, there is evidence that supports the notion that the benefits of prolonged monetary accommodation after a crisis of this nature may be doubtful.

All this suggests that quick and effective balance sheet repair, together with structural reform, are required to lift the economy out of a balance sheet recession. Indeed, research has found that the relationship between the degree of monetary accommodation during recessions and the strength of the recovery is weaker – in fact, almost non-existent – when the recession is associated with a financial crisis (Figure 5, panel A).³

In this type of situation, monetary accommodation can help buy time to implement necessary balance sheet repair and structural reforms. But it cannot substitute for such measures. If the bought time is not used to address structural impediments, prolonged accommodative monetary policy may turn out to be counterproductive by giving rise to a number of side effects.

First, prolonged monetary accommodation provides incentives to delay necessary repair and reform. The slow progress after the crisis in the implementation of structural reforms and in the deleveraging process may be seen as a manifestation of this incentive, although again there are significant differences across countries. The high unemployment rates that persist in many advanced economies suggest that there are ongoing challenges for sectoral rebalancing in terms of resource allocation and that, in some cases, there were unresolved rigidities before the crisis. At the same time, and as mentioned before, the total debt of the world's non-financial sector has continued to rise, which

³ For a more detailed analysis and discussion, see Bech et al. (2012).



means that deleveraging has yet to take hold in many sectors and economies affected by the crisis, while other economies have significantly increased their leverage.

Second, prolonged monetary accommodation contributes to price and financial stability risks. In the 1970s, for example, the desire to return output and employment to pre-crisis levels resulted in surging inflation. One might argue that the situation today is quite different from then, with inflation remaining low in most jurisdictions and close to central bank targets. However, excessive monetary accommodation may have its pernicious effects through different channels today. Specifically, it may primarily find its way into asset prices and leverage rather than goods and services price inflation. This is what happened



² Net issues of international debt securities, all issuers, in all maturities, by residence of issuer.

³ External loans of BIS reporting banks vis-à-vis individual economies; estimated exchange rate-adjusted changes.

⁴ Argentina, Brazil, China, Chinese Taipei, Hong Kong SAR, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Poland, Singapore, South Africa and Thailand; weighted average based on 2005 GDP and PPP exchange rates.

⁵ Australia, Canada, Denmark, New Zealand, Norway, Sweden, Switzerland.

⁶ The Figure shows the range and the mean of the Taylor rate of all inflation-output gap combinations. See Hofmann and Bogdanova (2012).

Sources: IMF, *International Financial Statistics and World Economic Outlook;* Bloomberg; CEIC; Consensus Economics; Datastream; national data; BIS locational banking statistics by residence; BIS securities statistics by residence; BIS calculations.

in the run-up to the crisis and may again be happening now. Indeed, while unemployment rates in the core advanced economies have stayed high despite aggressive and prolonged monetary easing, stock markets have recovered, reaching new all-time highs (Figure 5, panel B). This suggests that monetary accommodation, in trying to bring unemployment rates down to pre-crisis levels, may have significantly boosted stock markets and other financial market segments, thereby distorting market signals and potentially creating new asset misallocations and new financial vulnerabilities.⁴

A third important side effect arises from global monetary policy spillovers.⁵ In particular, persistently low interest rates in the major advanced economies encourage capital flows to fast-growing EMEs and put upward pressure on their exchange rates. When strong enough, this can complicate the ability of emerging market central banks to pursue their stabilisation goals. On the one hand, if EME central banks keep policy rates very low, they could discourage capital inflows, but would encourage domestic credit growth. On the other hand, if EME central banks raise policy rates, the risk of further destabilising capital flows would rise. We have seen both these forces at work. EMEs have experienced strong credit flows post-crisis (Figure 6, panel A). At the same time, their policy rates have been low when compared to standard benchmarks such as the Taylor rule (Figure 6, panel B), an assessment that also holds true for the group of small advanced economies (Figure 6, panel C). This concern is particularly relevant in the case when US policy rates are low; research has found that US interest rates are an important variable in estimated interest rate rules for EMEs as well as for other advanced economies.⁶

These spillover effects have arguably contributed to the build-up of financial imbalances in many EMEs. Many of these economies have experienced rapid expansions of debt and house prices (Figure 7), driven not least by the cumulative impact of policy accommodation domestically and globally. Credit-to-GDP ratios have increased by roughly 30 percentage points over the past decade in the EMEs, albeit from lower starting levels. In the advanced economies,

⁴ Of course, the fact that unemployment has remained high does not mean that monetary accommodation has not had any positive macroeconomic effects. Monetary policy may have prevented unemployment from reaching even higher levels; in other words, it is hard to assess the counterfactual with any certainty. There is evidence suggesting that central banks' unconventional monetary policy measures have had a positive effect on output; see Gambacorta *et al.* (2013) and Chen *et al.* (forthcoming). However, the uncertainty surrounding the existence and strength of these macroeconomic effects remains high due to the unprecedented nature of central bank measures and the short time period over which they are observed.

⁵ For a more detailed discussion of the various channels of global monetary policy spillovers, see Caruana (2013b).

⁶ See Gray (2013), Spencer (2013) and BIS (2014) for evidence. Taylor (2013) provides a discussion of the different explanations of the causes of such monetary policy spillovers.

credit-to-GDP ratios and house prices have also risen, with the credit-to-GDP ratio standing above 200% by the end of $2013.^7$

We have seen that there are significant risks associated with an undue delay in monetary policy normalisation around the globe. However, there are also arguments that raise doubts about whether the time for exit from extraordinary



⁷ To be sure, rising credit-to-GDP ratios and house prices do not necessarily indicate an accumulation of financial imbalances: they may also reflect financial deepening and rising living standards. In order to take this point into account, and number of studies have looked at the divergence of credit-to-GDP ratios from their underlying trends, the credit gap (see eg Borio and Lowe (2002), Borio and Drehmann (2009) and Drehmann and Juselius (2013)), and found this metric to be a useful predictor of financial distress. From this perspective, Figure 7 suggests that financial trouble might be brewing, in particular in the EMEs, where credit-to-GDP ratios have risen sharply since 2007 compared to their previous trends.

monetary accommodation has come. Again, the differences across countries are notable.

The first argument is that the sheer length of time that unemployment rates have remained elevated may lead to hysteresis, ie that unemployment may become structural because of the depreciation of human capital. The theory says that labourers lose employability skills over time when unemployed, so that the longer members of the labour force remain out of work, the greater the likelihood of a longer unemployment spell (Blanchard and Summers (1986)). The hysteresis argument cautions against premature monetary policy tightening as it might scuttle a nascent recovery that would help boost employment.

In addition, some economists have argued that the lacklustre global recovery has its roots in decades-old trends,⁸ the "secular stagnation hypothesis." Under this view, technological forces have been sapping economic growth for decades and will for decades to come. Moreover, according to this argument, largescale reserve accumulation in some regions and increasing income and wealth inequality in others have given rise to a global structural excess of savings over investments. As a consequence of these forces, the natural rate of interest may be low, if not negative, for an extended period. This, in turn, would mean that monetary policy would need to deliver negative real rates in order to stimulate the economy and prevent inflation from spiralling down.

So, both views would call into question the need for an imminent policy rate normalisation. The labour market hysteresis view would highlight the increased downside risks to economic activity associated with premature tightening. The secular stagnation hypothesis would also argue against premature policy rate lift-off, not because of concerns about scuttling a recovery but because the natural rate has already fallen secularly and requires low policy rates for an extended period.

Despite the potential appeal of these two views, there are a number of important counterarguments, particularly as regards the measures to be taken. Whether loose monetary policy can fend off the risk of hysteresis in the labour market is doubtful. Monetary policy does not seem to be the best way to correct structural problems. As mentioned before, in the 1970s, for example, central banks sought to bring down persistently elevated unemployment rates through low interest rates, but these policies were not successful. Elevated unemployment rates at that time turned out to have structural roots, so that the accommodative monetary policy stance only ushered in what has become

⁸ See Summers (2014) and Gordon (2014) for a discussion of secular stagnation. For a contrary view, see Taylor (2014).

known as the "Great Inflation." Indeed, as argued above, there are reasons to suspect that the source of today's elevated unemployment rates are, at least in part also structural in nature: Deficiencies that were not resolved before the crisis and misallocation of resources associated with the financial boom. Accommodative monetary policies might thus again turn out to be the wrong tool to address unemployment hysteresis risks. It is also important to remember that other types of hysteresis can arise as a consequence of loose monetary policy. In particular, resource misallocation in persistently low interest rate environments promotes inefficiencies that grow over time and contribute to chronic malaise.

With respect to the secular stagnation hypothesis, the low or negative natural interest rates do not seem to be equilibrium rates, but rather the result of a lack of structural measures that would stimulate the economy. Monetary policy also does not seem to be appropriate here, for at least two reasons. First, given the zero lower bound for policy rates, attempts at policy accommodation are likely not to promote meaningful expansion but instead to stoke disruptive credit-asset price boom-bust dynamics. Second, by accommodating a low natural rate, monetary policy may in fact reinforce it. This follows from the side effects of monetary policy in balance sheet recessions discussed before. Accommodative monetary policy may create incentives to delay necessary supply side measures needed to boost growth and lift the natural rate.

The arguments against policy rate normalisation have taken on greater relevance in 2012–14 as inflation has fallen (Figure 1, panel B). Headline inflation in the core advanced economies averaged between 1% and 2% year on year. It also fell in EMEs, to around 4% on average, although it remains elevated in some of them, including Brazil, India, Indonesia and Turkey. This downward trend in inflation was somewhat surprising given that it happened at a time when the recovery appeared to be gaining traction in the core advanced economies and after five years of exceptionally accommodative monetary policies.

While some have emphasised the potential risks of low inflation, these risks need to be qualified. Even in economies experiencing disinflation, inflation expectations remain well anchored near inflation targets. Moreover, disinflationary pressures need not reflect only deficient demand. They may also reflect favourable supply side developments. Indeed, commodity prices have fallen and wage pressures in emerging market economies have been reduced over this period. More generally, the recent disinflation may reflect the re-emergence of the disinflationary supply side effects of globalisation that had already given rise to disinflationary dynamics before the crisis.



Overall, the balance of risks is shifting over time towards relatively greater risks associated with an undue delay of the exit from the extraordinarily accommodative monetary conditions that have prevailed globally for the past several years. Indeed, the delay could make the exit more challenging because of the risk of adverse market reactions. Global financial market developments in May and June 2013 in response to the Federal Reserve's tapering communication highlight such a risk. In both episodes, financial markets fundamentally reassessed the path of future interest rates not only in the United States but also globally. In June 2013, for example, the rise in US futures rates volatility spilled over to the euro area and the United Kingdom. Only after the ECB and the Bank of England gave more explicit forward guidance on future policy rates did the volatility spillovers abate (Figure 8, panel D). A global bond market sell-off ensued, equity market valuations dropped markedly and some emerging market exchange rates depreciated sharply (Figure 8). These global market dynamics were driven in part by an unwinding of risky, leveraged trade positions which were predicated on policy interest rates remaining very low for a long time (Bernanke (2013a)). The longer the exit is unduly delayed, the more difficult it will become to pull through, compounding the longer-term risks and challenges that have emerged in the wake of the crisis.

IV. LONGER-TERM RISKS AND CHALLENGES

The crisis and its aftermath have not only shaped the short-term balance of risks facing central banks but have also given rise to challenges to future monetary policy frameworks. Central banks will have to confront five challenges to avoid longer-term risks:

1. Central bank independence

Central bank independence is the cornerstone of effective price stabilityoriented monetary policy, as it aims at insulating monetary policy decisions from the political cycle.⁹ It will also be crucial for central banks to be able to effectively meet their financial stability mandates. The massive central bank interventions have raised long-known as well as new, more subtle risks to it.

The rapid growth of public sector liabilities could give rise to the well known risk of "fiscal dominance," ie that monetary policy is subordinated to the needs of the fiscal authorities. In fact, prominent economists have suggested that higher inflation rates may be called for to increase the rate of effective debt amortisation. Others have talked about the need for "financial repression" (ie efforts to keep the yield curve low via regulation and monetary policy actions) in order to lower the interest payments on government debt. This threat of fiscal dominance will persist until governments get their finances under control.

A new risk to central bank independence arises from the high levels of private sector indebtedness and financial fragility. As a consequence, central

⁹ Some central banks, such as the Bundesbank and the Swiss National Bank, are clear examples of how central bank independence supported efforts to build price stability credibility. These central banks enjoyed a high degree of independence and, on this basis, consistently delivered lower inflation than their peers during the post-Bretton Woods era.

banks may feel considerable pressure to restrain interest rate hikes as economic conditions warrant a normalisation of policy rates. With high debt levels, policy rate increases will tend to shift the whole yield curve upwards and raise debt service burdens. And, as debt servicing burdens rise, the calls for relief are bound to increase, especially from those households and businesses which have yet to deleverage sufficiently.

At the same time, jittery financial markets may induce central banks to delay normalising their monetary policy stance. In sum, there is a risk that



⁴ The Taylor rates are calculated as $i = r^* + \pi^* + 1.5(\pi - \pi^*) + 0.5y$, where π is the projected core PCE inflation, *y* is the Congressional Budget Office's estimate of the output gap as of 4 February 2014, π^* is the inflation target and r^* is the long-run level of the real interest rate, where $\pi^* + r^* = 4\%$, a median estimate from the Summary of Economic Projections.

⁵ Based on fed funds future contracts.

Sources: Federal Reserve Board; Congressional Budget Office; Bloomberg; Datastream; BIS calculations.

monetary policy becomes dominated by what has come to be called "financial dominance," broadly defined.¹⁰

Indeed, over the past 10 to 15 years, central banks have tended to respond to financial stability concerns in an asymmetric way. In advanced economies, policy rates were slashed aggressively in response to financial headwinds (the LTCM crisis, the bursting of the dotcom bubble, and the international financial crisis) but were subsequently raised gradually. The end result was that policy rates trended down over time (Figure 9, panel A).

A second risk emanates from unrealistic expectations about what central banks can deliver. Central banks have become increasingly seen as being the "only game in town" when it has come to addressing the lacklustre global recovery. Early on in the crisis, central banks had a comparative advantage to respond aggressively. But that argument became less compelling over time as the limits of what monetary policy could effectively do was reached. However, these limits are not universally understood, and some in the public debate are still expecting a continued high level of monetary activism. One may term this "expectations dominance."¹¹

These additional types of dominance may lead to a delay in monetary policy normalisation. Indicative of these mechanisms playing themselves out is the observation that the future path of policy rates expected by market participants and policymakers is well below that suggested by a Taylor rule benchmark (Figure 9, panel B).

2. The primacy of price stability

Against the background of the hitting of the zero lower bound, prominent economists have recommended that central banks target higher inflation rates. This, it is argued, would increase the room for manoeuvre during crises and might offer an easy "solution" to global overindebtedness.¹²

However, if anything, the crisis and its aftermath have underscored the importance of central banks' strong credibility for price stability. It was precisely this credibility that gave central banks more flexibility to respond to the crisis. Figure 10 illustrates that while there was some variation in short-term inflation

¹⁰ For a discussion of the concept of financial dominance, see Hannoun (2012).

¹¹ For a more detailed discussion of the concept of expectations dominance, see Caruana (2013a).

¹² See eg Blanchard et al. (2010).



Notes: ¹ One-year-ahead mean forecast of consumer price inflation, derived from current-year and next-year consensus forecasts; for India, wholesale price inflation.

² Six- to 10-year-ahead consensus forecasts of consumer price inflation; for India, wholesale price inflation after Q4 2011. Half-yearly observations (March/April and September/October reports) converted to quarterly using stepwise interpolation.

³ Weighted averages based on the 2005 GDP and PPP exchange rates of the euro area, Japan, the United Kingdom and the United States.

⁴ Weighted averages based on the 2005 GDP and PPP exchange rates of Brazil, Chile, China, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Singapore, Thailand and Turkey.

⁵ Weighted averages based on the 2005 GDP and PPP exchange rates of Canada, Norway, Sweden and Switzerland.

Source: Consensus Economics.

expectations, long-term inflation expectations remained well anchored, serving as a testament to the gains in credibility that had been achieved.

This firm anchoring was not universally the case and highlights the risks of accommodating high inflation rates. For instance, inflation expectations have become dislodged in some EMEs. This has meant that in addition to addressing the challenges of the lacklustre global recovery, their central banks also had to stiffen their resolve to restore price stability through higher policy rates at inopportune times. The key lesson to take away from these experiences is that inflation-fighting credibility is particularly valuable when an economy is crisis-prone.

In sum, there are compelling arguments that price stability should remain the primary objective of monetary policy. However, the crisis has shown that price stability is not enough, in the sense that keeping inflation low in the short term is not sufficient to ensure long-term price stability (White (2006)). In the past decade, accommodative monetary conditions arguably contributed to massive underpricing of risk and unsustainable increases in credit and asset prices without driving up consumer price inflation, which was partly contained by the incorporation of emerging market economies in the global economy. The corresponding financial imbalances resulted in financial instability with serious macroeconomic consequences, damaging the transmission of monetary policy and threatening deflation. This raises the question of how to modify monetary policy frameworks in order to better safeguard lasting price stability.

3. Integrating financial stability concerns into monetary policy frameworks

The crisis and its aftermath have clarified the need to better integrate financial stability considerations into monetary policy frameworks. There is little doubt that financial stability is essential for lasting price stability, but forging a new consensus about a range of operational and conceptual issues is no easy task.

On the operational side, central banks are asking themselves how they should respond to credit and asset price booms and busts. A consensus is emerging around the need for central banks to use other policy tools beyond the policy rate. However, the evidence so far suggests that macroprudential tools, such as loan-to-value ratios and countercyclical capital buffers, may act more as complements than as substitutes for policy rate settings. Moreover, these alternative tools seem to contribute more to improving the resilience of the financial system vulnerabilities than to controlling the aggregate credit cycle. Unlike monetary policy, there remain open questions about the impact of macroprudential instruments on financial and asset price dynamics, and there are still many unknowns in the theory and practice of macroprudential policy and its interactions with monetary policy. This could mean that macroprudential tools are not as effective as policy rates in preventing an accommodative monetary policy stance from encouraging excessive risk-taking in all parts of the financial system. After all, the policy rate sets the universal price of leverage in a given currency; it is not vulnerable to regulatory arbitrage and can complement prudential measures.

Achieving lasting price stability –the primary objective of central banks– requires leaning against the build-up of financial imbalances, even if nearterm inflation remains low and stable. To do this, monetary policy should, in its analysis of financial imbalances, extend its horizons beyond the two years typical of inflation targeting regimes. That way, the risks to macroeconomic stability posed by destabilising financial cycles would be more likely to appear on a central bank's radar screen. And by lengthening the horizon, central banks could gain room for manoeuvre to lean against financial imbalances even when near-term inflation remains low and stable. Obviously, lengthening the policy horizon should not be interpreted in a mechanical way, since no one can predict the exact timing of the unwinding of financial imbalances or their macroeconomic cost. Rather, it is simply a means of assessing more systematically the balance of risks.

In addition, a more symmetric policy approach to the financial cycle (ie successive episodes of financial booms and crisis) is called for. As mentioned before, over the past decades, central banks have tended to act asymmetrically, insufficiently during booms when inflationary problems did not materialise, and then loosening monetary policy aggressively in crisis times. Over time, this has narrowed their room for manoeuvre and has entrenched the risks perpetuating distortions, making exit and normalisation of the policy stance harder. At the height of the crisis, faced with the collapse of the markets, it is clearly essential for central banks to take resolute action using the whole arsenal at their disposal.

On the conceptual side, central banks are asking how best to shift our traditional macroeconomic perspective towards a more fully integrated macrofinancial perspective. While our understanding of the traditional monetary policy trade-offs is much further advanced after decades of academic and policy research, the research on financial stability and the nexus is still in its infancy.

4. Internalising global spillovers

The crisis has also underscored the importance of better appreciating global monetary policy spillovers in the increasingly globalised world. In the past,

accommodative monetary conditions played a role in boosting vulnerabilities globally. The build-up of financial imbalances in a number of emerging market and small advanced economies raises concerns that this mechanism may be at work again.

This does not necessarily mean that central banks need to coordinate their policies more closely than in the past. Rather, it suggests that central banks, at a minimum, may improve their decisions through a more complete analytical framework which internalises and puts more weight on their individual monetary policy decisions' effects in the rest of the world and feedback effects on their own economies. This is in each central bank's own interest, especially if the spillovers have the potential to foster financial instability that ends in crisis, with significant global repercussions that swing back to the originating countries.

Again, greater symmetry is desirable. In the wake of the "tapering tantrum," global monetary policy spillovers have received greater attention in the public debate. The volatility in EMEs caused by the tapering has led some to argue that the pace of policy normalisation in the core advanced economies should also take into account the spillover it inflicts on other economies. However, if spillovers were taken into account only in the tightening, but not in the loosening, phase of the monetary policy cycle, the consequence would be a loosening bias in the global monetary system.

5. Communication policies

Central banks around the world have become more transparent about all aspects of their monetary policy frameworks in recent decades. During the crisis, particularly when interest rates neared the effective zero lower bound, communication policies to shape private sector expectations gained in importance. Questions remain about whether the new practices of using forward guidance, especially threshold-based forward guidance, represent a continuation of the existing trend or whether they should be reserved for crisis periods.

