Globalization and Monetary Policy Institute

2008 Annual Report

Federal Reserve Bank of Dallas


POLUS ARCTICUS.
AMERICA
Circulus Arcticus
SEPTEN-
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Circulus Antarcticus
POLUS SEPTEN
TRIONALIS.
Systema Mundi juxta mentem Claudii Ptolomæi Alexand.
MARE
TARTARI
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Letter from the President

When I took office as president of the Federal Reserve Bank of Dallas in 2005, I reorganized our Research Department to make the study of globalization and its implications for U.S. monetary policy our signature research issue. My belief then, as now, was that the models we use to think about monetary policy in the U.S. give too little weight to developments beyond our borders, as I outlined in a lecture given at Harvard University on Nov. 3, 2005 (see page 27). In essence, policymakers were thinking as if the tectonic events of the past two decades had never happened. Yet the evidence that the world has changed—had changed utterly—confronts us every day in every aspect of our lives. We see it where we work, when we shop, and in how we save, invest and borrow.

In the fall of 2007, we launched the Globalization and Monetary Policy Institute to focus our efforts in this area, and I am pleased to introduce the institute's first annual report. The researchers who form the core of the institute's staff have been very active developing research programs that will advance our understanding of what globalization means for monetary policy, circulating their analyses in working paper form, presenting their findings at prominent conferences and university seminars, and submitting their papers to peer-reviewed journals. Their efforts have been complemented by a group of prominent senior fellows and a growing list of research associates. Some of the emerging research themes are highlighted in institute Director Mark Wynne's essay, "First Steps"—measuring the extent to which an economy is globalized, the controversial "global slack hypothesis" and "decoupling," and the political aspects of monetary policy making in open economies.

But this is just a start, the first steps in what will no doubt be a long journey. The challenges (and opportunities) that globalization presents us with are many. The events of the past year have underlined the importance of understanding the nature of the trade and investment relationships that tie our individual economies into a single global economy. The Dallas Fed's Globalization and Monetary Policy Institute will be at the leading edge of this research.

Richard W. Fisher

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First Steps

Developing a Research Agenda on Globalization and Monetary Policy

Monetary policy makers in small open economies are used to thinking about external events when making their policy decisions.

In 2008, for only the third time since its creation in 1969, the Nobel Memorial Prize in Economics was awarded for research in international economics.[1] The recipient, Paul Krugman of Princeton University, received the award for "his analysis of trade patterns and the location of economic activity." In addition to his work on what came to be known as the "new trade theory" and economic geography, Krugman made important contributions to the study of international financial crises. Few awards have been so timely: The world currently finds itself in the midst of the largest global financial crisis since the Great Depression of the 1930s, and the crisis has underlined the importance of thinking about monetary policy and financial stability in a global instead of a purely national context.

The global nature of the crisis that began in August 2007 is a reflection of the extent to which the economies of different countries have become integrated into a single global economy over the past two decades or so. Financial globalization, the greater mobility of capital across national borders, was pivotal to the boom in the U.S. housing market that preceded the crisis. It has also been the primary conduit whereby problems in the U.S. housing market have been transmitted to the rest of the world. Real globalization, the surge in global trade in goods and services, is also playing an important role in the current cyclical episode, as slower growth overseas limits the potential for U.S. export growth, and weaker growth in the U.S. reduces demand for imports from emerging market economies.

This essay reviews some of the issues we see as crucial to advancing our understanding of globalization's implications for U.S. monetary policy and highlights some of the research we have been doing to shed light on these issues. We will make no claim to being comprehensive. Rather, our objective is to describe some of the initial steps we have taken toward developing a research agenda and show how it fits in with the broader literature.

How Globalized Is the U.S. Economy?

Monetary policy makers in small open economies are used to thinking about external events when making their policy decisions. One only has to peruse the monthly bulletins or inflation reports of central banks around the world to get a sense of the importance they attach to the international environment when assessing the outlook for inflation and real economic activity in their economies. But for a large, seemingly relatively closed economy such as the U.S., surely international developments are of secondary importance. We frequently encountered this argument when the Dallas Fed started pushing this research program three years ago.

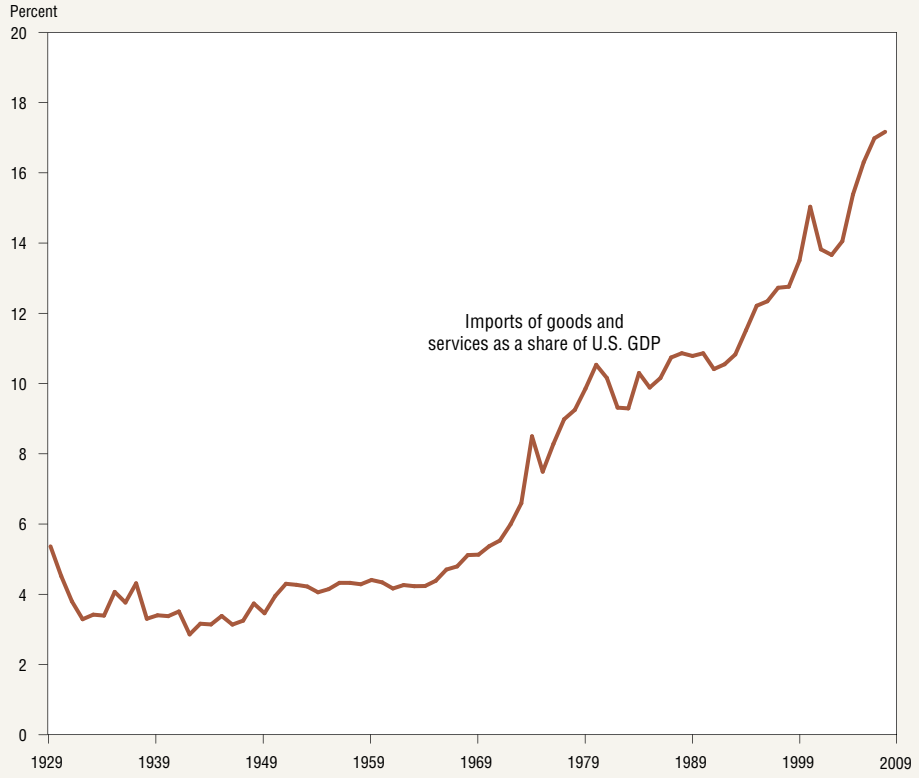
Let's start with the assertion that the U.S. is a relatively closed economy. When we think about the extent to which an economy is open to the rest of the world, the measure most commonly looked at is the ratio of imports of goods and services to GDP. This measure has a certain intuitive appeal: Obviously, if a country is completely isolated from the rest of the world, it won't be importing anything and the ratio will be zero. As a country opens up to the rest of the world, imports will grow and the ratio should increase. Figure 1 plots the ratio

of imports of goods and services to U.S. GDP since 1929. Through the mid-1960s, imports amounted to less than 5 percent of GDP. But starting in the mid-1960s, imports increased as a share of GDP, and as of 2007, amounted to just over 17 percent. Note that the increase seems to have occurred in two steps: the first from the mid-1960s through the early 1980s, when imports leveled off at about 10 percent of GDP; and then starting around 1990, when imports again began to grow relative to GDP and have yet to show any sign of leveling off.

So by this measure, it could be said that the U.S. is three times more globalized today than it was in the early post–World War II period. But also by this measure, despite the big increase in imports relative to GDP, the U.S. remains relatively closed. Just looking at our NAFTA partners, in both Canada and Mexico imports amount to about one-third of GDP, about twice their importance to the U.S. Looking farther afield, in Ireland imports amounted to more than two-thirds of GDP in recent years, while in Belgium the share of imports was 85 to 90 percent.

But the volume of imports relative to overall economic activity is a very incomplete measure of the extent to which a country is integrated with the rest of the world. First, most economists would argue that a better measure of integration would look at price data and ask whether goods and services in the domestic market sell at something close to their world prices. A country would be considered globalized if the prices of a representative basket of goods and services were not that different from those prevailing on world markets; a country would be considered more globalized if domestic prices had converged to world

Figure 1
Real Globalization



SOURCE: Bureau of Economic Analysis/Haver Analytics.

prices. We see this approach employed frequently in historical analyses of globalization (see, for example, O'Rourke and Williamson 2002a, b) but less frequently in the literature on contemporary globalization due to data problems.[2]

Indeed, if we think about defining economic integration in terms of how close domestic prices are to world prices, it quickly becomes obvious that the ratio of imports to GDP can severely understate the degree to which an economy is globalized. For example, if domestic prices were identical to world prices, there might be no incentive to engage in international trade and the share of imports in GDP would be zero. Yet globalization would have very real consequences for the pricing power of domestic firms: The threat of imports would limit their ability to pass on price increases to their domestic customers.

Guilloux and Kharroubi (2008) illustrate this point concretely by showing how the impact of import price inflation on overall inflation is qualitatively different for commodity imports and noncommodity imports in the industrialized countries of the Organization for Economic Cooperation and Development over the period 1980–2005. They show that whereas the overall volume of commodity imports is an important determinant of the impact of commodity import inflation on domestic commodity inflation, the impact of noncommodity import inflation on domestic noncommodity inflation is independent of the volume of noncommodity imports. As they note, "Noncommodity imports are essentially manufactured goods for which contestability exists. Hence domestic producers modify their prices according to the price of imports or according to the international price whatever the effective volume of imports because the threat of possible imports triggered by arbitrage opportunities stemming from price gaps is credible."

But globalization is about more than just trade. The global financial crisis that began in August 2007 and intensified over the course of 2008 would have taken a very different course were it not for the extraordinary increase in financial globalization over the past two decades. Capital is more mobile internationally than it was 35 years ago.

