Monetary Policy under Financial Turbulence: An Overview

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The financial crisis that started in 2007 brought the global economy to the brink, and in many respects it is still unfolding, especially in Europe. How to understand and deal with the crisis has naturally been the subject of fierce debates that continue today. However, some consensus appears to be emerging with regard to the shocks that originated the crisis, the mechanisms that amplified those shocks, and official policy responses, especially from central banks. All of these aspects of the new consensus assign a substantially bigger role to financial imperfections and institutions than previously assumed, to the point that one can safely say that for the next several years, research on macroeconomic policy will be dominated by the interaction between financial frictions, the financial system, and aggregate fluctuations.

To set the stage for the rest of the book, this introduction starts with a review of this consensus and contrasts it with received macroeconomic wisdom. As for the causes of the current crisis, the consensus (as given by Brunnermeier, 2009; Rajan, 2010; Allen and Carletti, in this volume) blames a lax monetary policy in the United States, together with policies in China and other countries that fostered excess savings at the global level, for creating an

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environment prone to bubbles in housing and other asset markets, whose bursting around 2007 marked the onset of the crisis.[1]

While this view echoes similar analyses of the origin of previous crises (such as the 1997–98 crisis in Asia), a new dimension related to changes in the nature of financial instruments and the emergence of a so-called "shadow" banking industry may have been key for triggering the crisis.[2] The development of collateralized debt obligations (CDO), credit default swaps, and a myriad of other financial engineering products allowed banks to move towards an "originate-and-distribute" model, under which banks offload risk by repackaging loans and passing them to other agents.[3] As noted by Brunnermeier (2009), this process and the fact that the banking sector increasingly incurred maturity mismatches by financing their assets with debt at shorter maturities contributed to building a fragile situation in financial markets.

The increased use of the securitized products and the lack of an adequate regulatory framework combined to deliver poor incentives, cheap and excessive credit, and a fertile ground for the growth of asset price bubbles.[4] Moreover, this financial innovation process within an unregulated (shadow) banking sector gave rise to the possibility of old-fashioned panics in financial markets (Gorton, 2008, 2010). While identifying a bubble as it is occurring is exceedingly hard, many commentators did warn that historically high price-to-earning ratios and other indicators suggested that several asset markets were

1. One indicator of lax monetary policy is the difference between the observed interest rate in the United States in the period 2002–06 and the interest rate computed from a conventional Taylor rule. See Taylor (2008).

2. The term shadow banking industry refers to financial intermediaries that conduct maturity, credit, and liquidity transformation without access to public guarantees or central bank liquidity. See Pozsar and others (2010) for a detailed description of shadow banking activities.

3. This process of financial innovation is reminiscent of episodes of financial liberalization when proper regulation is missing. Díaz-Alejandro (1985) documents some common characteristics of cases of financial liberalization in Latin America where domestic financial intermediation flourished and then collapsed. First, regardless of whether or not deposits were explicitly insured, the public expected governments to intervene to save most depositors from losses when financial intermediaries ran into trouble. Second, the central bank neglected prudential regulations over financial intermediaries, either because of a misguided belief that banks are like butcher shops or because of lack of trained personnel. Finally, the end of financial repression (which can be read as the beginning of financial innovation) encouraged many types of financial savings. Paradoxically, however, total domestic savings did not increase in the South American experiments in financial liberalization.

4. See Rajan (2005) for an early warning regarding the risks that financial innovation and poor incentives (and regulation) were generating for the world economy.

indeed frothy and would eventually implode. Ex post, of course, it is evident that bubbles did take place. Why they were allowed to grow can be explained by an alleged lack of policy instruments to prick bubbles without causing more harm than good (as some have argued to have been the case in Japan) or by the lack of decisive information at the time, in a fashion reminiscent of Caplin and Leahy's (1994) "business as usual" phase.

In short, the dominant explanation maintains that the key shock underlying the recent worldwide crisis was the bursting of asset price bubbles that emerged thanks to a combination of factors such as easy monetary policy, excess global savings, financial engineering, and poor regulation and oversight.[5] Whether or not one agrees with this position, it does not take much to realize how much of a departure from conventional macroeconomic wisdom it represents. Dominant macroeconomic models are built on assumptions, such as complete financial markets, that downplay the role of financial institutions, regulation, and the like, so that the shocks of interest are often restricted to exogenous productivity shocks or shocks to monetary and fiscal policy rules.