In principle, forward guidance can clarify the policy intentions of central banks and therefore reinforce the main thrust of their policy actions. The guidance can help stimulate the economy in a recession and rein in exuberant expectations in booms.¹³ In practice, however, this communication strategy can complicate monetary policymaking in several ways. Forward guidance is

¹³ See Filardo and Hofmann (2014) for a more detailed discussion of forward guidance as a central bank communication tool.

effective when it is credible, clear and consistent with the actions of the central bank. But its conditional nature implies a risk that it will be misinterpreted.

If the private sector focuses too narrowly on the baseline case of the central bank and does not fully appreciate the uncertainties involved, financial markets may price for perfection and create market turbulence when there are deviations from the baseline. Arguably, the global market turbulence in mid-2013 can be traced back to misinterpretation of the Federal Reserve's guidance on the expected pace of its tapering of quantitative easing.

How the new forward guidance practices will evolve and ultimately be judged is an open question, especially when it comes to the more explicit, statecontingent measures. It will depend on how well forward guidance will work in navigating the final stages of the recovery from the crisis and, ultimately, its contribution to the normalisation of prolonged monetary accommodation.

V. CONCLUSIONS

Central banks face shifting short-term and longer-term risks and challenges at the late stage of the balance sheet recession. In this paper, we have highlighted successes in the use of monetary policy in the different phases of the crisis. Indeed, it has played an essential role in the management of the crisis. However, as monetary policy reached its limits and was not complemented by structural reforms and balance sheet repair, its relevant upside and downside risks have shifted.

The main risks arise if monetary policy tries to do too much and its normalisation is unduly delayed. The consequences would include credit-asset price bubbles, inflation overshoots, disruptive international spillovers and inefficient real resource allocations associated with the risk-taking channel of monetary policy. In addition, one must consider the risks of secular stagnation and unemployment hysteresis. However, it appears that these structural problems can be addressed most effectively through structural measures. Striking the right policy balance is a daunting challenge for central banks and other authorities.

In the medium and long term, monetary policy frameworks will have to be updated, in particular to better integrate financial factors and the greater interdependence that exists in a globalised economy. This should ensure a more symmetric approach to the financial cycle, as well as a better internalisation of global monetary policy externalities. While there are promising signs of a growing appreciation of these two challenges, there is need for more research to help both considerations be successfully factored into practical monetary policy decision-making.

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MACROPRUDENTIAL POLICY AFTER THE FINANCIAL CRISIS

José María ROLDÁN

I. INTRODUCTION

The financial crisis of 2007 is now considered a "one in a hundred years event." Indeed, since 1929, the world, or the part of the world that we call the West, had not seen a situation as complex and difficult as that of the last few years. The 2007 financial crisis will mark a before and after in the configuration, supervision, and regulation of the financial system due to its intensity, its rapid international extension, and, above all, the social and even political consequences that have come out of it. Jochen Sanio, ex-President of the German regulatory agency BAFIN, summarized the situation experienced during the crisis in this way:

"The suddenness and violence of the monster storm that roiled the financial markets and wreaked terrible havoc on the international financial system was almost beyond belief for those who had to fight it. The uncontrollable forces put the entire financial world at risk, sweeping away the false sense of security that market participants and regulators alike had developed over the last few decades. Those who have seen the sky falling—and I count myself among them are willing to believe now that just about anything terrible can happen in financial markets.

To live under the paradigm of apocalypse is an unhealthy state of affairs, one that is surely intolerable. What we need now is something that we have come to call regime change–the fundamental overhaul of a system that has been dangerously destabilized."¹

Part of the new paradigm in regulation and supervision is the implementation of macroprudential supervision, understood as a triplet that includes analytics, specific instruments, and institutional structures for decision-making. According to the ESRB's (European Systemic Risk Board) definition, the objective of supervision or macroprudential policies is "to contribute to the safeguard of the stability of the financial system as a whole, including by strengthening the resilience of the financial system and decreasing the build up of systemic risks, thereby ensuring a sustainable contribution of the financial sector to economic growth."

¹ Sanio (2010).

Indeed, the crisis highlighted the need for approaches that went beyond a situation of profitability and solvency of individual institutions and the need for analysis that would unravel the interconnections among banks, between banks and the financial system, and between the financial system and the real economy. We could say that the crisis revealed that we could not see the forest of financial stability in the middle of the microprudential trees. Decidedly and more specifically, an individualized analysis of the Money Market Funds in the Unites States would not have generated worry, but if their interconnections, for example, with a concrete European bank had been analyzed, one would have been able to identify a powerful mechanism for the transmission of potential problems from a particular segment of the US financial market to the European financial system.

Interestingly, the concepts of macroprudential policies and financial stability preceded the crisis. To be sure, the leadership of the BIS and its Managing Director Andrew Crockett and its channeling through the pioneering work of Claudio Borio,² had already given the concept considerable intellectual support. In analytical terms, in the years before the crisis, distinct supranational agencies and central banks had already established a number of financial stability reports.³ Lastly, considering measures, the Spanish dynamic provisioning introduced in 2000 was a first attempt at putting macroprudential measures into practice.⁴

In spite of this partial progress, it is obvious that the crisis revealed other problems affecting the macroprudential framework. First, the new framework displayed clear analytical deficiencies (for example, in the field of OTC derivatives). Secondly, there was no clear identification of the tools available to put that macroprudential policy into practice (with the exception, perhaps, of Spanish dynamic provisioning). Thirdly, a complete framework or general model that would integrate the financial system and the real economy was not available (and to this day is still to be had). Finally, the absence of accountable authorities caused a disconnection between a macroprudential and financial stability diagnosis and taking measures consistent with said diagnosis. To sum up, as a result of the shortcomings identified above, these advances in analysis and macroprudential policy prevented neither the outbreak of the crisis nor its rapid spread through the various financial systems of the Western world.

In any case, this relative failure of macroprudential policies did not lead to their abandonment. On the contrary, a very important element of global financial

² See Crockett (2001) and Borio (2013) for more detailed discussion of the conceptual origins of macroprudential regulation.

³ It is ever so curious that the great promoter of the macroprudential concept and of financial stability, the BIS, has never published a specific report under the heading of financial stability.

⁴ A number of emerging jurisdictions were already actively using other tolos such as LTVs, Loan To Values, (Hong Kong, for example).

reform aims to deepen the operational practice of those macroprudential policies by strengthening their institutional, analytical, and enforceable bases (for example, setting specific macroprudential measures).

This article will briefly review the major institutional developments around the issue of financial stability and the structure of macroprudential authorities.⁵ Furthermore, it will analyze some misunderstandings, problems, and contradictions regarding macroprudential policy in order to draw conclusions, inevitably through speculation, about the future possibilities and the evolution of such policy.

II. NEW MACROPRUDENTIAL INSTITUTIONS

One of the lessons drawn from the crisis is that major financial analysts, understood broadly and including central banks and financial authorities, did not detect signs of a bubble. However, analysis of diverse reports from the years prior to the crisis reflects concerns about some issues that came out in the course of it.⁶ More than a general diagnostic error, what has become clear is that the warnings about the crisis that come from official publications (in the end, a type of "moral suasion") are insufficient to stop pro-cyclical dynamics in upturns. The "moral suasion" must, therefore, be completed through coercive measures concerning the financial system.

But, in order to take that step, that is, to take steps to restrict financial activities not depending on the situation of a particular entity but on the financial system as a whole, a different institutional framework was needed because neither the microprudential regulation nor the solvency oversight agencies of individual financial institutions have the necessary legal and institutional mechanisms to take these steps. The first step was, then, to institutionalize macroprudential policy; that is, to complement the analysis of financial stability with macroprudential actions. This institutionalization was only possible by means of incorporating a broad range of public authorities: central banks (there was usually a reference to the maintenance of financial stability which was most often insufficient in their mandates); solvency and market supervisors from the banking, securities, and insurance sectors; and finance ministries.

⁵ Saurina and Roldán (2013) discuss these issues from a distinct perspective.

⁶ To be honest, those concerns proved to be partial, in most cases, in the sense that there was no analytical connection among all the areas of concern in the various national and supranational authorities: if there had been, the brutal financial storm that was around the bend would have been clearly visible.

1. The Financial Stability Board (FSB)

The FSB, an international organization with its own by-laws but that is part of the Bank for International Settlements (BIS), has been established as the global macroprudential authority. It is the promoter and coordinator of financial reforms launched after the crisis, and its members include representatives from the national Ministries of Finance, the Central Banks, and the Supervisory Boards of the G20 countries, committees and organizations setting financial and accounting standards (IOSCO, IAIS, the Basel Committee, the Committee on the Global Financial System, the Committee on Payments and Settlement Systems and IASB), and Multilateral Agencies (the IMF, the World Bank, the BIS, the European Commission, the European Central Bank and the OECD). Furthermore, its governance -rules include, critically for its effectiveness, the need to coordinate with the G20 summits. This coordination, with a political sphere that is not only very high but is, above all, operational, ensures consistent alobal implementation of the adopted reforms; it would be inconsistent for the G20 to push through reforms that did not then end up being applied in each of their jurisdictions.

The activities of the FSB are those expected of an institution whose main purpose is to maintain global financial stability: to identify vulnerabilities affecting the global financial system and to continuously review the regulatory and supervisory measures in order to eliminate such vulnerabilities; to promote coordination and the exchange of information among the authorities responsible for ensuring financial stability; to track financial market developments and assess their impact on regulatory policies; to advise on the best practices in regulatory policies and to ensure that they are complied with by members; to review the strategies used by standard setting bodies (the Basel Committee, IOSCO, etc.) and to promote coordination among them; to support the establishment of colleges of supervisors for supranational financial institutions; and, finally, to support the establishment of contingency plans for supranational financial crises.

Despite its inception in 2009, the truth is that the FSB is the heir of the activities of the Financial Stability Forum (FSF), which was created in 1999 by the G7 and aimed to improve cooperation between the various agencies and committees in order to promote global financial stability. In other words, the interconnected financial system required global governance and coordination. However, not fully appreciating the importance of the changes introduced in 2009 would be a grave error: the subtleties of a foreign language may suggest that *forum* and *board* mean something very similar, but their translations into Spanish (*foro* and *consejo*) indicate the importance of the change.

The changes can be summarized in the following two aspects: membership and institutional governance. Regarding the first aspect, the creation of the G20, reflecting the growing strength of the so-called emerging countries, forced the FSF to expand beyond the original G7 members towards a G20 composition (a change which allowed Spain to become a member of the FSB).⁷ With respect to the second aspect, the architecture of the FSF needed enhancing so that it had greater political legitimacy (through its connection with the G20 summits) as well as the ability to effectively coordinate the various members. This second aspect, that of the institutional strengthening of macroprudential authorities, is a general tendency at the supranational level as well as the regional and national levels.

The FSB has several substructures to carry out its work: the plenary, the Steering Committee, several standing committees (Standards Implementation, Vulnerabilities, Supervisory and Regulatory Cooperation, and Budget and Resources), and six Regional Advisory Groups (expanding, de facto, membership beyond the G20). Altogether, it is an institutional mechanism with enough power to drive global regulatory reform from all fronts.⁸ However, its secretariat is characterized by its small size, so in terms of efficiency, it stands, no doubt, as the most cost-effective international, multilateral agency.

2. The European Systemic Risk Board

In the context of the European Union, and with the implementation of European banking, securities, and insurance supervisors (EBA, ESMA, and EIOPA), the European Systemic Risk Board (ESRB) was established. The ESRB was created as a committee closely connected to the ECB: it is chaired by the President of the ECB, and the home of its secretariat, albeit autonomous from the rest of the ECB, lies therein and holds its meetings in its building in Frankfurt. Its composition differs from that of the FSB because even though both the central banks of the EU and the microprudential supervisors of banks, securities, and insurance (both national and European authorities, EBA, ESMA, and EIOPA) are members, the treasuries of the EU members are absent.

The origin of the creation of the ESRB goes back to the so-called *Laroisière Report* which revised the status quo of supervisory cooperation in the EU, was

⁷ Interestingly, although Spain was not a member of the FSF, there was always a Spaniard in their ranks, albeit representing international agencies: Eudald Canadell, Manuel Conthe, and Jaime Caruana, who attended representing the IOSCO, the World Bank, and the Basel Committee.

⁸ For a brief review of the FSB's work, see "A Narrative Progress Report on Financial Reforms (report of the FSB to G20 leaders)." In only nine pages it provides an overview of what has been done so far and what still must be finished.

Part III: Balance of risks and the interactions with other policies

put in place after the *Lamfalussy Report*, and recommended taking a step further towards the institutionalization of this cooperation, thus transforming the CEBS, CESR, and CEIOPS committees (the banking, securities, and insurance sectors) in the EBA, ESMA, and EIPOA authorities. In terms of financial stability, the *Laroisière Report* identified deficiencies not only in the coordination of macroprudential policies between distinct national authorities but also within the national authorities themselves. In fact, one of the main activities of the ESRB has been to advocate for the existence in each country of a single authority responsible for maintaining domestic financial stability with a clearly defined mandate and specific powers.

The ESRB is responsible for the macroprudential oversight of the financial system of the EU in order to prevent systemic risks and widespread financial stress. To achieve this goal, the following functions may be performed: collection and analysis of any and all necessary information; issuing warnings about potential systemic risks, which may be public warnings if so decided; and, in case of emergencies, issuing a confidential warning to the EU Council which can coordinate with these supervisory agencies a possible response; keeping track of warnings and recommendations; cooperating closely with the new advisory agencies (EBA, ESMA, and EIOPA) and coordinating with the IMF and the FSB.

As occurs with other EU institutions, one of the ESRB's problems is its size-around 100 members. For that reason, the constitution of certain smaller and more operational subgroups is essential. Still, the final decision-making body is the plenary in which only the governors and representatives of the European supervisory agencies can vote. Additionally, the ESRB does not have full executive capacity, but its ability to act stems from the fact that countries must either implement the adopted recommendations or explain why they do not ("comply or explain").

There are three ESRB subgroups: the so-called Steering Committee, the Advisory Technical Committee (ATC), and the Advisory Scientific Committee (ASC), which is made up of renowned academics. It is the preparatory work of these committees that allows the ESRB to have some operational and decision-making capacity despite its large size.

A final point regarding the ESRB is the creation of the Single Supervisory Mechanism for eurozone banks that will impact their governance and role; however, to this day the possible directions of reform are not yet known. What is more, the link between national macroprudential authorities and the ESRB is also pending realization, again without a clear course of action (for example, the French and German macroprudential authority is chaired by their Finance Ministries, which are not represented in the ESRB).

3. The Financial Stability Oversight Council

The US has launched a new macroprudential authority known as the Financial Stability Oversight Council (FSOC), which is chaired by the Secretary of the Treasury and whose institutional members are the Federal Reserve, the CFTC (Commodity Futures Trading Commission), the FDIC, the Federal Housing Finance Agency, the National Credit Union Administration, the OCC (Office of the Comptroller of Currency), the SEC (Stock Exchange Commission), and the Consumer Financial Protection Bureau (along with other observers such as the Director of the Office of Financial Research, the Director of the Federal Insurance Office, and two state banking and insurance commissioners). The secretariat of the FSOC resides in the Office of Financial Research (recently created within the Department of the Treasury to comply with the mandate of the Dodd-Frank Act), which implies that in the case of the US, the secretariat of macroprudential authority is not bound to the central bank as it is in the EU.

FSOC functions are defined more broadly: to respond to situations that threaten financial stability by means of coordinated response by the Treasury and the various regulatory agencies. For proper identification of emerging risks to financial stability, the Treasury's Office of Financial Research can be addressed for guidelines for action and to request both data and analysis.

The FSOC also has a structure of subgroups: the Deputies Committee, the Systemic Risk Committee (of analytical nature), and several Standing Functional Committees dedicated to the various operational aspects of the FSOC (for example, that of the designation of systemic institutions).

III. SOME PRACTICAL DIFFICULTIES IN IMPLEMENTING MACROPRUDENTIAL POLICIES

As is evident, the crisis has given strong global momentum to the creation of new authorities with specific mandates in the macroprudential field. In general, these institutions have tried to take advantage of synergies with established authorities (central banks, supervisors, and treasuries), and even though there are differences among the institutions leading the new policies (in some cases the Treasuries and in others the central banks) complex institutional frameworks around these new competences have not been created.

The purpose of this renewed institutional framework is clearly that of providing macroprudential policies with greater preventive power; that is, we

cannot merely predict the next financial crisis, but, more importantly, we must implement measures to either completely prevent it or at least limit its impact. If we consider the vast procyclicality of the financial system and the recurrence of crises with different impacts in recent centuries (as regular yet unpredictable as are earthquakes), this goal is extremely ambitious.

Will macroprudential policy be successful in limiting the impact of the crisis? This question is probably meaningless: it is obvious that a lack of perception of the dangers associated with the entire financial system (and not its parts in isolation) has contributed to a crisis more intense than any other in the last century. Macroprudential policies are thus here to stay. But we must not ignore the practical and operational difficulties of their implementation, though we must refine, in a way, the expectations this implementation can generate.

1. The risk of overstretching macroprudential policies

With some frequency, a somewhat naïve view of macroprudential policy can be observed in regulatory and financial circles; thus it would seem that the crisis could have surely been avoided through their implementation. Perhaps the ex post diagnosis of the causes of the crisis is confused with the ex ante capability to identify weaknesses in the financial system. In any case, there is a real risk of overloading macroprudential policies. The following paragraphs are dedicated to this issue –the risks of expecting too much out of macroprudential policies.–

In fact, this risk is to some degree inherent in these policies. So while monetary policy (at least in the dominant classical sense prevalent before the crisis) should be responsible for price stability, and microprudential oversight and regulation policies for the solvency of financial institutions, the fundamental responsibility of macroprudential policy is to ensure the absence of crises in which the risk of the entire financial system threatens the real economy; that is, no more and no less, to avoid systemic crises. Furthermore, to achieve this objective, which is not at all a modest objective, an analytical corpus, which is still largely under construction, is available, as well as a series of wide-scoped measures, with little proven efficacy (as the focus is novel) and which may conflict with other areas of economic or microprudential policies.

Given this risk, it only makes sense to prudently manage these new policies, emphasize analytical inexperience, and lower expectations as to their potential gains. And all this without neglecting that it is important to incorporate macroprudential policy in the analytical apparatus and the decision-making that existed before the crisis: it is one thing to ponder the practical possibilities of these policies in order to curb the frequency and intensity of crises, but yet something very distinct to not recognize that the intensity of the current crisis could have been limited had there been effective policies and macroprudential authorities during the years of pre-crisis economic expansion.

Another more short-term risk of macroprudential policy overload is derived from the special situation of monetary policy in the aftermath of the Great Recession that we are experiencing. Thus, the prevailing and pervasive low interest rates environment can cause bubbles in financial markets and real estate, and macroprudential policy is the only one that can offset these risks.

2. Macroprudential policy costs in terms of efficiency

Unlike microprudential regulation and supervision (that is, directed at individual financial institutions), macroprudential policy cannot adapt to the characteristics of each of the components of the financial system. In other words, macroprudential measures are applied to all components of the system—to those that may individually cause risk to the system and also to those that have very solid risk management: when faced with a housing bubble, we may reduce the loan to value (LTV) of mortgages that receive preferential treatment in capital requirement rules (lower risk weights), but we cannot make distinctions, exonerating the most prudent financial intermediaries (and if we did so, we would be applying microprudential policies). In summary, macroprudential policy by definition amounts to one-size-fits-all policy.

This imposes an efficiency cost that is both difficult to measure and unavoidable: there is a cost, insofar as restrictions are imposed on prudent riskmanaging agents whose activity does not pose a risk to the system, which is not theoretical. In the case of the Spanish dynamic provisioning imposed before the crisis, the most prudent banks were quite critical of the injustice of one-size-fitsall policies and rightly opined from their individual perspectives on the efficiency costs involved. However, the implementation of dynamic provisioning in all banks alike is coherent from a macroprudential point of view: those efficiency costs would be negligible compared to the costs of a systemic crisis.

It is somewhat surprising that this characteristic of macroprudential policy -the general application of measures to all institutions regardless of their risk profiles- is so scarcely understood by both the supervised entities and academia.

3. The tendency towards over-activism in macroprudential policy

The efficiency problems arising from the inevitable one-size-fits-all aspect of macroprudential policies would be merely anecdotal were it not for another unavoidable characteristic of such policies: their inevitable tendency towards activism.

Consider, for example, a person responsible for macroprudential policy who faces a decision regarding a potential systemic risk. That is, a problem with the financial system serious enough to cause financial instability and damage the real economy. Clearly, decision-making is carried out in a context of uncertainty, therefore identifying a problem is probable, but so is discovering that no real risk of a systemic crisis exists. In truth, he or she may take action when doing so is unnecessary or not take action when it is in fact necessary (similar to the well-known type I and type II errors in econometric hypothesis testing). What is interesting is the cost associated with both errors: In the case of misidentification of a systemic crisis, the cost derived from the efficiency loss as a result of implementing unnecessary macroprudential measures; In the case of not taking action against a systemic crisis when it is in fact necessary, the cost is the damage to the real economy caused by said crisis (as well as the reputational cost for the macroprudential authority that did not adequately react to the crisis).

It is not difficult to imagine what the choice of the person responsible for macroprudential policy would be: minimizing the type II error, that of failing to act when doing so is necessary, at the expense of not minimizing the type I error, that of acting when it is unnecessary. Ultimately, macroprudential policy has a structural tendency to activism and therefore imposes efficiency costs on the financial system.

