

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.

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.

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

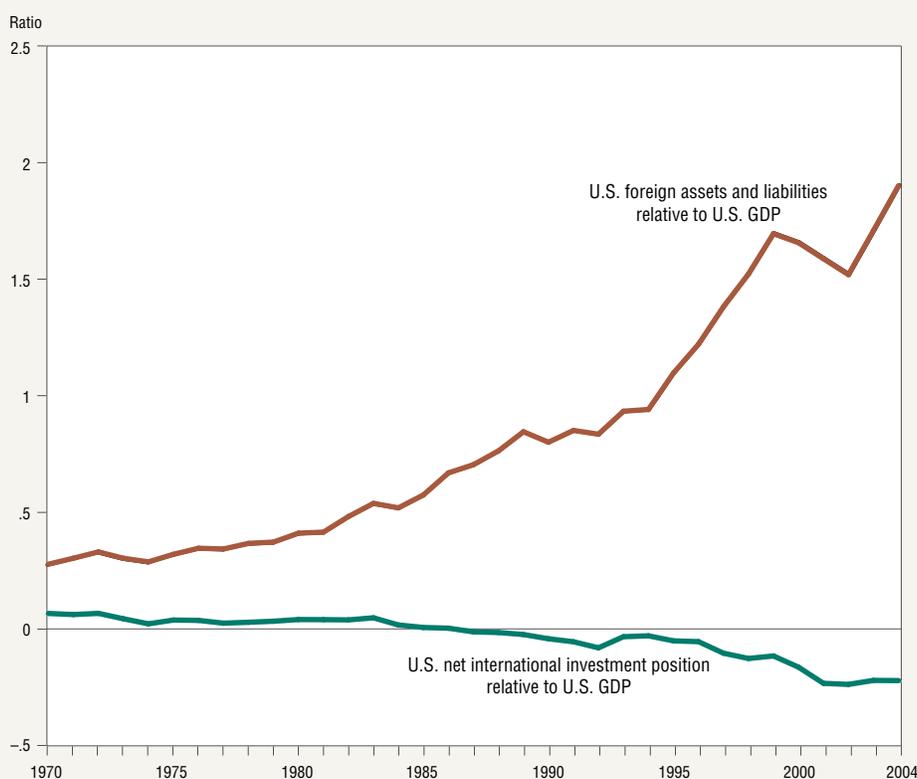
would have taken a very different course were it not for the extraordinary increase in financial globalization over the past two decades. Capital is more mobile internationally than it was 35 years ago.

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

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.

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

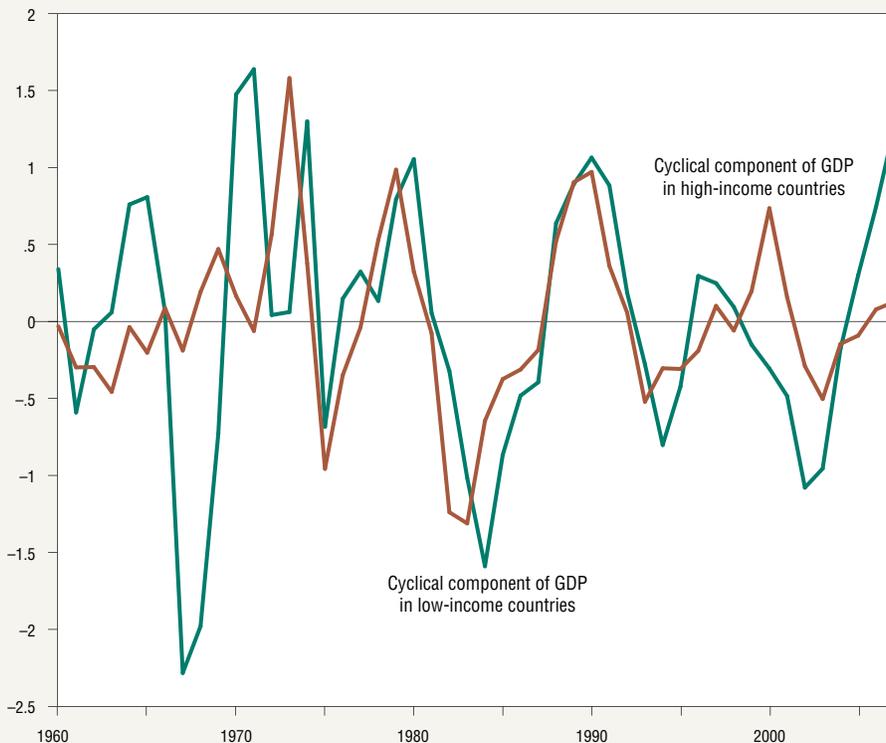
In addition to posing an important challenge for empirical evaluation of the global slack hypothesis, this synchronization of activity is interesting in and of itself. What causes it? Is it simply due to common shocks? For example, the prices of oil and other commodities are set on world markets, and 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.

