Macroeconomic and Financial Stability: An Overview

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On September 2008, Lehman Brothers filed for bankruptcy and the world became aware that the financial crisis that had been unfolding for months was far more serious than expected. Months later, it became clear that the financial crisis of 2008-2009 was the worst economic downturn since the Great Depression of the 1930s: real GDP in the United States declined at an annual rate of 1.3% in the fourth quarter of 2008, 5.4% in the first quarter of 2009 and 6.4% in the second quarter of 2009. The crisis originated in the U.S. but it spread rapidly to the rest of the world, as real world GDP fell by 6.4% in the fourth quarter of 2008 and by 7.3% in the first quarter of 2009.[1]

The crisis not only brought the global financial system to the brink of disaster, but also shook the existing consensus regarding the appropriate conduct of monetary policy and macroeconomic stabilization.

Before the crisis, macroeconomists, in general, and central bankers in particular, believed that monetary policy was well understood. As Mishkin points out in his contribution to this volume,

1. See the paper by Mishkin included in this volume.

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there was general consensus that a central bank's monetary policy strategy should be oriented towards *flexible inflation targeting*, which implied an explicit commitment from the central bank to stabilize CPI inflation without disregarding a complementary objective of output stabilization. While most central banks arguably cared about financial stability, it was believed that this goal could be successfully pursued through careful regulation and monitoring of individual financial institutions, in many cases conducted by separate regulatory authorities. This belief did not come from neglecting the potential spillovers between the conduction of financial and macro stability, but from a sort of consensus that these spillovers could be successfully tamed through regulation, that preserving price stability contributed—or at least did not weaken—financial stability, and that the cost of using monetary policy to address financial stability concerns was too large and its efficiency too uncertain.

Mishkin convincingly argues that the crisis led policymakers and academic economists around the globe to question several aspects of this implicit consensus. In his view, this episode taught us that financial disruptions have highly non-linear effects over the economy. The impact of a financial crisis is larger and more persistent than that of a series of small shocks of the same overall size. Models based in local dynamics may do a very poor job predicting the impact of such an event. Indeed, the depth of these crises is such that the monetary policy rate is likely to reach the zero lower bound. He also explains that the recent experience suggests that price and output stability do not ensure financial stability because the buildup of risks in the U.S. financial system occurred during a period of stability that had even been dubbed as "The Great Moderation." Furthermore, he thinks that it may have even been the case that low nominal interest rates, through what has been recently labeled the *risk-taking channel* of monetary policy, may have fostered excessive risk-taking and contributed to create the conditions for a financial crisis to take place. Finally, the implicit commitment of governments to clean up after an episode of financial distress and protect financial stability means that financial crises often lead to fiscal crises.

In a way, the first and primary lesson to learn from the crisis was humility. The crisis challenged the conventional wisdom about monetary policy and rekindled the debate on the role of monetary policy in the presence of financial frictions.

The present volume collects twelve papers that were presented at the XVI Annual Conference of the Central Bank of Chile, that took place in Santiago on November 15 and 16, 2012. The event brought together leading economists from academia and central banks that discussed the main challenges that the rise of financial stability as a policy goal poses to the conduction of monetary policy.

The volume is organized as follows: The first section discusses the lessons left by the financial crisis for the conduct of monetary policy. The contribution of Mishkin outlines these key lessons and discusses where central banking should be headed in the coming years.

The second section is devoted to the analysis of the role of monetary policy in the buildup of a financial crisis. Bordo and Landon-Lane present evidence suggesting that loose monetary policy might aid in this process by contributing to a rise in asset prices. The articles by Shimer and Hall study markets with asymmetric private information and identify conditions under which a crisis in those markets may unfold. The article by Geanakoplos studies the leverage cycle and explains why high leverage in stable periods makes the economy more vulnerable to the drop in leverage associated to an increase in uncertainty.

The third section discusses the role of monetary and macro-prudential policies in preventing a financial crisis. Christiano and Ikeda show that macro-prudential policy, in the form of leverage restrictions, may increase welfare in an environment in which the effort exerted by financial intermediaries to obtain high returns for their creditors is not observable. Beau, Cahn, Clerc and Mojon analyze the interaction between monetary and macro-prudential policies and find that macro-prudential policies are not likely to interfere with the objective of price stabilization of monetary policy that, as Mishkin points out, should undoubtedly be the main goal of monetary policy. Mian argues that neither ex-ante macro-prudential policies, nor ex-post monetary policy, are effective in dampening the effects of the financial crisis because the households that have to engage in a deleveraging process are unlikely to be those benefited by these measures. He proposes instead the implementation of ex-ante flexible financial contracts that would satisfy the dual objective of making crises less likely and reducing its severity if a one indeed takes place.

