The importance of macroprudential policy for monetary policy

The global financial crisis has sparked intense debate amongst economists regarding the future shape and role of monetary policy. Certain elements of the pre-crisis monetary policy consensus remain valid even today – in particular, the continued paramount significance of price stability. By contrast, one issue that remains open is the relationship between monetary policy and financial stability.

Although no definitive answers can be expected as yet, some initial insights have been gained. There is a broad consensus that a new policy area with its own set of instruments is needed in order to safeguard financial stability. The swift establishment of an effective macroprudential policy therefore continues to have high priority. As both monetary policy and macroprudential policy measures initially affect the financial sector, interaction between these two policy areas is inevitable. However, at the current juncture, experience and knowledge of the functioning of macroprudential instruments, their calibration and the way in which they interact with each other and with monetary policy are rather limited. A monetary policy geared towards price stability in the medium term is no guarantee on its own for the prevention of unwelcome developments in the financial markets that could spill over into the real economy and ultimately endanger price stability. The recent past has shown that the monetary policy stance can influence financial market players' propensity to take risks, in particular.

Monetary policymakers must therefore also duly consider the effect of their decisions on the stability of the financial system as a whole. This suggests two things: first, that monetary policy is symmetrically designed over the financial cycle – that is to say, a monetary policy stance that is generally stricter during upswings even in the absence of inflationary pressures and is aggressively eased in the short term during marked downturns, but a less persistent expansionary monetary policy stance following a period of economic downturn – and, second, a trade-off between medium and longer-term risks to price stability. A symmetrical monetary policy in this vein could help to avoid a situation in which financial market participants take on too much risk.

In principle, monetary policy could also explicitly pursue financial stability as an objective in its own right. However, in addition to political-economic reasons, the primary obstacles to this are excessively high expectations placed on the effectiveness of monetary policy instruments with regard to safeguarding financial stability and a still-limited understanding of the way in which these two policy areas interact.

The Eurosystem's monetary policy strategy is sufficiently flexible to respond appropriately to future challenges. A fundamental change in strategy is not required. More work should be done on implementing an effective macroprudential policy; this would not only improve the stability of the financial system as a whole but also maintain the conditions in which the single monetary policy is able to ensure price stability in accordance with its mandate.

■ Introduction

Financial crisis has shown that price stability is not enough to ensure financial stability

The global financial crisis has challenged the prevailing monetary policy paradigm. For example, it has shown that low inflation rates and comparatively moderate business cycle fluctuations are not always sufficient to ensure financial stability.[1] Although a number of different monetary policy measures were implemented all over the world following the outbreak of the global financial crisis, these were not always able to prevent a deep and prolonged recession. It is not least because several central banks were forced to resort to nonstandard measures due to a zero lower bound on interest rates that sooner or later became binding that intense debate has been sparked amongst economists regarding the future shape and role of monetary policy.

Key elements of the pre-crisis monetary policy consensus remain intact, however

Despite many differences in opinion, certain elements of the pre-crisis monetary policy consensus remain valid: these include the continued paramount significance of price stability, the key role played by the independence of central banks and, in connection with that, the importance placed on a high degree of transparency of monetary policy.[2]

By contrast, relationship between monetary policy and financial stability needs to be revisited in wake of crisis …

By contrast, one issue that remains open is the relationship between monetary policy and financial stability. Views on the topic range from a categorical separation of both policy areas and taking greater account of financial market developments in future monetary policy all the way to the proposal that monetary policy explicitly put the objective of financial stability on a plane with that of price stability.

… and, in doing so, macroprudential policy needs to be taken into account …

As unwelcome developments within the financial system were the key factors behind the scale and persistence of the global financial crisis, new institutional conditions have emerged that need to be considered when examining the issue above. These include the establishment of macroprudential institutions and the development of an effective set of instruments to go with them. This is intended to reduce systemic risk and strengthen the resilience of the financial system as a whole.[3]

… as it interacts with monetary policy

As both monetary policy and macroprudential policy initially affect the financial sector, interaction between these two policy areas is inevitable. For example, banks' lending is not only important for monetary policy transmission but is also relevant to macroprudential policy. This opens up the possibility of monetary and macroprudential policy measures complementing each other, but also harbours the danger of a clash between the two. Therefore, neither policy area can blithely ignore the other completely. The future transmission of monetary policy is likely, in principle, to be changed by macroprudential policy – that is to say, by its institutional structure and the use of its instruments.

Knowledge of macroprudential policy and how it interacts with monetary policy is still limited

This article will provide an overview of the current academic and political debates on the interaction between monetary and macroprudential policy, from which normative conclusions will be drawn. In doing so, it must be noted that, at the current juncture, experience and knowledge of the functioning of macroprudential instruments, their calibration and

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1 In this article, financial stability is defined as the financial system's ability to perform its key macroeconomic functions (eg payments, assumption and management of risk, liquidity provision, credit intermediation), especially in periods of stress and upheaval.
2 "… [I]t is important to state the obvious: the baby should not be thrown out with the bathwater." See T Bayoumi, G Dell'Ariccia, K Habermeier, T Mancini-Griffoli and F Valencia (2014), Monetary Policy in the New Normal, IMF Staff Discussion Note, SDN/14/3, p 5.
3 Another major reform in Europe with respect to financial stability was the launch of the European banking union. One of the central pillars of the banking union is the Single Supervisory Mechanism (SSM), which commenced operations in November 2014. This entailed the transfer of extensive microprudential and macroprudential powers to the European Central Bank. See Deutsche Bundesbank, Launch of the banking union: the Single Supervisory Mechanism in Europe, Monthly Report, October 2014, pp 43-64; Deutsche Bundesbank (2014), Implications of the banking union for financial stability, Financial Stability Review 2014, pp 69-88.

the way in which they interact with each other and with monetary policy is still rather limited.[4]

Empirical evidence and lessons learned from the crisis

Empirical evidence for the euro area

Inflation rates, inflation expectations and GDP were stable prior to outbreak of financial crisis, …

Prior to the outbreak of the global financial crisis, the inflation rate in the euro area hovered at around 2% (see adjacent chart). Long-term inflation expectations were similarly stable. Until the crisis broke out, the low volatility of the (expected) inflation rate was accompanied by minor fluctuations in business cycle developments, especially in gross domestic product (GDP).

*… while financial variables underwent major fluctuations*

By contrast, other macroeconomic aggregates and financial variables underwent major fluctuations. For example, the relationship between asset prices and investment and overall economic development in the euro area rose steadily on the whole until the onset of the crisis. This growth was funded by a sharp increase in lending.

Economic and credit cycles out of step prior to the crisis

Thus, the economic and financial cycles did not develop along the same lines prior to the outbreak of the crisis, as signalled by the credit cycle, a major component of the financial cycle (see chart on page 42). While the credit cycle concept is based on the conventional business cycle, it examines patterns of private debt rather than of GDP. The credit cycle is often defined as the medium-term component of credit aggregate fluctuations.[5] Credit cycles differ from classic business cycles in terms of their greater amplitude, in particular. In addition, according to many economists, credit cycles last longer than business cycles, averaging a duration of eight to 30 years.[6] The significance of the credit cycle rests on the observation that peaks in the cycle are often followed by financial crises.

Consumer prices in the euro area[*]

Monthly; year-on-year percentage change
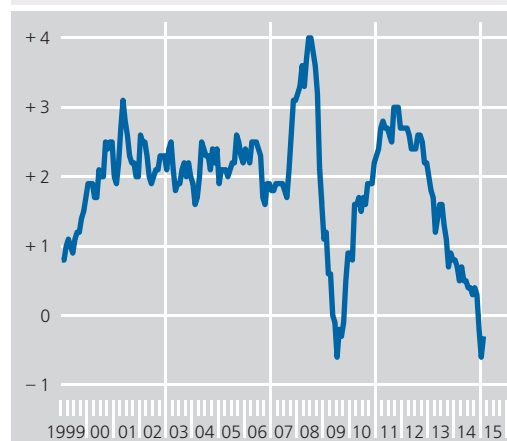
Source: Eurostat. **[*]** HICP.
Deutsche Bundesbank

Sharp increase in lending prior to crisis generated systemic risk

As recent experience has clearly shown, a sharp increase in lending coincided with commercial banks occasionally increasing their leverage ratio to a level that, as the financial crisis has demonstrated, resulted in systemic risk.[7] The elevated leverage ratio led to a rise not only in the credit and liquidity risk of individual financial institutions but also, given the scale of interbank links, in the risk to which the financial system as a whole is exposed. In particular, maturity transformation assumed extraordinarily

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4 See C M Buch (2014a), Challenges of evaluating economic policy measures, speech delivered at the academic ceremony of the Otto-von-Guericke University in Magdeburg to mark the 412th birthday of Otto von Guericke; C M Buch (2014b), Macroprudential policy: what do we need to know?, in A Houben, R Nijskens and M Teunissen (eds), Putting Macroprudential Policy to Work, De Nederlandsche Bank, Occasional Studies, Vol 12-7.
**5** Credit cycles have long been associated with financial crises. See H P Minsky (1986), Stabilizing an Unstable Economy, New Haven, CT, Yale University Press. See also M Drehmann, C Borio and K Tsatsaronis (2012), Characterising the financial cycle: don't lose sight of the medium term!, BIS Working Paper, No 380; S Claessens, M A Kose and M E Terrones (2011), Financial Cycles: What? How? When?, IMF Working Paper, No 11/76.
6 See D Aikman et al (2014), Curbing the credit cycle, Economic Journal, DOI: 10.1111/ecoj.12113. The authors investigated the spectral density function (spectrum) and concluded that medium-term frequencies were dominant. In addition, the medium-term cycle dovetails better with crisis periods. There is still no consensus on how to determine the duration of credit cycles. A conventional business cycle lasts between around one-and-a-half and eight years.
7 See T Adrian and H S Shin (2014), Procyclical leverage and Value-at-Risk, Review of Financial Studies, Vol 27, pp 373-403.

Short and medium-term components of credit and business cycles*

Quarterly data
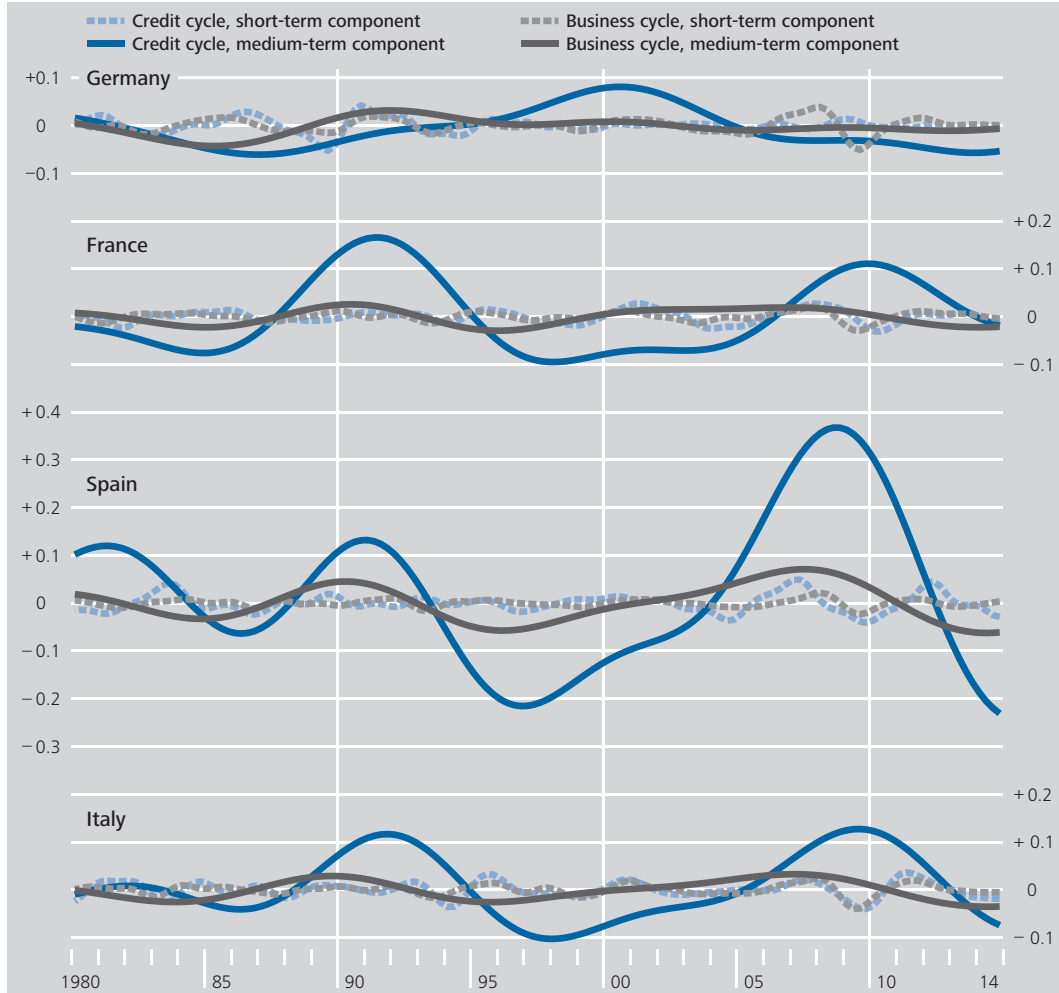
Sources: ECB ("ECB Balance Sheet Items", loans of domestic MFIs to the non-financial private sector in the euro area, outstanding loan amounts at the end of the quarter) and OECD ("Main Economic Indicators", real GDP and the consumer price index to determine real outstanding loan amounts). ***** The Christiano-Fitzgerald band pass filter is used to extract the cycles. The short-term component is specified to be 1.5 to 8 years compared with 8 to 30 years for the medium-term component.

Deutsche Bundesbank

high proportions. When short-term loans were no longer prolonged following the outbreak of the crisis, many financial institutions were immediately forced to liquidate their assets in fire sales.[8]

Dissimilarity in credit cycles throughout euro area suggests macroprudential policy should be organised at national level

The synchronicity of credit cycles will be an important factor in the future design of macroprudential policy in the euro area and in the potential role of monetary policy in safeguarding financial stability. Synchronicity is unlikely in the euro area at the present time (see chart above).[9] Centralised, cyclical policy measures alone – be they part of macroprudential policy or monetary policy – are therefore unlikely to

be efficient. This is also why macroprudential policy in the euro area is, in general, organised at the national level (see the section on the new institutional set-up in the euro area and the EU on page 49).

8 This experience has led the international community to attach particular importance to lending to non-financial enterprises and households within the context of macroprudential regulation.

9 See B Meller and N Metiu (2015), The Synchronization of European Credit Cycles, Deutsche Bundesbank Discussion Paper, forthcoming.

