25 May 2013

Preliminary and incomplete

Financial stability and monetary policy: How closely interlinked?[1]

Frank Smets

European Central Bank

1. Introduction

The 2007-2008 financial crisis and its long-lasting legacy have shaken up the macro-economic policy framework that appeared to be so successful in stabilising the economy during the great moderation period. First, it led to a rethinking of monetary policy frameworks focused primarily on maintaining price stability, as price stability has proven not to be a sufficient condition for financial stability and lack of financial stability can have large negative feedback effects on price stability.[2] Second, it accelerated the introduction of a new policy domain called macroprudential policy, inspired by the early contributions of Crockett (2000) and his colleagues at the Bank for International Settlements (BIS).[3] This was based on the realisation that ensuring the soundness and safety of individual financial institutions is not enough to guarantee the stability of the whole financial system and that there is a need for a systemic approach to financial stability. [4] Third, specifically to EMU, the sovereign debt and banking crisis made the financial trilemma of having a single monetary policy, an integrated financial market and a national financial supervisory system painfully

---

[1] This paper was prepared for the Riksbank Conference on "Two decades of inflation targeting: Main lessons and remaining challenges", held in Stockholm on 3rd June 2013. The views expressed are my own and not necessarily those of the European Central Bank. I would like to thank Tobias Linzert for discussions and comments, Elizaveta Krylova, Magdalena Lalik and Pawel Gertler for help with the graphs and data.

[2] Early contributions to this debate include Bean et al (2010), Blanchard et al (2010) and Mishkin (2010). See also Baldwin and Reichlin (2013).

[3] See, for example, Borio (2003) and Borio and White (2006).

[4] Macroprudential policies are designed to identify and mitigate risks to systemic stability, in turn reducing the cost to the economy from a *disruption in financial services* that underpin the workings of financial markets—such as the provision of credit, but also of insurance and payment and settlement services (FSB/IMF/BIS, 2009; IMF 2011a)

clear. In order to break the vicious circle between national banking and sovereign risks and to avoid cross-border externalities in supervision that may arise from the underprovision of national refunding for troubled cross-border banks, the incentive to ring-fence liquidity within national borders and the pressure to generate demand for government debt through national banks, the introduction of a financial union complementing the monetary union is long overdue.[5]

Against this background and with the expected establishment of the Single Supervisory Mechanism later this year, the new policy framework in the euro area can be schematised as in Exhibit 1.[6] Consistent with the description in IMF (2013), the newly emerging paradigm is one in which both monetary policy and macroprudential policies are used for countercyclical management: monetary policy primarily aimed at price stability; and macroprudential policies primarily aimed at financial stability, whereas microprudential policy focusses on the safety and soundness of individual financial institutions.[7]

This assignment of the two policy domains to well defined objectives is consistent with Tinbergen's effective assignment principle, which says that i) one should have as many instruments as objectives and ii) that the instruments should be assigned to those objectives that they can most efficiently achieve.[8] In general, the introduction of macroprudential policies can reduce the trade-offs for monetary policy and increase its room for manoeuvre. Maintaining financial stability can help ensure a well-working financial system and an effective transmission process which makes achieving price stability more efficient. Moreover, macroprudential policies can by managing the financial cycle and increasing the resilience of the financial sector reduce the probability of systemic stress and therefore the probability that monetary policy becomes constrained by the zero lower bound and needs to resort to non-

5 See Schoenmaker (2011).

6 Note that the macroprudential function remains largely in the remit of the national competent authorities. However, the Single Supervisory Mechanism can intervene on a stricter application of macroprudential policies.

7 There is still a debate about the goals of macroprudential policy. In particular, should it aim at managing the financial cycle and counteracting the procyclicality of the financial system, or should it rather focus on improving the resilience of the financial system to shocks by reducing its fragility? The answer depends in part on how effective macroprudential policy is expected to be in leaning against the wind. See Section 4.1 below.

8 See, for example, Bean et al (2010), "Policies should be assigned to the frictions that they have a comparative advantage in addressing".

standard policies to address malfunctioning financial markets. It can also reduce trade-offs that may arise when exiting accommodative monetary policies.[9]

The relationship between monetary and macroprudential policies hinges, however, also on the "side effects" that one policy has on the objectives of the other and how perfectly each operates in the pursuit of its own primary goal.[10] For example, changes in policy interest rates or non-standard monetary policies may affect risk-taking behaviour ex ante and the tightness of credit constraints ex post. In a crisis situation, liquidity policies by the central bank may avoid a collapse of the banking sector, but also reduce the incentive for banks to recapitalise and restructure and promote the evergreening of non-performing loans and regulatory forbearance by supervisors. In principle, well-targeted macroprudential policies can offset the side effects of these monetary policies, but in practice there may be limits.[11] Similarly, changes in macroprudential policy may affect financing conditions, the real economy and price stability, which monetary policy may want to offset.[12] It is therefore important that both policies are coordinated and take those interactions into account. Conflicts of interest of a "push-me, pull-you" nature may arise when monetary and macro-prudential policy instruments are used more aggressively, in opposite directions, leading to a worse outcome than if the instruments had been coordinated.[13] Alternatively, the respective policies can have positive externalities on each other and, if not taken into account, each policy response will be "too" strong and might risk to overshoot the achievement of the policy objective. Finally, non-standard monetary policy instruments, like changes in haircuts for central bank operations or changes in reserve requirements, are not that different from macroprudential policy instruments such as liquidity constraints and regulation of margin requirements. It is therefore a legitimate question which instrument should be used for what objective.[14]

---

[9] See, for example, Bernanke (2013) for a discussion in the current context of exit from expansionary Fed policies.

[10] See Gerlach et al (2009) and IMF (2012).

[11] For example, Maddaloni and Peydro-Alcalde (2010) show that the effects of monetary policy on bank lending standards depend on the tightness of the prudential regime.

[12] See Collard et al (2012).

[13] Examples of such outcomes are shown in Bean et al (2010), De Paoli and Paustian (2013) and Angelini et al (2011).

[14] Cecchetti and Kohler (2012) provide an extreme example: In their model, it does not matter which authority uses which instrument.

The need for coordination raises the question of the appropriate institutional set-up. Overall, as a result of the crisis central banks have been given a larger role in maintaining financial stability.[15] Bringing monetary and macroprudential policies under one central bank roof will tend to solve possible coordination problems that may arise from their interaction. At the same time, it may lead to incentive problems if failure of one policy domain affects the other policy domain. One example of such an incentive problem which may lead to time-inconsistency is that monetary policy is kept looser than is necessary for price stability because it helps maintaining financial stability. This may lead to an inflation bias, in particular if the objectives of the macroprudential policy function are not clearly specified, its effectiveness is not ensured, and/or macroprudential policy measures are subject to more intense political scrutiny and pressure. One solution is to maintain a clear separation of objectives, instruments and communication of the two policy domains. This will make the policy makers accountable for achieving their respective objectives and thereby increase the effectiveness and efficiency of the policies, while allowing an efficient information sharing between the two policy domains. In section 5 below I argue that it is particularly important to protect the credibility of the monetary policy framework for maintaining price stability while the macroprudential policy domain is building up its own reputation.[16]

Turning back to the ECB and its future role, Exhibit 2 shows schematically how monetary and macroprudential policy interact, while being geared at their specific objectives and using separate instruments. The current monetary policy strategy of the ECB with its medium-term orientation and emphasis on monetary analysis explicitly involves looking beyond short-term price developments and taking into account the medium-term implications of booming asset prices and credit markets for price stability.[17] Broadening and deepening this analysis to better understand the health of the financial system and its implications for price stability over the medium term can

[15] See, for example, the new institutional frameworks in Belgium and the United Kingdom. For an overview, see the recent Ingves report.

[16] Woodford (2013) argues that clear communication and transparency in monetary policy is even more important now to avoid the notion that unconventional measures will lead to unconventional outcomes (such as the abandonment of low inflation targets).

[17] See, for example, Trichet (2004) and Issing (2002).

be complementary to the use of new macroprudential policy instruments in leaning against the boom and bust behaviour in credit markets we have seen over the past decade.

In the rest of the paper, I first review the macro-economic and financial experience of the euro area over the past decade. I focus on the period 2003 till 2012 following the bursting of the dot-com bubble, which covers both the boom period five years before the financial crisis of 2007-2008 and the aftermath characterised by the sovereign debt crisis and by private and public debt deleveraging. Next, I review three different views about the interaction between macroprudential and monetary policy and their implications for whether monetary policy should pursue financial stability objectives. These views in turn depend on different views about the effectiveness of the macroprudential framework and the interaction of financial stability and price stability. In section 4, I briefly review the empirical evidence on both issues. Finally, in section 5 I argue that to avoid financial and fiscal dominance it is important that the primary objective of monetary policy remains price stability, i.e. that a lexicographic ordering for monetary policy is maintained. I use a simple model developed by Ueda and Valencia (2012) to make this point. Section 6 presents some overall conclusions.

2. Price stability, booms and busts in asset and credit markets and intra-euro area imbalances[18]

The Treaty creating EMU establishes price stability as the primary objective of monetary policy in the euro area. In 1998, the ECB adopted a quantitative definition of price stability which says: "Price stability shall be defined as a year-on-year increase in the HICP for the euro area of below 2%. Price stability is to be maintained over the medium term." Following an evaluation of the strategy in 2003, the ECB clarified that it aims to keep HICP inflation "below, but close to, 2 %". With some foresight, two main reasons for a small, but positive inflation rate were highlighted.[19] First, it provides a sufficient buffer against the probability of hitting the zero lower bound on the short-term nominal interest rate. And, second, it allows for a smoother

[18] This section follows the discussion in Fahr et al (2010).

[19] Add reference.

adjustment of relative prices and wages across countries in a monetary union which still features a high degree of downward nominal wage rigidity.

Chart 1 shows that various measures of inflation (including the HICP) have been stable around 2 per cent throughout this whole period. Similarly, both medium and long-term inflation expectations were solidly anchored throughout the decade (Chart 2). As argued in Fahr et al (2010), the relative stability of inflation did not come at the cost of larger fluctuations in aggregate output, but, when the financial crisis hit, output volatility did increase dramatically. Smets (2010) argues that the solid anchoring of inflation expectations throughout the crisis period contributed to mitigating the fall-out in economic activity and avoiding a Fisherian debt deflation spiral. More generally, there is evidence that in regimes focused on price stability, the real effects of the financial crisis have been more subdued.[20]

While the prices of goods and services were well anchored, low macro-economic volatility and the procyclicality of the financial system contributed to a boom and bust in credit, asset prices, and investment, leaving the economy with a large debt overhang. Chart 3 shows the boom and bust in aggregate asset prices and aggregate investment over nominal GDP in the euro area since 2002. Housing prices and residential investment played a significant role in this boom and bust behaviour.

The investment boom was fuelled by a rapid growth of bank lending and money creation, falling risk premia and an easing of bank lending standards. Following the start of the sub-prime crisis in 2007 and in particular the collapse of Lehman in October 2008, this procyclical process went quickly in reverse with the growth of money and credit falling rapidly, risk premia skyrocketing and bank lending standards tightening sharply (Charts 4 to 7). This translated in the deepest recession in 2008-2009 in the euro area since the Great Depression in spite of a rapid and coordinated policy response by both monetary and fiscal authorities. As of 2010, the rapidly rising government debt led to a confidence crisis in government finances and rising sovereign spreads in a number of periphery countries. This set in motion a mutually reinforcing negative spiral between sovereign and banking risks, which is reflected in

[20] See De Carvalho and Evangilista (2011)

a large positive correlation between sovereign and bank bond premia in the euro area and a double-dip, more shallow but more persistent recession in 2012. The ECB responded by lowering its policy-controlled interest rates to close to zero (standard policy) and by taking a number of non-standard measures geared at addressing malfunctioning financial markets and avoiding that a collapse of the financial system would endanger price stability. In line with previous historical experience as, for example, extensively documented in Reinhart and Rogoff (2009, 2010), the debt overhang in both the private and public sector and the subsequent deleveraging process are shedding a long shadow on economic activity in the euro area.[21]

While the boom/bust nature of credit and asset prices is ex post clearly visible in the aggregate euro area data series, it is well-known that the underlying dynamics was characterised by growing cross-country imbalances within the euro area, making a response by the ECB's single monetary policy more complicated.[22] Table 1 compares average house price growth, credit growth to the private sector, residential investment, inflation rates and growth in unit labour costs between currently distressed countries (Greece, Ireland, Italy, Portugal and Spain) and non-distressed countries (Austria, Netherlands, Finland, France, Germany) over the pre- and post-2007 period. While the details differ somewhat across countries, the picture of a classic boom and bust in housing markets in the distressed countries is very clear. On average, growth in credit, house prices and residential investment was respectively 10, 4 and 2.5 percentage point higher in the periphery than in the core countries in the pre-2008 period.

The boom in the housing market was partly financed by a widening current account deficit and an accumulation of net foreign debt. As a result the net foreign debt position on average reached more than 50 per cent of GDP towards 2009. Until 2008, most of the foreign debt was financed by private capital inflows, often through the short-term interbank market. Chart 8 shows the accumulation of claims of banks in the non-distressed countries on those in the distressed ones. These claims increased five-fold from 2002 till 2007. As domestic resources were reallocated to the real-estate and other non-traded sectors, these countries also experienced a loss of

[21] See also Cecchetti et al (2011).

[22] See Smets (2012) for a more detailed description of the growing intra-euro area imbalances and the ECB's monetary policy response.

competitiveness, as is witnessed by a higher average inflation rate and increase in unit labour costs of respectively 2.7 per cent. In turn, this contributed to lower real financing costs in the periphery compared with those in the core.

