

# Financial Frictions Conference

## Reviews Paths to Monetary Policy Objectives

By J. Scott Davis



**The recent financial crisis has precipitated much new research on financial frictions' effects.**



The Globalization and Monetary Policy Institute hosted “Financial Frictions and Monetary Policy in an Open Economy,” March 16–17, in

Dallas. The conference brought together theoretical and empirical researchers to examine how financial frictions—often using models in which company balance sheets appear prominently—affect monetary policy in an open economy.

Michael Devereux of the University of British Columbia and Mark Wynne and Scott Davis of the Federal Reserve Bank of Dallas organized the meeting. Presenters came from the European Central Bank (ECB), the Swiss National Bank, the Federal Reserve Bank of New York and the Dallas Fed as well as from the University of British Columbia, New York University, the University of Houston and the University of Southern California. Paper discussants were also drawn from a wide range of institutions, including the University of Montréal, Georgetown University, the Bank of Canada, Vanderbilt University, the World Bank and the Capital Group, an investment management firm.

The recent financial crisis has precipitated much new research on financial frictions' effects. However, it has been mostly limited to a closed economy framework. While few have studied financial frictions in an open economy setting, even fewer have specifically examined the impact of those frictions on the conduct of monetary policy.

While all papers focused on the conference theme, each employed different methodologies. Some papers were empirical, while others were based on large-scale dynamic stochastic general equilibrium (DSGE) models. In some papers, the equilibrium was the solution to a portfolio choice problem; in some it was the solution to a game theory problem. When discussing optimal monetary policy, some papers considered the optimal interest rate rule; others contemplated the optimal

size and frequency of bailouts.

### Monetary Transmission

Conference co-organizer Devereux began the conference with his paper “Nominal Stability and Financial Globalization” (coauthored with Alan Sutherland and Ozge Senay of the University of St. Andrews). A remarkable increase in international financial integration has occurred over the past 20 to 30 years, the paper notes. At the same time, a number of countries have adopted monetary policies focused on domestic inflation and have achieved a remarkable degree of price stability.

Many authors have argued that global financial integration has helped produce inflation stability. With such financial integration, domestic factors determine less of a country's income or wealth. A central bank has less ability to use expansionary monetary policy to boost national income, even in the short run, and likely will be less tempted to attempt policies that foster long-run inflation instability.

Does the line of causation run in the opposite direction, Devereux asked. He contended that greater monetary and price level stability in a country attracts investment. Investors are reluctant to invest in the real or financial assets of a foreign country with a highly variable inflation rate. Devereux's paper sought the analytical solution to a portfolio choice problem: A household in one country chooses optimal portions of its asset portfolio for investment in home assets and in foreign assets. Devereux and coauthors showed that the parameters of the central bank's policy function appear in the analytical solution to this portfolio choice problem. As the weight of foreign central bank efforts toward inflation stabilization increase, the domestic household devotes a greater share of its portfolio to foreign assets. In preliminary empirical evidence, Devereux showed that bilateral country

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pairs with more inflation stability exhibit greater bilateral financial integration.

The second paper in the conference, presented by Luca Dedola of the ECB (coauthored with Giovanni Lombardo and Peter Karadi, also of the ECB), also examined cross-border financial integration and looked explicitly at central bank policies in two open economies. The authors sought to learn if there is any gain from international central bank cooperation.

In their model, financial intermediaries hold both home and foreign assets and liabilities. Because of cross-border financial integration, a shock in one country affects balance sheets of financial intermediaries in the other country. Thus, in a model with financial frictions, where the balance sheets of financial intermediaries can have a major macroeconomic effect, cross-border financial integration can serve as a mechanism for international business cycle propagation.

The researchers then use the model to seek a solution under two different assumptions about international central bank cooperation. With the first assumption, central banks in the two countries cooperate and, thus, each takes into account the effect of its actions on the foreign economy and foreign welfare. Under the second assumption, each central bank maximizes welfare in its own country, taking as given the actions of the other central bank. Dedola shows that since the degree of international propagation is high when the balance sheets of financially constrained intermediaries are closely intertwined, there is a large benefit from international central bank cooperation. In the model, when the two central banks cooperate, they will fully offset any financial shocks. However, they find that the noncooperative equilibrium leads to a suboptimal degree of central bank intervention because of large spillovers following a financial shock.

