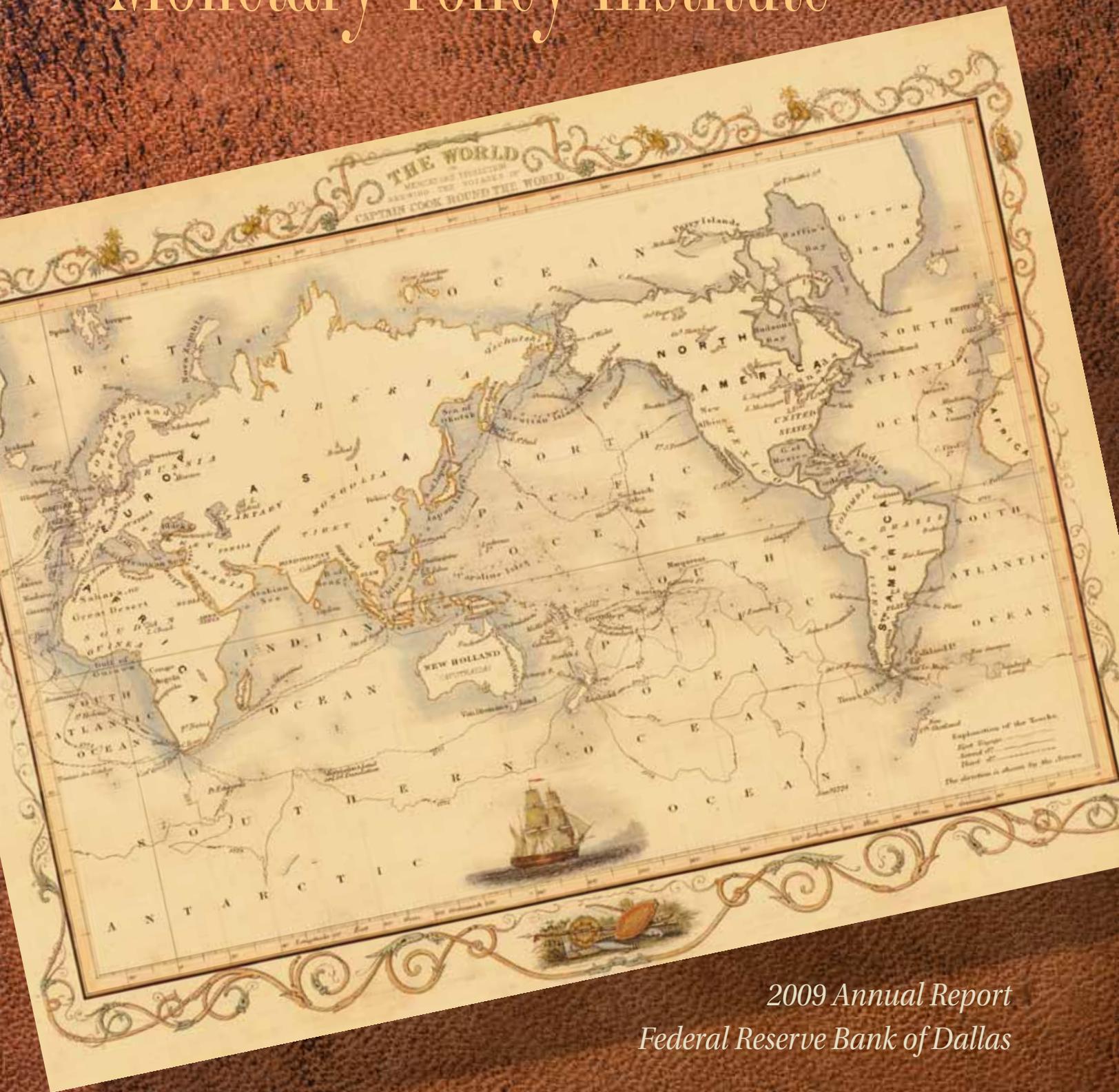


Globalization and Monetary Policy Institute



2009 Annual Report
Federal Reserve Bank of Dallas



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Published by the Federal Reserve Bank of Dallas, March 2010.

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Letter from the President



As this publication goes to print, we are slowly closing the books on one of the most tumultuous economic periods since the Great Depression.

An infection in the American housing sector spread like an epidemic through financial markets to countries around the world. In a matter of months, economic growth in developing and developed countries alike shifted abruptly into reverse. International trade collapsed. Manufacturing activity plummeted. Employment growth hit a wall before beginning a painful decline. No nation was spared the contagion's effects as the global economy was dragged forcefully to the edge of a precipice.

A global crisis of historic magnitude necessitated a commensurate global response. Monetary policy makers around the world quickly began to work together—announcing coordinated policy movements and establishing swap lines for foreign exchange.

The events of this crisis underscore an important fact: We live in a truly interconnected world. What happens beyond our borders can have a significant impact on our domestic economy and, as a result, on U.S. monetary policy.

It was that fact that motivated my decision in 2005 to make the study of globalization and its implications for the conduct of monetary policy the Dallas Fed's signature research issue. That directive

culminated in the fall of 2007 with the formation of our Globalization and Monetary Policy Institute.

Under its auspices, top minds from around the globe have come together to explore the linkages between an increasingly interconnected global economy and monetary policy. In the two years since the institute's establishment, its research team—under the advisement of professional and academic experts, including two central bank governors and one Nobel laureate—has garnered considerable attention. Staff members have presented their findings at conferences across the country and published their research in some of the profession's leading journals.

These individuals have also contributed significantly to the Federal Reserve's understanding of our most recent crisis. For instance, in his essay entitled "The Financial Crisis, Trade Finance and the Collapse of World Trade," Director Mark Wynne cuts through headlines lamenting the end of globalization to identify potential factors behind the recent collapse in world trade. Wynne argues that the trade declines of the Great Recession were likely a result of deteriorating global economic activity and a drying up of trade finance. His analysis provides evidence that protectionist policies—while always dangerous enough to warrant a watchful eye—are not yet on a significant rise.

Members of institute staff were called upon by

the Federal Open Market Committee—the Federal Reserve's principal policymaking group—to present their work on inflation dynamics. These individuals provided analytical support for the notion that price pressures at home can be affected by economic slack abroad. While empirical evidence remains fragile, one thing is clear: The Fed must remain abreast of international developments if it is to deliver on its mandate for price stability.

In the 2009 Annual Report of the Dallas Fed's Globalization and Monetary Policy Institute, readers will learn more about these research efforts and activities over the past year. Members of this elite team are at the leading edge of economic research and continue to build on the institute's reputation for excellence in the study of globalization and its impact on monetary policy. While they have not yet found all the answers, I am confident that they continue to ask the right questions. My colleagues and I are most grateful for their efforts and look forward to the insights we will derive from their important work.



Richard W. Fisher
President and CEO
Federal Reserve Bank of Dallas

The Fed must remain abreast of international developments if it is to deliver on its mandate for price stability.

The Financial Crisis, Trade Finance and the Collapse of World Trade

As economic activity in many parts of the world started to recover in the latter half of 2009, trade volumes picked up.

The financial crisis that began in August 2007 and intensified in the fall of 2008 pushed the global economy into its most severe recession since World War II. As 2009 drew to a close, there were signs that economic activity in many countries was rebounding, but the fragile state of many countries' financial systems and concerns about how governments and central banks will manage the exit strategies from the extraordinary measures taken to mitigate the worst effects of the crisis leave many open questions about the ultimate course of the recovery. World trade collapsed in 2008–09 at a pace not seen since the Great Depression, raising concerns that the financial crisis would lead to deglobalization—a reversal of the globalization that has characterized the past three decades. As global economic activity has rebounded, trade flows have picked up as well, allaying some of these fears. But the scale and the speed of the collapse of global trade warrants investigation and poses a challenge for some standard models of international economics.

In this essay I will discuss the impact that the crisis had on world trade. I will then review two explanations for the severity of the collapse. One line of argument holds that given the normal behavior of trade flows over the course of the business cycle and given the severity of this most recent cyclical downturn, a major contraction of world trade should have been expected. A second line of argument, which is not incompatible with the first,

holds that the financial crisis had an independent effect on trade flows, over and above the effect it had on global economic activity, by limiting or severing access to trade finance. We will see that the decline in trade was excessive, even given the severity of the recession. And there is evidence that reduced access to trade finance is an important part of the overall explanation.

What Has Happened to Global Trade?

Despite the recent increase in the importance of international trade in services—long considered the quintessential nontradable—the bulk of international trade still consists of trade in goods and commodities. Each month the CPB Netherlands Bureau for Economic Policy Analysis produces a report on global trade in goods, along with a breakdown for the major groupings. Chart 1 shows the time series of global exports of goods since January 1991, when the series began. Following steady growth over most of the past decade, global exports peaked in the first half of 2008 (specifically, in April 2008) and then posted a precipitous 20 percent decline through the early months of 2009. (The trough month was January 2009, but exports hovered at close to their January level through May 2009.)¹ As economic activity in many parts of the world started to recover in the latter half of 2009, trade volumes picked up, and at the time of writing, the volume of trade had increased 15.5 percent from May through December 2009.

What was extraordinary about this trade collapse was its scale and breadth. The 20 percent decline from peak to trough in the series in Chart 1 is the biggest in the history of that specific measure. Global trade declined during the 2001 recession, but only by 7 percent. Other measures of global trade with a longer time series show that the decline was the largest since World War II, indeed the largest since the Great Depression.²

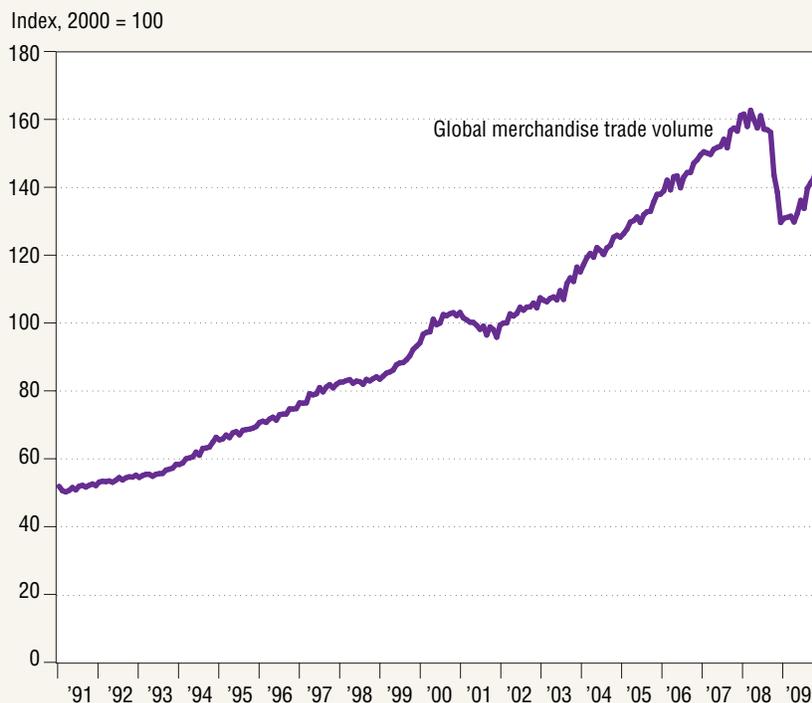
Furthermore, the trade collapse was widespread. As Table 1 shows, the collapse was not confined to the advanced economies that were at the epicenter of the financial crisis, but encompassed the emerging economies as well. Exports of the advanced economies—defined here as the Organization for Economic Cooperation and Development (OECD) excluding Turkey, South Korea and Mexico—peaked in April 2008 and then declined 23.3 percent through January 2009.

Japan's exports peaked earlier and saw by far the largest decline, while U.S. exports peaked a bit later. Exports of the emerging economies also peaked in April 2008, with central and eastern Europe and Latin America peaking in January 2008, whereas Asian exports did not peak until July. By early 2009, exports had turned around in most regions of the world, with Latin America being the last to experience recovery. Just as Japan experienced the most severe downturn, so too has it experienced the sharpest rebound. But the advanced economies as a whole seem to be lagging, held back in particular by the weak recovery of euro-area exports.

Why Did Trade Collapse?

Many explanations have been proposed for the scale of the collapse in trade. One immediate concern was that countries were raising tariff and nontariff barriers to trade flows to protect domes-

Chart 1
Global Trade Posts Historic Drop



SOURCE: CPB Netherlands Bureau for Economic Policy Analysis *World Trade Database*.

