## MONETARY POLICY AND FINANCIAL STABILITY: TRANSMISSION MECHANISMS AND POLICY IMPLICATIONS AN OVERVIEW

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Financial stability, understood as a situation when the financial system smoothly performs its function of allocating capital and adverse shocks are unlikely to be amplified, has been for long a key concern for policymakers and, in particular, for monetary authorities. However, until 10 years ago, most central banks did not try to pursue the financial stability goal by using their main instrument, the shortterm interest rate. Instead, they tried to do this through regulation and supervision of individual financial institutions, a process that was in most cases conducted by additional regulatory authorities. The consensus was that monetary policy should be conducted with an explicit commitment from the central bank to stabilize inflation, and perhaps with a complementary objective of output stabilization.

The main concern against this consensus was asset prices. The "lean versus clean" policy debate, generated after the recession following the stock-market boom in the U.S. in the late nineties, focused on whether monetary policy should react to signs of misalignment of prices from their fundamental values in a preemptive way, or should only counteract the adverse effects after a bubble bursting.

Monetary Policy and Financial Stability: Transmission Mechanisms and Policy Implications edited by Álvaro Aguirre, Markus Brunnermeier, and Diego Saravia, Santiago, Chile. © 2018 Central Bank of Chile. Overall, using monetary policy to address financial stability was perceived too costly relative to its uncertain benefits. The main view was that preserving price stability was the optimal way to maintain financial stability, and decades of successful central-banking practice reflected in output stabilization and anchored private agents' inflation expectations around policy targets reinforced the benefits of following this strategy.

However, the global financial crisis that started 10 years ago challenged this consensus. While financial supervisors deemed each individual institution to be sound, risks were building in the system, leading to inadequate levels of capitalization and liquidity. And the buildup of risks occurred during a period of price and output stability, during the so-called "Great Moderation" period, where low nominal interest rates that were consistent with the central bank commitment of CPI inflation stability, may have contributed to excessive risk-taking by financial intermediaries and to a raise in asset prices, while good economic conditions masked the growth of financial imbalances.

The increasing concern about financial conditions and the consequent reassessment of the macroeconomic policy framework was most evident with the implementation of macroprudential policies. The objective was to reduce potentially adverse asset and credit-boom effects, and they were aimed at the stability of the whole financial system instead of at the soundness of individual institutions, as financial-stability policies mostly did in the past. Unlike monetary policy, macroprudential policies can be targeted at certain sectors of the economy if the financial vulnerability is narrow, and have direct effects on specific measures such as capital requirements and loan-to-value ratios. Because of these advantages they have become the preferred instrument to mitigate financial vulnerabilities, while monetary policy has still maintained its focus on the inflation-real activity trade off. Many of the papers in this volume explore the implementation and effects of these macroprudential policies.

The developments over the last 10 years have led to a surge of interest in the relationship between monetary policy and financial vulnerabilities. The debate focuses on the broad question of whether and how monetary-policy frameworks should incorporate explicitly risks to financial stability.

Should monetary policy follow a tighter stance in normal times in order to avoid the build-up of risks? Should monetary policy *Lean against the wind* (LAW)? This strategy has been called this way since 1956, after the remark by the Federal Reserve Board of Governors Chairman William McChesney Martin Jr. when describing to the Congress the purpose of the Fed as "leaning against the winds of deflation or inflation, whichever way they are blowing".

On one side, a separable approach between monetary policy and policies aimed at financial stability, i.e., to continue with the current framework, is proposed. Financial imbalances are difficult to detect and hence they are best addressed with other tools such as macroprudential policies. The benefits of LAW are too uncertain, and the costs too high to consider modifying the prevailing policy framework.

On the other side, proponents of LAW emphasize the effects of monetary policy not only on financial stability but also on financial vulnerabilities—specific features leading to the amplification of adverse shocks that raise future risks to financial stability—, mainly through a risk-taking channel. Additionally, monetary policy would affect costs for all borrowers and lenders, and would have a wider reach than macroprudential policies, which may simply push certain activities into non-regulated sectors. Papers in this volume contribute to this ongoing debate.

