The future of monetary policy
Summary of the conference held in Rome on 30 September and 1 October 2010

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What lessons can be learnt from the financial and economic crisis for the strategy and conduct of monetary policy? To analyse and debate this topic, more than eighty participants, chiefly from Europe and the United States, mostly professors of economics at prestigious universities or central bank economists, came together in Rome on 30 September and 1 October 2010. This conference was the fruit of collaboration between the Banque de France, the Banca d'Italia and its research institute, the Einaudi Institute for Economics and Finance. It provided a forum for the presentation of a number of studies about the various aspects of this question, including the role of central banks in maintaining the smooth functioning of the interbank market, the effectiveness of the non-standard monetary policy measures adopted during the crisis, the interaction between monetary policy and macroprudential policy, and the role of macroeconomic stabilisation policies during periods of "excessive" credit expansion.[1]

The conference lasted two days and included two presentations by prominent academics, the first by Professor Michael Woodford from Columbia University in New York and the second by Professor Markus Brunnermeier from Princeton University in New Jersey. A number of research papers were presented by their authors and discussed by two selected experts before an open debate with the audience. The conference closed with a round table debate between Mario Draghi (Governor of the Banca d'Italia), Charles Evans (President of the Federal Reserve Bank of Chicago), Christian Noyer (Governor of the Banque de France) and Athanasios Orphanides (Governor of the Central Bank of Cyprus) on "The future of monetary policy".

This article summarises the main questions that dominated the presentations, discussions and debates, namely: are monetary policy and liquidity management always independent from each other? Should monetary policy preserve financial stability? Should monetary policy react to asset price bubbles? And, more generally, what is the future for monetary policy?

Keywords: asset price bubbles, financial crisis, interbank market, macroprudential policy, monetary policy.
JEL codes: E3, E4, E5, E6, F4, G1, G2.

1 *The conference's programme and its papers may be consulted online at:* http://www.banque-france.fr/gb/publications/seminaires/the_future_of_monetary_policy.htm.

1 | Are monetary policy and liquidity management always independent from each other?

The first session of the conference, entitled "Monetary policy and liquidity", focused on monetary policy implementation in a liquidity crisis context. Its primary objective was to highlight the operational challenges facing central banks in such situations and to examine the effectiveness of their available tools. The two articles in this session analysed the conduct of monetary policy in the euro area and in the United States respectively.

In their contribution, Achim Hauck and Ulrike Neyer (Heinrich Heine University, Dusseldorf) examine the implementation of the Eurosystem's monetary policy during the crisis after the collapse of the investment bank Lehman Brothers. To that aim, the authors develop and use a model designed to reflect the principal characteristics of an operational framework based on an interest rate corridor. In such operational frameworks, commercial banks can refinance themselves either by obtaining liquidity directly on the interbank market or by borrowing from the central bank. In the latter case, they can either make permanent use of the central bank's marginal lending and deposit facilities – but on less favourable terms than those offered by the market – or they can participate in the central bank's weekly tender operations. The authors show that when interbank participation costs rise, the central bank's intermediation increases. At the height of the crisis, participation costs – mainly reflecting transaction and monitoring costs in situations where information on counterparty credit risk is imperfect – became prohibitive. This led to a near seizure of the interbank market, characterised notably by a sharp fall in transaction volumes and prompting the Eurosystem to stand in for this failing market. The authors also explain, in this context, why certain banks made such heavy use of the central bank deposit facility. In their view, any measures that might be taken by the Eurosystem to reactivate the interbank market which imply an increase in its funding costs may prove inconsistent with the desired monetary policy stance.