Table 1
Financial Crisis Takes Widespread Toll on World Exports

| | Peak month | Trough month | Peak to trough (percent change) | Trough to December 2009 (percent change) |
|----------------------------|--------------|---------------|------------------------------------|---|
| Advanced economies | April 2008 | January 2009 | -23.3 | 12.6 |
| U.S. | July 2008 | April 2009 | -24.7 | 20.2 |
| Euro area | April 2008 | February 2009 | -23.1 | 8.4 |
| Japan | January 2008 | March 2009 | -41.4 | 40.3 |
| Emerging economies | April 2008 | January 2009 | -21.5 | 22.0 |
| Asia | July 2008 | January 2009 | -24.7 | 29.5 |
| Latin America | January 2008 | August 2009 | -21.1 | 20.9 |
| Central and eastern Europe | January 2008 | May 2009 | -30.8 | 12.9 |
| Africa and Middle East | April 2008 | April 2009 | -12.8 | 8.5 |

SOURCE: CPB Netherlands Bureau for Economic Policy Analysis *World Trade Monitor*, December 2009.

There is very little evidence to date that this protectionist rhetoric translated into more restrictive trade policy.

tic industries from the worst of the downturn. While there was a very real increase in protectionist rhetoric over the course of 2008 and 2009, there is very little evidence to date that this rhetoric translated into more restrictive trade policy. Evenett (2009) is less sanguine on this topic, noting a steady increase in the number of protectionist measures implemented during 2009. He finds that for several advanced economies the share of goods affected by beggar-thy-neighbor policies exceeds precrisis levels. However, given the short history and nature of the data upon which this assessment rests, it is difficult to know how important the effects are at the aggregate level. Importantly, Evenett also notes that "... few governments have introduced anything like across-the-board discrimination against foreign commercial interests; in this respect, the world economy is still far from a 1930s-style protectionist outcome."

Policymakers seem to have absorbed the lesson of the Great Depression, when protectionist trade policy exacerbated the downturn.³ Meeting in London in April 2009, the leaders of the Group of Twenty publicly declared that they would "... not repeat the historic mistakes of protectionism of previous eras." In the most recent report from the OECD, the U.N. Conference on Trade and

Development and the World Trade Organization on trade and investment policy responses to the downturn in the G-20, it was noted that the responses so far have been "relatively muted" (OECD, UNCTAD, WTO 2010). In the period October 2008 to October 2009, new import-restricting measures introduced by the members of the G-20 covered about 1.3 percent of G-20 imports (0.8 percent of global imports). In the more recent period from September 2009 through February 2010, new import-restricting measures covered 0.7 percent of G-20 imports. The report also noted that no major measures had been identified as reducing market access among the G-20 members in the service sector, although it did draw attention to the potentially distortionary effects of government support for the transportation and financial sectors in a number of countries.

To get a sense of what constitutes the normal behavior of trade over the course of the business cycle, it is useful to look at the time series behavior of trade and economic activity in tandem. Chart 2 plots the growth rate of global real gross domestic product (GDP) and the growth rate of global exports of goods and services over the past 25 years. Two points are worthy of note. First, global exports tend to move in tandem with global GDP: The cor-

relation between the growth rates of the two series over the sample period is 0.84. That is, exports are procyclical: They tend to boom when real economic activity is booming and to slump when real economic activity is slumping. Second, global exports are a lot more volatile than global GDP.

The standard deviation of the growth rate of global GDP from 1986 to 2009 was 1.3 percent, while the standard deviation of the growth rate of global exports over the same period was 4.6 percent.

We see the same pattern at the level of individual countries. Engel and Wang (2007) report a series of statistics on trade patterns in the OECD countries and show that the median (across countries) correlation between the cyclical components of imports and GDP is 0.61, while the median correlation between the cyclical components of exports and GDP is 0.45. Likewise, they show that imports are about three times more volatile than GDP in

the OECD countries, while exports are 2.7 times more volatile than GDP.⁴

Why is that? Part of the reason appears to be that despite recent innovations the composition of international trade is still heavily skewed toward goods rather than services. Approximately 80 percent of all global trade consists of trade in goods, and this share has remained remarkably stable over time. By contrast, the share of goods in global GDP has declined by about 10 percentage points over the past four decades, from about a half in 1970 to slightly more than one-third in recent years. Close to 70 percent of U.S. exports by value are exports of goods, while goods make up about 84 percent of U.S. imports (by value). By comparison, goods production accounts for only about one-fifth of overall production in the United States (measured as a share of value added).⁵ Furthermore, the goods traded across international

The world economy is still far from a 1930s-style protectionist outcome.

Chart 2
International Trade Moves with the Business Cycle



SOURCE: International Monetary Fund *World Economic Outlook*, January 2010 Update.

Some of the decline in trade was a natural cyclical phenomenon.

borders tend to be durable rather than nondurable. Table 4 of Engel and Wang (2007) reports the share of durable goods in the imports and exports of the OECD countries and shows that the median share in recent decades has been around 60 percent.

So, international trade flows tend to move with the business cycle; indeed, they tend to increase by more in good times and decline by more in bad times than the rest of the economy. It should not then come as a great surprise that international trade flows have dried up in the midst of the most severe global recession since World War II. Far from telling us about incipient deglobalization, as some feared at the time, some of the decline in trade was a natural cyclical phenomenon.

The Excess Trade Collapse

It appears that the decline in trade was greater than one might have expected, given what happened over the same period to the usual determinants of trade flows, specifically the relative price of the traded goods and the level of economic activity. For example, following Chinn (2009), Wynne and Kersting (2009) estimate a simple model of U.S. import demand that relates real imports of goods and services into the United States to U.S. real GDP and the real value of the dollar. *A priori* one would expect imports to be positively related to real GDP and negatively related to the real value of the dollar, and a simple model along these lines does a reasonably good job at capturing the quarter-to-quarter changes in the growth of U.S. imports over the past three decades. However, the model predicted a decline in U.S. imports of 3.7 percent in first quarter 2009, but the actual decline (in the vintage of data used in the Wynne and Kersting study) was 11.3 percent.⁶

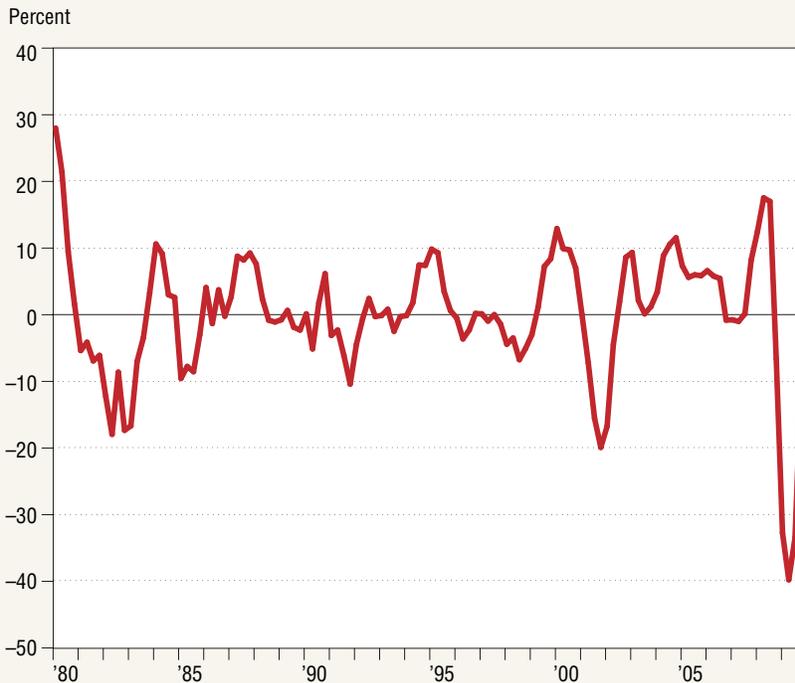
A similar exercise is reported in Levchenko, Lewis and Tesar (2009). However, rather than estimate an import demand equation for the United States, they perform a “wedge accounting” exercise of the sort pioneered by Cole and Ohanian (2002)

in their study of the Great Depression and Chari, Kehoe and McGrattan (2007) in their study of postwar U.S. business cycles.⁷ Levchenko, Lewis and Tesar start with demand relationships that express domestic consumption of foreign output (or imports) as a function of the price of foreign goods relative to domestic goods (with a constant elasticity) and the scale of domestic economic activity (with a constant elasticity of unity). They then calculate for each quarter since 1968 how far actual trade flows are from the levels predicted by these demand relationships. They report that in second quarter 2009, U.S. imports were a lot lower than would have been predicted based on this simple relationship. In Chart 3 I show my own estimates of the trade wedge over the same period. The collapse in 2009 stands out. The trade wedge, the deviation of trade from levels predicted by relative prices and the level of economic activity, was –33 percent in the first quarter of 2009 and –40 percent in the second. This suggests that the financial crisis had a more direct impact on trade flows, over and above the effect it had through the decline in economic activity. Why? One possibility is that stress in the financial system caused financial institutions to cut back on trade finance to exporting firms.

Access to Trade Finance as an Explanation

Before proceeding, we might pause to ask exactly what trade finance is.⁸ The broadest definition of trade finance includes every kind of loan, insurance policy or guarantee that is directly tied to an international sale of a good or service. This definition captures anything from direct trade credit extended by an exporter to an overseas customer to government-backed guarantees issued by a country’s official export credit agency. The other key institutions involved in trade finance are commercial banks, multilateral development banks and private insurers. In addition, various trade finance instruments are used to insure against risks

Chart 3
The Trade Wedge Illustrates 2009 Collapse



SOURCES: Bureau of Economic Analysis; author's calculations.

The form that trade finance takes will typically depend on the degree of trust between the two parties engaged in trade and the degree to which one or both parties is dependent on bank financing.

arising from international transactions, such as commercial risk, transportation risk and political risk. According to some estimates, about 80 to 90 percent of global trade relies on trade finance, and most of this finance is short-term in nature.⁹

The form that trade finance takes will typically depend on the degree of trust between the two parties engaged in trade and the degree to which one or both parties is dependent on bank financing. Transactions that involve only the exporter and importer can be done on a cash-in-advance basis (where the importer pays the exporter before the goods are shipped) or on an open-account basis (where the exporter is paid after the goods are shipped to the importer). The latter arrangement constitutes an extension of trade credit in the usual sense by the exporter to the importer. Cash in advance is used mainly when the importer has particularly high credit risk or is located in a

country with high political risk. Cash in advance is least risky from the perspective of the exporter and most risky from the perspective of the importer. The allocation of risks is reversed when the transaction takes place on open account.

Between these two extremes, banks offer a variety of products to offset the risk of nonpayment or nondelivery. A letter of credit is a commitment by a bank on behalf of the importer that payment will be made as soon as the terms and conditions in the letter are satisfied. With a letter of credit, the exporter need no longer be concerned about the creditworthiness of the importer, but only with the creditworthiness of the issuing bank. However, letters of credit are typically the most expensive form of trade finance. A less expensive option is documentary collection, where the exporter uses a bank as its agent to collect payment from the importer once it presents the shipping documents

While exporters everywhere were confronted with higher trade finance costs, the decline in trade finance availability occurred primarily in the emerging markets.

to the bank. While the bank facilitates payment of the exporter, it does not offer any guarantee, so documentary collection is typically cheaper than a letter of credit. Banks also offer export credit insurance when goods are sold on open account and also finance exports through working capital loans.

What can we say quantitatively about the impact of the financial crisis on the availability of trade finance? Surprisingly little, it turns out. There are no comprehensive measures of the volume of trade finance outstanding or indicators of its cost or availability. Such measures as do exist provide at best a partial picture of what is happening. As Auboin (2009) notes, at present the only source of reliable data on trade finance is the Berne Union database, which covers trade credit insurance. When concerns about the availability of trade credit were at their peak in the fall of 2008, the International Monetary Fund conducted a survey of major banks in emerging markets and advanced economies in conjunction with the Bankers' Association for Finance and Trade to get a more complete picture of the state of trade finance.¹⁰ More than 70 percent of the banks surveyed noted that the prices of letters of credit had risen relative to 2007, while more than 90 percent reported higher rates for short- and medium-term lending facilities where the goods exported served as collateral. Unsurprisingly, most of the survey respondents attributed the higher prices to their increased cost of funds. While exporters everywhere were confronted with higher trade finance costs, the decline in trade finance availability occurred primarily in the emerging markets. Trade among advanced economies seemed largely unaffected by the availability (or otherwise) of trade finance, while the availability of financing for imports from South Asia, South Korea and China had decreased sharply.