Finally, the fourth section discusses policies that can aid the economy in the path to recovery from a financial crisis. Calvo, Coricelli and Ottonello document the fact that financial crises are usually

followed by jobless recoveries. They show that, when inflation spikes accompany the recovery phase, the recovery is not jobless but instead wageless. Thus, a contained level of inflation immediately after the crisis may lead to a persistent level of unemployment. Currency depreciation can help reduce unemployment insofar as it is associated with inflation. Measures to reactivate credit flows could be beneficial to wage earners as a whole. Devereux studies the international transmission of shocks and argues that, with trade and financial market integration, if one country hits the zero lower bound in response to a negative shock, the liquidity trap becomes a global phenomenon. Fiscal policy is an effective policy tool when a country faces a liquidity trap, but at the cost of making the commercial partners worse off. To optimally respond to the shock, countries should coordinate their actions by jointly implementing fiscal expansions.

The last two papers of this section study the adoption of unconventional policies in Chile in the aftermath of the 2009 crisis. Céspedes, García-Cicco and Saravia look into the effects of the implementation of a long-term liquidity facility in Chile, the FLAP. They find that the FLAP caused a flattening of the nominal yield curve, with medium-term yields decreasing by around 30 to 50 basis points. Moreover, it stimulated commercial and consumption lending by banks. Lagos and Tapia explore the effects of the capitalization of BancoEstado, a publicly owned commercial bank. They report that this measure led to an expansion of commercial credit by BancoEstado. It is unclear, however, whether this additional provision of credit reached credit-constrained firms, which were the ones that needed it the most.

In what follows, we discuss in more detail each contribution in this volume and its relation to the existing literature.

1. The Buildup of a Financial Crisis

As **Mishkin** points out in the work reproduced in this volume, common wisdom among economists before the crisis was that price and output stability would promote financial stability. An important body of research stemming from the work of Bernanke, Gertler and Gilchrist (1999) and Bernanke and Gertler (2001) rationalized this idea.[2]

2. See Mishkin (in this volume) and Christiano et al. (2010) for a discussion on the conventional wisdom pre-crisis about financial stability and monetary policy.

The bankruptcy of Lehman Brothers in September 2008 and the financial crisis that unfolded right after however, led many economists to revise previous events in a quest to identify the macroeconomic conditions that led to it and the early warnings that could have foretold the events that were to come.

In this context, special interest was assigned to the role that monetary policy had (if any) in laying the foundations of the crisis through excessive liquidity provision.

Taylor (2007) was one of the first economists that suggested that the housing boom of the 2000s was fueled by the prevailing monetary conditions during that period. To justify this claim, he computes the U.S. Federal Funds rates that should have been implemented according to the Taylor rule estimated for the Fed, and compares them to the rates effectively in place during that period. He finds that the latter were around 3 percentage points below the former. At the opposite corner, Bernanke (2010), Bean, Paustian, Penalver and Taylor (2010), Turner (2010) and Posen (2009) have argued that the Fed's policy prior to the crisis did not fuel the housing bubble. Several recent studies finding mixed evidence on the relation between loose monetary policy and housing prices have failed to settle this debate.[3]

Beyond the focus on housing prices, several authors have studied the impact of prolonged periods of low interest rates on risk-taking and asset prices. As Borio and Zhu (2008) assert, monetary policy can influence the perception and pricing of risk with economic agents, resulting in a separate transmission mechanism that they label *the risk-taking channel* of monetary policy. The theoretical underpinnings of this mechanism have also been discussed in a number of studies (Rajan, 2005; Adrian and Shin, 2010; among others); recent empirical analyses using micro data seem to confirm its importance (Jimenez et al. (2013), Delis and Kouretas (2011)).

On a related note, Borio and Lowe (2002) argue that financial imbalances can build up in a low inflation environment and that, in some circumstances, it is appropriate for policy to respond in order to contain these imbalances. For instance, Christiano et al. (2010) show through historical data and model simulations that inflation tends to be low during stock market booms caused by signals of

3. Hott and Jakipii (2012), Gerlach, Assenmacher-Wesche (2008) and McDonald and Stokes (2013) find evidence that expansionary monetary policy had a key role in fostering housing booms in the last decade, but Del Negro and Otrok (2007) and Dokko et al. (2011), among others, claim that the increase in housing prices cannot be explained by low interest rates alone given the historical relationship between these two variables.

future technology. In such a situation, the prospect of higher future productivity creates downward pressures on inflation. A monetary authority that reduces the interest rate in response to these signals will suboptimally fuel the boom. Consequently, monetary policy that focuses on inflation can only be destabilizing and lead to suboptimal volatility of output and asset prices.