Xavier Freixas (Pompeu Fabra University), Antoine Martin and David Skeie (both at the Federal Reserve Bank of New York) conducted a similar study focused on the reaction of the Federal Reserve System. Their analytical framework introduces an uncertainty about the distribution of liquidity desired by the banking system. The authors examine the optimal monetary policy response in this framework. They show that when banks are confronted with a shock that impacts the distribution of liquidity within the banking system engendering

substantial liquidity differentials between them, the central bank should lower its target interest rates. This is precisely what happened in the United States and Europe. The objective of this easing is to prompt banks to lend to each other at reasonable rates and thereby relieve tensions in the interbank money market. Such action, however, implies that in a crisis situation, monetary policy can no longer be conducted without financial stability considerations. The paper also shows that following an aggregate liquidity shock, the central bank should try to attenuate its impact by adjusting market liquidity. They therefore recommend that central banks should use two different instruments depending on the nature of the shock affecting the interbank market: interest rates in reaction to a shock affecting the distribution of liquidity within the banking system, and liquidity injections in response to generalised liquidity shocks. The authors therefore suggest that maintaining the separation principle in times of crisis – which recommends that central banks use interest rates exclusively to contain risks to price stability – would pose a risk to financial stability by raising the likelihood of bankruptcies and hence of bank runs.

2| Should monetary policy preserve financial stability?

2|1 Sources of financial instability

2|1|1 The risk-taking channel

One session focused on the analysis of the factors and mechanisms that tend to destabilise the supply of credit. Here, Luisa Lambertini (*École polytechnique fédérale*, Lausanne) presented a model explaining how excessive mortgage lending may arise. The primary objective of this study is quantitative. Can the magnitude of the recession experienced in 2008 and 2009 be explained by a sudden change in lenders' risk assessment and an increase in the proportion of borrowers likely to default? The model underscores the transmission mechanism via which borrowers' defaults lead to a contraction of housing prices. The latter reduces the borrowing capacity of home-owners and subsequently their consumption and investment spending. However, according to this model, the macroeconomic impact of this phenomenon is limited as it produces only a relatively shallow recession. It is in fact likely that other mechanisms, not covered by this model, such as a confidence channel and a collapse of trade, have played an important role in the amplification of the financial crisis.

2|1|2 The optimal level of credit and the effectiveness of macroprudential policy

Anton Korinek (Maryland University) presented a paper co-written with Olivier Jeanne (Johns Hopkins University) on the design of economic policy to manage credit and asset price cycles. A financial accelerator mechanism is at the heart of their model. A rise in asset prices eases private agents' borrowing constraints, allowing them to spend more and thereby fuelling the rise in asset prices further. In the absence of public intervention, individual borrowers do not internalise the effects of their decisions on prices and so subsequently suffer the effects of exposure to cycles of excessive lending. A macroprudential policy should take the form of a "Pigouvian" tax on borrowing. Such a tax would prompt issuers of debt to internalise this externality and would thus contribute to the collective welfare. The model used by the authors is calibrated using data for American households and SMEs (small & medium enterprises). The optimal tax would be counter-cyclical, dropping to zero at the bottom of the cycle and increasing to approximately half a percentage point of the amount of debt at the top of the cycle.

In their contribution, Gianluca Benigno (London School of Economics) and his co-authors partially question the wisdom of a macroprudential policy aimed at preventing the sort of over-borrowing that leads to a financial crisis. First, from a qualitative point of view and somewhat counter-intuitively, they demonstrate that the existence of an occasionally restrictive credit constraint does not systematically lead to overborrowing (vs. an optimal level of debt). Depending on the structure of the economy and the values used to calibrate the model, such a constraint may also lead to underborrowing. Second, from a quantitative point of view, they find that the gains from an optimal public intervention in terms of welfare are higher in times of crisis than in normal times. These two results suggest that the implementation of a macroprudential policy in the form of a prudential tax on capital flows or of capital controls are of limited effectiveness in this class of model compared with ex post public interventions in times of crisis.