A second component of the dominant explanation is the crucial role played by financial frictions and institutions in amplifying the effects of the bubble bursting. This is a key ingredient of the argument, since by virtually every account the initial impact of the collapsing bubbles was quite small relative to the size of the financial crisis, its worldwide effects, and the impact on the real economy. Most estimates of the subprime mortgage "problem" in the United States around 2007, the start of the crisis period, were in the region of a few hundred billion dollars, while the financial wealth lost in the crisis easily surpasses many trillion dollars. The necessary multiplier effects, according to the new consensus, are to be found in the nature of financial imperfections and the structure intended to deal with them. Of course, financial-based explanations are not the only possible candidates for solving the puzzle of how

5. The importance of the factors mentioned and the connections among them differ, however. For example, Obstfeld and Rogoff (2009) argue that for the United States, the interaction among the Federal Reserve's monetary stance, global real interest rates, credit market distortions, and financial innovation created the toxic mix of conditions that made the United States the epicenter of the global financial crisis. Moreover, economic policies followed by emerging markets such as China contributed to the United States' ability to borrow cheaply abroad and thereby finance its unsustainable housing bubble.

small shocks translate into big real effects. However, they offer the advantage of being consistent with the plethora of accompanying phenomena that characterized the recent crisis, such as stock market panics, the freezing of interbank credit markets, and skyrocketing interest rate spreads.

The key intuition on how financial frictions can result in quantitatively significant multiplier effects goes back to Bernanke and Gertler (1989) and Kiyotaki and Moore (1998). In these papers, potential investors need external financing, but their borrowing capacity is limited by their own net worth. The crucial ingredient is that the value of net worth may depend on the prices of assets, such as land or capital, which are endogenous. Under such conditions, an exogenous shock may initiate a loss spiral (to use Brunnermeier's 2009 term), in which financially constrained agents must sell some of their assets to fulfill collateral requirements, which in turn depresses the price of the assets and, therefore, the value of the agents' net worth, their borrowing capacity, and so on.[6] The interaction between asset prices and borrowing constraints can be exacerbated by the fact that in a financial crisis, margins, haircuts, and lending standards become more stringent after price drops, as emphasized by Gorton and Metrick (2009). This means that financially constrained agents need to deleverage, which causes an even stronger drop in prices, an effect that Brunnermeier and Pedersen (2009) term the margin spiral.[7]

The related literature, however, has yet to address several issues that became prominent in the current crisis. One of them is the role of banks and interbank credit. As Gertler and Karadi (2009) emphasize, banks are absent from most existing models of the interaction between financial frictions and the macroeconomy. Recently, a number of papers have attempted to address this deficiency (Gertler and Karadi, 2009; Cúrdia and Woodford, 2009; Gertler and Kiyotaki, 2010), but, as discussed by Céspedes, Chang, and García-Cicco in their contribution to this volume, the current state of play is still one of exploration.

A second aspect of the current crisis that warrants new research is the role of financial engineering, leverage, and the so-called shadow

6. Similar fire sale processes have been stressed by Diamond and Rajan (2010), Acharya, Shin, and Yorulmazer (2009), Allen and Gale (2004), and Caballero and Simsek (2009).

7. See Brunnermeier (2009) for explanations of the rise in margins during huge price drops. That paper also discusses other works that address the loss spiral and the margin spiral.

financial system. Indeed, the crisis was dramatically marked by the implosion of derivatives markets, insurance markets, and investment houses. The rapid growth of the markets for collateralized debt obligations, credit default swaps (CDS), and other derivatives may have occurred because financial innovation increased speculators' ability to mount bets over bets, resulting in staggering amounts of systemic risk. For example, according to one estimate, the notional amount of CDS outstanding at the end of 2007 was more than US$62 trillion.[8] By the end of 2009, the size of the CDS market had fallen to less than half that amount.

While the significance of these developments remains to be clarified, the new consensus on the crisis is that financial frictions and institutions have taken center stage in explaining the amplification mechanism. This contrasts with dominant New Keynesian models, which, as synthesized in Woodford (2003), are built on the assumption of complete and perfect financial markets and thus imply, in Modigliani-Miller fashion, that financial structure is irrelevant.