Key lesson learned from the crisis: macroprudential policy as a policy area in its own right

*Experience gained during financial crisis is putting "pre-crisis consensus on monetary policy", …*

Following the outbreak of the global financial crisis, central banks all over the world stabilised the international financial system and business cycle developments by cutting interest rates and implementing a raft of non-standard monetary policy measures. Experience gained during the crisis is putting not only financial supervision but also the "pre-crisis consensus on monetary policy" to the test.[10] In simplified terms, this can be characterised as follows: price stability, operationalised by stabilising the inflation rate at around 2% in the medium term, was conceived as the primary monetary policy objective. Managing short-term interest rates was considered an adequate means of achieving this objective, with the interest rate floor deemed a theoretical curiosity with little practical relevance. Forecasts made by central banks played a major role in monetary policy decision-making.

… which typically assumed efficient financial markets, to the test

Under this paradigm, efficient capital markets were generally assumed; imperfections in the financial markets and their potential macroeconomic effects were largely disregarded. Temporary inefficiencies were considered possible, but the majority view was that monetary policy, with its interest rate instrument, could effectively do little to counteract such problematic developments. Considering how difficult it is to promptly and reliably identify certain unsound developments in the capital markets – in the form of asset price bubbles, for instance – the majority view until the outbreak of the financial crisis was that monetary policy could not control asset prices, therefore also making it unable to prevent the emergence of such bubbles, nor should it burst any asset price bubbles that may arise. A "benign neglect" approach[11] was thus adopted: monetary policymakers should only respond if, due to capital market developments, real economic adjustments were expected that not only suggested a revision of inflation and economic forecasts but

Synchronicity of credit cycles[*]

Dissimilarity (1-correlation)
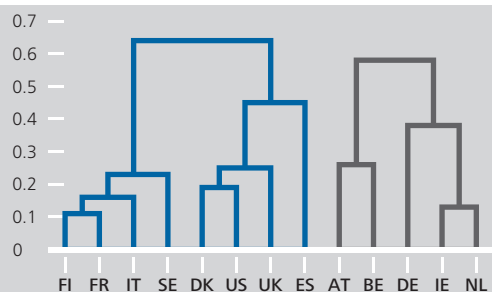
Source: B Meller and N Metiu (2014), The Synchronization of European Credit Cycles, Deutsche Bundesbank Discussion Paper, forthcoming. * "Dissimilarity" on the y-axis is measured by "1-correlation of the medium-term component of the credit cycles of two countries". The countries that are most similar are connected to each other to form groups, which are then linked to other groups of countries that are most similar to them.
Deutsche Bundesbank

also signalled an undesirable deviation from monetary policy objectives. In the event of an unwelcome, abrupt, downward revision, monetary policy was to cushion the negative effects by supplying the financial sector with sufficient liquidity. It was thought that monetary policymakers should intervene only once a financial crisis was already taking place, minimising the macroeconomic damage through resolute interest rate cuts. Microprudential supervision – which focuses on individual financial institutions – was regarded as an adequate means of preventing financial crises.

Experience gained during the crisis has, however, highlighted the fact that microprudential supervision alone is not sufficient to guarantee the stability of the financial system because it ignores the repercussions of developments at the level of individual institutions on the entire

Crisis has shown that microprudential supervision alone is not enough

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10 See Deutsche Bundesbank, The implications of the financial crisis for monetary policy, Monthly Report, March 2011, pp 53-68.
11 See B Bernanke and M Gertler (1999), Monetary Policy and Asset Price Volatility, Federal Reserve Bank of Kansas City Economic Review 84, pp 17-51; B Bernanke and M Gertler (2001), Should Central Banks Respond to Movements in Asset Prices?, American Economic Review 91, pp 253-257; S Gilchrist and J Leahy (2002), Monetary Policy and Asset Prices, Journal of Monetary Economics 49, pp 75-97.

financial system.[12,13] In addition, it has become apparent that the macroeconomic damage following the outbreak of a severe financial crisis can only be partly stemmed by monetary policy after the fact.

Aim of macro-prudential policy is to stabilise financial system as a whole

In order to stem the risk of financial crises in future, the stability of the financial system as a whole is therefore now a policy objective in its own right. Macroprudential supervision is responsible for making a crucial contribution to this goal. One of its tasks is to help ensure that all financial market participants keep in mind the consequences of their actions on the stability of the financial system. Macroprudential policy is now established at an institutional level as a policy area in its own right. Ideally, it works in two ways. On the one hand, it helps curb incentives for excessive risk-taking *ex ante*. The instruments used should help ensure that market participants take account of the contribution that they are making to systemic risk with their decisions (see the box on welfare-theoretical thoughts on pages 45 to 48). On the other hand, various macroprudential instruments increase the financial system's resilience, thereby reducing its vulnerability to shocks and, in that respect, minimising the total macroeconomic costs of a financial crisis. Since a large number of different distortions and misaligned incentives in different areas (eg real estate market, general government debt) can entail the risk of instability, this new policy area requires its own set of instruments to be able to contain specific problems in the financial sector.[14] These instruments include a range of capital surcharges, such as counter-cyclical capital buffers for banks, and potential loan-to-value ratios for mortgage loans. In a more general sense, incentive-compatible deposit insurance schemes or functioning bank insolvency legislation could also count as macroprudential instruments.

The well-measured, well-communicated use of macroprudential instruments contributes to macroeconomic stability and, in this respect, should make it easier in future for monetary policy to perform its task and reduce the likelihood of the need to cut interest rates to their lower bound and implement widespread non-standard measures in the event of a crisis escalating.

The new institutional set-up in the euro area and the EU

As a general rule, responsibility for macro-prudential policy lies with member states

As a general rule, responsibility for macroprudential policy in the EU lies with individual member states (see chart on page 49). However, upon the launch of the SSM[15] in November 2014, the ECB was entrusted with not only microprudential supervisory powers but also certain macroprudential information and intervention rights in relation to the SSM member states. It is to be notified in advance of any planned macroprudential intervention at the national level because of possible cross-border effects. However, the ECB also has the power to tighten measures.[16]

ECB is responsible for banking supervision in cooperation with national supervisory authorities

The ECB has been responsible for banking supervision in the SSM member states since November 2014. However, it works in cooperation with the national supervisory authorities rather than performing all supervisory tasks itself: the ECB has assumed direct supervision of the 123 institutions classified as significant, with responsibility for the supervision of the remaining institu-

Although macroprudential and monetary policy ideally complement each other, interaction between the two policy areas needs to be analysed

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12 Traditional banking supervision aims to ensure the stability of individual institutions. This means that risks to the overall financial system, and thus to the economy as a whole, arising from individual institutions that are experiencing distress are not the main focus.
13 See M K Brunnermeier (2009), Deciphering the Liquidity and Credit Crunch 2007-2008, Journal of Economic Perspectives 23, pp 77-100; J Weidmann (2014a), All for one and one for all? The role of microprudential, macroprudential, and monetary policy in safeguarding financial stability, speech delivered at the Bundesbank Symposium on Financial Stability and the Role of Central Banks, Frankfurt am Main, 27 February 2014.
14 See IMF (2013), op cit. The emergence of a financial crisis cannot be completely ruled out in future, either. However, the objective of joint efforts must be to minimise the likelihood of such a break to the greatest extent possible and create conditions in which aggregate losses are kept as small as possible.
15 All euro-area countries are SSM member states. Other EU countries can opt into the SSM.
16 See Deutsche Bundesbank, Financial Stability Review 2013, pp 102-104.

Welfare-theoretical thoughts on possible monetary policy objectives

In order to arrive at an optimal monetary policy for complex economies which are characterised by a large number of frictions and market imperfections, use is often made of theoretical models. An analysis of that kind is based on a welfare function which, based on the respective model, contains those variables that are to be stabilised by economic policy measures. When optimising the welfare function, the model structure – and therefore the way in which economic policy measures affect the economy (ie the transmission process) – has to be taken into account as a restriction. It is possible, within the model framework of dynamic stochastic general equilibrium (DSGE) models, to derive for a given structure of the model economy the appropriate objectives for different policy actors. The relevant target function is derived from the utility functions of the actors in this model economy and is an approximate representation of overall economic welfare. Which of the economic variables the decision-makers of certain policy areas ought to observe then results from the arguments that are contained in this (micro-founded) target function (eg inflation rate or output gap). An optimal policy is one that maximises welfare assuming that the conditions of equilibrium that describe the dynamics of the model are satisfied at all times.

Thus, taking financial market frictions into account can affect two points in the analysis of optimal policy: the welfare function and the equations that describe the dynamics of the model. However, it is not necessarily the case that frictions in the financial sector lead to a change in both the model dynamics and the welfare function. In this box, a simple New Keynesian model is used to show, first, the consequences only of modifying the model dynamics and, subsequently, also the consequences of modifying the welfare function. Only monetary policy is considered and further possible policy actors and instru-

ments are disregarded. It is assumed that only the interest rate is available as a monetary policy instrument in order to achieve an optimal economic development for a given structure of the model economy. In principle, it is possible to examine the optimal policy of different policy areas, for example monetary, fiscal and/or macroprudential policy, within the scope of a welfare analysis (see the box on pages 56 to 61).

General equilibrium models with frictionless financial markets generally come to the conclusion that a monetary policy that focuses primarily on safeguarding price stability maximises welfare. This is reflected in the usual approximation of overall economic welfare for these models:[1]

$$\mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \mathrm{U}_t \approx -\Omega \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\pi_t^2 + \lambda_x \left(x_t - x^* \right)^2 \right].$$

The part in square brackets consisting of quadratic terms indicates those variables according to which monetary policymakers ought to gear their measures: the inflation rate, π_t, and the output gap, x_t (x_t is usually defined as the difference between the actual output and the output that would occur if prices were flexible).[2] Given that the relative importance of stabilising the output gap – reflected in the parameter λ_x – is typically low,[3] the primary focus of monetary policy on price stability is to be justified with these analyses.

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1 See also M Woodford (2003), Interest and Prices – Foundations of a Theory of Monetary Policy, Princeton University Press. In the above formula, E_0 represents the expectation operator in period $t=0$, β is the relevant discount factor, U_t is the utility function at period t and both Ω and λ_x are positive parameters which are derived from the model structure.
2 Owing to the quadratic structure, each deviation from a given target value is to be minimised: in the case of the inflation rate, this is (for reasons of simplicity) the value zero and, in the case of the output gap x^*, an optimal value resulting from the model structure; ideally, this value is likewise zero.
3 See also M Woodford (2003), op cit.

The question that now arises is whether the same result is obtained when financial market frictions are taken into account in the model: in other words, does a welfare analysis which takes into account frictions in the financial sector lead to justification for monetary policy to stabilise the financial sector directly in addition to focusing primarily on price stability if no other instruments – macroprudential policy in particular – are available? To answer this question, we refer in this box to recent research which integrates financial market frictions into a general equilibrium model and derives a micro-founded loss function.[4,5]

It should first be noted that taking frictions in the financial sector into account evidently leads to modifications in the structure of the respective model compared with the standard New Keynesian model in which only price rigidities represent a significant friction. This is reflected, in a first step, in changing equilibrium conditions that describe the dynamics of the model.[6,7] Consequently, this leads to changes in the transmission process, and potential additional sources of shocks arise which have to be taken into account when deriving and, eventually, actually implementing the (optimal) monetary policy.

Based on the notion that the expectation value of a squared variable, $E(X^2)$, such as appears, for example, in the above-mentioned welfare function, can be broken down into a (squared) level term (mean), $E(X)^2$, and a variance term, $Var(X)$,[8] it is possible to examine the consequences of the modifications described above for a given welfare function. In contrast to the standard model, the changes as described above to the dynamics of the model can typically lead to a non-trivial trade-off between achieving the goal of the level term of the loss function and of the variance term of the loss function (which is affected by the probability and the scale of the crisis). This is particularly significant if the scale of financial frictions (and therefore the risk

and scope of a financial crisis) is model-endogenous and so also depends on monetary policy itself. By contrast, it could also be assumed that the financial frictions follow an exogenous process. The result of this is that the variance term of the loss function cannot be influenced by monetary policy, which is in keeping with typical assumptions of the standard model. The above-mentioned trade-off decision between the mean and the variance would therefore not be relevant in the case of exogenous frictions.

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4 See also C T Carlstrom, T S Fuerst and M Paustian (2010), Optimal Monetary Policy in a Model with Agency Costs, Journal of Money, Credit and Banking, Vol 42, No 6, pp 37-70; V Cúrdia and M Woodford (2009), Credit Frictions and Optimal Monetary Policy, Columbia University, mimeo; F De Fiore and O Tristani (2012), Optimal Monetary Policy in a Model of the Credit Channel, The Economic Journal 123, pp 906-931.
5 Put very generally, financial market frictions occur, in particular, when there is no complete set of state-contingent Arrow-Debreu securities that is able to specify payouts for all potential developments and through which complete risk sharing would be possible. See also E M Leeper and J M Nason (2014), Bringing Financial Stability into Monetary Policy, Indiana University, mimeo.
6 In the simplest variant of a New Keynesian general equilibrium model, these conditions are described by two equations: first, the so-called IS curve, which results from the optimal consumption decision of households and describes the aggregate demand side of the economy, and second, the so-called New Keynesian Phillips curve, which represents aggregate supply, derived from the optimal pricing decision of monopolistic firms under the assumption of price rigidities. In both equations, acting in a forward-looking manner, and therefore forming expectations, plays a crucial role.
7 Amongst other things, the financial frictions are reflected in all the models used here as a so-called cost-push term in the New Keynesian Phillips curve. This produces a conflict of objectives between stabilising inflation and stabilising the output gap if the cost-push terms deviate from their stationary equilibrium values due to exogenous or endogenous developments.
8 In particular, the following applies. $E(X^2|A) = E(X|A)^2 + Var(X|A)$, where X represents a macro-economic variable and A a given monetary policy orientation. The left (and therefore also the right) side of the equation can be transferred to the corresponding terms in the loss function. See also N Kocherlakota (2014), Discussion of 2014 USMPF Monetary Policy Report, speech delivered at the "2014 US Monetary Policy Forum" of the "Initiative on Global Markets" of the University of Chicago, Booth School of Business, New York, NY, 28 February 2014.

If, on the other hand, the risk of a crisis increases model-endogenously due to an expansionary monetary policy stance, this affects the variance. The higher variance can be countered, however, by adopting a more restrictive monetary policy stance. Although this would lead to a deviation in the case of the mean (as a result of which the inflation rate target would, strictly speaking, be missed), the likelihood and/or the scale of a crisis would be reduced; this in turn would lower the variance (that of inflation, in particular). This gives the central bank the incentive to take action against developments in the financial markets that would increase the risk and scale of a crisis (leaning against the wind (LATW) policy), although that would result in a (temporary) deviation of the "classic" welfare-relevant variables (inflation and output gap) from their target values.[9]

Considerations so far indicate, then, that it can be desirable for the central bank to pursue a policy of LATW solely on account of the model dynamics that are affected by financial frictions. This (indirect) bearing of monetary policy on financial stability can exclusively be explained by the fact that monetary policymakers have an eye on the classic target variables of monetary policy – inflation and possibly the output gap – yet are faced with a specific transmission process. It is crucial in this respect that the financial frictions are model-endogenous, which can occur due to mechanisms such as those described by the risk-taking channel, for example.