To inform this fundamental debate, it is essential to explore the mechanisms through which monetary policy and financial stability are interlinked. In particular we need to understand the channels through which conventional monetary policy affects financial vulnerabilities and assess whether monetary policy can have substantial effects on financial vulnerabilities. Since macroprudential policies would be a part of the general framework, we need to understand their interaction with a monetary policy aimed at financial stability.

One of the most relevant monetary transmission channels in this debate relates to risk-taking behavior, through which, at times of economic expansion and low interest rates, monetary policy can lead to the creation of vulnerabilities via an endogenous increase in risk-taking. One way this can occur is through an institutional factor driven search-for-yield that may lead some fund managers to seek higher risk to maintain yields after rates on safer assets decline. High asset values could also lead financial institutions to underestimate risks. Alternatively, higher net worth of borrowers arising from high collateral values eases borrowing constraints and allows for excessive credit accumulation, or may incent carry trades based on short-term funding, thus leading to excessive maturity transformation. Hence, through this risk-taking channel of monetary policy, a policy stance that is consistent with current financial stability can lead to financial vulnerabilities, thus reducing the resilience to financial shocks and raising future risks to financial stability.

The growing literature studying the interaction between monetary policy and financial risks acknowledge the channels through which monetary policy not only affects financial conditions, i.e. current borrowing costs, but also can lead to build-ups of financial vulnerabilities in the presence of financial frictions that amplify negative shocks. Under these conditions policymakers face an intertemporal trade-off, since improving current conditions may lead to future financial vulnerabilities. This raises the question: Are the net benefits of a LAW strategy large enough to reform monetary policy frameworks to cope directly with financial vulnerabilities?

Proponents of the separable approach presumed that monetary policy has small and uncertain effects on financial imbalances, and when weighted against the costs of slowing the economy, i.e. high unemployment rates, the trade-off is unfavorable. Proponents of LAW argue that relatively small changes in short-term interest rates may result in a large impact on financial intermediaries' risk-taking behavior. While the costs of LAW may appear as downward-biased business cycles, the benefits appear as less recurring and severe financial crises, episodes that in the absence of a preemptive strategy are much more costly than regular recessions.

Most of the developments mentioned so far have occurred in the developed world. In turn, in developing countries, financial vulnerabilities have been much more common, and monetary policy has been involved to a larger degree with financial stability objectives. Maintaining a certain level of the exchange rate and managing capital flows are perhaps the most common, particularly in countries with currency mismatches in the banking and corporate sectors due to episodes of very high inflation rates in the past.

In recent years, macroprudential policy has become an increasingly active policy area in developing countries as well. Many countries have adopted it as a tool to safeguard financial stability, in particular to deal with the credit and asset price cycles driven by global capital flows. Indeed most of the experience with macroprudential policies comes from emerging countries, which show however less complex financial systems, thus limiting the insights for developed countries. In the following paragraphs, we provide a brief summary of the papers included in this volume.

In "*Negative Interest Rates: Lessons from the Euro Area*," Jens Eisenschmidt and Frank Smets explore whether the pass-through from policy rates on bank deposit and lending rates as well as loan volumes are affected by the existence of a negative interest rate policy.

They focus on the decision of the European Central Bank, starting in June 2014, to cut the rate on its deposit facility to -0.4 percent as part of the introduction of a more comprehensive monetary policy easing package. To explore the effect of this policy, the authors examine the behavior of bank loan and deposit rates and loan volumes before and after its introduction, using a confidential dataset containing balance sheet data for 256 selected euro-area banks at the monthly frequency.

The first fact the paper documents is that a zero lower bound on interest rates seems to exist only for interest rates on household deposits held at banks. This is consistent with the view that it is relatively cheaper for households to substitute deposits for cash. Therefore distortionary effects from a negative interest rate policy should be most visible for banks with high-reliance on household deposits, an observation that guides the empirical exploration in the paper. Furthermore, the analysis focuses on the differential response of the German banking sector, since due to its relatively low initial interest rates, it had the least room to lower them after the policy was implemented.