The work of **Bordo and Landon-Lane** contained in this volume revisits this issue and explores whether an expansionary monetary policy may cause the type of asset booms that end in costly asset busts. To answer this important question, the authors conduct a historical analysis of house price booms, stock market booms and commodity booms for 18 OECD countries from 1920 to 2010. They discern boom and bust periods using a dating algorithm of Bry and Boschan (1971) that identifies turning points of asset price series. Because the algorithm may spuriously identify some turning points, the authors further require these to satisfy some previously defined criteria.

Once the house price, stock price, and commodity price booms and busts have been identified, the authors conduct an empirical analysis of the effect of monetary policy on the deviations of asset prices from their long-run trend by pooling the data from the 18 countries analyzed. To this end, they include two different measures of the monetary policy stance. The first measure is the deviation of a short-term interest rate from that implied by a Taylor rule that assigns equal weight to deviations of inflation and output from their targets. The second measure is the deviation of the rate of money growth from 3%. Additional controls include the deviation of inflation from its long-run trend and a measure of credit conditions, which is the deviation of the share of bank loans to GDP from its long-run mean. Finally, they interact a dummy variable that takes the value of 1 if the given period corresponds to a boom, and with the other regressors to see if their effects over deviations of asset prices are different in booms with respect to normal times.

The results of this exercise show a clear relation between loose monetary policy and house price increases during booms that is absent during normal times. House prices also increase during booms while at the same time inflation falls below its long–run level, and when credit conditions are loose. Once again, during normal times these two factors are largely unrelated to housing prices. Monetary policy is also related to the evolution of stock and commodity prices during booms, although the relation between

these variables, low inflation and easy credit is not established well in the empirical analysis.[4]

These new results add to the existing evidence cited above that an excessively loose monetary policy may help fuel asset price booms. While sorting causality in this literature is difficult and the issue is not completely settled, it would be wise for central banks to consider the potential consequences of their actions on risk taking and asset prices when analyzing different policy options. More specifically, the results presented by Bordo and Landon-Lane suggest that the deviation from well understood rules are the ones that tend to be associated with asset price increases. Thus, a monetary policy guided by stable monetary rules should be less subject to these types of undesired consequences.

While an overly expansive monetary policy may have contributed to create the conditions leading to the crisis, it is clear that other factors must have been at play. This has driven researchers to try to understand the market conditions that may foster a financial crisis. Understanding this issue may help policymakers identify the markets that are more prone to instability to develop early warnings and management programs that may prevent or limit the propagation of the crisis. **Shimer's** article in this volume contributes to this literature and studies trade with private information in markets for mortgage-backed securities (MBSs). The author first summarizes existing evidence of the presence of private information about the quality of loans on MBSs, and proceeds to show the implications of private information for the decline of trade when a crisis takes place.

Private information seems to be a relevant factor in explaining financial crises. A first effort, therefore, is devoted to assess whether private information is present on MBS markets. Shimer focuses on the market for MBSs issued by private financial institutions, so-called private-label MBSs, which experienced a rapid growth and subsequent fall in the period 2000-2009 (from a peak of $883 billion in

4. The results show that inflation and easy credit have a negligible effect on stock prices, even during booms. The analysis of commodity prices shows a stronger relation with loose monetary policy during booms than in normal times. Low inflation has a positive impact on these prices but easy credit does not. These last results should however be taken with caution, because the empirical exercise for commodity prices uses only U.S. data, rendering the number of observations small. The reason for this is that commodity prices are the same for all countries in the sample, so it is not possible to use a panel for the estimation.

2005 to a trough of $18 billion in 2009). A first reason for the presence of private information in these markets is that the underlying loans usually have low or no documentation. Instead, originators base their decision to lend on "soft" information, such as the mortgage originator's expectation about the buyer's income stability. (Keys et al., 2010; Demiroglu and James, 2012 provide evidence that supports this idea). Other reasons are misrepresentations of information provided by borrowers and identified by originators—such as income misreporting—(Jiang et al., 2011; Piskorski et al., 2013) and the use of superior valuation models by mortgage originators that are unavailable to MBS buyers. The U.S. mortgage industry has developed a number of techniques to moderate the amount of private information and mitigate its consequences, such as warranties,[5] independent evaluations by credit-rating agencies, reputation mechanisms and tranching. These devices, however, were insufficient to deal with private information in the MBS market when prices began to decline in 2005. Shimer presents a model in which sellers with favorable information separate from those with unfavorable information thanks to a shortage of buyers at high prices. The model can generate two mechanisms through which a crisis in MBS markets takes place. In the first, a change in fundamentals leads to an initial decline in house prices. Homeowners start to default at higher rates, and previously safe assets become risky. This fosters the emergence of private information relevant to the buyer, as information-insensitive debt becomes information-sensitive and, eventually, may imply that all trade breaks down in a crisis. The second mechanism arises when there is no change in fundamentals, but rather a reduction in the number of investors who use their cash to purchase securities.