Research by Iacovone and Zavacka (2009) shows that banking crises generally do have an impact on exports. They disentangle the effects of banking crises from the effects of other types of shocks that might affect exports (specifically,

demand shocks) and find that the exports of manufacturing sectors that are more dependent on external finance tend to grow significantly more slowly than other sectors during a banking crisis. However, what appears to be key is dependence on bank finance as opposed to other forms of external finance (for example, trade credit), which would be consistent with the idea that the availability of trade finance declines during banking crises. Iacovone and Zavacka also find that sectors with more tangible assets that can be used as collateral also tend to do better in terms of maintaining exports during a banking crisis.¹¹

Additional historical evidence that access to trade finance has important implications for firms' exports is provided by Amiti and Weinstein (2009). They use a unique Japanese data set that allows them to match banks to individual firms to examine the consequences of the Japanese financial crises of the 1990s for Japanese manufacturing exports over that decade. Japanese exports declined 6.7 percent in 1993 and 7.1 percent in 1999.¹² The first decline came on the heels of the first round of bank problems following the bursting of the stock price and real estate bubbles in 1989 and 1991, respectively. The second decline in exports was preceded by an intensification of the financial crisis in late 1997 that culminated in the nationalization of the Long-Term Credit Bank (at the time the eighth-largest bank in the world) at the end of 1998. For each firm in their sample, which covers the period 1986 to 1999, they are able to identify its main "reference bank," which is the bank that would typically handle the firms' payment settlement and foreign exchange dealings, that is, trade finance needs. Amiti and Weinstein find a statistically significant relationship between the health of these banks (as measured by changes in their market-to-book ratios) and firms' export growth. Specifically, a deterioration in the health of a firm's main reference bank is usually followed within a year by a decline in its exports. They also find that while a deterioration in bank health also has a det-

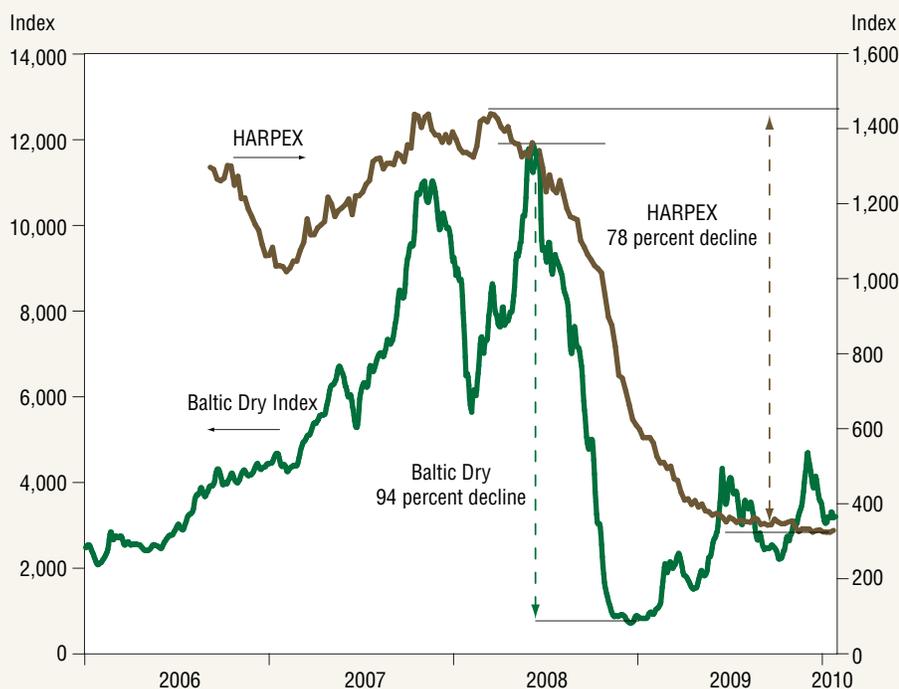
Trade and Shipping

With the collapse of global trade, there was a simultaneous collapse in the demand for shipping services to transport goods internationally. According to media reports, by the summer of 2009 almost 10 percent of the global merchant shipping fleet (container ships, bulk carriers, tankers, car carriers and so on) had been laid up due to the collapse in trade. Naturally this manifested itself in shipping costs. While we do not have a good comprehensive measure of what it costs to ship goods around the world, the chart shows the recent behavior of two closely watched indexes. The Baltic Dry Index tells us what is going on in one segment of the shipping market, namely that for dry bulk commodities such as coal, iron ore and grain. After peaking at 11,793 on May 20, 2008, the index collapsed to 663 on Dec. 5, 2008 (a decline of just over 94 percent), before posting gradual improvements over the course of 2009 and into 2010. The HARPEX index, produced on a weekly basis by the shipbroking firm Harper Petersen, is a measure of the cost of shipping containers. Unlike the Baltic Dry Index, it has yet to show signs of a recovery. As of Jan. 1, 2010, the HARPEX index stood at 317.44, down from a precrisis peak of 1,444.62. The differential behavior of the two cost indexes over the past year as trade volume picked up is interesting and probably reflects

capacity problems in the container liner services. This segment of the shipping market, which accounts for close to two-thirds of the market for seaborne trade, expanded dramatically as supply chains became more globalized.

Movements in shipping costs reflect a number of factors. The capacity of the global merchant shipping fleet adjusts only slowly in response to increased demand due to greater trade volumes. Rapid growth in the demand for shipping capacity to move raw materials to China and other emerging markets is believed to have been instrumental in the run-up in the Baltic Dry Index in 2007 and 2008. However, higher energy prices probably also played a role. Oil prices, as measured by the price of West Texas Intermediate, peaked at \$145.66 a barrel on July 11, 2008. (Prices of fuel oil—No. 2 New York—peaked the same day at \$4.0425 a gallon.) The peak in oil prices came just two months after the peak in the Baltic Dry Index, and then the two series declined dramatically over the remainder of 2008. Both series have since shown a steady improvement. The tight correlation between the two series suggests that oil prices are an important component of overall shipping costs. But it is also consistent with both series being driven by a common third factor—global economic activity.

Shipping Costs Reflect Global Economic Activity



SOURCES: Harper Petersen and Co.; Bloomberg.

The availability of trade finance declines during banking crises.

perimental effect on domestic sales, the effect is a lot smaller than the effect on exports, consistent with the view that exporting is a particularly finance-dependent activity due to its greater riskiness.

But is there any evidence that the drying up of trade finance contributed to the excessive decline in global trade during the recent crisis? Levchenko, Lewis and Tesar (2009) investigate the possibility that a collapse of trade credit was a key determinant of the collapse of U.S. imports and exports over the period June 2008 through June 2009 by examining import and export performance over a large number of sectors and asking whether those sectors that are most dependent on trade credit or most willing to extend it saw larger declines. They are unable to find any statistically significant relationship, and they conclude that a collapse of trade credit is not a plausible candidate for explaining the excess decline.

However, this finding needs to be interpreted with caution. The terms trade credit and trade finance are often used interchangeably, but as we have noted above, there are important differences.¹³ The term trade credit is best defined as credit created or extended by a nonfinancial firm to one of its customers when there is a mismatch in time between when goods are ordered and delivered and when they are paid for. Trade credit in this sense is reflected in the accounts receivable on a firm's balance sheet (with a matching amount showing up in the accounts payable on the customer's balance sheet.) Levchenko, Lewis and Tesar (2009) employ exactly such measures of trade credit (either accounts payable relative to the cost of goods sold or accounts receivable relative to total sales) to assess whether a contraction in trade credit played an important role in the contraction of global trade. Of course, such measures do not distinguish between trade credit extended to domestic customers (or received from domestic vendors) and trade credit extended to foreign customers (or received from foreign vendors). Trade finance, as it pertains to international trade, is best

understood as the entire array of financial products that serve to facilitate international trade. This includes—in addition to that portion of trade credit extended to or received from foreign customers or vendors—bank loans to finance working capital to produce for export; letters of credit; insurance; and the host of other financial products that exist to mitigate the risks associated with international trade.

Some indirect evidence that access to trade finance was indeed a critical factor contributing to the 2008–09 decline in global trade is presented by Chor and Manova (2009). Their idea is to use interbank lending rates in different countries as a measure of the cost of external capital (including trade finance) to firms. They interpret higher interbank rates as being indicative of tighter credit markets, and they document that countries with higher rates tend to export less to the United States. Of course, the need to access external finance varies across sectors, as does the ability to post collateral for loans or the ability to obtain trade credit. Chor and Manova show that countries with tighter credit conditions suffered a larger decline in exports to the United States during the crisis, and these effects were most apparent in the sectors that were most dependent on external finance, had the fewest collateralizable assets or had the least access to trade credit from trade partners. Based on reduced-form estimates, they conclude that “... U.S. imports would have fallen by 25.6% more if interbank rates had remained at their peak September 2008 level through April 2009, essentially doubling the actual percentage decline in trade volumes observed after September 2009.”

The findings of Chor and Manova are consistent with the findings of Bricongne et al. (2009) for French exporters. They look at the performance of about 100,000 individual French exporters through April 2009 and find that firms in sectors more structurally dependent on external finance experienced the biggest declines in exports. However, their data do not allow them to distin-

guish between finance for international trade and finance for generic working capital.

So, evidence in support of the trade finance story is, at best, suggestive. A more conclusive evaluation of the idea will depend on better measures of trade finance becoming available. But the evidence does highlight the need for a better understanding of finance's role in facilitating international trade and points to the existence of a financial accelerator for exports similar to that generally believed to exist for real economic activity.

Conclusions

In 2008–09, global trade collapsed at a pace not seen since the Great Depression, raising concerns in some quarters that the globalization of the past three decades was going to be reversed. Global trade has since recovered (although it has yet to attain its precrisis level), and to date there seems to have been limited use of protectionist measures. However, given the prospect of elevated unemployment levels in many countries for some time to come, the pressures to engage in some form of protectionism will remain and will continue to pose a threat to free trade. Much of the decline in trade can be explained by the severity of the downturn in economic activity. But some of the decline was excessive, over and above what would have been warranted by the collapse in activity.

In this essay, I have focused on limited access to trade finance as a possible explanation for the excessive decline. Existing models of international trade do not assign a prominent role to access to trade finance as an important determinant of trade. And data limitations make it very difficult to determine just how important a role trade finance plays empirically. But the limited evidence available suggests that access to trade finance is an important determinant of a firm's ability to export and that the declines in exports to the United States were greatest among firms in countries where access to finance was already limited and for firms that were most dependent on external

finance, had the fewest collateralizable assets and had the least access to trade credit.

Finance is often viewed as a veil on the engine of the real economy, but as has been observed, “when the veil flutters, the engine sputters.” The collapse of global trade in 2008–09 has drawn attention to the little-studied area of trade finance and the important role it plays in facilitating global commerce.

—*Mark Wynne*

Notes

¹ An alternative measure of global trade from the OECD's Main Economic Indicators tells a similar story. After peaking at \$2.606 trillion (measured in year 2000 dollars) in first quarter 2008, global imports of goods and services declined to a low of \$2.164 trillion in second quarter 2009 (a decline of just under 17 percent), before rebounding in the third quarter. The OECD's measure of global exports of goods and services peaked at \$2.572 trillion (2000 dollars) in second quarter 2008. This was not all that different from the first quarter figure of \$2.271 trillion. The exports measure bottomed out at \$2.160 trillion in second quarter 2009 (a decline of 16 percent) and subsequently rebounded. The OECD measure has the advantage of including trade in services as well as having a longer time series than the CPB measure. However, it tends to lag the CPB series in terms of availability and also relies more heavily on projections for a number of countries rather than actual published data.

² For example, the measure of global exports reported as part of the International Monetary Fund's International Financial Statistics database, which starts with April 1949, showed exports declining by 25 to 30 percent (on a 12-month basis) each month from January through August 2009. The only declines of comparable magnitude in this measure occurred in 1956, when exports fell about 20 percent each month from June through December. However, these statistics measure nominal rather than real trade volumes. The measure of global exports of goods and services that the OECD reports as part of its Main Economic Indicators is a real series (measured in constant 2005 dollars). This series starts in first quarter 1970. In the first and second quarters of 2009, global exports as measured by this series posted declines in excess of 14 percent (on a four-quarter basis) in both quarters, the largest declines in the series' history.

³ The extent to which the resort to protectionism during the Great Depression contributed to the severity of the Depression is the subject of some controversy. Mario Crucini and James Kahn (1996) were the first to conduct a quantitative analysis of tariffs' contribution to the decline in economic

Much of the decline in trade can be explained by the severity of the downturn in economic activity. But some of the decline was excessive, over and above what would have been warranted by the collapse in activity.

activity during the Great Depression. They showed that even when international trade constitutes a small share of aggregate output, tariffs and other trade barriers can have a significant negative effect on GDP if the goods that are traded are used as intermediate inputs in production. They conclude that the tariff war during the 1930s could have reduced U.S. gross national product by as much as 2 percent.

⁴ The statistics that Engel and Wang (2007) report are based on Hodrick–Prescott filtered data with smoothing parameter of 1600.

⁵ Goods production (defined as the sum of agriculture, mining, construction and manufacturing) accounts for a slightly higher share of gross output, closer to 30 percent.

⁶ The most recent vintage of the National Income and Product Accounts puts the decline of first quarter 2009 at 10.7 percent.

⁷ See also Ahearne, Kydland and Wynne (2005) and Cociuba and Ueberfeldt (2008) for examples of wedge accounting exercises, albeit in closed-economy frameworks.

⁸ See chapter 18 of Bekaert and Hodrick (2009) for a lengthy exposition of various options for financing international trade, or see U.S. Department of Commerce (2008).

⁹ See, for example, Auboin (2009).

¹⁰ See Dorsey (2009) and International Monetary Fund (2009).

¹¹ According to Table 2 of Iacovone and Zavacka, tangible assets are 62 percent of the total assets of firms in the petroleum refining sector but a mere 14 percent of assets in the office and computing sector.