2|2 Non-standard monetary policies and macroprudential policies

What are the alternatives to and effects of a combined use of monetary policy and macroprudential policy? These questions were notably discussed in a session dedicated to the macroeconomic impact of non-standard monetary policies and the potential challenges and conflicts relating to the simultaneous use of monetary and macroprudential policy instruments.

Gauti Eggerston (Federal Reserve Bank of New York) presented a qualitative and quantitative analysis of the non-standard monetary policies implemented by the US Federal Reserve. One of the central issues of the analysis is the switch in monetary policy instruments that occurs when the traditional instrument, the policy rate, reaches the zero bound and therefore has no further easing potential. In such conditions, the central bank can augment its supply of money in order to change its relative price by issuing financial instruments that are considered partially substitutable for cash. The study shows the substantial effects of these quantitative easing policies on economic activity as long as two conditions are met: nominal interest rates must effectively be fixed at zero, and the economy must show clear signs of strong nominal rigidities that prevent an adjustment of supply to the level where demand contracted.

The second article of the session, presented by Stefano Neri (Banca d'Italia), focused on the interplay between monetary policy and macroprudential policy. The authors consider two situations. In the first, the authorities responsible for implementing these policies cooperate with each other and coordinate their decisions; in the second, they take their decisions independently in a non-cooperative game. Their two main conclusions should be stressed. First, in most cases, macroprudential policy only has a limited impact on price stability. Thus even in the non-cooperative case, monetary policy usually manages to achieve its price stability objective. Second, the two policy levers are, in effect, complementary in the event of an asset price bubble. Their coordination then allows a simultaneous stabilisation of the financial cycle and of price levels.

3| Should monetary policy react to asset price bubbles?

The mechanism underlying the formation of financial bubbles remains obscure. One of the most frequently evoked theories suggests a strong input from contagion phenomena. In their contribution, Martin Eichenbaum (Northwestern University), Craig Burnside (Duke University) and Sergio Rebelo (Northwestern University) present an original model of property price formation that captures large upward and downward price movements using a somewhat unusual representation of the notion of economic contagion. In fact, their approach is inspired by an epidemiological model. In this model, "optimistic" agents meet agents who are indecisive about the nature of their economic environment and "contaminate" the latter with their optimism. These optimistic agents have a

certain likelihood of subsequently returning to an indecisive state of mind. In this framework, expectations about the developments in property prices follow a non-linear upward dynamic, followed by a fall. This dynamics of expectations is introduced in a model of property market prospection and matching. The authors show that the model faithfully reflects the dynamics of the key variables on the US property market.

Another paper, presented by Olivier Loisel (Banque de France), joint with Aude Pommeret (Lausanne University) and Franck Portier (Toulouse School of Economics), focused on the role of monetary policy when asset price bubbles result from herd behaviour. Entrepreneurs may massively adopt a new technology whose productivity is uncertain at the time the investments are made (for example, the Internet technology in the 1990s). Herd behaviour is due to an "informational cascade": if the first entrepreneurs receive encouraging private signals about the productivity of the new technology and therefore invest in this new technology, then all the subsequent entrepreneurs will rationally choose to invest in the new technology too, irrespective of their own private signal. A tightening of monetary policy that raises borrowing costs for entrepreneurs can then prompt them to invest in this new technology if and only if they receive an encouraging private signal about its productivity. This tightening of monetary policy then interrupts entrepreneurs' herd behaviour, by forcing them to act on the basis of their own private information, and therefore interrupts the asset price dynamics due to herd behaviour. Such a policy can be implemented even when the central bank knows less about the productivity of the new technology than each entrepreneur. And, in certain cases, because it "insures" the economy against the consequences of bad surprises vis-à-vis the actual productivity of the new technology, it may be ex ante preferable in terms of social welfare to the *laisser-faire* policy.

4| The future of monetary policy

What have we learned from the crisis and what are the lessons for the future strategy, conduct and implementation of monetary policy? To reply to this question, two eminent specialists, Michael Woodford and Markus Brunnermeier, put forward their views in two open presentations. This was followed by a closing panel that drew up a first assessment and offered some preliminary perspectives on these questions.