In an insightful contribution, **Hall** uses the canonical model of trade with asymmetric information by Akerlof (1970) to reinterpret the mechanics of Shimer's model. He explains MBS market freeze-ups during the crisis by acknowledging that before the crisis over-collateralized claims on mortgage portfolios had zero perceived default probabilities and adverse selection was not a

5. As Shimer explains, MBS include warranties that insure the buyer against defects. A MBS is administered by an independent third party, the trustee, which has a specified amount of time after the execution of the MBS, to uncover any material defects in the underlying loans. If the trustee uncovers such defects, the securitizer must either purchase the loan by paying off the principal and interest, or it must replace the loan with a similar asset.

factor in transactions. With the advent of the crisis and the decline of house prices, investors learned that over-collateralization was inadequate, and adverse selection became an important issue to them. The consequence was a decline in transaction prices, and in the likelihood that a seller could make a deal with a buyer, and an increase in fire sales as financial institutions came under pressure from funding sources.

Overall, these two contributions to the volume that highlight the role of asymmetric private information also suggest that markets with these characteristics are especially prone to collapse during situations of macroeconomic turbulence. If the markets affected by this type of phenomenon are large, closely linked to the real economy, and with highly leveraged participants, their collapse may result in a financial crisis. Limiting the presence of private information in markets of crucial assets, and a careful monitoring of these markets, are measures that should be seriously considered by policymakers.

The role of leverage in the buildup of a financial crisis is studied in **Geanakoplos'** contribution to this volume. Contrary to Shimer and Hall, Geanakoplos considers that private and asymmetric information, though important, is not a crucial determinant of leverage. Instead, the author presents a theory in which agents are individually rational and there is no asymmetric information. Both the equilibrium leverage and the interest rate of a loan are determined from the equilibrium of supply and demand. The degree of impatience of borrowers with respect to lenders has an effect over the interest rate charged; similarly, the risk embedded in an asset has an effect over the collateral demanded by lenders. Next, he describes what he calls the *leverage cycle:* long periods of low uncertainty result in lenders increasing loan to value ratios, which in turn increases borrowing and asset prices through an increase in demand. The arrival of bad news in this setup creates downward pressures on asset prices, which translate into substantial losses for highly leveraged agents. This latter effect reinforces the fall in asset prices and leads lenders to tighten margins, thus reducing leverage. All these elements feedback on each other fueling a crash.

The policy implications of Geanakoplos' contribution are clear and powerful: in order to prevent a crash from occurring, it is necessary that the Fed constantly manage system-wide leverage, curtailing it in normal times and propping it up in downturns.

2. Preventing and Fighting a Financial Crisis

Since financial fragilities may build up in environments of price and output stability and bypass existing prudential regulation, what can then be done to prevent the occurrence of financial crises? This question has been repeatedly asked in academic and policy circles in the last 5 years, and has led to the development of a large body of literature that studies the roles of micro- and macro-prudential regulation and monetary policy in preventing crises.

The contribution of **Christiano and Ikeda** to this volume is part of this literature. It studies the effects of leverage restrictions on financial intermediaries that exert costly hidden effort to identify good risky investment projects and earn high returns for their creditors in a standard medium-size DSGE model. The basic premise of the model is that households cannot monitor the costly effort that financial intermediaries (banks) exert. This situation gives rise to a standard agency problem, and the competitive market solution does not necessarily deliver efficiency.

Christiano and Ikeda show that, in a steady state, leverage restrictions that imply a 15% decrease in leverage (in a steady state) increase welfare because they bring employment and consumption closer to the level they reach in the efficient equilibrium where effort is observable. This increase in welfare is potentially large, reaching up to 1.2% permanent increase in consumption. The intuition behind this result is that banks with low leverage can insulate their creditors from risk because their net worth can cover the losses that may arise from the asset side of its balance sheet. Creditors internalize this and demand lower interest rate spreads to banks with high net worth. For the bank, this lower spread implies that it can reap the full reward of its high effort, so it will be more willing to exert this high effort in the first place. Since the competitive equilibrium is not efficient, regulation acts as a commitment device that allows the equilibrium to come closer to the efficient one.