The large real estate boom went hand in hand with increasing financial fragility as illustrated most vividly by the case of Ireland. Leverage of Irish MFIs, measured as total assets over capital and reserves, increased from 15 in 2000 to 25 in 2007, with almost 40 per cent of the funding coming from overseas short-term debt liabilities. At the same time, the risks of the mortgage loans increased, with the share of first-time buyer mortgages with a loan-to-value ratio of 100 per cent or more rising from less than 5 % in 2003 to almost 35% in 2006.

The bursting of the house price bubble and the sudden stop in private capital inflows in the periphery, led to a deep recession, sharply rising unemployment, an exposed and fragile banking sector and a rapidly deteriorating fiscal deficit.[23] Ultimately, this contributed to a reversal of the ranking in the various indicators in Table 1. In the distressed countries house prices fell on average by 3 per cent in the post 2008 period, while residential investment fell by 9.5% and a painful and protracted rebalancing process was set in motion.

A few lessons can be drawn from this descriptive analysis of the euro area economy over the past decade. First, price stability as defined by low inflation in goods and services prices has not been a sufficient condition for financial stability. A new set of instruments (macroprudential policy) is therefore needed to address the procyclicality of the financial system and its key role in the propagation and collapse of credit, asset prices and the real economy. This is particularly important in a monetary union where the single monetary policy stance may give rise to different real financing conditions in the presence of asymmetric developments. One element of the EU response was to set up the European Financial Authorities (EFAs) and the European Systemic Risk Board (ESRB) to strengthen micro and macroprudential supervision in the European

[23] For a discussion of capital flows see, for example, Merler, S. and J. Pisani-Ferry (2012), Cour-Thimann (2013), Auer (2012). These papers also discuss how due to the ECB's fixed-rate, full-allotment policy the private capital flows were partly replaced by official capital flows as captured by the increase in Target2 balances.

Union.[24] More recently, considerable progress was made to set up a banking union for the euro area. Second, as is often the case, excessive bank credit into overextended real estate markets leads to a build-up of financial fragility and a subsequent collapse. This is a pattern familiar in other big financial crises like the Scandinavian and the Japanese crises of the early 1990s, as well as the recent crisis in the United States and the United Kingdom. However, like in the United States the house price bubbles were not uniform. While the financial imbalances concentrated very much in the periphery countries, the financing and the exposure was euro area-wide. The new instruments must therefore be granular and address the imbalances where they arise. At the same time, these vulnerabilities appear to be fuelled by easy finance and therefore also the liability side, which may be more global, has to be addressed. Third, there are important asymmetries in the boom and the bust phase due to fire sale dynamics, the interaction between market and funding liquidity and the negative loops of the financial sector with the real economy and fiscal sustainability. In their role of lenders/market makers of last resort and with the view of maintaining price stability, central banks have been called upon to backstop the financial system. This gives them the right incentives to also deal ex ante with the building up of financial imbalances, but also risks putting them in a corner when financial fragility and doubts on fiscal sustainability are not fundamentally addressed. Fourth, the fall-out of a systemic banking crisis is often long and protracted due to political and distributional difficulties with addressing the debt overhang problem in a transparent and efficient way.[25] In a low inflation environment, the depth and the persistence of the recession may, moreover, be exacerbated by the zero lower bound on interest rates and downward rigidity of prices and wages which prolong the adjustment process and increase the costs of unemployment. An important overall lesson is therefore that it does not suffice to try to clean up after the bust, but that a preventive policy is called for.

3. The interaction of financial stability and price stability: Three views and their conceptual frameworks.

[24] See the de Larosière report (2009) for the rationale for setting up the European Financial Authorities and the European Systemic Risk Board.

[25] For example, Van Wijnbergen and Homar (2013) show how the strength of the recovery following systemic banking crises depends on the restructuring of the banking sector.

As highlighted above, in order to deal with the financial stability objective, policy makers have introduced under the aegis of the G20 a new macroprudential policy domain. The implications for the monetary policy framework will, however, depend on the effectiveness of the new macroprudential policies in reducing the procyclicality and fragility of the financial system, as well as on the degree of interaction between financial stability and the monetary authorities' pursuit of price stability. In this section, we describe three different views about the implications of financial stability considerations for the monetary policy framework.

View 1: A modified Jackson Hole consensus

The first view argues that the monetary authority should keep their relatively narrow mandate of price stability and resource utilisation around a sustainable level, whereas macro prudential authorities should pursue financial stability, with each having their own instruments. It can be described as a modification of the popular "Jackson Hole consensus" that prevailed before the crisis: Financial stability concerns are only taken into account by the monetary authority to the extent that they affect the outlook for price stability and economic activity. [26] The biggest need for change as a result of the lessons learned from the financial crisis is the establishment of an effective and credible macroprudential policy framework with the objective of maintaining financial stability.[27] Once this is in place, monetary policy can continue to focus on price stability as, for example, described in the flexible inflation targeting literature, but taking changes in the working of the economy and the monetary transmission process due to financial factors into account. Financial stability considerations will indirectly enter into monetary policy decisions to the extent that assessments of systemic tail risks change the expected outlook for inflation or real activity. There is therefore still a role for financial stability monitoring and information exchange with the macroprudential authorities (Adrian et al, 2013).

[26] The original view goes back to Greenspan (2002), Bernanke and Gertler (1999) and many others. Support for the modified version has been expressed by Gerlach (2010), Svensson (2012) and Bean et al (2010).

[27] See also Cecchetti et al (2013), "An alternative view is that central banks simply lacked the tools they needed to mitigate financial-stability risks at a time when policymakers were pursuing price stability. Interest-rate increases high enough to effectively mitigate pre-crisis debt-fuelled property booms would also have caused a major economic contraction. Some other tools, ones more appropriate to moderating the financial cycle – such as countercyclical capital requirements on lenders or maximum loan-to-value ratios applied to borrowers – are needed for times like this.

This view argues that the objectives, the instruments and the transmission mechanisms of monetary and macro-prudential policy can easily be separated. It is based on the judgement that the interaction between monetary policy and macroprudential instruments is limited, that the monetary policy stance did not significantly contribute to the building up of imbalances before the crisis, and that in contrast to macroprudential policy the short-term interest rate is not a very effective instrument to deal with those imbalances. One question is how this view deals with the lender-of-last-resort function of central banks.

Collard, Dellas, Diba and Loisel (2012) have recently developed a model that very much supports the modified Jackson Hole consensus view. The paper offers a characterisation of the jointly optimal setting of monetary and prudential policies (in a Ramsey sense) in a model with financial and price rigidities and discusses its implications for the business cycle. The source of financial fragility is the socially excessive risk-taking by banks due to limited liability and deposit insurance. Interestingly, the model links excessive risk-taking to the type of projects that banks may be tempted to fund because limited liability protects them from incurring large losses, and the degree of riskiness may not be reflected in a larger volume of credit. In this model, sufficiently high capital requirements can always force banks to internalise the riskiness of their loans and tame risk-taking.[28] Monetary policy, in contrast, is less suited for this task as it works primarily through the volume rather than the composition of credit and thus it has no first-order effect on risk-taking incentives.[29] In contrast to models that emphasise the credit cycle, this framework does not suggest a strong connection between interest rate policy and financial stability. In response to shocks that do not affect banks' risk-taking incentives prudential policy should leave the capital requirement constant and monetary policy should move the interest rate in the standard way to stabilise prices. In response to shocks that increase banks'risk-taking incentives, prudential policy should raise the capital requirement and monetary policy should cut the interest rate in order to mitigate the effects of prudential policy on bank lending and output. So, in this case, the two policies move in opposite directions over the cycle. The authors also show

[28] Note that there is no uniform agreement on whether higher capital reduced risk-taking incentives. See, for example, Gale (2010).

[29] This is a stark assumption, which contrasts, for example, with Stein (2010) who finds that a lower interest rate may encourage banks to take on more risk on the liability side by increasing short-term market funding.

that if the incentive to take risks increases with the volume of loans, a positive productivity shock may lead to an optimal joint tightening of the capital requirement and the interest rate. In this case, there is a complementarity between both policies in the sense that the optimal interest rate is smaller due to the tightening of capital requirements.[30]

In more standard New Keynesian models with credit constraints and a financial intermediation sector, interest rate policy and macroprudential policy (e.g geared at constraining the loan-to-value ratio or the capital ratio of banks) will naturally interact much more through their common effects on the cost of finance. For example, one striking finding of Cecchetti and Kohler (2012) is that the choice of the instrument itself does not matter (either policy maker could use it), as a capital requirement which affects loan supply and the policy controlled interest rate which has both a demand and a supply effect are perfect substitutes. Cecchetti and Kohler (2012) show that the optimal outcome can be reached in a coordinated optimisation of the two instruments, i.e. a situation where each policy maker takes into account the externality it has on the other policy maker. The papers by Angelini et al (2011), De Paoli and Paustian (2013), Gelain et al (2012), Lambertini, Mendicino and Punzi (2011) and Beau et al (2012) have similar features in a dynamic context. [31] For example, using a DSGE model with financial frictions a la Kiyotaki and Moore (1997), monopolistic competition in the banking sector and a role for bank capital and an ad-hoc loss function which includes the credit to GDP gap, Angelini, Neri and Panetta (2011) study the interaction between macroprudential and monetary policies and find that the benefits of introducing macroprudential policy that changes capital requirements become large when the economy is driven by financial shocks which affect the supply of loans through bank capital. They also find that a non-cooperative pursuit of macroprudential and monetary policy may lead to higher volatility in the instruments of both policies because both policies act on closely related variables (bank rates, credit and asset prices), but have different objectives, so that they may push in

[30] In contrast, Dell'Ariccia, Laeven and Marquez (2010) argue that a lowering of the short-term interest rate may lead to lower risk-taking in a model with limited liability and risk-shifting. A lower funding rate may increase profits when the pass-through to lending rates is partial and thereby increase the franchise value of the bank. Under asymmetric information, this may lessen moral hazard and reduce bank risk taking.

[31] Angelini et al (2011) and Leclerc et al (2012) use ad-hoc loss functions, whereas De Paoli and Paustian 92013) and Lambertini et al (2011) use a welfare-based criterion. See also ECB (2012), MaRs report, p33, for an overview of recent research that analyses the interaction between monetary and macroprudential policies.

different directions. Gelain et al (2012) analyse the relative effectiveness of interest rate changes versus measures that affect the mortgage credit constraint (such as LTV and DTI). They find that DTI and LTV measures are more effective in controlling debt then the short-term interest rate. The latter has a relatively large negative side effect on inflation.

Overall, these studies conclude that i) introducing macroprudential policies is useful in leaning against the financial cycle driven by over-optimistic expectations or expectations of reduced volatility and risk premia and increase welfare; ii) there are potential coordination problems due to the "push me – pull you" nature of both policy instruments; iii) overall, the introduction of macroprudential policies does not change the optimal reaction function of the monetary authorities very much.

View 2: Leaning against the wind vindicated

The second view argues that the narrow focus of many central banks on the inflation outlook over the relatively short term of two to three years prevented them from leaning more aggressively against growing financial imbalances.[32] This view vindicates the "leaning against the wind" strategy proposed by Borio and Lowe (2002), White (2006) and others.[33] It acknowledges that there is a financial cycle that cannot be fully addressed by macro-prudential policy and interacts with the business cycle in various potentially non-linear ways. It also acknowledges that the monetary policy stance may affect risk-taking by the financial intermediation sector and, conversely, that the fragility of the intermediation sector affects the transmission process and the outlook for price stability. In this view, financial stability concerns should be part of the secondary objectives in the monetary policy strategy. The inclusion of secondary financial stability objectives naturally leads to a lengthening of the policy horizon of the monetary authorities as the financial cycle is typically longer

[32] See Banerjee, Cecchetti and Hofmann (2013). One interpretation of why central banks did not lean more strongly against the credit booms of the 2000s is that inflation targeting in its prevailing form, with a point inflation target to be met over a specified time horizon of a year or two, prevented central banks from leaning more aggressively against these imbalances. With broader and more flexible mandates, ones that went beyond narrowly defined inflation targets, central banks would have maintained a tighter monetary-policy stance to curb the build-up of leverage and the underpricing of risk.

[33] See also Rajan (2005) who warned that price stability may not be sufficient for financial stability and suggested that central banks should lean against the emergence of financial imbalances by tightening their monetary policy stances. This view is also closer to the ECB's view as, for example, elaborated by Issing (2011) and Trichet (2010).

than the business cycle.[34] It suggest a modification of flexible inflation targeting whereby financial stability concerns are taken into account in deciding on the optimal adjustment path for inflation, introducing a term which resembles "leaning against the wind".

Woodford (2012) develops a stylised model along the lines of Curdia and Woodford (2012) to analyse the implications of financial imbalances for monetary policy. In order to address concerns about financial stability in an inflation targeting regime, he postulates a reduced-form model of the way in which endogenous state variables (like leverage) affect the probability of a crisis, and considers how allowance for such a relationship would change the standard theory of optimal monetary stabilisation policy. As in the papers discussed above, the presence of frictions in the financial intermediation sector leads to the inclusion of a financial stability objective in the loss function. This is then taken into account in the optimal targeting rule. The main finding is that the optimal targeting rule now involves not only the output gap, but also a financial stability related term. In particular, the usual optimal output gap adjusted price level targeting rule is augmented with a term that captures the marginal risk of a financial crisis. The implications for the monetary policy framework is that financial stability concerns should be taken into account in the adjustment path, but the overall primacy of maintaining a price stability objective over the medium-term is not affected. The model implies that it may be appropriate to use monetary policy to "lean against" a credit boom, even if this requires both inflation and the output gap to be below their medium-run target values for a time. One particular version of the model is Woodford (2011), who embeds Stein (2012)'s setting in which financial intermediation activity is distorted due to fire sales during a financial crisis, into a traditional new Keynesian model of monetary policy. This model effectively introduces a risk-taking channel of monetary policy into a macroeconomic setting.[35]

In the "leaning against the wind" view, central banks may face additional trade-offs which will require increased credibility of the price stability target. So, monetary

[34] See Drehmann, Borio and Tsatsaronis (2012) for empirical evidence that the financial cycle is longer than the typical business cycle.