4 | 1 Should the current monetary policy strategy be amended?

4|1|1 Inflation targeting and financial stability

Michael Woodford (Columbia University) referred to the conclusions of his ongoing research with Vasco Cúrdia (Federal Reserve Bank of New York) to support the notion that the inflation targeting strategy could and should be adapted to take into account the possibility of financial crises. Monetary policy should respond to changes in financial conditions during a crisis. For example, key rates should be lowered proportionally to the rise of interest rate spreads on markets. This does not imply a change in monetary policy objectives (which, in the framework of a flexible inflation targeting strategy, are expressed in terms of inflation and output gap), but requires the use of a forecasting model that takes into account the macroeconomic implications of financial frictions. Moreover, monetary policy has a role to play in the prevention of financial crises, alongside other policies that are not totally effective in this respect. The role of these policies is not to detect asset price bubbles and to eliminate them, but rather to discourage extreme financial debt phenomena that represent a risk for financial stability. In the case of monetary policy, this financial stability objective may, from time to time, be inconsistent with the price stability objective; but such inconsistencies would in fact be very similar to those already existing, in the framework of flexible inflation targeting, between stabilising inflation and stabilising the output gap. Michael Woodford recognised that such a strategy could be considered equivalent to the ECB's "two-pillar" strategy, but he pointed to two major differences. Monetary analysis should be used to identify the risks to financial stability and not those to long-term price stability. And it should not be based on an analysis of the growth rates of monetary aggregates, but rather on signs of systemic risk.

4|1|2 A new role for money

Markus Brunnermeier (Princeton University) proposed a new model of a monetary economy that includes financial intermediaries. In this model, households invest their savings in financial assets provided by financial intermediaries. The latter lend to entrepreneurs with financial frictions. The specificity of this new approach is that it is conducted in general equilibrium and continuous time, without linearising the model around a stationary equilibrium. This approach has precisely the advantage of highlighting the financial instability phenomena, the multiple equilibria and the non-linearities that characterize periods of crisis. Markus Brunnermeier demonstrates, in the framework of a flexible price monetary model, the existence of a deflationary spiral. A contraction

in agents' wealth can lead to a decline in credit and a lower level of intermediation, which, in turn, lead to a fall in prices. He then compares the properties of this model with those of a standard New-Keynesian model to emphasize the advantages of his focus on financial intermediaries.

4|2 How to combine the monetary stability and financial stability objectives?

The conference ended with a round table on "The future of monetary policy", in which four central bank governors or presidents took part: Mario Draghi (Banca d'Italia), Charles Evans (Federal Reserve Bank of Chicago), Christian Noyer (Banque de France) and Athanasios Orphanides (Central Bank of Cyprus).

Mario Draghi addressed two topics. The first concerned the non-standard monetary policy measures used by the Eurosystem during the crisis. Mr Draghi started by stressing the very positive impact of these policies on economic activity in the euro area and Italy. Without them, the drop in production would have been substantially greater. Mr Draghi went on to underscore the high risk inherent to the exit from non-standard monetary policies: some fragile banks have become particularly dependent on the support provided by the Eurosystem. Consequently, if the problems posed by fragile banks were not promptly solved by national authorities, the exit from these non-standard policy measures could destabilise such banks and engender systemic risk. Mr Draghi made it clear that the national authorities should provide assistance to these banks.

The second topic discussed by Mr Draghi was the interplay between monetary policy, macroprudential policy and financial stability. First, although Mr Draghi recognises that central banks should monitor a broader range of indicators, including credit growth and financial intermediary leverage, he does not believe that this requires a change in the mandate of central banks. Lastly, he expressed the view that macroprudential policies should allow a greater capacity of loss absorption for the financial sector. This could be made possible by, for example, contingent capital or capital adequacy ratios varying over time.