The statistical analysis uncover suggestive evidence that in the euro area the negative interest rate policy did not have a differential effect on lending behavior by banks that are reliant on household deposits, neither in terms of prices nor of quantities. By using panel estimations, they do not find evidence of a change in the pass-through of policy rates to bank lending rates during the negative interest rate policy. This evidence leads the authors to conclude that negative rates in the euro area were expansionary.

As short-term interest rates are close to the zero lower bound, more attention has been devoted to policies aiming at long-term rates to control inflation. In "*Central Banks Going Long*," Ricardo Reis evaluate the performance of central banks that in the past have turned their attention to long-term interest rates as a target or as a diagnosis of policy, by using a model where inflation and the yield curve are jointly analyzed. The model restates the classic problem of monetary policy through interest-rate rules in a continuous-time setting where shocks follow diffusions in order to integrate the endogenous determination of inflation, long-term and short-term interest rates.

Then the paper uses the model to analyze two historical episodes when monetary policies relied on going long, significantly changing the composition of their balance sheets and adapting their procedures to focus monetary policy on long-term interest rates. The first of these episodes was the U.S. in 1942–51, when the Fed stood ready to buy and sell 90-day Treasury bills at a fixed rate and set a ceiling to the 10-year yield. Through the lens of the model, the way in which the Fed went long was ultimately unsustainable since it created a highinflation equilibrium that might have been reached were it not for the change in policy.

The second episode is the U.K. in the 1960s, when monetary policy devoted itself first to stabilizing the exchange rate and capital flows through the setting of short-term interest rates, and second to managing the yield curve and the cost of government financing through the setting of long-term interest rates. Although using long-term interest rates is consistent with keeping inflation under control, the model suggests that without a precise understanding of the yield curve, its slope and how it responds to shocks, keeping inflation under control will be hard.

The analysis leads the author to conclude that there are several caveats to going long. First, unless it is implemented carefully, it can put the solvency of the central bank at risk or lead to much volatility in interest-rate markets. Second, a ceiling on long-term rates creates a stable equilibrium with high inflation to which the economy can easily escape if there are positive shocks to inflation. Third, a feedback rule for long rates requires very precise knowledge of the yield curve and how it changes with separate shocks. Fourth, making the slope of the yield curve the policy tool requires steepening the yield curve, raising long rates relative to short rates in order to raise inflation.

In "Capital Flows, Macroprudential Policies and Capital Controls," Álvaro Aguirre, Sofía Bauducco and Diego Saravia study how macroprudential policies and capital control measures affect capital inflows in developed and developing economies, over the 2004–2013 period. The main finding is that macroprudential policies, especially those targeted at financial institutions, have a positive impact on bond inflows in developing economies, while the effect is negative in developed ones. This result survives the introduction of different control variables, changes in the sample period considered and in the frequency of the macroprudential policy measures.

To further explore the mechanisms behind these findings the authors show additional results related to domestic credit and financial development. In particular they show that domestic credit is negatively influenced by macroprudential policies in developing economies, but not in developed ones, and that in developing countries with more developed financial systems, the effect of macroprudential policies on capital inflows is larger. This brings support to the idea that relatively small domestic firms see their funding needs curtailed by such policies.

These findings are broadly consistent with the hypothesis of carry-trade opportunities present in developing economies, which are intensified when macroprudential policies limit the ability of domestic financial institutions to provide credit to firms. Non-financial firms with access to international markets see an opportunity to obtain profits from interest rate differentials by bringing in external funds and acting as financial intermediaries in the domestic market.

In terms of capital controls, the econometric estimations show that these instruments exert a negative effect on capital inflows in developing economies, as it is expected, but also that capital controls impact negatively the volatility of equity inflows in these economies, the main goal of capital controls in developing economies.

In "A Global Safe Asset for and from Emerging Market Economies", Markus Brunnermeier and Lunyang Huang examine international capital flows induced by flight-to-safety and propose a new global safe asset for the emerging economies.

In their model, domestic investors have to co-invest in a safe asset along with their physical capital. At times of crisis, they fire-sell part of their capital and replace initially safe domestic government bonds with safe U.S. Treasuries. The reduction in physical capital lowers GDP and tax revenue, thus leading to default and a loss of the government bond's safe-asset status. There are two ways to mitigate this adverse scenario.