In addition to the change in transmission, taking frictions in the financial sector into account can make itself felt in a second step in the form of a modification of the approximated welfare function. The common denominator in the research studies considered here is that the above-mentioned equation of a target function in the standard model is, as a general principle, extended by additional variables; these variables "represent" the important frictions in the financial sector:[10]

$$\mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \mathrm{U}_t \approx -\Omega \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\pi_t^2 + \lambda_x \left(x_t - x^* \right)^2 + \lambda_\Phi \Phi_t^2 \right].$$

In this equation, the welfare-relevant financial variables that are contained in the respective models are summarised by the vector in the last term, ie Φ_t.[11] This variable takes a different form in each of the different models: the interest rate level (De Fiore and Tristani, 2012), the interest rate spread (Cúrdia and Woodford, 2009; De Fiore and Tristani, 2012), the real consumption of resources in the financial sector (Cúrdia and Woodford, 2009) or the risk premium (Carlstrom, Fuerst and Paustian, 2010).[12] Thus, the results from these models suggest that welfare is maximised not only by primarily stabilising the inflation rate but also by stabilising selected variables of the financial sector as an objective in its own right. The different frictions that exist within the respective models are therefore reflected not only in the dynamics of the model but also in the loss function, which makes the (potential) conflict of objectives between the

9 See also M Woodford (2012, Inflation Targeting and Financial Stability, NBER Working Paper 17967), which analytically derives within a New Keynesian model with (endogenous) financial frictions a LATW motive as an element of optimal monetary policy.

10 This occurs, in particular, when the frictions in the financial sector are determined endogenously in the model. If the financial frictions follow an exogenous process, the additional term in the loss function cannot be affected by policy measures and is therefore not relevant for optimisation.

11 The models examined here specifically display the following financial market frictions. Borrowers are faced with a condition with regard to providing collateral due to a principal-agent ("hold-up") problem, which leads to so-called agency costs (Carlstrom, Fuerst and Paustian, 2010); they are not free to enter into financial contracts at their discretion, but only into those with the intermediation sector, for whose work real resources are necessary and which is faced with an asymmetric distribution of information; this gives rise to an interest rate premium (Cúrdia and Woodford, 2009). Information asymmetries between the lender and the borrower as well as the possibility of the customer becoming insolvent result in an interest rate premium (De Fiore and Tristani, 2012).

12 In addition, the models also generate combinations of these variables as well as correlation terms, eg of the financial variables with the output gap.

variables transparent.[13] However, in the research work mentioned above – as in the case of the output gap – the relative importance of the financial market variables, λ_Φ, is relatively low from an economic viewpoint. This result should be considered provisional given that research in this field is still at a very early stage. Moreover, it should be noted that the models used here make several simplifications to be able to derive a micro-founded loss function. They disregard, in particular, different economic mechanisms that typical models for policy analysis display to be able to describe the observed data as accurately as possible (for example, sluggish wage-setting).

Thus, these concluding thoughts indicate that, in the theoretical perspective presented here, the direct stabilisation of financial market variables may possibly rank as an objective in its own right alongside the stabilisation of the classic variables. However, it should be noted that the target function is an approximation of general societal welfare and that the objectives need not be achieved exclusively through monetary policy. In fact, as the main text illustrates, there are strong arguments as to why the stabilisation of welfare-relevant variables of the financial sector should be transferred to macroprudential policy, in particular.

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13 The fact that certain macroeconomic variables appear in the loss function does not necessarily mean that there is a conflict of objectives; only in combination with model dynamics is a conflict of objectives to be found. As is explained above, the models considered here display cost pressure terms in the New Keynesian Phillips curve, which means that a conflict of objectives can indeed arise.

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tions continuing to fall within the remit of the national supervisory authorities.[17]

Unlike monetary policy, macroprudential policy can take account of national factors

The national authorities therefore have more macroprudential surveillance powers than either banking supervision or monetary policy powers. Unlike monetary policy, which is uniform throughout the euro area, macroprudential policy can differ from member state to member state and take account of national factors. In-depth knowledge of national financial systems is thus required to correctly manage how instruments are applied. At the same time, as the macroeconomic (and fiscal) costs of a systemic crisis – notably the real economic costs – are incurred primarily at the national level, responsibility for macroprudential policy should also rest at the national level. The ECB's ability to tighten measures mitigates the danger of delays or inaction on the part of national authorities when measures need to be implemented (inaction bias). This reduces the risk of other member states being affected by excessively lax policy.

However, the specific institutional structure of macroprudential policy still provides no information on the relationship between this policy area and monetary policy. For a comprehensive breakdown of this relationship, the fundamental interaction between monetary and macroprudential policy needs to be identified and analysed in detail.

Interaction between monetary policy and macroprudential policy

Price stability and financial stability are mutually complementary over the long term. Over the short to medium term, however, these two objectives can clash. For instance, macroprudential instruments designed to contain certain developments within the financial sector can run

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17 See Deutsche Bundesbank, Financial Stability Review 2014, pp 69-88.

Although monetary policy and macroprudential policy are complementary in the long run, they may clash in the short and medium run

counter to monetary policy intentions. But monetary policy measures, too, can temporarily run counter to financial stability. (A conceivable case in point is that, at the zero lower bound on interest rates, monetary policymakers could be tempted to maintain an accommodative monetary policy stance whereas, from a macroprudential policy viewpoint, it might appear to make sense to tighten the reins in order to curb excessive asset price growth.) The recent past has shown that the monetary policy stance can influence financial market players' risk appetite, in particular. This so-called "risk-taking channel", largely unnoticed before the financial crisis, should therefore be explained in more detail below.

Financial agents' risk appetite[18]

An "overlap" of monetary policy and macroprudential policy …

Monetary policy and macroprudential policy "overlap" significantly in a central – and generally economically desirable – function of the financial system: the taking up, management and sharing of economic risks.

… is created by the risk-taking channel

Summarised in brief: the risk-taking channel describes how an expansionary monetary policy, notably in the form of low policy rates, incentivises commercial banks or other financial market players to take excessive risk.[19] In this channel, an expansionary monetary policy leads not only to an increase in lending – as is generally described in the context of other monetary policy transmission channels – but can also lead to an increase in the overall riskiness of lending. If, all in all, "too many" risky projects are being funded, this can increase the likelihood of a financial crisis.

Risk-taking channel can operate in at least three ways …

Thus, the monetary policy risk-taking channel describes how monetary policy measures, especially a change in the policy rate or the interest rate path, can alter the perception of risk or risk tolerance.[20] It thus encompasses the impact of monetary policy measures on the perceived or measured risk of investment portfolios, asset valuation and funding costs.[21] Un-

The new institutional set-up in the euro area
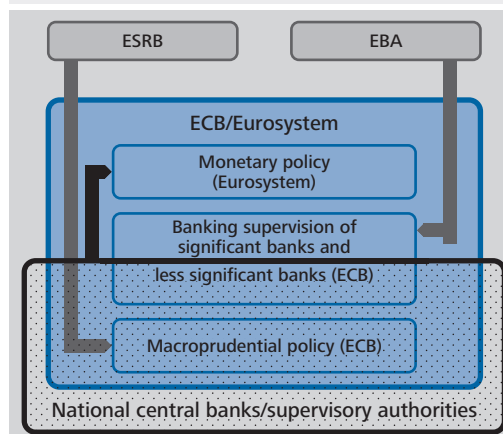
The chart shows how responsibility for monetary policy, macroprudential policy and banking supervision in the euro area is divided between the national level (central banks/supervisory authorities) and the supranational level (ECB/Eurosystem). While the Eurosystem is responsible for monetary policy, national central banks can exert influence over it via the ECB Governing Council. The ECB and national central banks/supervisory authorities share responsibility for macroprudential policy. Essentially, responsibility for banking supervision rests with the ECB. The ECB has assumed direct supervision of institutions classified as significant, with responsibility for the supervision of the remaining institutions falling within the remit of the national authorities. The European Systemic Risk Board (ESRB) and European Banking Authority (EBA) can exert influence over macroprudential policy and banking supervision.

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18 For further details, see, in addition, Deutsche Bundesbank, Low interest rates – risks to financial stability?, Financial Stability Review 2014, pp 13-34.
19 A reminder is in order here that a low policy rate is not necessarily per se associated with an expansionary monetary policy stance. That depends in decisive measure on the level of the "natural rate of interest", ie on the interest rate which is compatible with price stability. For more on the meaning of risk appetite, see the box on pp 50-54.
20 See C Borio and H Zhu (2012), Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism?, Journal of Financial Stability 8, pp 236-251.
21 G Dell'Ariccia, L Laeven and R Marquez (2014), Real Interest Rates, Leverage, and Bank Risk-Taking, Journal of Economic Theory 149, pp 65-99, develop a microeconomic partial equilibrium model for which generally two assumptions suffice for the existence of a risk-taking channel: the first being that of limited liability and the possibility of commercial banks to choose the risk of their portfolios by themselves. However, since the portfolio's risk is not directly observable to creditors, the commercial bank's capital structure plays a decisive role. The second is that commercial banks' financing costs are a function of the level of a risk-free reference rate. On the basis of these assumptions, risk appetite is determined largely by three forces or aspects, some of which go in opposite directions: a pass-through effect, a risk-shifting effect and the level of indebtedness. It turns out that a reduction in the risk-free interest rate generally leads to increased risk-taking (see Proposition 2). See also I Angeloni and E Faia (2013), Capital regulation and monetary policy with fragile banks, Journal of Monetary Economics 60, pp 311-324, and A Abbate and D Thaler (2014), Monetary Policy Effects on Bank Risk Taking, mimeo.

Effects of monetary policy on risk taking[1]

The studies available to date on the risk-taking channel of monetary policy are based on detailed data for individual loans and support the existence of such a monetary policy transmission mechanism,[2] particularly in European countries.[3] The benefit of using loan microdata is that the existence of the risk-taking channel can be clearly identified, but leaves open the question regarding the effects of the monetary policy risk-taking channel on the behaviour of banks as a whole – and therefore also its macroeconomic relevance.

In the following, data on heterogeneity in the banking sector are used to investigate the overall impact of changes in monetary policy on risk taking. The following analysis examines new loans and credit spreads across different bank types and credit risk categories. As no comparable data are available for the euro area, the analysis is carried out for the United States.

The banking data are taken from the Federal Reserve's quarterly "Survey of Terms of Business Lending (STBL)". This survey collects data on the gross volume of new loans (in US dollar) granted during the first full business week of the second month in each quarter. The STBL contains information on loan volumes and credit terms. This information is available for all commercial banks as well as for three bank categories: large domestic banks, small domestic banks, and US branches and agencies of foreign banks. The sample period spans from the second quarter of 1997 to the second quarter of 2008, ending at the point where monetary policy hits the zero lower bound. By using data on new loans, it is possible to take into account the fact that the risk-taking channel describes the incentives to engage in *ex ante* riskier projects. Finally, the STBL contains information on how banks perceive the credit risk of new loans. As part of the survey, banks are asked to assign new loans to one of four categories of increasing risk. The discussion below focuses on new loans categorised as either "low risk" or "high risk".[4] Based on these data, we are thus

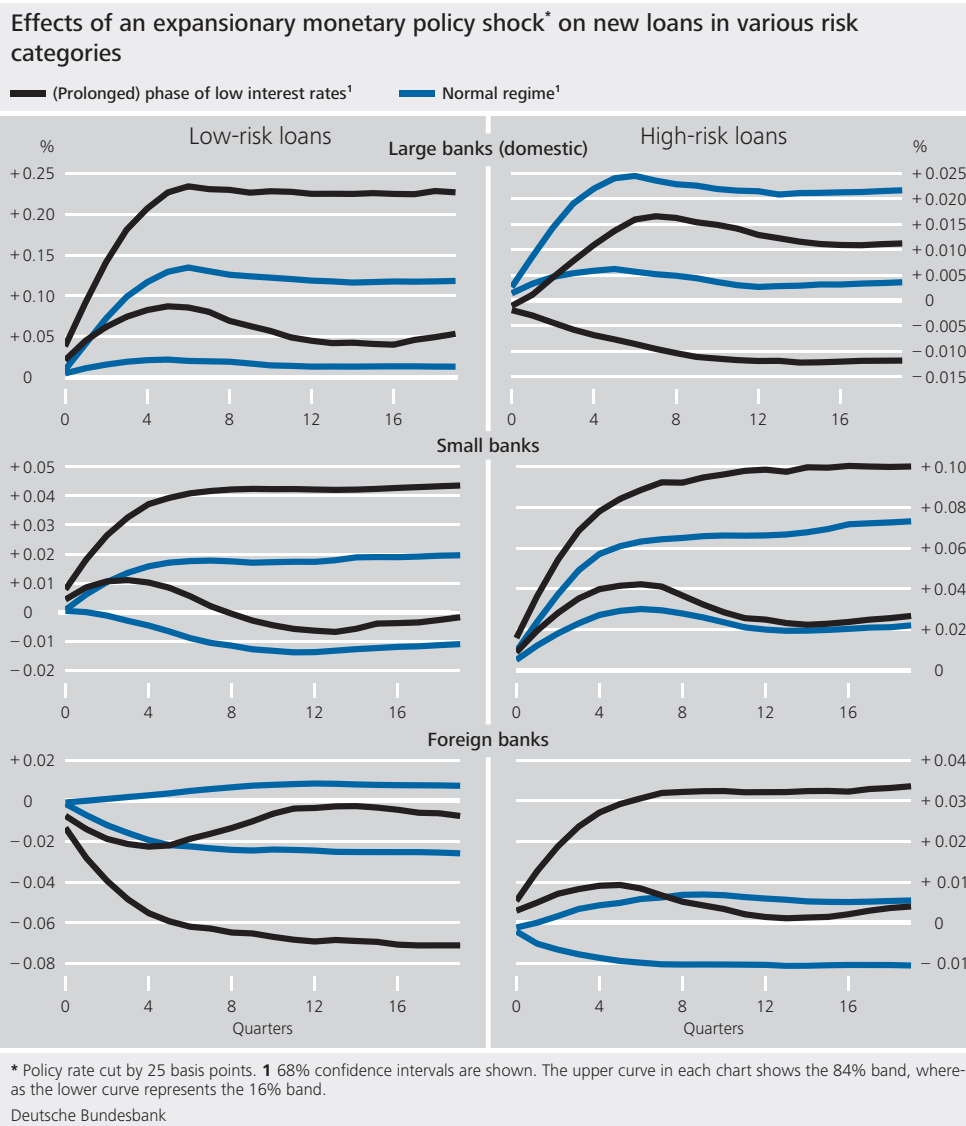### Federal funds rate and loan portfolio risk composition

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1 This text is based on C M Buch, S Eickmeier and E Prieto (2014), In search for yield? Survey-based evidence on bank risk taking, Journal of Economic Dynamics and Control, Vol 43 (C), pp 12-30.
2 See, in particular, G Jiménez, S Ongena, J L Peydró and J Saurina (2014), Hazardous times for monetary policy: What do twenty-three million bank loans say about the effects of monetary policy on credit risk?, Econometrica, Vol 82, Issue 2, pp 463-505, as well as I Vasso, S Ongena and J L Peydró, Monetary policy, risk-taking and pricing: Evidence from a quasi-natural experiment, Review of Finance, forthcoming.
3 Jiménez et al (2014) op cit for Spain; P Gaggl and M Valderrama (2010), Does a Low Interest Rate Environment Affect Risk Taking in Austria?, Monetary Policy & the Economy, Oesterreichische Nationalbank, Issue 4, pp 32-48 for Austria; Geršl, Jakubík, Kowalczyk, Ongena and Peydró (2012), Monetary conditions and banks' behaviour in the Czech Republic, mimeo for the Czech Republic; Apel and Claussen (2012) op cit for Sweden.
4 For detailed information on the STBL's structure, see T F Brady, W B English and W R Nelson (1998), Recent changes to the Federal Reserve's survey of terms of business lending, Federal Reserve Bulletin, August 2014, pp 604-615.