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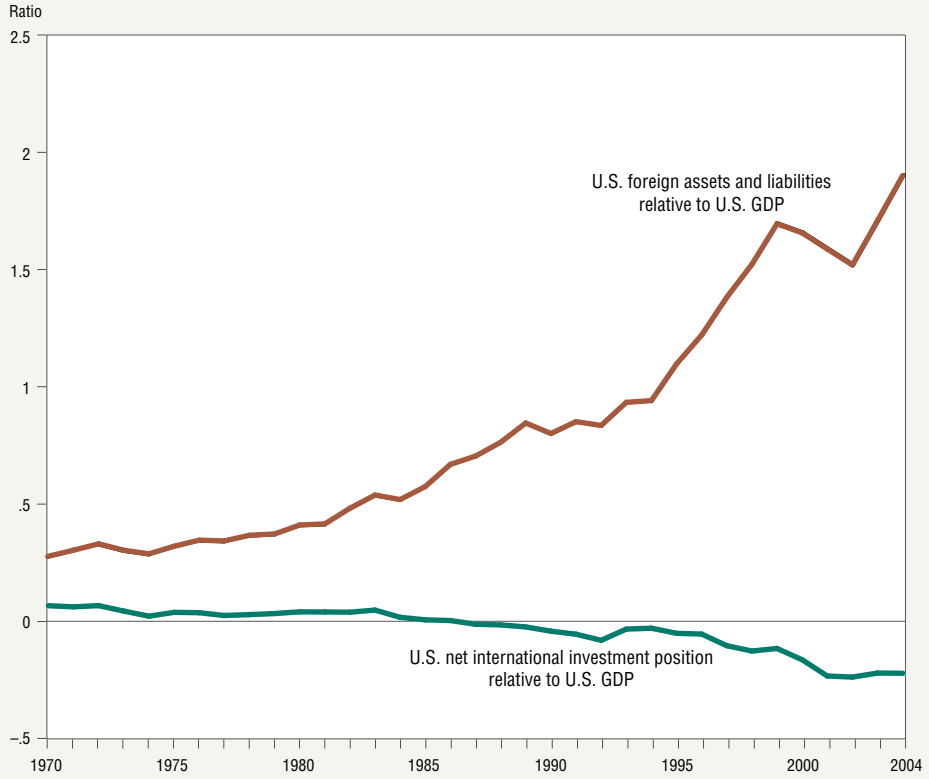
One simple measure of the extent to which a country is financially globalized is given by the ratio of its foreign assets and liabilities to its GDP. Figure 2 shows this ratio for the U.S. from 1970 through 2004 using data from Lane and Milesi-Ferretti (2006). It is well known that the U.S. has become a net debtor to the rest of the world in recent decades. But as we have accumulated liabilities to the rest of the world through our borrowing, we have continued to lend and invest overseas on a massive scale. As of 2004, the last year for which data are available from this particular source, U.S. foreign assets and liabilities amounted to nearly two times U.S. GDP.[3]

How do we combine a measure of financial globalization with a measure of real globalization to arrive at a single index? Indeed, how do we incorporate information on the extent to which the U.S. labor market is open into our measure of globalization? The United States has long been a destination of choice for international migrants. Over the past decade, net international migration into the U.S. has amounted to more than 1 million people a year. Some 12.5 percent of the current U.S. population is estimated to have been born overseas. The ability of the U.S. to draw on a large stock of foreign workers has been a significant source of strength for the U.S. economy over the years, and the cyclical response of migration to economic conditions in the U.S. helps alleviate labor market pressures.

Quantifying the extent to which the U.S. is globalized or has become more globalized over time is a nontrivial exercise. Even if we confine ourselves to the economic dimensions of globalization—the extent to which the U.S. economy has become more integrated into the global economy—the measures commonly used have short-

Figure 2
Financial Globalization



SOURCE: "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004," by Philip R. Lane and Gian Maria Milesi-Ferretti, Discussion Paper no. 126, Institute for International Integration Studies, Dublin, August 2006.

comings and are not easily combined in a single indicator. An important area for future research is to understand the limitations of existing measures and try to come up with better ones.

The Global Slack Hypothesis

Few relationships play a more central role in debates about monetary policy than the Phillips curve, the negative relationship between inflation and resource utilization. It is generally accepted that this relationship has changed in many countries in recent years, although the exact reason for the change is not well understood. Some have argued that better monetary policy is the explanation, while others have asserted that globalization is the key. That is, as countries have begun to trade more with each other, foreign slack in addition to domestic slack matters for domestic inflation developments. This so-called global slack hypothesis is arguably one of the more controversial hypotheses advanced in the debate over globalization's potential implications for U.S. monetary policy. Although the notion that foreign resource utilization might be an important determinant of U.S. inflation was explored in a number of papers in the 1990s (Garner 1994, Orr 1994 and Tootell 1998), the debate was reinvigorated by Borio and Filardo's (2007) comprehensive analysis. They found an increased role for foreign slack as a determinant of inflation in a variety of countries and attributed this to globalization. Subsequent research by Ihrig et al. (2007) raised questions about the robustness of Borio and Filardo's results, but the debate is far from over.[4]

As a matter of theory, foreign slack should matter for domestic inflation developments in the new neoclassical synthesis/new Keynesian models of Goodfriend and King (1997) and Clarida, Galí and Gertler (2000). These models combine elements from the real business-cycle models of Kydland and Prescott (1982) with the sorts of nominal rigidities long emphasized in Keynesian models of the business cycle to create a framework that has proven extremely useful in thinking about monetary policy. Clarida, Galí and Gertler (2002) extend the basic model to an open-economy setting and consider some of the challenges monetary policy makers face in a more globalized environment.[5]

What remains a challenge is understanding why the relationship between U.S. inflation and measures of foreign resource utilization is so fragile in the data. It may be because the measurement of output gaps is itself an exercise fraught with difficulty, and these difficulties are compounded when seeking to operationalize the concept in countries where data are limited and of questionable accuracy.[6] Another concern is that the theory-consistent measure of the output gap may bear little or no relationship to the traditional measures employed in empirical studies to date.

Decoupling

Yet another reason it might be difficult to detect evidence for the global slack hypothesis in the data is the seemingly significant synchronization of economic activity around the world. When the current crisis began to unfold late in the summer of 2007, there was some hope that continued strong growth in the emerging giants (such as China, India and Brazil) might be able to sustain global growth as the more advanced economies slipped into recession. This idea was referred to as decoupling, with growth in emerging markets no longer dependent on their ability to sell to the richer countries. By the fall of 2008, however, that idea seemed to have been put to rest: The crisis that began in the North Atlantic region had spread with a vengeance to the rest of the world. Once we abstract from the rapid rates of trend growth in the emerging market economies, the ups and downs of economic activity that we refer to as the business cycle seem very synchronized across countries. Figure 3 shows the business-cycle component of GDP growth for the developed and developing countries, demonstrating how economic activity tends to rise and fall in tandem around the world.[7]

In addition to posing an important challenge for empirical evaluation of the global slack hypothesis, this synchronization of activity is of interest in and of itself.

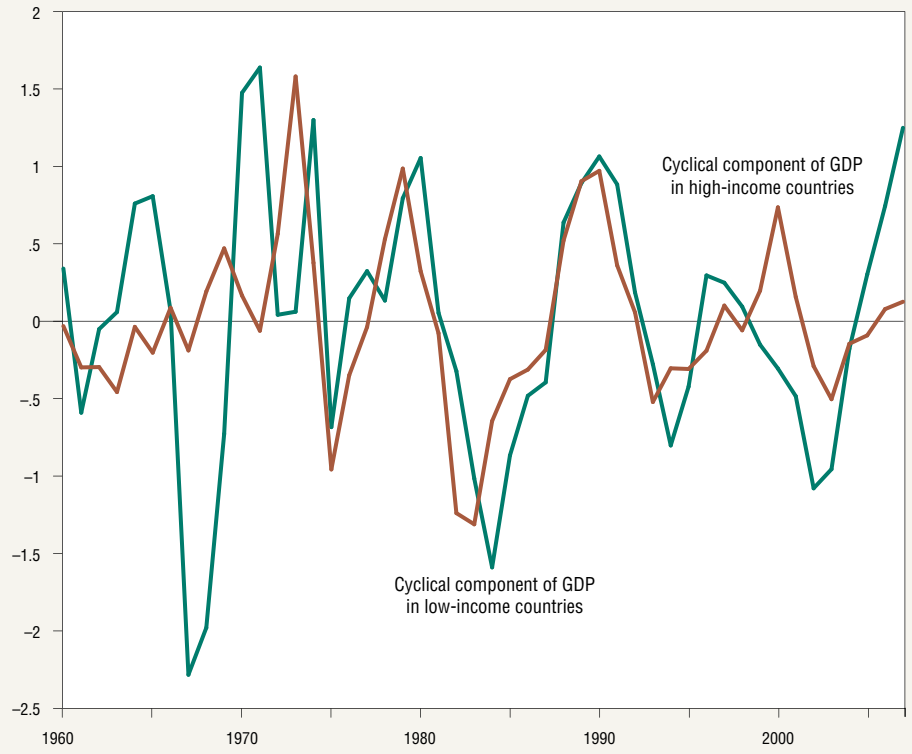
In addition to posing an important challenge for empirical evaluation of the global slack hypothesis, this synchronization of activity is interesting in and of itself. What causes it? Is it simply due to common shocks? For example, the prices of oil and other commodities are set on world markets, and movements in these prices tend to impact all countries at the same time, albeit differently depending on whether the country is a net user or net producer of the commodity and depending on the country's production structure.[8]

Or perhaps trade linkages are the key? Frankel and Rose (1998) were the first to document that countries with strong trade ties also tend to have highly correlated business cycles. How well do existing models explain this feature of the data? López (2007) examines the role of production sharing by Mexican maquiladoras as a mechanism through which shocks are transmitted from the U.S. to the maquiladora sector in Mexico and finds some success. However, Arkolakis and Ramanarayanan (2008) find in a more general setting that the standard mechanisms in existing, open-economy macro models cannot generate the degree of synchronization we see in the data.

Globalization and Inflation

More-globalized countries seem to have lower inflation rates over long periods than less-globalized countries do. This relationship was first noted by Romer (1993) and has spawned a significant research literature. Figure 4 shows

Figure 3
Decoupling?