One consequence has been that macroeconomic policy, particularly central banking, has had to radically modify its strategy and goals and resort to new tools to implement them. To an extent, this was forced by the fact that at the onset of the crisis, many central banks lowered policy interest rates to virtually zero, but additional monetary stimulus was warranted. Nevertheless, the proliferation of a number of new tools and credit facilities—such as the U.S. Federal Reserve's Troubled Asset Relief Program (TARP), Term Asset-Backed Securities Loan Facility (TALF), and several others—and the decisions to expand the range of securities that the Federal Reserve and the European Central Bank purchase in open markets can only be justified by the need to shore up the financial system. In other words, it can be argued that the goals of fiscal and monetary policy have expanded to include the stability of the financial system along with the traditional objectives of full employment and low and stable inflation.

In sum, the recent financial crisis has required novel thinking in terms of the ultimate triggers of the crisis, the mechanisms that amplified the initial shocks, and the kinds of policies and tools that governments should use in response. This state of affairs may have profound implications for research in macroeconomics, as the

8. See the ISDA Market Survey for mid-year 2010, compiled by the International Swaps and Derivatives Association.

conventional paradigms had little to say in the recent period. Several questions remain, however. Can conventional theory be amended to deal with and perhaps include the new consensus? Or will we have to live with the uncomfortable position of using the extant theory during "normal" times and other, substantially different models in "crisis" times? If the conventional theory can be fixed, wouldn't it have to admit financial frictions and shocks as integral components even in normal times? What are the implications of all this for macroeconomic policy, especially for central banking and its now-dominant version, inflation targeting?

The chapters in this volume attack these and related questions from different angles and perspectives. They can be grouped into four broad themes, with some papers contributing to more than one group. The first group emphasizes the identification of the causes of the crisis, as well as the relation of this episode to previous ones. A second set of contributions focuses on the role of credit market imperfections in the occurrence and propagation of crises. A third group includes works addressing monetary and fiscal policies in crisis periods. Finally, the last group explores financial stability and its implications for monetary policy and macroeconomic performance. The remainder of this introduction summarizes the chapters in each group and puts them in the context of the new consensus just discussed, thus providing a guide to the rest of the volume.

1. The Origins of the Recent Crisis

As already noted, the contribution of Allen and Carletti to this volume reflects the view that the ultimate source of the current global crisis was the existence of a real estate bubble in the United States and other countries, such as Spain, Ireland, and the United Kingdom. The authors play down the role of distorted incentives caused by financial instruments, arguing that these were a symptom rather than the cause of the crisis. This raises the question of what made the real estate bubbles possible and whether policy was responsible for their appearance, a question that has not been addressed satisfactorily by existing theory. Allen and Carletti argue that the bubbles had two causes: the Federal Reserve's policy of low interest rates after 2001 in response to the tech bubble and terrorist attacks; and the existence of global imbalances caused by precautionary savings in Asian economies after the crisis in the late 1990s. This diagnosis coincides with Brunnermeier's (2009) influential analysis.

Nevertheless, the debate regarding how or why bubbles must emerge in an environment of easy money is still open.

Allen and Carletti provide an insightful discussion of the consequences of the bubble bursting. They emphasize that prices were then not useful for guiding economic decisions and that the financial sector therefore performed poorly, aggravating the situation. They argue that the poor performance was due to the lack of regulation directed toward correcting financial market imperfections, such as inefficient provision of liquidity, persistent mispricing of assets due to arbitrage limits, and contagion.[9]

In terms of policy implications, Allen and Carletti argue that the financial system should be regulated appropriately to prevent excessive risk taking by the private sector. It is also necessary to revise the policies and governance mechanisms leading to excessive risk taking in the public sector. For example, quantitative easing may cause a future run on the dollar if there is a burst of inflation. They further call for a debate on the desirability of mark-to-market accounting, on the basis that asset prices can be quite misaligned in a crisis and can therefore be misleading as a guide to value net worth positions.

Finally, Allen and Carletti propose that Asian countries should be treated as European ones in the International Monetary Fund (IMF). This institution, arguably, contributed to the existence of global imbalances by imposing harsh policies on Asian countries following the crisis of the late 1990s, exacerbating the incentives to build excess reserves in order to avoid needing IMF assistance in the future.

The apparent contrast between conventional macroeconomic wisdom and the dramatic events surrounding the current crisis has led many to seek guidance from historical perspectives, especially from comparisons between the current period and the Great Depression. Barry Eichengreen's contribution to this volume follows this strategy in making a selective review of similarities and differences between the Great Depression and the current crisis, after which he speculates on the lessons for the future of globalization.[10]

Eichengreen argues that the 1929 crash decisively influenced the policy response to the current crisis. In contrast with the policy

9. They recognize, as does Eichengreen (in this volume), that regulation of the banking sector was mainly aimed at reducing the occurrence of crises after the crash in 1929.