Effects of an expansionary monetary policy shock* on new loans in various risk categories

■ (Prolonged) phase of low interest rates[1]   **■** Normal regime[1]

Low-risk loans   Large banks (domestic)   High-risk loans

Small banks

Foreign banks

Quarters   Quarters

* Policy rate cut by 25 basis points. **1** 68% confidence intervals are shown. The upper curve in each chart shows the 84% band, whereas the lower curve represents the 16% band.

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able to use information on *ex ante* risk taking from the bank manager's perspective.

The chart on page 50 shows the development of high-risk loans as a share of total lending, as well as developments in risk premiums and the federal funds rate. It shows that high-risk lending was particularly prevalent, and that risk premiums were particularly low when the federal funds rate was at low levels for a prolonged period in the mid-2000s. This provides an initial indication of a possible negative relationship between high-risk loans and the policy rate. This phase (the mid-2000s) is therefore

considered separately in the following analysis.

The factor-augmented vector autoregressive model

Assuming that the vector of banking variables collected from the STBL (X_t) follows an approximate dynamic factor model (Bai and Ng 2002, Stock and Watson 2002),[5]

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5 J Bai and S Ng (2002), Determining the number of factors in approximate factor models, Econometrica, Vol 70, Issue 1, pp 191-221, as well as J H Stock and M W Watson (2002), Macroeconomic forecasting using diffusion indexes, Journal of Business & Economic Statistics, Vol 20, Issue 2, pp 147-162.

Effects of an expansionary monetary policy shock[*] on the risk premiums of new loans in various risk categories
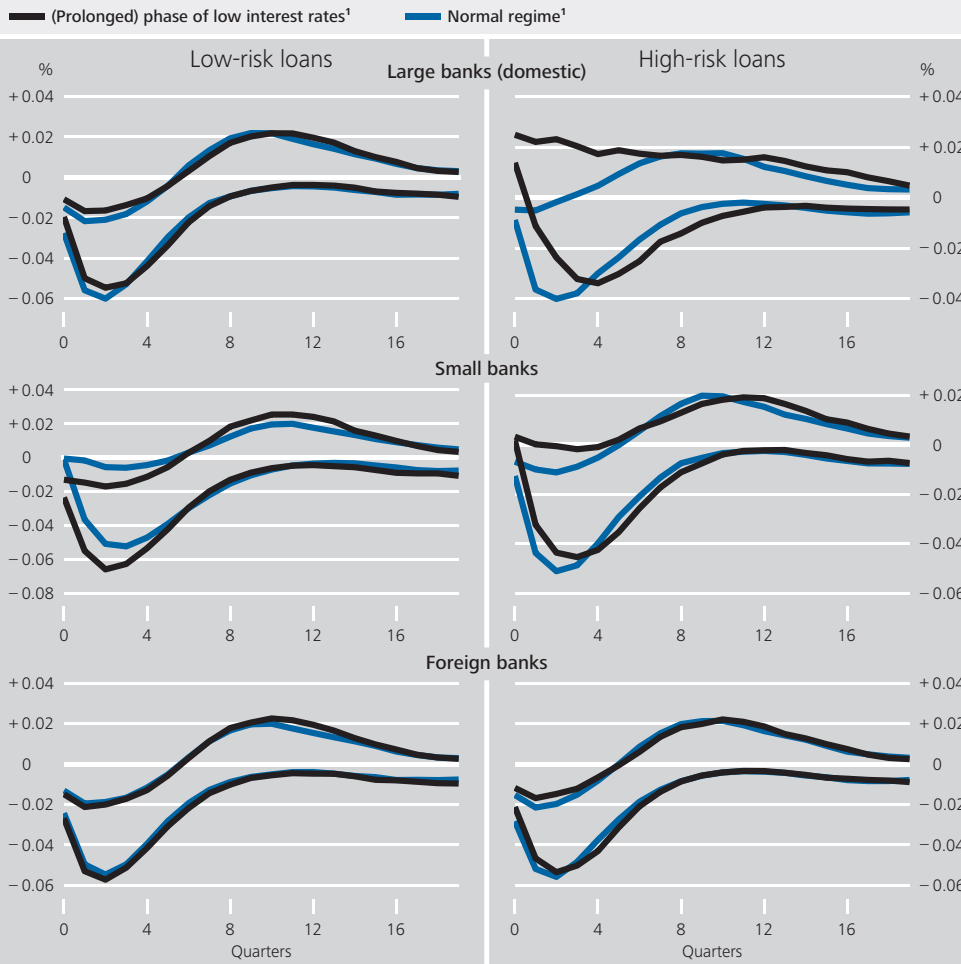
━━ (Prolonged) phase of low interest rates[1]   ━━ Normal regime[1]

* Policy rate cut by 25 basis points. 1 68% confidence intervals are shown. The upper curve in each chart shows the 84% band, whereas the lower curve represents the 16% band.

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where each time series x_{jt} is determined by the $r \times 1$ vector of common factors F_t and a time series-specific component e_{jt}, then:

$$x_{jt} = [\lambda_j^{F-MP\prime} \lambda_j^{(1)MP\prime}]'F_t + e_{jt} \forall t < \tau_1$$
$$x_{jt} = [\lambda_j^{F-MP\prime} \lambda_j^{(2)MP\prime}]'F_t + e_{jt} \forall \tau_1 \leq t \leq \tau_2$$
$$x_{jt} = [\lambda_j^{F-MP\prime} \lambda_j^{(1)MP\prime}]'F_t + e_{jt} \forall t > \tau_2.$$

F_t can be broken down into two parts: a set of observable factors G_t and a set of unobservable factors H_t. Therefore, the following applies: $F_t = [H_t' \ G_t']'$. It is assumed that G_t comprises the differences of the logarithms of GDP (Δy_t) and of the GDP deflator (Δp_t) as well as the level of the fed-

eral funds rate (ffr_t). The unobserved banking factors (H_t) are estimated (details on the estimation can be found in Buch et al, op cit) and summarise the banking variables. The factors are assumed to follow a first-order vector autoregressive model.

$\lambda_j^{F-MP\prime}$ represents the $(r-1) \times 1$ vector of loadings for variable j associated with all (observable and unobservable) factors, with the exception of the policy rate. These loadings are constant over time. $\lambda_j^{(k)MP\prime}$ is the scalar loading of the jth variable associated with the policy rate, which differs across regimes $k = \{1,2\}$. Hence, the banking vari-

ables' reactions to movements in the policy rate are dependent on the monetary policy regime. The prolonged phase of low interest rates (the "too-low-for-too-long" period) from $\tau_1 = $ 2003 Q1 to $\tau_2 = $ 2005 Q4 is assumed to be the period when monetary policy was excessively accommodative (Taylor 2013).[6] The second regime refers to the remaining period.

Results

The charts on pages 51 and 52 show the dynamic effects (impulse response functions) of loans and risk premiums to shocks which lower the federal funds rate by 25 basis points in the two regimes. For reasons of clarity, the charts show 68% confidence intervals and the results for high-risk and low-risk loans only.

The results suggest that in "normal times", only small domestic banks significantly increase new lending to high-risk borrowers following an expansionary monetary policy shock (see the chart on page 51). The composition of loans granted by small banks shifts towards riskier loans. However, risk premiums are not increased to compensate for changes in the risk composition of loan portfolios (see the chart on page 52). Instead, banks shift their new loan portfolios towards riskier loans and charge a lower risk premium. The reduction in the credit spread of high-risk loans is, in fact, greater than that of low-risk loans. Borio and Zhu (2012)[7] state the following with regard to the risk-taking channel: banks are willing to take on greater risks without raising their risk premiums to compensate for these risks. Although large domestic banks issue more new high-risk loans in absolute terms, the composition of their loan portfolios does not change significantly. Foreign banks do not change their risk composition when policy rates are not excessively low.

Loan impulse responses to a monetary policy shock (of the same magnitude) do, however, differ significantly during a prolonged phase of low interest rates from those during a normal period (see the chart on page 51). The results show that between 2003 and 2005, additional risk taking is not only found for small but also for foreign banks. The risk premiums on high-risk loans decline for small and foreign banks, which suggests that these institutions did not increase their risk premiums to compensate for the higher risk of the new loans (see the chart on page 52). As with the normal regime, there is no evidence of a change in the risk-taking behaviour of large domestic banks here either.

Our finding that the risk appetite of foreign banks increases in response to an expansionary monetary policy shock in a "too-low-for-too-long" period supports the findings of Bruno and Shin (2013) as well as Shin (2012).[8] These authors emphasise the role that large European banks played in fuelling the US credit boom in the mid-2000s. They argue that expansionary monetary policy in the United States and the regulatory structure in Europe that allowed high debt leverage enabled European banks to take on excessive risks in the United States. Anecdotal evidence provided in Shin (2012) shows that foreign banks used cheap, short-term US dollar funding to in-

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6 See J B Taylor, A review of recent monetary policy. Testimony before the Subcommittee on Monetary Policy and Trade, Committee on Financial Services, US House of Representatives, 5 March 2013. The results are not very sensitive to the exact timeframe of the "too-low-for-too-long" period.
7 C Borio and H Zhu (2012), Capital regulation, risk taking and monetary policy: A missing link in the transmission mechanism?, Journal of Financial Stability, Vol 8, Issue 4, pp 236-251.
8 V Bruno and H S Shin, Capital Flows and the Risk-Taking Channel of Monetary Policy, Journal of Monetary Economics, forthcoming, as well as H S Shin (2012), Global banking glut and loan risk premium, mimeo, Princeton University.

vest in toxic assets generated by the shadow banking system. The results presented here complement these findings insofar as they show that the increase in risk appetite was not confined solely to the securities markets, but was also apparent in the traditional lending business.

All in all, these findings provide strong evidence of the existence of an active monetary policy risk-taking channel. Furthermore, the results suggest that the effects of monetary policy on the risk-taking behaviour of banks are particularly pronounced during prolonged phases of low interest rates.

Related work on the effects of monetary policy on risk taking in a macroeconomic environment complements the present study and corroborates its findings. Bekaert et al (2014)[9] show that a loose monetary policy significantly reduces risk aversion (in terms of market-based measures), assuming, however, a constant dynamic relationship. Eickmeier et al (2014)[10] document that risk taking is particularly pronounced in periods of low uncertainty. In such periods, an expansionary monetary policy leads to reduced funding costs and stimulates lending (and therefore business investment and output) more strongly than in times of high uncertainty.

9 G Bekaert, M Hoerova and M Lo Duca (2013), Risk, uncertainty and monetary policy, Journal of Monetary Economics, Elsevier, Vol 60, Issue 7, pp 771-788.
10 S Eickmeier, N Metiu and E Prieto (2014), Monetary policy propagation and uncertainty, mimeo, Deutsche Bundesbank.

like other monetary transmission channels, such as the interest rate channel or exchange rate channel, the risk-taking channel is less tightly circumscribed; rather, it comprises a variety of mechanisms.[22] It can therefore operate in at least three ways.[23]

… through the valuation of assets, income streams and payment flows, …

First, monetary policy decisions affect the valuation of assets, income streams and payment flows. This means that a reduction in monetary policy rates will generally lead to an increase in asset prices and income streams,[24] which for their part reduce (consciously or unconsciously) the perception of risk and/or increase risk tolerance. In a prolonged period of low interest rates, risk tolerance can rise undesirably sharply and market participants, in an environment of low volatility, can erroneously seriously underestimate the risk of an interest rate move.

… via the search for yield …

Another way the risk-taking channel can operate is through an undesirably intensive search for yield, in that a reduction in the monetary policy interest rate will generally lower nominal yields; this means, for instance, that those financial market agents whose long-term liabilities are nominally fixed by contractual terms are willing to tolerate higher-risk investment in the expectation of achieving a higher return. Financial market agents could, for instance, bypass relatively safe government bonds and invest instead in higher-risk, higher-return securities.[25]

22 See M Apel and C Claussen (2012), Monetary Policy, Interest Rates and Risk-Taking, Sveriges Riksbank Economic Review 2, pp 68-83.
23 See C Borio and H Zhu (2012), op cit.
24 This aspect of the risk-taking channel bears a certain resemblance to the "financial accelerator" in that, due to credit market imperfections, a reduction in the monetary policy rate will ultimately also lead to an increase in borrowing and in aggregate demand, therefore even amplifying the original monetary policy stimulus through feedback effects. For more, see B Bernanke, M Gertler and S Gilchrist (1999), The Financial Accelerator in a Quantitative Business Cycle Framework, published in J B Taylor and M Woodford (eds), Handbook of Macroeconomics, Vol 1C, pp 1341-1393.
25 See R Rajan (2005), Has Financial Development Made the World Riskier?, Jackson Hole 2005 Symposium Proceedings, Federal Reserve Bank of Kansas City.

The third and final way of activating the risk-taking channel is through monetary policy communication. The justified outlook of a sharp cut in the policy rate in a crisis will lead market participants to expect that they can receive all of the profits associated with heightened risk if they are successful but will not have to bear the costs in full in the event of a loss. In this respect, the crucial factor is not the low interest rate *per se* but market participants' expectations that the central bank will behave in a specific way. A more or less explicit promise by monetary policymakers to provide support in the event of a financial crisis encourages the development of collective moral hazard, which can contribute to financial instability.[26]

Three different perspectives on the interaction between monetary policy and macroprudential policy

At the current juncture, experience and knowledge of the effectiveness of macroprudential instruments, their calibration and their interaction with each other and with monetary policy are still rather limited. Therefore, model simulations are highly necessary in order to study these questions (see the box on interaction on pages 56 to 61).

It should therefore come as no surprise that no consensus on the interaction between monetary policy and macroprudential policy has been reached as yet. As a matter of fact, the current discussion in the literature can be broken down into different points of view,[27] the main differences between which boil down to their answers to a series of key questions: How effective is the new macroprudential framework in safeguarding financial stability? How dependent are risk appetite or risk-taking on the monetary policy stance? (And, as a corollary, to what extent can monetary policy fuel a financial crisis?) How great is the danger that a monetary policy regime which also takes the safeguarding of financial stability into account in its

decisions will undermine the credibility of a central bank in achieving its price stability objective?