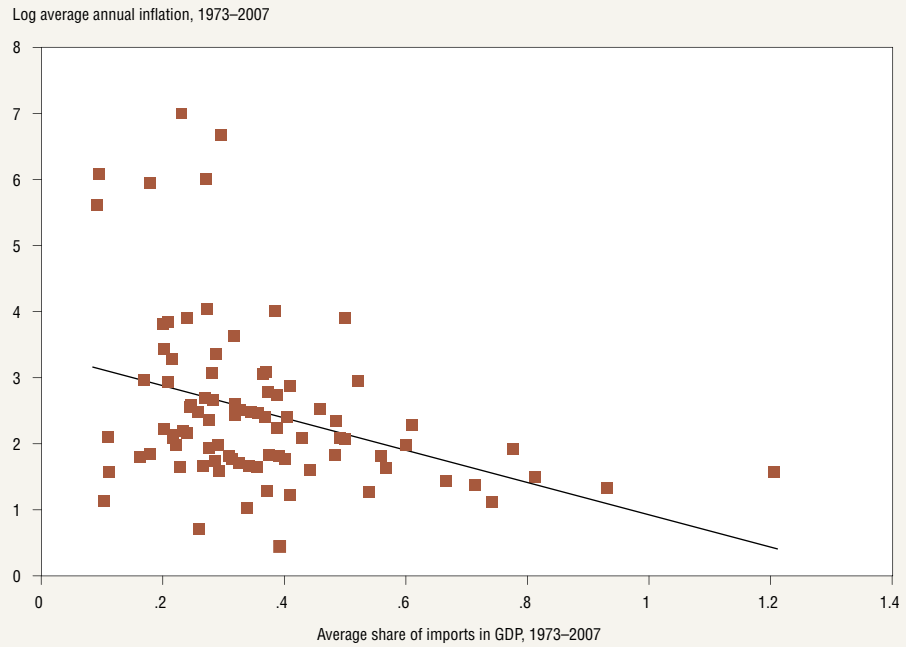
SOURCE: World Development Indicators, World Bank.

average annual inflation rates in a large group of countries over three decades relative to the degree of openness of the countries, as measured by the share of imports in their GDP. The clearly negative relationship holds up even after we control for a variety of other factors. Inflation over long periods is completely in the hands of monetary policy makers, and this chart raises the question of what it is about the monetary policy making process in more-open economies that causes policymakers in those economies to choose lower inflation rates. Is it the benign environment created by greater competition in domestic markets? Or the fear of capital flight if bad policies were to be pursued?[9] Or access to foreign factors of production that make supply more elastic? Perhaps low inflation and trade openness are driven by a common third factor, such as good institutions that pursue sound policies in all areas.

Many explanations have been advanced for the observed negative relationship between long-run inflation and openness as traditionally measured. Almost all are based on some variant of the time consistency problem that arises under discretionary monetary policy making first highlighted by Kydland and Prescott (1977). However, there have been relatively few attempts to develop formal general equilibrium models that account in a quantitative sense for what we see in the data. In the Globalization and Monetary Policy Institute's first working paper, Evans (2007) developed a simple general equilibrium model to shed some light on the observed relationship and found that, contrary to what we see in the data, greater openness should be associated with higher, not lower, inflation.

Figure 4

Long-Run Inflation Is Lower in More-Open Economies



SOURCE: World Development Indicators, World Bank.

Countries that are more globalized seem to have lower inflation rates over long periods of time than countries that are less globalized.

Next Steps

This essay has reviewed some of the themes emerging from the research being conducted at the institute. We are developing many more themes, which will be highlighted in future institute annual reports. We have not addressed issues concerning financial globalization in any great depth, yet it is clear that the growth of international capital markets is a crucial element of globalization and has very direct implications for monetary policy, as recent events have shown.[10] Nor have we addressed the issue of international pricing, which is at the core of many debates in contemporary international macroeconomics. We expect to make significant contributions to this issue in the years ahead.

An important part of our ongoing research entails developing better models of the international economy. For all the progress that has been made in recent years, we are still a long way from having a workhorse model of the international macroeconomy that performs well on most dimensions. The seminal contribution of Backus, Kehoe and Kydland (1992, 1995) documented a number of anomalies that arise in a standard open-economy version of the Kydland and Prescott (1982) model. Foremost among these anomalies is that output appears to be more highly correlated across countries than consumption. This is the opposite of what we expect to see based on the model's predictions and is clearly related to our ability to model international financial markets.

The basic open-economy model of Clarida, Galí and Gertler (2002) builds on the methodological foundations laid by Kydland and Prescott and has proven useful for developing some understanding of monetary policy issues in an open-economy context. Nevertheless, the model has important shortcomings and can certainly be

improved. To begin with, despite its roots in the real business-cycle literature, the model has no role for capital accumulation. For some questions, this may be a harmless abstraction, but for many others it is of vital importance. Given the centrality of capital accumulation to the business cycle in capitalist economies, it is difficult to imagine any consensus model not having a crucial role for capital.

A second shortcoming of Clarida, Galí and Gertler's framework is its inability to capture the effect of greater competition associated with globalization on firms' markups.[11] Finally, the assumption about price setting at the firm level that is used to generate nominal rigidities in this model seems to be at variance with some microeconomic evidence on the frequency of price changes.

Indeed, even many features of trade flows and patterns are not well explained by the existing corpus of trade theory. We noted at the beginning of this essay that the 2008 Nobel Prize in economics was awarded for work that led to the development of the new trade theory in the 1980s to better account for trade flows between similar countries. The recent work of Eaton and Kortum (2002) and Melitz (2003) has likewise deepened our understanding of geography's role in trade patterns and trade's impact on productivity at the firm level and is spurring the development of what is coming to be known as the *new* new trade theory.

In short, while economists already have many tools available for understanding globalization and what it might mean for monetary policy, there are numerous open questions, and these questions will form the institute's research agenda over the years to come.

—Mark Wynne

Notes

[1] Previous Nobel laureates in economics who received the award for work in international economics were Bertil Ohlin and James Meade in 1977, who received the award "for their pathbreaking contribution to the theory of international trade and international capital movements" and Robert Mundell in 1999, who won the award "for his analysis of monetary and fiscal policy under different exchange rate regimes and his analysis of optimum currency areas." Since the creation of the Nobel Prize in economics in 1969 (or more accurately, the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel), 62 individuals have received the prize. In the press release announcing the 1977 award to Ohlin and Meade, the Swedish Academy drew attention to what it called "the growing internationalization of the economic system" as a key factor illustrating the importance of their contributions. The press release concluded, "It has become increasingly clear that problems related to the allocation of resources, business cycles and the distribution of income are very much international problems. This means that foreign trade, international price fluctuations, the international allocation of economic activities and the transfer of resources, as well as the international payments system, have become dominant factors in economic analysis and economic policy." Recall that John Maynard Keynes also used the term *internationalization* to describe the highly integrated global economy that existed prior to World War I. The use of the term *globalization* to refer to essentially the same phenomenon is of more recent vintage. The internationalization of the pre-WWI period and the 1960s and 1970s did exclude a significant part of the world's population; globalization is internationalization for everyone.

[2] See Knetter and Slaughter (1999).

[3] A comparable figure is obtained using data reported by the Bureau of Economic Analysis.

[4] Calza (2008) evaluated the global slack hypothesis using euro-area data and finds little evidence that global output gaps matter for euro-area inflation.

[5] Martinez-Garcia (2008) provides a detailed analysis of the basic two-country model, with a particular emphasis on exploring the implications of local currency pricing.

[6] Some of these issues are explored in Wynne and Solomon (2007).

[7] Backus, Kehoe and Kydland (1992, 1995) document a number of facts about the business-cycle behavior of macroeconomic aggregates in different countries and show how they are at variance with the predictions of a two-country version of the Kydland and Prescott (1982) model.

[8] Balke, Brown and Yücel (2008) examine the importance of oil price shocks for fluctuations in U.S. economic activity and find that they are less important than shocks to total factor productivity or the labor wedge.

[9] Cox and Alm (2006) explored some of the ways in which globalization serves to discipline public policy in the Dallas Fed's 2005 Annual Report.

[10] A number of our working papers released over the past

year address important aspects of financial globalization. Curcuru, Dvorak and Warnock (2007) look at the returns differential of U.S. claims on the rest of the world over U.S. liabilities to the rest of the world and find that the apparent differential is a lot smaller than previously estimated. Kho, Stulz and Warnock (2008) seek to understand the evolution of home bias over time by combining standard portfolio theories of home bias with theories of insider ownership drawn from the corporate finance literature, developing an optimal ownership theory of home bias. They show that the home bias of U.S. investors toward the 46 countries with the largest equity markets did not fall over the past decade but did decrease toward countries in which the ownership by corporate insiders decreased. Finally, Devereux and Sutherland (2008) develop techniques that allow for more sophisticated modeling of financial markets in standard open-economy macro models.

[11] The constant elasticity of substitution specification of preferences that is used in this and other models of open economies implies a constant markup of price over marginal cost, regardless of the degree of openness of the economy. Guerrieri, Gust and López-Salido (2008) develop an extension of the Clarida, Galí, Gertler model with variable demand elasticities and markups to examine the impact of foreign competition on desired markups. Auer and Fischer (2008) look at the effect of U.S. trade with labor-abundant nations on U.S. producer prices over the 1997–2006 period. They show that when the nine labor-abundant countries in their sample capture a 1 percent market share in a U.S. sector, U.S. producer prices decline by 2 to 3 percent. While the bulk of the price decline is due to induced productivity growth in the sector, a nontrivial (albeit not statistically significant) amount is due to decreased markups.

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Summary of Activities

When Richard Fisher took office on April 1, 2005, as the 12th president of the Federal Reserve Bank of Dallas, he mandated that the Bank's Research Department make the study of globalization and its implications for U.S. monetary policy its signature research program. To that end, in September 2007, following two years of preparatory work that included the hiring of a group of economists to work specifically on this project, the Bank formally created a Globalization and Monetary Policy Institute. The institute has now been in business for just over one year, and it is appropriate to review what has been accomplished in that time.