10. Eichengreen's contribution to this volume corresponds to his keynote speech for the conference.

response at the beginning of the Great Depression, governments fought the recent crisis forcefully with expansionary monetary and fiscal policy, as well as liquidity and other measures to shore up the financial system. Eichengreen argues that this strategy was successful in preventing a replay of the Great Depression. He also argues, however, that policymakers may have focused excessively on the lessons of that crash, as they mainly concentrated on the banking industry, which was the principal financial actor in the Great Depression. This focus on the banking sector did not take into account new characteristics of the sector, such as securitization. In Eichengreen's words, this "reflected the difficulty of realizing that, while history repeats itself, it never repeats itself in the same way."

Another lesson learned, Eichengreen emphasizes, is that this time policymakers around the world cooperated in addressing the crisis, whereas that was not the case in 1929. For example, institutions like the U.S. Federal Reserve System, the European Central Bank, and the Bank of England extended swap lines to each other to cope with potential liquidity shortages. Swap lines were also extended to countries outside Europe and the United States, such as Brazil and Mexico. International cooperation was further seen in countries' resistance to isolate their economies, avoiding protectionism to a reasonable extent.

As for the consequences of the crisis for globalization, Eichengreen draws a key distinction between financial globalization and other kinds of globalization. He expects to see countries regulating their financial systems more extensively and putting some sand on the wheels of capital flows. After all, countries relying more heavily on capital inflows suffered the greatest dislocations once the crisis hit. To slow these inflows, according to Eichengreen, countries are likely to rely more on capital controls and regulations and, perhaps more notably, enhanced exchange rate flexibility in order to eliminate one form of currency bets and curtail the carry trade.

On the other hand, Eichengreen argues that a lower degree of financial globalization is not likely to be accompanied by a similar reduction in other kinds of globalization, such as global supply chains and production networks, as these phenomena are explained by technological progress and other real developments. Again, Eichengreen reminds us that history may provide some hope here, as trade opening continued in the post-war era despite the existence of stringent barriers to capital movements for decades.

2. Financial Frictions and the Dynamics of Crises

Whether the reason behind the initial shock was a low interest rate policy followed by the U.S. Federal Reserve, global imbalances, poor incentives in a context of lax regulation, or a combination of these factors, there is a growing consensus that financial markets played a crucial role in the amplification of the initial disturbance. Understanding the connection between financial markets and economic activity in these episodes is therefore crucial.

Claessens, Kose, and Terrones provide an overview of the linkages between recessions and financial market disruptions for a group of emerging and developed economies. They study a sample of 23 emerging market economies and 21 members of the Organization for Economic Cooperation and Development (OECD) between 1978 and 2007, and they develop a dating methodology to identify turning points and cycles in the series for output growth, credit growth, and equity prices. This methodology allows them to uncover revealing differences across countries, as well as the association between financial disruptions and the severity of recessions. For example, they find that time spent in recession is 50 percent longer in Latin American countries than in Asian ones, and that recessions in Latin American countries are twice as costly, in terms of cumulative output loss, as those in Asian countries. They also show evidence that recessions are deeper in emerging markets than in developed ones and that they are synchronized across emerging economies.

Perhaps more significantly for the purpose of this volume, Claessens, Kose, and Terrones present convincing evidence that recessions in emerging economies are longer and deeper when accompanied by financial disruptions. The average output decline in a recession jumps from 5.0 percent if there is no concomitant credit crunch to 8.5 percent if there is a credit crunch. Likewise, recessions associated with equity price busts result in a 6.8 percent decline in output, on average, versus a milder 3.3 percent fall in the absence of equity price busts. Notably, these associations are statistically significant only for emerging economies and not for advanced countries. This is quite suggestive, as it is consistent with the view that differences in the severity of financial frictions between developed and developing countries may be a key factor underlying their differences in macroeconomic dynamics (see Céspedes, Chang, and Velasco, 2004).

The paper by Catão and Pagan in this volume also explores the connections between macroeconomic models, financial frictions, and the data. The authors extend a canonical dynamic stochastic general equilibrium (DSGE) model to allow for a bank-dependent domestic sector. A key assumption is that credit growth, which interacts with absorption, depends on the real exchange rate; this is consistent with recent theoretical models that emphasize balance sheet effects and currency mismatches. They estimate the model for two countries that use inflation targeting (namely, Brazil and Chile), which yields interesting differences.