Idealised perspective

The first perspective holds that monetary policy should remain focused on price stability – with the option, if desired by society, of adding the objective of stabilising the output gap or the utilisation of resources. Macroprudential policy, on the other hand, should stick to financial stability and use its own toolkit to achieve that goal.

This means that the key difference compared with the pre-crisis consensus lies in establishing an effective and credible macroprudential policy. Monetary policy can then, as before, focus exclusively on the objective of price stability. However, it should take into account the (institutional) changes in the transmission mechanism resulting from the application of the macroprudential toolkit. This toolkit should not be used for the general management of aggregate demand and thus not be directly geared to macroeconomic targets (inflation, utilisation of resources), for which monetary policy is responsible, in particular, as the policy measures taken would then cause distortions by possibly necessitating (inefficient) changes in behaviour going above and beyond their actual target. In this perspective, targeted monetary policy and macroeconomic policy mutually enhance each other's effectiveness.[28] The idealised perspective is founded on the assumption that each policy area – especially the newly created area of macroprudential policy – is capable of redu-

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26 See E Farhi and J Tirole (2012), Collective Moral Hazard, Maturity Mismatch, and Systemic Bailouts, American Economic Review 102, pp 60-93.
27 See F Smets (2013), Financial Stability and Monetary Policy: How Closely Interlinked?, Sveriges Riksbank Economic Review 3, pp 121-160. For an abridged version, see F Smets (2014), Financial Stability and Monetary Policy: How Closely Interlinked?, International Journal of Central Banking 10, pp 263-300.
28 The idealised perspective is reflected, for instance, in the macroeconomic model presented in F Collard, H Dellas, B Diba and O Loisel (2014), Optimal Monetary and Prudential Policies, University of Bern, mimeo.

Model-based analysis of the interaction between monetary and macroprudential policy

The financial crisis has shown that price stability alone is not enough to ensure financial stability. As a response to the experiences of the recent financial crisis, a new policy area – that of macroprudential policy – has been established and designed with the aim of countering risks for the financial system as a whole. Yet this does not necessarily mean that monetary policy should not contribute to financial stability at all. As the different views outlined in the main text show, there is still disagreement about the extent to which monetary policy should be taking general developments in the financial markets into account. Nor is there any consensus in the literature about the form that the interaction between monetary and macroprudential policy should take from a welfare-theoretical viewpoint.

In light of this, two questions are analysed below on a theoretical model basis. Does macroprudential policy have a positive impact on welfare? Should monetary policy respond to developments in the financial markets despite the existence of macroprudential policy?

To answer these questions, models have to be used which feature both a financial sector and a point of departure for monetary and macroprudential policy. In recent years, dynamic stochastic general equilibrium (DSGE) models have established themselves as the standard analytical tool for monetary policy issues. In these models, monetary policy has, because of nominal rigidities (such as price or wage rigidity), an effect on real variables.[1] These abstract and stylised models are also referred to as New Keynesian models. Accordingly, the models used here are based on a New Keynesian framework as in Christiano et al (2005) or Smets and Wouters (2007).[2]

By contrast, there is as yet no generally acknowledged analytical framework for macroprudential issues. This is true with regard to the choice both of the model class and of the macroprudential instruments; in most cases, banks' capital is used as the instrument.[3] Nor does there exist a generally accepted model framework which allows for the analysis of the interaction between monetary and macroprudential policy. Endeavours have increasingly been undertaken recently to include financial intermediaries or markets and, proceeding from them, so-called financial frictions in New Keynesian models. New modelling variants have been developed since the financial crisis, in particular, though none of them have so far established themselves as a standard. Against this backdrop, three different models are included in the analysis. These models differ substantially in how they model the banking sector and financial frictions in order to take the model uncertainty described above into account.[4,5]

1 See M Woodford (2003), Interest and Prices: Foundations of a Theory of Monetary Policy, Princeton University Press; and J Galí (2008), Monetary Policy, Inflation, and the Business Cycle: An Introduction to the New Keynesian Framework, Princeton University Press.
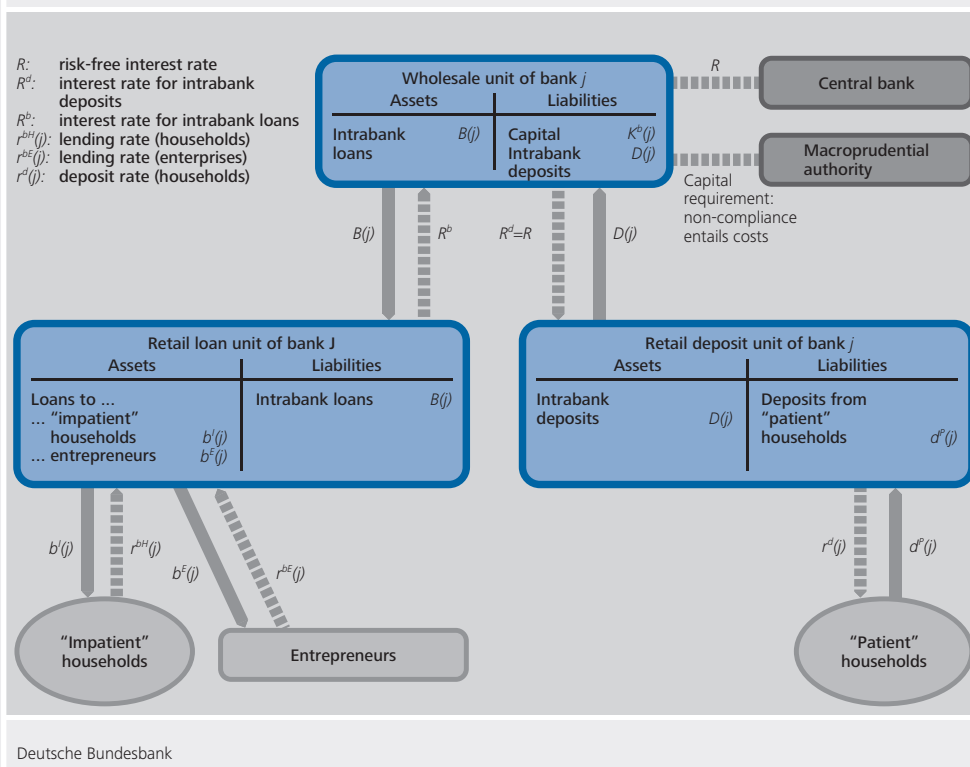**2** See L J Christiano, M Eichenbaum and C L Evans (2005), Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy, Journal of Political Economy 113, pp 1-45; and F Smets and R Wouters (2007), Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach, American Economic Review 97, pp 586-606. The models show price and wage rigidity, habit formation in consumption, adjustment costs in investment and variable capital utilisation. These specifications are needed in order to harmonise the model results with empirical data.
3 In the following analysis, only the capital requirements for banks are examined as a macroprudential instrument. Consequently, financial stability policy is presented in a rather stylised manner.
4 For more information about the need not to derive policy recommendations from individual models alone, see M Hellwig, After the Reform of Banking Regulation: Has the Financial System Become Safe?, Keynote Address for de Nederlandsche Bank Conference, June 2014.
5 Each of the models was estimated using Bayesian methods in order to base the welfare analysis on a realistic shock structure. To this end, data on GDP, consumption, inflation, investment, banks' capital, wages, short-term interest rates, lending rates for loans to households and enterprises, lending volumes to households and enterprises, deposit rates, deposit volumes and house prices for the euro area between the first quarter of 2000 and the second quarter of 2008 are used (sources: Eurostat and ECB). See C Choi, R Gerke, D Kienzler and J Tenhofen (2014), On the interaction of monetary and macroprudential policy, mimeo.

Stylised representation of the financial sector in model variant A

R:	risk-free interest rate	
R^d:	interest rate for intrabank deposits	
R^b:	interest rate for intrabank loans	
$r^{bH}(j)$:	lending rate (households)	
$r^{bE}(j)$:	lending rate (enterprises)	
$r^d(j)$:	deposit rate (households)	

Wholesale unit of bank j

Assets		Liabilities	
Intrabank loans	$B(j)$	Capital	$K^b(j)$
		Intrabank deposits	$D(j)$

R — **Central bank**

— **Macroprudential authority**

Capital requirement: non-compliance entails costs

$B(j)$ R^b $R^d=R$ $D(j)$

Retail loan unit of bank J

Assets		Liabilities	
Loans to ...		Intrabank loans	$B(j)$
... "impatient" households	$b^I(j)$		
... entrepreneurs	$b^E(j)$		

Retail deposit unit of bank j

Assets		Liabilities	
Intrabank deposits	$D(j)$	Deposits from "patient" households	$d^P(j)$

$b^I(j)$ $r^{bH}(j)$ $b^E(j)$ $r^{bE}(j)$ $r^d(j)$ $d^P(j)$

"Impatient" households

Entrepreneurs

"Patient" households

Deutsche Bundesbank

In this way, it is possible to examine whether robust statements about the interaction between monetary policy and macroprudential policy can be derived across different modelling variants.

Model variant A is based on Gerali et al (2010).[6] The financial sector is characterised by banks with pricing power; they incur adjustment costs when deposit and lending rates vary. Households and enterprises are faced with credit constraints that are determined by the collateral that is available (real estate and capital goods). Banks must observe a given capital ratio and incur costs if they fall below or exceed it. The capital ratio is the macroprudential policy instrument. The chart above shows a stylised representation of the financial sector in this model.

Variant B models the financial market based on Gertler et al (2012).[7] Banks can procure funding via households in the form of short-term debt instruments (deposits) as well as capital increases. In addition, banks can ac-

cumulate capital by retaining earnings. A so-called principal-agent problem between households and banks gives rise to an endogenous credit constraint for the financial intermediary. Banks can use securities to their own private advantage, motivating households to limit the funds they make available to financial intermediaries. This credit constraint gives banks the incentive to accumulate capital by retaining earnings. The point of departure for macroprudential policy constitutes an overall capital ratio which banks take into account in their optimisation strategy. The chart on page 58 shows a stylised representation of the financial sector in this model.

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6 See A Gerali, S Nerri, L Sessa, and F M Signoretti (2010), Credit and banking in a DSGE model of the euro area, Journal of Money, Credit and Banking 42, pp 107-141.

7 See M Gertler, N Kiyotaki and A Queralto (2012), Financial Crises, Bank Risk Exposure and Government Financial Policy, Journal of Monetary Economics 59, pp 17-34.

Stylised representation of the financial sector in model variant B
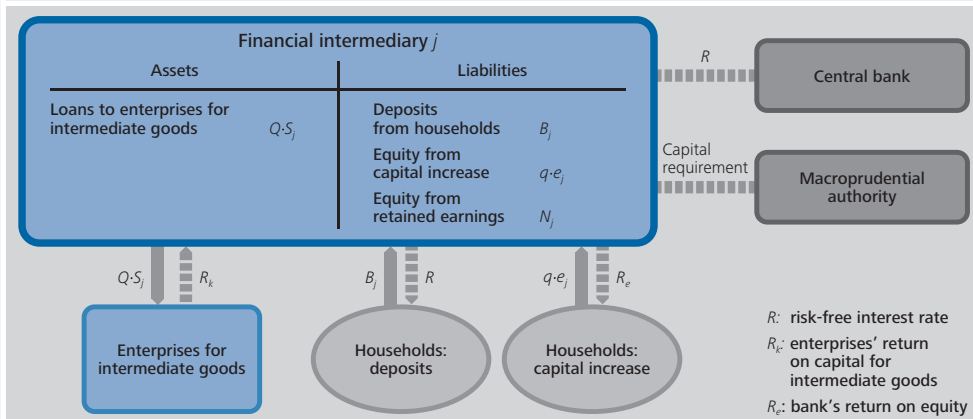
Deutsche Bundesbank

Model variant C is based on a paper by Benes and Kumhof (2011).[8] Here, costs arise for banks when they verify the default of a borrower. Because the lending rate is set independently of the actual future economic development, banks may incur losses from lending to enterprises if the actual development deviates from the development that had been expected. A fine is imposed on banks which fail to achieve the capital ratio set by macroprudential policymakers. This again motivates banks to accumulate capital through retained earnings. The chart on page 59 shows a stylised representation of the financial sector in this model.

The interaction between monetary and macroprudential policy is examined on the basis of simple rules for setting interest rates and the cyclical adjustment of capital requirements for banks.[9] In the monetary policy rule, the nominal interest rate R_t is adjusted in response to the changing inflation rate π_t, output growth $\dfrac{y_t}{y_{t-1}}$ and, where applicable, real credit growth $\dfrac{b_t}{b_{t-1}}$. Moreover, the interest rate is set depending on the interest rate level of the previous period, which smoothes the interest path to a certain extent.[10]

$$R_t = (R_{t-1})^{\rho_R} \left\{ \overline{R} \pi_t^{\kappa_\pi} \left(\frac{y_t}{y_{t-1}} \right)^{\kappa_y} \left(\frac{b_t}{b_{t-1}} \right)^{\kappa_b} \right\}^{1-\rho_R} \epsilon_{R,t}$$

The parameters ρ_R, κ_π, κ_y and κ_b determine the strength of the response to changes to the relevant variables. The variable ϵ_R represents a monetary policy shock and $\overline{R}$ the equilibrium real interest rate.

8 See J Benes and M Kumhof (2011), Risky Bank Lending and Optimal Capital Adequacy Regulation, IMF Working Paper 11/130.
9 The choice of cyclical capital requirements for banks as a macroprudential instrument is driven by various factors. For instance, this instrument has high practical relevance as part of the Basel III regime. For this reason, it is often discussed in the literature (see, for example, P Angelini, S Neri and F Panetta, 2014, The Interaction between Capital Requirements and Monetary Policy, Journal of Money, Credit and Banking 46, pp 1073-1112; or J Benes and M Kumhof, 2011, op cit). From a technical viewpoint, all three models used here have a common point of departure for setting cyclical capital requirements for banks; this is not the case for other instruments such as loan-to-value-ratios.
10 Empirical studies of monetary policy rules typically find a statistically significant coefficient for the interest rate level of the previous period, which is also the case in the estimation carried out for this study. This result may be interpreted in different ways. On the one hand, it could be the result of an optimal monetary policy, which is usually characterised by very sluggish interest rate movements. On the other hand, the academic literature holds that central banks possibly want to avoid large interest rate changes in order to prevent disruptions in the financial markets. See also C E Walsh (2010), Monetary Theory and Policy, 3rd edition, MIT Press, Cambridge, MA.