[35] Angeloni and Faia (2013) analyze optimal policy in a model with a risk-taking channel. When policy eases bank risk increases because the short term funding ratio rises and therefore the lending rate drops by less. Agur and Demertzis (2011) also discuss interaction between monetary policy and risk taking.

policy becomes more complicated, but not different in set-up. Woodford (2012) argues that the additional complexity is less of a problem to the extent that the optimal targeting rule implies a commitment to a price level target. This means that any departure from the price level from its long-run target path that is justified by an assessment of variations in the projected marginal crisis risk will subsequently have to be reversed. For a number of central banks that already have mandates to contribute to financial stability, such as the European Central Bank, this may not require a big change. Its monetary policy strategy already includes a two-pillar approach involving monetary analysis. The latter has been presented as a way to take into account financial stability concerns and a leaning-against-the-wind approach. Fahr et al (2013) use macro-economic simulations in an estimated model with financial frictions for the euro area to show how monetary policy leaning against credit developments may shift the price and output gap stability trade-off inward and therefore contribute to an overall improvement of macroeconomic performance.

View 3: Financial stability is price stability

The third view proposes a more radical change in the objectives of monetary policy. It argues that financial stability and price stability are so intimately intertwined that it is impossible to make a distinction.[36] Under this view, both standard and non-standard monetary policies are in the first place attempts at stabilising the financial system, addressing malfunctioning financial markets and unclogging the monetary transmission process. This approach also highlights the time-inconsistency problems involved. Because of threats of financial and fiscal dominance, the coordination with fiscal and financial stability policy are crucial.[37]

A model that captures most clearly the intimate interaction between monetary policy and financial stability is the I-theory of money of Brunnermeier and Sannikov (2012), which puts financial frictions at the centre of the monetary policy transmission mechanism. In the words of Brunnermeier and Sannikov (2013): "… the I-theory of

[36] Recently, Alan Blinder argued that financial stability should come first in the ranking of objectives because "there is no price stability without financial stability".

[37] Others, like Whelan (2013) argue that the mandates of central banks should be broadened to include financial stability, output gap stability and price stability to allow central banks to pursue the most efficient trade-offs. In this approach the time-inconsistency is not emphasised.

money … argues that price, financial and fiscal stabilities are intertwined due to financial frictions. In downturns, optimal monetary policy should identify and unblock balance sheet impairments that obstruct the flow of funds to productive parts in the economy. In upturns, diligence is required to avoid imbalances that make the economy vulnerable to liquidity and deflationary spirals."

The close connection between price stability and financial stability comes from the fact that the health of the financial intermediation sector determines the degree of inside money creation and the price of risk in the economy.[38] Monetary policy works by redistributing wealth in such a way that dampens the amplification effects coming from balance sheet constraints. For example, cutting the short-term interest rate can increase the value of long-term bonds, thus stabilising banks' balance sheets, or, purchasing specific assets such as mortgage-backed securities support real-estate prices and thereby help households who suffer from debt-overhang problems.

Brunnermeier and Sannikov (2013) conclude: "The framework of the I-theory suggests a new way of thinking (gives a new perspective) about optimal monetary policy that goes strictly beyond inflation targeting: In downturns: ex-post crisis management is like 'bottleneck monetary policy'. Central banks have to figure out which sectors suffer from impaired balance sheets. The key question is: where is the bottleneck in the economy? Monetary policy has to work against liquidity and deflationary spirals that redistribute wealth away from productive balance sheet-impaired sectors – especially if fiscal-policy measures cannot be implemented in a timely manner. Second, monetary-policy tools should be employed in such a way as to reduce negative moral-hazard implications in the long run. In upturns: ex-ante crisis prevention is essential in order to avoid being cornered later, and to be forced to conduct ex-post redistributive monetary policy. Central banks have to be aware of the interactions between the three stability concepts (price, financial, fiscal). They also should have a close eye on aggregate and sector-specific credit growth and other monetary aggregates. Simply following current interest rates is misleading, quantity aggregates have to be closely watched and acted upon because the economy becomes vulnerable when imbalances are building up. In a worst case, we might enter a regime

[38] See also Adrian and Shin (2010).

of ‘financial dominance’, in which the financial industry corners the central banks to conduct certain policies that restrict their freedom to fight inflation.”

The three views clearly have different implications for the optimal institutional set-up of financial stability and price stability oriented policies. Under the modified Jackson Hole consensus view, there is no need to bring macroprudential and monetary policies under one roof as long as there is sufficient information sharing amongst the authorities. In contrast, under the view that financial stability and price stability are largely overlapping, it is difficult to separate both objectives and the instruments to achieve those objectives.

Each of those different views acknowledges that there is an important interaction between financial stability and monetary policy in pursuit of price stability. There is, however, a different appreciation of the pervasiveness of this interaction, the effectiveness of independent macroprudential policies, the extent to which monetary policy may be a source of financial instability and the extent to which monetary policy can avoid being drawn into financial stability concerns in particular in times of crisis.

First, if the interaction is very intense, there will naturally be a larger role for coordination which may be more easily internalised when one institution, the central bank, pursues both objectives with the full set of instruments. Second, if macroprudential tools are ineffective in managing the financial cycle, it may be more appropriate for monetary policy instruments to also pursue a financial stability objective. Third, if pure price-stability monetary policy is itself a source of growing imbalances, it may be appropriate to take the financial stability implications of monetary policy into account. Finally, if monetary authorities cannot avoid being drawn into stabilising the financial system in times of crisis, it may be useful to bring both policies under one roof. De facto, many of the non-standard monetary policies (e.g. changes in reserve requirements or in haircuts in central bank operations) could also be seen as macroprudential policy instruments.[39] Moreover, being the first in line

[39] One of the questions this raises is whether central banks should also use non-standard measures to lean against boom periods.

to clean up when the bubble bursts, central banks should have the right incentive to lean against the building up of the bubble ex ante.

The main counterargument is that the central bank's involvement in financial stability may undermine the credibility of its pursuit of price stability. This may happen through two main channels. First, the central bank's involvement in financial stability requires a stronger involvement in distributional policies (as highlighted by Brunnermeier and Sannikov (2013)) and in quasi-fiscal operations (as emphasised in Pill (2013)). This requires a greater accountability and political involvement which may undermine the independence of the central bank and increase political pressures. Second, involvement in financial stability risks creating important time inconsistency problems for monetary policy. Central banks may get trapped in providing more liquidity than appropriate for long-run price stability if the fundamental problems of debt overhang following a financial crisis are not addressed.

Next, in section 4 we will review some of the evidence on the effectiveness of macroprudential policy measures and the risk-taking channel of monetary policy. In section 5 we then have a look at the time-inconsistency problem.

4. Empirical evidence on the effectiveness of macroprudential policy measures and the role of monetary policy in risk-taking.

4.1. Evidence on the effectiveness of macroprudential policy instruments

As discussed above, whether macroprudential policy can take over as the first line of defence in reducing the probability of a financial crisis very much depends on its effectiveness. However, assessing effectiveness is difficult because i) there is a variety of possible macroprudential tools; ii) there is as yet no widely agreed and comprehensive theoretical framework for the optimal choice and calibration of macroprudential policy tools; and iii) there is only scant actual experience with such tools in advanced economies.[40] The intermediate targets of macroprudential policy may differ and vary over time and with it the choice of policy instruments, also in the

[40] See Progress Report to G20, Macroprudential tools and Frameworks, 27 October 2011 and ESRB (2011).

light of emerging systemic risks and future financial innovation. For example, macro-prudential policy for the banking sector could include each of the four intermediate targets: 1. Mitigate and prevent excessive credit growth and leverage; 2. Mitigate and prevent excessive maturity and liquidity mismatch; 3. Limit excessive direct and indirect exposure concentrations; and 4. Limit expectations of bail-out. The most effective instruments to achieve those intermediate objectives will differ across those intermediate objectives.[41] For example, a macroprudential policy of countercyclical capital requirements could help to lean against excessive credit growth and leverage. But, to the extent that many financial crises have their roots in excessive credit creation in mortgage markets and house price bubbles, countercyclical changes in the loan-to-value (LTV) or debt-service-to-income (DTI) ratios of mortgage borrowers may be a more effective instrument. On the other hand, quantitative restrictions or a tax on short-term funding may be the more appropriate macroprudential instrument to reduce excessive liquidity mismatch, etc.

One advantage of macroprudential policy is that in contrast to monetary policy the potential instruments are granular enough to address the growing imbalances where they arise. On the other hand, a shortcoming of specific macro prudential policies is that they may be subject to regulatory arbitrage and therefore less effective than thought, in particular when the policies are not internationally coordinated. The direct intervention in specific markets may also come at a higher political cost if it involves specific interest groups.

What is the evidence on effectiveness? Overall, there is still limited experience with macroprudential policies in the advanced economies as the policy framework has just been established. Most of the evidence on its effectiveness comes from experiences in emerging market economies, which raises the question how relevant this evidence is for advanced economies. Typically, the existing evidence analyses to what extent macroprudential measures have been successful in reigning in credit and asset price growth. Even less evidence is available on the impact on other intermediate targets

[41] For a taxonomy of risks and instruments, see, for example, CGFS (2012).

such as the liquidity mismatch or on the overall price of risk and, most importantly, the probability of a systemic crisis.[42]

Borio and Shim (2007) provides an early assessment of 15 country experiences with prudential measures. They argue that based on the authorities' own assessments as well as on those of outside observers, these measures have, on balance, been regarded as useful. In some cases, they have been reported to have slowed down credit expansion somewhat, at least temporarily, and to have acted as a restraint on imprudent practices. This is confirmed by simple bivariate analysis which suggests that, on average, they did have a restraining effect on credit expansion and asset prices.

More recently, Lim et al (2011) provide a more comprehensive overview of the evidence on the effectiveness of macroprudential policies using three approaches. One approach is a set of case studies involving an examination of the use of instruments in a small but diverse group of countries (China, Colombia, Korea, New Zealand, Spain, the US, and some Eastern European countries). Overall, the experience is mixed. To various degrees, the instruments may be considered effective in addressing systemic risk in their respective country-specific circumstances, regardless of the size of their financial sector or exchange rate regime. At the same time, in a number of these countries, the instruments did not prevent a build-up of systemic risk. For our purposes, the experience in Spain is particularly interesting. In Spain, the authorities introduced dynamic provisioning as a macroprudential tool in 2000. The instrument appears to have been effective in helping to cover rising credit losses during the early stages of the global financial crisis, but it did not prevent the big run up in house prices and mortgage credit and its systemic collapse. This may be partly due to the cap imposed in 2005 on the size of provisions, but it may also point to the fact that the increase in capital requirements during the boom may need to be quite large before it

[42] An alternative approach to assess macroprudential policy would be to use the unified framework of Adrian, Covitz and Liang (2012). They see financial stability policies as policies that are designed to change the systemic risk/ return trade-off. More stringent regulatory and supervisory policies can raise the price of risk in periods when potential shocks are small in order to reduce systemic risk in the event of large adverse shocks. The balance between the higher pricing of risk (and therefore the higher financial intermediation costs) and the lower level of systemic risk is the crucial policy choice from a financial stability perspective.

has a restraining effect. Jimenez et al (2013) confirm this conjecture. Using detailed micro-level data they show that countercyclical dynamic provisioning smooths cycles in the supply of credit and in bad times upholds firm financing and performance, but may not be powerful enough to lean against the boom.

Lim et al (2011) also examine the performance of the target (risk) variables, such as excessive credit growth, before and after an instrument is introduced to see if they have had the intended effect. They find that, throughout the economic cycle, macroprudential instruments seem to have been effective in reducing the correlation between credit and GDP growth. In countries that have introduced caps on the loan-to-value ratio, debt-to-income ratio and reserve requirements, the correlation is positive but much smaller than in countries without them. In countries that have introduced ceilings on credit growth or dynamic provisioning, the correlation between credit growth and GDP growth becomes negative. The change in the correlations is also statistically significant, except in the case of caps on foreign currency lending and restrictions on profit distribution.

One notable example is Korea, which has introduced LTV and DTI ratios in 2002 and 2005 respectively, and more recently imposed leverage caps on FX derivatives positions and a financial stability levy on non-core FX liabilities of banks to prevent currency and maturity mismatches in the banking sector from developing. Kim (2013) presents evidence that a tightening of LTV or DTI regulations tend to be associated with a statistically significant decline in the speed at which house prices and/or mortgage lending increases (Figure 10, p4). Also the other measures taken in 2010 seem to have been effective in the FX derivative positions of particularly foreign banks and lengthening the term structure of external debt. Kim (2013) warns, however, also for unintended consequences which may worsen systemic risk.

Finally, Lim et al (2011) also perform cross-country regression analysis, which suggests that caps on the loan-to-value ratio, caps on the debt-to-income ratio, ceilings on credit or credit growth, reserve requirements, countercyclical capital requirements, and time-varying/dynamic provisioning may help dampen pro-cyclicality of credit or leverage. The results also suggest that common exposures to foreign currency risk and

wholesale funding can be effectively reduced by limits on net open positions in foreign currency and limits on maturity mismatch.

Overall, the empirical literature tentatively supports the effectiveness of macroprudential tools in dampening procyclicality, notably LTV and DTI caps to tame real estate booms, but also ceilings on credit or credit growth, reserve requirements, and dynamic provisioning (see also Crowe et al (2011) and CGFS (2012, Annex 4)). To what extent such measures are effective enough to significantly reduce systemic risk is as yet unclear.

