Monetary Policy and Global Spillovers: Mechanisms, Effects and Policy Measures – An Overview

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The global economy of today "is a small world after all." The high degree of international trade integration and financial interconnectedness has created tight linkages across most countries, even between countries that may be very distant geographically, or that may not have significant trade or financial relations with each other. This phenomenon is particularly evident when observing the international implications of monetary policy decisions made by the authorities of key advanced economies, mainly the U.S. Federal Reserve (Fed) and the European Central Bank (ECB), and the global spillovers of fluctuations in commodity prices or changes in capital markets conditions in individual countries or regions. These implications run in a two-way street, in which changes in interest rates by key central banks have global effects on financial conditions and real activity, and at the same time there are also important effects of, for example, world commodity markets or financial vulnerabilities in emerging economies or Eurozone members on monetary policy decisions made by the Fed or the ECB as well as by other central banks.

The complex linkages created by the globalization of financial markets and economic activity make the study of monetary policy

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and global spillovers a complex subject. Traditionally, international macroeconomics (e.g. the Mundell-Fleming model or the Metzler diagram) viewed the analysis of the international implications of monetary policy and global spillovers mainly as exogenous changes in foreign monetary policy, or the terms of trade affecting the savings-investment imbalance of a small open economy, or the world allocation of savings, investment and the equilibrium interest rate in two-country models. But what we observe in the global economy today are spillovers operating through a variety of transmission mechanisms, particularly financial, that are absent from traditional models. These mechanisms end up affecting both advanced and emerging economies through various channels, and have posed new policy challenges that have been met with different policy responses. These have included reconsidering the pros and cons of traditional policies (e.g., capital controls, exchange rate management, monetary policy), as well as the use of new instruments or new approaches to use existing ones (e.g., macroprudential financial regulation, "leaning against the wind" of financial instability with monetary policy). To a large extent, however, the practice of these policies has moved at a much faster pace than the research work and the development of quantifiable models needed to understand them better and enhance their effectiveness.

The Twentieth Annual Conference of the Central Bank of Chile brought together some of the world's leading experts on this new frontier, and the papers published in this volume reflect some of the transformative new perspectives and policy insights derived from their latest research. The works included here shed light on some of the central questions in the analysis of monetary policy and global spillovers.

The seven papers included in this conference volume are organized in two sections. The first section consists of four empirical studies. The first three provide strong evidence on the relevance of global spillovers via linkages between U.S. monetary policy and sovereign and corporate bond markets worldwide (Burger, Warnock, and Warnock), fluctuations in the intensity of financial information acquisition and the occurrence of financial crises (Chousakos, Gordon, and Ordóñez), and interconnectedness across world markets of different commodities (Diebold, Liu and Yilmaz). The fourth empirical study, authored by Eichengreen and Gupta, demonstrates that sudden stops in emerging markets (i.e., sudden reversals in capital flows) remain a relevant problem even twenty years after the sudden stops of the 1990s.

The second section of this volume includes three papers that focus on the transmission mechanisms of global spillovers and policy responses stemming from them. These papers propose innovative models in the intersection of macro and finance, in which traditional policies, such as monetary and exchange-rate policies, have new implications because of their impact on the financial transmission mechanism (Devereux and Yu, and Gourinchas), or in which the promise and challenges of new policies, particularly macroprudential policy, can be analyzed in theory and evaluated quantitatively (Mendoza).

In the following paragraphs we provide a brief summary of the papers included in this volume.

Section 1: Spillovers – Empirical Relevance

This section includes four papers that conduct empirical studies of the relevance of selective channels of spillovers of monetary policy from developed to emerging economies.

In "*Global Information Spillovers*," Kyriakos Chousakos, Gary Gorton and Guillermo Ordoñez use a panel dataset of advanced and emerging countries to study the link between financial fragility, economic activity, and a measure of information production specified below. They reach three key findings: (1) Recessions that involve financial crises are characterized by a boom in the production of information previous to the crisis; (2) there is evidence of global spillovers: a boom in production of information in some advanced economies predict crises in other advanced as well as emerging economies; and (3) booms in the production of information predict global imbalances, suggesting that the production of information is one determinant for the international reallocation of resources.