A methodological point of the Catão and Pagan study is to emphasize the analysis of the structural equations underlying the model, in contrast with the current emphasis on impulse responses. They argue that the structural equation approach helps in interpreting whether the model does, in fact, support the theory used to build it. This is clearest in the case of Brazil, where they find that a real exchange rate appreciation has a significant, positive coefficient in the credit growth equation. Since credit growth, in turn, has a positive effect on absorption, this means that there is a mechanism through which a monetary contraction has an expansionary effect on activity: such a contraction leads to an appreciation of the exchange rate and, hence, an increase in credit growth, which boosts absorption. Given that the monetary contraction has other negative effects on absorption (for conventional reasons), the question emerges as to what is the net impact on expenditure, income, and output. Catão and Pagan find, based on the impulse responses of output, that the conventional contractionary forces dominate, but the link between exchange rates, credit growth, and expenditure does moderate the response substantially, at least in the case of Brazil. These effects are less powerful for Chile, which is itself a suggestive finding, as it may reflect a more sophisticated financial system or a smaller degree of liability dollarization.

One channel through which financial imperfections may exacerbate the effects of shocks in activity is by increasing the vulnerability of the economy. Benigno, Chen, Otrok, Rebucci, and Young (in this volume) expand on a recent debate concerning the possibility of excessive borrowing by emerging countries. This debate has focused on the interaction between collateral constraints and relative prices. Such an interaction emerges, in particular, if foreign borrowing is limited by the value (in terms of tradable goods) of national income or wealth: if national income or wealth include

some nontradable goods or assets, its value in terms of tradable goods depends on the real exchange rate (that is, the relative price of tradable goods in terms of nontradable goods).

As Benigno and others note, the literature emphasizes the possibility of overborrowing, which occurs if individual borrowers take real exchange rates as given and hence do not internalize the negative impact of their own borrowing on the collateral constraints of their conationals. This emphasis has led to a call for taxes on private borrowing to correct the externality in a Pigovian fashion (Jeanne and Korinek, 2010). More generally, the possibility of socially excessive borrowing raises the question of whether international borrowing should be discouraged in normal times.

To shed light on this issue, Benigno and others study a dynamic stochastic economy in which domestic households can borrow internationally up to a multiple of the tradable value of their current income, which includes profits and the wage bill. The economy has an endowment of tradables and produces nontradables. This specification has the implication, which turns out to be quite significant here, that the tradables value of the wage depends on the consumption and production of both tradables and nontradables. Since the collateral restriction depends on the wage in tradables, this raises the possibility of affecting and even overturning the likelihood of overborrowing.

Indeed, after comparing the decentralized equilibria of the economy against the solution of a social planner's problem, Benigno and others show that the model can yield both overborrowing and underborrowing, depending on the volatility of exogenous shocks and other parameters such as the rate of time preference. In terms of policy, this implies that ex ante economy-wide macroprudential policies, such as taxes and controls on capital flows, do not receive unqualified support from the theory: they may or may not be welfare improving, depending on the case. On the other hand, Benigno and others argue that ex post interventions to alleviate the effects of the crisis once it occurs, such as bailouts, are supported by the model.

In many countries, the sharp fall in asset prices and economic activity after the Lehman Brothers collapse was followed by a rapid recovery. Caputo, Medina, and Soto argue that this significant rebound could be described as an overreaction of market participants to the initial shock, followed by a reassessment of the severity of the initial shock and an adjustment of expectations upward. They show that imperfections in financial markets, coupled with small

departures from the standard rational expectations assumption of most macroeconomic models, may lead to a significant amplification of the effects of shocks. In particular, Caputo, Medina, and Soto build a DSGE model with nominal frictions and a financial accelerator mechanism as in Bernanke, Gertler, and Gilchrist (1999), and they depart from rational expectations, assuming instead that individuals form expectations about shocks through adaptive learning, as in Evans and Honkapohja (2001).

They argue that the interaction of financial frictions and learning is a key ingredient for generating enough amplification of initial shocks to mimic the busts and recoveries observed during the post-Lehman episode. The underlying mechanism is the momentum in asset prices described by Adam, Marcet, and Nicolini (2008), interacted with financial frictions. Caputo, Medina, and Soto argue that sequential and negative shocks that reduce output, asset prices, and net worth feed back into expectations formation. When shocks are sequential, the expectations formation mechanism can endogenously generate a deviation of asset prices from their fundamental values. These asset price fluctuations interact with the financial accelerator mechanism, reinforcing movements in real variables that, in turn, affect expectations and asset prices.