Stylised representation of the financial sector in model variant C
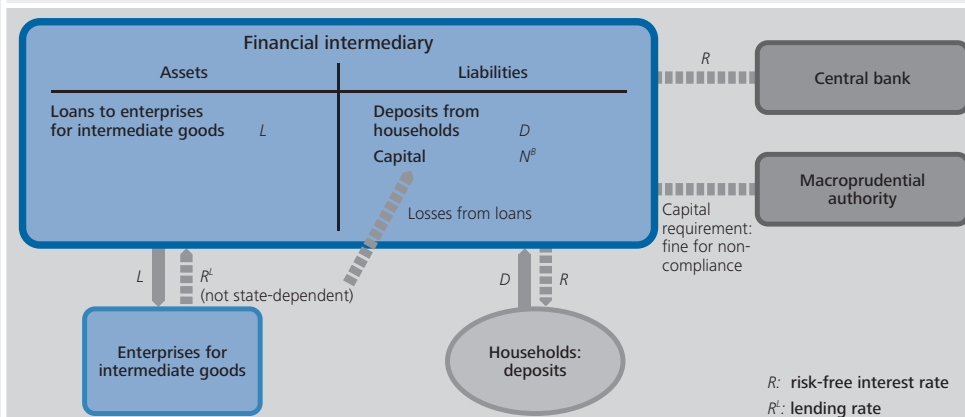
Deutsche Bundesbank

According to the macroprudential rule, the capital requirements m_t respond to credit growth and to the capital requirements of the previous period (in order to avoid fluctuations of the instrument that are "too volatile").

$$m_t = (m_{t-1})^{\rho_m} \left\{ \overline{m} \left(\frac{b_t}{b_{t-1}} \right)^{\varphi_b} \right\}^{1-\rho_m}$$

The parameters ρ_m and φ_b determine the strength of the response to changes to the relevant variable and $\overline{m}$ represents the capital requirements in equilibrium.

A grid search is carried out to find for each of the models the combination of parameters for the two rules that achieves the highest welfare.[11] The utility function of households serves as the welfare criterion. The values of the smoothing parameters are fixed in the two policy rules, ρ_R and ρ_m.[12] In this way, the grid search is carried out for the parameters κ_π, κ_y, κ_b and φ_b.[13]

The following has to be borne in mind when interpreting the results. If the welfare-maximising parameter constellation shows a positive parameter φ_b (and, at the same time, the parameters in the monetary policy rule are different from zero), macroprudential policy as well as monetary policy plays a part in increasing welfare. If the welfare-maximising parameter constellation shows a positive κ_b, monetary policy

should take credit growth in its interest rate rule and, therefore, also developments in the financial market directly into consideration.

The model simulations (see the table on page 60) indicate how important the modelling of the structure of the banking sector is with regard to the interaction between monetary and macroprudential policy as well as to the importance of financial market variables in the monetary policy rule.

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11 A grid search involves creating a grid for the parameters to be varied and calculating the welfare criterion for each possible combination of parameters. A comparison of the values of the welfare criterion identifies the combination of parameters that achieves the highest value for the welfare criterion. The welfare criterion is the recursive formulation of the expected value of the sum of discounted period-utility functions.
12 These two parameters are fixed on the basis of mathematical restrictions. The smoothing parameter in the monetary policy rule ρ_R, is set at its estimated value. This possibility is not available for ρ_m, as the models are estimated without a macroprudential rule. The reason for this is that the estimation period for the models ends prior to the financial crisis at a time when macroprudential policy was not yet practised in Europe. That is why this parameter was set at 0.5 following an agnostic approach. A positive value for this parameter may be explained by a wish not to cause too much uncertainty and volatility by abruptly changing the capital requirement for banks.
13 Perturbation methods are applied to solve the models. To this end, a second-order Taylor approximation is used in each case to allow for an ordering of welfare results for different parameter constellations. For the area of possible parameter values, see the table on p 60.

Optimal values for the coefficients in the monetary policy and macroprudential rule*

Model	Monetary policy rule			Macro-prudential rule
	κ_π	κ_y	κ_b	φ_b
Model A[1]	1.75	0	0.38	0
Model B	2.25	0.4	0	22.5
Model C	1.01	0.11	0.2	40

* Note: The range of possible parameter values is set as follows. As in S Schmitt-Grohé and M Uribe (2007, Optimal Simple and Implementable Monetary and Fiscal Rules, Journal of Monetary Economics 54, pp 1702-1705) the inflation parameter in the monetary policy rule ranges from 1 to 3 and the parameter for output growth and for credit growth in the same rule from 0 to 3. In the macroprudential rule, the parameter for credit growth is varied from 0 to 40. Given credit growth of 1%, a value of 40 would be equivalent to an increase in the capital ratio by 2 percentage points. **1** Angelini et al (2004, op cit) use the same model framework as model A. However, in contrast to the study under consideration, they find a positive optimal value of the credit growth coefficient in the macroprudential rule (here: 0). The analyses are not directly comparable with each other, however. Angelini et al ((2004), op cit) use an ad hoc loss function and rule out the possibility of a reaction to a financial market variable on the part of monetary policy.

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According to model variant A, it is optimal from a welfare viewpoint if monetary policy responds to credit growth with interest rate changes yet macroprudential policy does not change the capital requirements in response to changes in credit growth. Beyond that, monetary policy ought to respond only to changes in inflation. In model variant B, monetary policy should adjust the interest rate in response to changes in both inflation and output. Macroprudential policy should respond relatively strongly to developments in credit growth, whereas monetary policy should not respond to credit growth. In model variant C, on the other hand, monetary policy should respond to credit growth in tandem with a strong response from macroprudential policy. By contrast, the response on the part of the monetary policy interest rate to output growth should be weak, and the response to the inflation rate should be as weak as possible in order to just achieve a stable equilibrium.[14]

Thus, it is not possible to make a universally valid statement with regard to the optimal interaction between monetary and macroprudential policy across the different models. In light of these results, policy recommendations that are based on only one model must be considered problematic. At the same time, the results support the relevance of the research agenda with regard to financial market frictions and the interaction between different policy areas. Only if the modelled financial market and its imperfections are capable of reflecting the most important aspects of the reality as regards specific issues and time periods can reliable model-based policy recommendations be made.[15]

Finally, it is important to bear in mind the limited meaningfulness of DSGE models with regard to the issues considered here. The aim of macroprudential policy is to identify systemic risks at an early stage and, ideally, to avert them. However, the present class of DSGE models typically cannot capture systemic risk; and the newly developed DSGE models which include systemic risk are still too abstract to be able to capture the interaction between monetary and macroprudential policy.[16] The class of DSGE models dealt with here was developed to represent relatively small fluctuations of the model variables around a stable long-term equilibrium ("steady state"). This means that important features of financial crises – such as an abrupt drop in asset prices, fire sales of securities or runs on financial mar-

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14 According to the Taylor principle, the inflation coefficient in the monetary policy rule has to be greater than one in order to achieve a stable equilibrium. The more than proportional reaction by the nominal interest rate to changes in the inflation rate implies raising the real interest rate where shocks have a positive effect on the inflation rate and a decrease of the real interest rate where shocks have a negative effect.

15 As E M Leeper and J M Nason (Bringing Financial Stability into Monetary Policy, CAMA Working Paper 72/2014) emphasise, there is, generally speaking, no such thing as the "most important" financial frictions. Rather, the importance of the frictions varies over time and depends on the state of the economy.

16 See M K Brunnermeier and Y Sannikov (2014), A Macroeconomic Model with a Financial Sector, American Economic Review 104, pp 379-421; or J Bianchi (2011), Overborrowing and Systemic Externalities in the Business Cycle, American Economic Review 101, pp 3400-3426.

ket institutions – can only be described to a limited extent.[17] In this sense, the analyses presented here are to be considered as positive.[18] Proceeding from the observation that macroprudential institutions were established for very good reasons, the implications of this policy (or individual segments of it, such as capital requirements for banks) are examined with regard to the macroeconomic effects and their interaction with monetary policy.[19]

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[17] See E M Leeper and J M Nason (2014), op cit. For more recent theoretical studies on macroprudential policy, see H Gersbach and J-C Rochet (2012), Aggregate Investment Externalities and Macroprudential Regulation; Journal of Money, Credit and Banking 44, pp 73-109; H Gersbach and J-C Rochet (2013), Capital Regulation and Credit Fluctuations, mimeo.
[18] See Angelini et al (2014), op cit.
[19] See P Angelini, S Neri and F Panetta (2014), op cit.

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cing the key problems in its area precisely and effectively.

Idealised perspective largely rejects idea that monetary policy should address financial stability issues

In this perspective, monetary policy makes no meaningful contribution to the development of financial imbalances, such as through market players' excessive risk appetite, which means that the risk-taking channel is viewed as insignificant. The monetary policy rate is regarded as an ineffective tool for containing, far less avoiding risks to financial stability. Were monetary policy responsible for price stability and financial stability at the same time, this would result in a conflict of objectives, and would create the danger that safeguarding financial stability would undermine credibility regarding the objective of price stability.[29]

Extended perspective

Others regard the first perspective explained above as an ideal scenario that would practically never materialise in the real world.[30] Although they, too, believe that monetary policy should fundamentally be geared to the relatively narrowly defined objective of price stability, they think that monetary policy should not focus – as was the case before the crisis – too narrowly on achieving a short-term inflation target,[31] as that hinders monetary policy from combating longer-term financial imbalances (such as pronounced credit cycles), which would ultimately be at odds with price stability

Extended perspective: monetary policy should keep an eye on long-term threats to price stability caused by financial imbalances

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[29] A theoretical model of the potential incentive for a central bank with the dual objectives of price stability and financial stability to respond less decisively to inflation pressure is presented in K Ueda and F Valencia (2014), Central bank independence and macro-prudential regulation, Economics Letters 125, pp 327-330.
[30] "… an ideal benchmark in which both policies operate perfectly, … this benchmark is most likely unattainable, …", see IMF (2013), The interaction of monetary and macroprudential policies, pp 4-5.
[31] See also Deutsche Bundesbank (2011), The implications of the financial crisis for monetary policy, Monthly Report, March 2011, pp 53-68, and C Borio (2014), Monetary policy and financial stability: what role in prevention and recovery?, BIS Working Paper No 440.

over the medium to long term as well.[32] Much as in the idealised perspective, the objective of financial stability should be achieved primarily by macroprudential policy, using macroprudential tools. However, unlike the idealised perspective, the extended perspective assumes that it is impossible to eliminate an excessively pronounced financial cycle and thus risks to financial stability with these tools alone.[33]

Monetary policy should take financial stability into consideration in a systematic manner and thus be more "symmetrical" than before, …

This represents a not-inconsiderable modification for the conduct of monetary policy: it should not be focused, as before, exclusively on achieving a short-run inflation target but must now systemically incorporate the financial cycle into its decisions in order to safeguard price stability in the long run as well. A monetary policy stance that is generally stricter during upswings, even in the absence of inflationary pressures, and is aggressively eased in the short term during marked downturns, but a less persistent expansionary monetary policy stance following a period of economic downturn, would lead to a "more symmetrical" monetary policy design.[34] Even if, in the short term, the monetary policy stance were to cause the target variables to differ from their desired values – especially from the objective of price stability – this would justify the associated costs by avoiding future, yet larger deviations – such as in the form of a crisis.[35] Although aggressive monetary policy action is proposed specifically for managing crises – that is, during the business cycle downturn – the meat of crisis resolution lies in "repairing" the balance sheets in the private sector, meaning, above all, eliminating the debt overhang. Monetary policy is regarded as being less suited to this task; instead, conducting a prolonged expansionary monetary policy could bring to bear primarily the risks and side-effects of such measures.[36]

… which also protects it from a futile battle against balance sheet recessions

Even if recourse is taken to non-standard monetary policy measures, monetary policy makers' options for dealing with such a recession caused by overindebtedness are restricted.[37] To that extent, they are also limited in their ability to create the conditions for a self-sustaining

upswing – at least in the aftermath of severe financial crises. The extended perspective therefore stresses the danger of overloading monetary policy in the context of severe financial crises. Its proponents therefore believe that it is appropriate to combat the financial excesses of a boom using monetary policy tools in order to avoid such overloading later on. The (preventive) contribution of monetary policy to ensuring financial stability is therefore regarded as necessary in order to protect credibility regarding the price stability objective.

In terms of monetary policy, financial stability is interpreted as an intermediate objective along the road to the ultimate objective of sustainable price stability,[38] and therefore requires an extended policy horizon. The main reason this is necessary is that, in a typical case, the interval between the build-up of a systemic risk and

Financial stability requires a longer-term policy horizon

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32 "The key concept is that of sustainable price stability." See C Borio (2014), op cit, p 12.
33 Scepticism concerning the effectiveness of macroprudential policy is voiced in a variety of ways. The expressions and sources of this scepticism are manifold: risks to financial stability are difficult to measure; the analytical framework for assessing transmission channels is underdeveloped; experience of the specific calibration of the instruments is lacking; institutional and political-economic considerations need to be looked at; there are doubts as to whether all forms of financial frictions can even be addressed using macroprudential instruments. See C Borio (2014), op cit; M Feroli, A K Kashyap, K Schoenholtz and H S Shin (2014), Market Tantrums and Monetary Policy, Chicago Booth Working Paper, No 14-09; C A E Goodhart (2014), Lessons for Monetary Policy from the Euro-Area Crisis, Journal of Macroeconomics 39, pp 378-382; J C Stein (2014), Incorporating Financial Stability Considerations into a Monetary Policy Framework, speech delivered at the International Research Forum on Monetary Policy, Washington, DC, 21 March 2014; M Woodford (2012), Inflation Targeting and Financial Stability, NBER Working Paper 17967.
34 See C Borio (2014), op cit, p 9. See the box on pp 45-48 for more on the question of whether, on average, the inflation target is achieved "in spite of that".
35 See N Kocherlakota (2014), Discussion of 2014 USMPF Monetary Policy Report, speech delivered at the "2014 US Monetary Policy Forum" of the "Initiative on Global Markets" of the University of Chicago, Booth School of Business, New York, NY, 28 February 2014; J C Stein (2014), op cit; and M Woodford (2012), op cit.
36 See C Borio (2014), op cit, p 13.
37 See C Borio (2014), op cit, pp 12-13. In this context, the term "balance sheet recession" often comes up. It denotes a recession which is primarily marked by the reduction of a debt overhang; see R C Koo (2003), Balance Sheet Recession: Japan's Struggle with Uncharted Economics and its Global Implications, John Wiley and Sons, Singapore.
38 See also IMF (2013), op cit.

a crisis is considerably longer than the monetary policy horizon resulting from the conventional battle against inflation.[39] The main point here is to weigh up the risks and not to mechanistically stretch out the forecast horizon.[40] In upswing phases, this could counteract the build-up of financial imbalances and hence longer-term price instabilities.