Structure

The core permanent staff of the institute consists of a director, five staff economists and two research assistants. The research activity of this group is complemented by a small group of senior fellows, who primarily represent academia, and a slightly larger group of research associates, all of whom are currently drawn from other central banks. The activities of the institute are overseen by an advisory board, which is chaired by Stanford University professor John B. Taylor. (See the institute roster on page 33.)

Working Papers

The long-term business objective of the institute is to make the Federal Reserve Bank of Dallas a recognized center of excellence in the study of globalization and how it alters the way policymakers should think about monetary policy. We believe that such recognition will only come with a demonstrated ability to contribute to the peer-reviewed literature at the highest levels, and so the promotion of rigorous academic research on key policy questions will be our main priority. To this end, the core business product of the institute is its working paper series. Through September 2008, 20 papers have appeared in the series, with contributions from staff of the institute, senior fellows, research associates and other Federal Reserve Bank of Dallas staff. One of the papers has already been published in a peer-reviewed journal. "Cross-Border Returns Differentials," by senior fellow Frank Warnock and coauthors Stephanie Curcuru and Tomas Dvorak, was published in the *Quarterly Journal of Economics* in November 2008. These working papers address a wide range of issues pertaining to globalization and its implications for U.S. monetary policy, ranging from whether global output gaps have become more important for domestic inflation dynamics than domestic output gaps, to examination of the determinants of real exchange rate movements. (For a complete set of working paper abstracts, see page 20.)

Conferences and Seminars

Staff economists affiliated with the institute have been active presenting their research at conferences and seminars. Over the past year, they have participated at the October 2007 meeting of the Federal Reserve System Committee on International Economic Analysis, the summer meetings of the Society for Economic Dynamics, the Midwest Macro Meetings, Midwest Economic Association, North American summer meetings of the Econometric Society, 16th Annual Symposium of the Society for Nonlinear Dynamics and Econometrics, Conference on Methods and Topics in Economic and Financial Dynamics at the University of Texas at Dallas, 14th International Conference on Computing in Economics and Finance, the 2008

NBER Summer Institute and the 2008 Far Eastern Econometric Society Meeting. They have taken part in seminars at Texas A&M University, University of Texas at Arlington, Hong Kong University of Science and Technology, Chinese University of Hong Kong, Hong Kong Monetary Authority, Shanghai University of Finance and Economics, Vanderbilt University and the University of Western Ontario.

Staff have also served as discussants at a number of conferences and as referees for journals such as the *Journal of Monetary Economics*, *Journal of International Economics*, *Journal of Development Economics* and *Review of Economic Dynamics*. Institute staff have also been developing joint projects with researchers at other institutions (Bank of England, Federal Reserve Bank of Boston, Federal Reserve Bank of San Francisco, Federal Reserve Board of Governors) and universities (University of Wisconsin, Yale University, Boston University, University of Virginia, Vanderbilt University), and one economist taught a course on globalization and monetary policy at the University of Alicante in Spain in December 2007.

The institute cosponsored the Murray S. Johnson Memorial Conference at the University of Texas at Austin in April. We organized a session on international pricing that featured research done at the institute (some preliminary findings from Anthony Landry's IKEA project) and invited other prominent researchers on international pricing to participate in the session. (More details are provided in the conference summary on page 16.)

Bank Publications

In addition to producing working papers intended for publication in academic journals and other peer-reviewed publications, the institute disseminates research through the Federal Reserve Bank of Dallas' publications. Over the past year, institute economists contributed two articles to the Bank's *Economic Letter* series: "Why Are Exchange Rates So Difficult to Predict?" by Jian Wang, which appeared in the June 2008 issue, and "The Big Mac: A Global-to-Local Look at Pricing" by Anthony Landry, in the September 2008 issue. On the basis of his *Economic Letter* article, Wang was invited to contribute a web article to VoxEU, a policy portal maintained by the Center for Economic Policy Research in London to promote rigorous policy commentary by top researchers. (Wang's article is available on the Internet at www.voxeu.org.)

Mark Wynne and Erasmus Kersting published an article on "The Globalization of U.S. Business Investment" in the Bank's *Staff Papers* series in February 2008, and Wynne gave an interview that appeared in the January/February 2008 issue of *Southwest Economy* sketching out plans for the institute. Institute senior fellow Charles Engel discussed globalization and the current financial crisis in a *Southwest Economy* interview. (Read the interview on page 30.) The institute also produces a regular update on international economic conditions to complement the national and regional updates that have been published on the Bank's website for several years.

Visiting Scholars

Since its creation, the institute has hosted a number of visitors. In December 2007, professors Eric Young from the University of Virginia and Kim Ruhl from the University of Texas at Austin spent several days at the institute and gave seminars. In the spring, Jens Søndergaard of the Bank of England and professors Rody Manuelli from the University of Wisconsin, Costas Arkolakis from Yale University and Mario Crucini from Vanderbilt University each visited for a week, as did professors Ronald Jones of the University of Rochester and Roy Ruffin of the University of Houston. Søndergaard has since joined the institute as a research associate, and Crucini has joined as a senior fellow.

—Mark Wynne

Conference on International Economics

On April 4 and 5, 2008, the Globalization and Monetary Policy Institute, in collaboration with the Department of Economics at the University of Texas at Austin, cosponsored the Murray S. Johnson Memorial Conference on international economics in Austin. The conference brought together scholars to discuss a variety of international topics. Nine papers were grouped under three sessions: exchange rates and capital flows, empirical international trade and international prices.

Exchange Rates and Capital Flows

The first session dealt with exchange rate movements and capital flows in emerging countries. The first paper was presented by Cristina Arellano from the University of Minnesota and the Federal Reserve Bank of Minneapolis. The paper, written jointly with Ananth Ramanarayanan from the Federal Reserve Bank of Dallas, studies the maturity composition of government debt in emerging countries. Arellano and Ramanarayanan note that governments in emerging countries issue debt in international markets with a volatile maturity structure: Debt issuances are mostly short-term when interest rate spreads are high and are mostly long-term when interest spreads are low.

Using a dynamic model of borrowing and defaults, the authors show that managing the maturity of debt can provide benefits to the government because of uncertainty over future interest rates. In their model, maturity composition of debt reflects the time-variation properties of long-term debt relative to the cost of short-term debt. On one hand, long-term debt is beneficial because it can hedge against variation in short-term interest rates. On the other hand, short-term debt is beneficial because it can deliver immediate liquidity. They find that the volatility of the maturity composition of government debt is indeed an optimal response to interest rate fluctuations experienced by emerging countries.

Other dimensions that characterize the relationship between sovereign debt and economic activity have been difficult to explain simultaneously using contemporary economic models. For example, three often-cited facts are that (i) default episodes are often associated with recessions, (ii) interest rates on sovereign debt and domestic output are negatively correlated, and (iii) external debt as a share of output is usually high. Vivian Z. Yue from New York University presented the second paper. Coauthored with Enrique Mendoza from the University of Maryland and the National Bureau of Economic Research (NBER), the paper takes on the task of explaining these three facts through a model of sovereign default with endogenous output fluctuations.

Yue and Mendoza's model borrows from the business-cycle literature a transmission mechanism that links default risk with economic activity via the financing of working capital. Using numerical analysis, they show that the model can explain simultaneously these three facts of sovereign debt. The results hinge on three premises of the model: Imported inputs require working capital; domestic production is done with imported inputs; and

default on foreign obligations of firms and government occurs simultaneously.

The third paper was presented by George Alessandria from the Federal Reserve Bank of Philadelphia. The paper, cowritten with Joseph Kaboski from Ohio State University and Virgiliu Midrigan from New York University and NBER, looks at the implications of large swings in exchange rates on international trade. First, they highlight the importance of fixed transaction costs (such as document preparation, custom clearing, etc.) and delivery lags for international trade flows. Quantitatively, these fixed costs amount to 3 to 11 percent of shipments. Given that most goods transacted across borders are storable, these costs make it optimal for importers to engage infrequently in international transactions and to hold substantial inventories of imported goods.

Building on this idea, they construct a dynamic stochastic general equilibrium (DSGE) model of trade with fixed transaction costs and delivery lags to study international trade dynamics under large exchange rate variations. Following a currency devaluation, their model accounts well for the dynamics of import quantity and price observed in the data. That is, in response to unanticipated currency devaluations, importers reduce retail markups, reduce import quantities and reduce import variety.

Empirical International Trade

The second session discussed topics in empirical international trade. The first two papers of the session look at the determinants of firms' export behavior, while the final one studies the relationship between trade flows and income.

Current models of international trade often attach productivity or product quality as the single attribute to firms' heterogeneity. While these models capture the salient fact that exporters tend to be large firms, this prediction leaves much of the observed relationship between firm size and export status unexplained.

Conference Papers

Conference papers can be found on the Federal Reserve Bank of Dallas website at www.dallasfed.org/news/research/2008/08msj.cfm

1. Cristina Arellano and Ananth Ramanarayanan, "Default and the Maturity Structure in Sovereign Bonds"
2. Enrique Mendoza and Vivian Yue, "A Solution to the Default Risk–Business Cycle Disconnect"
3. George Alessandria, Joseph Kaboski and Virgiliu Midrigan, "Inventories, Lumpy Trade, and Large Devaluations"
4. Maurice Kugler and Eric Verhoogen, "Product Quality at the Plant Level: Plant Size, Exports, Output Prices, and Input Prices in Colombia"
5. Juan Carlos Hallak and Jagadeesh Sivadasan, "Productivity, Quality and Exporting Behavior Under Minimum Quality Requirements"
6. Ana Cecilia Fieler, "Non-Homotheticity and Bilateral Trade: Evidence and a Quantitative Explanation"
7. Emi Nakamura, "Accounting for Incomplete Pass-Through"
8. Mario Crucini and Hakan Yilmazkuday, "A Model of International Cities: Implications for Real Exchange Rates"
9. Anthony Landry, "International Pricing and the Law of One Price"

The fourth paper was presented by Eric Verhoogen from Columbia University. The paper, cowritten with Maurice Kugler from Wilfrid Laurier University and Harvard University, looks at the relationship between plant size and product quality and prices. Using Colombian manufacturing plant data, Verhoogen and Kugler find that (i) plant size and output prices are positively correlated within industries, (ii) plant size and input prices are positively correlated within industries, and (iii)

these correlations are more positive in industries with more scope for quality differentiation.