¹² Exports also declined 1.8 percent in 1998 but posted increases in every other year of the decade.

¹³ See also the discussion in footnote 2 of Amiti and Weinstein (2009) on the differences between the accounting and finance uses of these terms.

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Summary of Activities

For 2009, the Dallas Fed had two high-priority objectives that pertained to research: “Produce high-quality current analysis and long-term research that enable the Dallas Fed to be an active player and intellectual leader in the Federal Open Market Committee’s monetary policy deliberations” and “Promote research that deepens our understanding of the implications of globalization for U.S. monetary policy through the Globalization and Monetary Policy Institute.” Contributing to these two high-priority objectives, Enrique Martínez-García and Mark Wynne gave a presentation on the global slack hypothesis to the full FOMC at its December 2009 meeting. This presentation was part of a broader set of presentations on inflation dynamics. The paper underlying the presentation is forthcoming as a *Staff Paper* in 2010.

Academic Research

The core business product of the institute is its Working Paper series. By year end, we had circulated 40 papers in the series. One of the working papers contributed by our advisory board member William White on “Should Monetary Policy ‘Lean or Clean’?” received some high-profile press coverage and was one of the most downloaded publications on our website in 2009.

However, working papers are just an intermediate step—the ultimate objective is to have the research meet the standards of the peer-reviewed literature and be published in academic journals. Jian Wang’s paper “Home Bias, Exchange Rate Disconnect, and Optimal Exchange Rate Policy,” which was circulated as Research Department Working Paper No. 0701,

was accepted for publication at the *Journal of International Money and Finance* in December 2008 (too late for inclusion in last year’s annual report). Anthony Landry’s paper “Expectations and Exchange Rate Dynamics: A State-Dependent Pricing Approach,” which was circulated as Research Department Working Paper No. 0604, was accepted for publication at the *Journal of International Economics* in December 2008. Ananth Ramanarayanan’s paper “Vertical Specialization and International Business Cycle Synchronization” (joint with Costas Arkolakis of Yale University), which appeared as Institute Working Paper No. 21, was accepted for publication in the *Scandinavian Journal of Economics* in a December 2009 special issue of that journal on “Heterogeneous Firms and International Trade.” Enrique Martínez-García’s paper “Investment and Trade Patterns in a Sticky-Price, Open-Economy Model” (coauthored with Globalization and Monetary Policy Institute research associate Jens Søndergaard of the Bank of England) was accepted for publication in a book of conference proceedings. (For recent working paper abstracts, see page 30.)

Bank Publications

The institute published eight international updates on the web and five *Economic Letters* on “Seeking Stability: What’s Next for Banking Regulation?” (by Simona Cociuba), “Trade, Globalization and the Financial Crisis” (by Mark Wynne and research associate Erasmus Kersting), “Ties that Bind: Bilateral Trade’s Role in Synchronizing Business Cycles” (by Ananth Ramanarayanan), “Has Greater Globalization Made Forecasting Inflation More Difficult?”

(by Mark Wynne and Patrick Roy) and “Labor Market Globalization in the Recession and Beyond” (by W. Michael Cox, Richard Alm and Justyna Dymerska). The institute also published one *Staff Paper* on “Exchange Rate Policies” by senior fellow Charles Engel. The staff also received some external recognition for their contributions to Bank publications. The Winter 2009 issue of the *Journal of Economic Perspectives*, a publication of the American Economic Association, highlighted Anthony Landry’s 2008 *Economic Letter* on “The Big Mac: A Global-to-Local Look at Pricing” in its Recommendations for Further Reading listing. Simona Cociuba’s *Economic Letter* on bank regulation is featured on the St. Louis Fed’s website dedicated to the financial crisis.

Conferences and Seminars

Institute economists have been active over the past year presenting their work at conferences and seminars. Staff gave several presentations at the January 2009 meeting of the American Economic Association and organized sessions at the meeting. In April, the institute organized a conference on “Globalization, Political Economy and Trade Policy” jointly with the Department of Economics at Southern Methodist University. (More details are provided in the conference summary on page 18.) On Oct. 1–2, we hosted the annual meeting of the Federal Reserve System Committee on International Economic Analysis at the San Antonio Branch. On Nov. 13–14, we hosted a joint conference with the Bank of Canada on international capital flows at the Dallas office. (More details are provided in the conference summary on page 24.) The institute also cosponsored a conference with the O’Neil Center for Global Markets and Freedom at SMU on Oct. 16 on “What Do Businesses Need to Succeed in Today’s Global Economy?”

Staff presented their research at a number of prestigious venues (such as the Bank

of England and the Bank for International Settlements), as well as several high-profile conferences (most notably the Econometric Society North American summer meeting and the Canadian Economics Association annual meeting). Mark Wynne gave a series of lectures on “Globalization and Financial Services” at the American Bankers Association Stonier National Graduate School of Banking at the University of Pennsylvania in June.

The institute hosted a number of external seminar speakers over the course of the year, and we added 11 research associates to our network. (A list of all the research associates is on page 44.)

Other Activity

Governor Masaaki Shirakawa of the Bank of Japan formally joined the advisory board of the institute effective July 3, and Heng Swee Keat, managing director of the Monetary Authority of Singapore, joined the advisory board in August.

A key component of the institute’s strategy to promote research and raise the visibility of the Dallas Fed in the broader research community is to run a very active visitor and seminar program. We hosted a number of visitors over the summer, including Ina Simonovska of the University of California at Davis, Karen Lewis of the University of Pennsylvania, Pengfei Wang of Hong Kong University of Science and Technology and Chikako Baba of the University of Wisconsin and IMF. Erasmus Kersting, a recent Texas A&M Ph.D. and currently a visiting assistant professor at SMU, spent the summer working with Mark Wynne on a project on international trade finance and its role in the contraction of global trade over the last year. Tatsuma Wada from Wayne State University began an extended visit to the institute in September. Several of these visitors have subsequently joined our network of research associates.

—Mark Wynne

Conference on Globalization, Political Economy and Trade Policy

On April 24 and 25, 2009, the Globalization and Monetary Policy Institute joined with Southern Methodist University to cosponsor a conference on Globalization, Political Economy and Trade Policy at SMU's Collins Executive Education Center. Nine scholarly papers were presented and discussed in three sessions.

The first session consisted of two papers describing offshoring's impact on the distribution of work and the relative unemployment and wages of unskilled labor. A third offering focused on how foreign direct investment (FDI) flows from more- to less-developed countries influence innovation.

The second session started with a paper focusing on the rationale for multilateral trade agreements, followed by two presentations on international protection of intellectual property. The first two papers in the last session concern export dynamics, and the third discusses the relationship between bilateral trade agreements and multilateral trade liberalization.

Offshoring and FDI

Princeton University professor **Gene Grossman** presented the conference's first paper, titled "Task Trade Between Similar Countries" and coauthored with his Princeton colleague Esteban Rossi-Hansberg.

Most models treat the objects of international trade as final goods, not abstract tasks. However,

final goods are produced by combining the outputs of the tasks, which might be regarded as similar to intermediate goods. This final step has to be done in the headquarters country. In a previous paper, the authors proposed a theory of task trade between countries with dissimilar relative factor endowments, generating interesting results that differ from the traditional factor endowment-based Heckscher–Ohlin model.

In the present paper, Grossman and Rossi-Hansberg propose a theory of task trade between countries that have similar relative factor endowments but differ in size. Firms produce differentiated goods by performing a continuum of tasks, each of which generates local spillovers. Tasks can be performed at home or abroad, but offshoring costs vary. A crucial assumption is that the tasks are characterized by external economies of scale at the national level.

In equilibrium, tasks with the highest offshoring costs may not be traded at all. Among the remainder, those with higher offshoring costs are performed in the country that has higher wages and aggregate output. When offshoring costs aren't too high, firms concentrate certain tasks in particular locations to realize external economies of scale. Grossman and Rossi-Hansberg discuss the relationship between equilibrium wages, equilibrium outputs and relative country size, examining how the pattern of specialization reflects the

model's key parameters.

The theory predicts the pattern of task specialization for countries that differ only in size. The authors find an equilibrium always exists in which the larger country has higher wages and greater aggregate output of final goods.

If offshoring costs are low enough and the countries aren't too different in size, another equilibrium may exist in which the smaller country has higher wages and greater aggregate output. In either case, the country with the higher wages and output performs tasks that are more difficult and costly to offshore.

Syracuse University professor **Devashish Mitra** presented the second paper, titled "Search and Offshoring in the Presence of 'Animal Spirits,'" coauthored with Priya Ranjan of the University of California at Irvine.

The authors introduce two sources of unemployment in a two-factor, closed-economy general equilibrium model—search frictions and fairness considerations. Models with search friction are the most widely used for analyzing unemployment in a general equilibrium setting. Recently, models with fairness considerations have generated increasing interest.

Basically, this kind of model assumes unskilled workers demand wages that aren't too far below those of skilled workers. This normally leads to unemployment of unskilled workers but not necessarily skilled workers.

In the present paper, the authors find that a binding fair-wage constraint increases the unskilled unemployment rate and can at the same time lead to a higher jobless rate for skilled workers. The wages of unskilled workers increase and the wages of skilled workers decrease.

Next they introduce offshoring of unskilled jobs into the model, which makes it more likely that the fair-wage constraint becomes binding. Offshoring of unskilled jobs always leads to increases in unskilled unemployment, decreases in skilled unemployment and increases in skilled

workers' wages. The unskilled wage can increase or decrease as a result of offshoring.

The opening session's final paper, titled "Southern Innovation and Backward Knowledge Spillovers: A Dynamic FDI Model," was presented by professor **Keith E. Maskus** of University of Colorado at Boulder and coauthored with his colleague Yin He.

The focus is a theory concerning the trade and FDI relationships between the more-advanced countries of the North and the less-developed countries of the South.

The authors develop a model in which the portion of Northern firms choosing to become multinationals is endogenous. In the benchmark model, Northern firms engage in innovation based on the local knowledge stock and learning-by-doing (LBD), and a share of these products is transferred to Southern production via FDI. An increase in Southern imitation limits the rate at which countries become multinational.

Up to this point, the model is pretty standard. The Maskus and He innovation involves extending the model to permit Southern innovation based on the amount of local knowledge and LBD. Because Southern firms have higher innovation costs, this generates inefficient specialization in both regions and reduces global growth. The authors also allow for "backward spillovers" to Northern innovation, which partially restores global efficiency and growth.

Backward spillovers from the South to the North do occur. In his presentation, Maskus pointed out that the video compact disk was invented in China, but the technology wasn't patented. A Japanese firm learned and patented the technology, which eventually evolved into the DVD.

The model's results highlight a possibility not widely recognized. Specifically, technology transfer through multinational investment tends to rise with a decline in imitation risk, perhaps achieved through strengthening intellectual property protection. Thus, multinationals may kick off a process

in the South in which local imitation and LBD establish the possibility of domestic innovation as R&D costs fall.

In equilibrium, however, all Southern firms that innovate and invest in multinational subsidiaries must obtain the same economic return and cover both the innovation costs and the FDI setup cost. This implies that costs of innovation will remain higher in the South than the North. As a result, inefficient specialization can reduce FDI and global knowledge accumulation.

To counter this, a Southern policy of strengthening intellectual property protection and reducing the costs of inward investment can expand multinational contacts and growth, an effect enhanced by backward spillovers to the advanced countries.

Trade and Intellectual Property

Stanford University professor **Kyle Bagwell** kicked off the second session with “Profit Shifting and Trade Agreements in Imperfectly Competitive Markets,” coauthored with his Stanford colleague Robert W. Staiger.

The authors have been leaders in the analysis of multilateral trade agreements. They argue that countries constrained by such agreements are less likely to alter the terms of trade in their favor and impose negative externalities on other countries. Their previous work has mainly concentrated on perfectly competitive markets.

Under imperfect competition, trade policies can alter the terms of trade, shift profits from one country to another and moderate or exacerbate existing distortions associated with monopoly power. In light of the various ways trade policies may influence welfare, we might expect that new rationales for trade agreements would arise under imperfectly competitive markets.

In their paper, the authors consider a sequence of trade models that feature imperfectly competitive markets, finding the same basic rationale for trade agreements as under perfectly

competitive markets. In all the models, addressing inefficient terms-of-trade restrictions in trade volume is the only rationale for trade agreements—whether or not governments have political or economic objectives.

Having identified the problem trade agreements might solve, Bagwell and Staiger proceed to the next step and evaluate the form that efficiency-enhancing pacts might take. Once again, their results parallel the established results for models with perfectly competitive markets.

In particular, Bagwell and Staiger show that the principles of reciprocity and non-discrimination (i.e., most-favored-nation provisions) are efficiency-enhancing because they undo the terms-of-trade restrictions in trade volume that occur when governments pursue unilateral trade policies.