Should monetary policy respond to asset prices in this context? Previous literature has responded to this question under the assumption that any deviation of asset prices from fundamentals is exogenous. In Caputo, Medina, and Soto's work, these deviations have an endogenous component that may change the prescription that responding aggressively to inflation is sufficient to reduce output and inflation volatility (as in Bernanke and Gertler, 2001). Asset prices are informative in this context to the extent that they signal potential inflationary or deflationary forces. Caputo, Medina, and Soto find that responding exclusively to inflation still leads to lower output and inflation volatility. Responding to asset prices may reduce output volatility and inflation volatility in the short run, but it leads to a surge in inflation in the medium term.

3. Monetary and Fiscal Policy Responses

As mentioned above, most governments responded forcefully to the current crisis with expansionary monetary and fiscal policies, and many of them resorted to policy tools that had seldom, if ever, been used. The justification for these unconventional policies was

that the severity and characteristics of this crisis demanded extreme interventions and that conventional instruments, foremost among them interest rate control, reached a limit at some point in the process (such as a zero lower bound). The use of these extreme interventions revived some debates about the effectiveness of monetary and fiscal policies and their possible future consequences. The next set of papers in this volume discusses different aspects of unconventional monetary interventions and the effects of associated fiscal policy in this special environment.

Céspedes, Chang, and García-Cicco discuss theoretical and practical aspects of heterodox monetary policies. Their theoretical discussion focuses on the two main lines of argument that have been used to justify heterodox policy. The first argument is that quantitative easing and other heterodox policies are needed once the monetary policy instrument, an overnight interest rate, has been brought to zero while monetary stimulus is still warranted. The second line of argument is that the incompleteness of markets, financial frictions, and the like may warrant direct intervention by a central bank in credit markets, as well as other unconventional policy measures, an argument outlined by Gertler and Karadi (2009), Gertler and Kiyotaki (2010), and others.

With respect to the first argument, Céspedes, Chang, and García-Cicco draw attention to the issue of central bank credibility, and they show that unconventional monetary policy may be called for if and only if the central bank is unable to commit to honoring past policy promises. They provide a fairly general analysis and illustrate it in a simple open economy model borrowed mostly from Jeanne and Svensson (2007). In that model, optimal policy in response to an adverse shock may justify bringing the policy interest rate all the way down to zero. Somewhat surprisingly, a central bank that has perfect commitment power cannot gain any more from quantitative easing, credit easing, or any other unconventional policy, a result that echoes Eggertsson and Woodford (2003).

Céspedes, Chang, and García-Cicco also show, however, that if the central bank has a time inconsistency problem, the maturity structure of the central bank's balance sheet can be used as a commitment device to implement optimal policy. This takes the form of the central bank issuing short-term debt to purchase long-term assets, an operation that has no effect on the central bank's balance sheet under the optimal policy, but results in a capital loss to the central bank if it departs from its promised policy ex post.

The use of unconventional policies to bolster the credibility of policy announcements may be a tight theoretical point, but in practice it is another kind of argument, based on financial frictions, that may have had more influence on actual policy. In fact, Céspedes, Chang, and García-Cicco argue that unconventional policy has often been justified by the need to unlock credit markets and reduce unwarranted interest rate spreads. These arguments can only be understood in the context of a model that allows for financial frictions and, in order to have a realistic picture of actual policies, that also features banks and financial institutions playing an essential role in the allocation of funds.

To illustrate, Céspedes, Chang, and García-Cicco develop a preliminary dynamic small open economy model with banks à la Edwards and Végh (1997). They crucially depart from Edwards and Végh's model in assuming that bank capital limits the amount of credit that banks can extend. They use this model to evaluate the relevance of alternative credit policies and draw lessons for policy, as well as to assess the current literature. In particular, the authors argue that the introduction of financial intermediaries in standard models leads to results that may challenge existing wisdom regarding the effects of unconventional policies.