The third paper in the conference, presented

by Simone Meier of the Swiss National Bank, also examined the implications of cross-border financial integration, studying its effect on the monetary transmission mechanism. Some policymakers have raised the concern that in a world of highly integrated financial markets, central banks lose the ability to control the domestic real interest rate, and thus, monetary policy would have less impact on domestic output and prices.

To investigate this issue, Meier extends the standard international New Keynesian DSGE model to incorporate a richer asset-trading framework where households own both domestic and foreign assets, with the share of each determined through solution of a portfolio choice problem.

Meier found evidence that the classic interest-rate channel of monetary policy transmission is reduced with greater international financial integration. Investment is a function of the long-term interest rate, and the central bank controls the short-term rate. Greater financial integration means that global factors rather than shocks to the domestic short-term interest rate influence the long-term interest rate and, thus, aggregate investment.

But while international financial integration should reduce the effectiveness of the interest rate channel of monetary policy transmission, it should increase effectiveness of both the exchange-rate and wealth channels. Since the nominal exchange rate is heavily influenced by the short-term rate, even in a financially integrated world, the central bank through monetary policy has control over the nominal exchange rate. The channel of monetary transmission is enhanced in a highly integrated world economy when, through an expansionary monetary policy, the central bank causes an exchange-rate depreciation and the home country's exports become cheaper in the rest of the world. In addition, when households hold a portfolio of foreign assets, this exchange-rate depreciation in-



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creases the real value of their foreign asset portfolio, making households feel wealthier and stimulating consumption spending through the wealth effect.

Through simulated impulse responses, Meier found that the diminished role of the interest-rate effect and the enhanced role of the exchange-rate and wealth effects approximately cancel each other out. Thus, increased international financial integration will reduce the effectiveness of monetary policy through the classic interest-rate channel but should not reduce the overall effectiveness of monetary policy.

### **Optimal Monetary Policy**

The conference's second session dealt with optimal monetary policy. The first paper, presented by Davis of the Dallas Fed (coauthored with Kevin Huang of Vanderbilt University), asks whether the central bank should include financial market variables, such as the interbank lending spread, in its optimal simple monetary policy rule (involving application of the Taylor rule for suggested policy rates, for example). The paper looks at this issue in an open economy setting; the question becomes, does the central bank want to include both home and foreign financial market variables in its policy rule?

The answer depends on the source of the financial market imperfection. Specifically, in a model where incomplete information between borrowers and lenders gives rise to interbank lending spreads that depend on variables such as bank debt-to-asset and loan-loss ratios, the authors distinguish between endogenous and exogenous changes in the interbank lending spread. Endogenous changes occur because a real shock, such as a negative productivity shock, adversely affects bank balance sheets, leading to an increased interbank lending spread. The authors call this an endogenous shock because the shock arises in the real sector and affects the financial sector through the endogenous response of real variables. This contrasts with exogenous changes in the interbank lending rate, which arise because of exogenous shocks within the financial markets. These shocks can be interpreted as a sudden increase in financial market uncertainty leading to interbank lending rate spikes.

The authors find that it is optimal for the central bank to respond to exogenous fluctuations in the interbank lending spread but to ignore

endogenous movements. The intuition behind this is simple: Endogenous fluctuations in the spread arise because of some shock in the nonfinancial sector that affects the interbank rate through bank balance sheets and loan-loss ratios. If the central bank is already including nonfinancial variables such as the output gap and the inflation rate in its policy rule, then the endogenous fluctuation in the interbank rate contains no new information. When the central bank is already putting the optimal weight on the information contained in the output gap and the inflation rate, putting any weight on a new variable that contains no new information would be suboptimal.