The analysis suggests that the important implications of the terms-of-trade approach are quite general, applying not just to perfectly competitive but also to a wide range of imperfectly competitive markets. However, they emphasize that this paper considers only markets for which the number of firms is fixed.

In a companion paper in 2008, they considered imperfectly competitive models in which the number of firms is endogenous. They concluded that the inefficiencies associated with terms-of-trade motivations provide the only rationale for trade agreements in this setting as well.

Edwin Lai of the Federal Reserve Bank of Dallas presented the next paper, “Innovation, Intellectual Property Protection and Globalization,” coauthored with Davin Chor of Singapore Management University.

Patent protection often takes the form of restrictions on how easily innovators are allowed to invent around existing patents, which the authors term “patent breadth.” Lai and Chor explore the implications of a patenting regime based on patent breadth by incorporating such intellectual property protection considerations in a quality-im-

provement model of technology, trade and growth.

The authors first study how changes in patent breadth affect innovation rates and welfare in a closed-economy benchmark. In considering whether to increase patent breadth, policymakers face a tradeoff between the benefits of higher innovation rates and the costs of higher prices from granting patent-holders monopoly pricing power for a longer duration. They find an optimal breadth under certain reasonable conditions, suggesting government intervention to protect intellectual property will improve welfare.

The paper goes on to formulate an open-economy model in which countries interact through trade and firms patent internationally. They find a stable equilibrium for patent breadth in which national governments underprotect intellectual property from a global perspective.

This result is similar to findings in a 2004 paper by Lai and Grossman, which analyzed international patent protection based on duration rather than breadth. Interestingly, home and foreign patent-breadth policies are strategic complements—at least in the symmetric equilibrium. This contrasts with Grossman and Lai's finding that home and foreign patent-length policies are strategic substitutes.

In the present paper, Lai and Chor also find that countries with larger domestic markets or lower innovative capabilities would tend to set larger patent breadths. In addition, globalization's reduced trade frictions lead countries to lower patent breadths. As a result, globalization actually leads to lower equilibrium research intensities in all countries. Other studies have found that globalization has no general impact on research intensities, making this result even more surprising.

Next on the program was professor **Lee Branstetter** of Carnegie Mellon University, who presented a paper titled "Intellectual Property Rights, Imitation and Foreign Direct Investment: Theory and Evidence," coauthored with Columbia's Raymond Fisman, Harvard's C. Fritz Foley and

SMU's Kamal Saggi.

The paper analyzes the effects of strengthening intellectual property rights in developing countries on the level and composition of industrial development. The authors first develop the theory of a North–South product cycle in which Northern innovation, Southern imitation and FDI are all endogenous.

The theory predicts that intellectual property rights reform in the South leads to increased FDI from the North as developed country firms shift production to less-developed country affiliates. This FDI accelerates Southern industrial development, bringing increases in both the South's share of global manufacturing and the pace at which production of recently invented goods shifts to the South. In addition, the model predicts that Northern resources will be reallocated to R&D as production shifts to the South, driving an increase in the global rate of innovation.

The authors go on to test the model's predictions by analyzing the responses of U.S.-based multinationals and domestic industrial production to intellectual property rights reforms in the 1980s and 1990s.

First, they find that multinational companies expand the scale of their activities in countries that reform intellectual property rights. Multinationals that make extensive use of intellectual property disproportionately increase their use of these inputs.

Second, there is an overall expansion of industrial activity after intellectual property rights reform, and highly disaggregated trade data indicate an increase in the number of initial exports in response to reform. These results suggest that the expansion of multinational activity more than offsets any decline in indigenous firms' acquiring intellectual property through imitation.

Export Dynamics and Trade Pacts

The third session's first paper, titled "A Search and Learning Model of Export Dynamics," was

presented by New York University professor **Jonathan Eaton** and coauthored with Marcela Eslava, C. J. Krizan, Maurice Kugler and James Tybout.

A goal of policy in many developing countries is establishing new markets for nontraditional exports. Well-known success stories from Latin America include Brazilian regional jets, Chilean wines and Colombian cut flowers. By finding new buyers abroad, governments hope to create jobs, bolster demand for their currencies and further industrial development.

The paper presents a preliminary theoretical framework for analyzing export dynamics at the firm level. Specifically, the authors assume that export success reflects a process of search and learning in foreign markets. Producers interested in a particular overseas market devote resources to identifying potential buyers. When they find one, they learn something about their products' appeal in this market. They also learn about the potential for profits by observing the experiences of rivals selling similar products in the foreign market.

Taking stock of the available information, firms initially not selling in the foreign market update their beliefs about potential export profits, and they adjust the intensity of their search efforts accordingly, attempting to maximize their net expected profit streams. Export gains take place when firms receive positive early signals about potential profits, both from their own experiences and from rivals' experiences, and they intensify their search and marketing efforts, adding quickly to their foreign client base.

World Bank economist **Caroline Freund** presented the next paper, "Export Entrepreneurs: Evidence from Peru," coauthored with her World Bank colleague Marta Denisse Pierola.

Like the previous paper, this one considers the dynamics of exporting firms' entry and exit. In developing countries, many exporters produce only for foreign markets. These firms tend to be larger and more productive than firms focused on the domestic market, and they often produce

several products and export to many markets.

To understand this type of export entrepreneurship, Freund and Pierola examine data on Peru's nontraditional agriculture exports from 1994 to 2007. This sector grew sixfold over the period, driven in large part by firm entry and new product and market discoveries.

The authors identify a pattern of trial and error: Firms frequently enter and exit both products and markets. Exits are more likely after one year and among firms that start small. Large exporters tend to be the first to discover products and markets new to their country, and they export more products to more markets.

Freund and Pierola develop a model that explains how entrepreneurs decide to develop new export products and markets in a business environment characterized by sunk costs of discovery and uncertainty about costs and foreign demand. The model explains many features of the Peruvian data.

The authors' theoretical framework assumes uncertainty about exporting and sunk costs—this leads to a process of trial and error, with a high share of exits after one year. Good entrepreneurs develop large firms that tend to export more to a given product and market, enter more markets and more products, and enter new markets and products earlier. Firms also start small and grow exports over time to avoid large losses from uncompetitive products. The data seem to confirm these predictions.

The conference's last paper was "Bilateralism, Multilateralism and the Quest for Global Free Trade," presented by Ryerson University professor **Halis Murat Yildiz** and coauthored with Kamal Saggi of SMU.

Whether bilateralism is a stepping stone or stumbling block to multilateral trade liberalization has long been a topic of intense debate. This paper develops an equilibrium theory of trade agreements and evaluates the relative merits of bilateralism and multilateralism.

The authors envision a three-country game in which each nation faces a range of policy options in negotiating trade agreements—join with both trading partners (i.e., practice free trade), select just one of them for a bilateral pact, or don't deal with either of them (i.e., opt for the status quo under which all countries impose their optimal tariffs on each other).

To determine whether bilateralism matters, they also analyze this game under the assumption that countries follow a purely multilateral approach to trade liberalization. Thus, both the degree and nature of trade liberalization are endogenously determined.

First, Yildiz and Saggi find that global free trade is the only stable equilibrium, regardless of whether countries can pursue bilateral agreements. This lends support to the view that bilateral trade agreements aren't stumbling blocks to multilateral trade liberalization.

The second finding focuses on countries with asymmetric endowment levels. For them, there exist circumstances under which free trade is a stable equilibrium only if countries are free to pursue bilateral trade agreements. This supports the view that bilateral trade agreements are stepping stones to multilateralism. These results hold even when governments are politically motivated—that is, they value producer interests and tariff revenue more than consumer benefits that come from freer trade.

—Edwin Lai

Conference on Capital Flows, International Financial Markets and Financial Crises

Financial markets throughout the world have become increasingly more developed in recent decades. At the same time, global financial integration has risen: Cross-border financial flows and asset holdings have increased significantly over time, showing deepening financial-market linkages between countries. Economists in various fields have been addressing the effects of more sophisticated financial markets and international financial integration, but many open issues remain. These include evaluating the degree and the macroeconomic effects of financial integration, assessing the role of regulating financial intermediaries and understanding the emergence and transmission of financial crises.

The current global financial crisis has brought to light the need to develop a better understanding of these issues and their implications for policymaking. To this end, on Nov. 13–14, 2009, the Federal Reserve Bank of Dallas and the Bank of Canada cosponsored a conference on capital flows, international financial markets and financial crises.¹ The purpose of the conference was to bring together researchers working on various aspects of financial markets and financial crises. Many of the papers presented at the conference addressed one of two broad questions. The first is, how integrated are international financial markets and how effective are they at sharing resources and risk? Second, what are the channels through which financial

markets—and their regulation—impact the rest of the economy? Specifically, do they result in stabilization or amplification of macroeconomic fluctuations in response to shocks? The remainder of this summary explains why this research is fruitful in the context of the current financial turmoil and summarizes the researchers' contributions.

Why We Need Better Models

Two of the conference papers nicely illustrate how the global dimension of the current financial crisis underscores the need to develop and apply new theoretical models to address these questions. **Steve Kamin** from the Federal Reserve Board presented evidence (in a paper coauthored with Laurie Pounder from the Federal Reserve Board) on the degree to which direct financial links with the U.S. help explain the different effects on foreign countries' financial markets. Specifically, Kamin and Pounder ask whether the exposure of a country's financial sector to U.S. mortgage-backed securities (MBS) or its dependence on U.S. dollar funding can explain how the financial sector in that country fared early in the crisis. This question is motivated by the fact that, up until late 2008, the crisis had very different effects on many foreign

¹The papers presented can be found online at dallasfed.org/institute/events/09capital.cfm. The names mentioned in bold throughout this summary are those of the presenters at the conference.

countries. If these differences depend closely on how much those countries were linked to the markets for U.S. MBS or short-term U.S. dollar funding—arguably the markets where the financial crisis originated—then the way the financial crisis was transmitted abroad would be fairly clear. Foreign financial institutions that directly held a lot of U.S. MBS would have sustained tremendous losses when the market for these assets turned sour, and foreign institutions dependent on dollar funding would have run into trouble when funding in these markets dried up. However, interestingly, Kamin and Pounder find that these direct financial links explain very little of the decline in financial sector indicators in foreign countries; some with very little exposure to U.S. MBS had quite negative effects on their financial institutions, and vice versa.

In a paper coauthored with Shang-Jin Wei from Columbia University, **Hui Tong** from the IMF also addressed the issue of how the effects of the current crisis were transmitted abroad. Tong and Wei's paper, in contrast to Kamin and Pounder's, looks at how nonfinancial firms fared in countries with different levels of dependence on foreign capital flows. The paper asks whether firms operating in sectors that tend to depend heavily on outside financing experienced more severe liquidity problems in countries more dependent on foreign capital inflows. Tong and Wei find that while higher overall inflows of foreign capital were associated with more severe effects on firms, the composition of capital flows matters as well. Foreign capital in the form of foreign direct investment (FDI) was less a culprit than non-FDI capital. The reasoning behind this may be that FDI, in the form of foreign multinationals buying out existing firms or creating subsidiaries, is a more stable source of foreign financing than non-FDI capital, including debt or portfolio equity investment.

These two papers show how thinking about the current financial crisis brings one back to the two main questions raised above. If financial markets in different countries are so integrated that

crises in one market affect others, it is important to understand financial integration in the first place—the degree to which it has progressed and the reasons it has done so. Moreover, the various channels of international financial transmission are not obvious, so it is also important to understand what they are and how they work.

How Integrated Are Financial Markets?

It is common to point to the rise of cross-border asset holdings as evidence of international financial integration. While such observations tell us a lot about how integrated economies are, they leave open the questions of why this trade in financial assets matters, and what exactly are the frictions or conditions that make financial markets more or less imperfect. For these reasons, a long line of research has used theoretical models to understand the role of financial market integration and the degree to which certain market frictions can rationalize the observed data. In the context of short-run economic fluctuations, standard theory provides a role for international financial markets to move resources to their most productive location, as well as to share risk. International trade in financial assets allows a country with a boom to receive investment from abroad, temporarily importing more than it exports. In addition, domestic and foreign households trade financial assets to smooth out fluctuations in their income stream and consumption. The level of financial market integration can in part be understood from measuring how effective these mechanisms are, and four of the conference papers approach this task from different angles.

The basic idea of shifting resources to where they can be most productively used implies that country pairs with highly integrated financial markets should have less synchronized output fluctuations than country pairs with less financial integration. However, the rise of global financial integration has coincided with more international business cycle synchronization, not less.

Sebnem Kalemli-Ozcan from the University of Houston, in a paper with Elias Papaioannou from Dartmouth College and José Luis Peydró from the European Central Bank, sheds some light on this apparent contradiction. Their paper considers data on cross-border banking—the amounts of foreign assets and liabilities banks in a country have—to reevaluate the relationship between financial integration and output synchronization. Kalemli-Ozcan, Papaioannou and Peydró find that when financial integration is measured at the level of individual banks, country pairs that are more integrated do have less synchronized business cycles; that is, there is evidence of the standard resource shifting mechanism. The main difference with previous work is the authors' ability to use the microlevel bank data to control for common global factors that have increased both financial integration and business cycle synchronization over time. Importantly, however, the paper considers a time

Steve Kamin from the Federal Reserve Board and Alessandro Rebucci from Inter-American Development Bank



frame and set of countries that do not include major financial disruptions, so it aims to understand the functioning of financial markets in “normal” times. Whether this is different from the transmission effects of financial markets during periods of financial stress is a topic that comes up in several other conference papers.