First, holding international reserves reduces the severity of a crisis, which they label the "buffer approach." Alternatively, one can modify the international financial architecture by adding a truly globally supplied safe asset in the form of a sovereign bond-backed security (SBBS). Such an asset pools sovereign bonds of many countries and tranches them into a senior and a junior bond. The newly created senior bond serves as a new global safe asset, referred

to as GloSBies. Instead of leaning against capital outflows, this approach rechannels flight-to-safety capital flows from international cross-border flows to flows across two asset classes, from the junior to the senior bond. Since both the senior and junior bond are from emerging economies, the cross-border dimension of capital flows is reduced, thereby stabilizing the global economy.

In "*Capital Flow Management with Multiple Instruments*," Viral Acharya and Arvind Krishnamurthy examine theoretically the interaction between reserves management and macroprudential capital controls as tools to manage the capital-flow cycle in emerging markets.

The authors build a model with reserves management as an ex-post safeguard against sudden stops. Reserves may be deployed after these episodes to reduce fire-sales and stabilize the exchange rate. However, due to a form of moral hazard from the insurance provided by reserves, their potential effect is partially undone exante by short-term capital flows, thus reducing its role as a buffer against sudden stops.

When introducing capital controls as an ex-ante safe guard, they offset the moral hazard distortion, thus increasing the benefit of holding reserves. This is the main conclusion of the paper: unlike much of the literature on capital-flow management where reserves management and capital controls are cast as alternative instruments to reduce sudden stop vulnerability, the model shows that they are complementary—better capital controls enable more effective reserve management.

With foreign investment flows into both domestic and external borrowing markets, the complementarity result holds between three instruments: reserves management and capital controls in external and domestic currency. If capital controls can only be introduced on one margin, say foreign-currency debt, then they cannot be too tight because of the prospect of arbitrage of capital controls between the two markets. With an additional instrument, say capital controls on domestic-currency debt, capital controls as a whole can be more effective, which then makes reserve polices also more effective.

The authors revise movements in foreign reserves, external debt, and the range of capital controls being employed in India through the lens of the model. This country has deployed a range of macroprudential measures to contain the impact of sudden stops and reversals of foreign capital flows, and the authors discuss how they map into the model's economic forces and implications. In "Foreign Exchange Intervention Redux," Roberto Chang highlights the opposite views between academic research and policymakers with respect to the economic impact of foreign effect interventions. While theories predict insignificant effects on relevant variables, policymakers have intervened frequently and intensively, especially following the global financial crisis.

To close this gap the author explores a novel channel to analyze the effectiveness of sterilized foreign exchange interventions. Unlike the commonly studied channel through the currency composition of assets held by the public with imperfect substitutability between domestic- and foreign-currency bonds, the key channel in the model is that sterilized interventions change the net credit position of the central bank vis-à-vis financial intermediaries, thereby affecting external debt limits. In the model, private banks, which borrow from the world market and in turn extend credit to domestic households or the government, are subject to occasionally binding collateral constraints. In this context intervention has real effects if and only if it occurs when the constraints bind. At such times, a sterilized sale of official reserves, where central banks buy an offsetting amount of securities, relaxes the constraints by reducing the central bank's debt to domestic banks, thus freeing resources for the latter to increase the supply of credit to domestic agents.

The analysis yields several noteworthy implications for intervention policy, official reserves accumulation, and the interaction between intervention and monetary policy. Interventions can be an effective policy tool when financial constraints bind, even under perfect asset substitutability or if the economy is financially dollarized. Since credit spreads correlate strongly with the severity of financial constraints, a policy of intervention based on these is superior to a policy based on the level of the exchange rate. A trade-off emerges when deciding the optimal level of reserve accumulation: although a larger amount of these allow the central bank to respond more effectively when financial constraints are hit, they also make banks more vulnerable because of the corresponding large outstanding quantities of sterilization bonds. The cost of holding reserves is then that the constraint is hit more frequently by private banks. Finally, the analysis implies that intervention is an independent policy tool and complements conventional monetary policy.