Is this an unsolvable problem? Perhaps it is, but considering steps to minimize the effects is not difficult. For example, one practice that should be applied is regularly reviewing macroprudential decisions to discern whether enforcing them still makes sense. In this way, the efficiency costs would be only temporary. Still, an unstable regulatory corpus would be accepted.

4. The unbearable lightness of macroprudential policy instruments

The recent implementation of macroprudential policies and authorities has required a boost in the clarification of the instruments available for their

implementation. However, almost all of the available instruments, such as Loan to Value of mortgages or regulatory capital surcharges of financial institutions, are actually microprudential instruments. Macroprudential features arise either in the most prudent calibration of microprudential instruments (they do not aim to protect only one concrete financial institution but the financial system as a whole) or by means of the introduction of countercyclical elements in microprudential standards (as in Spanish dynamic provisioning or countercyclical capital ratio under Basel III). This will inevitably lead to conflict between the two purposes as we are using the same instrument to ensure both the stability of individual financial institutions and the system as a whole. For the moment, if we calibrate bank solvency, or Basel III, this conflict is resolved by adding safety margins in these microprudential measures (which are very conservatively calibrated) in order to guarantee the stability of the financial system as a whole. In this sense, the implementation of Basel III has been, without a doubt, the most relevant macroprudential measure taken since the onset of the crisis.

What is the most powerful macroprudential instrument? It is in fact interest rates, which, obviously, is not a "pure" macroprudential instrument. Indeed, when faced with a bubble of any kind, the only measure that effectively reaches all of its sources and covers all possible cracks is an increase in interest rates.

In short, it would appear that macroprudential policy has begun its path without established instruments.

5. The national versus the supranational dimension

Although the existence of global bubble-generating processes cannot be ruled out, especially after the experience of the 2007 crisis, the fact is that in the future the generation of bubbles is much more likely to be national and perhaps even sectorial in character rather than global. If this hypothesis is true, it makes sense to supplement supranational macroprudential authorities with national authorities that have certain comparative advantages in identifying processes of local underestimation of risks. In this sense, the recent creation of the single supervisory mechanism in the eurozone recognizes this complementarity and establishes a system of shared power between national authorities and the ECB in macroprudential matters.

From a different perspective, this complementarity is reinforced, albeit in this case thanks to the strength of a supranational body taking measures. Indeed, whilst a national macroprudential agency may have a clear competitive advantage in identifying potential irrational exuberance, a supranational authority, distant from public and national socio-economic interest, may have a competitive advantage when imposing measures to prevent bubble generation (or at least in allowing bubbles to burst at an early stage in order to minimize risks).

6. The countercyclical element of macroprudential policy

The need for macroprudential policy stems from the verification that economic agents do not properly assess financial risks throughout the economic cycle; therefore, risks are underestimated during booms, or times of prosperity, and overestimated during busts, or times of crisis. From this perspective, macroprudential policy should correct this bias both in times of crisis and in periods of exuberance.

Spanish dynamic provisioning⁹ responds perfectly to this philosophy: it accumulates resources in banks in times of financial prosperity and allows said resources to be used in times of crisis. This countercyclical profile, which is in great measure vilified by accountants yet ever so interesting from the macroeconomic management point of view, allows for the correction of the agents' bias, in this case that of banks, when estimating their clients' credit risks. Such compensation is not necessarily complete; in practical terms, the longer the process of economic expansion, the more difficult it is for a macroprudential measures to compensate for the underestimation of the risk premium.

But that countercyclical element, that temporal dimension, is not being seen in the development of macroprudential policies. Indeed, we are witnessing a significant tightening of the rules for banking although countercyclical elements in the application of those rules do not exist except for some exceptions such as the countercyclical buffer in Basel III or the introduction of time delays for implementing in full the new measures. Therefore, the bias towards overestimating risk that occurs in times of crisis is not being corrected, nor is there any intention of correcting it. This tightening can be justified based on the need to establish a new level of equilibrium for regulatory capital after finding that the older regulatory regime entailed unacceptably low levels of capital. However, it is alarming that the implementation of macroprudential policies is ignoring the countercyclical element: that is, demanding more in periods of expansion and relaxing requirements at the onset of a crisis.

In short, although the role of new macroprudential policies for correcting the underestimation of risk that occurs during prolonged periods of economic

⁹ See Saurina (2009) and Trucharte and Saurina (2013) for more detailed discussion.

growth is accepted, there is a lack of promotion of countercyclical measures in times of crisis, among academics and among those responsible for macroprudential policies.

7. Analytical problems associated with macroprudential policy

In a more analytical and even more academic sense, one of the major problems that must be faced in order to be able to make macroprudential policies operative is the lack of satisfactory theoretical models that integrate the various components of the financial system and the real economy. In fact, beyond the sectors that are most regulated through solvency requirement policies and prudential supervision, there is a lack of empirical studies that specify the complex interrelationships between the various components of the financial system. For example, this knowledge would have been of vital importance to understand that a relatively small segment of the US mortgage market (the subprime segment) could cause a chain reaction that would lead to the worst financial crisis in the last century. We now know this, but if we want to prevent similar situations we must have access to this type of information *ex ante*.

A superb piece of evidence that demonstrates this complexity can be found in the Staff Paper published by the New York Fed in 2010¹⁰ (and revised in 2012), which deals with shadow banking.¹¹ In fact, this study contains a chart summarizing the interrelationships between the different elements of shadow banking in the US, and the number of agents and relationships involved is so large that a one by two meter print is necessary in order to appreciate the details (curiously, it is a graph whose main message is that you cannot read anything: this is the extent of the shadow banking system's complexity). If we wanted to expand it to include other key elements of the international financial system, its complexity would be even greater.

IV. CONCLUSIONS

The purpose of this article is not to criticize macroprudential policies but is instead to highlight their importance in preventing future crises like the one we have experienced in recent years and also to remember the theoretical and

¹⁰ Pozsar et al. (2012).

¹¹ Although the term shadow may seem pejorative, indicating something bad, dirty, or illegal, it only refers to the intermediation of credit risk with maturity transformation (shorter-term funding of that credit risk) occurring outside the banking system under prudential regulation (currently Basel III).

practical difficulties that are coupled with their implementation. The negative tone must therefore be understood as constructive criticism to make us aware of the need to devote more resources to their successful implementation. This is, at least, the author's purpose, which is, as always, left to the better judgment of the reader.

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MONETARY POLICY IN EMERGING COUNTRIES, INTERNATIONAL SPILLOVERS, AND INTERNATIONAL MONETARY COOPERATION¹

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I. INTRODUCTION

The 2007-2008 financial crisis originated in advanced economies, which have had to make significant changes as to how they conduct their monetary policies along with other adaptations. Emerging economies—initially more bystanders than protagonists—have been deeply affected by these changes and have experienced substantial shocks, which they have been better prepared to face than in the past.

Looking back, one can observe a historical regularity associated with financial liberalization: capital flows describe trajectories in the form of waves, named as "surges" by the IMF in 2007. Surges are prolonged episodes of abundance of capital that usually coincide with periods of strong credit growth and/or an increase in the price of assets, that often end abruptly with currency crises, banking crises, or, less frequently, sovereign crises.

In the case of emerging economies, at least three episodes of large surges over the past four decades can be identified: one in the 1970s, which ended with the Latin American debt crisis; another in the 1990s, which ended with the Asian crisis; and a third from 2003 to 2007, which, after a notable interruption in 2008, has extended into a new phase, from 2009 to 2013, the outcome of which is still uncertain.

Economies that are in the process of convergence towards higher standards of living, such as the emerging economies, should attract external funding given their higher return on capital, and therefore complement domestic savings, increase investment, and boost productivity. However, more than thirty years of experience with financial liberalization show that inefficient financial intermediation may generate imbalances, bubbles, or sudden reversals

¹ The authors belong to the Associate Directorate General for International Affairs. Thanks for the valuable comments of Ignacio Hernando, Pablo Moreno, Pedro del Río, and Javier Vallés, and the excellent technical assistance of Enrique Martínez Casillas. All errors are the authors' responsibility. This article is the authors' responsibility and does not necessarily reflect the views of Banco de España.

in capital flows, which end up being very costly in terms of output losses and financial instability

The response to the global financial crisis of 2008 brought on that ground many surprises. One was the ability of emerging economies to withstand the widespread recession in developed economies. In the case of Latin America, this was unprecedented. Another closely related unexpected result was the rapid, massive return of capital inflows to emerging economies few quarters after the fall of Lehman Brothers in September 2008, while advanced economies intensified the implementation of ultra-expansive monetary policies. In other circumstances, given the global recessionary environment, one wight have expected a significant increase in risk aversion and a strong preference for assets traditionally considered of high credit quality to the detriment of assets such as emerging market ones, associated with higher levels of risk.

In fact, since late 2009, there were questions as to whether the massive capital inflow to emerging economies corresponded with their strong macroeconomic fundamentals, which had clearly improved after the crisis of the late 1990s, or if it was instead a result of "global" factors; in other words, whether the decline in official interest rates in the US and other advanced economies along with the extraordinary expansion of global liquidity, might have in caused the avalanche. If the latter were the main cause, one could question the permanent nature of such capital inflows.

From the point of view of emerging economies, the return of capital flows was initially positive as it allowed for a recomposition of the level of reserves, set a floor to the downward spiral in financial markets, and acted as a catalyst to facilitate market access. However, it also raised a number of familiar challenges for macroeconomic policies and posed a number of risks to financial stability, similar to the ones which had appeared before 2007, and which required important changes in policy frameworks in many of these countries.

In particular, since 2010, monetary policies have come up against a dilemma derived from the emergence of inflationary pressures (accompanied by overvaluation of asset prices) which required monetary tightening. At the same time, capital inflows pushed for currency appreciation, advocating greater monetary accommodation in order to avoid the entry of volatile short-term flows in search of higher returns. Moreover, those inflows could feed into higher credit growth, increasing the monetary policy dilemma.

The reaction of emerging economies to this dilemma was to expand their range of policy measures to mitigate the risks arising from capital inflow. Exchange rate management became more flexible, reserve accumulation intensified, and interest rates fell. In some cases, fiscal policy was tightened, the use of macroprudential instruments complementary to the work of monetary policy became more widespread, and capital outflows were partially liberalized.

Indeed, lessons learned from the management of previous surges of capital inflows, which ended up generating crises, led many emerging countries' policymakers, aware of these risks, to act counter-cyclically within certain margins, under the assumption that, despite its persistence, there was a transitory component in the avalanche. The most problematic aspect came later, when this initial reaction was insufficient to address the magnitude of the inflows received, leading, in some cases, to justify the introduction of capital inflow controls as a measure of last resort.

At present, the global monetary cycle is changing, and it is expected that very gradually the monetary policies of advanced countries will begin tightening, which will in turn transfer to global monetary conditions. The question arises as to whether the "counter-cyclical" measures adopted during the boom by authorities in emerging economies have sufficiently contained the buildup of imbalances so as to allow for a smooth adjustment (without recession, crisis, or the need to impose controls to capital outflows) to the inevitable normalization of the global monetary cycle. It cannot be ruled out, of course, that despite the caution with which this normalization has been addressed, sudden reversals of capital inflows, albeit temporary and selective, can occur. In fact, there have been episodes of this type between May and August 2013 and in early 2014.

From a different perspective, the strong external impact brought on by the capital inflows associated with the expansionary monetary policies of the advanced economies and the impact that their eventual withdrawal can have during the normalization phase reflect the depth of global financial interconnectedness. In this context, monetary policy measures adopted in some countries –or groups of countries – to deal with their own internal difficulties end up having important, unintended consequences, or spillovers, in countries not associated with the initial problem.

In fact, this type of externality has also appeared among emerging economies themselves, arising, for example, from the capital flows management measures taken by the authorities of large economies such as Brazil, which could possibly have had an impact on capital inflows in neighboring economies. The difficulties encountered by the authorities of emerging economies in addressing these external shocks and maintaining macroeconomic and financial stability point to the need for supranational cooperation mechanisms to support the countries affected by these shocks. In the context of the response to the financial crisis of 2008, progress has been made in international cooperation, mainly channeled through the G20, which gathers the main advanced and emerging economies. With respect to monetary cooperation, the G20 has basically served as a forum for discussion, communication, and the sharing of concerns, but no explicit policy coordination between the advanced and emerging economies, or amongst the emerging economies themselves, has taken place.

With respect to the provision of liquidity, against bouts of capital inflow volatility, some significant bilateral agreements have been adopted (swap agreements) as well as multilateral agreements (with the increase in IMF resources and the establishment of precautionary facilities). To what extent these efforts have been sufficient is a debated topic that will, in any case, be tested in the normalization phase that is starting at present.

The remainder of this article discusses in greater detail the impact and consequences of monetary policies applied in advanced economies in the aftermath of the crisis, as well as reactions to them, in emerging market economies (the analysis mainly covers the phase of monetary expansion as the withdrawal phase has barely begun). Section 2 describes the impact on capital inflows and other financial variables, and the text box reviews the literature related to spillovers. Section 3 describes the policy reaction of emerging economies through various instruments. Section 4 discusses the progress of international cooperation. And the final section provides some brief conclusions.

II. THE IMPACT OF MONETARY POLICY IN INDUSTRIALIZED COUNTRIES ON EMERGING FINANCIAL MARKETS THROUGHOUT THE CRISIS

In the five years between the onset of the global financial crisis in late 2008 and the beginning of the reduction of US Federal Reserve monetary stimulus in late 2013, emerging economies (of Asia, Latin America and Eastern Europe) received net private capital flow close to two trillion dollars in cumulative terms (see Figure 1): a figure much higher than in recent decades, which even exceeds the volume of accumulated net flow received during the 2003-2007 boom (1.7 trillion dollars).² This is despite the fact that immediately after the Lehman Brothers crisis, capital inflows shrunk during some quarters.

² IMF WEO Database, October, 2013, Table A14, "Emerging Market and Developing Economies: Private Financial Flows".



Note: *Composed of 154 countries: Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, The Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of the Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Croatia, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Eguatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Kyrgyz Republic, Lao P.D.R., Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, FYR Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Morocco, Mozambigue, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Oatar, Romania, Russia, Rwanda, Samoa, São Tomé and Príncipe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, South Africa, South Sudan, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Syria, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, and Zimbabwe. Source: WEO October 2013 (IMF).

Moreover, if one also considers the period of large capital inflows into emerging economies in the last five years together with the period in the boom years before the crisis, the total duration of this capital inflow surge is more than ten years, making this the longest expansion phase in recent history.

The brief but sharp drop in capital flow that occurred at the end of 2008 and beginning of 2009 aggravated the short but intense recession experienced by many emerging economies at that time. Surely that fall in output was to be expected, as it was associated with the greatest global shock the world



economy has experienced since the 1930s. The most remarkable and surprising aspect was the subsequent rapid and robust recovery experienced by these economies, unlike what happened in the industrialized economies in which the recovery took more than four years. In fact, in 2010, emerging Asia was leading the expansion of the world economy with an average growth rate of 9.8% of the GDP, Latin America had regained growth rates of 6%, and Eastern Europe of 4.6% after the brief recession of 2009 (see Figure 2).

This unexpectedly strong performance of emerging economies is associated both with their solid macroeconomic fundamentals and their ability to put in place countercyclical economic fiscal and monetary policies (in many cases for the first time), as well as with the abundant liquidity in financial markets as a result of the application of very loose monetary policies in developed economies.³ Other key global determinants in the growth phase of emerging economies were the high growth rate in China and its upward impact on the price of commodities.

The recovery of capital inflows into Latin America and Asia was very clear. In 2010, it was at levels of around 3.5% to 4% of the regional GDP (see figures 3

³ For more details about the features and implementation of these policies, see Berganza, Hernando, and Vallés (2014).





and 4). In Eastern Europe, it reached 4.5% of the GDP in 2010 but remained well below the average in the years before the crisis (see Figure 5).

An interesting element is to discern what type of capital inflow was the one that returned to emerging economies after 2008. At both the aggregate and regional levels, a greater and more rapid increase in portfolio flows (bonds and stocks) was observed, that is, those that are more directly influenced by global interest rates. In contrast, and as expected, direct foreign investment was more stable and tended to recover more slowly. Finally, flows related to "other investments," mainly international bank lending, reported decreases consistent with the process of global bank deleveraging.

Micro survey data⁴ illustrate the temporary impact that the various quantitative measures have had on accumulated net flows in fixed income and equities in emerging economies, which in some cases has been quite

⁴ Emerging Portfolio Funds Research (EPFR) is a daily, weekly, and monthly database which includes the investment portfolio of a large sample of Mutual Funds and Exchange Trade Funds (ETFs). Its main advantage is its immediacy. It is used as the leading indicator of payment flow balances, although the composition of the sample can produce significant differences between two data sets.



FIGURE 5 NET CAPITAL INFLOWS Eastern Europe (*) % GDP bn dolars 200 12.0 10.0 150 8.0 100 6.0 50 4.0 0 2.0 -50 0.0 2009 2010 2000 2002 2003 2005 2006 2001 2000 2,004 Direct investment Portfolio investment Other investment Total net flow Net flows in % GDP (rhs) Note: *Composed of 14 countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, Latvia, Lithuania, FYR Macedonia, Montenegro, Poland, Romania, Serbia, and Turkey. Source: WEO October 2013 (IMF).





significant. Figure 6 compares the impact of quantitative easing (QE1 and QE2) programs of the Federal Reserve and long-term auctions of the ECB (LTRO) with the impact caused by the announcement in May 2013 that the Federal Reserve was considering the beginning of the gradual withdrawal of monetary stimulus, which is an example of the effect that the normalization of monetary conditions might have.

Capital inflows between 2009 and 2011 caused significant exchange rate appreciation in much of Latin America and Asia (see figures 7 and 8). In Latin America, Chilean and Colombian currency exchange rates against the US dollar recovered to near pre-crisis levels during 2011, representing an appreciation of about 30% over the minimum, while the Brazilian real appreciated above previous levels (around 50% over the minimum).

In Asia, exchange rates also recovered from the recorded depreciation in late 2008, although the trend of appreciation against the US dollar was in general more moderate than in Latin America with the exception if the Chinese yuan, which appreciated almost constantly starting in 2010, and in late 2013 stood at 30% more appreciated than in early 2007. In contrast, the exchange rates of other emerging economies such as Turkey and Russia never appreciated to their pre-crisis levels. Similarly, between early 2009 and mid-2011, there was an intense compression of sovereign spreads widespread in all three emerging Part III: Balance of risks and the interactions with other policies





areas, albeit more intense in Asia and Eastern Europe, which reversed almost completely the expansion that occurred during the crisis (see Figure 9). Finally, the trajectory of stock indices was similar, with a strong recovery from 2009 to 2011 and a subsequent stabilization until early 2013 (see Figure 10).







Text Box 1:

A REVIEW OF THE LITERATURE ON SPILLOVERS

There is an extensive literature explaining how capital inflows to emerging economies are not determined solely, or even primarily, by the economic fundamentals of these economies. On the contrary, global factors such as US risk-free interest rates, global liquidity, and the so-called "risk appetite" are key.⁵

In the specific context addressed in this article, which refers to the international effects of monetary policies by industrialized economies in the last five years, one can point out at least four channels through which QE can cause spillover effects on emerging economies. First, "portfolio reallocation" is a channel whereby purchases of government bonds by the central bank in this case the US Federal Reserve, by reducing their term premium, increase the demand and performance of riskier assets such as bonds from emerging economies. Second, a "signaling" channel: A statement by the Federal Reserve to the market conveys an idea about the state of the economy and the future path of interest rates, which, depending on how long it indicates that interest rates in dollars will continue near zero, can serve as an incentive for the acquisition of riskier assets because of the yield spread and a reduced likelihood of capital losses caused by increased interest rates. The third channel would be the increase in liquidity in the market and reduced risk premium derived from the existence of a principal buyer. A fourth channel goes through confidence effects. Although the literature that specifically assesses the impact of each of these possible channels of financial flow to emerging economies is limited, there are some studies that provide evidence regarding the effects of spillovers.

In this regard, the International Monetary Fund (IMF, 2010) estimates that 60% of the increase in capital inflows to emerging economies from 2009 to 2013 is explained by so-called "push factors," including several rounds of quantitative easing, each with decreasing impact. A model with which the impact of an orderly withdrawal of monetary stimulus in the US is simulated, and the result is a modest reduction in capital flows to emerging economies. However, more extreme scenarios that anticipate rising interest rates with abrupt level changes cause more substantial effects such that the reduction of capital flow to emerging economies would reach between 30% and 50%.

Further IMF analysis (2013) shows that after years of extraordinarily accommodating monetary policies in the US, by the end of 2013, capital inflows to

⁵ The literature often refers to "push" or "pull" factors.

Text Box 1: (continued)

A REVIEW OF THE LITERATURE ON SPILLOVERS

emerging bond markets reached levels above their long-term structural trend by over 450 billion dollars (350 billion when corrected for valuation effects). This brings into question the impact of monetary normalization process if capital inflows end up returning to their long-term average.

Marco lo Duca *et al.* (2013) investigate the impact of successive rounds of quantitative easing in the US on the global issuance of corporate bonds and find a major upward impact, even controlling for potential substitution effects between bank loans and bonds, especially in the case of issuers in emerging economies. Specifically, they point out that without quantitative easing, the issuance of corporate bonds in emerging economies would have stood at around half the volume issued between 2009 and 2013 and that the main channel of transmission is through what they call "flow" (asset purchases by the Federal Reserve) rather than through stock effects, that is, the reduction of interest rates and risk premiums.