4.2. Evidence on monetary policy and risk taking

Whether monetary policy should take an active, preventive role in maintaining financial stability also depends on how effective the standard monetary policy instrument is in leaning against growing financial imbalances and their unwinding and on to what extent the short-term interest rate is a key variable in driving the risk-taking capacity of financial intermediaries.

Adrian and Shin (2010) argue in favour of a key role for the short-term interest rate, building on a central nexus between shifts in the short-term policy rate, future bank profitability, the risk-taking capacity of financial intermediaries and real activity. In this view, relatively small changes in short-term interest rates can have a large impact on risk taking.[43] Moreover, the monetary policy stance affects risk taking of the financial system as a whole. While macroprudential policies typically are designed to target specific vulnerabilities on an ex ante basis, monetary policy affects the cost of finance for all financial institutions, even the ones in the shadow banking system that are more difficult to target via typical supervisory or regulatory actions.[44] Due to their

[43] This follows from the fact that the business of banking is to borrow short and lend long. For an off-balance sheet vehicle such as a conduit or SIV (structured investment vehicle) that finances holdings of mortgage assets by issuing commercial paper, a difference of a quarter or half percent in the funding cost may make all the difference between a profitable venture and a loss-making one. This is because the conduit or SIV, like most financial intermediaries, is simultaneously both a creditor and a debtor — it borrows in order to lend. See Adrian and Shin (2010).

[44] Proponents of monetary policy leaning against the wind often rely on this argument as is illustrated by the following quotes: Monetary policy "sets the universal price of leverage and is not subject to regulatory arbitrage" (Borio and Drehmann, 2009); It allows CBs "to influence the behaviour of institutions that escape the regulatory perimeter" (Cecchetti and Kohler, May 2012) and it "gets in all of the cracks and may reach into corners of the market that supervision and regulation cannot" (Gov. Stein, Feb 2013).

narrow focus, supervisory and regulatory tools may simply end up pushing vulnerabilities into other parts of the financial system where only monetary policy is an effective policy tool.

The main counterargument points to the blunt nature of standard monetary policy tightening and the large collateral damage that could result from attempts at reigning in growing asset price bubbles. In this view, short-term interest rates would have to be increased by a large amount to lower double-digit credit growth and effectively lean against overly optimistic expectations (see, e.g. Blanchard, Dell'Ariccia and Mauro (2009), Gerlach (2010)). Moreover, in this view, interest rate changes are a poor tool for targeting tail outcomes, whereas regulatory and supervisory tools may be able to more directly address financial vulnerabilities that emanate from specific markets or institutions.[45]

Following Rajan (2005) and Borio and Zhu (2008), an increasing number of papers have both theoretically and empirically investigated the link between the monetary policy stance and the risk-taking behaviour of banks and other investors. A recent survey can be found in De Nicolò, Dell'Ariccia, Laeven and Valencia (2010).[46] In this section we review some of the evidence for the euro area. This evidence is related to the question whether monetary policy was too loose in the boom and has contributed to the building up of imbalances.

Before doing so, it is worth distinguishing between two main channels of transmission. One is working through leverage and the riskiness on the asset side. In their review, De Nicolò et al (2010) distinguish between i) portfolio reallocation such as the asset substitution, search for yield (Rajan, 2005) and procyclical leverage (Adrian and Shin, 2009) channels which will tend to increase the share of risky assets and ii) risk shifting which will tend to lower risk taking. The latter effect will be larger, the better capitalised the financial sector is and the more skin-in-the-game there is. The other main channel is working mainly through the funding side like in Stein (2013). Easy monetary policy increases incentives to use more short-term

[45] It is worth noting that in crisis times non-standard monetary policy measures may be more appropriate for addressing some of those tail risks.

[46] Holmström and Tirole (1998) is a classic reference on the impact of liquidity injections.

funding (See also Allen and Gale (2007), Diamond and Rajan (2009) and Acharya and Naqvi (2010)). Adrian and Shin (2010) provide evidence that increases in the Fed Funds target are associated with declines in the short term funding liabilities. In reality, both channels are likely to interact and strengthen each other (as in Brunnermeier and Pedersen (2009)).[47]

In the light of the review of developments in the euro area in section 2, one of the most interesting pieces of research is a series of papers by Jiménez et al which uses detailed credit register data to investigate the risk-taking channel in Spain. Peydro-Alcalde and Ongena (2011) summarise the impact of short-term interest rates on the risk composition of the supply of credit. They find that lower rates spur greater risk-taking by lower-capitalised banks and greater liquidity risk exposure. They highlight three main results for a decrease in the overnight interest rate (even when controlling for changes in the ten-year government-bond interest rate):

(1) On the intensive margin, a rate cut induces lowly capitalized banks to expand credit to riskier firms more than highly capitalized banks, where firm credit risk is either measured as having an ex ante bad credit history (i.e. past doubtful loans) or as facing future credit defaults.

(2) On the extensive margin of ended lending, a rate cut has if anything a similar impact, i.e. lowly capitalized banks end credit to riskier firms less often than highly capitalized banks.

(3) On the extensive margin of new lending, a rate cut leads lower-capitalized banks to more likely grant loans to applicants with a worse credit history, and to grant them larger loans or loans with a longer maturity. A decrease in the long-term rate has a much smaller or no such effects on bank risk-taking (on all margins of lending).

The results in Jiménez et al (2011) suggest that, fully accounting for the credit-demand, firm, and bank balance-sheet channels, monetary policy affects the composition of credit supply. A lower monetary-policy rate spurs bank risk-taking. Suggestive of excessive risk-taking are their findings that risk-taking occurs especially at banks with less capital at stake, i.e. those afflicted by agency problems,

[47] Angeloni et al (2013) test, in a VAR context, for the two channels of increased bank risk by including measures of funding risk and borrower risk and overall bank risk. They argue that the transmission works primarily through funding risk. They also show that overall bank risk as measured by volatility of bank equity prices has a large impact on output.

and that credit risk-taking is combined with vigorous liquidity risk-taking (increase in long-term lending to high credit risk borrowers) even when controlling for a long-term interest rate.[48]

These findings are confirmed by related research by Altunbas et al (2012) and Paligorova and Santos (2012). Using the KMV probability of default as a bank risk indicator, Altunbas et al (2012) show that easy monetary policy reduces bank risk in the short run, but increases it in the longer run. Paligorova and Santos (2012) investigate banks' corporate loan pricing policies in the United States over the past two decades and find that monetary policy is an important driver of banks' risk taking incentives. They show that banks charge riskier borrowers (relative to safer borrowers) a smaller premium in periods of easy monetary policy compared to periods of tight monetary policy. Using individual bank information about lending standards from the Senior Loan Officers Opinion Survey, they unveil evidence that the interest rate discount that riskier borrowers receive in periods of easy monetary policy is prevalent among banks with greater risk appetite. This finding confirms that the observed loan pricing discount is indeed driven by the bank risk-taking channel of monetary policy.

The important conclusion from this research is that monetary policy interacts with bank regulation. Banks that are sufficiently capitalised do not suffer from the risk-taking incentive when interest rates are low, consistent with the theoretical findings of the risk-shifting channel by Dell'Ariccia et al (2010).

One important question is whether these results are macro-economically relevant. Maddaloni and Peydro-Alcalde (2011) use a data set of euro area and US bank lending standards to show that low policy-controlled interest rates soften standards, for household and corporate loans. These effects are also economically important as

[48] These results are confirmed by Ioannidou et al (2009) who focus on the pricing of the risk banks take in Bolivia (relying on a different and complementary identification strategy to Jiménez, et al 2011 and studying data from a developing country). Examining the credit register from Bolivia from 1999 to 2003, they find that, when the US federal-funds rate decreases, bank credit risk increases while loan spreads drop (the Bolivian economy is largely dollarised and most loans are dollar-denominated making the federal-funds rate the appropriate but exogenously determined monetary-policy rate). The latter result is again suggestive of excessive bank risk-taking following decreases in the monetary-policy rate. Despite using very different methodologies, and credit registers covering different countries, time periods, and monetary policy regimes, both papers find strikingly consistent results.

the impact of a one-standard deviation decrease of Taylor-rule residuals is more than five times higher than the softening due to a comparable increase of real GDP growth. This softening – especially for mortgages – is amplified by securitisation activity, weak supervision for bank capital and monetary policy rates that stay too low for longer. They also provide some suggestive evidence on the linkages between the excessive softening of lending standards and the costs of the crisis. Countries that prior to the financial crisis had softer lending standards related to comparatively low monetary policy rates experienced a worse economic performance afterwards, measured by real, fiscal and banking variables. Finally, the evidence that low long-term rates do not have this impact may suggest that one important channel works through the funding side as financial intermediaries rely mostly on short-term funding (see Maddaloni and Peydro (2011), Figures 1 and 2, and table 6).

Moreover, there is quite a bit of evidence that changes in bank lending standards also have significant effects on both credit growth and economic activity. Ciccarelli et al (2010 and 2013) further explore the link between monetary policy, bank lending standards and economic activity and inflation in the euro area using a panel VAR model. They decompose changes in total lending standards in two variables using the answers related to the factors affecting these changes. Innovations to changes of credit standards due to banks' changes in balance sheet strength and competition are interpreted as a measure of credit supply (bank lending channel), and an innovation to change of credit standards due to firms' (households') changes in balance sheet strength as a measure of borrower's quality (firm/household balance-sheet channel). Overall they find that a monetary policy easing has a significant effect on economic activity and inflation through both the bank lending and balance sheet channel. Somewhat surprisingly, they find that the pure bank lending channel is more relevant for loans to businesses than to households. Ciccarelli et al (2013) show how the amplification effects through respectively the broad balance sheet channel and the bank lending channel changes over time in line with the conditions affecting the banking sector and the non-standard policies supporting liquidity provision. Overall, they find that outside the heat of the financial crisis, the broad balance sheet channel is more important than the bank lending channel.

While the literature review above suggests that the risk taking channel is active, various authors have argued that standard estimated multipliers of a monetary policy tightening on asset prices, credit and economic activity would suggest that attempts at reigning in asset price bubbles would require large interest rate changes with negative consequences for economic activity. For example, simulations by Bean et al. (2010) suggest that, to stabilise real house prices in the UK from 2004 on, interest rates would have to have been several percentage points higher and, by mid-2007, GDP 3.3% lower. Bean et al (2010) conclude: "But, at least most of the time, monetary policy does not seem like the most appropriate instrument to call on – it is not targetd at the key friction and involves too much collateral damage to activity". Moreover, as argued by Broadbent (2013), domestic mortgages, the most interest rate-sensitive part of their domestic balance sheets, accounted for less than a quarter of UK banks' assets immediately prior to the crisis and have contributed only a tiny fraction of their losses. Instead, it was losses on overseas assets – including US mortgages – that did most of the damage. So while stabilising domestic house prices would probably have involved material costs in foregone output, it's less clear it would have done much to reduce the likelihood or costs of the financial crisis. Similarly, Gerlach (2010) argues that the effects of a policy tightening on house prices is much less than on output, suggesting large collateral damage of leaning against house price bubbles.

The existing empirical analysis is, however, mostly performed using linear regression methodologies. In order to make a more thorough cost-benefit analysis it is important that non-linear approaches are developed which capture the possibly time-varying nature of interest rate changes on credit and house prices their effect on the probability of crises. Some early attempts at estimating such models are Hubrich and Tetlow (2012) and Hartmann, Hubrich, Kremer and Tetlow (2013). Similarly, the focus on credit and asset prices in this analysis ignores the important link with increasing fragility due to a shortening and much more complex liability side. One challenge for both analytical and empirical approaches is to combine the build-up of vulnerabilities on the asset side with those on the liability side.

5. The institutional framework

A recent BIS report (the "Ingves report") discusses the variety of ways in which central banks fulfil their macroprudential functions alongside their other roles. In some countries (like Malaysia and the United Kingdom), the central bank has clear responsibility for both macroprudential and microprudential policy. In others, central bankers account for a large share of the votes in the committee (as in the ESRB). In the US arrangements, the Federal Reserve is one of 10 voting members of the FSOC, but it is charged with the regulation of systemically important banks and non-bank financial institutions, as designated by FSOC.

Giving the central bank a strong macroprudential policy objective (with the appropriate instruments) in addition to its price stability objective has a number of advantages. It allows for a better information sharing and coordination amongst both policy domains. It ensures that macroprudential policy is pursued by an independent institution with a lot of expertise in macroeconomic and financial surveillance. Finally, as lenders of last resort, central banks have an incentive to reduce the probability of a financial crisis, because they will be the first in line to clean up when the risks materialise. At the same time, there are two main challenges. First, as macroprudential policy is unlikely to fully prevent financial crises, there is a risk that the reputation of the central bank is damaged which may affect its independence and credibility also with respect to its monetary policy mandate. Second, when both objectives are equally ranked, it may give rise to time-inconsistency problems as ex-post monetary policy will have an incentive to inflate away some of the debt overhang and ex ante macroprudential policies may succumb to political pressures not to lean too much against the boom and rely on monetary policy to solve part of the debt overhang. [49]

Both risks can be mitigated by clearly separating the objectives, instruments, communication and accountability of both policy domains (even if they are performed by the same institution), while maintaining the benefits from information sharing. In particular, in order to avoid the time-inconsistency problem and also to ensure clear

[49] Macroprudential calibrations are often based on discretion and judgment rather than rules, although some countries have used rule-based instruments. While rules have merits – they can help to overcome policy inertia, enhance accountability, and create greater certainty for the industry – designing them may be difficult, especially when multiple instruments are being used in combination. This is why rules are often complemented with discretion.

accountability, it is important that price stability remains the monetary authorities' primary objective. A lexicographic ordering with the price stability objective coming before the financial stability objective will avoid an inflationary bias that may arise from the central bank's involvement in financial stability, while ensuring that financial stability concerns are still taken into account. Such a credible mandate of the monetary authorities will also give the right incentives for the macroprudential policy makers to lean against the build-up of leverage and growing imbalances and not rely on inflation to solve their problems.