To account for these observed correlations, they augment the Melitz model of heterogeneous firms with quality differentiation in inputs and outputs. In their framework, input quality and plant size are complementary in determining output quality. They conclude that a model of quality differentiation of inputs and outputs is consistent with the above correlation while difficult to reconcile with models that impose symmetry of homogeneity on both sets of goods.

The fifth paper was presented by Juan Carlos Hallak from Universidad de San Andres and NBER. Coauthored with Jagadeesh Sivadasan from the University of Michigan, the paper develops an alternative model of international trade with two sources of firm heterogeneity: productivity and caliber. Caliber reflects a firm's ability to produce quality.

Compared with single-attribute models of firm heterogeneity emphasizing either productivity or product quality, Hallak and Sivadasan's model produces a more nuanced characterization of firms' export behavior. In particular, size is not the sole determinant of export status because exporters differ in quality as well as productivity. They also demonstrate that conditional on size, exporters sell products of higher quality at higher prices, use capital more intensively and pay higher wages.

Finally, Ana Cecilia Fieler from New York University presented the sixth paper, which studies the relationship between trade flows and income distribution. Standard empirical models of international trade predict that trade flows increase with both importer and exporter total income but ignore how total income is divided across populations. However, the data show that trade grows strongly with income per capita but is largely unresponsive to population growth.

Fieler develops a model of international trade that allows the elasticities of trade with respect to per capita income and population to diverge. In her model, goods are divided into two types: income elasticity of demand and heterogeneity in production technologies. In equilibrium, low-income countries consume relatively more goods of the low-income elasticity type, and they have a comparative advantage in producing goods with low levels of heterogeneity in production technologies. Using data on bilateral trade flows, Fieler shows that her model improves the predictions of standard empirical models regarding variations due to income per capita and population.

International Prices

The last session looked at the relation between exchange rate movements and domestic prices. This is of particular importance given the recent movements in currency markets.

Recent theoretical work suggests a number of potentially important factors for the incomplete pass-through of exchange movements to prices. These include markup adjustment, local costs and menu costs. Emi Nakamura from Columbia University and NBER presented the seventh paper. She uses data on prices and sales of coffee beans to uncover the role of these factors in accounting for incomplete exchange rate pass-through. Nakamura finds that local costs and markup adjustments explain the bulk of incomplete pass-through, while menu costs only explain a small fraction. Nevertheless, menu costs play an important role since they explain the delayed response of price to costs. Moreover, she finds that delayed pass-through in the coffee industry occurs almost entirely at the wholesale rather than the retail level.

The eighth paper was presented by Mario Crucini from Vanderbilt University, who cowrote it with Hakan Yilmazkuday, also from Vanderbilt. The paper notes that price deviations for similar goods across countries are too large to be accounted for by transportation costs, tariffs and other barriers to trade and too persistent to be accounted for by nominal rigidities.

Instead, a recent stream of empirical papers focuses on the notion that final goods are composites of traded and nontraded components. Building on this literature, Crucini and Yilmazkuday develop a model where trade occurs at the level of cities. Each city has two agents: a manufacturer that specializes in the production of a single homogenous good and a retailer that imports, bundles and distributes a variety of goods from other cities. In this environment, price dispersion arises because of trade costs via distances separating cities, consumer demand for a city-specific good and difference in productivity levels in the distribution sector.

Using micro price data, they explore the relative contribution of trade costs and distribution margins in accounting for price dispersion in the Organization for Economic Cooperation and Development (OECD). They find that trade costs are more important than distribution margins in accounting for price dispersion. However, the contributions of distribution margins and trade costs are roughly equal when less-developed economies are included. This arises because measured wage differentials are small relative to price dispersion within the OECD. In contrast, larger wage differentials between the OECD and the less-developed economies boost the contribution of distribution costs in accounting for price dispersion around the globe.

Finally, Anthony Landry from the Federal Reserve Bank of Dallas presented a paper on IKEA retail prices. While the empirical literature finds significant price deviations for similar goods across countries, the economic interpretations of those deviations are controversial. Most concerns are about the homogeneity of goods used to test deviations in the law of one price (LOP).

To avoid this concern, Landry looks at identical goods advertised in annual catalogs from the multinational IKEA. The large number of observations and the tractability of the database allow him to control for product heterogeneity, product turnover and price changes. Landry confirms significant price deviations for similar goods across countries. In addition, he finds that most of the price dispersion is attributable to long-run LOP deviation. This suggests that some goods are always cheaper or more expensive in one country relative to another. While this new database confirms previous findings, IKEA micro price data should shed new light on questions related to LOP deviations.

—Anthony Landry

Abstracts of Globalization and Monetary Policy Institute

Working Papers Issued from October 2007 through September 2008

No. 1

Is Openness Inflationary? Imperfect Competition and Monetary Market Power

Richard W. Evans

Abstract: Much empirical work has documented a negative correlation between different measures of globalization or openness and inflation levels across countries and across time. However, there is much less work exploring this relationship through structural international models based on explicit microeconomic foundations. This paper asks the question of how the degree of openness of an economy affects the equilibrium inflation level in a simple two-country OLG model with imperfect competition in which the monetary authority in each country chooses the money growth rate to maximize the welfare of its citizens. I find that a higher degree of openness in a country is associated with a higher equilibrium inflation rate. This result is driven by the fact that the monetary authority enjoys a degree of monopoly power in international markets as foreign consumers have some degree of inelasticity in their demand for goods produced in the home country. The decision of the monetary authority is then to balance the benefits of increased money growth that come from the open economy setting with the well-known consumption tax costs of inflation. In addition, I find that the level of imperfect competition among producers within a country is a perfect substitute for the international market power of the monetary authority in extracting the monopoly rents available in this international structure.

No. 2

A Monetary Model of the Exchange Rate with Informational Frictions

Enrique Martinez-Garcia

Abstract: Data for the U.S. and the euro area during the post-Bretton Woods period show that nominal and real exchange rates are more volatile than consumption, very persistent, and highly correlated with each other. Standard models with nominal rigidities match reasonably well the volatility and persistence of the nominal exchange rate, but require an average contract duration above four quarters to approximate the real exchange rate counterparts. I propose a two-country model with financial intermediaries and argue that: First, sticky and asymmetric information introduces a lag in the consumption response to currently unobservable shocks, mostly foreign. Accordingly, the real exchange rate becomes more volatile to induce enough expenditure-switching across countries for all markets to clear. Second, differences in the degree of price stickiness across markets and firms weaken the correlation between the nominal exchange rate and the relative CPI price. This correlation is important to match the moments of the real exchange rate. The model suggests that asymmetric information and differences in price

stickiness account better for the stylized facts without relying on an average contract duration for the U.S. larger than the current empirical estimates.

No. 3

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

Charles Engel and Jian Wang

Abstract: Data for OECD countries document: 1. imports and exports are about three times as volatile as GDP; 2. imports and exports are procyclical, and positively correlated with each other; 3. net exports are countercyclical. Standard models fail to replicate the behavior of imports and exports, though they can match net exports relatively well. Inspired by the fact that a large fraction of international trade is in durable goods, we propose a two-country two-sector model in which durable goods are traded across countries. Our model can match the business cycle statistics on the volatility and comovement of the imports and exports relatively well. In addition, the model with trade in durables helps to understand the empirical regularity noted in the trade literature: home and foreign goods are highly substitutable in the long run, but the short-run elasticity of substitution is low. We note that durable consumption also has implications for the appropriate measures of consumption and prices to assess risk-sharing opportunities, as in the empirical work on the Backus–Smith puzzle. The fact that our model can match data better in multiple dimensions suggests that trade in durable goods may be an important element in open-economy macro models.

No. 4

Cross-Border Returns Differentials

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

Abstract: Were the U.S. to persistently earn substantially more on its foreign investments ("U.S. claims") than foreigners earn on their U.S. investments ("U.S. liabilities"), the likelihood that the current environment of sizable global imbalances will evolve in a benign manner increases. However, we find that the returns differential of U.S. claims over U.S. liabilities is far smaller than previously reported and, importantly, is near zero for portfolio equity and debt securities. For portfolio securities, we confirm our finding using a separate dataset on the actual foreign equity and bond portfolios of U.S. investors and the U.S. equity and bond portfolios of foreign investors; in the context of equity and bond portfolios, we find no evidence that the U.S. can count on earning more on its claims than it pays on its liabilities. Finally, we reconcile our finding of a near zero returns differential with observed patterns of cumulated current account deficits, the net international investment position, and the net income balance.

Published as "Cross-Border Returns Differentials" in *Quarterly Journal of Economics*, vol. 123, no. 4, November 2008.

No. 5

Production Sharing and Real Business Cycles in a Small Open Economy

José Joaquín López

Abstract: Production sharing and vertical specialization account for a significant share of trade between developed and developing countries. The Mexican maquiladora industry provides an ideal example of production sharing in a small open economy. The typical "maquila" imports most of its inputs from and exports all its output to the United States. This article tries to determine to what extent production sharing, as in the Mexican maquiladora, can serve as a transmission mechanism of business cycles in small open economies. We utilize a simple, two-sector, small open economy model of real business cycles that incorporates production sharing in the traded sector. The transmission channel of business cycles is introduced in the model via demand shocks to the traded

sector, originated in the United States' manufacturing sector. The model is successful in replicating real business cycles statistics for the maquiladora sector, as well as some of the characteristics of the nontraded sector.