The measure of information production the authors use is based on the cross-sectional average returns of firms' stock prices. If financial markets are (approximately) efficient, differences in firms' stock returns are related to the intensity in the use of information specific to firms in portfolio decisions. Then, they identify recessions in their dataset and sort them according to whether these recessions involve episodes of financial crises or not. In line with their previous work, they find that only a subset of recessions is associated with financial crises. To reach the first of their key findings, they show that recessions with crises are preceded by an increase in the cross-sectional average of firms' stock prices, while recessions with no crises do not.

To reach their second key result, regarding global spillovers, they use a principal component analysis to estimate common information factors across a number of advanced countries with a long history of stock prices data. These factors turn significant not only in the countries used in the estimation, but also in other advanced and emerging countries in their dataset. They interpret this result as evidence of global spillovers. If this interpretation is correct, a boom in the production of information should trigger strong reallocation of resources across economies. This is exactly what they find in their third key result: an increase in information production is associated with a higher level of domestic imbalances and a lower level of foreign imbalances. This implies that more information is related to a higher level of domestic assets funded with foreign liabilities.

In the second paper, "*The Effects of U.S. Monetary Policy on Emerging Market Economies' Sovereign and Corporate Bond Markets,*" John Burger, Francis Warnock, and Veronica Cacdac Warnock use data on the denomination of emerging economies' sovereign and corporate bond markets in an attempt to understand what drives U.S. investors' portfolios in those markets. For this purpose, they use a panel dataset covering a large number of countries from 2007 to 2015.

They find that the structure of emerging bond markets has changed in the sample period: The share of bonds denominated in local currency has increased and, after controlling for local variables, there has been a trend toward a larger local currency sovereign bond market and a larger foreign currency corporate bond market. In turn, countries that are more stable, with stronger regulatory quality/creditor rights, and more positive current account balances have more developed local currency bond markets, both sovereign and corporate.

In "*Commodity Connectedness,*" Francis Diebold and Laura Liu focus on spillovers through commodity markets. This is a very important channel of international spillovers for Chile, as well as other mineral commodity exporters.

For their analysis, they use variance decompositions of high-dimensional vector autoregressions to characterize 'connectedness' among the return volatility of 19 commodities underlying the Bloomberg Commodity Price Index, using daily data between 2011 and 2016. Connectedness is defined as a statistic that incorporates dynamic cross-variable interactions across commodity markets as well innovations correlations, which is estimated by using machine-learning techniques.

The main results that emerge from their work are the clustering behavior of commodity returns into groups that match traditional industry classifications, and the relevance of particular sectors in the transmission of shocks to other sectors. Notably, the energy sector is most important in terms of sending shocks to others; and energy, industrial metals, and precious metals are highly connected among themselves.

A different aspect of the broad focus of this section is covered in "*Managing Sudden Stops,*" by Barry Eichengreen and Poonam Gupta. These authors empirically analyze the incidence of sudden stops in capital flows to emerging economies in a sample including data for many developed and developing countries from 1991 to 2014. They show that the frequency of sudden stops has remained surprisingly unchanged despite all the advancements in the design and implementation of policies to prevent them and to deal with them once they occur. Stronger macroeconomic and financial frameworks have allowed policy makers to respond more flexibly, but these more flexible responses have neither guaranteed insulation from nor mitigated the impact of sudden stops. However, the authors also found that the factors behind sudden stops have changed. Sudden stops now tend to affect different parts of the world simultaneously rather than bunching regionally, especially since 2002. Global factors, particularly global risk aversion as captured by the VIX, appear to have become more important.

In terms of the effects of sudden stops, the financial effects show up first: the exchange rate depreciates, reserves decline, and equity prices fall. GDP growth then decelerates, investment slows, and the current account strengthens. The growth of GDP falls by roughly 4 percent year on year in the first four quarters of a sudden stop. The decline in GDP is somewhat larger in the second subperiod, reflecting a larger global shock (larger increase in the VIX, in particular), something whose effects were offset only partially by stronger macroeconomic positions.

Section 2: Spillovers – Mechanisms and Policy Implications

This section includes three papers that study the transmission mechanisms of global spillovers and the policy responses by using quantitative dynamic stochastic general equilibrium models of small open economies.

In "*Monetary Policy Responses to External Spillovers in Emerging Market Economies,*" Michael B. Devereux and Changhua Yu explore the degree to which emerging market economies can utilize monetary and exchange rate policies to respond to external and internal macroeconomic shocks when the country is prone to endogenous financial crises. The model exhibits nominal price rigidity and collateral constraints depending on asset prices, and considers shocks either to the world interest rates or to leverage limits, both of which may lead the economy to a crisis.