Charles Evans discussed the question of the appropriate monetary policy stance for the United States in the current situation, where short-term interest rates are close to zero. He began by summarising the economic situation in the United States. The unemployment rate is very high and there is no sign of any significant break in the Beveridge curve, suggesting that a significant proportion of the current unemployment is cyclical

rather than structural. The current economic behaviour of households seems to indicate the presence of a liquidity trap. The savings rate is increasing and has already exceeded demand for private sector funding despite the current low yield on savings. These elements suggest that other monetary policy actions may be necessary in the current situation.

Christian Noyer addressed the relationship between financial stability and monetary stability. Historical examples and recent events show that price stability is a necessary but not a sufficient condition for financial stability. In effect, high and volatile inflation generally leads to substantial fluctuations in asset prices that can destabilise financial markets. Moreover, we have seen the formation of financial imbalances in periods of low inflation. At the same time, the authorities responsible for monetary stability should be concerned with financial stability because of the impact that financial crises can have on prices. Financial and banking crises usually lead to a fall in demand and in inflation that can, in extreme cases, lead to deflation, with enormous costs for the general economy. The second point addressed by Mr Noyer concerned the complementarity between monetary and macroprudential policies. He began by reminding the audience that it is important to establish clear objectives for each of these policies. Monetary policy aims to ensure price stability whereas the objective of macroprudential policy is to maintain financial stability. Then, certain interactions between these two policies can be identified. For example, macroprudential policy can have an impact on inflation via the volume of credit. Inversely, monetary policy can raise investors' risk appetite when interest rates are low. Governor Noyer stressed that additional research that would improve our understanding of the interaction between monetary and macroprudential policies is warranted.

Lastly, Athanasios Orphanides stressed that, to understand the future of monetary policy, we should first look at its recent past. In this domain, he emphasised, questions relating to financial stability have progressively disappeared from monetary policy debates. He attributes this state of affairs to the limits of the tools of monetary macroeconomics used by central banks and by a large part of the academic community. Professional economists have insisted on the internal coherence of models and on the question of micro-foundations, sometimes at the expense of mechanisms that are more difficult to model but nevertheless essential for the conduct of monetary policy. For example, the question of the link between monetary policy and international current account imbalances, which are typically left out of the most widely used monetary policy models, is crucial. Mr Orphanides therefore invited the academic community and central bank economists to address more directly the articulation between monetary stability and the determinants of financial stability.

At the tail-end of a financial and economic crisis of a severity unmatched since the Great Depression, the quality and diversity of the works presented and discussed during this conference reflected the dynamism of current research on the topic of the future of monetary policy. The conference was therefore an excellent opportunity for a fruitful exchange between researchers and economic policy-makers on this topic.

Two main preliminary conclusions can be drawn from the discussions that took place.

Firstly, it is essential to pursue the considerable research effort into understanding the complex mechanisms underlying the formation of financial imbalances and at work during financial crises. This should allow the implementation of the most appropriate cyclical and structural economic policies in order to prevent the formation of such imbalances and to respond to such crises. In particular, to the extent that these mechanisms introduce an externality such as a financial accelerator or herd behaviour, intervention by the public authorities may be justified even if these authorities do not have any informational advantage over the private sector concerning the fundamental value of financial assets.

Secondly, a consensus seems to have emerged in support of the idea that the recent economic and financial crisis does not call for a fundamental change in central bank mandates or in the current strategic framework of monetary policy. However, the crisis calls for a better integration of considerations about financial conditions and financial-crisis risks in the implementation of this monetary policy strategy. Moreover, central banks will soon have to take into account the potential interactions between monetary policy and macroprudential policy in their conduct of monetary policy, both in normal times and in periods of crisis. Numerous questions remain as to the best way to adapt the conduct of monetary policy to its new environment. This conference clarified these questions, even if it did not provide any definitive answers to them.