No. 6

Driving Forces of the Canadian Economy: An Accounting Exercise

Simona E. Cociuba and Alexander Ueberfeldt

Abstract: This paper analyzes the Canadian economy for the post-1960 period. It uses an accounting procedure developed in Chari, Kehoe, and McGrattan (2006). The procedure identifies accounting factors that help align the predictions of the neoclassical growth model with macroeconomic variables observed in the data. The paper finds that total factor productivity and the consumption–leisure trade-off—the productivity and labor factors—are key to understanding the changes in output, labor supply, and labor productivity observed in the Canadian economy. The paper performs a decomposition of the labor factor for Canada and the United States. It finds that the decline in the gender wage gap is a major driving force of the decrease in the labor market distortions. Moreover, the milder reduction in the labor market distortions observed in Canada, compared to the U.S., is due to a relative increase in effective labor taxes in Canada.

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

Abstract: Volatile and persistent real exchange rates are observed not only in aggregate series but also on the individual good-level data. Kehoe and Midrigan (2007) recently showed that, under a standard assumption on nominal price stickiness, empirical frequencies of micro price adjustment cannot replicate the time-series properties of the law-of-one-price deviations. We extend their sticky price model by combining good-specific price adjustment with information stickiness in the sense of Mankiw and Reis (2002). Under a reasonable assumption on the money growth process, we show that the model fully explains both persistence and volatility of the good-level real exchange rates. Furthermore, our framework allows for multiple cities within a country. Using a panel of U.S.–Canadian city pairs, we estimate a dynamic price adjustment process for each 165 individual goods. The empirical result suggests that the dispersion of average time of information update across goods is comparable to that of average time of price adjustment.

No. 8

How Should Central Banks Define Price Stability?

Mark A. Wynne

Abstract: It is now generally accepted that the primary objective of central banks should be the maintenance of price stability. This paper considers the question of how central banks should define price stability. I address three specific questions. First, should central banks target broad or narrow measures of inflation? Second, should central banks target headline or core measure of inflation? And third, should central banks define price stability as prevailing at some positive measured rate of inflation?

No. 9

Country Portfolios in Open Economy Macro Models

Michael B. Devereux and Alan Sutherland

Abstract: This paper develops a simple approximation method for computing equilibrium portfolios in dynamic general equilibrium open economy macro models. The method is widely applicable, simple to implement, and gives analytical solutions for equilibrium portfolio positions in any combination or types of asset. It can be used in models

with any number of assets, whether markets are complete or incomplete, and can be applied to stochastic dynamic general equilibrium models of any dimension, so long as the model is amenable to a solution using standard approximation methods. We first illustrate the approach using a simple two-asset endowment economy model, and then show how the results extend to the case of any number of assets and general economic structure.

No. 10
Vehicle Currency

Michael B. Devereux and Shouyong Shi

Abstract: While in principle, international payments could be carried out using any currency or set of currencies, in practice, the U.S. dollar is predominant in international trade and financial flows. The dollar acts as a "vehicle currency" in the sense that agents in nondollar economies will generally engage in currency trade indirectly using the U.S. dollar rather than using direct bilateral trade among their own currencies. Indirect trade is desirable when there are transactions costs of exchange. This paper constructs a dynamic general equilibrium model of a vehicle currency. We explore the nature of the efficiency gains arising from a vehicle currency and show how this depends on the total number of currencies in existence, the size of the vehicle currency economy, and the monetary policy followed by the vehicle currency's government. We find that there can be very large welfare gains to a vehicle currency in a system of many independent currencies. But these gains are asymmetrically weighted toward the residents of the vehicle currency country. The survival of a vehicle currency places natural limits on the monetary policy of the vehicle country.

No. 11
Globalization and Monetary Policy: An Introduction

Enrique Martinez-Garcia

Abstract: Greater openness has become an almost universal feature of modern, developed economies. This paper develops a workhorse international model and explores the role of standard monetary policy rules applied to an open economy. For this purpose, I build a two-country DSGE model with monopolistic competition, sticky prices, and pricing-to-market. I also derive the steady state and a log-linear approximation of the equilibrium conditions. The paper provides a lengthy explanation of the steps required to derive this benchmark model and a discussion of (a) how to account for certain well-known anomalies in the international literature and (b) how to start "thinking" about monetary policy in this environment.

No. 12
Financial Globalization, Governance, and the Evolution of the Home Bias

Bong-Chan Kho, René M. Stulz and Francis E. Warnock

Abstract: Standard portfolio theories of the home bias are disconnected from corporate finance theories of insider ownership. We merge the two into what we call the optimal ownership theory of the home bias. The theory has the following components. In countries with poor governance, it is optimal for insiders to own large stakes in corporations and for large shareholders to monitor insiders. Foreign portfolio investors will exhibit a large home bias against such countries because their investment is limited by the shares held by insiders (the "direct effect" of poor governance) and domestic monitoring shareholders ("the indirect effect"). Foreigners can also enter as foreign direct investors; if they are from countries with good governance, they have a comparative advantage as insider monitors in countries with poor governance, so that the relative importance of foreign direct investment in total foreign equity investment is negatively related to the quality of governance. Using two datasets, we find strong evidence that the theory can help explain the evolution of the home bias. Using country-level U.S. data, we find that, on

average, the home bias of U.S. investors toward the 46 countries with the largest equity markets did not fall during the past decade, but it decreased the most toward countries in which the ownership by corporate insiders decreased, and the importance of foreign direct investment fell in countries in which ownership by corporate insiders fell. Using firm-level data for Korea, we find evidence of the additional indirect effect of poor governance on portfolio equity investment by foreign investors.

No. 13

Globalization, Domestic Inflation and Global Output Gaps: Evidence from the Euro Area

Alessandro Calza

Abstract: This paper tests whether the proposition that globalization has led to greater sensitivity of domestic inflation to the global output gap (the "global output gap hypothesis") holds for the euro area. The empirical analysis uses quarterly data over the period 1979–2003. Measures of the global output gap using two different weighting schemes (based on PPPs and trade data) are considered. We find little evidence that global capacity constraints have either explanatory or predictive power for domestic consumer price inflation in the euro area. Based on these findings, the prescription that central banks should specifically react to developments in global output gaps does not seem to be justified for the euro area.

No. 14

The Effect of Trade with Low-Income Countries on U.S. Industry

Raphael Auer and Andreas M. Fischer

Abstract: When labor-abundant nations grow, their exports increase more in labor-intensive sectors than in capital-intensive sectors. We utilize this sectoral difference in how exports are affected by growth to identify the causal effect of trade with low-income countries (LICs) on U.S. industry. Our framework relates differences in sectoral inflation rates to differences in comparative-advantage-induced import growth rates and abstracts from aggregate fluctuations and sector-specific trends. In a panel covering 325 manufacturing industries from 1997 to 2006, we find that LIC exports are associated with strong downward pressure on U.S. producer prices and a large effect on productivity. When LIC exporters capture 1 percent U.S. market share, producer prices decrease by 3.1 percent, which is nearly fully accounted by a 2.4 percent increase in productivity and a 0.4 percent decrease in markups. We also document that while LICs on average find it easier to penetrate sectors with elastic demand, the price and productivity response to import competition is much stronger in industries with inelastic demand. Overall, between 1997 and 2006, the effect of LIC trade on manufacturing PPI inflation was around 2 percentage points per year, far too large to be neglected in macroeconomic analysis.

No. 15

Variety, Globalization, and Social Efficiency

W. Michael Cox and Roy J. Ruffin

Abstract: This paper puts recent work on the benefits of variety into the context of a more complete quantitative analysis of the Dixit-Stiglitz-Krugman model of monopolistic competition. We show how the gains from globalization are reflected in the increase in variety and the exploitation of economies of scale, and that the social efficiency question is quantitatively insignificant. These results follow from examining a Bertrand–Nash equilibrium that allows for a finite number of varieties to affect the elasticity of demand facing each firm. We develop a precise expression for per capita real income with any number of sectors where globalization increases productivity through economies of scale.

No. 16

Technical Note on 'The Real Exchange Rate in Sticky Price Models: Does Investment Matter?'

Enrique Martinez-Garcia and Jens Søndergaard

Abstract: This technical note is developed as a mathematical companion to the paper "The Real Exchange Rate in Sticky Price Models: Does Investment Matter?" (Institute Working Paper no. 17). It contains three basic calculations. First, we derive the equilibrium conditions of the model. Second, we compute the zero-inflation, zero-trade balance (deterministic) steady state. Third, we describe the log-linearization of the equilibrium conditions around the deterministic steady state. Simultaneously, we explain the system of equations that constitutes the basis for the paper to broaden its scope. Commentary is provided whenever necessary to complement the model description and to place into context the assumptions embedded in our DSGE framework.

No. 17

The Real Exchange Rate in Sticky Price Models: Does Investment Matter?

Enrique Martinez-Garcia and Jens Søndergaard

Abstract: This paper re-examines the ability of sticky-price models to generate volatile and persistent real exchange rates. We use a DSGE framework with pricing-to-market akin to those in Chari et al. (2002) and Steinsson (2008) to illustrate the link between real exchange rate dynamics and what the model assumes about physical capital. We show that adding capital accumulation to the model facilitates consumption smoothing and significantly impedes the model's ability to generate volatile real exchange rates. Our analysis, therefore, caveats the results in Steinsson (2008), who shows how real shocks in a sticky-price model without capital can replicate the observed real exchange rate dynamics. Finally, we find that the CKM (2002) persistence anomaly remains robust to several alternative capital specifications, including set-ups with variable capital utilization and investment adjustment costs (see, e.g., Christiano et al., 2005). In summary, the PPP puzzle is still very much alive and well.

No. 18

Some Preliminary Evidence on the Globalization–Inflation Nexus

Sophie Guilloux and Enisse Kharroubi

Abstract: The aim of this paper is to evaluate the impact of globalization, if any, on inflation and the inflation process. We estimate standard Phillips curve equations on a panel of OECD countries over the last 25 years. While recent papers have concluded that globalization has had no significant impact, this paper highlights that trying to capture globalization effects through simple measures of import prices and/or imports to GDP ratios can be misleading. To do so, we try to extend the analysis following two different avenues. We first separate between commodity and noncommodity imports and show that the impact on inflation of commodity import price inflation is qualitatively different from the impact of noncommodity import price inflation, the former depending on the volume of commodity imports while the latter being independent of the volume of noncommodity imports. This first piece of evidence highlights the role of contestability and the insufficiency of trade volume statistics to properly describe the impact of globalization. This leads us to adopt a more systematic approach to capture the contents and not only the volume of trade. Focusing on the role of intra-industry trade, we provide preliminary evidence that this variable can account (i) for the low pass-through of import price to consumer price and (ii) for the flattening of the Phillips curve, i.e., the lower sensitivity of inflation to changes in output gap. We hence conclude that different facets of globalization, especially changes in the nature of goods traded, can be an important channel through which globalization affects the inflation process.