The last part of the paper is devoted to presenting some evidence regarding the recent experience with heterodox central banking. They discuss the timing and type of unconventional policies implemented so far, compiling a list of announcements made by central banks regarding those policies. They then present descriptive evidence to assess the impact of these policies on the shape of the yield curve and the lending-deposit spread. The analysis reveals significant heterogeneity in the success of different types of measures in reducing the slope of the yield curve and decreasing lending spreads. Moreover, it appears that the effectiveness of these policies was particularly influenced by the stance of the policy rate, being generally more effective if the central bank had committed to keeping the rate at the zero lower bound for some time.

The international financial crisis raised the question of whether inflation-targeting regimes were flexible enough to respond to this extreme event or, on the contrary, whether inflation targeting restricted monetary policy responses. To answer, Calani, Cowan, and García (in this volume) study the experience of nine inflation-targeting central banks (namely, Australia, Brazil, Chile, Colombia, Indonesia, Mexico, New Zealand, Peru, and South Korea) that did not

face systemic financial problems during this period. They assess two dimensions of the monetary policy response: monetary policy interest rate changes and unconventional monetary policy actions.

In the first place, they estimate standard Taylor rules for the nine economies under study and detect a structural change that occurs during the very unfolding of the financial panic in late 2008. Calani, Cowan, and García contrast the predicted monetary policy interest rates against actual monetary policy interest rates, documenting large discrepancies. In particular, the reduction in interest rates was more aggressive than the path implied by the estimated Taylor rules up to the structural break. The question that emerges in this case is whether these deviations are related to changes in the persistence parameter of the Taylor rule or to a stronger response to the output gap. They argue that this result might be better understood as a downward shift in the weight of past decisions on current ones (namely, activism), rather than a higher weight on the output gap, or dovishness. Further, they document that even though a sudden fall of inflation expectations can result in a similar path of policy rate decisions, such a fall would be unrealistically large.

Second, in addition to discussing the flexibility of the inflation-targeting regime using monetary policy interest rate reaction rules, they compile the daily history of unconventional measures undertaken by central banks (namely, local and foreign currency facilities and exchange rate interventions). They argue that the unconventional policies were implemented to preserve price stability, in keeping with the inflation-targeting framework, and that their objective was to ensure adequate transmission of monetary policy. To assess the effectiveness of the policy interventions, they explore their impact on local currency and U.S. dollar onshore interest rates and nominal exchange rates. They show that, despite the significant heterogeneity in the specific characteristics of non-monetary-policy measures and their effectiveness, such measures were broadly successful in limiting and reducing tensions in the money market and the foreign exchange rate market.

From these two exercises Calani, Cowan, and García conclude that inflation-targeting frameworks have been flexible enough to accommodate unconventional central bank policies.

As monetary policy seemed to reach its limits during the recent crisis, many governments pursued expansionary fiscal policy as well. While most people believe that such policies may have prevented a bad situation from becoming worse, there is a lot of

debate about their effectiveness and the relative merits of specific measures, such as whether to finance additional government expenditure via debt or taxes. Michael Devereux's contribution to this volume sheds light on some aspects of this debate. He points out, correctly, that dominant macroeconomic models have nothing to say about, for example, the distinction between tax finance or debt finance, since they are built on assumptions that imply Ricardian equivalence, such as the irrelevance of the mode of government finance. Therefore, Devereux argues, one needs to develop models in which Ricardian equivalence does not hold in order to be able to say something useful on these issues.

Consequently, Devereux develops a model, originally due to Blanchard and Yaari, for analyzing the impact of government spending, tax cuts, and government deficits. A novel and crucial part of his discussion is to contrast normal times with times in which interest rates have been lowered to their zero lower bound. He finds that, at the zero bound, fiscal policies are much more expansionary if government spending is financed through an increase in the deficit rather than taxes; this contrasts with normal times, when the difference is quantitatively small. The intuition is that the wealth effects are much bigger when the economy is at the zero bound, and government debt can provide an outlet that satisfies the private sector's increased desire to save. Devereux also makes the point that tax cuts could be expansionary if the economy is in a liquidity trap, although they would have little effect in normal times. This suggests that a tax cut may be more desirable than an increase in government spending when the interest rate is close to a lower bound and there is demand for liquidity, a lesson that goes against the consensus that emerged from policy debates. In the context of Devereux's model, tax cuts are effective tools for addressing the reduction in aggregate demand, as they ameliorate the fall of real interest rates and thus prevent the propagation of the initial shock.