Exogenous fluctuations in the interbank spread arise because of shocks from within the financial sector and contain new information—even when the weights on these nonfinancial variables (for example, output gap and the inflation rate data) have been chosen optimally. Thus, the question of central bank response to financial market conditions is not as simple as it initially appears. If fluctuations in the interbank lending spread arise because of nonfinancial shocks, the central bank should ignore them. If they arise because of financial sector shocks, the central bank should cut the risk-free rate in response to a widening spread.

The second, optimal policy paper was presented by Lombardo of the ECB (coauthored with Marcin Kolasa of the National Bank of Poland and Warsaw School of Economics). The paper, closely related to the first paper in this session, looked at the performance of monetary policy rules in an open economy with financial frictions.

The authors focused on specific trade-offs involved with setting optimal monetary policy and how the presence of financial frictions affects them. The authors compare simple rules (such as Producer Price Index, or PPI, targeting or exchange-rate targeting) to optimal monetary policy. In a model without financial frictions, strict PPI targeting yields nearly the same outcome as Ramsey optimal policy. However, they show that in a model with financial frictions, a trade-off arises between price level stability and financial stability following a productivity shock. Strict PPI targeting would maximize price level stability, but also would exacerbate financial market instability. Thus, a nearly optimal policy when there is no trade-off

between price level stability and financial stability is far from optimal when such trade-off needs to be taken into account.

The authors also examined issues such as the currency denomination of debt and how it might create a trade-off involving price level stability, exchange-rate stability and financial stability. When assets are denominated in one currency and liabilities another, currency fluctuations can significantly affect balance sheets and financial stability, which many eastern European countries discovered during the recent crisis. When liabilities are denominated in a foreign currency, exchange-rate depreciation leads to an increased real value of those liabilities and deteriorating balance sheets. Without financial frictions, this doesn't matter, but in a model with them, deteriorating balance sheets will lead to financial instability and widening credit spreads. In this case, the central bank has an added incentive to target the nominal exchange rate.

Javier Bianchi of the University of Wisconsin and New York University presented the third paper of the session, "Efficient Bailouts?" It asks whether government policy to transfer money to credit-constrained parties can be optimal during times of financial stress, even when taking into account the moral hazard argument that bailouts during a crisis lead to excessive risk taking during normal times.

Bianchi starts with a simple and intuitive way of examining the costs and benefits of such intervention. A bailout—a government policy of transferring funds from non-credit-constrained parties to credit-constrained parties—reduces the severity of a financial crisis. At the same time, bailouts only lead to the expectation of such help in the future. The expectation of bailouts reduces the riskiness of assuming debt; thus, a legacy of bailouts leads to excessive borrower risk taking.

Given that there are costs and benefits to bailouts, there is an optimal size where maximization of benefits minus costs occurs. The point where that occurs depends on whether the government imposes a tax on debt, Bianchi argues. Such a tax will reduce the incentive to hold debt. Thus, if a policy of bailouts during financial crises leads to a moral hazard where credit-constrained parties take on more debt, the tax on debt will temper the incentive to take riskier positions. Quantitatively, Bianchi finds that when a tax on debt limits this incentive,

a government policy of bailouts during crises is optimal. Specifically in his model, Bianchi finds that a government bailout equal to about 2 percent of gross domestic product is optimal. However, Bianchi finds that when the bailout policy is not paired with a moral-hazard-inhibiting tax on debt, a government bailout policy is not optimal. The tendency of a policy of bailouts to lead to excessive risk taking—absent a debt tax—is too strong, and periodic instances of financial instability without bailouts are preferable to the moral hazard of regularly bailing out credit-constrained firms.

### Banking and International Business Cycle Transmission

The first paper of the third session was presented by Bent Sorensen of the University of Houston (coauthored with Sebnem Kalemli-Ozcan of Hec University and Harvard University and Sevcn Yesiltas of Johns Hopkins University). The authors present a new set of stylized facts about banking and leverage during the 2000–09 period using internationally comparable firm and bank microdata.