No. 19

Default and the Maturity Structure in Sovereign Bonds

Cristina Arellano and Ananth Ramanarayanan

Abstract: This paper studies the maturity composition and the term structure of interest rate spreads of government debt in emerging markets. We document that in Argentina, Brazil, Mexico, and Russia, when interest rate spreads rise, debt maturity shortens and the spread on short-term bonds is higher than on long-term bonds. To account for this pattern, we build a dynamic model of international borrowing with endogenous default and multiple maturities of debt. Short-term debt can deliver higher immediate consumption than long-term debt; large long-term loans are not available because the borrower cannot commit to save in the near future toward repayment in the far future. However, issuing long-term debt can insure against the need to roll over short-term debt at high interest rate spreads. The trade-off between these two benefits is quantitatively important for understanding the maturity composition in emerging markets. When calibrated to data from Brazil, the model matches the dynamics in the maturity of debt issuances and its comovement with the level of spreads across maturities.

No. 20

An International Perspective on Oil Price Shocks and U.S. Economic Activity

Nathan S. Balke, Stephen P. A. Brown and Mine K. Yücel

Abstract: The effect of oil price shocks on U.S. economic activity seems to have changed since the mid-1990s. A variety of explanations have been offered for the seeming change—including better luck, the reduced energy intensity of the U.S. economy, a more flexible economy, more experience with oil price shocks and better monetary policy. These explanations point to a weakening of the relationship between oil prices shocks and economic activity rather than the fundamentally different response that may be evident since the mid-1990s. Using a dynamic stochastic general equilibrium model of world economic activity, we employ Bayesian methods to assess how economic activity responds to oil price shocks arising from supply shocks and demand shocks originating in the United States or elsewhere in the world. We find that both oil supply and oil demand shocks have contributed significantly to oil price fluctuations and that U.S. output fluctuations are derived largely from domestic shocks.

Globalization and Monetary Policy

Excerpted from Richard W. Fisher's Warren and Anita Manshel Lecture in American Foreign Policy Harvard University, Cambridge, Mass. November 3, 2005

I want to talk about what I consider one of the biggest challenges my colleagues and I face: globalization's impact on the gearing of the economy and the making of monetary policy.

The literature on globalization is large. The literature on monetary policy is vast. But literature examining the combination of the two is surprisingly small.

What gives? Is the process of globalization disconnected from monetary policy? Is the business of the central bank totally divorced from globalization?

I think not. I believe globalization and monetary policy are intertwined in a complex narrative that is only beginning to unfold.

First, a definition, so that we can contemplate this matter together from common ground. There are many convoluted definitions of globalization. Mine is simple: Globalization is an ecosystem in which economic potential is no longer defined or contained by political and geographic boundaries. Economic activity knows no bounds in a globalized economy. A globalized world is one where goods, services, financial capital, machinery, money, workers and ideas migrate to wherever they are most valued and can work together most efficiently, flexibly and securely.

Where does monetary policy come into play in this world? Well, consider the task of the central banker, seeking to conduct a monetary policy that will achieve maximum sustainable noninflationary growth.

Consider, for example, the experience of former Federal Reserve Governor Larry Meyer, articulated in his excellent little book *A Term at the Fed*. In it, you get a good sense of the lexicon of monetary policy deliberations. The language of Fedspeak is full of sacrosanct terms such as "output gap" and "capacity constraints" and "the natural rate of unemployment," known by its successor acronym, NAIRU, the non-accelerating inflation rate of unemployment. Central bankers want GDP to run at no more than its theoretical limit, for exceeding that limit for long might stoke the fires of inflation. They do not wish to strain the economy's capacity to produce.

One key capacity factor is the labor pool. There is a shibboleth known as the Phillips curve, which posits that beyond a certain point too much employment ignites demand for greater pay, with eventual inflationary consequences for the entire economy.

Until only recently, the econometric calculations of the various capacity constraints and gaps of the U.S. economy were based on assumptions of a world that exists no more. Meyer's book is a

Globalization and monetary policy are intertwined in a complex narrative that is only beginning to unfold.

real eye-opener because it describes in great detail the learning process of the FOMC [Federal Open Market Committee] members as the U.S. economy morphed into the new economic environment of the second half of the 1990s. At the time, economic growth was strong and accelerating. The unemployment rate was low, approaching levels unseen since the 1960s. In these circumstances, if you believed in the Phillips curve and the prevailing views of potential output growth, capacity constraints and the NAIRU, inflation was supposed to rise. That is precisely what the models used by the Federal Reserve staff were saying, as was Meyer himself, joined by nearly all the other Fed governors and presidents gathered around the FOMC table. Under the circumstances, they concluded that monetary policy needed to be tightened to head off the inevitable. They were frustrated by Chairman Greenspan's insistence that they postpone the rate hikes they were proposing, yet perplexed that inflation wasn't rising. Indeed, inflation just kept on falling.

If the advice of Meyer and other devotees of the Phillips curve, capacity constraints, output gaps and NAIRU had prevailed, the Fed would have caused the economy to seriously underperform.

Now, how was Greenspan able to get it right when other very smart men and women did not? Well, we now recognize with 20/20 hindsight that Greenspan was the first to grasp the fact that an acceleration in productivity had begun to alter the traditional relationships among economic variables. He understood the data and the modeling techniques of the Fed's research staff. But he was also constantly talking—and listening—to business leaders.

It is important to listen to the operators of our business economy. America's business managers have taken advantage of the phenomenon of globalization. Our business managers are the nerve endings in Adam Smith's invisible hand, stretching the fingers of capitalism into every corner of comparative advantage worldwide.

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Just consider what the fall of the Soviet Union, the implementation of Deng Xiaoping's "capitalist road" in China and India's embrace of market reforms mean to a business operator. Consider labor alone. In the early '90s, the former Soviet Union released millions of hungry workers into the system. China joined the World Trade Organization at the turn of the century and injected 750 million workers into play. And now India, with over 100 million English-speaking workers among its 1 billion people, has joined the game.

What does an American manager—paid to enhance returns to shareholders by growing revenues at the lowest possible costs—do? Because labor accounts for, on average, about two-thirds of the cost of producing most goods and services, a business manager will go where labor is cheapest. She will have a widget made in China or Vietnam, or a software program written in Russia or Estonia, or a center for processing calls or managing a back office set up in India.

Let me return home to Harvard once more and read you three quotes from Joseph Schumpeter, who taught here from 1932 until 1949, and I think you will get the picture.

First, from *Capitalism, Socialism, and Democracy*: "The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates."

From that same page: "The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory … illustrate the same process of industrial mutation … that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of creative destruction is the essential fact about capitalism. It is … what every capitalist concern has got to live in."

And from volume one of Schumpeter's *Business Cycles*: "A railroad through new country, i.e., a country not yet served by railroads, as soon as it gets into working order upsets all conditions of location, all cost calculations, all production functions within its radius of influence; and hardly any 'ways of doing things' which have been optimal before remain so afterward."

String the key operative phrases of those three citations together and you get the plot of this story, the plot of globalization: "The opening up of new markets, foreign or domestic … revolutionizes the economic structure, … destroying the old one, … creating a new one.… [It] upsets all conditions of location, all cost calculations, all production functions, … and hardly any ways of doing things which have been optimal before remain so afterward."

The destruction of communism and the creation of vast new sources of inputs and production have upset all the calculations and equations that the very best economics minds, including those of the Federal Reserve staff—and I consider them the best of all—have used as their guideposts. The old models simply do not apply to the new, real world.

You could sense something was wrong with the econometric equations if you listened to the troops on the ground, fighting in the trenches of the marketplace. This is what Chairman Greenspan does so well. And, though I am no Greenspan and never will be, this is what my colleagues and I on the FOMC do by making dozens upon dozens of calls to CEOs, COOs and CFOs of businesses, large and small, every month to prepare for FOMC meetings. We are simply observing managers at work expanding the capacity of our economy, expanding the gap between what their previously limited resources would allow them to produce and what their newly expanded globalized, technologically enhanced reach now allows them to produce.

From this, I personally conclude that we need to redraw the Phillips curve and rejig the equations that inform our understanding of the maximum sustainable levels of U.S. production and growth.

Let me illustrate the point by citing another fine writer, Greg Ip. In yesterday's *Wall Street Journal*, he noted that the "U.S. economy grew at a 3.8% annual rate in the third quarter [of this year], its eighth consecutive quarter at about that pace. That's above what most economists consider the economy's potential growth rate—that is, what it can produce with existing capital and labor."

How can economists quantify with such precision what the U.S. can produce with existing labor and capital when we don't know the full extent of the global labor pool we can access? Or the totality of the financial and intellectual capital that can be drawn on to produce what we produce?

As long as we are able to hold back the devil of protectionism and keep open international capital markets and remain an open economy, how can we calculate an "output gap" without knowing the present capacity of, say, the Chinese and Indian economies? How can we fashion a Phillips curve without imputing the behavioral patterns of foreign labor pools? How can we formulate a regression analysis to capture what competition from all these new sources does to incentivize American management?

Until we are able to do so, we can only surmise what globalization does to the gearing of the U.S. economy, and we must continue driving monetary policy by qualitative assessment as we work to perfect our quantitative tool kit. At least that is my view.

—Richard W. Fisher

We need to redraw the Phillips curve and rejig the equations that inform our understanding of the maximum sustainable levels of U.S. production and growth.

Making Sense of Today's Globalized Economy

A Conversation with Charles Engel

Reprinted from Southwest Economy, *Issue 5, September/October 2008, Federal Reserve Bank of Dallas*

A discussion with University of Wisconsin economics professor Charles Engel, a senior fellow of the Dallas Fed's Globalization and Monetary Policy Institute, ranges from the current financial crisis to the unpredictability of exchange rates.