The authors compare three alternative monetary policy regimes: inflation targeting with flexible exchange rates, optimal discretionary policy with flexible exchange rates, and an exchange rate peg. The three variations of the model match quite well emerging markets' stylized facts abstracting from financial crises. But during crises, the exchange rate peg puts severe constraints on the capacity of the country to take debt abroad. By contrast, there is little difference between the two policy regimes with flexible exchange rates: the economy performs much better to smooth the effects of an external shock. Consequently, these results indicate that there should be no macro-prudential role for monetary policy, in the sense that it should not respond to expectations of future crises but react only upon the occurrence of a crisis. When the authors extend their model to include nominal wage rigidity, results are similar, with the only exception that inflation targeting performs worse than the discretionary optimal policy, but still performs much better than a fixed exchange rate policy.

"*Macro-prudential Policy: Promise and Challenges,*" by Enrique G. Mendoza, takes a different perspective by focusing on macro-prudential policy analysis rather than on the use of monetary policy as a macroprudential tool. The quantitative approach also differs markedly, because it emphasizes the use of global, nonlinear solution methods that capture financial crisis dynamics accurately, as well as the self-insurance incentives on which macro-prudential policies operate. Importantly, the framework studied in this paper exhibits Fisherian collateral constraints such that agents are subject to borrowing limits that depend on the market value of assets or goods posted as collateral. This introduces a pecuniary externality, because private agents do not internalize the effect of their borrowing decisions made in "good times" on the collapse of collateral values in "bad times." In this way, financial amplification of domestic shocks or global spillovers provide a sound theoretical foundation for a macro-prudential policy.

The quantitative results show that macro-prudential policy is a powerful tool for preventing financial crises, in the sense that a constraint-efficient financial regulator can reduce significantly the severity and frequency of such crises. However, macro-prudential policy is not free of implementation challenges. First, its sophistication makes it difficult to implement, as an optimally-designed macro-prudential policy rule involves non-linear responses to a wide variety of domestic factors as well as regime shifts in global liquidity, news about global fundamentals, financial innovation and regulatory changes in world capital markets. Second, the optimal policy design suffers of time-inconsistency: policies promised before crises to be implemented during crises that are optimal before crisis may not be optimal at the time of a crisis. In turn, expectations about policies to be implemented during crises are crucial for the design and success of macro-prudential policies. In particular, when a crisis hits, regulators pledge to lower consumption in the future so as to prop up the value of collateral, but when that future arrives, delivering on this pledge is not optimal for the regulator. Third, a successful macro-prudential policy relies on the delicate interaction of authorities with different scope, such as monetary policy, fiscal policy, and the financial regulator. This last point is illustrated with a quantitative analysis of a calibrated New Keynesian model augmented with the Bernanke-Gertler financial accelerator. This analysis shows that monetary and financial policies are much more effective when implemented *via* separate policy rules, but that coordination of the monetary and financial authorities is also necessary in order to prevent costly strategic interaction in the conduct of both policies.

The last, but by no means the least, of the papers covered in this section is "*Monetary Policy Transmission in Emerging Markets: An Application to Chile,*" by Pierre-Olivier Gourinchas. This paper discusses the role of financial spillovers in the transmission of U.S. and domestic monetary policy to emerging market economies, with special emphasis on the Chilean economy. The model is an extension of the Mundell-Fleming model of a small open economy with financial spillovers, which is estimated with Chilean data between 1999 and 2015 by using Bayesian methods.

There are three distinct channels by which the tightening of monetary policy in the U.S. generates international spillovers: The response of aggregate demand in the U.S. generates a contraction of exports in an small open economy, the local currency depreciates if allowed to float, which invigorates local aggregate demand, and

affects the value of collateral in the small open economy, thus tightening de balance sheets of local financial intermediaries and a contraction of credit which impact negatively in local economic activity. The overall effect of these spillovers is, in principle, not clear; quantitatively, however, it turns out to be that a tightening in U.S. monetary policy is contractionary for the Chilean economy. But this finding does not overturn the basic conclusion of the Mundell-Fleming analysis: the transmission of domestic monetary policy is not perverse, and therefore flexible exchange rates remain the primary line of defense against foreign monetary policy and global financial cycles alike.