When studying the dynamic properties of the model economy, the authors find that contractionary shocks cause consumption, investment, output, employment, inflation and bank net worth to go down—consistently with the patterns observed in a recession—while the dispersion of equity returns across banks goes up. This is true regardless of the nature of the shock, as monetary policy shocks and financial shocks deliver similar qualitative implications.

Christiano and Ikeda's paper delivers a powerful message in terms of policy implications: even in steady state, leverage restrictions on banks are welfare enhancing because they promote high screening effort by banks and alleviate the agency problem between them and their creditors.

In light of these results, the next natural step is to analyze how macro-prudential and monetary policy should be conducted along the business cycle. Their model is well suited to study these crucial aspects of preemptive macroeconomic policy, as the analysis of the dynamic properties of the model suggests.

The paper by **Beau, Cahn, Clerc and Mojon** included in this volume complements the previous study by analyzing the interaction between monetary and macro-prudential policies in a DSGE model with financial frictions, a housing sector and heterogeneous agents based on Antipa et al. (2011). The model is estimated for the Euro area over the period 1985-2010 and is used to identify the conditions under which monetary and macro-prudential policies may have compounding, neutral or conflicting impacts on price stability.

The article describes the institutional arrangements for macro-prudential policies in the U.S. and Europe and explains the possible interdependency between monetary and macro-prudential policy that stems from the limits that the latter impose on the activity of financial institutions. Since these institutions provide liquidity to the economy, they constitute a crucial link in the transmission of monetary policy, and limiting their activity may impinge on this transmission. They also acknowledge the possible conflicting impact these policies may have on financial, price, and output stability. On one hand, there is the risk-taking channel of monetary policy, by which loose monetary policy may lead to more risk taking. On the other hand, a stringent macro-prudential policy that restricts credit and liquidity growth may have a negative impact on aggregate activity and price stability.

The paper considers four configurations of monetary and macro-prudential policies: a simple Taylor rule, an augmented Taylor rule that reacts to credit growth, a Taylor rule and an independent macro-prudential rule that limits the amplitude of the deviation of aggregate credit from its steady-state value, and an augmented Taylor rule that coexists with an independent macro-prudential rule. When analyzing the performance of each policy regime, it is important to acknowledge that the four possible configurations of monetary and macro-prudential policies may have different implications for inflation, depending on

which shock the economy is subject to. The authors find that, if the economy is hit by a productivity, cost-push or monetary policy shock, then the four policy regimes studied yield very similar results in terms of the dynamics of inflation, as these shocks do not generate a conflict between price, output and financial stability.[6] When analyzing housing and credit shocks, however, macro-prudential policies can be destabilizing for inflation. Unlike productivity, cost-push and monetary shocks, these shocks do generate a trade-off for the policy maker between price and financial stability.

The stochastic structure of the model economy is estimated over the period 1985-2010.[7] Housing and credit shocks, which are the most relevant for macro-prudential policies, are not quantitatively relevant to explain the variance of inflation over this period. In contrast, productivity and cost-push shocks have an important role in accounting for inflation dynamics. Therefore, jointly implementing macro-prudential and monetary policies would have not had a conflicting impact on price stability in the period under study. More generally, there is no evidence that implementing macro-prudential policies would have been harmful for the conduct of monetary policy; on the contrary, if macro-prudential policies deter the emergence of asset bubbles and credit shocks by leaning against credit, their implementation would have contributed to the goal of price stability.[8]

Mian's contribution to this volume departs from the view of the previous two articles and challenges the traditional view that macroeconomic policies, either preemptive ones such as macro-prudential policies, or ex-post ones such as monetary policy, can reduce the incidence of financial crises, or their depth once they take place.

According to Mian, the main flaw of the existing paradigm in macroeconomics lies in the assumption of a representative agent in the household sector (or in broad groups of households), which

6. A positive and transitory productivity shock generates a decline in inflation and a negative output gap. At the same time, households acquire assets in order to smooth consumption. Consequently, a decrease in the policy rate that stabilizes output and inflation does not destabilize credit; on the contrary, it fosters consumption and lowers savings. As it is clear from this example, in this model productivity shocks do not entail conflicting interests between price, output and financial instability. Similar arguments can be applied to cost-push and monetary policy shocks.