In order to illustrate this, we use a simplified version of the static model analysed in Ueda and Valencia (2012). In this model, the objective of policy makers is to minimise the following loss function:

(1) $\frac{1}{2}(\pi)^2 + \frac{a}{2}(y - y^*)^2 + \frac{b}{2}(\theta - \theta^*)^2$

where π is inflation, y is output, θ is leverage and the starred variables are optimal targets. We assume the inflation target is zero. The first two terms of the loss function are standard. The last one captures the cost of a debt overhang and the associated financial crisis.

The economy is given by the following two equations:

(2) $y = \bar{y} + \alpha(\pi - \pi^e) + \beta\delta$

(3) $\theta = \bar{\theta} - (\pi - \pi^e) + \delta$

Equation (2) is a standard Phillips curve with an additional term reflecting the impact of macroprudential policy. Output is positively affected by unexpected inflation and by an easing of macroprudential policy. Think of δ as a macroprudential instrument positively affecting credit growth or negatively the cost of finance. Changes in macroprudential policy work like a cost-push shock. For example, a lowering of capital requirements (or an increase in the threshold for leverage) reduces the cost of capital, which in turn increases output and reduces inflation (e.g. through a working capital channel). The second equation determines ex-post leverage. Higher unexpected inflation (and possibly output) will tend to reduce the debt overhang, whereas looser macroprudential policy will tend to increase the debt overhang.

Furthermore, we assume that $\bar{y} < \hat{y}$, reflecting the fact that potential output is lower than steady-state output, a standard assumption in the Barro-Gordon literature, which gives an incentive to boost output, and that $\bar{\theta} > \hat{\theta}$, reflecting the assumption that there is a tendency for the financial sector to over-accumulate debt, for example, because of pecuniary externalities due to fire sale dynamics in the bust.[50]

This static model can be seen as illustrating the steady-state effects of a financial stability objective on monetary policy. We analyse two cases. First, assume that the central bank sets both monetary and macroprudential policy to minimise the loss function and can commit to these policies. This setting will give rise to the first best in this simple example. In this case, the central bank can credibly affect inflation expectations and we can set $\pi^e = \pi$ in equations (2) and (3). The central bank minimises loss function (1) subject to equations (2) and (3). The first-order-conditions with respect to inflation (π) and macroprudential policy (δ) are respectively:

(4) $\delta = \frac{a\beta}{a\beta^2+b}(\hat{y} - \bar{y}) - \frac{b}{a\beta^2+b}(\bar{\theta} - \hat{\theta})$

(5) $\pi = 0$

Monetary policy sets inflation equal to zero (the inflation target) and macroprudential policy is set so as to optimally trade off the advantages of higher output versus the costs of a higher debt overhang. A higher steady-state distortion in output will lead to loser macroprudential policy, whereas a higher tendency to overaccumulate debt will result in tighter macroprudential policy. Whether there will be net tightening depends on the relative size of both distortions, their relative cost and the relative effectivess of macroprudential policy.[51] We will assume that on balance macroprudential policy is tightened in the first best solution.

How can this first-best solution be implemented in an environment where the authorities cannot commit? As discussed above, when there is a debt overhang it is very likely that monetary policy will be the last one moving. It is therefore reasonable to assume that the macroprudential decision makers set policy taking the monetary policy reaction function as given (a Stackelberg equilibrium with the macroprudential

[50] See Korinek (2012), Bianchi (2010), Lorenzoni (2010) etc. for models in which pecuniary externalities due to fire sales give a rationale for ex ante prudential policy.

[51] In a more complete model, the costs of debt overhang need of course to be related to lower output. However, this way, we maintain the linear-quadratic structure.

authorities moving first). If the monetary authority has price stability as its sole objective, then the first-best can be replicated. The monetary authority will set inflation equal to zero. The macroprudential authority will realise this and will therefore have no incentive to relax macroprudential policy in order to have a higher output and let the monetary authorities do part of the work. Macroprudential policy will be set as in equation (4). This will be independent on whether the macroprudential policy authorities care about inflation or not.

The first-best will not be achieved if the monetary authority also cares about financial stability. If the monetary authority has a loss function with both price stability and financial stability (i.e. the first and third term of equation (1)), the monetary authority's reaction function will be given by:

(6) $$\pi = b\left(\bar{\theta} - \hat{\theta}\right) - b(\pi - \pi^e) + b\delta$$

Inflation will be higher, the higher the debt overhang and the easier macroprudential policy. Knowing this, the macroprudential authority will have an incentive to make use of the fact that the monetary authority will accommodate a part of the debt overhang. The financial stability objective gives rise to an inflation bias.

To see this, assume the macroprudential authority minimises losses from output and leverage deviations taking the monetary policy reaction into account. Under rational expectations, this yields the following reaction function:

(7) $$\delta = \frac{a(\beta(1+b)+\alpha b)}{b+\alpha\beta(\beta(1+b)+\alpha b)}(\hat{y} - \bar{y}) - \frac{b}{b+\alpha\beta(\beta(1+b)+\alpha b)}(\bar{\theta} - \hat{\theta})$$

Comparing equation (7) with (4), it is easy to show that the reaction coefficient to the output gap is greater in (7), whereas the reaction coefficient in absolute terms to the leverage gap is smaller. In other words, because the macroprudential authority knows the monetary authority will have an incentive to inflate part of the debt overhang away, it will chose an easier macroprudential policy stance favouring output and allowing for a larger debt accumulation. The end result is a somewhat higher output, but also higher debt accumulation and an inflation bias. The inflation bias is larger than the one which would result from the time-inconsistency problem that would

result from the fact that ex-post a monetary authority that cannot commit will always have an incentive to inflate part of the debt away.

6. Conclusions

The financial crisis has highlighted the importance of financial stability for economic stabilisation and monetary policy. In this paper we illustrated this point by briefly reviewing the experience in the euro area over the past decade, which was characterised by stable inflation and a very costly boom and bust in credit and asset prices. Some of the lessons learned are very clear: Both macro and microprudential policies need to be strengthened in order to increase the resilience of the financial sector and reduce its procyclicality. The implications for the monetary policy framework are, however, more debated, with some arguing for minimal changes to the price stability oriented frameworks that existed before the crisis and others arguing for a radical rethink putting financial stability at equal footing with price stability as a monetary policy objective. After reviewing the various arguments and the empirical evidence in this paper, I find myself in the middle ground. The costs of financial instability and systemic financial crises are very large: just cleaning up is no longer an option. The new macroprudential policy framework is, however, still very much under construction and its effectiveness in avoiding systemic crises largely unproven. At the same time, there is evidence that the standard monetary policy stance intimately interacts with important drivers of financial imbalances such as credit, liquidity and risk taking. And various non-standard monetary policy instruments used in the recent crisis (such as reserve requirements, collateral rules and asset purchases) are difficult to distinguish from macroprudential tools both in their intermediate objectives (addressing financial market malfunctioning) and in their transmission channels. All these arguments would argue for making financial stability an explicit objective of monetary policy. But doing so entails important risks. First, as policy makers are unlikely to fully prevent financial crises, there is a risk that the reputation of the central bank is damaged which may affect its overall independence and credibility. Second, when both objectives are equally ranked, it may give rise to time-inconsistency problems as monetary policy ex-post has an incentive to inflate away some of the debt overhang associated with financial crises. More generally a concern for financial stability may lead to “so-called” financial dominance. To

mitigate these risks, it is important that price stability remains the primary objective of monetary policy and a lexicographic ordering with financial stability is maintained. This will allow the central bank to lean against the wind (if necessary), while maintaining its primary focus on price stability in the medium term.

Another issue is whether macroprudential policy and monetary policy should be put under one central bank roof. In section 5 we listed a number of important arguments in favour related to synergies, expertise, independence and aligned incentives. However, in order to mitigate some of the risks mentioned above, it is advisable to clearly separating the objectives, instruments, communication and accountability of both policy domains, even if they are performed by the same institution.

References:

Acharya, V. and H. Naqvi (2010), “The seeds of a crisis: A theory of bank liquidity and risk-taking over the business cycle”, New York University.

Adrian, Tobias and Hyun Song Shin. (2008) "Financial Intermediaries, Financial Stability, and Monetary Policy, " 2008 Jackson Hole Economic Symposium Proceedings, Federal Reserve Bank of Kansas City, pp. 287-334.

Adrian, T. and H.S. Shin (2009), “Money, liquidity and monetary policy”, American Economic Review, Papers and Proceedings 99, pp. 600-605.

Adrian, Tobias and Hyun Song Shin (2010) "Financial Intermediaries and Monetary Economics", in Friedman, Benjamin M and Michael Woodford (eds), Handbook of Monetary Economics. New York: Elsevier.

Agur, I. and M. Demertzis (2011), “Monetary policy and excessive bank risk taking”, DNB Working Paper 271, 2011.

Allen, F. and D. Gale (2007), Understanding financial crises, Oxford University Press, 2007.

Angelini, P., S. Neri and F. Panetta (2011), “Monetary and macroprudential policies”, Banca d’Italia Discussion Paper, 801.

Angeloni, I., E. Faia and M. Lo Duca (2013), “Monetary policy and risk taking”, mimeo, Safe.

Altunbas, Yener, Leonardo Gambacorta, and David Marques-Ibanez, 2012, “Do Bank Characteristics Influence the Effect of Monetary Policy on Bank Risk?” ECB Working Paper Series 1427 (Frankfurt am Main: European Central Bank).

Angelini, Paolo, Stefano Neri, and Fabio Panetta, 2011, “Monetary and Macroprudential Policies,” Bank of Italy Working Paper 801 (Rome: Banca d’Italia).

Auer, R. (2012), “What drives Target2 balances? Evidence from a panel analysis”, Swiss National Bank Working Papers 2012-15.

Baillu, Jeannine, Cesare Meh, and Yahong Zhang, 2012, “Macroprudential Rules and Monetary Policy When Financial Frictions Matter,” Bank of Canada Working Paper 12–06 (Ottawa: Bank of Canada).

Baldwin, R. and L. Reichlin (eds), , Is inflation targeting dead? Vox-EU e-book.

Bank for International Settlements (2011), “Central bank governance and financial stability”, A report by a study group under the chairmanship of Stefan Ingves, Governor, Sveriges Riksbank, May 2011.

Bean, Charles, Matthias Paustian, Adrian Penalver, and Tim Taylor, 2010, “Monetary Policy after the Fall,” in Macroeconomic Challenges: The Decade Ahead: Proceedings of the Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole, 2010 (Kansas City: Federal Reserve Bank).

Beau, D., L. Clerc, and B. Mojon, 2011, “Macro-prudential Policy and the Conduct of Monetary Policy,” Bank of France Occasional Paper 8 (Paris: Banque de France).

Bernanke, B. and M. Gertler (1999), „Moneary policy and asset price volatility“, in New Challenges for Monetary Policy, 77-128. Federal Reserve Bank of Kansas: Kansas City.

Bernanke, B. (2013), “Long-term interest rates”, Speech held at the Annual Monetary/Macroeconomics Conference: The past and future of monetary policy, sponsored by Federal Reserve Bank of San Francisco, San Francisco, California.

Bianchi, J. (20..), American Economic Review.

Blanchard, O., G. Dell’Ariccia and P. Mauro (2009), „Rethinking macroeconomic policy, IMF.

Borio, C. (2003), “Towards a macroprudential framework for financial supervision and regulation?”, CESifo Economic Studies, 49, 2/2003, 181-216.

Borio, Claudio, Craig Furfine, and Philip Lowe (2001). "Procyclicality of the Financial System and Financial Stability: Issues and Policy Options," BIS papers 1.

Borio, C. and P. Lowe (2002), “Asset prices, financial and monetary stability: Exploring the nexus”, BIS Working Paper 114, 2002.

Borio, C. and W. White (2003). "Whither Monetary and Financial Stability? The Implications of Evolving Policy Regimes," Proceedings of the Kansas City Fed Economic Symposium.

Borio, C, (2011), “Implementing a Macroprudential Framework: Blending Boldness and Realism”, Capitalism and Society 6(1): Article 1.

Borio, C and I Shim (2007), “What Can (Macro-)Prudential Policy Do to Support Monetary Policy?”, BIS Working Papers 242.

Borio, C. (2010), “Implementing a Macroprudential Framework: Blending Boldness and Realism,” Keynote address for the BIS-HKMA conference on Financial Stability: Towards a Macroprudential Approach, 5–6 July 2010.

Borio, Claudio and Haibin Zhu (2008) "Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism", Working Paper 268, Bank for International Settlements.

Brunnermeier, M. and Y. Sannikov (2013), „Reviving money and banking“, in Baldwin and Reichlin (eds), Is inflation targeting dead?, CEPR e-book.

Bruno, Valentina, and Hyun Song Shin, 2012, “Capital Flows and the Risk-Taking Channel of Monetary Policy,” presented at the 11th BIS Annual Conference (Basel: Bank for International Settlements).

Cecchetti, S. M. Mohanty and F. Zampolli (2011), “The real effects of debt”, BIS Working Papers 352, September 2011.

Cecchetti, S. and M. Kohler (2012), „When capital adequacy and interest rate policy are substitutes (and when they are not)“, BIS Working Papers 379, May 2012.