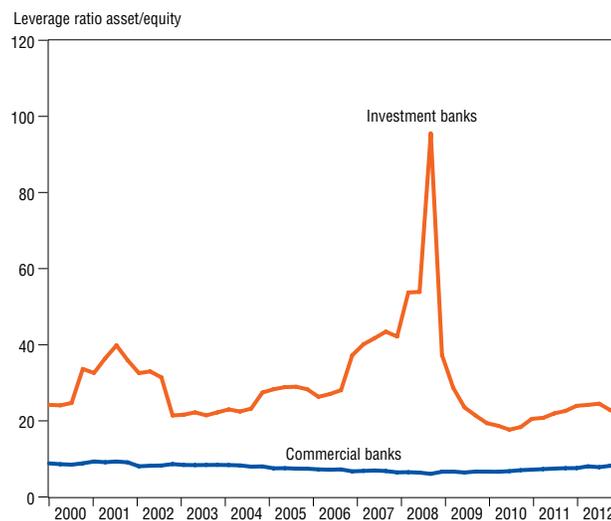
Sorensen documents how in the years prior to the crisis, investment banks in many countries significantly increased their leverage. However, at the

same time, leverage ratios for commercial banks or nonfinancial firms didn't notably rise (*Chart 1*). Moreover, Sorensen reported, investment banks' leverage ratio is strongly procyclical. This is also true for the commercial banking sector, though it's driven by procyclical leverage in a few big commercial banks. The median commercial bank did not have a procyclical leverage ratio in the years leading to the crisis, he found.

Given that he is compiling a set of stylized facts from an internationally comparable set of bank- and firm-level microdata, Sorensen could compare the behavior of leverage in different countries with different regulator regimes. Banks in emerging markets with tighter bank regulation did not experience the same buildup of leverage in the years prior to the crisis, he found. Thus, differences in the regulatory regime across countries were important for determining international differences in the debt buildup and procyclicality of leverage in the past decade.

In the second paper in this session, Linda Goldberg from the New York Fed (with Nicola Cetorelli, also of the New York Fed) examined how liquidity management among multinational banks led to the international transmission of the recent

Chart 1  
**Leverage Diverges at Investment, Commercial Banks at Crisis Onset**



SOURCE: Federal Reserve Flow of Funds.

financial crisis (*Chart 2*). Goldberg starts with the simple observation that global intrabank financial flows are as large as global interbank flows. When a large multinational bank experiences funding problems at one of its affiliates, funds are transferred from within. Thus, liquidity is affected at the large multinational bank's other affiliates, leaving reduced funding for their own customers.

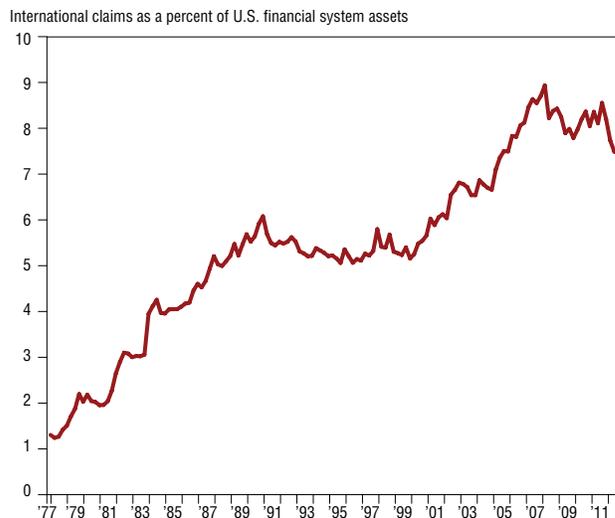
Goldberg looks at large multinational banks with U.S. affiliates. The hypothesis: During the financial crisis, parent banks pulled funds from affiliates in countries unaffected by the crisis. This led to a liquidity shortage in affiliates that the crisis hadn't originally touched, thus leading to rapid international transmission during the crisis. Specifically, Goldberg found that for every \$1 that a foreign parent bank pulled out of a U.S. affiliate, the affiliate reduced lending by 40 cents.