Q. What are some important themes of globalization?

A. One of them is that global trade is increasing. If you look at importing and exporting as a percentage of world gross domestic product, it's grown by leaps and bounds over the past 20 or 30 years. That's been true not only for the U.S. but also for just about everyone else.

From the U.S. perspective, one of the most striking things is how much our trade with China has increased. A lot of that has come at the expense of trade with Korea and Japan, so it's not just that we're buying goods from China that we used to make at home.

The other thing is financial markets. They're much more intertwined than they ever have been. Part of this is because governments have allowed their residents to do more foreign investing and allowed foreign investors to buy more of their countries' assets. That's a trend that started in the early 1960s. For the U.S, Western Europe and Canada, most of that liberalization was completed by the end of the 1970s. In Asia, it continued to happen in the 1980s and 1990s.

The trend more recently hasn't been governments relaxing regulations but just the amount of innovation in financial markets and the willingness of people to invest in financial assets around the globe.

Q. How does this globalization impact the current financial crisis?

A. In general, well-working financial markets perform better if they're globalized. It's better to be able to spread risk across a number of countries. It's better to be able to channel savings to their most productive uses anywhere in the world. If capital markets mess up, if they're misallocating resources or if there's something wrong with the financial system, it's going to be magnified if financial markets are globalized.

Certainly, we're very aware of the international aspects of this financial catastrophe. We can't build

a wall around American banks. For example, in the current crisis, there's no way to "rescue" only U.S. banks. If we successfully shore up the balance sheets of U.S. banks, this is good for the global banking system. This highlights why we need international cooperation. There's a big incentive for each country to sit on the sidelines and let other countries take the risk and incur the expense of a financial rescue. We need some way to get all the major countries committed to a mutually agreed upon scheme to regulate international capital markets and ensure that they function smoothly in the future.

Q. What challenges does this financial crisis present for globalized financial markets?

A. It's clear we needed more oversight of financial markets. A general worry is that we'll impose too much, that we'll throw too much sand in the wheels. Part of that would be stifling globalization. We don't want to lose the benefits of a globalized financial system.

A separate but related worry is that there's going to be some kind of economic nationalism, with countries treating domestic and foreign-owned institutions differently. I worry that without international cooperation, each country will try to devise schemes that favor its own banks and citizens at the expense of foreign investors. For example, countries might provide deposit insurance—but only for their own citizens. We could end up taking a giant step backward in the globalization of capital markets.

The thing we have to realize is that our financial system is intertwined with the rest of the world. The failure of a large international banking concern could harm our economy, just as financial troubles in the U.S. spill over into the rest of the world. We need to address this problem systematically, not in the ad hoc way we're forced to during a crisis.

Q. What are your current research interests?

A. There are two main threads to my research. One is trying to understand exchange rate movements—why they behave the way they do. My work in that area has involved thinking hard about the implications of exchange rates as asset prices, which spills over into the way asset prices in general behave.

Currency values don't depend only on current economic fundamentals, such as trade balances, money supply and national income. The asset-price approach pays attention not only to current data but also to expectations of what the fundamentals will be in the future.

One of the key things that comes out of the work is the observation that asset prices, including exchange rates, are unpredictable under much more general circumstances than many economists have believed. Simply put, we can't do a good job of forecasting changes in exchange rates. That has implications for policymakers. It has implications for Wall Street. It has implications for international business.

Q. So the time and effort investors and companies spend trying to forecast exchange rates is just a waste?

A. I do think there are times when currency prices get out of line, and we can forecast an eventual return to more sustainable levels. When the euro cost $1.60 earlier this year, I was pretty sure it would come down, just as I was pretty sure it would rise when it was down around 85 cents several years ago.

But I am talking in these cases about a forecast over a long horizon. I sure wouldn't want to try to predict which way exchange rates are going to go over the next couple of months or even the next couple of quarters.

Asset-price forecasters have a high propensity to fool themselves about how successful their prediction schemes are. A lot of models might look good with hindsight. But there isn't much rigorous, peer-reviewed evidence that we can forecast exchange rates over short periods.

Q. And the other thread in your research?

A. I've been looking at aspects of open economies for monetary policy. The study of monetary policy is really dominated by this closed-economy framework, which is kind of crazy. What economy in the world is closed? Openness matters for monetary policy in a lot of different ways. To what extent, for example, should monetary policy worry about exchange rate misalignments?

I like to use the example of the recent rise in the price of oil from below $20 a barrel to up to $147. In the early part of that period, when it went from the $20s to about $45 a barrel, the price didn't go up at all in Europe. How is that possible? How could it be nearly doubling for us and not going up in Europe?

The answer is that the dollar was losing value against the euro at a rate equal to the price increase of oil. There's no economic reason in the world that oil should have gotten more expensive for Americans and not gotten more expensive for Europeans. That's purely a result of exchange rate misalignments. It leads to an inefficient allocation of resources. There's no reason Americans should have had to cut back on oil consumption more than Europeans.

It's exactly because of situations like this that monetary policy ought to worry about exchange rates. Moreover, the exchange rate is something monetary policy can influence—the value of the dollar in terms of the euro, for example.

The focus of monetary policy has been almost completely on reducing inflation, which is important. A credible monetary policymaker has to keep inflation low, but another part of credible monetary policy is keeping the currency strong.

Q. Why should a strong dollar be a goal of monetary policy?

A. I wouldn't say a strong dollar. I would say that a goal of monetary policy is to prevent large dollar misalignments. We don't want it too strong or too weak. Remember, in the early part of this decade, the dollar was very strong, and our manufacturing sector was getting hammered. We had a hard time competing in world markets, even in sectors in which the U.S. is a world leader, like aircraft, sophisticated industrial equipment and high tech.

Our economy adapted—resources got shifted into construction and services—but in retrospect maybe the reallocation wasn't such a great use of our resources. If we had more actively tried to prevent the appreciation of the dollar, that shift in workers and investment away from manufacturing would have been slowed down.

Q. What contribution can the Dallas Fed's Globalization and Monetary Policy Institute make?

A. As you know, the institute is focused on how monetary policy is influenced by international forces. A great thing about the Federal Reserve System is that it has 12 independent research staffs that provide a portfolio of research skills and policy insights. I agreed to join the Dallas Fed's efforts on globalization because I think this subject is crucial, its importance is growing, and there wasn't enough attention to these issues in the System.

Richard Fisher, the Dallas Fed's president, has talked a lot about trying to understand how openness feeds into domestic inflation. That's an important question with obvious relevance to central bankers, but I think there are other important questions that we should be thinking about.

The exchange rate itself, should we worry about that? In thinking about unemployment, do we have to worry about the effects of foreign competition? Beyond those issues, the big thing we need to think about right now is the Fed's other role—not in setting monetary policy but in keeping a well-functioning financial system intact. There, I think the impact of globalization is enormous.

Who's Who at the Institute

Director of the Institute

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.

Advisory Board Chairman

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.

Senior Fellows

W. Michael Cox, senior vice president and chief economist, joined the Dallas Fed in 1984. Cox authors the Bank's annual report essays, which have received extensive attention from leading publications such as 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 Great Depression and, most recently, international pricing. He received a B.A. from the University of Western Ontario and an M.A. and Ph.D. from the University of Rochester.

Michael B. Devereux is professor of economics at the University of British Columbia and a visiting scholar at the International Monetary Fund in Washington, D.C. He is widely published in leading economic journals and is associate editor of the *International Journal of Central Banking*. He received a B.A. in economics and politics and an M.A. in economics from University College, Dublin, and Ph.D. from Queen's University, Kingston, Ontario.

Charles Engel is professor of economics at the University of Wisconsin–Madison and a research associate of the National Bureau of Economic Research. He has written extensively on exchange rate determination. He is currently coeditor of the *Journal of International Economics* and has been a visitor or consultant to many central banks, including the Board of Governors of the Federal Reserve, De Nederlandsche Bank, Reserve Bank of Australia, Bank of England and several Federal Reserve Banks. He received a B.A. from the University of North Carolina at Chapel Hill and a Ph.D. from the University of California–Berkeley.

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.

Institute Staff Economists

Simona E. Cociuba joined the Dallas Fed in 2007. Her major fields of concentration are macroeconomics, growth and development. She recently received a Ph.D. in economics from the University of Minnesota.

Anthony Landry joined the Federal Reserve Bank of Dallas in 2006. Previously, he worked at the Bank of Canada. Landry's recent research focuses on the effects of nominal rigidities in the context of open-economy macroeconomic models. He holds an M.A. in economics from McGill University and a Ph.D. in economics from Boston University.

Enrique Martinez-Garcia's main research interests are in the fields of international macroeconomics and finance, monetary economics and applied econometrics. Previously, Martinez-Garcia was a teaching and research assistant at the University of Wisconsin–Madison and at the university's Center for World Affairs and the Global Economy. He also worked at the Bank of England. He holds a B.A. from the University of Alicante in Spain, an M.A. from the University of Pennsylvania and a Ph.D. from the UW–Madison, all in economics.

Ananth Ramanarayanan joined the Dallas Fed in 2007, after receiving a Ph.D. in economics from the University of Minnesota. His research interests are in the fields of international trade and macroeconomics.

Jian Wang is a senior economist with primary research interests in open-economy macroeconomics, international finance and monetary economics. Prior to joining the Bank, he taught at the University of Wisconsin–Madison. He holds an M.A. from the University of Arkansas and a Ph.D. in economics from UW–Madison.

Support Staff

Janet Koech has been an economic analyst for the Globalization and Monetary Policy Institute since October 2007. Koech holds B.A. and M.A. degrees in economics from the University of Kansas. She is from Kenya.

Patrick Roy began working at the Dallas Fed as a research assistant in November 2007. He graduated from Bentley College in 2005 with a B.S. in economics. Roy was deployed to Iraq as a platoon leader in 2006–07 and still serves as an officer in the Texas Army National Guard.

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