Monetary policy contributes to the build-up of financial imbalances through risk-taking channel

In this perspective, monetary policy can contribute to the build-up of financial imbalances since the monetary policy stance generally impacts on the risk appetite of financial intermediaries, therefore affecting the stability of the financial sector and, by extension, the outlook for price stability. The monetary policy interest rate is accordingly regarded as effective in at least containing risks to financial stability even though financial stability can only be ensured in conjunction with macroprudential policy.[41]

Integrated perspective

Integrated perspective: separation of monetary policy and macroprudential policy not appropriate

Proponents of the third perspective argue that even the extended perspective calls for an excessively strict and inappropriate separation of the two policy areas. The aims of price stability and financial stability and the instruments and transmission mechanism of monetary policy and macroprudential policy, they hold, are so closely interwoven that monetary policy cannot focus on the narrow objective of price stability. For instance, non-standard monetary policy measures such as securities purchase programmes not only have direct intended monetary policy effects but also, through "stealth recapitalisation" of ailing financial institutions, impact on financial stability, which in turn feeds back indirectly into price stability.[42] Moreover, macroprudential measures affect lending (with the immediate objective of ensuring financial stability), which impacts on money creation and thus on price stability.[43] The integrated view thus advocates using both macroprudential and monetary policy instruments (standard and non-standard) in order to ensure financial stability – and, at the same time, price stability. Strictly speaking, it therefore does not make sense to classify the

tools by target area but is even, if anything, counterproductive.[44] Rather, both policy areas need to cooperate closely.

This perspective represents the most radical departure from the pre-crisis consensus. Although its proponents also hold that establishing a macroprudential framework and making it as effective and credible as possible is the right path, achieving this objective should not be used to justify monetary policymakers' fixation on price stability. Financial market events should always be part of monetary policy considerations. Monetary policy instruments are held to be indispensable as means of containing or avoiding financial imbalances. If, despite the joint efforts of monetary policy and macroprudential policy, a crisis nevertheless does break out, a "bottleneck approach" should be taken, ie supporting those sectors that suffer most from a debt overhang and whose balance sheets were hit the hardest. Without such policy measures, the result could be liquidity spirals and "fire sales", culminating in a self-reinforcing deflationary spiral.[45]

Therefore, gear monetary policy instruments to encompass financial stability objective as well

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39 See also IMF (2013), op cit, p 16; C Borio (2014), op cit, p 9.
40 "… balance of risks in the outlook." See C Borio (2014), op cit, p 9.
41 The fact that monetary policy is regarded as less vulnerable to regulatory arbitrage also matters; in other words, "… it gets in all of the cracks"; for more, see J C Stein, Overheating in Credit Markets: Origins, Measurement, and Policy Responses, speech delivered at the symposium "Restoring Household Financial Stability after the Great Recession: Why Household Balance Sheets Matter", St Louis, Missouri, USA, 7 February 2013, p 17.
42 See M K Brunnermeier and Y Sannikov (2014a), The I Theory of Money, Princeton University, mimeo.
43 See M K Brunnermeier and Y Sannikov (2014b), Monetary Analysis: Price and Financial Stability, ECB Forum on Central Banking, May 2014, p 12.
44 See E M Leeper and J M Nason (2014), Bringing Financial Stability into Monetary Policy, Indiana University, mimeo, pp 44 ff. The authors argue that, in the interests of a complete assessment, fiscal policy is also needed alongside monetary policy and macroprudential policy. See also M Hellwig (2014), Financial Stability, Monetary Policy, Banking Supervision, and Central Banking, Preprints of the MPI for Research on Collective Goods 2014/9.
45 In this connection, some also recommend that central banks also act as a "market-maker of last resort" in a crisis. See W Buiter and A Sibert (2008), The central bank as the market-maker of last resort: from lender of last resort to market-maker of last resort, in A Felton and C Reinhart (eds), The first global financial crisis of the 21st century, pp 171-178.

According to this view, monetary policy impacts on the build-up of risks to financial stability.[46] Finally, the integrated perspective holds that, if policymakers are overly fixated on the goal of price stability, the danger of "financial dominance" arises following the outbreak of a severe financial crisis (see box on pages 65 to 67).[47] If monetary policy does not (preventively) make an adequate contribution to protecting financial stability, the potential result is that the fragility of the financial sector in a crisis could force monetary policy to be too loose in terms of price stability, as otherwise the continued existence of many financial institutions would be in doubt and thus additional adverse impacts on economic developments could be expected. The intensive preventive contribution of monetary policy to ensuring financial stability is regarded as necessary in order to protect credibility regarding the price stability objective.

Challenges involved in making monetary policy more focused on financial stability

At present, there are still no signs of a consensus or of a majority emerging in favour of one particular perspective. One contributory factor in this is that macroprudential policy is a relatively new policy area. It would therefore be unrealistic to expect conclusive answers to already be available to the many issues that have been discussed to date.

The explanations above regarding the extended and integrated perspective contain a number of arguments in favour of a greater involvement of monetary policy in safeguarding financial stability. In addition to these conceptual aspects, it could also be advantageous from an organisational perspective for monetary policy to play a role in addressing financial stability issues. This would sidestep the problems that exist with regard to the flow of information and coordination between financial stability and price stability-oriented policy. Furthermore, by placing

financial stability within the remit of monetary policy, responsibility for financial stability would lie with an independent institution, namely the central bank, which already has experience and expertise in the area of macroeconomic developments and financial markets.[48]

A greater involvement of monetary policy in safeguarding financial stability does, however, present a challenge for central banks for a number of reasons. First and foremost, our current understanding of the interrelationships between the financial and the real economic sector is still limited. Moreover, the effectiveness of the monetary policy interest rate as an instrument in preventing financial stability risks is likely to be limited, especially in the euro area, not least owing to the lack of synchronicity of credit cycles in the single currency area. And even if these arguments are not taken into account, political-economic considerations, which ultimately affect the credibility of monetary policy, and possibly also undesired economic side-effects from gearing monetary policy more strongly towards financial stability, still present a challenge.

46 The central starting point for asset price changes is the change in risk premiums (see J H Cochrane (2011), Presidential Address: Discount Rates, Journal of Finance 66, pp 1047-1108). Various studies accordingly explain how monetary policy measures affect risk premiums. See R J Shiller, J Y Campbell and K L Schoenholtz (1983), Forward Rates and Future Policy: Interpreting the Term Structure of Interest Rates, Brookings Papers on Economics Activity, pp 173-223; M Gertler and P Karadi (2015), Monetary Policy Surprises, Credit Costs, and Economic Activity, AEJ: Macroeconomics 7, pp 44-76; S G Hanson and J C Stein, Monetary policy and long-term real rates, Journal of Financial Economics, forthcoming. In this connection, reference is also made to the "volatility paradox", according to which, precisely in apparently tranquil times of low fundamental risk, systemic risk is built up – owing to, for instance, excessive indebtedness – which then erupts in economic crises. See also M K Brunnermeier and Y Sannikov (2014c), A Macroeconomic Model with a Financial Sector, American Economic Review 104, pp 379-421.
47 For more see M K Brunnermeier and Y Sannikov (2014b), op cit, pp 11-12. For more on financial dominance, see also M Hellwig (2014), op cit. A simplified way of explaining financial dominance is when monetary policy, following the outbreak of a severe financial crisis, perceives itself as being forced (or is actually forced) to gear its monetary policy toolkit to stabilising the financial sector, running the risk of setbacks in its efforts to achieve the objective of price stability.
48 See F Smets (2013), op cit.

"Financial dominance" as a potential problem for monetary policy

Given the overlap between the fields of monetary policy and macroprudential policy, the two policy areas' measures may complement or, under certain circumstances, come into conflict with each other. Within a theoretical model framework, this box will illustrate possible interdependencies between the two policy areas, with particular focus on potentially destabilising developments in private debt.[1] Notably, we will identify which configuration of the two policy measures enables a stable model solution and therefore generally stable economic development.[2] To allow for a transparent depiction of central mechanisms and the related results, it should be noted that the stylised model used here and the associated analysis are based on, in some cases, strong assumptions. This also means that the model's output may not be directly transferable to the current economic situation, and caution is therefore advisable.

The analysis is based on a model framework similar to that of Benes and Kumhof (2011).[3] The credit market examined in this analysis is subject to frictions, as the success of projects carried out by enterprises is uncertain at the time of borrowing, while the liability of these enterprises is limited in the event of default. Enterprises depend on credit financing for conducting investment projects, which they receive from banks. The banks finance loans using equity and deposits acquired from households. Enterprises are subject to the risk of not being able to meet their loan repayment obligations. Given the assumption that loan contracts cannot be made contingent on the success of the enterprises' projects, unexpectedly high default rates are reflected negatively in the banks' balance sheets.

The assumption of a complete deposit insurance scheme, funded by tax revenues, means that deposits are risk-free for households. Therefore, compared with deposits, equity is the more expensive form of funding for financial intermediaries. This means that without regulatory intervention – ie without regulatory capital requirements – the model economy would be inherently unstable on account of its incentive structure: the banks would seek to achieve full debt financing and could fund more or less any loan amount. In this economy, only macroprudential policy intervention lays the foundation for stable macroeconomic development. The macroprudential instrument employed is a binding bank capital requirement, ie banks are required to hold a minimum percentage of their credit volume as equity.[4] In addition, the model contains price rigidities and a monetary policy institution. This allows us to examine the interplay between the macroprudential policy described above and monetary policy.

The present model can be compared to a prototypical New Keynesian model without financial frictions. In this kind of standard model, the "Taylor principle" is a necessary and sufficient condition for the existence of a determinate, stable solution.[5] The principle states that monetary policymakers should raise their policy instrument (the nominal short-term interest rate) by more than 1 percentage point if the inflation rate rises by 1 percentage point. Intuitively, this means that, if monetary policymakers react

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1 Dynamic Stochastic General Equilibrium (DSGE) models are used to examine the transmission of shocks in an economy and to describe the impacts of policy decisions on economic agents (households, enterprises and banks).
**2** The present analysis relates to a specific example of interaction and policy instruments; many other frictions and instruments are conceivable.
3 See J Benes and M Kumhof (2011), Risky Bank Lending and Optimal Capital Adequacy Regulation, IMF Working Paper WP/11/130.
4 Unlike with the Benes and Kumhof (2011) model, downward deviation from the minimum capital ratio is not possible here.
5 See M Woodford (2001), The Taylor rule and optimal monetary policy, American Economic Review Papers and Proceedings, Vol 91, pp 232-237.

Determinacy regions of the model as a function of the policy rule parameters
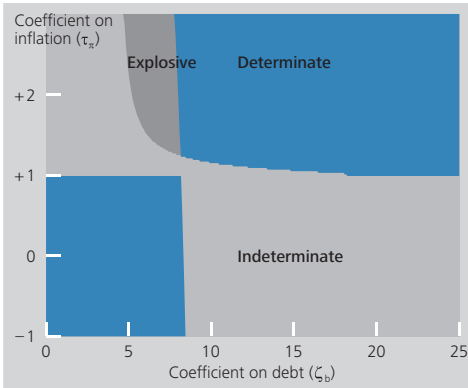
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strongly enough to inflation, the real interest rate will increase in response to higher inflation (in technical terms, the coefficient on inflation in the policy rule is greater than one). As a result, aggregate demand will fall, which will ultimately cause the inflation rate to contract. In this kind of standard model, monetary policymakers are thus able to stabilise inflation by following the Taylor principle.

However, the model framework used here takes into account financial market frictions, meaning that interest rate changes imply additional effects which, in turn, may impact on the stability of the economy. In this regard, it is particularly important that the loan contracts mentioned above are written in the form of nominal contracts. Consequently, an inflation rate rise in the present model leads to a reduction in the real debt burden if the nominal lending rate remains unchanged. Taken in isolation, this has a stabilising effect on corporate debt. Generally speaking, both monetary policy and macroprudential policy can therefore have an effect on debt dynamics under the present model framework. For example, macroprudential policy is able to use a higher bank capital ratio to curb lending, while monetary policy can lower the debt burden by allowing for inflation. Conversely, there is also a possibility in this scenario of

a monetary policy based on the Taylor principle having a destabilising effect if, given high debt levels, very low inflation causes the real debt level to rise further (Fisher's "debt-deflation theory").

Such a situation can arise, in particular, if banks are not required to maintain a sufficient capital buffer during a boom and, as a result, issue too many loans to enterprises, which may lead lending down an unstable path. In the context of the present model, this means that macroprudential policy does not respond or does not respond strongly enough to debt, allowing lending to strengthen and ultimately pressuring monetary policymakers to stabilise the real debt burden by raising inflation (otherwise there would be no stable equilibrium in the present model). In other words, to keep the debt level sustainable, inflation is generated by a violation of the Taylor principle.[6] Monetary policy then finds itself in a situation that can be described as "financial dominance".

A simulation study can be used to illustrate the concept of financial dominance. This involves examining a range of parameter values for both the monetary policy rule and the macroprudential rule. These parameter values reflect the sensitivity of the policy to indicator variables and therefore to certain economic developments. The monetary policy rule is expressed as follows:

$$\frac{R_t}{R} = \left(\frac{\Pi_t}{\Pi} \right)^{\tau_\Pi},$$

where R_t is the short-term nominal interest rate and Π_t is the inflation rate. Variables without the subscript t denote variables in long-term equilibrium. The coefficient τ_Π

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6 Similarly, the term "fiscal dominance" was already coined by Leeper (1991, Equilibria under Active and Passive Monetary and Fiscal Policies, Journal of Monetary Economics, Vol 27, Issue 1, pp 129-147) when he showed that monetary policymakers can be forced to pursue a policy which violates the Taylor principle when fiscal policy is unsustainable.

represents the policy instrument's sensitivity to inflation. The macroprudential rule is given by the following formula:

$$\frac{\phi_t}{\phi} = \left(\frac{b_t}{b}\right)^{\zeta_b},$$

where ϕ_t represents the bank capital ratio and b_t designates lending; the coefficient ζ_b controls the macroprudential instrument's sensitivity to private debt.

The result of the analysis is presented in the chart on page 66. The horizontal axis shows the coefficient of the macroprudential rule (ζ_b), while the vertical axis represents the coefficient of the monetary policy rule (τ_{Π}).[7] The chart is divided into four quadrants, two of which reflect parameter combinations that lead to a determinate, stable solution and therefore to generally stable economic development. These are the blue shaded areas in the bottom left and top right quadrants. As long as the coefficients of the policy rules are either both low or both high, a determinate and stable model solution exists. In the first scenario, following Leeper (1991), macroprudential policy is described as active and monetary policy as passive, whereas in the second scenario, monetary policy is characterised as active and macroprudential policy as passive.

What is the intuition behind this classification? If, for example, macroprudential policy is active, ie ζ_b is (too) low, the capital requirements for banks are comparatively low, which leads to excessive lending. The economy is in a state of financial dominance, as the burden of stabilising the debt level is ultimately imposed on monetary policy. A determinate, stable solution is presented in the bottom left quadrant. As macroprudential regulation does not sufficiently stabilise the debt level, monetary policy is forced into the passive policy category. More specifically, this means that, in order to arrive at a stable equilibrium, the central bank responds to inflation rate changes with a less than one-to-one change

in the interest rate. As a result, the violation of the Taylor principle reflects the fact that monetary policy gives priority to financial stability: it uses inflation to stabilise debt.

In the top left quadrant, however, monetary policy follows the Taylor principle: the coefficient in the policy rule is greater than one, $\tau_{\Pi} > 1$. However, macroprudential policy does not respond strongly enough to debt in this quadrant either. This results in an unsustainable level of debt, and an explosive solution shows up in this quadrant of the model.