Meanwhile, Fraztscher *et al.* (2013) show empirically that both the announcements as well as the effective implementation of each quantitative expansion impacted markets, primarily through portfolio reallocation. Specifically, in 2010, the so-called QE2 served to reallocate portfolios towards assets in other countries. One of the study's conclusions is that although the cumulative impact of the Federal Reserve's measures can explain only part of the capital flow to emerging economies, the main effect was to increase pro-cyclicality. However, they find no strong general evidence for the effectiveness of exchange rate policy measures by emerging economies from spillovers. (In this sense, the authors argue that the effectiveness of the measures taken was higher in countries with lower risk; that is, those with stronger policy fundamentals and credibility).

Other studies (Chinn, 2013, for example) are more skeptical regarding the influence of quantitative easing on capital inflows to emerging economies. In conclusion, although the observed correlation between the different rounds of quantitative easing in the US and the recovery of capital flow suggests the existence of spillover effects, proof of causation requires more careful analysis. That causality is established more clearly in the case of QE2.⁶

⁶ Other studies have mixed results on the effects of the expansion of global liquidity on stock and housing prices in individual countries and the correlation between global liquidity and exchange rate appreciation, credit growth, and the prices of various assets.

III. MONETARY POLICY REACTION IN EMERGING COUNTRIES

As mentioned in the introduction, the monetary authorities in emerging economies confronted the monetary expansion implemented by the central banks of developed countries after the Lehman crisis, and the ensuing affluence of capital inflows from the strongest position since the crises of the 1990s and 2000s in their monetary policy frameworks. These better fundamentals and institutions—regimes with more credible inflation goals, more flexible exchange rates, less foreign currency debt, and lower currency mismatches—allowed for the launch of a series of measures that are reviewed in some detail below, with particular emphasis on Latin America and somewhat less on Asia. To facilitate analysis, three policy groups are distinguished:⁷

- Exchange rate policy and international reserve management.
- Monetary policy and interest rates
- Capital controls and macroprudential policy

1. Exchange rate policy and international reserve management

A common feature of the policy reaction in most emerging economies in Asia and Latin America after overcoming the worst of the crisis in late 2008 and early 2009 was the decision to continue accumulating international currency reserves. This allowed for the recomposition of the reserve levels that had been used during the crisis to support exchange rates and subsequently amply surpassing those levels in parallel to the recovery of capital inflows. Such increase has been much larger than the rate of reserve accumulation in recent decades. In Latin America, over 300 billion dollars were accumulated in that period, exceeding 800 billion, a trend also followed in oil-exporting countries and in emerging Asia. In China, foreign currency reserves almost doubled between 2008 and 2013 (reaching almost 4 trillion dollars), an increase that has been due more to mercantilist motives and exchange rate management than self-insurance reasons.

While it is generally recognized that the accumulation of reserves is an insurance mechanism that can be inefficient and generate distortions, the main advantage is autonomy regarding their use. Emerging countries have found that during a crisis, the volume of reserves necessary to instill confidence and prevent capital flight is much higher than indicated by the adequacy ratios that have been commonly used, and that maintaining wide margins (sufficient to

⁷ We follow Obstfeld (2014) to define this typology, adapted to the specific situation after the global financial crisis.

even completely replace external finance for some time) is necessary. In addition, reserve accumulation has also been used in order to restrain excessive exchange rate volatility (and/or excessive appreciation), which cannot be achieved with the use of other insurance mechanisms such as the IMF's credit lines.

By the end of 2013, aggregate foreign exchange reserves in Brazil, Mexico, Chile, Colombia, and Peru (close to 700 billion dollars) virtually doubled their pre-crisis levels as a result of a very substantial recovery of non-residents' gross investments and despite an also significant increase of residents gross outflows.⁸ These reserve levels are much higher than indicated by traditional adequacy ratios such as the ratio to imports and to short-term external debt or even more demanding ratios measured over monetary supply aggregates.

However, the accumulation of reserves was not enough to prevent strong pressure between 2009 and 2011 towards exchange rate appreciation as a result among other factors of favorable growth prospects. The most significant case in Latin America is Brazil. Since mid-2009 the Brazilian economy experienced an increased net capital inflow, which surpassed its pre-crisis level in mid-2011, reaching a maximum of 125 billion dollars, 5% of the GDP. This rise mainly came out of in an increase in portfolio investment flow, which reached around 2% of the GDP. Between early 2009 and mid-2011, the Brazilian real appreciated by more than 40% against the US dollar, surpassing its peak prior to the crisis, despite the fact that the Central Bank of Brazil accumulated more than 130 billion dollars in reserves.

In Chile, Peru, and Colombia, whose economies are eminently commodity exporters, less diversified than Brazil, exchange rate appreciation since 2009 was linked in part to the improvement of current account balance as a result of the increase in the terms of trade. This development was accompanied by a strong increase in net capital inflow throughout 2011, primarily portfolio investments and foreign loans, reaching very high levels in Chile (8.2% of the GDP), Colombia (4.5% of the GDP), and Peru (9.1% of the GDP). As a result, until 2011 the Chilean peso appreciated 27%, the Colombian peso 20%, and the Peruvian sol 13%. The individual countries' reactions to the exchange rate policies were not homogeneous. While in Colombia and Peru reserve accumulation intensified, in Chile the central bank only intervened occasionally in the foreign exchange market (probably due to the existence of a large fund of sovereign wealth) and capital outflows were liberalized.

Mexico faced a different, somewhat less demanding situation in managing capital inflows, since its economic prospects were linked more directly to the

⁸ See Text Box 1 "Semiannual Report of Latin American Economics, Second Semester 2012," in the *Boletín Económico* of the Banco de España.

US due to high trade and financial integration. In those years, the exchange rate of the Mexican peso appreciated much less than other currencies in the region (around 8%) mainly in the context of the current deficit reduction and moderate net capital inflow in the form of direct investment (0.2% of the GDP at the end of 2009), and reserve accumulation was lower.

In Asia, reserve accumulation did not prevent the general trend of increasing exchange rate appreciation. In general, the response in terms of reserve accumulation in both regions can be interpreted as indicating that the central banks considered some of those capital inflows as temporary, which is why, despite the prevalence of flexible exchange rate regimes, they only partially tolerated appreciating exchange rates. Instead of accommodating capital inflows and allowing the market to determine the exchange rate (more appreciated in all likelihood), they invested in reserve accumulation.

2. Monetary policy and interest rates

In 2010, along with the return of capital inflows, rapid growth recovery in emerging economies came with the emergence of macroeconomic imbalances (inflation, credit growth, signs of overheating in asset prices)⁹ that led to a gradual tightening of monetary policy and to reverse the sharp decline in official interest rates implemented in late 2008 and 2009 following the crisis (see Figure 11). Thus, all Latin American countries with inflation targets with the exception of Mexico raised their interest rates. In Brazil, the rise in official interest rates was more than four percentage points, a substantial increase although moderate by historical standards. Also, the unexpected strength of recovery in Asia required the tightening of monetary policy since early 2010. This indicates some degree of synchronization between the monetary cycles of two very different regions.

However, the rise in official interest rates was strongly influenced by the trend of exchange rate appreciation. Thus, the fear of greater appreciation and its impact on external competitiveness and financial stability made the central banks reluctant to raise interest rates preemptively, or at least prompted them to increase them only in a limited way, something that might have translated into higher inflation later. In fact, the Bank for International Settlements (BIS, 2014) and the IMF (2010) estimate that in the years of larger capital inflows official interest rates in emerging economies stood between 75 and 150 basis points below what a standard Taylor Rule with a closed output gap and stable inflation would have indicated.

⁹ Caruana, Filardo, and Hoffman (2014) emphasize the accumulation of imbalances (credit and home prices) in emerging economies as an indirect effect of overly accommodative monetary policies in developed countries.



A second challenge for monetary policy was the concern about financial stability associated with strong credit growth in some countries and the possible overvaluation of asset prices in others. Given the limitations for monetary policy imposed by capital inflows and its potentially limited effectiveness in solving overvaluation problems in specific sectors, several emerging countries complemented the traditional monetary policy management (via interest rates) with use of macroprudential measures.¹⁰ This approach likely represents the major change in monetary policy management in emerging countries in the last decade.

3. Capital controls and macroprudential measures

Just as the transition from fixed to flexible exchange rate regimes and to inflation targeting schemes were major changes in monetary policy after the

¹⁰ Macroprudential policy measures are those designed to limit the buildup of systemic risk from internal imbalances or external shocks in the financial system. Many of these instruments have been used in emerging economies since the nineties and more generally and counter-cyclically of late. LTV ratios, debt service to disposable income, reserve requirements or liquidity ratios are considered macroprudential measures, and sometimes also measures targetted to influence financial transactions between residents and non-residents or between local and foreign currency. There is some uncertainty as to which measures may be considered strictly macroprudential and which may not. For example, the last two mentioned are also often called "capital flow management measures," among which would be capital controls, which in turn are not often considered macroprudential measures.

Asian crisis,¹¹ the main change after the global financial crisis has seemingly been the widespread use of macroprudential instruments, capital flow management measures, and even the occasional use of capital controls (see tables 1 and 2). In Latin America, the measures were mainly to alleviate the pressure from capital inflows and the risk of exchange rate overshooting. Asia, having taken some steps in the area of capital flow management, seems to have focused more on the prevention of the overvaluation of asset prices, especially real state ones, and excessive credit growth (see IMF, 2013; Zhang and Zoli, 2014; among others).

Since 2010, in fact, several Latin American countries have complemented the rise in official interest rates with increases in bank reserve requirements (in order to reduce liquidity), higher capital requirements for financial institutions, and controls on capital inflows. Among the latter stands the tax on foreign financial transactions in Brazil (capital control via prices), successively increased from 2% to 6% to prevent excessive capital inflows in search of the broad interest rate spread between the Brazilian real and the US dollar as well as to discourage borrowing by residents in foreign currency.

Partly as a result of such control, and also probably of the beginning of the cycle of decreasing interest rates as the economy slowed down, since mid-2011, net capital inflow to Brazil gradually declined, reaching 74.6 billion dollars (3.5% of the GDP) by the end of 2012. Particularly noteworthy was the decline in portfolio investment inflows, which fell to less than 20 billion dollars from the first quarter of 2012. Since then, there has been a complete reversal of the previous exchange rate appreciation (a depreciation of 40%), a significant moderation in the pace of reserve accumulation, and a disappearance of the monetary policy dilemmas that had conditioned macroeconomic management in 2010 and 2011. This allowed for the progressive reduction of the tax on foreign financial transactions until its elimination in early 2013 and that of several of the macroprudential measures previously imposed.¹²

Other countries such as Peru implemented various macroprudential measures to limit financial stability risks arising from strong capital inflow such as increased reserve requirements on local and foreign currency, limitations of foreign currency positions, and liberalized limits on capital outflows, measures which have gradually been unwound over the course of 2013 and 2014. Neither Chile nor Colombia managed inflow by using measures restricting foreign capital.

¹¹ The name of "inflation targeting plus" regimes stems from always considering the exchange rate as the most important financial variable for emerging economies.

¹² A series of measures to reduce the cost of credit such as changing the lower limit of savings deposits (considered as the minimum official interest rate) were also taken; and indirect reduction to 5.5% of cash reserve ratios and long term interest rates of the public bank.

TABLE 1

SOME MEASURES FOR CAPITAL INFLOW MANAGEMENT (ASIA AND LATIN AMERICA)

Instrument	Country	Aim
Limits on the foreign currency position of the banking system and corporations	Korea	Reducing external borrowing
Interest rate ceiling on foreign currency borrowing	India	Limiting foreign currency borrowing
Minimum holding period for central bank bonds	Indonesia	Mitigating volatile, short-term capital inflows
Partial liberalization of capital outflow	Malaysia, the Philippines, Thailand	Offsetting exchange rate appreciation pressure
Increase in foreign currency reserve ratios	Indonesia, Peru	Reducing incentives for banks to intermediate short-term capital
Withholding tax on government bond coupons	Thailand, Korea	Moderating short-term inflows
Tax on foreign transactions	Brazil	Limiting portfolio inflows and debt inflows, and increaasig the cost of foreign borrowing
Limits on the currency position	Brazil, India, Malaysia	Limiting exchange rate risk
Sources: IMF Regional Economic C authors' own work.	Dutlook: Asia and Pacific (20	11), Medina and Roldos (2014), and the

TABLE 2 Some macroprudential measures (Asia and Latin America)			
Instrument	Country	Aim	
LTV ratios	Hong Kong, Korea, Singapore, China, Indonesia, Malaysia, Filipinas, Thailand	Limiting mortgage borrowing	
Transfer tax	China	Limiting speculation in the property market	
Reserve requirements	Brazil, Peru, Colombia, Turkey, China, India	Limiting liquidity in local currency and credit	
Countercyclical provisions	China, India, Colombia, Peru	Limiting credit pro-cyclicality	
Capital requirements	India, Malaysia	Limiting banking system risk taking	
Sources: IMF Regional Ecor (2013), and the authors' o	nomic Outlook: Asia and Pacific (Apwn work.	oril 2010), Medina and Roldos (2014), Morg	
Meanwhile, Asian countries resorted to a wide range of macroprudential measures to complement their monetary policy actions mainly in order to mitigate the financial stability risks potentially arising from real estate markets with strong upward pressures in prices (*IMF Asia Regional Economic Outlook, 2013*). Korea limited banks and corporate foreign currency borrowing. India put limits on interest rates to discourage capital inflow seeking the short-term differential interest rate against the dollar. Indonesia deterred short-term capital inflows through the temporary requirement of minimum holding periods of securities to foreign investors, and through the application of a withholding tax on purchases of government debt (which was also done in Thailand and Korea). Several countries took measures to liberalize capital outflows. Applying stringent loan to value ratios in mortgage lending was relatively widespread. Countries like China, Hong Kong, and Singapore also imposed limits on debt to disposable income ratios. Other measures to curb credit growth were higher provisions in India and higher reserve requirements in China and India.

It is difficult to assess whether the measures taken to contain exchange rate appreciation in some countries, including capital controls, have been effective. Brazil was able to reverse the sharp appreciation of the real after the crisis due to growth in private credit. However, it is uncertain to what extent this can be directly attributed to the use of macroprudential measures and capital controls. Baumann and Gallagher (2012) endorse a positive response and show that the controls in Brazil helped to move the capital inflow into longer-term investments.

The introduction and removal of capital controls in Brazil could have spillover effects on other countries. Forbes *et al.* (2011) find that the imposition of controls in Brazil resulted in the reduction of its weight in international portfolios, which is also true for other countries that, although they had not imposed such controls, were considered likely to do so. Lambert *et al.* (2011) find the same type of effect and argue that higher tax transactions in Brazil explain much of the increase in portfolio inflow in Mexico in the aftermath, suggesting the existence of displacement effects and financial spillovers within the region.

In Asia, the authorities' perception of the measures adopted generally supports their efficacy as a supplement as opposed to a substitute for monetary policy. In Korea, capital inflow and bank debts, which in other circumstances could have led to strong credit growth, were limited. In China, the measures are considered a supplement to alleviate pressures on the real estate sector which resulted from the massive fiscal stimulus that was implemented in response to the global financial crisis. In Singapore, the authorities were also effective in restraining overheating in the housing market; however, there are more critical reviews, which point out their ability to alter the composition of capital inflows but not limiting the total volume and perhaps to mitigate overvaluation in specific markets (see Medina and Roldós, 2014).

IV. INTERNATIONAL MONETARY COOPERATION AND GLOBAL SAFETY NETS

The previous sections show to what extent the international financial crisis has been a huge external shock for emerging economies, which have been affected through different channels and very significantly by the huge influx and volatility of international financial inflows. The magnitude of these inflows reflects the intensity that global financial interconnectedness has reached so that countries that were originally unrelated to the causes of the crisis (i. e., the emerging economies) have been strongly affected by its development.

In some sense, it can be said that globalization has created an integrated international financial system of which the national financial systems are interconnected parts. From this point of view, the question arises as to what extent there are multilateral management arrangements that are appropriate for the global nature of the international financial system and work.¹³ Two particular questions arise. The first is that of monetary coordination and cooperation, that is, whether the central banks have sufficiently considered then global impact of other monetary policy responses. The second refers to the existence of precautionary instruments for crisis management at an international level that could provide the necessary liquidity for countries to address the consequences of the changes in international financial flows when national level insurance mechanisms are insufficient or inefficient.¹⁴

Regarding the coordination of monetary policies, establishing explicit mechanisms seems very difficult.¹⁵ However, there is some agreement that more effective cooperation in the area of monetary policy after the crisis would have permitted the establishment of tighter global monetary conditions; at least in the sense of mitigating the overly lax tone that seems to have resulted from the conjunction, on the one hand, of quantitative easing and forward guidance

¹³ This idea was expressed by Andrew Haldane at the "Bretton Woods @ 70: Regaining Control of the International Monetary System" in February 2014 in Vienna.

¹⁴ The first line of defense is any case developing solid frameworks of macroprudential and regulatory policies including the exchange rate adjustment and international reserve accumulation within the limits set by reasonable criteria.

¹⁵ And it is not clear that this is desirable. Traditional theory says that under normal conditions, if every central bank follows a set of well-defined rules addressing their internal goals, the result achieved will be close to the optimum and the profits that can be obtained through monetary policy coordination are second order (Taylor, 2013). However, it is likely that in the post-crisis period the central banks of the major developed economies will have removed their optimal rules to implement unconventional monetary policies, encouraging central banks of emerging economies to do the same (see Bullard, 2014 and Rajan, 2014).

policies in advanced economies, and, on the other, of the defensive measures of central banks in emerging economies. (Caruana, 2012b).

The fact that flexible exchange rates do not always provide sufficient insulation against external shocks (due to the importance of foreign currency funding in many emerging economies) and the fact that bond markets are highly integrated internationally and are potent transmission channels of the major central banks' monetary policies, illustrate the externalities generated by these policies. Consequently, the sum of the best policies at the national level does not, in general, lead to the most appropriate policy at the global level, and adopting an explicit overarching perspective is necessary (Caruana, 2012a).

However, decision frameworks of central banks lead them to fix their monetary policies based mainly on national criteria. It is true that there have been some exceptions. There were some significant cases of cooperation in the most acute moments of the crisis such as the opening of swap lines by the Federal Reserve and the European Central Bank for the supply of dollars and euros to other central banks (including those of some of the major emerging economies) in the early stages. Also, in October 2008, the central banks of the major advanced economies simultaneously reduced their interest rates in a concerted effort. A few weeks later, the President of the US brought together the heads of state of the G20 in order that this group became the lever of the global response to the crisis.

From the point of view of monetary cooperation, the G20, supported by analytical material of increasing quality from the IMF and other agencies, have functioned as a discussion forum based on peer pressure in which emerging countries' concerns have been voiced as to the risks of financial instability that, in their opinion, ensued from the aggressive expansionary policies pursued by central banks in the major advanced countries.¹⁶ However, it has not been a genuine mechanism of monetary coordination, and it is difficult to know whether there have been any practical implications on the policies that have been implemented. In any case, the more formal mechanisms of policy coordination set by the G20 in areas of non-monetary policy through Mutual Assessment Process and the Framework for Growth have not proven to be much more effective.

Instead, the G20's efforts to agree on the criteria to be followed for the implementation of capital controls must be noted (see Text Box 2). The use of these instruments had been considered ineffective in the past, and with negative spillovers on neighboring countries, as previously mentioned. Despite this,

¹⁶ "The currency war" was suggested by Brazilian finance minister Guido Mantega in this context.

they have come to be regarded as part of the emerging economies' arsenal of response to the massive capital inflows in the context of quantitative expansion. This forced the IMF to revise its own opinion on the conditions for the use of

Text Box 2:

CHANGING OPINIONS ABOUT CAPITAL CONTROLS

The increase in capital flows to emerging economies in recent years has certainly had a positive impact, but it has also brought difficult challenges and dilemmas. The need for the IMF to provide clear and consistent advice to countries that have faced this problem has required since 2010 a deeper and broader analysis of the implications of capital inflows for emerging economies, an analysis that has been mentioned in several papers and publications. The conclusions of this work, which serve as the IMF's position and are supplemented by the G20 (see G20, 2011), are summarized in a document (IMF, 2012) that notes that the waves of capital inflows, and the disorderly exits, can create challenges for a country's economic policies in terms of the appropriate policy responses, which affect both the countries that are sending and receiving capital flows. For the latter, which are the subject of this article, the IMF concludes that the key is economic policy management—fiscal and exchange monetary policy—along with financial supervision, regulation, and the establishment of solid institutions. However, it is recognized that in some circumstances, "capital flow management measures" (including capital controls) may be useful, provided they are not used as substitutes for macroeconomic adjustment.

The document provides details on what kind of policy responses might be appropriate depending on the circumstances of each country. In the presence of significant capital inflows, if no overheating or asset inflation has occurred, the policy recommendation is to lower interest rates. Allowing currency appreciation is also recommended if the exchange rate is not overvalued relative to fundamentals. Intervention in exchange markets to accumulate foreign exchange reserves is also considered appropriate "when they are not more than adequate." Finally, capital flow management measures may be useful when the margin for adjustment of macroeconomic policies is slight (for example, if all of the above cases occur at the same time), when necessary to gain time for policy responses to take effect, or when capital inflow threatens financial stability.