7. The model is estimated assuming that monetary policy is conducted through a standard Taylor rule.

8. These results can be extrapolated to other economies and/or time periods, only insofar as productivity and cost-push shocks are the most relevant sources of fluctuations. The conclusions presented here do not apply in economies and/or periods in which credit and housing shocks are fundamental drivers of the business cycle.

implies that households can perfectly share idiosyncratic financial risks. If this assumption is wrong, then the bursting of a financial bubble may create a large cross-sectional redistribution of wealth. In other words, when the bubble bursts, the burden of the decline in asset prices is distributed unevenly in the population. Mian et al. (2012) show that this has indeed been the case in the U.S. after the financial crisis of 2008-2009: the ten percent of U.S. ZIP codes that lost most wealth during the crisis lost close to 60% of their total wealth in 2006. The ten percent of ZIP codes that lost the least, on the other hand, only suffered a wealth loss of around 10%.

A second consequence of departing from the representative agent assumption is that the hardest hit households cut their consumption sharply, causing an amplification of the shock that translated into job layoffs. The paper by Mian provides evidence that households that were hit by a stronger net wealth shock were those that reduced consumption more aggressively.[9] Moreover, there is also a strong correlation between job losses in the non-tradable sector and the net wealth shock experienced by a county, while the drop in employment in the tradable sector—whose production is evenly spread throughout the U.S.—is uniform across counties.

All this evidence supports the idea that households are unable to adequately share financial risk, and policy prescriptions obtained from models that implicitly assume full risk sharing among households may be deeply flawed. Following this line of argument, Mian discusses three reasons to doubt the ability of macro-prudential policies for preventing a financial crisis. First, regulation gives banks incentives to operate in the unregulated, or shadow, area of the financial system. Second, regulators have limited ability to properly measure capital and risk, so they may be unable to impose adequate capital requirements. Finally, Mian argues that the main bottleneck during the last financial crisis was the high leverage of households' balance sheets, which cannot be addressed by raising capital requirements in the banking sector.

Even if macro-prudential policy cannot do much to prevent a crisis from taking place, it might still be possible to use monetary policy to alleviate its effects. But Mian argues that, for monetary policy to be effective in the aftermath of a crisis, it must reach those

9. The paper in the current volume uses the number of new automobiles sold as a proxy for consumption. Mian et al. (2012) show that that result holds when considering broader measures of consumption.

households that have been hit hardest by the shock. According to evidence reported in Mian et al. (2012) this has not been the case, since these households were close to defaulting and hence were not eligible candidates to refinance their mortgage debts. Consequently, monetary policy in the U.S. has been unable to aid highly indebted households during the last financial crisis.

While Mian's views on the likely effectiveness of monetary and macro-prudential policies to deal with financial crises are a matter of debate, he proposes an unconventional, yet interesting, policy that would deal with the heterogeneous impact of a financial shock across households and its potential amplification mechanism: the establishment of *ex-ante flexible financial contracts*. These contracts would have contingent clauses that automatically write down the value of a household's outstanding debt if the overall economic environment is bad enough.[10] These characteristics would reduce the probability of a deep crisis following an economic downturn because they would break the amplification related with the deleveraging process, and for the same reason they would make the crisis less severe once it has effectively happened. Arguably there are many potential difficulties with the implementation of such contracts that need to be carefully looked into, but their benefits might well outweigh these difficulties.

3. Dealing with the Consequences of a Financial Crisis

Once it has occurred, a financial crisis has vast consequences for various aspects of macroeconomic performance. The article of Calvo, Coricelli, and Ottonello, and the one by Devereux, both in this volume, address the impact of crises on employment and their international spillovers, and suggest some avenues to deal with these consequences.

Calvo, Coricelli and Ottonello study the consequences of financial crises on unemployment, distinguishing between their impact during the crisis, and in its aftermath. Following Calvo et al. (2012), they claim that a salient feature of financial crises is that, once the recovery phase ends, there is an increase in unemployment with respect to its pre-crisis level that is higher than in other recession episodes. This phenomenon has been labeled as *jobless recovery* and

10. As an example, Mian suggests that the mortgage principal could be automatically written down if the local house price index fell beyond a certain threshold.

has received ample attention from the profession in the recent past (Knotek and Terry, 2009; Bernal-Verdugo et al., 2012). Calvo et al. document this finding by analyzing two different crises episodes in two countries: Sweden and Argentina.

Given the incidence of jobless recoveries after a financial crisis, the authors study three policy tools that may speed up employment recovery: an increase in inflation, a real currency depreciation, and a credit-recovery policy. They use data on 55 financial crises in emerging economies to document the effects of such policies in the aftermath of a financial crisis.