Looking at implications for consumption rather than output, **Robert Kollmann** from Université Libre de Bruxelles presented a paper addressing the risk-sharing role of international financial markets. Models with perfect financial markets predict that relative consumption between two countries should be tightly linked with the real exchange rate—the relative price of national consumption baskets, expressed in a common currency. This means that the functioning of financial markets ensures that households in a country whose consumption basket is relatively inexpensive compared with that of a trading partner temporarily consume relatively more. Again, this is another prediction that is not borne out in the data, where there is a very weak relationship between relative consumption and real exchange rates. Kollmann presented a model in which some households do not have access to financial markets, a feature motivated by a widely noted observation that a large fraction of households in the U.S. actually hold no financial assets and therefore just consume their income. In Kollmann’s model, the presence of these “hand-to-mouth” consumers can break the link between aggregate consumption and real exchange rates. The lesson of the paper is that, from the perspective of sharing consumption risk, international financial integration is far from complete, but this has more to do with households’ access to financial assets than with the development of financial markets.

In another paper highlighting the difference between international and domestic financial markets, **Diego Valderrama** from the Federal Reserve Bank of San Francisco (in joint work with Katherine Smith from the U.S. Naval Academy) considers

why the composition of capital flows in developing economies is so different from that in industrialized economies. Specifically, developing countries have large inflows of FDI and outflows—or smaller inflows—of debt, while developed economies tend to have the opposite pattern. Smith and Valderama build on the observation that it is costlier in developing countries for firms to issue debt than it is in developed economies. This provides multinational firms the incentive to purchase firms in developing countries and use their more developed financial markets to finance debt; FDI provides the channel for this. At the same time, households would like to save some of their income to smooth out fluctuations; they do this by lending abroad because of the higher costs domestic firms face to borrow. The message in this paper is again that seemingly incompatible observations can be rationalized as the product of individuals' participation in financial markets, as imperfections in these markets affect their decisions and therefore also affect macroeconomic aggregates.

While international trade in financial assets certainly has effects on consumption, output and the composition of capital flows, its most direct mechanical manifestation is simply in the balance of trade in goods. A country that imports more than it exports is borrowing from its trading partners, and a country whose exports outstrip imports is lending to its trading partners. Indeed, without cross-country trade in financial assets, there can be no gap between a country's exports and imports. In reality, trade imbalances are significant—most clearly illustrated by the large and persistent trade deficit of the U.S. with the rest of the world. In her paper at the conference, **Wei Dong** from the Bank of Canada asks what can account for the behavior of the U.S. trade balance in recent decades. The question is motivated by the observation that, prior to the early 1990s, a standard mechanism naturally stabilizing the trade balance seemed to be working: A country with a large trade deficit would experience an exchange rate depre-

ciation and expenditure on imports would decline, closing the deficit. Since the early '90s, however, the U.S. has run a sustained trade deficit, despite a persistent depreciation of the U.S. dollar. Dong's paper attributes this largely to the fact that imports and exports have become less sensitive to changes in their relative prices. She points to higher costs for domestic distribution and increased rigidity in prices as possible explanations for why changes in import and export prices do not pass through as strongly to the quantities of goods imported and exported. The paper addresses the need to think about international financial markets in the context of a broader environment, including international trade in goods.

Channels of Financial Transmission

The second broad set of questions addressed in the conference papers covers the mechanisms by which shocks are transmitted through the financial system to the rest of the economy. These questions are of direct relevance when thinking about the current financial crisis, and the papers covered various ways in which frictions in financial markets can propagate or amplify shocks to generate severe recessions.

Three papers addressed in detail the effects of collateral and leverage in the financial system: those by **Anton Korinek** from the University of Maryland (coauthored with Olivier Jeanne from Johns Hopkins University), **Michael Devereux** from the University of British Columbia (coauthored with James Yetman from the Bank for International Settlements, Hong Kong) and **Enrique Mendoza** from the University of Maryland. These papers all study a basic mechanism by which small shocks can trigger large real macroeconomic effects through asset prices. In the presence of a collateral constraint (alternatively a leverage constraint), individuals—such as banks, households or firms—cannot borrow more than a certain fraction of the value of their assets. When this constraint is binding, a small negative shock to asset prices can

generate large effects: The value of collateral falls, causing borrowing and consumption to decline, which can reduce the value of assets further, causing a cycle of asset price declines and reduced borrowing and consumption. The three papers apply this basic mechanism in various ways.

Jeanne and Korinek explain how an economy borrowing from abroad can experience credit booms and busts that are inefficiently large from a social perspective. Rising asset prices increase the value of collateral and so allow further borrowing, making it more likely that the collateral constraint is eventually hit, triggering the decline described above. This is socially inefficient because of an externality: An individual who takes on more debt does not take into account the effect this action has on asset prices and therefore on others' borrowing constraints. As such, Jeanne and Korinek propose the classic solution to dealing with an externality: a tax on individuals' borrowing. They

argue that moderate taxes on foreign borrowing inhibit excessively large credit booms and therefore reduce or eliminate the chances of an economy experiencing severe credit busts.

Devereux and Yetman consider the effects of collateral constraints on the international transmission of shocks. The motivation for this question is the widely noted observation that the current financial crisis spread very quickly to many countries, even between those that did not have close links through international trade. The more important links between these countries may be through financial markets, but the channel of transmission through international financial linkages is not clearly understood. (In fact, the general intuition described in the previous section, and one of the paper's results, indicate that in normal times financial links should in fact dampen transmission of shocks.) Devereux and Yetman argue that the basic mechanism working through collateral constraints can explain international transmission of shocks through financial linkages. Since investors in a country diversify their asset holdings between domestic and foreign assets, shocks to the foreign country that decrease foreign asset prices can lower the value of the domestic investor's collateral and therefore lower domestic borrowing and consumption because of a tighter collateral constraint.

Mendoza's paper is a contribution toward understanding if the effects of collateral constraints matter quantitatively for macroeconomic aggregates. Specifically, under standard assumptions on economic behavior, would we ever expect these constraints to have large macroeconomic effects? If so, what are the conditions for that to happen? Mendoza shows that, in fact, introducing collateral constraints into a standard quantitative theoretical framework can result in financial crises as infrequent, but recurrent, events. Importantly, a shock does not need to be exceptionally large or of unusual nature for a financial crisis to occur. The buildup of debt can bring the economy close

Igor Livshits from the University of Western Ontario and Robert Kollmann from the Université Libre de Bruxelles



to its collateral constraint, when a small shock can trigger the declining asset price–collateral–borrowing cycle described above. This type of event would be infrequent because households typically accumulate precautionary savings, which keeps them out of the region of debt where constraints threaten to bind.

Two other papers in the conference, by **Igor Livshits** from the University of Western Ontario (coauthored with Koen Schoors from the University of Ghent) and **Ali Dib** from the Bank of Canada, illustrate the role of the banking sector in the transmission of shocks. Regulation on banks' capital adequacy and leverage has been at the center of the discussion on reforming the financial system, so it is important to understand the banking system and how bank regulation affects the economy.

Livshits' paper addresses questions on how banking regulation should respond to changes in the riskiness of assets. Prudential banking regulation aims to curtail excessive risk taking, and it is standard practice to do this by providing incentives for banks to hold safe assets. However, when the risk of safe assets rises, the failure of banking regulation to recognize this change can make the banking system vulnerable. Livshits illustrates this with a stark example: In 1998, bank regulation in Russia considered the government's debt to be safe, even as the risk of default on this debt was rising. This policy encouraged banks to gamble on risky currency securities to the point that when the government did finally default, the banking system crashed. This paper, therefore, carries important lessons on the effects of bank regulation and raises questions about the best way to induce efficient investment by banks.

Dib's paper makes progress on understanding the macroeconomic effects of banking by introducing a banking sector that intermediates credit into a variant of the models used by many central banks for policy analysis. Typically, these models

are silent on the effects of financial frictions and the transmission of shocks through financial intermediaries, but Dib's work presents a framework in which these effects can be studied. He finds that the presence of an active banking sector with a frictional interbank market can amplify the effects of supply-side shocks but dampen the effects of financial shocks. In addition, his framework provides a role for the sorts of unconventional monetary policies pursued by the Fed and many central banks over the past year, including liquidity injections and asset swaps.

The overall lessons from the papers at this conference reflect the progress that comes with sharing insights among researchers working in various fields. Indeed, some of the clearest implications for understanding the current crisis in the U.S. may come from the work on emerging-market debt crises, as in the papers presented by Mendoza and Korinek. Another theme of the conference papers, aside from the topics each one addressed, was the integration of the analysis of "normal" economic conditions with the study of crisis periods. From the perspective of understanding why crises happen and what the policy implications are, this is an extremely important step. The policy implications of some of the work presented at the conference reflect the importance of this integration. For example, both Korinek and Jeanne's results and Mendoza's paper show that it is important to consider how policies affect the incentives to accumulate debt before a crisis. More generally, many of the other papers presented illustrate the need to understand the degree of integration of financial markets and the channels of financial transmission in order to form policy that works through their operation. The overall picture is encouraging for future research developing these ideas further.

—*Ananth Ramanarayanan*

Globalization and Monetary Policy Institute Publications

Abstracts of Working Papers Issued from October 2008 through October 2009

No. 21

Vertical Specialization and International Business Cycle Synchronization

Costas Arkolakis and Ananth Ramanarayanan

Abstract: We explore the impact of vertical specialization—trade in goods across multiple stages of production—on the relationship between trade and international business cycle synchronization. We develop a model in which the degree of vertical specialization is endogenously determined by comparative advantage across heterogeneous goods and varies with trade barriers between countries. We show analytically that fluctuations in measured productivity in our model are not linked across countries through trade, despite the greater transmission of technology shocks implied by higher degrees of vertical specialization. In numerical simulations, we find this transmission is insufficient in generating substantial dependence of business cycle synchronization on trade intensity.

Published as “Vertical Specialization and International Business Cycle Synchronization” in *Scandinavian Journal of Economics*, vol. 111, no. 4, 2009, pp. 655–80.

No. 22

The Taylor Rule and Forecast Intervals for Exchange Rates

Jian Wang and Jason J. Wu

Abstract: This paper attacks the Meese–Rogoff (exchange rate disconnect) puzzle from a different perspective: out-of-sample interval forecasting. Most studies in the literature focus on point forecasts. In this paper, we apply Robust Semi-parametric (RS) interval forecasting to a group of Taylor rule models. Forecast intervals for twelve OECD exchange rates are generated, and modified tests of Giacomini and White (2006) are conducted to compare the performance of Taylor rule models and the random walk. Our contribution is twofold. First, we find that in general, Taylor rule models generate tighter forecast intervals than the random walk, given that their intervals cover out-of-sample exchange rate realizations equally well. This result is more pronounced at longer horizons. Our results suggest a connection between exchange rates and economic fundamentals: economic variables contain information useful in forecasting the distributions of exchange rates. The benchmark Taylor rule model is also found to perform better than the monetary and PPP models. Second, the inference framework proposed in this paper for forecast-interval evaluation can be applied in a broader context, such as inflation forecasting, not just to the models and interval forecasting methods used in this paper.

No. 23**Exchange Rate Pass-Through in a Competitive Model of Pricing-to-Market***Raphael Auer and Thomas Chaney*

Abstract: This paper extends the Mussa and Rosen (1978) model of quality-pricing under perfect competition. Exporters sell goods of different qualities to consumers who have heterogeneous preferences for quality. Production is subject to decreasing returns to scale and, therefore, supply and the toughness of competition react to cost changes brought about by exchange rate fluctuations. First, we predict that exchange rate shocks are imperfectly passed through into prices. Second, prices of low quality goods are more sensitive to exchange rate shocks than prices of high quality goods.

Third, in response to an exchange rate appreciation, the composition of exports shifts towards higher quality and more expensive goods. We test these predictions using highly disaggregated price and quantity U.S. import data. We find evidence that in response to an exchange rate appreciation, the composition of exports shifts towards high unit price goods. Therefore, exchange rate pass-through rates that are measured using aggregate data will tend to overstate the actual extent of pass-through.

Published as “Exchange Rate Pass-Through in a Competitive Model of Pricing-to-Market” in *Journal of Money, Credit and Banking*, Supplement to vol. 41, no. 1, 2009, pp. 151–75.