However, the IMF expressed doubts about the real effectiveness of capital flow management measures, which at any rate should be transparent, temporary, and non-discriminatory.

capital controls and the G20 to establish principles of use, making it clear that they should remain instruments of last resort. In any case, these criteria are only indicative.

What factors hinder policy coordination or, more modestly, hinder cooperation between monetary authorities? Overall, there are many obstacles to policy coordination ranging from a lack of agreement as to what is the impact of policies (and thus what their benefits are), the asymmetric distribution of costs and benefits between countries, a lack of vision on the part of the authorities as to the range of policy options, and the incentives to breach the agreement (see Ghosh and Ostry, 2013). These factors seem to affect particularly acutely the area of international monetary cooperation in which central banks are guided by mandates aimed at maintaining domestic macroeconomic stability. However, it is conceivable that in the future financial interconnectedness will intensify and external monetary policy spillovers will be higher, making it even more relevant to consider the international consequences of policy and making cooperation between authorities more necessary. In this context, institutions such as the IMF and the BIS must play a fundamental role in providing a sound analytical basis to explicitly incorporate these interconnections and spillovers.

Note that central bank cooperation is not restricted to monetary policy but has been extended to other areas of their performance such as regulation and financial stability in which coordination has worked more effectively (Caruana, 2012a). In fact, regulatory and financial stability agreements have experienced a major boost since the crisis under the umbrella of the G20 and the effective support of the FSB and the BCBS.¹⁷ This is a very important part of the response to the financial crisis, which aims to remedy deficiencies that originated the crisis and helped it to spread quickly through the financial interconnections between countries. The implementation of the agreements on capital requirements (Basel 3) and liquidity management standards will be monitored by these same forums and should ensure a stronger and more solvent global financial system.

A second area where there should be adequate tools for managing episodes of international crisis is that of precautionary or insurance mechanisms that ensure the provision of liquidity to countries that may be affected by sudden shifts in worldwide financial flows. With respect to this fundamental aspect of the management of an integrated global financial system, there have been substantial advances, mainly under the G20, which has supported and approved initiatives in several directions. However, even in this regard there is room to complete the network of instruments available and make safeguarding against a systemic global financial stability crisis more effective, which is the

¹⁷ The Financial Stability Board (FSB) and the Basel Committee for Banking Supervision (BCBS).

view of both the IMF (see IMF, 2010c), the authorities of emerging economies (see R. Rajan, 2014), and the academic community (see Fahri, Gourinchas, and Rey, 2013). Against this, the high resource requirements and moral hazard considerations are usually the arguments most used by those more wary of making for further progress in this area.

Insurance mechanisms, or safety nets, can be constructed at different levels: from a purely national level --international reserves- to global levels --IMF resources and facilities that channel those resources to the countries that need them- (Moreno, 2013). There are also some bilateral mechanisms (such as swaps between central banks) and regional financial safety networks (Regional Financial Agreements, RFA), which have all played a role in the response to the crisis, in its preventive aspect, and also, in some cases, in the effective provision of liquidity when necessary. In any case, it should be noted that these mechanisms¹⁸ only provide effective protection and offer scope for the authorities to respond to transitory shocks if they are supported by fundamentally sound economic frameworks and an appropriate implementation of economic policies.

International reserves are an essential protection for emerging economies that are increasingly integrated in commercial and financial terms.¹⁹ As noted above, international reserves have grown very significantly since the crisis, in line with the intensification of financial links, the development and deepening of financial markets in emerging countries, and their proved usefulness during the crisis. However, while they have the advantage of being available without restriction, they also have significant fiscal and financial costs. Additionally, the sources of protection must be diversified.

Although they are less predictable, bilateral swap lines can be supplementary protective cushions, especially if they are coordinated and there is a commitment by the granting central bank (as was the case of the lines opened by the FED and the ECB in 2008). Likewise, regional financing arrangements have played an important role in the crisis, especially in Europe, more as resolution instruments than as precautionary ones (see Garrido, Moreno, and Serra, 2012).

Finally, the IMF, whose work has been greatly enhanced as a result of the crisis, is the most important liquidity backstop at the multilateral level. Under the leadership of the G20, IMF resources have quadrupled since 2008 and now account for almost one trillion SDRs. The IMF has developed precautionary facilities (FCL, PLL) allowing that institution to channel liquidity to countries with very strong or reasonably solid fundamentals, requiring insurance against

¹⁸ Which would form part of a global insurance network (Global Financial Safety Net, GFSN).

¹⁹ See Assessing Reserve Adequacy—Further Considerations, *IMF Policy Paper*, November, 2013.

external liquidity shocks. In particular, the FCL lines, which are aimed at countries with the greatest strengths, have been used by three countries so far: Mexico, Colombia, and Poland; and there is evidence that they have helped strengthen their positions in the world market. However, both the increase in Fund resources and the opening of insurance lines are subject to moral hazard problems (their existence can generate incentives for less cautious behavior by international investors and recipient countries). Moreover, in the case of facilities, there are stigma problems²⁰ to be added to the high consumption of Fund resources and the lack of clarity regarding the conditions of maintenance and exit. Under these circumstances, the Fund has revised the FCL and PLL twice; the latest revision took place last February (FMI, 2014), and they will be further revised in the future to properly define their operation.



Notes: ¹ Germany includes resources from the following agreements: CMIM, EFSF, ESM, BRICS funds, AMF and FLAR.

² GDP and capital inflows variables are defined as an average of several years, similarly in FMI (2010): Fourteenth General Review Quotas — The size of the Fund:Initial Considerations and The Chairman's Concluding Remarks. For example, the data used for Revision 14rd is an average from 2004 to 2008 and the actual data, from 2009 to 2012. The capital inflows variable is defined as the addition of direct investment, portfolio and other investments.

Sources: IMF (WEO, for GDP and IFS, for capital inflows), Annual Reports of IMF, AMF and FLAR and, data from CMIM, EFSF, ESM and the BRICS fund.

²⁰ "Stigma" refers to the possible negative implications on the assessment that markets make of a country that may result from access to an IMF facility suggesting that the country has difficulties without specifically assessing them.



In short, global safety nets have experienced a significant development during the crisis, but their maintenance and their use in normal times are yet to be defined. Additionally, there is a debate as to what should be the size of these networks in the future, either considered separately or together. Some indicators would suggest that they are insufficient considering the size of global GDP, and specially the volume reached by global foreign assets (see Figure 12). In particular, the size of IMF resources is subject to an ongoing debate, also linked to issues related to the governance of that institution (L'Hotellerie-Fallois and Moreno, 2014).

V. CONCLUSIONS

The financial crisis has led to an external shock of great magnitude for emerging economies, which have been able to face it from a position of strength with solid fundamentals and macroeconomic policy frameworks, which confirms that this is the first and most effective line of defense against an external shock. In the context of financial globalization, this external shock has materialized mainly through global financial conditions, and particularly through strong capital inflows resulting from the expansionary monetary policies in the major advanced economies. The management of these flows has tested the monetary policy frameworks and exchange rate flexibility established by emerging economies, which have proven to be effective defense mechanisms. In addition, given financial stability risks, the authorities have also resorted to the use of macroprudential measures and, in some cases, of capital controls, the use of which has been rehabilitated by the IMF.

The external origin of the shock experienced by emerging economies and the magnitude of its impact suggest the need for mechanisms of international monetary cooperation in order to support the 'innocent bystanders' of financial crises. In this sense, the G20 has been the main forum for developing such cooperation, which has not been very intense in terms of coordinating monetary policies; but the G20 have handled the request from emerging economies that advanced economies take into account the externalities of their policies. Regarding the establishment of multilateral insurance mechanisms to provide necessary liquidity, advances have been clearer, although the global safety net is still under construction and there is no clear agreement as to its final configuration.

The next stage of exit from the policies introduced to address the crisis, with a return to more normal global monetary conditions and lower levels of financial inflows to emerging economies, will be a new test for the mechanisms of crisis management, both domestic and multilateral.

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PART IV

Open questions in the euro area

VIRTUAL UNCONVENTIONAL POLICIES. THE EURO AREA RECOVERY AND THE ROLE OF ECB POLICY

Huw PILL

1. INTRODUCTION¹

The financial crisis has posed many new challenges for central banks. Nowhere have these challenges been more acute than in the euro area. In the face of threats to financial and macroeconomic stability as market activity seized up, central banks throughout the world were forced to take actions supporting market functioning and financial institutions.

As a consequence of the unique institutional structure of monetary union, demands on the ECB were even greater than elsewhere. The lack of area-wide fiscal and regulatory authorities placed more responsibility on the ECB, while the fragmentation of Euro markets on national lines as the perceived threat of break-up rose have both intensified the challenges and made responses more difficult to implement.

The ECB has acted to address financial dislocations through a variety of measures that are discussed in more detail in the remainder of this paper. Overall, the rewards to these interventions have been substantial: of course it is hard to assess the counter-factual, but ECB measures have served to stabilise the financial system, preserve the integrity of the euro area and ultimately underpin the current recovery in economic activity.

Yet these interventions have also come with risks. A comprehensive assessment of the ECB's interventions should analyse the risk / reward profile of its measures. Since many of the downside risks associated with such interventions accrue over time –largely as a result of other actors exploiting the moral hazard that ECB interventions may create – such an assessment requires a thorough examination of the institutional framework in which the ECB operates and how that is evolving over time.

¹ The views expressed in this paper are those of the author and do not necessarily reflect the views of Goldman Sachs. Thanks for comments are due to colleagues at GS and participants at the Banque de France colloquium "Sovereign Risk, Banking Risk and Central Banking" held in July 2013 and the ICMB Geneva Conference "Exit strategies: Time to think ahead" held in May 2013.

II. LIQUIDITY VS. SOLVENCY

Conventional central bank wisdom draws a sharp distinction between liquidity and solvency problems in the sovereign and financial markets. Endowed with the 'printing press', central banks are able to produce monetary liquidity costlessly and in potentially unlimited amounts. They are thus uniquely wellplaced to deal with liquidity crises. But central banks have proved understandably reluctant to take responsibility for solvency problems. Restructuring insolvent banks and/or sovereigns is essentially an exercise in distributing unavoidable (and potentially very large) losses. Independent and unelected central bankers are ill-suited to taking fiscal decisions with such significant distributional consequences: they have no mandate to do so.

Nevertheless, through their prior claim on monetary income (or seigniorage), central banks have access to fiscal resources. Avoiding entanglement in solvency problems is therefore –at least to some extent– a matter of choice rather than a matter of logic, reflecting concerns about how such involvement will influence incentives and, ultimately, the ability of the central bank to reach its primary objective of price stability.

More precisely, scope exists for central banks to channel seigniorage from general government revenue to specific ends, including addressing solvency concerns.² Yet these resources, while potentially significant, are limited.³ As a result, central banks can address solvency difficulties by diverting seigniorage revenues – but only up to a point. Beyond that point, fiscal claims on the central bank that exceed its fiscal capacity threaten to generate inflation (for reasons that ultimately derive from the emergence of fiscal dominance over the price level), and thus run counter to the central bank's price stability mandate.⁴

All this creates well-known incentive problems. To manage these, normal practice has been for central banks to refrain from directing seigniorage on a discretionary basis. Rather responsibility has been left with the fiscal authorities: seigniorage has been distributed to governments, for politicians to take the distributional decisions – including whether to offer solvency support. In the euro area, these norms took institutionalised form in the Lisbon Treaty's prohibition of monetary financing (Article 123), as well as in the procedures underlying central bank operations (including the provision of emergency liquidity assistance).

Experience during the financial crisis has tested this established thinking.

² See Durré and Pill (2010).

³ See Pill (2011).

⁴ See Kocherlakota and Phelan (1999).

III. PROVIDING LIQUIDITY SUPPORT

A welfare-optimising central bank will always choose to satiate the private sector's demand for liquidity. This is an implication of the Friedman (1969) rule. Because the marginal cost of creating fiat money –in the modern context, the cost of electronically crediting banks with reserves at their central bank accounts– is essentially zero, welfare theory implies that the opportunity cost of holding reserve money should also be zero. In turn, this entails that reserves should be supplied elastically by the central bank at a price (interest rate) equal to the remuneration offered on reserve holdings.

In pre-crisis times, the ECB achieved this outcome by: (1) imposing reserve requirements on banks that exceeded the natural demand for liquidity arising from inter-bank payments; (2) supplying reserves via the so-called 'benchmark allotment' at its regular weekly operations, thereby ensuring that the banking system as a whole had sufficient liquidity to meet reserve requirements in aggregate; and (3) paying interest on required reserves equal to the rate at which those reserves were borrowed at the weekly operation. Crucially, this approach relied on a functioning inter-bank market to distribute liquidity across individual institutions.

With the onset of financial crisis in 2007-08, the inter-bank money market seized up. It could no longer be relied upon to distribute liquidity efficiently across banks.⁵ The ECB stepped in, offering its own balance sheet as a vehicle to conduct the inter-bank transactions that could no longer take place in the market. Central bank intermediation substituted for private intermediation: the ECB supplied liquidity in place of private provision.⁶

Central to the ECB's approach was the adoption of fixed rate / full allotment (FRFA) tenders in its regular monetary policy operations.⁷ Against a broad range of collateral, banks could obtain liquidity on demand at a pre-specified interest rate. The excess liquidity created through recourse to these operations ended up on the ECB's deposit facility.

⁵ Heider *et al.* (2009) argue that concerns about counterparty credit risk in interbank transactions emerged after the failure of Lehman in 2008. Given the information asymmetries created by uncertainty about the quality of asset-backed securities on.

⁶ Durré and Pill (2012) argue that this has been observed in previous financial crises, albeit in different form reflecting the different nature of the crisis. Many recent unconventional measures mimic central bank responses to 'sudden stops' in emerging markets. For example, foreign exchange intervention and expansion of domestic assets during the Asian crisis reflected the central bank balance sheet being substituted for cross-border funding of the domestic bank system, another example of substituting central bank intermediation for private intermediation.

⁷ See Lenza *et al.* (2010) and Giannone *et al.* (2012) for an empirical analysis of such central bank intermediation and a comparison with the responses implemented in other jurisdictions).

Rather than have banks with excess liquidity lending to banks short of liquidity through the inter-bank market, the ECB acted as an intermediary, collecting the excess liquidity at its deposit facility and lending it on via monetary policy operations. The difference between the interest rate at the ECB's refinancing operations and the rate on its deposit facility became the bid / ask spread on such central bank intermediation.

Implicit in its performance of this intermediation function was the ECB's assumption of counterparty credit risk embodied in inter-bank transactions. In the account of Heider *et al.* (2009), the seizing up of the money market reflected adverse selection stemming from concerns about the solvency of some market participants following the failure of Lehman. To the extent that these concerns owed to information asymmetries rather than genuine solvency problems, the ECB's intervention was well-targeted: in a surgical manner, it overcame a specific market failure.

IV. PROVIDING SOLVENCY SUPPORT

Yet the ECB was not necessarily in a better position than other market participants to form a judgement about the fundamental strength of bank balance sheets, given the opacity of asset-backed securities (ABS) at the heart of bank solvency concerns. In providing central bank intermediation, the ECB may have been taking on and (more importantly) mis-pricing the fundamental (as opposed to perceived) counterparty credit risk (e.g., by wrongly valuing the ABS it accepted as collateral, by having too narrow a bid / ask spread on central bank intermediation). Any such mis-pricing would represent an implicit 'quasifiscal' subsidy to the financial sector. Providing such a subsidy goes beyond the uncontroversial central bank role of supplying liquidity elastically.

In this context, an alternative rationale for ECB intervention emerges. The externalities supplied by a functioning money market in terms of broader financial and macroeconomic stability justify the provision of a subsidy to private market participants on conventional Pigovian grounds. Subsidising market participants by assuming counterparty credit risk on preferential terms is justified to correct another form of market failure: the under-provision by the market of positive externalities coming from the public good properties of market liquidity.

In real-time, making fine distinctions between these two rationales for ECB intervention was, at most, a second-order concern (if that). The first order objective was to arrest the vicious downward spiral in market functioning and financial and macroeconomic stability.

With the (considerable) benefit of hindsight, the ECB's actions on these dimensions appear successful. Moreover, when compared with other leading central banks, the ECB's performance in the immediate post-Lehmann phase of the crisis can be seen as strong. The design of the its operational framework for monetary policy implementation –the large number of banks that could access monetary policy operations, the broad set of instruments that were accepted as collateral in those operations, etc.– served the ECB well, whereas other central banks had to introduce a range of more ad hoc instruments and operations.

Yet this experience begs the question of how far central banks should be prepared to undertake quasi-fiscal actions and obligations.

On the one hand, such actions may prove crucial in arresting self-reinforcing crisis dynamics. Financial crises demand politically controversial decisions are taken quickly and decisively. In this context, the decision-making autonomy and insulation from day-to-day political pressures afforded by independence –as well as the immediate availability of financial resources outside the constraints of normal, slow-moving budgetary procedures– gives a strong rational for central bank quasi-fiscal action.

On the other hand, such actions come with their own dangers, which may become more pronounced the longer time passes. Initially well-intentioned (even necessary) interventions to prevent a systemic crisis may morph into an ongoing, growing and ultimately excessive drain on the central bank's fiscal resources as solvency problems mount and dependence on central bank support builds. Ultimately, this can threaten fiscal dominance and put price stability at risk.

Admittedly, back-of-the-envelope calculations to estimate the capitalised value of future seigniorage revenues suggest this is a quite distant prospect (see Table 1). Yet, of itself, this leaves little room for complacency. First, in a context of systemic financial crisis and/or sovereign default, demands for solvency support can also be large, certainly of the same order of magnitude of central bank fiscal resources as future seigniorage revenues, if not larger. And second, with forward-looking price and wage setting behaviour, it is expectations that drive inflation developments: these can be influenced by the possible emerge of fiscal dominance long before the financial flows themselves reach the critical point.

Such considerations reveal the time consistency problem that lies at the heart of this discussion. Using a central bank's fiscal capacity more proactively to address immediate crisis pressures may undermine attempts to limit recourse to that capacity in the future and thereby threaten the credibility of price stability. As is apparent from the traditional literature on monetary policy and

TABLE 1				
ESTIMATE	S OF CAPITALISE	D SEIGNIORAGE I O NATIONAL FISC/	NCOME OF CENTRA AL POSITIONS	L BANKS RELATIVE
Central Bank	NPV of Seigniorage		Fiscal Stance (end-2011)	
	a = 0.5	a =1	Debt level	Deficit
ECB	EUR 1.4 tr	EUR 2.5 tr	EUR 6.3 tr	EUR 305.5 bn
FED	USD 1.5 tr	USD 2.7 tr	USD 11.0 tr	USD 1,259.5 bn
BoJ	JPY 142 tr	JPY 259 tr	JPY 612.6 tr	JPY 41,489.1 bn
BoE	GBP 67 bn	GBP 122 bn	GBP 1.2 tr	GBP 103.9 bn
<i>Notes: a =</i> income nacroeconomic as <i>Sources:</i> Pill (2011)	elasticity of deman sumptions.), IMF World Econd	nd for central bank i omic Outlook.	money. See sources fo	r details on underlying

the (expectations augmented) Phillips curve,⁸ resolving such time consistency problems lies at the heart of the central bankers' job.

V. DISTINGUISHING LIQUIDITY AND SOLVENCY PROBLEMS

In managing this difficult time consistency problem, distinguishing between liquidity problems is crucial. But –as revealed by the discussion of the immediate post-Lehman phase of the crisis above– in practice distinguishing between liquidity and solvency problems is difficult in real time. Unfortunately, in modern financial markets, there is no time for procrastination in making this judgement.

The problem can be yet more formidable if the possibility of multiple equilibria emerges. Self-fulfilling dynamics can transform what is initially a liquidity problem into a solvency problem (and, in principle, vice versa). In such circumstances, drawing a hard distinction between liquidity and solvency issues may not even be possible.⁹

⁸ See Barro and Gordon (1983) for the seminal treatment.

⁹ See Cole and Kehoe (2000) for an analysis of this phenomenon and Corsetti *et al.* (2013) for a discussion of how such self-fulfilling dynamics can be used to explain developments in the Euro area financial markets after 2010.



The classic example of such multiplicity stems from the implications of rollover risk (see Figure 1). If markets become concerned that cash flow problems arising from a failure to roll maturing debt will trigger default, they will incorporate a credit risk premium into yields, thereby driving up refinancing costs. Higher refinancing costs bring into question the debt sustainability of a highly indebted borrower, which, in turn, only serves to intensify concerns about default. And so on. What was originally a liquidity problem is transformed into a solvency problem.

In this context, the actions of the central bank help select among various possible equilibria. For example, by providing liquidity generously and underwriting debt issuance, a central bank can ensure that the self-fulfilling threat of rollover risk triggering a solvency problem is ruled out. Rather than simply responding to exogenous shocks, the central bank plays an active role in determining the nature of the equilibrium –and thus whether it raises purely liquidity concerns, or is a solvency problem.

Treating the problem as a liquidity problem ensures it remains a liquidity problem. Credible communication of the central bank's willingness to underwrite debt issuance by supplying liquidity as necessary (thus ruling out Paretodominated 'bad' equilibria embodying the threat of insolvency) will be sufficient to stabilise markets. The credible threat of action is enough to coordinate private market behaviour on a 'good' equilibrium where debt can be rolled at yields that do not bring debt sustainability into doubt.