Their analysis shows that when high inflation spikes follow the crisis, the recovery does not seem to be jobless but is instead *wageless* (Calvo et al., 2012). Financial crises where the annual rate of inflation exceeds 30 percent have unemployment returning to trend at the same speed as output but real wages that lag significantly below their pre-crisis level. Further results lead them to argue that currency depreciations are ineffective in dealing with the rise in unemployment after a crisis unless they result in inflation. The reason is that they find that many crises associated with large depreciations do not result in quick employment recovery; only those do where there is a simultaneous increase in inflation that reduces real wages. All in all, this evidence brings support to the idea that nominal wages are partially rigid (Schmitt-Grohe and Uribe, 2013).

Since both jobless and wageless recoveries place the burden of a financial crisis on the labor market, as both affect wage earners, the authors argue that policy should be aimed at relaxing credit constraints for firms so that they can increase their labor demand. This assertion is based on the view that firms facing collateral constraints will avoid expanding employment in favor of investment in physical capital because the latter, but not the former, can be easily pledged as collateral. This hinders the creation of jobs and leads to a jobless recovery.

The authors provide some evidence that supports the view that credit policies can be an effective instrument in mitigating the effects of financial crises on real economic activity and, in particular, in improving employment and wages simultaneously during the recovery phase.

Most countries affected by the global financial crisis of 2008 engaged in aggressively expansive monetary policy as a first line of action to stimulate the economy. Still, the crisis was so deep that many countries saw their policy interest rates go down to nearly

zero, hitting the so called *zero lower bound*, which until that moment had been regarded either as a theoretical curiosity or a Japanese phenomenon. Many authors, such as Christiano et al. (2011), Werning (2012), Cook and Devereux (2011), Cook and Devereux (2013) and Correia et al. (2013) among others, became interested in understanding the economic implications of reaching the zero lower bound and the effectiveness of fiscal policy in such situation.

In the present volume, the paper by **Devereux** contributes to this literature and studies how shocks are transmitted across countries when the zero lower bound is active in one or more of them. To this end, he sets up a two-country New Keynesian model that allows for parametric variation in the degree in which they are integrated in trade and financial markets, both of which can range from full openness to autarky. This rich configuration yields results for a wide range of possibilities in terms of international integration.

Countries are subject to country-specific demand shocks. A negative shock can drive a country into a liquidity trap that, depending on the degree of international trade and financial integration, may propagate to the other country. When trade and financial integration are complete, all liquidity traps are global, but less integrated markets reduce the transmission of shocks and the likelihood of a global liquidity trap. In this case, the country originally hit by the demand shock is the one more prone to hit the zero lower bound on its nominal interest rate and experience a terms of trade appreciation that amplifies the effect of the shock.[11]

In line with previous studies (Christiano et al., 2011; Cook and Devereux, 2011; Cook and Devereux, 2013), the author finds that fiscal policy is very effective when the economy is at the zero lower bound: at the zero lower bound, a home country fiscal expansion raises expected inflation in the home country relative to the foreign country. This reduces the home country's real interest rate, and generates a terms of trade depreciation. The terms of trade depreciation increases demand for the home good, but reduces demand for the foreign good. Therefore, the increase in activity comes at the cost of reducing the terms of trade, hampering international trade and reducing the output of the trading partner. The *beggar thy neighbor* nature of

11. As Devereux points out, the terms of trade appreciation is tied to the fact that while nominal interest rates are constrained by the zero bound, there is still arbitrage in bond markets, so a fall in demand in the home country, by reducing inflation in the home country, will raise the home real interest rate. This produces a terms of trade appreciation.

unilateral fiscal policy calls for international coordination in response to a shock that creates a liquidity trap. The optimal coordination policy consists of fiscal policy expansions in both countries and a policy rate increase in the least hit country, designed to revert the response of terms of trade to the shock. This coordination policy is welfare improving for both economies.

The limit reached by monetary policy at the zero lower bound has increased interest among policy makers and scholars to study alternative, or unconventional, monetary policy tools that may provide the stimulus needed by the economy after a crisis. As Mishkin points out in this volume, unconventional policy tools typically involve one or more of the following aspects: the management of expectations about the future path of the policy rate in order to affect long-term interest rates, a decrease in risk and term premiums by the purchase of securities, or exchange rate interventions that depreciate the domestic currency and foster exports.

The present volume contains two contributions to this literature that study the effects of unconventional policies implemented in Chile in response to the financial crisis of 2008-2009.