In "*Interest Rate Policies, Banking and the Macroeconomy*," Vincenzo Quadrini analyzes the benefits of low interest rates as a stimulus for the real economy, beyond the well explored trade-off between spending stimulus and higher inflation. In particular, the paper explores two additional channels, namely, the reduction in the demand for liquid financial assets by savers and the increase in the incentives to leverage for financial intermediaries.

The analysis is done in a model in which banks play a central role in the intermediation of funds, and policy interventions by the monetary or fiscal authority take the form of asset purchases from financial intermediaries. Importantly, the wealth of savers is key for the demand of production inputs. In equilibrium, producers are net savers while households are net borrowers, thus capturing the fact that U.S. corporations hold volumes of financial assets in excess of their aggregate financial liabilities and household debt has grown significantly in the last years. In the model this is generated by the use of liquid assets as insurance against production risks. When firms hold more of these assets, they are willing to take more risks, which generates an increase in labor demand and economic activity. In this context, low interest rates discourage savings, with the resulting negative effects on the real sector of the economy.

In addition, low interest rates encourage financial intermediaries to issue more liabilities than equity. The increase in leverage on the other hand raises the cost of a crisis because it generates a bigger distribution of financial wealth from savers to borrowers, with the consequent negative effects on labor demand and economic activity. Therefore policies aimed at reducing the interest rate induce a fall in aggregate production and an increase in macroeconomic volatility.

The last two contributions to the volume contribute more directly to the important debate originated after the global financial crisis about the scope of monetary policy. In "*The Relation between Monetary Policy and Financial-Stability Policy*," Lars E.O. Svensson examines in detail the conduct, instruments, goals, and effects of both monetary and financial-stability policies, as well as how responsibility for achieving the goals and instruments can be assigned to the corresponding authorities. The analysis of these policies emphasizes their connection and differences, and ultimately evaluates the convenience of following a monetary policy aiming not only at inflation but also at asset prices and credit booms, i.e., a LAW policy.

Basing the analysis also in the Swedish experience of a transition between a LAW and a conventional monetary policy, as well as a cost-benefit analysis of LAW, the main conclusion is that monetary policy should not have financial stability as a goal. Instead, it should focus on stabilizing inflation and resource stabilization. The main reason is that monetary policy is not capable of achieving financial stability. This doesn't imply that there should not be an interaction between the two types of policies, but Svensson argues that the two should normally be conducted independently, i.e., by separate decisionmaking bodies, each held accountable for achieving its goals, similarly to the way monetary and fiscal policies are implemented. Also, as it is the case with monetary and fiscal policy, it is very important that each policy should be fully informed about and take into account the conduct of the other.

In "Monetary Policy in the Grip of a Pincer Movement", Claudio Borio, Piti Disyatat, Mikael Juselius, and Phurichai Rungcharoenkitkul, emphasize two macroeconomic developments that have laid bare some of the limitations of prevailing monetary policy frameworks, particularly in the analytical notions that have guided much of its practice. These developments consist, first, in the growing size of financial cycles. The pre-crisis experience has shown that, in contrast to common belief, disruptive financial imbalances could build up even alongside low and stable, or even falling, inflation.

The second development is the fact that the inflation process has become quite insensitive to domestic slack. Inflation was higher than expected during the Great Recession, given the depth of the slump, and lower than expected during the recovery. And it has been puzzlingly low especially more recently, as a number of economies have been reaching or even exceeding previous estimates of full employment.

In this context, putting the economy back onto a robust, balanced and sustainable path after the global financial crisis has proved to be much harder than expected for monetary policy. The authors argue that the natural rate of interest as a guidepost for monetary policy has a couple of limitations: the concept, as traditionally conceived, neglects the state of the financial cycle in the definition of equilibrium. In addition, it underestimates the role that monetary policy regimes may play in persistent real interest rate movements. These limitations may expose monetary policy to blindsiding by the collateral damage that comes from an unhinged financial cycle. The paper proposes a more balanced approach that recognizes the difficulties monetary policy has in fine-tuning inflation and responds more systematically to the financial cycle.