In all of this, the central bank is a strategic actor, taking decisions that influence the actions of others rather than simply reacting to a set of exogenous shocks and pre-defined private sector behavioural responses to them. But other actors will also be able to behave strategically in this context, responding to the incentives created by anticipated central bank measures.

For example, if governments and/or banks enjoy a central bank liquidity guarantee, moral hazard can be created, with borrowers undertaking or perpetuating activities that ultimately lead to bigger solvency problems. For example: (1) excessive public sector deficits can persist and expand if governments believe that the central bank will underwrite debt issuance, since market discipline on fiscal decisions is weakened;¹⁰ and (2) non-performing assets on bank balance sheets can be 'evergreened' (rolled over repeatedly, with unpaid interest being rolled into the principal) indefinitely if banks have access to an elastic supply of central bank funding against a very broad set of collateral. In this case, the strategic interaction between borrower and central banks in the face of a liquidity problem can create a moral hazard that ultimately generates a solvency issue.

To sum up, recent experiences have challenged conservative central bank doctrines. They point to a rationale for a more activist central bank responses to financial crisis – ones that seek to reinforce socially-desirable equilibria. But such activism comes with risks: if applied inappropriately or excessively, central banks activism can exacerbate the underlying problems and/or create new ones, especially over longer horizons, by accommodating unsustainable bank and government behaviour.

In this strategic context, central bank actions to underwrite the roll of potentially problematic outstanding debt can lead to three possible outcomes:

- (1)'Risk-shifting', i.e. central bank liquidity support simply transfers any underlying fundamental solvency risk from the private sector to the central bank, to the extent that the latter is ultimately the 'buyer of last resort' for debt on issuance;
- (2)'Risk-reducing', i.e. by ruling out risky equilibria created by self-fulfilling expectations of rollover-induced default, central bank actions can reduce

¹⁰ See Roch and Uhlig (2013) for a very elegant demonstration of how liquidity support to avoid self-fulfilling roll over crises creates a moral hazard that leads to higher steady state levels of sovereign debt.

the riskiness of the system as a whole (in a potentially Pareto improving manner);

(3)'Risk-creating', i.e. to the extent that they create moral hazard among borrowers, central bank actions can support unsustainable behaviour that ultimately increases the overall riskiness of the system.

In assessing the success of central bank measures, distinguishing among these three outcomes (and recognising that different effects may dominate at different horizons) is key.

VI. ADDRESSING THE EUROPEAN SOVEREIGN CRISIS

Owing to the impact of successive waves of sovereign debt crisis in Europe (starting with Greece in early 2010), financial market dysfunctionality was both more profound and more prolonged in the euro area than elsewhere. By the end of 2009, financial markets were functioning reasonably normally in the US and the UK: the quantitative easing programmes introduced by the Federal Reserve and Bank of England were conducted in that context. By contrast, dysfunctionality in euro area financial markets intensified from early 2010. With concerns about fiscal sustainability and Euro exit growing, capital fled the periphery. Banks as well as sovereigns were unable to obtain funding, as Euro markets segmented along national lines. Credit creation in bank-centric peripheral financial systems ceased, and the financial sector seized up.

Compounding these problems, the euro area suffered from institutional lacunae on the fiscal side. While the Federal Reserve and Bank of England faced cooperative and functional national treasuries, the ECB did not have a natural fiscal and regulatory counterpart. At the national level, fiscal capacity in the most severely affected peripheral countries was exhausted. The poor –in some cases, catastrophic– state of public finances (which had triggered the original sovereign crisis) implied governments lacked the resources to solve or contain difficulties arising in the financial sector. And at the area-wide level, the ECB faced a disparate and ill-coordinated set of national finance ministries and bank regulators, which were unwilling and/or unable to adopt a euro area approach that internalised the significant cross-border externalities created by spillovers and contagion.

The implications of this setting were twofold. From the end of 2009, relative to their colleagues in the Anglo-Saxon world, the euro area authorities faced a different (or at least additional) challenge – one that centred on re-establishing

market functioning rather than (simply) engineering monetary policy easing to sustain and stimulate demand. And the burden of meeting this challenge fell to a greater extent on the central bank that in other advanced economies, since the ECB was the only functioning euro area-wide institution with the autonomy, flexibility and financial resources to act effectively.

One important aspect of this European challenge was the contagion of sovereign market tensions across countries as markets re-segmented and foreign capital (from both outside the euro area and other euro area countries) withdrew. While solvency problems were evident in some peripheral countries, in others tensions appear to have been driven more by default concerns created as a result of rollover risk.

For the smaller peripheral countries, funding tensions were met through recourse to troika programmes financed by the IMF and European bailout mechanisms. But the financing needs of the larger peripheral economies (Italy and Spain) were simply too large to be addressed in this way.

VII. DOING "WHATEVER IT TAKES"

It was in this context that ECB President Mario Draghi announced his famous pledge to do "whatever it takes" to preserve the Euro. This commitment took institutional form in the ECB's outright monetary transactions (OMT) programme introduced in September 2012.

The OMT scheme foresaw the possibility of central bank purchases of the shorter-dated government debt of countries that entered European Stability Mechanism (ESM) programmes (and accepted the implied conditionality). In essence, the OMT allowed the ECB to use its own balance sheet to leverage the capital in the ESM. This created the capacity for the ECB balance sheet to be used to warehouse the public debt of large peripheral countries in the face of roll over risk –just as had already been achieved for the small countries via the troika– while retaining the important element of conditionality to maintain incentives for fiscal discipline and contain moral hazard.

The introduction of the OMT has exerted a powerful effect on market sentiment, leading to a substantial narrowing of peripheral sovereign spreads over German yields. In turn, the stabilisation of financial markets has created an environment conducive to the stabilisation of the real economy, while providing breathing space for the necessary underlying area-wide governance improvements and national structural reforms and fiscal consolidation to be implemented. In the framework developed above, at the time of writing the OMT has proved to be a risk-reducing intervention.

Crucially the OMT worked through expectational channels and the credibility of Mr. Draghi's "whatever it takes" announcement. The promise to underwrite sovereign debt has proved sufficient to re-coordinate private market participants on a 'good' equilibrium where debt rolls and sovereign credit risk premia remain contained. As a result, OMT purchases have never been made: the ECB has not bought one Euro of peripheral sovereign debt since the OMT was announced in September 2012, and the larger peripheral countries (Italy and Spain) have not entered ESM programmes to activate the possibility of such purchases.

The undoubted and substantial success of the OMT was founded on using an 'off-balance sheet approach' to stabilise sovereign markets. In essence, Mr. Draghi issued a put option on peripheral debt (albeit one with a vague strike price), rather than making outright purchases. This approach allowed him to navigate the dangerous waters between, on the one hand, understandable German concerns about the abuse of central bank financing stemming from the unique institutional set-up of the euro area and, on the other, market participants' concerns about the sustainability of peripheral fiscal positions in the face of both fundamental weaknesses in the public finances and roll over risk at a time of market tension.

But importantly this off-balance-sheet approach did not impose conditionality on the benefiting countries, which remained outside ESM programmes. Spain and Italy enjoyed substantial reductions in their financing costs as a result of the announcement of the OMT, but did not have to satisfy the conditions implied by participation in an ESM programme, comparable to those set for the small peripheral economies by the troika. Implementing the necessary macroeconomic adjustment was therefore a matter of trust.

To their credit, the Spanish authorities have pursued significant adjustment even without the imposition of explicit conditionality. Fiscal consolidation has been implemented aggressively over the past two years, resulting in significant deficit reduction – even if there remains some way to go before a sustainable fiscal position is achieved over the medium term.

Moreover, Spain has made progress on other dimensions. Reforms implemented in 2012 have led to a significant and rapid improvement in labour market flexibility, facilitating necessary wage moderation, reallocation of labour resources and improvements in productivity. Although wage moderation has brought inflation to very low levels (and is thus associated with the emergence of understandable concerns about deflationary risks), these supply-side measures have substantially improved international competitiveness by lowering relative unit labour costs. Exports have recovered as a result, in part because internationally mobile production has relocated to Spain to exploit the cost advantages. As a result, the Spanish economy stabilised in the second half of 2013.

Yet the issue of moral hazard remains. In the context of OMT-induced market calm, Italy's macroeconomic adjustment has been more hesitant than that in Spain. Admittedly, this reflects a different starting point: on several dimensions, Italy has less adjustment to make. Having not experienced credit and real estate dislocations of the magnitude seen in Spain prior to the crisis, Italy's external and financial imbalances were of a different magnitude. The challenge for Italy is to restore growth in an economy that has stagnated for more than a decade, starting even before the onset of the financial crisis. With an ageing population, in the end restoring growth requires productivity-enhancing structural reforms. Thus far the Italian political system has failed to deliver on this dimension. And with market pressure diminished by the OMT, it remains to be seen whether the promising political and institutional changes being seen in Italy at present will allow more rapid progress to be made.

The impact of moral hazard has a time series as well as a cross-sectional dimension. Spain's substantial efforts in undertaking a necessary but painful restructuring of its economy were prompted by the financial crisis. The question remains as to whether they will be sustained as market pressures diminish, especially given political pressures to ease up dictated by the electoral timetable.

Should there be recidivism on structural reform and fiscal performance –i.e., if moral hazard leads to risk-creating behaviour– the danger exists that fundamentals deteriorate to the point where the 'good' equilibrium supported by central bank liquidity guarantees (such as the OMT) disappears. In that context, the risks implicit in the central bank support become manifest.

The put option nature of the ECB's OMT commitment implies it is taking a highly leveraged bet that this risk-creating bad outcome will be avoided. The success of the OMT will ultimately be determined not on whether it maintains market calm in the coming quarters, but on whether it supports a sustainable and lasting adjustment that avoids this outcome. That is why it remains crucial that the 'breathing space' bought by the OMT is used to build the necessary area-wide governance and institutions that will render the euro area more workable, as well as maintain and deepen the necessary fiscal consolidation, bank deleveraging and economic restructuring required to engineer the conditions for sustainable economic growth in individual euro area countries.

VIII. CONCLUDING REMARKS

The financial crisis has demonstrated the vulnerability of highly levered financial institutions and governments to liquidity and solvency crises. In this context, central banks have an important role to play in stabilising financial markets. Given institutional gaps on the fiscal side in the set-up of monetary union, the role of the ECB may be especially important in the euro area.

Fulfilling this stabilising role entails the assumption of risks. And given the political and practical constraints created by the unique structure of the euro area, these risks may be magnified for the ECB. Risk management –in the broad macroeconomic sense, as well as the narrow financial sense– is therefore crucial.

Initiatives such as the provision of central bank intermediation in the immediate aftermath of Lehman in 2008 or the introduction of the OMT in the face of the sovereign crisis in 2012 certainly entail the assumption of risk by the ECB. To make that assumption politically feasible, in the latter case it has taken an off-balance sheet option-like form. But simply because credit risk in peripheral sovereign debt does not explicitly appear on the central bank balance sheet as a result of QE-like outright purchases does not mean that economically that risk has not been assumed.

The assumption of risk by the ECB does not imply these interventions were misguided. On the contrary, they have been essential to preventing the collapse of the European financial system and the integrity of the euro area – outcomes which clearly both serve the ECB's ultimate objective. Viewed through the lens of risk management, the key issue is whether the trade-off between risk and reward has been favourable.

Coming to a comprehensive judgement on this question takes time. The risk-reducing benefits of central bank interventions have been seen relatively quickly in European financial markets. They have laid the basis for the stabilisation and slow recovery of the European real economy. But the risk-creating costs of such interventions will accumulate over time, should moral hazard influence the underlying fundamental behaviour of banks and governments.

Managing the trade-off between risk-reducing and risk-creating implications of central bank action in a time consistent manner is the central challenge for monetary policy makers.¹¹ We know from an earlier literature that institutional design is central to addressing this challenge. While progress has been made in

¹¹ See Pill and Smets (2013) for a richer discussion of what institutional and strategic structures would serve this purpose.

the euro area on this dimension, much further effort is needed to build trust between the relevant actors, both across constituent countries and between various policy responsibilities.

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ADDRESSING WEAK INFLATION: THE ECB'S SHOPPING LIST

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I. INTRODUCTION¹

There are clear benefits to price stability. High inflation can distort corporate investment decisions and the consumption behaviour of households. Changes to inflation redistribute real wealth and income between different segments of society, such as savers and borrowers, or young and old. Price stability is therefore a fundamental public good and it became a fundamental principle of European Economic and Monetary Union. But the European Treaties do not define price stability. It was left to the Governing Council of the European Central Bank (ECB) to quantify it: "Price stability is defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%".² The Governing Council has also clarified that it aims to maintain inflation below, but close to, two percent over the medium term, though it has not quantified what 'closeness' means, nor has it given a precise definition of the 'medium term'.³ The clarification has been widely interpreted to mean that the actual target of the ECB is close to, but below, two percent inflation in the medium term.

In the current European circumstances, low overall euro area inflation implies that in some euro area member states inflation has to be very low or even negative in order to regain competitiveness relative to the core. The lower the overall inflation rate, the more periphery inflation rates will have to fall in order to achieve the same competitiveness gains. Given that wages are often sticky and rarely decline, significant unemployment increases can result from the adjustment process. In addition, lower-than-anticipated inflation

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² https://www.ecb.europa.eu/mopo/strategy/pricestab/html/index.en.html

³ In an interview, ECB Executive Board member Benoit Coeuré said that the academic definition of 'medium term' is 18 months, but currently "it is only normal that we see inflation coming back more slowly to the medium-term objective": http://www.ecb.europa.eu/press/inter/date/2014/html/sp140116.en.html

undermines the sustainability of public and private debt if the debt contracts are long-term nominal contracts. For governments, falling inflation rates often mean that nominal tax revenues fall, which makes the servicing or repayment of debt more difficult.

Inflation in the euro area has been falling since late 2011 and has been below one percent since October 2013. Core inflation, a measure that excludes volatile energy and food price developments, has developed similarly. Five of the 18 euro area member countries (Cyprus, Greece, Portugal, Slovakia and Spain) are already in deflation. Even in the countries that are not in a recession, such as Belgium, France and Germany, inflation rates are well below the euro area target of close to but below two percent. More worryingly, the ECB's forecast suggests that inflation will not return to close to two percent in the medium term.

Given the need to regain competitiveness, lower-than-target inflation in the euro area periphery can be expected and is even desirable. However, to facilitate adjustment and achieve the overall ECB inflation objective, inflation in the euro area's core countries needs to stabilise and reach levels above two percent. A key question for policymakers is therefore why inflation rates are subdued in core countries despite very accommodative monetary policy conditions and the gradual revival of economic growth. Policymakers must also consider which monetary policies are suitable for increasing aggregate inflation in the euro area, while ensuring that the inflation differential between the core and periphery remains. Finally, unresolved banking-sector problems are making the task of the ECB more difficult.

It is against this background that we discuss monetary policy options to address low inflation in the euro area. Evidently, structural and banking policies, wage-setting mechanisms and fiscal policies also need to play a role in addressing the recession and the low-inflation problem. They are, however, not discussed in this Policy Contribution.

II. HETEROGENEOUS INFLATION DEVELOPMENTS IN THE EURO AREA

Panel A of Figure 1 shows that the euro area headline inflation rate has been moving downwards since late 2011, while Panel B indicates a similar trend for core inflation.⁴ Panels A and B also highlight major differences between euro

⁴ This measure of core inflation can be a proxy for underlying price developments. Core inflation was less volatile than headline inflation and on average between 1999 and 2014, was 0.3 percentage points per year lower than headline inflation, which is a relatively small, though non-negligible, difference.



area countries. Countries in the euro area periphery (which we define as Cyprus, Greece, Ireland, Italy, Spain and Portugal) had higher inflation rates than other euro area counties before the crisis, persisting well into the crisis period. Only since 2013 has inflation in the periphery clearly fallen below that of the euro area as a whole.⁵

Several countries are already experiencing deflation. Cyprus, Greece, Portugal, Slovakia and Spain are in deflation, while the March 2014 inflation rates in the Netherlands (0.1 percent), Ireland (0.3 percent), Italy (0.3 percent) and Latvia (0.2 percent) are rather close to zero when measured by headline inflation. But even in Germany and France inflation has fallen below one percent.

— Is there a risk that the euro area as a whole will fall into outright deflation?

Inflation expectations have been falling since at least mid-2012. Figure 2 presents expectations from two sources (an ECB survey and a market-based indicator) and for two maturities. The two-year-ahead expectations are

⁵ Tax increases are partly responsible for the delayed fall in inflation rates during the crisis: several of the periphery countries increased taxes, there by increasing inflation.

significantly below two percent and even below one percent according to the market-based indicator. In the period relevant for the ECB, inflation expectations have thus become de-anchored from 2 percent. Lack of ECB action when the ECB's own medium-term inflation forecasts fell below the two percent threshold was a signal to markets that probably resulted in the downward revision of longer-term inflation expectations. The ECB is now less effective in anchoring longer-term expectations to, or close to, the 2 percent level.

There are four further reasons suggesting that the ECB should already have adopted additional monetary stimulus:

- (1) The cost of deviations from the current inflation baseline is asymmetric;
- (2) The track record of inflationary forecasts and expectations suggests that significant changes in inflation are often unforeseen;
- (3) The Japanese experience suggests that long-term market expectations can be persistently upward-biased;



Sources: ECB's Survey of Professional Forecasters and Datastream.

(4) Earlier action can prevent being forced into much larger unconventional policy measures later, when inflation falls so much that no other option remains.

First, at a low level of inflation, the costs of deviation from the ECB's forecast inflation are highly asymmetric. If inflation is higher than forecast, it would mean that inflation would be closer to the two percent threshold – a benign development. But if inflation is lower than forecast, then countries in the euro area periphery would have to maintain even lower inflation or higher deflation, with risks for the sustainability of public and private debt.

Second, the ECB's inflation forecasts and market expectations have been unable to predict significant deviations from the two percent threshold (Figure 3). When there was a sizeable deviation, ECB forecasts and market expectations both predicted a gradual return to two percent, which happened in some cases (see, for example, the December 2011 forecast of the ECB), but most of the time did not.

Third, the fact that long-term inflation expectations in the euro area have so far not deviated too much from two percent should not be taken as a guarantee that inflation will return to the two percent level without additional



Note: The HICP is defined as a 12-month average rate of change; in panel A, the ECB Staff projections indicate a range referred to as "the projected average annual percentage changes" (see https://www.ecb.europa.eu/mopo/strategy/ecana/html/table.en.html). For simplicity, we take the average of the given range. In panel B, Market-based expectations refer to overnight inflation swaps (OIS), which can be used as a proxy for future inflation expectations. *Sources*: Datastream. ECB. monetary policy measures. In Japan, long-term inflation expectations remained about one percent on average between 1996 and 2013, though actual inflation was slightly below zero (-0.1 percent, Figure 4). The average forecast error for the 6-10 year inflation forecasts made in Japan between 1996 and 2003 was 1.1 percentage points.⁶

At the same time, price developments in the euro area are still significantly different from Japan during the past two decades. In Japan, about half of the items in the consumption basket fell in price during the period when the average inflation rate was almost zero (Claeys, Hüttl and Merler, 2014). In the euro area there has been an increase in the share of items in the HICP basket that are already in deflation in recent months (to about 20 percent of the entire HICP basket), but this share is not very high (and similar to shares observed in 2005 when the inflation rate was close to two percent in the euro area) and is still significantly lower than in Japan.



Sources: Consensus Economics (2014) (expectations) and IMF (actual inflation).

⁶ We calculated the forecast error as the difference between the inflation forecast made in a certain year minus the average inflation rate from 6 to 10 years later. Therefore, the most recent forecast for which we could calculate the actual forecast error was made in 2003.

Overall, inflation has been falling significantly and so have inflation expectations. Inflation forecasts have proved consistently too optimistic about the return of inflation to the two percent threshold in the euro area and the one percent target in Japan. The ECB's own forecast suggests that euro area inflation will not return to close to two percent in the medium term, and we see a substantial risk that it will not return to this level even in the longer term.

III. HOW TO ADDRESS LOW INFLATION IN A HETEROGENEOUS MONETARY UNION?

1. Key constraints

The ECB's task is complicated by two very special circumstances. First, the euro area is a heterogeneous monetary union in which the process of relative price adjustment between its different parts is ongoing. This adjustment is a consequence of the very substantial past divergence in prices. To better understand the resulting problem for the ECB, it is useful to resort to a simple example of a two-country monetary union. In the monetary union, one region (say periphery) is depressed and runs a zero inflation rate, while the other region (say core) has an inflation rate of one percent, still below the two percent target, even though there is almost full employment. The monetary stimulus should result in aggregate inflation in the monetary union increasing to the two-percent target. However, since there has to be a relative price adjustment between the periphery and the core, the monetary stimulus should ensure that the inflation differential between the two regions remains in place.

The stimulus must therefore increase inflation and activity both in the core and the periphery. The necessary relative price adjustment implies that inflation in the core should increase to above the target, while inflation in the periphery has to stay below it. If the stimulus would not have an impact on the core, but only the periphery, then it would undermine the necessary price-adjustment process.