CGFS (2012), “Operationalising the selection and application of macroprudential instruments”, Report submitted by a Working Group established by the Committee on the Global Financial System. The Group was chaired by José Manuel González-Páramo, CGFS Papers No 48, December 2012

Ciccarelli, M., A. Maddaloni, and J.L. Peydró (2010), „Trusting the bankers: Another look at the credit channel of monetary policy“, ECB Working Paper 2010.

Ciccarelli, Matteo, Angela Maddaloni, and José-Luis Peydró, “Heterogeneous Transmission Mechanism: Monetary Policy and Financial Fragility in the Euro Area,” ECB mimeo, Economic Policy, forthcoming (Frankfurt am Main: European Central Bank).

Cour-Thimann, P. (2013), “Target balances and the crisis in the euro area”, CESifo Forum 14, April 2013.

Crockett, Andrew, 2000, “Marrying the Micro- and Macro-prudential Dimensions of Financial Stability,” remarks before the Eleventh International Conference of Banking Supervisors, September 20–21 (Basel).

Crowe, Dell’Ariccia, Igan and Rabanal, How to Deal with Real Estate Booms: Lessons from Country Experiences, IMF Working Paper 11/91, April 2011.

Curdia, V. and M. Woodford (2011), “The central bank balance sheet as an instrument of monetary policy”, Journal of Monetary Economics, 58: 54-79.

De Carvalho Filho, Irineu Evangelista (2011), “28 Months Later: How Inflation Targeters Outperformed Their Peers in the Great Recession”, The B.E. Journal of Macroeconomics 11(1), article 22.

De Larosière (2009), The de Larosière report, The high-level group on financial supervision in the EU, Brussels, 25 February 2009.

Dell’Arricia and Marquez (2012). "The Role of Real Interest Rates on Bank Leverage and Risk Taking," International Monetary Fund Working Paper

Dell’Ariccia, Giovanni, Luc Laeven, and Robert Marquez, 2010, “Monetary Policy, Leverage, and Bank Risk-Taking,” IMF Working Paper 10/276 (Washington: International Monetary Fund).

De Nicolò, Gianni, Giovanni Dell'Ariccia, Luc Laeven, and Fabian Valencia, 2010, "Monetary Policy and Bank Risk Taking," IMF Staff Position Note 10/09 (Washington: International Monetary Fund).

De Paolo. B. and M. Paustian (2013), "Coordinating monetary and macroprudential policies", mimeo, Bank of England.

Diamond, D. and R. Rajan (2009), "Illiquidity and interest rate policy", 2009.

Drehmann, M., C. Borio and K. Tsatsaronis (2012), "Characterising the financial cycle: Don't lose sight of the medium term", BIS Working Papers 380, June 2012.

Eichengreen, B., E. Prasad and R. Rajan (2011), "Central banks need a bigger and bolder mandate", Financial Times, 24 October 2011.

European Systemic Risk Board (2011), Recommendation of the ESRB of 22 December 2011 on the macro-prudential mandate of national authorities (ESRB/2011/2)

European Central Bank (2012), Report on the first two years of the Macroprudential Research Network, October 2012.

Fahr, S., R. Motto, M. Rostagno, F. Smets and O. Tristani (2010), "Lessons for monetary policy strategies from the recent past", in Jarocinski, M., F. Smets and C. Thimann (eds), Approaches to monetary policy revisited – Lessons from the crisis, Sixth ECB Central Banking Conference, 18-19 November 2010.

Fahr, S., R. Motto, M. Rostagno, F. Smets and O. Tristani (2013),

Gale, D. (2010)

Gambacorta, Leonardo and David Marqués-Ibáñez, 2011, "The new bank lending channel: Evidence from the crisis," Economic Policy, Vol. 6, pp. 135–182.

Gelain, P., K. Lansing and C. Mendicino (2012), "House prices, credit growth, and excess volatility: Implications for monetary and macroprudential policy", Norges Bank Research Working Paper 2012/08.

Gerlach, Stefan, Alberto Giovannini, Cédric Tille, and José Viñals, 2009, "Are the Golden Years of Central Banking Over? The Crisis and the Challenges," Geneva Reports on the World Economy 10.

Gerlach, S. (2010), "Asset prices and monetary policy: Some sceptical observations", in M. Balling, J.M. Berk and M.O. Strauss-Kahn (eds), The quest for stability: The macro view, Vienna, Suerf, 2010.

Greenspan, A. (2002), "Opening remarks", in Rethinking Stabilisation Policy, 1-10, Federal Reserve Bank of Kansas: Kansas City.

Hanson, Samuel G., Anil K. Kashyap, and Jeremy C. Stein (2011). "A Macroprudential Approach to Financial Regulation," *Journal of Economic Perspectives*, Vol. 25(1), 3-28.

Holmström, Bengt, and Jean Tirole (1998). "Private and Public Supply of Liquidity," *Journal of Political Economy*, Vol. 106(1), 1-40.

Igan, Deniz, and Heedon Kang, 2011, "Do Loan-to-Value and Debt-to-Income Limits Work? Evidence
from Korea," IMF Working paper 11/297 (Washington: International Monetary Fund).

IMF (2013), The interaction of monetary and macroprudential policies, IMF.

Ioannidou, Vasso P, Steven Ongena, and José-Luis Peydró (2009) "Monetary Policy, Risk-Taking and Pricing: Evidence from a Quasi-Natural Experiment", mimeo, CentER - Tilburg University/European Central Bank.

Issing, O. (2002), "Monetary policy in a changing economic environment", speech delivered at the symposium on "Rethinking stabilisation policy", sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August.

Issing, O. (2003), "Monetary and financial stability: Is there a trade-off?", BIS Working Paper, 18, 2003.

Issing, O. (2011), "Lessons for Monetary Policy: What Should the Consensus Be?", Working Paper 11/97, IMF.

Jacome, L. and E. Nier (2011), "Macroprudential policy: Protecting the whole", Finance and Development, IMF.

Jiménez, Gabriel, Steven Ongena, José-Luis Peydró, and Jesús Saurina, (2011), "Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say about the Effects of Monetary Policy on Credit Risk-Taking?", Forthcoming Econometrica.

Jiménez, Gabriel, Steven Ongena, José-Luis Peydró and Jesús Saurina (2012). "Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan Applications," *American Economic Review* 102(5), 2301-26.

———, 2012, "Macroprudential Policy, Countercyclical Bank Capital Buffers and Credit Supply: Evidence from the Spanish Dynamic Provisioning Experiments," mimeo, Tilburg University.

Kannan, Prakash, Pau Rabanal, and Alasdair Scott, 2009, "Monetary and Macroprudential Policy Rules in a Model with House Price Booms," IMF Working Paper 09/251 (Washington: International Monetary Fund).

Kashyap, A. and J. Stein (2012).

Kim, C. (2013), “Macroprudential policies: Korea’s experiences”, Paper presented at the Rethinking Macro Policy II: First Steps and Early Lessons conference, hosted by the IMF, Washington, DC, 16-17 April 2013.

Lambertini, L., C. Mendicino and M.T. Punzi (2011), “Leaning against boom-bust cycles in credit and housing prices”, Banco de Portugal Working Paper, 8, 2011.

Lim, C., F. Columba, A. Costa, P. Kongsamut, A. Otani, M. Saiyid, T. Wezel, and X. Wu (2011), “Macroprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences”, IMF Working Paper 11/238.

Maddaloni, Angela and Jose-Luis Peydró (2011) "Bank Risk-taking, Securitization, Supervision, and Low Interest Rates: Evidence from Euro-area and US Lending Standards", Review of Financial Studies 24: 2121-2165.

Merler, S. and J. Pisani-Ferry (2012), “Sudden stops in the euro area”, Breugel policy contribution, Issue 2012/06, March 2012.

Mishkin, F. (2010), “Monetary policy strategy: Lessons from the crisis”, in Jarocinski, Smets and Thimann (eds), “Approaches to monetary policy revisited: Lessons from the crisis”, Sixth ECB Central Banking Conference, 18-19 November 2010, ECB.

Nier, Erlend (2012), “The interaction of monetary and macroprudential policies”, IMF background paper.

Paligorova, T. and J.A.C. Santos, “Monetary Policy and Bank Risk-Taking: Evidence from the Corporate Loan Market” (July 31, 2012). Available at SSRN: http://ssrn.com/abstract=1991471 or http://dx.doi.org/10.2139/ssrn.1991471

Rajan, R. (2005)

Reinhart, C. and K. Rogoff (2009), This time it is different: Eight centuries of financial folly. Princeton, NJ: Princeton Press.

Reinhart, C. and K. Rogoff (2010), “Growth in a time of debt”, American Economic Review, 100(2), 573-78, May.

Schoenmaker, D. (2011), “The financial trilemma”, Economics Letters, 111, 57-59.

Smets, F. (2010), “Commentary: Modeling inflation after the crisis”, in Macroeconomic Challenges: The decade ahead, 2010 Economic Policy Symposium hosted by the Federal Reserve Bank of Kansas City in Jackson Hole, Wyoming on 26-28 August 2010.

Smets, F. (2012), “

Steven Ongena, José-Luis Peydró (2011), Loose monetary policy and excessive credit and liquidity risk-taking by banks, Vox-eu column, 25 October 2011.

Stein, Jeremy C. (2012). "Monetary Policy as Financial Stability Regulation," Quarterly Journal of Economics, Vol. 127(1), 57-95.

Stein, Jeremy (2013), “Overheating in credit markets: Origins, measurement, and policy responses”, speech at the “Restoring Household Financial Stability after the Great Recession: Why Household Balance Sheets Matter”, research symposium sponsored by the Federal Reserve Bank of St. Louis, Missouri.

Svensson, L. (2012), “The relation between monetary policy and financial stability policy”, International Journal of Central Banking 8, Supplement 1 (2012), 293-295.

Svensson, L. (2012), “Comment on Michael Woodford, “Inflation targeting and financial stability”, Sveriges Riksbank Economic Review, 2012:1, 33-40.

Taylor, John (2010), “Getting Back on Track: Macroeconomic Lessons from the Financial Crisis”, Federal Reserve Bank of Saint Louis Review, May-June, 165-176.

Trichet, J.C. (2004), “Key issues for monetary policy: An ECB view”, keynote at the National Association of Business Economics, Philadelphia, October.

Ueda, K. and F. Valencia (2012), “Central bank independence and macro-prudential regulation”, IMF Working Paper WP/12/101.

Van Wijnbergen, S. and T. Homar (2013), “Recessions after systemic banking crises: Does it matter how governments intervene?”, Tinbergen Institute Discussion Papers 13-039/VI/DSF54, Tinbergen Institute.

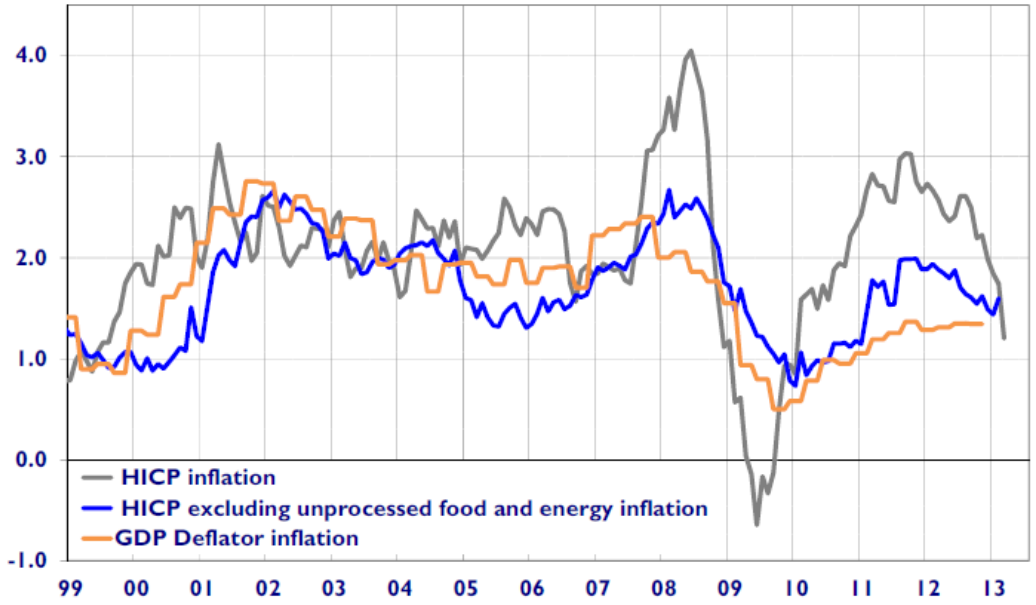
White, W. (2006), “Is price stability enough?”, BIS Working Papers, 205, April.

Woodford, Michael (2011). "Monetary Policy and Financial Stability," Columbia University Working Paper presented at the 2011 NBER Summer Institute.

Woodford, M. (2012), “Inflation targeting and financial stability”, Sveriges Riksbank Economic Review, 2012:1, 7-32.