The work by **Céspedes, García–Cicco and Saravia** focuses on the Term Liquidity Program (FLAP) implemented by the Central Bank of Chile from July 2009 to May 2010. The FLAP was a facility that offered liquidity to banks at the monetary policy rate at the time for terms of 90 and 180 days against eligible collateral (Central Bank bonds, time deposits and bank mortgage bills).

In addition to providing liquidity at longer terms than usual, the FLAP also aimed at credibly communicating the commitment of the Central Bank of Chile to maintain the policy rate at the lower bound (50 basis points) for several months. The analysis in the paper of Céspedes et al. suggests that the FLAP indeed was able to achieve this goal. According to their results, the announcement of the FLAP caused a flattening of the nominal yield curve, with yields at the 3-month in 3-month and in the 1-year in 1-year horizons decreasing by around 50 and 30 basis points, respectively. The real rates fell as well; however, it is not altogether clear whether this fall was solely due to the announcement of the FLAP or if it can be attributed to the decrease in the monetary policy rate that was announced at the same policy meeting.

Although the main goal of liquidity facilities is usually to relax funding restrictions for banks and guarantee the normal working of the financial system, a natural question that arises is whether

this provision of liquidity translates into more lending to the private sector. The authors tackle this question, and show that banks that used the FLAP increased their supply of commercial and, to a lesser extent, consumption loans relative to those that did not use it. Mortgage lending did not increase significantly because of the FLAP, which may be attributed to these being long-term loans, whereas the FLAP was intended as a short-term liquidity facility.

The results of this study provide valuable lessons for the conduction of monetary policy in periods when the traditional policy tool is constrained by the zero lower bound. The Chilean evidence suggests that unconventional monetary policy, in the form of liquidity facilities, affects nominal medium-term rates in the desired direction. More importantly, banks use the additional liquidity to increase commercial and consumption lending. To the extent that the most adverse effects of a financial crisis arise because households and firms are credit constrained, as Mian and Calvo, Coricelli and Ottonello argue in their respective contributions, the potential benefits of this credit expansion may be important. Of course, this would be the case as long as the credit expansion reaches directly or indirectly to the more constrained agents. The last paper in this volume tries to provide evidence whether credit expansion during a crisis does reach those agents.

An additional policy implemented in Chile in 2009 to palliate the effects of the international financial crisis was the capitalization of BancoEstado, a state owned commercial bank, for 500 million dollars, which implied an increase of 50% of BancoEstado's capital. The goal of this measure was the provision of loans to credit-constrained firms. This can be regarded as a quasi-fiscal policy measure, as the public sector channeled resources to the private sector in an indirect manner, using BancoEstado as an intermediary. The analysis of this type of measure is particularly interesting, since there was a renewed discussion after the crisis on the potential benefit of state owned banks as liquidity and credit providers of last resort (see Bertay, Demirguc-Kunt, and Huizinga, 2012)

Lagos and Tapia, in this volume, use quarterly data from Chilean banks' balance sheets to study the impact of the capitalization of BancoEstado on commercial credit, finding that, following the measure, BancoEstado quickly expanded commercial credit in a countercyclical manner during a time when other financial institutions were reducing it.

Of course, the expansion of credit does not necessarily mean that it reached those firms that were more severely constrained. Despite

being state owned, BancoEstado operates as a profit-maximizing institution with ample margins to decide where to allocate credit. The authors find evidence that firms that benefited may not have been those subject to the tighter credit constraints. BancoEstado expanded its credit operations in segments with large loans, which are usually granted to large firms that have better access to credit markets. Furthermore, the results show that BancoEstado expanded lending to sectors that had not seen a large reduction in credit during the first months of the crisis. This fact may be an indication that credit was expanded in sectors that were not credit-constrained; however, a credit reduction in a particular sector is the outcome of demand and supply effects, so further analysis would be needed to shed light on this assertion. Finally, the authors also provide some evidence that the expansion of lending by BancoEstado may have partially displaced lending by other private banks.

While the empirical exercise conducted in the article of Lagos and Tapia faces the tough challenge of defining the appropriate counterfactual scenario for the policy and the identification of supply and demand effect, it sends a clear warning sign of how difficult it may be to design a credit provision policy that actually reaches the households or firms that need it most. As argued by Mian, such measures may be an important part of a powerful stimulus package, but more research is needed to identify their desirable characteristics and determine effective implementation schemes. With all their potential limitations, macroeconomic tools, such as those discussed in the rest of the volume, may be the only ones at hand when having to face or prevent a future financial crisis.

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