The second problem for the ECB is that the process of bank balancesheet repair is ongoing. When several banks have vulnerable capital and liquidity positions, a monetary stimulus aimed at increasing bank lending to the private sector is less effective, similar to what happened after the threeyear longer-term refinancing operations (LTRO) in late 2011 and early 2012, when banks increased lending to governments and accumulated reserves at the ECB. In addition, the ECB is dealing with the quality of banks' balance sheets in the context of the asset quality review and stress test. Clearly, fixing the bank-lending channel cannot be done by monetary policy but requires action on the structural weaknesses of banks' balance sheets. A key question is if possible monetary policy measures (like new long-term liquidity provision to banks, asset purchase programmes from banks and/or from other private sector asset holders, or negative ECB deposit rates for banks) would be conducive to increased inflation under current circumstances. An equally important question is whether such a monetary policy measure would remove the incentive to fix the structural problems in the banking system where necessary.

2. Policies to address low inflation in the special euro area setting

Different policies could be deployed to increase inflation and inflationary expectations:

- Reduce the Main Refinancing Operation (MRO) rate to zero percent;
- Negative deposit rates for banks' deposits at the ECB;
- Ending the sterilisation of bond holdings from the Securities Markets Programme (SMP);
- New long-term (eg three years or longer) refinancing operations, possibly made conditional on net lending to the private sector;
- Asset purchases:
 - Purchase of euro area or European debt (debts of various European rescue funds and the European Investment Bank);
 - Purchase of sovereign debt of euro area member states;
 - Purchase of non-sovereign debt such as the debt of nonfinancial corporations, asset backed securities (ABS) or debt of financial institutions;
 - Foreign exchange intervention: purchase of foreign assets, such as non-euro area sovereign debt or corporate debt. Given the G7 statement of February 2013 by central bank governors and finance ministers reaffirming the "longstanding commitment to market determined exchange rates and to consult closely in regard to actions

in foreign exchange markets," this policy measure is not discussed further. 7

— Reducing ECB interest rates

The current 0.25 percent ECB main refinancing rate could be marginally reduced, but the impact of such a small reduction is unlikely to significantly change inflation expectations. In addition, the ECB could reduce the deposit rate, which banks receive when depositing liquidity at the ECB, from zero currently to negative territory. Since currently banks can hold excess reserves on their current account at the ECB at zero interest, a negative deposit rate should be accompanied by the same negative interest rate on excess reserves, to avoid the shifting of all deposits to excess reserves (Figure 5 shows that banks shifted half of their deposit rate would mean that banks pay interest for placing a deposit at the central bank. This would reduce the incentive for banks to hold deposits and excess reserves at the central bank and should therefore promote



⁷ http://www.bankofengland.co.uk/publications/Pages/news/2013/027.aspx
other uses by the banks of liquidity, such as greater lending to the rest of the economy. However, the sum of banks' deposits and their excess reserves at the ECB is declining fast (Figure 5), and with the normalisation of money markets they may return to their pre-crisis close-to-zero values. This implies that the direct impact of a negative deposit rate, in terms of changing the incentives to hold deposits and excess reserves, would be minimal.

It is difficult to assess the quantitative impact of a negative deposit rate on credit and inflation, but the example of Denmark does not suggest strong effects. In July 2012, the Danish central bank reduced its deposit rate for banks to -0.2 percent and kept a negative rate until the 24 April 2014. The main motivation for the negative deposit rate was to discourage the inflow of capital into Denmark, because with the intensification of the euro crisis, investors searched for safe assets. The most direct effects were the reduction of Danish treasury-bill yields below zero and a depreciation of the Danish Krona against the euro by about half a percent from 7.43 to 7.46. This change was quite sizeable for Denmark, where the euro exchange rate is kept very stable. A negative ECB deposit rate may lower treasury-bill yields especially of core euro area countries and weaken the exchange rate of the euro, which would increase inflation.

Some commentators (eg Papadia, 2013) have argued that banks would in fact increase loan interest rates in order to compensate for the loss from their deposits at the ECB. However, the Danish experience also showed that a negative deposit rate does not necessarily have any impact on banks' loan rates to their clients. Another concern is the impact of negative deposit rates on money-market activity. The ECB's decision to cut the deposit rate to zero has already led to the closure of various money-market funds and could drain liquidity in the money markets.⁸ In Denmark, however, money-market volumes decreased only slightly after the introduction of the negative central bank deposit rate. Investors exiting money-market funds would need to find other investments, pushing liquidity to markets with characteristics similar to money markets.

— Stopping the sterilisation of SMP holdings

Another possible measure would be stopping the sterilisation of the ECB's Securities Market Programme (SMP) holdings. Under the SMP, the ECB bought about €220 billion of Greek, Irish, Portuguese, Italian and Spanish government bonds. At present, there are €175.5 billion of SMP bonds left, the maturities

⁸ http://www.bloomberg.com/news/2012-07-06/jpmorgan-shuts-europe-money-market-funds-on-ecb-ratecut.html

of which are not publicly disclosed by the ECB. The bonds are held to maturity and the purchases are entirely sterilised. Stopping their sterilisation would inject €175.5 billion into euro area money markets.

However, the SMP was launched to address the malfunctioning of securities markets and restore an appropriate monetary policy transmission mechanism, while not affecting the stance of monetary policy.⁹ A key feature of the programme was sterilisation. Falling short of that commitment and changing the objective at this point would be problematic, because it might undermine trust in the ECB's other commitments. Importantly, the Outright Monetary Transaction (OMT) programme is also designed to be sterilised.¹⁰ In the ongoing judicial discussions on the OMT,¹¹ stopping the sterilisation of SMP holdings would give a powerful argument to the plaintiffs, who could say that the ECB's OMT commitments are unreliable.

- New long-term (eg three years or longer) refinancing operations

In normal times, central banks do not engage in long-term liquidity operations. One reason for this is moral hazard: long-term central bank financing at rates below what banks could get from the market might encourage excessive risk taking and keep insolvent banks alive. However, when the interbank market became dysfunctional during the crisis, several countries in the euro area periphery underwent a sudden stop in external financing. To address the problem, the ECB provided ample liquidity. The maturity of the ECB's liquidity operations were then extended from three months to six and twelve months. In December 2011 and in February 2012 the ECB also conducted two extraordinary Longer Term Refinancing Operations (LTROs) with maturities of three years, from which banks in the euro area borrowed almost €1 trillion.

The ECB also introduced a policy of 'full allotment' for all ECB liquidity operations. Under this procedure, the control of central bank liquidity is effectively moved from the central bank to the banking system, because banks can access all the central bank liquidity they need at a variable rate (if they provide sufficient eligible collateral).

These operations, along with the revised collateral policy (expanding and changing assets' eligibility requirements in order to mitigate possible constraints

⁹ http://www.ecb.europa.eu/press/pr/date/2010/html/pr100510.en.html

¹⁰ http://www.ecb.europa.eu/press/pr/date/2012/html/pr120906_1.en.html.

¹¹ See for instance in Wolff (2013).

arising from collateral shortage) allowed liquidity-strained banks to refinance a large portion of their balance sheets through central bank lending, available at a low interest rate and long-term maturity. In a heavily bank-based system, such as the euro area, these measures were essential to avoid a financial and economic meltdown.¹²

However, these operations did little to trigger additional lending to the private sector (even though they may have helped to prevent a collapse of existing lending). To a great extent, banks either deposited the cheap central bank funding at the ECB for rainy days, or purchased higher yielding government bonds. Thereby, the LTROs in effect supported liquidity, ensured stable long-term (three-year) financing of banks, subsidised the banking system and helped to restore its profitability, and temporarily supported distressed government bond markets. Considering the alternative of a potentially escalating financial crisis, these developments were beneficial. However, the LTROs might have delayed bank restructuring and prolonged the existence of non-viable banks.

For two main reasons, the current situation is very different from the situation when the two three-year LTROs were adopted.

First, one reason for the failure of the 2011-12 LTROs to foster lending was the weak balance sheet of the banks and uncertainty about the integrity of the euro area. With the ECB's Comprehensive Assessment, the structural weaknesses of the banking sector are gradually being mended. In addition, speculation about the break-up of the euro area has become less relevant. Therefore, a new LTRO might be more effective, in particular if ECB financing is made conditional on banks increasing their net lending to the non-financial private sector economy (similar to the Bank of England's Funding for Lending Scheme; see Darvas, 2013; Wolff 2013). Such conditions, by definition, would exclude the use by banks of ECB liquidity to purchase government bonds. With collateralised lending to banks, the ECB exposure to credit risk is minimal. In addition, the central bank would not replace the banking system in supplying and allocating credit to the non-financial private sector. A new LTRO could therefore be a good option to foster credit growth.

Second, the current situation is different because there is no longer a liquidity crisis. In fact, some banks are repaying their loans from the ECB early (Figure 6), even though they have to replace that funding at a higher cost from

¹² Another crucial ECB measure during the crisis was Emergency Liquidity Assistance (ELA), an emergency liquidity line provided by national central banks (under the consent of the ECB's Governing Council) to solvent banks that exceptionally and temporarily do not have enough (or sufficiently high quality collateral) to access normal Eurosystem operations.



other sources. The take-up of LTRO liquidity might therefore be limited and the programme could be ineffective in triggering lending and inflation.

IV. ASSET PURCHASES

For any central bank, asset purchases always involve difficult choices about what and how much to buy. The central bank becomes an important buyer in financial markets and therefore can be subject to pressure from politicians and companies. This is a powerful argument for central banks to act early in order to avoid a low-inflation trap, in which standard monetary policy measures become less effective. The longer an asset-purchase programme is delayed in a situation in which inflation is already very low, the greater the risk that an even larger purchase programme will ultimately be needed.

In response to the global financial and economic crisis and its, the Federal Reserve, Bank of England and Bank of Japan engaged in large-scale asset purchase programmes, or quantitative easing (QE).¹³ From the beginning of

¹³ The expression credit easing is also used when non-government securities are purchased.

2009 to March 2014, the Federal Reserve purchased \$1.9 trillion (11.9 percent of US GDP) of US long-term Treasury bonds and \$1.6 trillion (9.6 percent of US GDP) of mortgage-backed securities. Between January 2009 and November 2012, the Bank of England purchased £375 billion (24 percent of GDP) of mostly medium- and long-term government bonds. The Bank of Japan started a new round of asset purchases in March 2013 and plans to buy per year 50 trillion yen of government bonds (10.4 percent of 2013 GDP), 1 trillion yen of exchange-traded funds (0.2 percent of GDP) and 50 billion yen of Japanese real estate investment trusts (0.01 percent of GDP), in order to double the country's monetary base in two years. In addition to such asset purchases, these central banks also implemented programmes to support liquidity in various markets. The ECB has made few asset purchases so far but reacted to the crisis by providing liquidity to the banking system. The size of the balance sheets of the central banks therefore increased for different reasons (Figure 7).

Asset purchases can be used if interest rates reach the zero lower bound and refinancing operations are ineffective, as discussed above. There are a number of channels through which asset purchases can influence monetary conditions and thereby economic activity and prices:



Money multiplier: if the money multiplier (the ratio of broad monetary aggregates to the monetary base) is stable, then the asset-purchase-

induced increase in the monetary base will increase monetary aggregates, through more credit to non-financial corporations and households, which can boost demand.

- Altering yields: purchase by the central bank of a particular asset will reduce the net supply of that asset to the private sector and increase its price and thereby reduce the return that it yields.
- Portfolio rebalancing: Unless the purchased asset is a very close substitute for cash (such as short-term treasury bills), investors who sold the asset will search for other investment opportunities, pushing up prices and reducing yields in other markets too.
- Exchange rate: via portfolio rebalancing, previous asset holders could invest in assets denominated in other currencies and thereby depreciate the home currency. This in turn might increase import prices and thereby inflation, but could also boost export production and thereby economic activity.
- Wealth effect: the increase in asset prices can lead to a wealth effect for the asset holders, which can also increase consumption or investment.¹⁴
- Signalling: asset purchases by the central bank when the zero lower bound on interest rates is reached could signal to market participants that the central bank is serious about further easing monetary conditions. This can have an impact on inflation expectations and the expected future path of policy rates, which would lead to a reduction in real interest rates today.

1. How would these channels work in the euro area, and in particular, in core and periphery countries?

The experience of the past few years in countries that have implemented asset purchases is that the money multiplier is unstable and fell significantly in parallel to the expansion of the monetary base. Figure 8 shows that the in the US and the UK, M3 kept growing at about the same rate even when the monetary base doubled, thus halving the money multiplier. Most likely the money multiplier would be similarly unstable in the euro area after asset purchases, so the money multiplier channel would not be effective.

¹⁴ The potential impact of QE on wealth inequality has recently been in the spotlight, see the Bank of England (2012).



The ECB's balance sheet increased by 112 percent between September 2008 and June 2012, and has decreased by 30 percent since then primarily because of the repayment by banks of the LTROs. The decline in the balance sheet as such is not an indication of tighter monetary conditions, but rather reflects the fact that liquidity conditions in the inter-bank market have normalised.

The lowering of nominal yields is unlikely to be a powerful channel in the core, while it might have a somewhat greater impact in the periphery. In core euro area countries, both government bond yields and private-sector borrowing costs are currently very low. The yield on the 10-year German bund is about 1.5 percent per year, but even in Italy and Spain 10-year yields are about 3.1 percent, close to yields of the US government. In terms of corporate lending rates, nominal private sector borrowing rates are lower in the euro area core than in the UK and just slightly higher than in the US – these two countries that have already implemented large-scale asset purchases (Panel A of Figure 9). Since inflation is also expected to be lower in the euro area core than in the US, real lending rates are slightly higher in the euro area than in the US, but still well below their pre-crisis values. Therefore, lowering real yields by shifting inflation expectations could be somewhat more effective in the core, but the decline in real rates is likely to be limited.

For the periphery, nominal lending rates to non-financial corporations are higher than in the core, and because of even lower inflation expectations than



Sources: Bruegel calculations based on ECB (lending rates in EU countries), IMF (inflation forecasts) and St. Louis FRED (US nominal interest rates).

in the core, real interest rates are significantly higher. To what extent the yield differential between the lending rates in core and periphery countries reflects financial fragmentation and greater credit risk in the periphery remains an open question. At the height of the euro crisis in the Summer of 2012, both factors likely played major roles. Since then, fragmentation within the euro area has eased. To the extent that financial fragmentation, such as asset purchases impacting either directly or indirectly the borrowing costs of non-financial corporations, are justified. At the same time, asset purchases can have an indirect impact on credit risk via improved economic conditions.

A major question is the importance of changes to real interest rates for the ongoing relative price adjustment between the euro area core and periphery.

Taylor (1999) estimated the semi-elasticity of consumption and investment with respect to the real interest rate in G7 countries. He found that interest sensitivity was significantly higher in France and Germany than in Italy. Therefore, the same decline in real interest rates (either because of an increase in inflationary expectations or a lower nominal yield) would be more expansionary in core countries than in Italy (and probably in other periphery countries too). As we have argued, the scope for a decline in real rates is less in the core than in the periphery. Therefore, cutting real rates to the private sector could be broadly neutral for the ongoing relative price adjustment within the euro area, because in the core, limited scope for reduction is accompanied by large interest rate sensitivity, while in the periphery, greater scope for reduction is accompanied by small interest rate sensitivity.

Portfolio rebalancing would probably work both in the core and the periphery. For example, investors holding long-term German government bonds probably have a preference for safe long-term assets. If the net supply of such assets to the private sector declines, previous asset owners would most likely search for other fixed-income instruments with similar characteristics, such as bonds of major banks or non-financial corporations headquartered in Germany or other core countries. Such a rebalancing would favour the financing of these corporations, which might have an impact on their investment decisions, in particular for companies that finance investment through credit.

A weaker euro exchange rate could directly help to lift inflation because of its impact on import prices. The exchange-rate effect through exports would likely favour both the core and periphery, but would have different impacts. Since core countries with large trade surpluses have bigger tradable sectors, their export performances would likely be boosted more than the exports of periphery countries. Since labour markets are tighter in core countries, an export expansion would more likely translate into wage increases, while this is less likely to happen in the periphery because of high unemployment rates. A weaker euro exchange rate could thus help maintain the inflation differential between the core and periphery. However, we also acknowledge that a weaker exchange rate would mean that the euro area's current account surplus would increase further. It would mean a sort of beggar-thy-neighbour policy, yet the mandate of the ECB is to maintain price stability in the euro area and not to safeguard global imbalances, which have many other causes.

Finally, asset purchases could also have a 'signalling' impact on financing conditions in the euro area. Buying assets would show the determination to act, which would affect inflation expectations and the anticipated path of policy rates. How this would work in different countries is uncertain.

2. Size of the asset purchase programme

Working out the appropriate size of asset purchases is far from easy. Some analysis considered the total amount of asset purchases by the Bank of England and the Fed and suggested similar magnitudes for the euro area (20 to 25 percent of GDP, ie ≤ 1.9 trillion to ≤ 2.4 trillion). In our view, that is an inadequate benchmark, because a large share of asset purchases by the Fed and Bank of England were crisis-response measures, and the assets were accumulated over five years. The ECB dealt with the crisis in a different way (using liquidity operations) and the situation in the euro area is very different now.

A more relevant benchmark could be the amount purchased by the Federal Reserve in its third round of quantitative easing (QE3). This round of QE was announced in light of the weak economic situation of the US economy at a time when the acute phase of the financial crisis was over – a situation that is similar to the current euro area situation. In September 2012, the Fed announced it would purchase \$40 billion (€29 billion) of agency mortgage-backed securities per month, increased to \$85 billion (€61 billion) in December 2012 (by adding \$45 billion per month of Treasuries). Given that the euro area's economy is about 30 percent smaller than the US economy, the same size, as a share of GDP, would be between €20 and €40bn per month in the euro area.

The ideal way to select the size of asset purchases in the euro area would be through assessing its expected impact on inflation. However, it is rather difficult to measure this impact even in the US and the UK, where large-scale asset purchases have been conducted, and it even more difficult to assess in the euro area.

Joyce *et al.* (2012), Gagnon *et al.* (2011) and Meier (2009) argued that asset purchase programmes have had a strong direct effect by reducing long-term government bond yields by about 50-100 basis points in the UK and US. Hancock and Passmore (2011) and Krishnamurthy and Vissing-Jorgensen (2013) reported similar findings for the Fed's mortgage-backed security (MBS) purchase programme in the US.

Conclusions on the impact on GDP and inflation differ in magnitude, though all research papers report positive impacts. For the US for instance, Chung *et al.* (2012) estimated that the combination of QE1 and QE2 raised the level of real GDP by three percent and inflation by one percent (an impact equivalent to a cut in the federal funds rate of around 300 basis points). Chen *et al.* (2012) found that QE2 increased GDP growth by 0.4 percent, but had a minimal impact on inflation (equivalent to an effect of a 50-basis point cut in the federal funds rate). In a recent paper Weale and Wieladek (2014) estimated

that asset purchases equivalent to one percent of GDP led, respectively in the US and the UK, to a 0.36 and 0.18 percentage-point increase in real GDP and to a 0.38 and 0.3 percentage-point increase in CPI after five to eight quarters.

The share of capital markets is smaller in the euro area than in the US and the UK, the health of euro area banks has not been restored and nominal interest rates are rather low in core euro area countries. It is therefore difficult to estimate the impact of asset purchases on inflation in the euro area, but most likely the effects are different from those in the US and UK. Assuming a 0.20 percentage point inflation effect of a one percent of GDP asset purchase in the euro area, a yearly asset purchase of about four percent of euro area GDP ($\sim \notin 400$ billion) would lead to an inflation increase of approximately 0.8 percentage points after 18 months. Since core inflation in the euro area is about 1.0 percent now, such an increase would move it close to two percent. Since we do not know the exact size of the impact, we propose to commence with €35 billion of asset purchases per month, which would be close (as a share of GDP) to the \$85 billion per month purchase of the Fed under OE3. Starting with a much lower volume could be seen as too timid to have a substantial effect. Due to the uncertainty in the transmission, we propose that the size of the purchases should be reviewed after three months. The relevant criteria for the review should be the impact on actual (headline and core) inflation as well as on inflation expectations. Tapering should start only once inflation and inflation expectations have increased substantially.

3. Design principles for an asset-purchase programme

How could an ECB asset-purchase programme be designed and what would the purchase of different assets mean for monetary conditions in the periphery and the core, given the potentially different quality of bank balance sheets? What are the limits of the different instruments? In our view, the ECB will have to choose which assets to buy using five main criteria.

- First, the ECB should buy assets that will be most effective in terms of influencing inflation, through the channels we have described.
- Second, there should be sufficient volumes of assets available, to ensure that the ECB can purchase enough while not buying up whole markets.
- Third, the ECB should try to minimise the impact on the private-sector financing process. While QE by definition changes relative prices, the ECB should avoid buying in small markets in which its purchases would

distort market pricing too much. The more the ECB becomes a player in a market, the more it can be subject to political and private sector pressures when it wants to reverse the purchases.

- Fourth, the ECB should buy only on the secondary markets in order to allow the portfolio-rebalancing channel to work effectively. Purchasing on the primary market would imply the direct financing of entities, which should be avoided.
- Fifth, the assets should only originate from the euro area and be denominated in euros, because of the 2013 G7 agreement noted in section III.2.