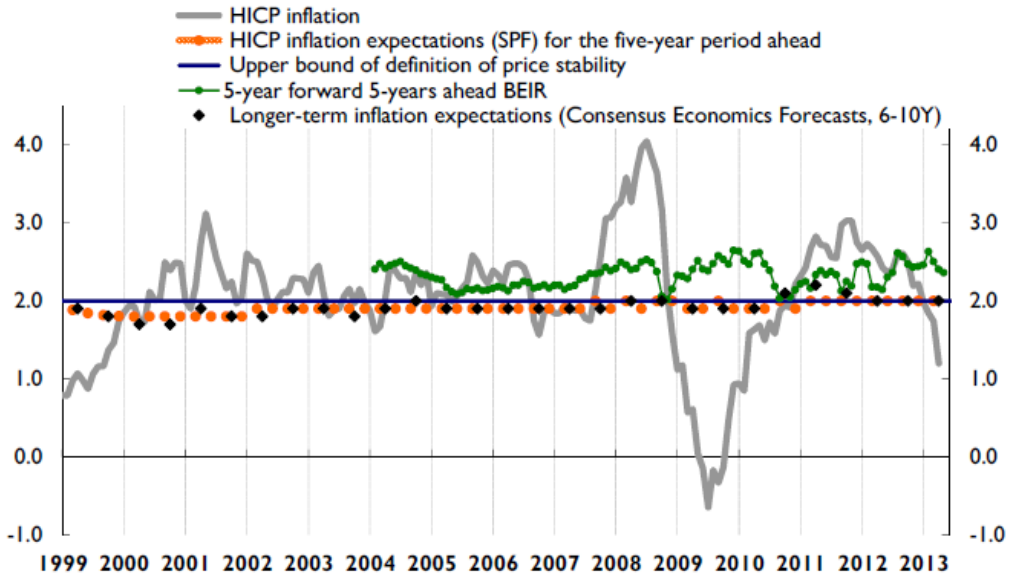
Woodford, M. (2013), “Inflation targeting: Fix it, don’t scrap it”, in Baldwin and Reichlin (eds), Is inflation targeting dead?, CEPR e-book.

Chart 1: Inflation developments in the euro area



Sources: Eurostat.
Last observation: March 2013, 2012Q4 for GDP deflator.

Chart 2: Inflation and inflation expectations

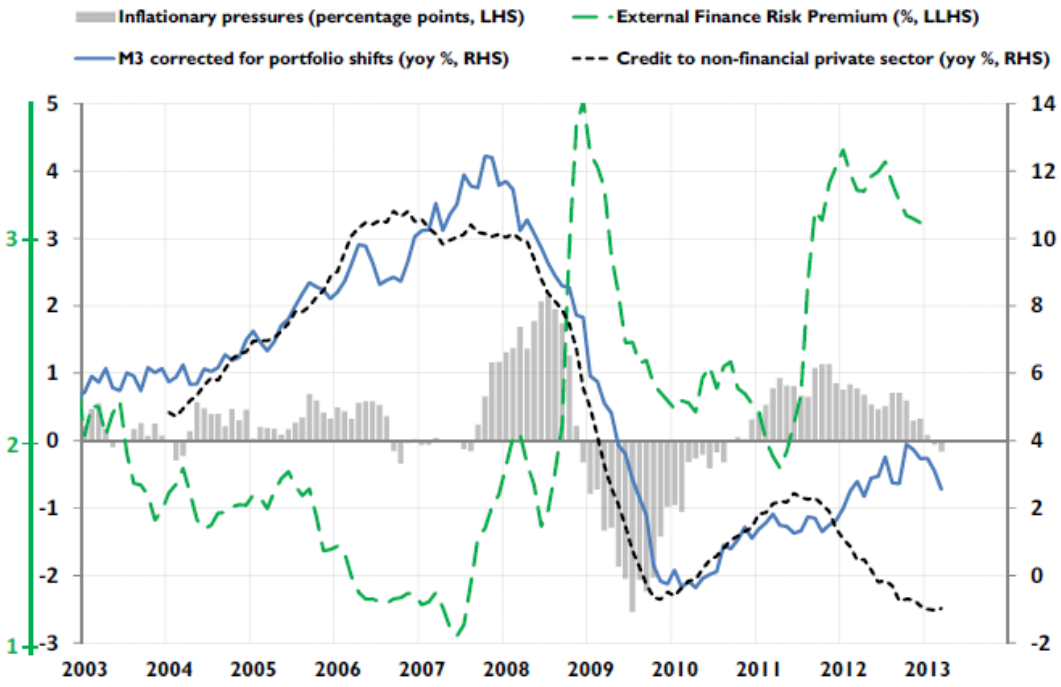


Source: Eurostat, SPF, Consensus Forecast, ECB calculations.
Note: Last observation refers to April 2013. Longer-term inflation expectations from Consensus Economics Forecasts refer to a horizon of six to ten years and, until December 2002, are constructed as a weighted average of the five largest euro area countries which together account for more than 80% of euro area GDP.

Chart 3: Aggregate asset prices and investment over nominal GDP in the euro area (2003 – 2013)

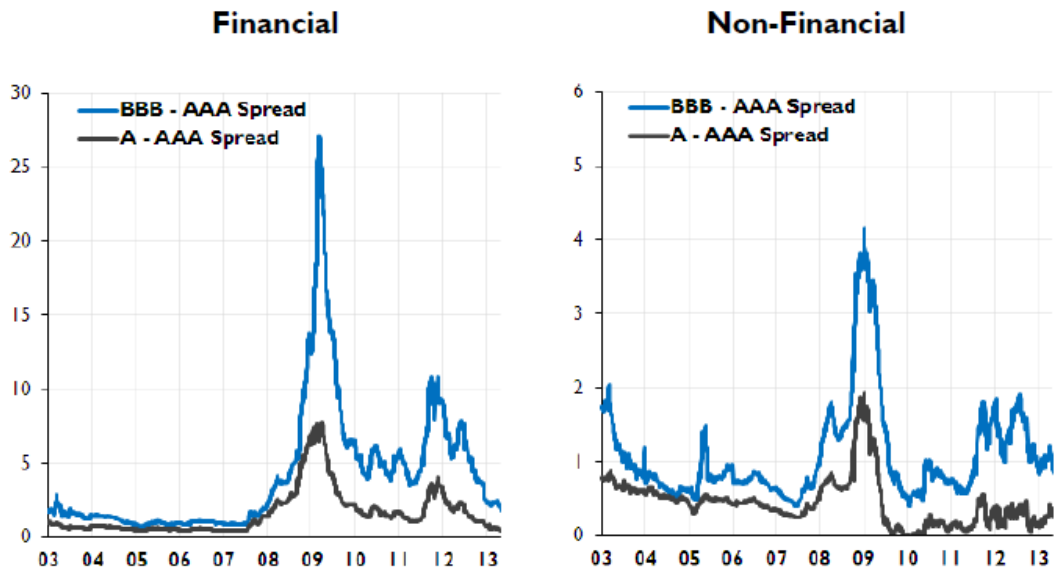
[to be done]

Chart 4: Credit and money growth and the external finance premium (2003-2013)



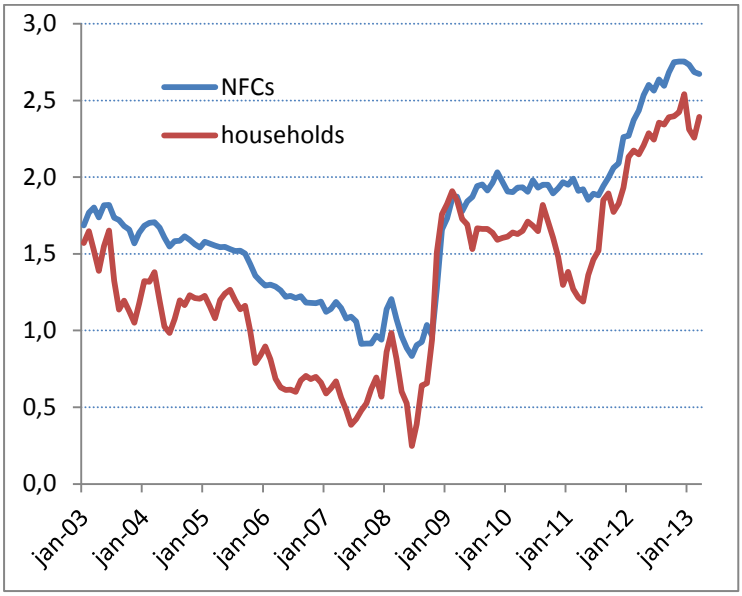
Source: ECB and ECB calculations.
Note: Inflationary pressures are HICP inflation in difference to 1.9%. Credit to non-financial private sector includes credit to Households and NFCs. The external finance premium is measured as a weighted average of spreads between lending rates, including corporate bond yields, and measures of risk-free rates of corresponding maturities. Last observation: Mar2013 (Dec2012 for EFP).

Chart 5: Market credit spreads in the euro area (2003-2013)



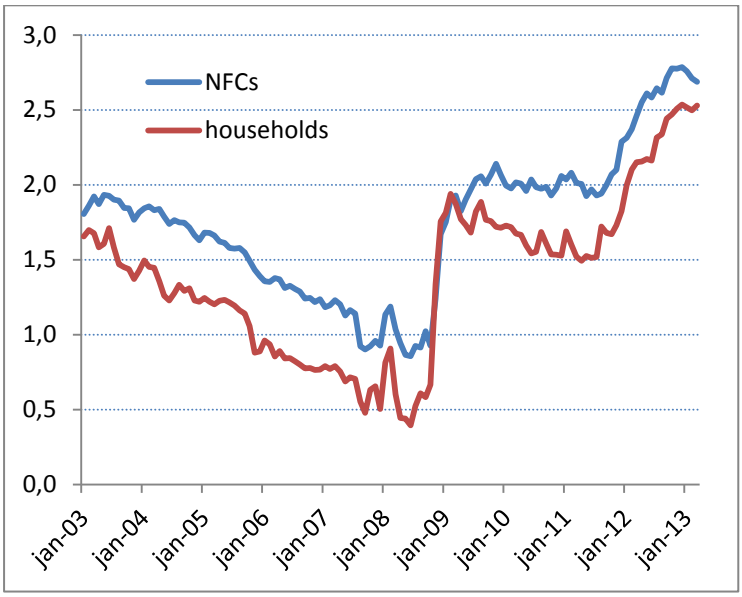
Source: DataStream and ECB calculations.
Last observation: 7 May 2013.

Chart 6:
A: Spread between composite CLI to NFCs and households and riskless rates



Source: ECB and ECB calculations

Chart 6:
B: Spread between short-term CLI to NFCs and households and 3-month Euribor



Source: ECB and ECB calculations

C: Spread between long-term CLI to NFCs and households and 5-year swap rate (basis points)

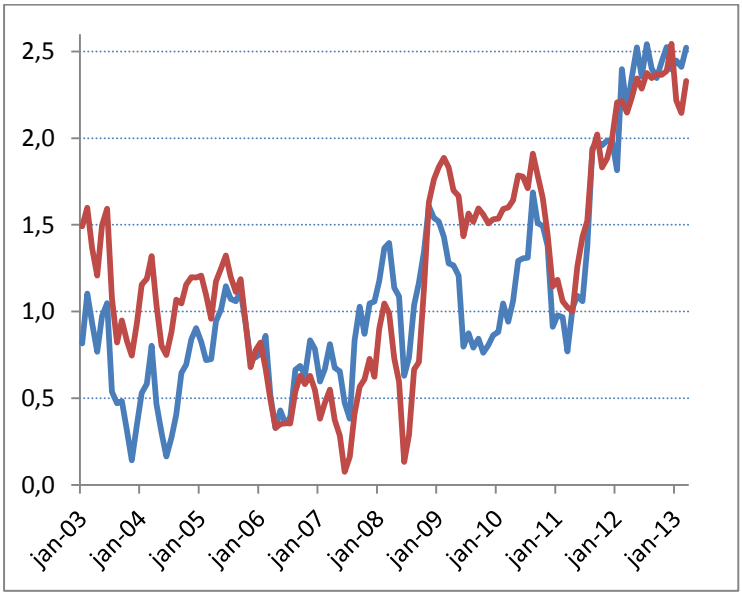
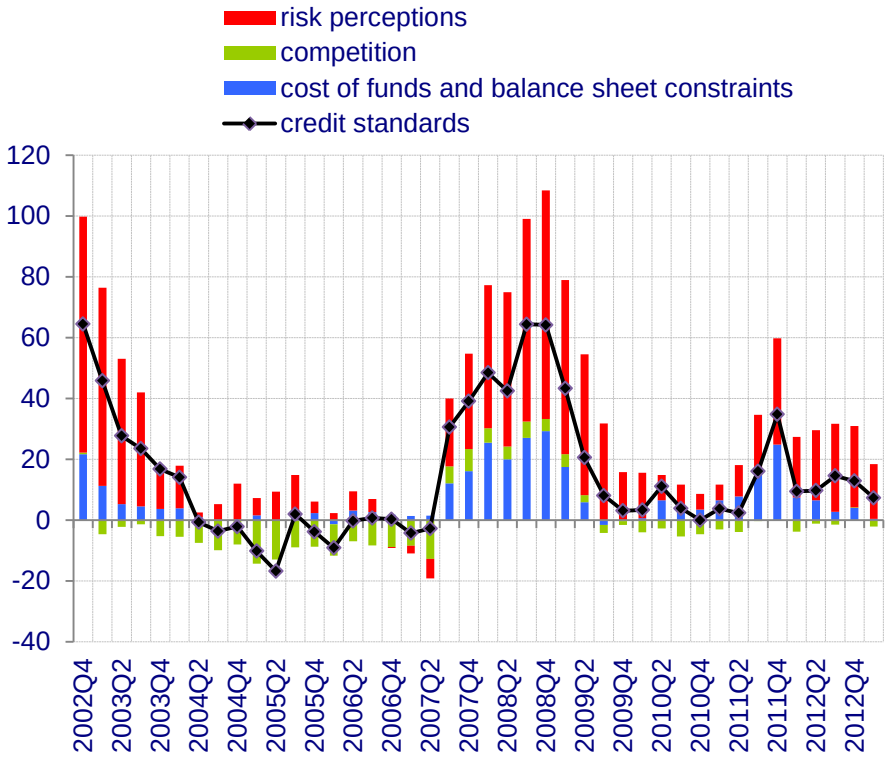


Chart 7: Bank lending standards to enterprises and households

A: Factors contributing to a tightening of credit standards for loans to NFCs
(Average net percentage per category)



B: Factors contributing to a tightening of credit standards for loans to households for house purchase