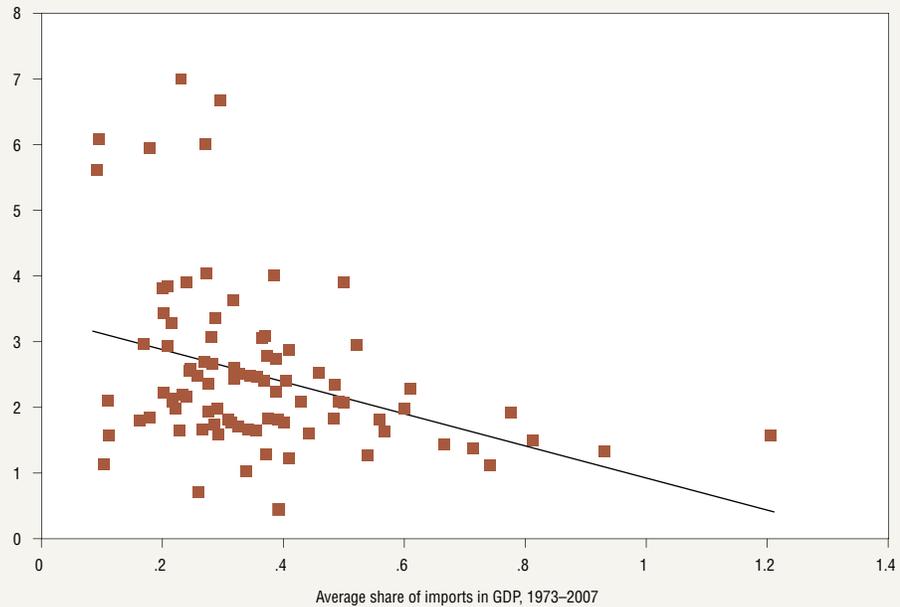
Many explanations have been advanced for the observed negative relationship between long-run inflation and openness as traditionally measured. Almost all are based on some variant of the time consistency problem that arises under discretionary monetary policy making first highlighted by Kydland and Prescott (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.

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

Figure 4

Long-Run Inflation Is Lower in More-Open Economies

Log average annual inflation, 1973–2007



SOURCE: World Development Indicators, World Bank.

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 macro-economy 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.

References

- Arkolakis, Costas, and Ananth Ramanarayanan (2008), "Vertical Specialization and International Business Cycle Synchronization," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 21 (October).
- Auer, Raphael, and Andreas Fischer (2008), "The Effect of Trade with Low-Income Countries on U.S. Industry," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 14 (June).
- Backus, David K., Patrick J. Kehoe and Finn E. Kydland (1992), "International Real Business Cycles," *Journal of Political Economy* 100 (4): 745–75.
- (1995), "International Business Cycles: Theory and Evidence," in *Frontiers of Business Cycle Research*, ed. Thomas F. Cooley (Princeton: Princeton University Press), 331–56.
- Balke, Nathan S., Stephen P. A. Brown and Mine K. Yücel (2008), "An International Perspective on Oil Price Shocks and U.S. Economic Activity," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 20 (September).
- Borio, Claudio, and Andrew Filardo (2007), "Globalization and Inflation: New Cross-Country Evidence on the Global Determinants of Domestic Inflation," BIS Working Paper no. 227 (Basel, Switzerland, Bank for International Settlement, May).
- Calza, Alessandro (2008), "Globalization, Domestic Inflation and Global Output Gaps: Evidence for the Euro Area," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 13 (May).
- Clarida, Richard H., Jordi Galí and Mark Gertler (2000), "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," *Quarterly Journal of Economics* 105 (2): 147–80.
- (2002), "A Simple Framework for International Monetary Policy Analysis," *Journal of Monetary Economics* 49 (5): 879–904.
- Cox, W. Michael, and Richard Alm (2006), "Racing to the Top: How Global Competition Disciplines Public Policy," Federal Reserve Bank of Dallas 2005 Annual Report.
- Curcuru, Stephanie E., Tomas Dvorak and Francis E. Warnock (2007), "Cross-Border Returns Differentials," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 4 (December). Published as "Cross-Border Returns Differentials" in *Quarterly Journal of Economics* 123 (4), November 2008.