No. 24**How Successful Is the G7 in Managing Exchange Rates?***Marcel Fratzscher*

Abstract: The paper assesses the extent to which the Group of Seven (G7) has been successful in its management of major currencies since the 1970s. Using an event-study approach, the paper finds evidence that the G7 has been overall effective in moving the U.S. dollar, yen and euro in the intended direction at horizons of up to three months

after G7 meetings, but not at longer horizons.

While the success of the G7 is partly dependent on the market environment, it is also to a significant degree endogenous to the policy process itself. The findings indicate that the reputation and credibility of the G7, as well as its ability to form and communicate a consensus among individual G7 members, are important determinants for the G7's ability to manage major currencies. The paper concludes by analyzing the factors that help the G7 build reputation and consensus and by discussing the implications for global economic governance.

Published as “How Successful Is the G7 in Managing Exchange Rates?” in the *Journal of International Economics*, vol. 79, no. 1, 2009, pp. 78–88.

No. 25**Do China and Oil Exporters Influence Major Currency Configurations?***Marcel Fratzscher and Arnaud Mehl*

Abstract: This paper analyses the impact of the shift away from a U.S. dollar focus of systemically important emerging market economies (EMEs) on configurations between the U.S. dollar, the euro and the yen. Given the difficulty that fixed or managed U.S. dollar exchange rate regimes remain pervasive and reserve compositions mostly kept secret, the identification strategy of the paper is to analyse the market impact on major currency pairs of official statements made by EME policymakers about their exchange rate regime and reserve composition. Developing a novel database for 18 EMEs, we find that such statements not only have a statistically but also an economically significant impact on the euro, and to a lesser extent the yen against the U.S. dollar. The findings suggest that communication hinting at a weakening of EMEs' U.S. dollar focus contributed substantially to the appreciation of the euro against the U.S. dollar in recent years. Interestingly, EME policymakers appear to have become more cautious in their communication more recently. Overall, the results

underscore the growing systemic importance of EMEs for global exchange rate configurations.

Published as “Do China and Oil Exporters Influence Major Currency Configurations?” in *Journal of Comparative Economics*, vol. 37, no. 3, 2009, pp. 335–58.

No. 26

Monthly Pass-Through Ratios

Marlene Amstad and Andreas M. Fischer

Abstract: This paper estimates monthly pass-through ratios from import prices to consumer prices in real time. Conventional time series methods impose restrictions to generate exogenous shocks on exchange rates or import prices when estimating pass-through coefficients. Instead, a natural experiment based on data releases defines our shock to foreign prices. Our estimation strategy follows an event-study approach based on monthly releases in import prices. Projections from a dynamic common factor model with daily panels before and after monthly releases of import prices define the shock. This information shock allows us to recover a monthly pass-through ratio. We apply our identification procedure to Swiss prices and find strong evidence that the monthly pass-through ratio is around 0.3. Our real-time estimates yield higher pass-through ratios than time series estimates.

No. 27

International Portfolios, Capital Accumulation and Foreign Assets Dynamics

Nicolas Coeurdacier, Robert Kollmann and Philippe Martin

Abstract: Despite the liberalization of capital flows among OECD countries, equity home bias remains sizable. We depart from the two familiar explanations of equity home bias: transaction costs that impede international diversification, and terms of trade responses to supply shocks that provide risk sharing, so that there is little incentive

to hold diversified portfolios. We show that the interaction of the following ingredients generates a realistic equity home bias: capital accumulation, shocks to the efficiency of physical investment, as well as international trade in stocks and bonds. In our model, domestic stocks are used to hedge fluctuations in local wage income. Terms of trade risk is hedged using bonds denominated in local goods and in foreign goods. In contrast to related models, the low level of international diversification does not depend on strongly countercyclical terms of trade. The model also reproduces the cyclical dynamics of foreign asset positions and of international capital flows.

Published as “International Portfolios, Capital Accumulation and Foreign Assets Dynamics” in *Journal of International Economics*, vol. 80, no. 1, 2010, pp. 100–12.

No. 28

Investment and Trade Patterns in a Sticky-Price, Open-Economy Model

Enrique Martínez-García and Jens Søndergaard

Abstract: This paper develops a tractable two-country DSGE model with sticky prices à la Calvo (1983) and local-currency pricing. We analyze the capital investment decision in the presence of adjustment costs of two types, the capital adjustment cost (CAC) specification and the investment adjustment cost (IAC) specification. We compare the investment and trade patterns with adjustment costs against those of a model without adjustment costs and with (quasi-) flexible prices. We show that having adjustment costs results into more volatile consumption and net exports, and less volatile investment. We document three important facts on U.S. trade: a) the S-shaped cross-correlation function between real GDP and the real net exports share, b) the J-curve between terms of trade and net exports, and c) the weak and S-shaped cross-correlation between real GDP and terms of trade. We find that adding adjustment

costs tends to reduce the model's ability to match these stylized facts. Nominal rigidities cannot account for these features either.

Published as “Investment and Trade Patterns in a Sticky-Price, Open-Economy Model” in *The Economics of Imperfect Markets: The Effect of Market Imperfections on Economic Decision-Making*, Giorgio Calzavara and Enrico Saltari, ed., New York: Springer, 2009

No. 29

Monetary Policy Strategy in a Global Environment

Philippe Moutot and Giovanni Vitale

Abstract: Since the mid-1980s the world economy has gone through profound transformations of which the sources and effects are probably not yet completely understood. The process of continuous integration in trade, production and financial markets across countries and economic regions—which is what is generally defined as “globalization”—affects directly the conduct of monetary policy in a variety of respects. The aim of this paper is to present an overview of the structural implications of globalization for the domestic economies of developed countries and to deduct from these implications lessons for the conduct of monetary policy, and in particular the assessment of risks to price stability.

Published as “Monetary Policy Strategy in a Global Environment,” European Central Bank, Occasional Paper, no. 106, August 2009.

No. 30

Insulation Impossible: Fiscal Spillovers in a Monetary Union

Russell Cooper, Hubert Kempf and Dan Peled

Abstract: This paper studies the effects of monetary policy rules in a monetary union. The focus of the analysis is on the interaction between the fiscal policy of member countries (regions) and the cen-

tral monetary authority. When capital markets are integrated, the fiscal policy of one country will influence equilibrium wages and interest rates. Thus, there are fiscal spillovers within a federation. The magnitude and direction of these spillovers, in particular the presence of a crowding out effect, can be influenced by the choice of monetary policy rules. We find that there does not exist a monetary policy rule that completely insulates agents in one region from fiscal policy in another. Some familiar policy rules, such as pegging an interest rate, can provide partial insulation.

No. 31

Fiscal Stabilization with Partial Exchange Rate Pass-Through

Erasmus K. Kersting

Abstract: This paper examines the role of fiscal stabilization policy in a two-country framework that allows for a general degree of exchange rate pass-through. I derive analytical solutions for optimal monetary and fiscal policy which are shown to depend on the degree of pass-through. In the case of partial pass-through, an optimizing policymaker uses countercyclical fiscal stabilization in addition to monetary stabilization. However, in the extreme cases of complete or zero pass-through, the fiscal stabilization instrument is not employed. There is also no additional gain from the fiscal instrument in the case of coordination between the two countries. These results are due to the specific way the optimal fiscal policy rule affects marginal costs: Rather than being a substitute for monetary policy, fiscal policy complements it by increasing the correlation of the marginal cost terms within and across countries. This in turn makes monetary policy more effective at stabilizing them.

No. 32**Has Globalization Transformed U.S. Macroeconomic Dynamics?***Fabio Milani*

Abstract: This paper estimates a structural New Keynesian model to test whether globalization has changed the behavior of U.S. macroeconomic variables. Several key coefficients in the model—such as the slopes of the Phillips and IS curves, the sensitivities of domestic inflation and output to “global” output, and so forth—are allowed in the estimation to depend on the extent of globalization (modeled as the changing degree of openness to trade of the economy), and, therefore, they become time-varying. The empirical results indicate that globalization can explain only a small part of the reduction in the slope of the Phillips curve. The sensitivity of U.S. inflation to global measures of output may have increased over the sample, but it remains very small. The changes in the IS curve caused by globalization are similarly modest. Globalization does not seem to have led to an attenuation in the effects of monetary policy shocks. The nested closed economy specification still appears to provide a substantially better fit of U.S. data than various open economy specifications with time-varying degrees of openness. Some time variation in the model coefficients over the postwar sample exists, particularly in the volatilities of the shocks, but it is unlikely to be related to globalization.

No. 33**Global Slack and Domestic Inflation Rates: A Structural Investigation for G-7 Countries***Fabio Milani*

Abstract: Recent papers have argued that one implication of globalization is that domestic inflation rates may have now become more a function of “global,” rather than domestic, economic conditions, as postulated by closed-economy Phillips curves. This paper aims to assess the empirical importance of global output in determining

domestic inflation rates by estimating a structural model for a sample of G-7 economies. The model can capture the potential effects of global output fluctuations on both the aggregate supply and the aggregate demand relations in the economy, and it is estimated using full-information Bayesian methods. The empirical results reveal a significant effect of global output on aggregate demand in most countries. Through this channel, global economic conditions can indirectly affect inflation. The results, instead, do not seem to provide evidence in favor of altering domestic Phillips curves to include global slack as an additional driving variable for inflation.

No. 34**Should Monetary Policy “Lean or Clean”?***William R. White*

Abstract: It has been contended by many in the central banking community that monetary policy would not be effective in “leaning” against the upswing of a credit cycle (the boom) but that lower interest rates would be effective in “cleaning” up (the bust) afterwards. In this paper, these two propositions (can’t lean, but can clean) are examined and found seriously deficient. In particular, it is contended in this paper that monetary policies designed solely to deal with short-term problems of insufficient demand could make medium-term problems worse by encouraging a buildup of debt that cannot be sustained over time. The conclusion reached is that monetary policy should be more focused on “preemptive tightening” to moderate credit bubbles than on “preemptive easing” to deal with the aftereffects. There is a need for a new macrofinancial stability framework that would use both regulatory and monetary instruments to resist credit bubbles and thus promote sustainable economic growth over time.

No. 35**European Hoarding: Currency Use Among Immigrants in Switzerland***Andreas M. Fischer*

Abstract: Do immigrants have a higher demand for large-denominated banknotes than natives? This study examines whether cash orders for CHF 1000 notes, a banknote not used for daily transactions, is concentrated in Swiss cities with a high foreign-to-native ratio. Controlling for a range of socio-economic indicators across 250 Swiss cities, European immigrants in Switzerland are found to hoard fewer CHF 1000 banknotes than natives. A 1 percent increase in the immigrant-to-native ratio leads to a reduction in currency orders by CHF 4000. This negative correlation between immigrant-to-native ratio and currency orders for CHF 1000 notes holds irrespective of the European immigrants' country of origin. Hoarding of large-denominated banknotes by natives is attributed to tax avoidance.

No. 36**Can Long-Horizon Forecasts Beat the Random Walk Under the Engel–West Explanation?***Charles Engel, Jian Wang and Jason Wu*

Abstract: Engel and West (EW, 2005) argue that as the discount factor gets closer to one, present-value asset pricing models place greater weight on future fundamentals. Consequently, current fundamentals have very weak forecasting power and exchange rates appear to follow approximately a random walk. We connect the Engel–West explanation to the studies of exchange rates with long-horizon regressions. We find that under EW's assumption that fundamentals are $I(1)$ and observable to the econometrician, long-horizon regressions generally do not have significant forecasting power. However, when EW's assumptions are violated in a particular way, our analytical results show that there can be substantial power improvements for long-horizon regressions, even

if the power of the corresponding short-horizon regression is low. We simulate population R -squared for long-horizon regressions in the latter setting, using Monetary and Taylor rule models of exchange rates calibrated to the data. Simulations show that long-horizon regression can have substantial forecasting power for exchange rates.

No. 37**Global, Local, and Contagious Investor Sentiment***Malcolm Baker, Jeffrey Wurgler and Yu Yuan*

Abstract: We construct indexes of investor sentiment for six major stock markets and decompose them into one global and six local indexes. Relative market sentiment is correlated with the relative prices of dual-listed companies, validating the indexes. Both global and local sentiment are contrarian predictors of the time series of major markets' returns. They are also contrarian predictors of the time series of cross-sectional returns within major markets: When sentiment from either global or local sources is high, future returns are low on various categories of difficult-to-arbitrage and difficult-to-value stocks. Sentiment appears to be contagious across markets based on tests involving capital flows, and this presumably contributes to the global component of sentiment.

No. 38**A Model of International Cities: Implications for Real Exchange Rates***Mario J. Crucini and Hakan Yilmazkuday*

Abstract: We develop a model of cities each inhabited by two agents, one specializing in manufacturing, the other in retail distribution. The distribution sector represents the physical transformation of all internationally traded goods from the factory gate to the final consumer. Using a panel of micro-prices at the city level, we decompose the cross-sectional variance of long-run LOP deviations into the fraction due to distribution costs, trade costs and a residual. For the median good, trade costs account

for 50 percent of the variance, distribution costs account for 10 percent with 40 percent of the variance unexplained. Since the sample of items in the data are heavily skewed toward traded goods, we also decompose the variance based on the median good on an expenditure-weighted basis. Now the tables turn, with distribution costs accounting for 43 percent, trade costs 36 percent and 21 percent of the variance unexplained.