The conference's final paper was presented by Vincenzo Quadrini of the University of Southern California (coauthored with Fabrizio Perri of the University of Minnesota and the Federal Reserve Bank of Minneapolis). Quadrini also studied rapid international transmission during the recent financial crisis. He examined various explanations, such as a large global adverse shock or propagation through usual trade and financial channels. None of

them, he concluded, offers a satisfactory explanation for the spread of the crisis. Quadrini instead started with the premise that both credit expansions and contractions result from self-fulfilling expectations. Because of these self-fulfilling expectations, credit expansions or contractions are each stable equilibria. If investors start to worry about the creditworthiness of a borrower, they restrict credit, which ultimately leads to bankruptcy. In this way, the economy switches between these two equilibria following a change in investor sentiment.

In a model, Quadrini showed how this process of switching between two equilibria can lead to the rapid international transmission of a crisis. In the model, two countries are linked by integrated financial markets. If investor mood shifts from optimism to pessimism in one country, borrowers there will face a liquidity shortage. They will pull funds from the other country (similar to the way funds are channeled between affiliate banks in Goldberg's paper). This will lead to a drain of liquidity from the second country, and investors there will turn pessimistic and a credit crunch will become self-fulfilling. Given this possibility for multiple equilibria, an exogenous change in investor mood in one country will endogenously lead to a change in investor mood in the other country, and the extent and speed of international transmission of a crisis are far greater than would have been achieved through financial channels alone, Quadrini showed.

Chart 2  
**Foreign Interest in U.S. Financial System Assets Rises Amid Globalization**



SOURCES: Bank for International Settlements Locational Banking Statistics, Federal Reserve Flow of Funds

## Conclusion

The recent financial crisis raised many interesting issues related to the role and conduct of monetary policy in an open economy under financial frictions.

A crisis, which began as a housing bubble and subprime crisis in the United States and a handful of other countries, quickly spread worldwide, raising questions about how international financial linkages create a truly global recession. About half the papers in this conference were specifically related to the issue of international financial integration and propagation through integrated financial markets. The role of liquidity, and specifically that of banks in the international propagation of the recent crisis, is not well understood. Goldberg's paper on global banks and the international spread of the crisis helped shed light on this transmission

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mechanism by empirically showing that liquidity transfers between affiliates of large global parent banks were in part responsible for propagation of the recent crisis.

Liquidity, and its larger macroeconomic effect, is a very difficult issue to think about theoretically. Quadri's paper on international recessions showed that, theoretically, this issue of liquidity can lead to self-fulfilling equilibria, where investors may switch between self-fulfilling moods of optimism and pessimism. In a financially integrated global economy, these self-fulfilling changes in investor mood have global implications. Work in this area still leaves unanswered questions, but it definitely offers an interesting avenue for further research where this abstract notion of a liquidity crisis can potentially explain the rapid international transmission of what began as a U.S. subprime lending crisis.

The beginning of the financial crisis in August 2007 led to an unprecedented series of actions by central banks and policymakers around the world. Since the only historical precedent for a financial crisis of this scale was the Great Depression, policymakers did not have a large menu of tested options from which to choose. Many important responses to the crisis were decided over the weekend and were not tested using formal macroeconomic tools. About half the papers in this conference addressed the issue of optimal monetary policy in a financial crisis. The papers presented by Davis and Lombardo specifically looked at the issue of how the central bank should alter its usual interest-rate rule in the presence of financial frictions. Lombardo showed how incorporating financial frictions into a model opens up a new set of policy trade-offs

affecting optimal monetary policy—such as the trade-off between price level stability and financial stability, or the link between exchange-rate stability and financial stability.

The financial crisis also saw an unprecedented degree of international central bank cooperation. As discussed during the conference, past work on central bank cooperation that did not include financial frictions or international financial linkages only found a modest benefit to central bank cooperation. Policy spillovers were not great, so cooperation had only a marginal effect. As shown in the Dedola paper, this finding is reversed when one considers the role of financial frictions and international financial linkages. Here, the international spillovers from monetary policy are so large as to lead to significant benefits from central bank cooperation. And thus, the papers in this conference discussed not only the conduct of optimal monetary policy when a central bank needs to take financial frictions into account, but also the high degree of international transmission and extent of policy spillovers. In a world of increasing financial globalization, future optimal monetary policy will involve not just one central bank reacting to domestic financial matters, but cooperation among policymakers globally.