In principle, the ECB could decide to buy any asset, except government securities on the primary market, which is clearly ruled out by the Treaty. In practice, the ECB's task will be more complex than it has been for the Fed, the Bank of England and the Bank of Japan given the peculiarities of the euro area:

- (a) Bank lending is much more important than in the UK and the US;
- (b) There is no euro area wide sovereign asset (beyond the limited amounts of securities issued by the European Financial Stability Facility (EFSF) and European Stability Mechanism (ESM) and the EU-wide bonds of the European Investment Bank and European Commission); instead, each member state issues sovereign debt and there are major differences in public debt levels (and thereby in their perceived sustainability) in different member states;
- (c) The outstanding stock of privately-issued debt securities is smaller (relative to GDP) than in the US and the UK, and the roles of privately-issued debt securities vary widely in different euro area member states.

4. Should there be a credit rating requirement for the assets to be purchased?

An important question is to what degree the ECB should care about risk. A number of points need to be considered:

The risks in purchasing asset are fundamentally different from the risks inherent in collateralised central-bank lending. In the latter case, the risk to the ECB is well contained by the high haircuts applied and the fact that the bank is the counterparty, which remains liable for repayment even if there is a default on the collateral. In the case of a purchase, the haircut to the face value is determined by the markets and the risk is taken directly onto the ECB's balance sheet.

- The ECB would take on board significant risk via asset purchases under three circumstances: (a) systemic risk, ie risk when all asset classes are highly correlated, (b) when the purchased portfolio is not diversified enough and concentrated on a few assets in large volumes, and (c) when market prices are distorted and therefore do not reflect well the riskiness of assets.
 - Systemic risk: it is the role of a central bank to address systemic risk and the ECB would in any case be heavily exposed to it also via normal central bank operations.
 - Diversification: given the quantities that would be bought under an asset purchase programme and assuming a proper diversification of risk, the ECB could make a profit on its portfolio if it buys assets at non-distorted prices. Buying many high-risk assets is therefore not problematic as such, because high returns would on average compensate for defaulting assets.
 - Distorted market pricing: market prices can be distorted because of market failures (eg the pricing of US subprime securities before the crisis) or because of central bank intervention in markets. To reduce the magnitude of the latter, it is imperative that the ECB does not buy up whole markets, but limits its purchase in each market to a small share. The less the ECB buys in any given market, the less risk it will take on board because the market distortion would be kept to a minimum. If market-pricing mechanisms are fundamentally wrong or if the ECB's purchases (including the anticipation of such purchases) materially changes the market pricing of the asset, only then would the ECB risk significant losses.
- The Treaty gives a mandate to the ECB to maintain price stability, not to protect its balance sheet.

Given these considerations, we recommend a reasonably low threshold for credit risk, but suggest that some criteria on riskiness should be adopted, because the ECB should not turn itself into a high-risk investment fund. Restricting asset purchases only to the eligible collateral (without any additional eligibility criterion) is an appropriate threshold and therefore this is our recommendation.¹⁵ The pool of eligible collateral has also the great advantage that the ECB already has a well-defined list of eligible assets and therefore the use of this list would limit lobbying activities for what the ECB should buy. It is important to highlight that our suggestion differs from the ECB's revealed preference, because during the 2009-12 Covered Bond Purchase Programmes (CBPPs), the only previous examples of ECB unsterilised asset purchases, the criteria for purchases was the eligibility of the assets as collateral for refinancing operations with the ECB and a minimum rating of AA or equivalent, awarded by at least one of the major rating agencies.¹⁶

5. The pool of eligible assets

According to the ECB, total marketable assets eligible as collateral represented almost €14 trillion at the end of 2013, equivalent to 146 percent of euro area GDP.¹⁷ Figure 10 shows that about half of the Eurosystem's eligible collateral pool at the end of 2013 comprised government bonds, with €6.37 trillion of central government securities and €0.42 trillion of regional government securities. The other half was split between uncovered bank bonds (€2.28 trillion), covered bank bonds (€1.53 trillion), corporate bonds (€1.46 trillion), asset-backed securities (€0.76 trillion) and other marketable assets (€1.17 trillion). Other marketable assets include European debt (the debts of EU rescue funds and the European Investment Bank). On top of those marketable assets, the ECB also accepts as collateral non-marketable assets, mostly credit claims.¹⁸ Being non-marketable, such assets cannot be within the scope of an asset-purchase programme, unless they are securitised.

Part of the eligible collateral has already been pledged in the context of the ECB's refinancing operations and is therefore not available for purchase for the moment (Figure 10). With the repayment of the three-year LTRO, at the latest on its terminal date of February 2015, a considerable part of the currently-used collateral pool will be freed. It is difficult to compare the size of the total eligible assets to the pool of assets already used as collateral, because the former is available in nominal terms whereas the latter is only available in net terms, ie taking into account the haircut applied by the ECB.

¹⁵ The minimum grade for marketable assets to be eligible as collateral for main ECB operations is BBB- but ABS under standard framework require AAA/Aaa rating at issuance and single A- rating during the life of the security http://www.ecb.europa.eu/pub/pdf/other/collateralframeworksen.pdf

¹⁶ http://www.ecb.europa.eu/ecb/legal/pdf/l_17520090704en00180019.pdf??d74bb43a6071db357e77cc2 439415ebe

¹⁷ In the permanent collateral framework, only euro-denominated securities are accepted, but under the temporary collateral framework introduced during the crisis, also assets denominated in USD, JPY ad GBP are accepted. For further details see: http://www.ecb.europa.eu/pub/pdf/other/collateralframeworksen.pdf

¹⁸ http://www.ecb.europa.eu/pub/pdf/scpops/ecbocp148.pdf



6. What to buy? A shopping list for the ECB

—European debt

A natural starting point for an ECB asset-purchase programme would be euro area wide government bonds, which do not exist. The closest existing asset, which could be bought without creating too many distortions, would be bonds issued by the EFSF and the ESM. The bonds of the European Union (issued by the European Commission) and the European Investment Bank (EIB) represent EU-wide supranational assets, but since the ECB is an EU institution, it could also consider EU assets. The total available euro-denominated pool of these bonds is around €490 billion (€230 billion for EFSF/ESM, €60 billion for EU, €200 billion for EIB).

Buying such pan-European assets would not affect the relative yields of euro area sovereign debts and would not distort the market-allocation process within the private sector, which would be advantages. While the transmission channel through lower yields may be weak, other channels (portfolio rebalancing, exchange rate, wealth and signalling) would probably work well. We therefore recommend that the ECB buys from this pool of assets.

— Government bonds

National sovereign debt offers the largest pool for ECB purchases. The portfolio rebalancing effect would work well, as would the exchange rate, wealth and signalling channels. The purchases would not distort the market allocation process within the private sector. In principle, the case for a government bond purchase programme is therefore strong. However, the purchase of national government debt would be more complicated for the ECB as a supranational institution without a supranational euro area treasury as counterparty, than it was for the Fed or the Bank of England. Several relevant issues should therefore be discussed carefully to decide if government debt should be purchased by the ECB.

The first issue is practical. Since there are 18 different sovereign debt markets, the ECB would have to decide which sovereign debt to buy. A proposal often made is to purchase government debt based on the share of each national central bank in ECB capital (which reflects the size of the countries in terms of GDP and population). However, to the extent that debt-to-GDP ratios are different and the demand for sovereign debt is different in different countries, the ECB purchase would alter the spreads between countries and change the relative price of sovereign debt. Even though probably all ECB measures have different implications for different euro area members (eg the SMP directly benefitted only five governments, the three-year LTROs were primary used by euro area periphery banks), influencing relative yields may expose the ECB to political pressure by individual countries to increase or decrease the speed of purchases or change its portfolio. It could also lead to moral hazard as market pressure for reforms would be altered.

Second, the Treaty on the Functioning of the European Union prohibits extension of any kind of ECB credit facility to public bodies, or the purchase of government securities on the primary markets by the ECB (the same applies to national central banks). This treaty provision was agreed in order to avoid the monetary financing of government debt that could result in cross-border transfers between taxpayers. Therefore, a purchase of government debt is allowed in the secondary bond markets only if it is done for monetary policy purposes and without the risk that it would lead to the financing of government debt. Since the goal of asset purchase will be to meet the ECB's primary objective of price stability, purchase of government bonds would be allowed if the risk of monetary financing could be excluded.

Third, the ECB has a well-defined sovereign bond purchase programme, the OMT programme, which we support (Darvas, 2012; Wolff, 2013). The basic idea of the OMT programme is to give the ECB a tool to buy government bonds in order to improve monetary policy transmission in countries under financial assistance. It is debatable whether a QE programme based on ECB capital keys would undermine the logic of the OMT programme. However, we note that a purchase based on capital keys would lead to small purchases relative to what an OMT programme would require. For example, buying €17.5 billion of EU sovereign debt (one-half of our proposed €35 billion purchases) based on capital keys, would imply that the ECB buys €3.1 billion Italian debt per month. Conditionality as required by the OMT programme may therefore be less relevant in a QE programme. If a country was under an OMT programme, its bonds could be excluded from the broader QE programme. On the other hand, buying government debt of countries with uncertain debt dynamics without the political OMT agreement could expose the ECB to greater political pressures when it wants to exit.

Fourth, experience shows that an ECB government-bond purchase programme would be politically controversial. So far, the ECB has had two government-bond purchasing programmes (SMP and OMT). Both were introduced under severe stress and both were motivated by the goal of restoring the monetary transmission mechanism. Both programmes were and are highly controversial, not least because of different assessments of to what extent they constitute monetary financing of government debt.

Overall, government-bond purchases would be a natural step because the bond market is very large and the positive effects of such a QE would be significant. However, in a monetary union with 18 different treasuries, such purchases are difficult for the economic, political and legal reasons we have outlined. Purchases of private sector assets –if well designed– would achieve similarly beneficial effects on euro area inflation and would protect the ECB better from political pressure. We therefore do not recommend the purchase of government bonds at this stage.

— Bank bonds

The second largest asset class is bank bonds, with €3.8 trillion available in eligible covered and uncovered bonds. Purchasing bank bonds could have an effect through all the major channels we discussed: portfolio-rebalancing, lowering yields, exchange rate, wealth and signalling. In particular, the previous holders of those bonds would have to find other assets to buy, while the reduction in market yields would also reduce the yields on newly issued bank bonds, thereby allowing banks to obtain non-ECB financing at a lower cost. This would improve bank profitability and may improve the willingness of banks to lend. However, bank bonds should be excluded from the ECB asset-purchase programme until the ECB's Comprehensive Assessment is concluded. Until then, any ECB purchases would lead to serious conflicts of interest at the ECB and would make a proper assessment by the ECB more difficult. Moreover, those banks for which the outcome of the Assessment will be unsatisfactory should continue to be excluded from the ECB's asset purchases until they have implemented all the required changes in their balance sheets. This might take several months after the completion of the Comprehensive Assessment.

— Corporate bonds

Eligible corporate bonds comprise the third largest asset class with almost €1.5 trillion outstanding. However, this amount also includes non-euro area corporate bonds and euro area bonds issued in other currencies. European corporate bonds are behaving well in terms of default: Moody's default report for February 2014 –which included a prediction of the forward trend for defaulters– shows that the baseline expectation is on a downward path towards levels rarely seen since 2008, for Europe and globally, and that the pessimistic forecast is also less severe than it was in 2013.

While there is no precise data on their magnitude, we estimate that the lower bound of eligible euro area corporate bonds would be €900 billion. In addition, the supply of corporate bonds in the euro area has grown considerably since 2009 (Figure 11).



Figure 12 shows the heterogeneity of corporate bond markets in the euro area. The euro area corporate bond market is highly concentrated. The main issuers of corporate bonds are French companies, whose bonds make up 44 percent of the total outstanding (ie \leq 466 billion). German and Italian corporate bonds follow at significant distance with each about 12 percent (or around €126 billion) of the outstanding corporate bonds. The Netherlands comes fourth with 9.6 percent of the outstanding (€107 billion). But thanks to the portfolio rebalancing effect, the origin of the corporate bonds is of less importance. The beneficial effect would come from the fact that the current owners of the corporate bonds would sell their bonds and use the cash for different purposes throughout the euro area. The origin of the bond says little about the owners of bonds, which are in some cases US funds. In any case, the ECB should not choose its purchases according to geographic origin, similar to the way it implemented the LTRO/MRO, which led to large amounts of liquidity going to some countries only. In addition, the purchases would encourage new issuance of corporate bonds everywhere and lead to a diversification of the sources of funding (Sapir and Wolff 2013). Lower funding costs for corporations should induce more corporate investment.



shown on Figure 10 comes from the fact that here we only consider corporate bonds issued by euro zone corporations, whereas eligible collateral include corporate bonds issued in the whole European Economic Area (EU countries and Iceland, Liechtenstein and Norway); see https://www.ecb.europa.eu/ paym/coll/standards/marketable/html/index.en.html *Source*: ECB. - Asset-backed securities

Another class of assets that could be bought by the ECB is asset-backed securities (ABS). Yearly EU securitisation issuance – which peaked in 2008 – is much lower than in the US and has been decreasing since 2008 (Figure 13).

The total outstanding stock of securitised products has been stagnating at around €1.06 trillion for the euro area compared to €2.5 trillion in the US (AFME, 2014). Products eligible as collateral for the ECB amount to about €761 billion, but some of them originate from outside the euro area. We estimate that the lower bound of eligible euro area ABS would be €330 billion.

It is worth highlighting that defaults on ABS in Europe have ranged between 0.6-1.5 percent on average, against 9.3-18.4 percent for US securitisations since the start of the 2007-08 financial crisis.¹⁹ The regulatory landscape for



¹⁹ http://www.bis.org/review/r140407a.htm, S&P reports that cumulative downgrade rate in the period between mid-2007 and end of Q3 2013 was 33.8%, meaning that the S&P ratings on two-thirds of European structured finance notes have either been stable or have risen since mid-2007. S&P also points out that default trends vary substantially across asset classes, with consumer transactions (i.e. RMBS, covered bonds and consumer ABS) generally outperforming corporate transactions (i.e. corporate securitisation, CMBS and other ABS).

securitised products has also changed considerably since the crisis and made the products safer and more transparent.²⁰

Considering the total amount of European ABS, more than half (€612 billion) is based on residential mortgages (see Table 1 below), which were

TABLE 1							
SECURITISATION IN EUROPE, OUTSTANDING STOCK IN 2013Q4 (${ m {\ensuremath{ \in}}}$ BNS)							
	ABS	CDO	CMBS	RMBS	SME	WBS	TOTAL
Austria	0.3		0.2	1.8			2.3
Belgium	0.1		0.2	63.3	17.8		81.4
Finland	0.6					0.5	1.1
France	22.6		2.0	10.2	1.9	0.5	37.3
Germany	35.8	2.2	10.6	15.3	5.9	0.1	69.9
Greece	14.3	1.8		4.3	7.2		27.6
Ireland	0.3	0.2	0.4	37.6			38.5
Italy	50.5	3.5	10.1	85.6	28.2	0.9	178,9
Netherlands	2.3	0.9	2.5	249.7	8.0		263.5
Portugal	4.2			26.2	5.3		35.7
Spain	27.0	0.5	0.4	118.0	37.7	0.0	183.6
PanEurope ¹	2.0	33.9	13.0	0.2	3.2	0.2	52.4
Multinational ²	0.9	81.1	1.8		0.4	0.8	84.9
Selected Euro area Total	160.9	123.9	41.2	612.3	115.8	3.0	1,057.2

Notes: All volumes in Euro. ABS: asset-backed securities for which collateral types include auto loans, credit cards, loans (consumer and student loans) and other. CDO: Collateralised Debt Obligations denominated in a European currency, regardless of country of collateral. CMBS: Commercial Mortgage Backed Securities. RMBS: Residential Mortgage Backed Securities. SME: Securities backed by Small- and Medium- sized Enterprises. WBS: Whole Business Securitisation: a securitisation in which the cash flows derive from the whole operating revenues generated by an entire business or segmented part of a larger business.

¹ Collateral from multiple European countries is categorised under 'PanEurope' unless collateral is predo minantly (over 90 percent) from one country.

² Multinational includes all deals in which assets originate from a variety of jurisdictions. This includes the majority of euro-denominated CDOs.

Source: AMFE (2014).

²⁰ Retention requirements – which should induce seller of ABS to monitor carefully the underlying collateral – have been introduced in the context of the EU Capital Requirements Directive, and the EBA is working on the technical details (i.e. 5% retention requirement) https://www.eba.europa.eu/-/eba-publishes-finaldraft-technical-standards-on-securitisation-retention-rules among the best performing category of securitised products (S&P, 2013) and would therefore be a natural target for ECB asset purchases. SME ABS constitute a smaller part (€116 billion). The ABS stock outstanding is unequally distributed across countries, with the main issuers being different from the main issuers of corporate bonds. ABS purchases would be concentrated on the Netherlands, Spain and Italy, and could therefore be a good geographical complement to corporate-bond purchases, which would be concentrated in France, Germany and Italy.

An ECB purchase could promote the development of securitisation in the euro area. The potential for securitisation is relevant, because many loans would qualify for securitisation. In March 2014, the outstanding amount of loans in the EU to non-financial corporations stood at €4.2 trillion, and to households at €5.2 trillion.²¹ From a monetary policy perspective, it would be very beneficial to create ABS that are based on a portfolio of European assets. Ideally, the credit risk should be pooled at the level of the private sector, thereby deepening cross-border financial integration. However, the ECB should not wait for developments in the ABS market before it starts buying securitised products.

V. CONCLUSIONS

Low inflation in the euro area is particularly dangerous, given high private and public debt levels in several euro area countries and the need for relative price adjustment between the euro area core and periphery. According to recent ECB forecasts, average euro area inflation is not expected to return to close to two percent in the medium term. The ECB's commitment to its communicated objective of keeping inflation "below but close to two percent inflation in the medium term" has therefore been undermined. In our view, it was a major mistake not to ease monetary conditions at the time that the ECB's own forecast signalled that inflation will not return to two percent in the medium turn. Also, government policies, including on bank restructuring and public investment, should have been implemented some time ago as a safeguard against the disinflationary process.

We also demonstrated that inflation forecasts and expectations about the return to normal inflation rates have proved to be too optimistic, both in the euro area recent years and in Japan for almost two decades. To effectively address the risk of persistently low inflation, the ECB should act. Cutting ECB interest

²¹ According to the calculation in Darvas (2013), out of these €4.2 trillion, the stock of SME loans in the EU in 2010 represents approximately €1.7 trillion and the largest stocks of SME loans were in Spain (€356bn), followed by Germany (€270bn), Italy (€206bn) and France (€201bn).

rates further and reducing the ECB's deposit rate for banks below zero would help but is unlikely to have a sizeable impact. Designing a new very long-term (eg three years or longer) refinancing operation would not be very effective either, because liquidity conditions have normalised and banks now have a preference for paying back three-year LTROs earlier. Stopping the sterilisation of the government bond holdings from the Securities Markets Programme (SMP) would be unwise, because that programme had a specific purpose with the stated feature of sterilisation.

The best option for the ECB, with the greatest potential to sizeably influence inflation and inflationary expectations, is an asset-purchase programme. We recommend that the ECB starts an open-ended programme of €35 billion per month of asset purchases and reviews this amount after three months to see if its size needs to be changed. Using empirical estimates from the literature and our assessment, €35 billion per month of purchases over the course of a year could lift inflation by 0.8-1.0 percentage points. The asset-purchase programme should only start to be cut back when inflation has increased and medium-term inflation expectations are anchored at two percent. When inflation has stabilised close to but below two percent, the purchased assets should be sold gradually at a pace that does not undermine inflationary expectations. However, if inflation expectations rise significantly above two percent, the sale of assets should be accelerated and standard monetary policy tools should also be deployed to fight inflation.

In terms of available assets, we recommend that the ECB purchases privately-issued debt securities and EFSF, ESM, EU and EIB bonds, but not government bonds. The purchase of government bonds can be problematic if there is a government solvency risk, and would be politically controversial. The combined stock of EFSF/ESM/EU/EIB bonds suitable for purchases is €490 billion. In terms of private debt instruments, we advise that the whole range of assets that are eligible as collateral at the ECB without further credit rating requirements should be considered. The total pool of such assets is €7 trillion. Of these, corporate bonds (for which we estimate that at least €900 billion are suitable for purchases) and asset backed securities (ABS, at least €330 billion suitable for purchases) are preferable, while the bonds of sound banks could be considered only after the ECB's comprehensive assessment of the banking system has been completed. We therefore recommend that before the completion of the comprehensive assessment, the ECB starts monthly purchases of €15 billon of corporate bonds, €8 billon of ABS and €12 billion of EFSF/ESM/ EU/EIB bonds.

Given the relative size of the purchases compared to the total size of the respective markets, the mispricing of risk would be limited and the ECB would

not take on board much risk if a sufficiently diversified portfolio of assets is purchased. We also highlight that the ECB's Treaty-based primary mandate is maintaining price stability and there is no prohibition of monetary operations that exposes the ECB to potential losses and profits. However, it is also clear that the ECB should avoid exposure to unchecked political and private sector pressures that could result in delays to the reversal of asset purchases, which would undermine the bank's price stability mandate.

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Monetary Policy after the Great Recession

"The financial crisis of 2008 and 2009 will leave a lasting imprint on the theory and practice of central banking. With respect to monetary policy, the basic principles of flexible inflation targeting--the commitment to a medium-term inflation objective, the flexibility to address deviations from full employment, and an emphasis on communication and transparency--seem destined to survive. However, following a much older tradition of central banking, the crisis has forcefully reminded us that the responsibility to use monetary policy effectively in the pursuit of macroeconomic objectives."

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