No. 39

State-Dependent Pricing, Local-Currency Pricing, and Exchange Rate Pass-Through

Anthony Landry

Abstract: This paper presents a two-country DSGE model with state-dependent pricing as in Dotsey, King, and Wolman (1999) in which firms price-discriminate across countries by setting prices in local currency. In this model, a domestic monetary expansion has greater spillover effects to foreign prices and foreign economic activity than an otherwise identical model with time-dependent pricing. In addition, the predictions of the state-dependent pricing model match the business-cycle moments better than the predictions of the time-dependent pricing model when driven by monetary policy shocks.

No. 40

Business Cycles and Remittances: Can the Beveridge–Nelson Decomposition Provide New Evidence?

Roberto Coronado

Abstract: In this paper, I analyze the business cycle properties of remittances and output series for three pairs of countries: United States–Mexico, United States–El Salvador, and Germany–Turkey. Using an unobserved components state-space model (via the Beveridge–Nelson decomposition), I decompose the remittances and output series into stochastic permanent and cyclical components. I then use the resulting stationary cyclical

components to estimate co-movements between remittances and output series. Empirical results indicate that remittances are countercyclical with all the home countries: Mexico, El Salvador and Turkey. With respect to source countries, remittances to Mexico are countercyclical with the United States business cycle, while remittances from the United States to El Salvador and remittances from Germany to Turkey are strongly procyclical with output fluctuations in the source country. The contribution of this paper to the literature is twofold: (1) I use high-frequency data (quarterly) for a relatively long period of time; and (2) I employ more recent and sophisticated econometric techniques in the decomposition of the series into stochastic permanent and cyclical components. The existing literature lacks both of these important aspects of my analysis. I show that once both of these factors are incorporated into the analysis, empirical results are more aligned to those predicted by economic theory.

Working Papers Issued from October 2007 through September 2008

No. 1

Is Openness Inflationary? Imperfect Competition and Monetary Market Power

Richard W. Evans

No. 2

A Monetary Model of the Exchange Rate with Informational Frictions

Enrique Martínez-García

Published as “A Model of the Exchange Rate with Informational Frictions,” in *B.E. Journal of Macroeconomics*, vol. 10, no. 1, 2010, Contributions, Article 2.

No. 3

International Trade in Durable Goods: Understanding Volatility, Cyclicalities, and Elasticities

Charles Engel and Jian Wang

No. 4**Cross-Border Returns Differentials**

Stephanie E. Curcuru, Tomas Dvorak and Francis E. Warnock

Published as "Cross Border Returns Differentials" in *Quarterly Journal of Economics*, vol. 123, no. 4, 2008, pp. 1495–1530.

No. 5**Production Sharing and Real Business Cycles in a Small Open Economy**

José Joaquín López

No. 6**Driving Forces of the Canadian Economy: An Accounting Exercise**

Simona E. Cociuba and Alexander Ueberfeldt

No. 7**Accounting for Persistence and Volatility of Good-Level Real Exchange Rates: The Role of Sticky Information**

Mario J. Crucini, Mototsugu Shintani and Takayuki Tsuruga

Published as "Accounting for Persistence and Volatility of Good-Level Real Exchange Rates: The Role of Sticky Information" in *Journal of International Economics*, In press accepted manuscript, 2010, doi:10.1016/j.jinteco.2010.01.003.

No. 8**How Should Central Banks Define Price Stability?**

Mark A. Wynne

No. 9**Country Portfolios in Open Economy Macro Models**

Michael B. Devereux and Alan Sutherland

No. 10**Vehicle Currency**

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Facing Troubles in an Era of Globalization

A Conversation with Nathan Sheets

Reprinted from Southwest Economy, First Quarter 2009, Federal Reserve Bank of Dallas

Economist Nathan Sheets, director of the Federal Reserve Board's Division of International Finance, puts a global perspective on the current economic crisis and the Fed's response to it.

Q. For more than a year, we've been trying to contain a global financial crisis. What went wrong?

A. The global economy has sustained the most intense and far-reaching financial shock in at least 50 years, a truly phenomenal financial shock. A number of factors have contributed to it. Most important, our major financial institutions weren't managing risk in a careful and prudent way. There's plenty of blame to go around. We should also include credit rating agencies, the regulators, corporate boards and investors. There was a breakdown in the capacity to analyze and understand the risk in the system.

A lot of folks see this crisis as first and foremost about housing. I see housing being more of a trigger that brought this failure of risk management to light.

Q. What does all this mean for your bailiwick—international finance?

A. The implications for the financial system are profound. We've seen a huge increase in risk aversion among investors. We've seen marked stresses in various kinds of financial markets, ranging from very short-term interbank markets all the way to longer-term debt markets. Equity prices have fallen significantly. There aren't many markets that have escaped the blow.



We're now seeing those financial shocks having a real impact on spending, production and GDP across the globe. I see this occurring through three important channels.

First, banks' willingness to lend has significantly deteriorated, so firms and individuals aren't getting the credit they need.

Second, we've seen a huge adverse wealth shock. With stock markets down as much as 50 percent and housing prices falling in a number of countries, people don't have the balance sheets to sustain spending.

Third, the financial developments have hit consumer and business confidence. It's true in the

U.S., U.K. and euro area, where the financial shock has been intense, but it's also true in emerging-market economies, where they didn't have the financial exposure.

Q. How has the accelerating globalization of recent decades shaped this crisis?

A. The fact that we're more globalized now has been one of the extraordinary features of this crisis. You look at trends in many financial markets—the U.S. line, the U.K. line, the euro-area line, the Japan line—and they're all moving together more or less in lockstep. The degree of integration has been phenomenal.

Part of that is a reflection of the fact that our financial markets were highly integrated, so subprime loans issued here ended up on foreign balance sheets. We're also very integrated through trade channels, meaning that the slowdown that's occurred as a result of this financial shock has hit other economies and fed back into ours.

One way of framing this is the debate about decoupling. If the U.S. economy slows or U.S. financial markets encounter problems, what does that mean for the rest of the world? There really was quite an argument about decoupling until about six months ago, centered on the question of whether other countries could avoid the troubles brewing in the United States. Now, it's clear that we rise and fall together.

Given the degree of integration and similar failures of risk management across the world, I think this episode is in some sense deeper than it would have been otherwise.

That doesn't mean that there aren't many positive factors from globalization. There are important efficiency gains, for example, but we're seeing that we're tied together and that we have many common vulnerabilities and shortcomings. We need to work together to manage these challenges and the responses to them.

Q. How does the international dimension affect the Fed's analysis and actions?

A. Let me give you a concrete example. Many financial institutions outside the U.S. have had significant demand for short-term dollar funding. They made loans to corporations in dollars or bought U.S.-denominated assets, and they needed dollars to fund those assets. I can't think of a previous instance of financial stress associated with such pronounced demand for dollars outside our borders.

The interbank markets these institutions depended on for funding essentially froze up last fall, and it created huge excess demand for short-term dollar liquidity abroad. Many of these foreign institutions would come to New York or other U.S. markets in search of dollars, so it would at times spill over into our markets and create stresses.

In response, the Fed joined with other major central banks to create a network of swap facilities, where we provide foreign central banks dollar liquidity and they give us an equivalent amount of their currencies. They then lend these dollars to financial institutions in their economies that need them. There's very little risk for the Fed. We have claims on the foreign central banks as well as holdings of their currencies to protect us.

We have had to extend the scope and influence of our liquidity facilities beyond our national borders, and that's been a new challenge.

Q. Has globalization put greater emphasis on cooperation with other central banks?

A. Absolutely. Central banks regularly communicated through mechanisms that were already in place, but the global stresses we've been facing have made it all the more important that central banks interact to keep each other informed and, where possible, even coordinate policy.

The swap agreements are an important example of this. Another is the coordinated inter-

est rate cuts by the Fed and other central banks in early October. Easing monetary policy was in the interest of each of these economies, but there's a strong additional statement that's made when central banks show they're cooperating to address global problems.

Q. What else will help us deal with global financial threats?

A. These aren't just Fed issues but matters of the broader financial architecture. We need better mechanisms to address problems faced by very large institutions that can be seen as too big to fail. We also need a well-articulated resolution process for a wider range of financial institutions. We have a good mechanism for addressing commercial banks under stress, but there's nothing comparable for some other types of institutions.

Q. More broadly, has globalization affected the way the Federal Reserve does its job?

A. It's certainly different. These dollar-funding pressures I mentioned earlier are a manifestation of just how much things have changed. We see this increased interdependence among economies and the need for collaboration among central banks and regulators in various countries.

Some people have argued that the effectiveness of monetary policy is being diminished, and I don't see that. Globalization has shifted the range of variables and the things you need to think about. You need to focus not only on what's going on within your own borders and your own financial markets but also on what's going on in the rest of the world and in global financial markets. There are feedback effects that are significant for assessing economic conditions and making policy decisions.

We're constantly trying to expand our analytical tool kit and improve our understanding of how economies and policies work. It's not explicitly global, but one issue we're thinking hard about at

the moment is the so-called financial accelerator effect, where sharp declines in asset prices hit the balance sheets of firms and individuals and make them less creditworthy. This can be a mechanism through which these kinds of financial shocks eat into the economy and become quite intense.

Another current issue is the zero lower bound. What are the implications for policy and the economy once short-term interest rates, the traditional tool for monetary policy, have been cut to nearly zero. What's the next step?

Q. How will this financial crisis affect the pace of globalization?

A. If anything, it may accelerate globalization in the sense that we're now very aware that we need to work closely together with other countries on such things as financial-sector supervision and rating assets. Major financial institutions are truly global in scope, and if we're approaching things one way and the French another and the Germans another and the British another, it creates dissonance in the global economy.

The leaders of the G-20 economies met in November in Washington, and they're going to meet again in early April in London. They're in the midst of addressing many of these issues in a global way, and I think we'll find that process has some staying power. We'll end up more integrated, more coherent and more consistent across countries than we were before this crisis erupted.

Along the way, there's risk of protectionism emerging. History teaches that we're more prosperous if we're open rather than closed—especially at times like this. Think about what happened in the Great Depression, when countries put up sizable tariffs and global trade collapsed. That can start a downward spiral for the global economy, so we have to guard very forcefully against protectionism.

Who's Who at the Institute

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Mark A. Wynne joined the Federal Reserve Bank of Dallas in 1989 and is currently a senior economist and vice president. He is widely published in many leading professional journals. During 1997–98, Wynne worked on issues related to monetary policy strategy under economic and monetary union for the European Monetary Institute and, later, the European Central Bank. He holds first-class honors B.A. and M.A. degrees from the National University of Ireland (University College, Dublin) and an M.A. and a Ph.D. from the University of Rochester.

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John B. Taylor is Mary and Robert Raymond Professor of Economics at Stanford University. He is a globally recognized expert on international monetary and financial issues and has produced extensive research on monetary policy, fiscal policy and international economic policy. Taylor is recognized throughout the economics profession and within monetary policy circles as the originator of the Taylor rule, a guiding principle for macroeconomic stabilization followed by many central banks. He also serves as senior fellow at the Hoover Institution and Stanford Institute for Economic Policy Research, was founding director of the Stanford Introductory Economics Center and is a research associate at the National Bureau of Economic Research. Taylor has many years of distinguished service with the U.S. government, most recently as undersecretary of Treasury for international affairs from 2001 to 2005. He was a member of the president's Council of Economic Advisers from 1989 to 1991. He received a B.A. in economics from Princeton University and a Ph.D. in economics from Stanford University.

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W. Michael Cox is director of the O'Neil Center for Global Markets and Freedom at Southern Methodist University's Cox School of Business and former senior vice president and chief economist at the Dallas Fed. He is author of a host of essays and reports that have received extensive attention from leading publications including the *Wall Street Journal*, *New York Times* and *USA Today*. He is also widely published in the nation's leading economic journals. Cox received an undergraduate degree in business and economics from Hendrix College and a Ph.D. in economics from Tulane University.

Mario Crucini is an associate professor of economics at Vanderbilt University. He is currently an associate editor of the *Journal of International Economics* and the *Journal of Money, Credit and Banking*. He is also a member of the board of editors of the *Review of International Economics*. Crucini has written widely on international business cycles, the contribution of trade policy to the

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Francis E. Warnock is associate professor of business administration at the Darden Graduate School of Business at the University of Virginia. He is currently a faculty research fellow at the National Bureau of Economic Research and a research associate at the Institute for International Integration Studies at Trinity College Dublin. He was recently a consultant at the International Monetary Fund and a research fellow at the Hong Kong Monetary Authority. In addition, he served for several years as senior economist in the International Finance Division at the Federal Reserve Board. Warnock received a B.A. from Johns Hopkins University and Ph.D. from the University of North Carolina at Chapel Hill.

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