- Devereux, Michael B., and Alan Sutherland (2008), "Country Portfolios in Open Economy Macro Models," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 9 (April).
- Eaton, Jonathan, and Samuel Kortum (2002), "Technology, Geography and Trade," *Econometrica* 70 (5): 1741–79.
- Evans, Richard W., (2007), "Is Openness Inflationary? Imperfect Competition and Market Power," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 1 (October).
- Frankel, Jeffrey A., and Andrew K. Rose (1998), "The Endogeneity of the Optimum Currency Area Criteria," *Economic Journal* 108 (July): 1009–25.
- Garner, C. Alan (1994), "Capacity Utilization and U.S. Inflation," Federal Reserve Bank of Kansas City *Economic Review*, Fourth Quarter, 5–21.
- Goodfriend, Marvin, and Robert G. King (1997), "The New Neoclassical Synthesis," in *NBER Macroeconomics Annual 1997*, ed. Ben Bernanke and Julio Rotemberg (Cambridge, Mass.: MIT Press).
- Guerrieri, Luca, Christopher Gust and David López-Salido (2008), "International Competition and Inflation: A New Keynesian Perspective," Federal Reserve Board, International Finance Discussion Paper no. 918 (Washington, D.C., January).
- Guilloux, Sophie, and Enisse Kharroubi (2008), "Some Preliminary Evidence on the Globalization–Inflation Nexus," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 18 (July).
- Ihrig, Jane, Steven B. Kamin, Deborah Lindner and Jaime Marquez (2007), "Some Simple Tests of the Globalization and Inflation Hypothesis," Federal Reserve Board, International Finance Discussion Paper no. 891 (Washington, D.C., April).
- Kho, Bong-Chan, René M. Stulz and Francis E. Warnock (2008), "Financial Globalization, Governance, and the Evolution of the Home Bias," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 12 (May).
- Knetter, Michael M., and Matthew J. Slaughter (1999), "Measuring Product-Market Integration," NBER Working Paper Series, no. 6969 (Cambridge, Mass., National Bureau of Economic Research, February).
- Kydland, Finn E., and Edward C. Prescott (1977), "Rules Rather than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy* 85 (3): 473–90.
- (1982), "Time to Build and Aggregate Fluctuations," *Econometrica* 50 (6): 1345–70.
- Lane, Philip R., and Gian Maria Milesi-Ferretti (2006), "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004," IIS Discussion Paper no. 126 (Dublin, Institute for International Integration Studies, August).
- López, José Joaquín (2007), "Production Sharing and Real Business Cycles in a Small Open Economy," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 5 (December).
- Martinez-Garcia, Enrique (2008), "Globalization and Monetary Policy: An Introduction," Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper no. 11 (April).
- Melitz, Marc J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica* 71 (6): 1695–1725.
- O'Rourke, Kevin, and Jeffrey Williamson (2002a), "After Columbus: Explaining Europe's Overseas Trade Boom, 1500–1800," *Journal of Economic History* 62 (June): 417–56.
- (2002b), "When Did Globalization Begin?" *European Review of Economic History* 6 (April): 23–50.
- Orr, James A. (1994), "Has Excess Capacity Abroad Reduced U.S. Inflationary Pressures?" Federal Reserve Bank of New York *Quarterly Review*, Summer/Fall, 101–6.
- Romer, David (1993), "Openness and Inflation: Theory and Evidence," *Quarterly Journal of Economics* 108 (4): 869–903.
- Tootell, Geoffrey M. B. (1998), "Globalization and U.S. Inflation," Federal Reserve Bank of Boston *New England Economic Review*, July/August, 21–33.
- Wynne, Mark A., and Genevieve R. Solomon (2007), "Obstacles to Measuring Global Output Gaps," Federal Reserve Bank of Dallas *Economic Letter*, no. 3.