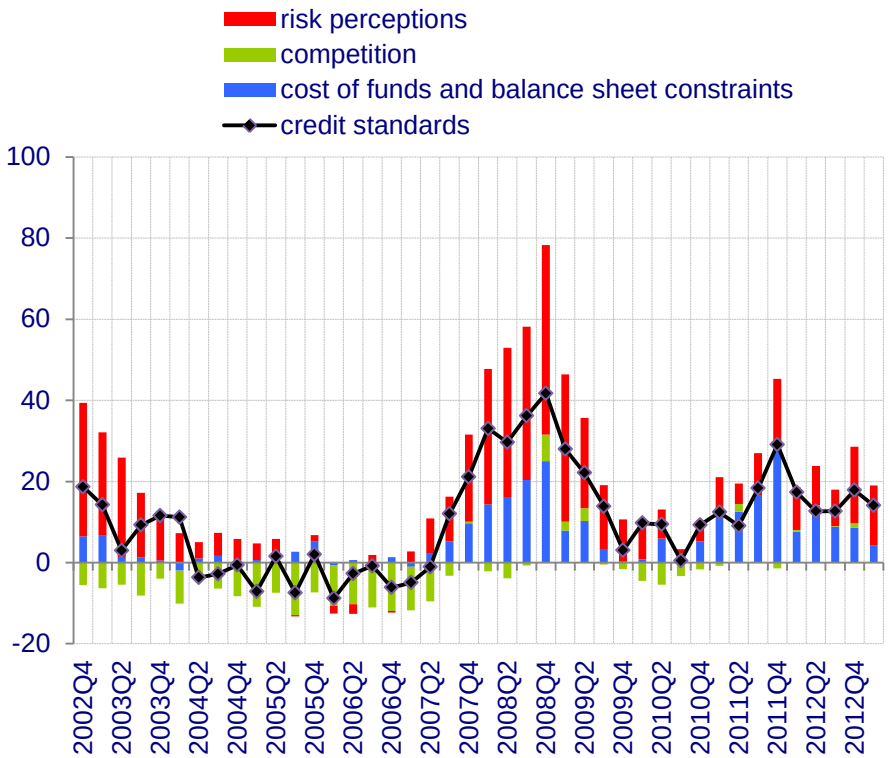
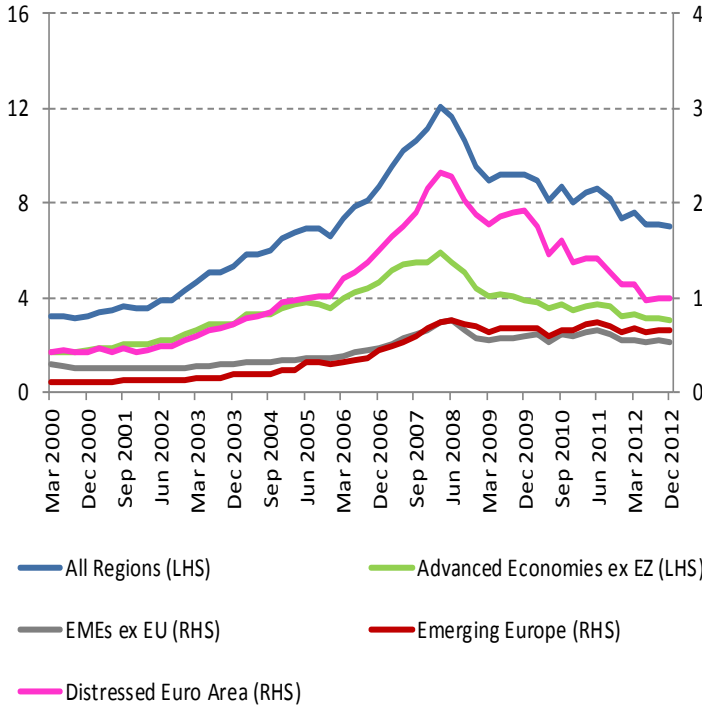


Chart 8: Claims of non-distressed and distressed euro area banks in selected regions

Claims of non-distressed euro area banks in selected regions
(USD tr)



Claims of distressed euro area banks in selected regions
(USD tr)

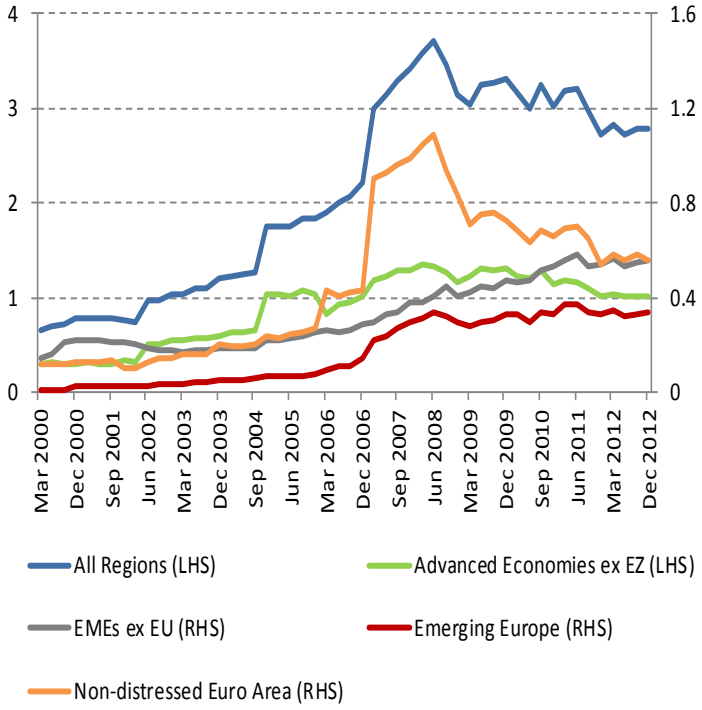


Table 1:

Macroeconomic imbalances in the euro area

(average annual percentage changes, unless otherwise indicated)

	2003-2007		2008-2012	
	Core	Periphery	Core	Periphery
Private credit flow[3]	5.2	16.5	3.1	2.2
House prices	4.8	8.5	1.6	-3.0
Residential investment	1.6	4.1	-1.0	-9.5
Real lending rates[2]	2.4	2.0	1.2	2.7
Current account balance[3]	3.3	-4.0	3.2	-3.9
Current account balance[3] in 2007/2012	4.1	-5.8	3.5	-0.8
Net foreign asset position[3] in 2007/2012	9.0	-50.3	18.6[5]	-61.5
HICP inflation	1.8	2.7	1.9	2.3
Unit labour costs	0.4	2.7	2.3	1.1
Real GDP	2.0	2.4	0.4	-1.4
Changes in unemployment[1]	0.0	-0.4	-0.1	2.0
General government balance[3]	-2.6	-3.3	-2.6	-5.1
Government bond spreads[4]	2	12	25	261

Source: ECB, Eurostat, European Commission

[1] Average annual changes

[2] Percent per annum

[3] As a percentage of GDP

[4] Period average, basis points

[5] 2011 data for France

Exhibit 1

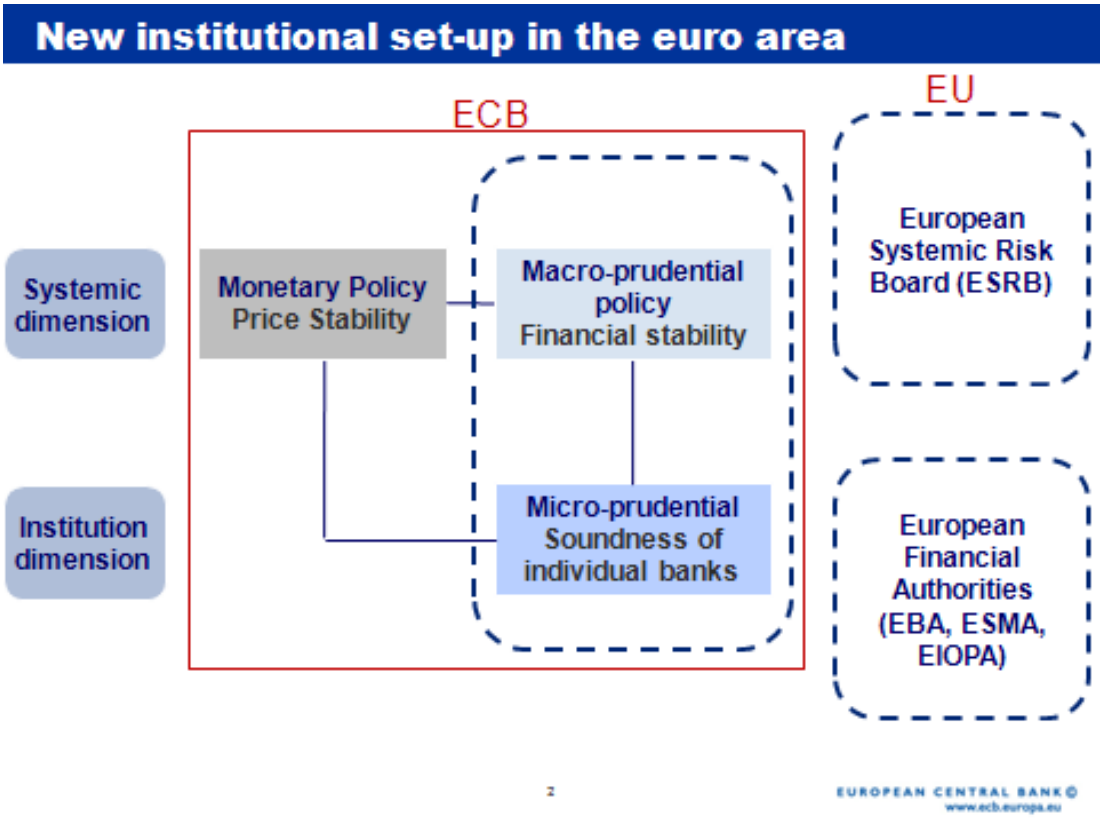
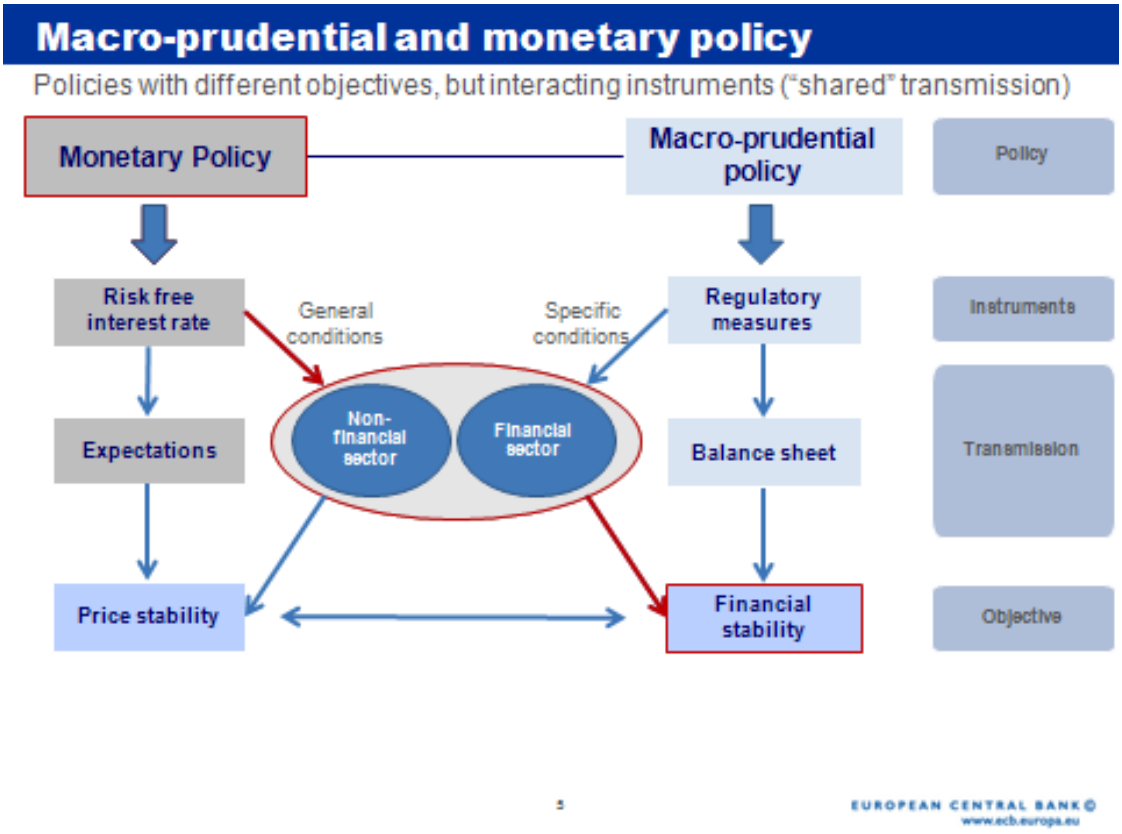

New institutional set-up in the euro area
ECB
EU
Systemic dimension
Institution dimension
Monetary Policy Price Stability
Macro-prudential policy Financial stability
Micro-prudential Soundness of individual banks
European Systemic Risk Board (ESRB)
European Financial Authorities (EBA, ESMA, EIOPA)
2
EUROPEAN CENTRAL BANK ©
www.ecb.europa.eu

Exhibit 2


Macro-prudential and monetary policy
Policies with different objectives, but interacting instruments ("shared" transmission)
Monetary Policy
Macro-prudential policy
Policy
Risk free interest rate
General conditions
Specific conditions
Regulatory measures
Instruments
Non-financial sector
Financial sector
Expectations
Balance sheet
Transmission
Price stability
Financial stability
Objective
5
EUROPEAN CENTRAL BANK
www.ecb.europa.eu