Provided the central bank continues to follow the Taylor principle, these results show that, within the model framework presented, macroprudential policy also needs to respond strongly enough to debt in order to ensure stable macroeconomic growth. Otherwise, in our analytical framework, an equilibrium would be reached only in situations of financial dominance. (Ultimately, the model analysis only presents the implications of certain policy circumstances. Any strategic action taken by the parties concerned is not modelled.) As a result, monetary policymakers would be forced to allow more inflation than if financial stability were irrelevant.

As specific assumptions apply to the model used here, the applicability of the mechanisms and results to the current economic situation is limited. Nevertheless, the analysis shows that it is important to continue to work intensively on establishing the most effective macroprudential policy possible, so that monetary policy can focus on its primary objective of price stability.

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7 It should be noted that the coefficient in the macroprudential rule ζ_b differs from the regulatory capital ratio ϕ_t.

Risks to credibility resulting from a financial stability-oriented monetary policy

The credibility of a central bank is of paramount importance. It plays a crucial role in steering expectations and thus in determining the effectiveness of monetary policy.[49] It must therefore be ensured that strengthening the role of monetary policy in financial stability issues does not jeopardise its credibility. Credibility could be affected in a number of ways.

First, the integration of monetary policy in financial stability issues harbours the risk (at least temporarily) of additional conflicting objectives (see also the box on welfare-theoretical thoughts on pages 45 to 48). Monetary policy could, for example, be faced with a situation where the objective of ensuring price stability requires a more relaxed (or a tighter) monetary policy stance, whereas the objective of safeguarding financial stability requires a tighter (or a more relaxed) stance. This would necessitate a deviation, at least temporarily, from one or both of the two objectives. Although monetary policy is already familiar with the problem of conflicting objectives brought about, for example, by supply shocks, which influence the outlook for prices and the economy in different directions in the short term, the communicative demands resulting from a greater integration of financial stability issues are likely to increase further. If the central bank does not succeed in communicating that a possible deviation from an objective does not imply that this objective is being "watered down" or abandoned, but is merely the outcome of a trade-off decision resulting from a temporary conflict of objectives, this could undermine the credibility of monetary policy.[50] This would result in a less effective monetary policy.

Second, the objective of ensuring financial stability could give rise to a time-inconsistency problem for monetary policy.[51] If monetary policy is responsible for both price stability and financial stability and if the latter is influenced by

private-sector debt, for instance, it may initially be desirable for monetary policy to pursue a low inflation rate. However, following the onset of a financial shock, which gives rise to a high level of private-sector debt, for example, monetary policymakers could, under certain conditions, decide to reduce the real debt burden further down the line by allowing a higher rate of inflation.[52] It is therefore essential that monetary policy continues to fulfil its obligation of maintaining price stability.

Third, monetary policy's independence could be jeopardised if it focuses too heavily on financial stability issues. The independence of monetary policy is, however, a fundamental institutional prerequisite for ensuring its credibility.[53] Gearing monetary policy solely towards the goal of price stability facilitates the political acceptance of central bank independence as the inflation target and the associated instrument, the short-term interest rate, can be clearly defined and assessed.[54] This is not the case for the objective of financial stability, however. On the contrary,

49 See A Cukierman (1992), Central Bank Strategy, Credibility, and Independence: Theory and Evidence, MIT Press; M Bordo and P Siklos (2014), Central Bank Credibility, Reputation and Inflation Targeting in Historical Perspective, NBER Working Paper 20693. For information on steering expectations, see Deutsche Bundesbank, Price-level targeting as a monetary policy strategy, Monthly Report, January 2010, pp 31-45.
50 For further information on central bank communication and its relevance to monetary policy, see A S Blinder, M Ehrmann, M Fratzscher, J De Haan and D J Jansen (2008), Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence, Journal of Economic Literature 46, pp 910-945.
51 The general problem is that a policy which is deemed to be optimal and is announced as such at a certain point in time is no longer optimal at a later point in time once the private economic agents have adjusted to the announcement and thus the policy is no longer implemented. For a classic definition of the time-inconsistency problem, see F Kydland and E Prescott (1977), Rules Rather than Discretion: The Inconsistency of Optimal Plans, Journal of Political Economy 87, pp 473-492.
52 See K Ueda and F Valencia (2014), op cit.
53 A central bank can only steer inflation expectations if the market players can trust that monetary policy decisions have the sole aim of achieving the central bank's objectives and are not influenced by political considerations. For an overview, see S Fischer (1995), Central Bank Independence Revisited, American Economic Review Papers and Proceedings 85, pp 201-206.
54 See O Blanchard, G Dell'Ariccia and P Mauro (2013), Rethinking Macro Policy II: Getting Granular, IMF Staff Discussion Note 13/03.

several variables are taken into consideration in this case (credit growth, asset prices, debt etc) the desired levels of which are *a priori* not determined; moreover, their attainment is difficult to assess and they cannot be associated mechanistically with the objective of financial stability.[55] In addition, by having to get involved in any solvency issues of private economic agents or other countries whilst trying to achieve its objective of financial stability, monetary policy moves closer to the domain of quasi-fiscal activities.[56] This inevitably raises the question as to the democratic legitimacy of monetary policy, as it is exercising fiscal tasks that are reserved for elected representatives. These aspects could generate political pressure which could undermine the independence and thus the credibility of the central bank with regard to its objective of ensuring price stability.

It must be ensured that the risks to credibility do not materialise

From a monetary policy perspective, it has to be ensured that the risks to credibility set out here, which result from a greater integration of monetary policy in financial stability issues, do not materialise. Conflicting objectives can be explained by means of careful communication and can thus be rendered manageable, as is already common practice in the core area of monetary policy in the event of supply shocks, for instance. The problem of time inconsistency has to be avoided by way of institutional arrangements, so that monetary policy sticks to its past announcements. Monetary policy independence can be protected by refraining from defining financial stability as a monetary policy objective in its own right.

Undesired side-effects of a financial stability-oriented monetary policy

A greater integration of monetary policy in financial stability issues could also entail economic costs …

The calls for a more symmetrically designed monetary policy with regard to credit cycles are the subject of much debate, even after the experience of the financial crisis. The view is sometimes taken that the costs of a greater integration of monetary policy in financial stabil-

ity issues, especially in the form of a tighter stance than would actually be necessary to achieve the objective of price stability within a given policy horizon (sometimes referred to as a "leaning against the wind" (LATW) policy), would outweigh the benefits.[57,58]

… and it is not a priori clear whether a policy of this kind always achieves its desired effect, …

Furthermore, a policy of this kind is criticised as it cannot necessarily be assumed *a priori* that it will always achieve its desired effect. In actual fact, it cannot be categorically ruled out, for example, that a LATW strategy will increase households' real debt burden instead of reducing it as intended (this can occur, for instance, if nominal debt reacts more sluggishly to an increase in interest rates than the price level or disposable income). A LATW policy could prove to be problematic, at least for some sectors (such as those that are characterised by a comparatively high level of debt).[59]

… which, however, does not justify the categorical refusal of such a policy

These objections do not imply *per se* that LATW cannot make a contribution towards stabilising the financial sector as a whole. In this respect, they by no means justify the categorical refusal of a LATW policy. They do, however, illustrate that a greater integration of monetary policy in ensuring financial stability can be associated

55 See A Houben, J Kakes and G Schinasi (2004), Towards a framework for financial stability, De Nederlandsche Bank, Occasional Studies 2; C M Buch, (2014a, b), op cit.
56 See H Pill (2013), Central Banking After the Crisis: Challenges for the ECB, in R Baldwin and L Reichlin (eds), Is Inflation Targeting Dead? Central Banking After the Crisis, CEPR e-book, pp 95-102.
57 It was recently argued taking model simulations for Sweden as an example that a LATW strategy would result in a distinctly higher unemployment rate without the likelihood of future crises being notably reduced. See L Svensson (2014), Inflation Targeting and "Leaning against the Wind", International Journal of Central Banking 10, pp 103-114. This assessment is controversial, however. See P Jansson, Swedish monetary policy after the financial crisis – myths and facts, speech at the SvD Bank Summit 2014, Stockholm, 3 December 2014.
58 Doubts as to the costs of a LATW policy outweighing the benefits can be indirectly seen in a recently published statement by the Federal Reserve. In this statement, monetary policy is rated as the final instrument that should be used to safeguard financial stability if macroprudential measures in the stricter sense fail to achieve the desired effect. See L Brainard, The Federal Reserve's Financial Stability Agenda, speech held on 3 December 2014.
59 See L Svensson (2013), "Leaning Against the Wind" Leads to Higher (not Lower) Household Debt-to-GDP Ratio, mimeo.

with economic costs (see also the box on welfare-theoretical thoughts on pages 45 to 48).

The secondary effect of the risk-taking channel is probably dominated by the first order effect

It is also possible under certain circumstances that the risk-taking channel points in the "opposite" direction (second order risk shifting effect).[60] A monetary policy tightening could, for example, increase the likelihood of individual financial market players defaulting owing to a rise in financing costs and incite them to take greater risks in order to achieve higher (expected) yields.[61] As a general rule, the empirical literature on risk-taking does, however, emphasise the fact that the secondary effect presented here is dominated by the first order effect. An increase in interest rates is therefore generally associated with a reduction in the incentive to take risks (see the box on risk propensity on pages 50 to 54).

The benefits of a monetary policy geared more strongly towards financial stability have to outweigh the real economic costs

The objections cited here illustrate that a greater integration of monetary policy in safeguarding financial stability can by all means entail costs for the real economy. These costs, which can be interpreted as an insurance premium, should be kept to a minimum by structuring such a policy to prevent them from outweighing the benefits of having a more resilient financial system. These objections do not justify a categorical rejection of a greater involvement of monetary policy in safeguarding financial stability *per se*; they do, however, illustrate that a greater integration of monetary policy in financial stability issues needs to be considered along with other factors and thus ultimately brings about new challenges.

■ Assessment and outlook

Role of monetary policy is controversial

In the period prior to the global financial crisis, debate concerning the relationship between monetary policy and financial stability was largely restricted to the question of whether it is advantageous to use the policy rate to burst financial market bubbles at an early stage. However, experience gained in the wake of the crisis have led to a shift and an expansion in the focus of the debate. The debate surrounding the role of financial stability is now no longer concentrated primarily on interest rate policy but on macroprudential policy. That being said, the issue as to whether monetary policy should play a greater role than to date in safeguarding financial stability is still controversial. The interdependencies between monetary and macroprudential policy play a significant role in this debate. Owing to the lack of experience in this area, there is a considerable need for further analyses of the impact of monetary policy on financial stability and of the effectiveness of macroprudential policy. An initial assessment can nevertheless be made on the basis of current debates and research findings.

There is a broad consensus that a new policy area with its own set of tools is indispensable in order to safeguard financial stability. The tools of monetary policy alone are too undifferentiated to do justice to the complexity of the task of ensuring financial stability. This is why it remains a top priority to establish and strengthen the effectiveness of macroprudential policy.[62] Macroprudential policy would then be in a position to create the framework conditions for a stability-oriented monetary policy by setting the right incentives and ensuring sufficient resilience in the financial sector. In particular, it is important to ensure that monetary policy does not fall into the "financial dominance" trap. Conversely, a monetary policy which has the

There is a consensus that macroprudential policy needs to be quickly established

60 Dell'Ariccia et al (2014), op cit, for example, show that in the event of exogenous debt leverage, commercial banks have an incentive to take greater risks with an increasing monetary policy interest rate.
61 An example based on a US financial institution (New Century Financial Corporation) shows that this institution adjusted its business model following a series of interest rate rises by, inter alia, loosening its credit standards and shifting the focus of its business operations, also geographically. This resulted in an increase in loan portfolio risk. See also A Landier, D Sraer and D Thesmar (2011), The Risk-Shifting Hypothesis, TSE Working Paper Series, No 11-279. See also C M Buch, S Eickmeier and E Prieto (2014), Macroeconomic factors and micro-level bank behavior, Journal of Money, Credit and Banking 46, pp 715-751.
62 See J Weidmann (2014a), op cit; J Weidmann (2014b), The macroeconomic importance of capital markets, speech at the annual reception of the Deutsches Aktieninstitut e.V., Frankfurt am Main, 22 May 2014.

primary objective of ensuring price stability can make use of the tools at its disposal to establish important preconditions for stable financial markets.

Macroprudential policy should be employed in a targeted manner and should not be reinterpreted as a national instrument for managing demand,[63] as this is ultimately the responsibility of other policy areas. Economic policy challenges which result from the heterogeneous nature of the euro area should not be tackled using macroprudential instruments unless these are directly linked to financial stability. Macroprudential policy should therefore be strictly geared towards financial stability.

Monetary policy should be designed symmetrically

A monetary policy which focuses on price stability in the medium term is unable to prevent the occurrence of undesirable developments in the financial markets, which could spill over to the real economy and thus jeopardise price stability. The recent past has shown that the monetary policy stance can influence, in particular, financial market players' propensity to take risks. Monetary policymakers should therefore also consider the effect of their decisions on the stability of the financial system as a whole. This suggests a symmetrical monetary policy stance over the financial cycle – in other words, a monetary policy stance that tends to be stricter in upswings, even in the absence of inflationary pressure, and is aggressively eased during a marked downturn, but a less persistent expansionary policy stance following a period of economic downturn – and thus a trade-off between medium and longer-term risks to price stability.[64] A symmetrical monetary policy along those lines should help to avoid a situation in which financial market participants take on too much risk.

An alternative or complementary argument in favour of more symmetry could result from an objective function of monetary policy which explicitly takes account of financial stability (see the box on page 45). The political-economic reasons mentioned in the text and, in particular, the limits of the monetary policy instruments do, however, give the impression that an expansion of the list of objectives is not expedient. If financial stability were to be adopted as an additional, separate monetary policy objective, it would also harbour the risk of raising unrealistic expectations regarding the effectiveness of the monetary policy instruments.

Price stability in the medium term must continue to be monetary policy's primary objective

The Eurosystem's monetary policy strategy, which could be placed somewhere between the idealised and the extended perspective, is sufficiently flexible to provide a targeted response to future challenges. A fundamental change in strategy is not required. Nevertheless, given the limited experience with and knowledge of the functioning of macroprudential instruments as well as their interaction with monetary policy, the Eurosystem should further develop the relevant analytical framework. This is, in principle, already contained in the monetary pillar of the Eurosystem's monetary policy strategy.

The Eurosystem's monetary policy strategy is sufficiently flexible to incorporate financial stability issues

Further work needs to be done in terms of implementing an effective macroprudential policy. This would not only improve the stability of the financial system as a whole but also create the conditions in which the single monetary policy is able to ensure price stability in accordance with its mandate.

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63 See C M Buch (2014c), Alter Wein in neuen Schläuchen? Die Ziele makroprudenzieller Regulierung, speech at the Banken- und Unternehmensabend event which took place at the Bundesbank's Regional Office in Bavaria.
64 See Deutsche Bundesbank (2011), op cit.