The large scale of expansionary fiscal and monetary policy has raised the issue of how such policies will be reversed. This is a difficult question, which is compounded by the fact that, in many advanced economies, growing entitlements and aging populations mean that fiscal transfers as a share of GDP will grow to levels that are hard to manage. Since many governments have failed to explain how they will deal with such a deteriorating fiscal position, Eric Leeper (in this volume) explores the consequences for the effectiveness and impact of monetary policy.

Leeper focuses on a standard model, with the added feature that at some point in the future, the government hits a fiscal limit, that is, a point at which further increases in taxes are infeasible. In such a setting, expectations about how growing fiscal transfers will be financed after the fiscal limit is reached become crucial for the effectiveness of monetary policy today. Leeper shows that the possibility of a fiscal limit implies that the usual monetary prescriptions, such as adherence to a Taylor-type rule, can be very misleading. In fact, he presents examples in which an inflation-targeting regime fails to anchor inflationary expectations in the periods before the fiscal limit is hit. These surprising cases arise because, in a rational expectations world, current beliefs about post-limit policy behavior affect current economic decisions. The policy implication is that the factors that anchor those beliefs may be crucial for the effects of current monetary policy and, in particular, the ability to conduct sound monetary policy can be enhanced if governments can reduce uncertainty about exit strategies and their plans for meeting their fiscal obligations in the medium run.

Leeper applies his theoretical framework to the cases of the United States and Chile. For the United States, the projections indicate that the fiscal situation is not sustainable for a long period of time. This, together with the lack of clarity about policies that will be followed after the fiscal limit is reached, implies a lack of anchor in fiscal and, consequently, monetary expectations. Leeper argues that Chile is in a different situation. Chile's institutional arrangements have been designed to prevent a fiscal limit from emerging, which allows the central bank to target an explicit inflation rate and anchor expectations.

4. Bank Regulation and Stability

As already mentioned, the banking system played a crucial role in the financial crisis of 2008–09. In particular, changes in the nature of financial instruments and the emergence of a shadow banking industry have been blamed as key components of the crisis. The origin of these changes may be found in the process of liberalization of the banking industry started in the 1970s in the United States.[11] Deregulation of the banking sector was seen as a process of increasing

11. From the 1940s to the 1970s, tight regulation was associated with great stability in the financial sector.

competition that triggered a significant expansion of financial intermediation. Vives (in this volume) analyses the trade-offs between banking competition and stability of the banking system.

Because of their particular mix of features, banks are subject to runs, with a potentially systemic impact and strong negative externalities for the economy. Vives indicates that a competitive banking system is often excessively fragile. Financial regulation can reduce the fragility significantly, but at the cost of side effects and regulatory failure.

Vives discusses the theoretical and empirical literature that relates competition and stability. There are two theoretical channels through which competition can negatively affect stability. First, competition makes a bank more susceptible to a run, as competitive pressure worsens both the coordination problem of investors and depositors and the impact of bad news on fundamentals. The second channel is related to incentives on the asset side. An increase in competition will tend to increase risk-taking incentives.

Vives also summarizes empirical evidence showing that some measures of bank competition (such as low entry barriers) are positively related to stability; that liberalization tends to increase the occurrence of banking crises, while a strong institutional environment and adequate regulation mitigate them; that the association between concentration and stability presents mixed results; and that larger banks tend to be better diversified, but can also assume more risks.

A noteworthy point in Vives's discussion regarding regulation is that it can alleviate the competition-stability trade-off, but its design has to take into account the intensity of competition. In particular, capital requirements should be higher when competition is more intense. However, given that fine tuning regulations is difficult, Vives argues that it is unwise to try to completely eliminate market power in banking.

An emerging market economy is typically characterized by higher uncertainty, a higher likelihood and incidence of financial and currency crises, a more predominant financial role for banks, and weak supervisory structures. For these economies, it is more difficult to follow the regulatory strategy typically followed in developed countries. Optimal policy should thus carefully balance the impact of the different levels of friction and the social cost of failure.

Finally, in a systemic crisis as occurred in 2008–09, there is pressure to stabilize the system through arrangements such as

guarantee schemes and capital injections. Vives indicates that these interventions are potentially distorting, for example, in terms of moral hazard, protection of inefficient incumbents, and long-term effects on market structures reducing competition in the market.[12] Given the trade-offs implicit in the banking industry, Vives argues that the regulator in charge of stability must collaborate closely with the competition authority. Regulatory requirements and competition policy have to be coordinated.

12. The crisis forced mergers of institutions backed by government subsidies, increasing the market power of the surviving incumbents.

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