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The Effects of Globalization on Inflation and Their Implications for Monetary Policy

Remarks by

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Thank you for the opportunity to participate in this conference on global imbalances, a topic of growing importance. Although I will touch on global imbalances, I would like to focus on globalization's potential influence on inflation and the associated implications for monetary policy. It seems a natural focus for a policymaker at a central bank, and, indeed, several of my colleagues on the Federal Open Market Committee (FOMC) have also addressed this issue in recent months.<sup>1</sup> As you would see from reading their remarks, no consensus has yet emerged about how globalization has been influencing recent inflation developments, and part of my intention today is to illustrate some of the considerable challenges that are involved in attempting to identify the extent to which the recent pickup in the pace of global economic integration has influenced inflation dynamics in the United States.<sup>2</sup>

Of course, the trend toward greater international integration of product and financial markets has been established for quite a while; the share of U.S. economic activity involved in international trade (measured by nominal exports plus imports as a share of nominal gross domestic product) has been rising since the early 1970s. However, this trend has accelerated markedly over the past fifteen years or so. In particular, the economies of eastern Europe became more integrated into the global economy, and China, India, and some other East Asian market economies have emerged as important players in the global trading system.

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<sup>1</sup> For example, Richard W. Fisher (2005), "Globalization and Monetary Policy," Warren and Anita Marshall Lecture in American Foreign Policy, Harvard University, November 3; and Janet L. Yellen (2006), "Monetary Policy in a Global Environment," speech delivered at The Euro and the Dollar in a Globalized Economy Conference, University of California at Santa Cruz, May 27.

<sup>2</sup> Deb Lindner and William Wascher, of the Board's staff, contributed to these remarks. The views expressed are my own and are not necessarily shared by my colleagues on the Board or the FOMC.

Although inflation is ultimately a monetary phenomenon, it seems natural to expect, as others have argued, that these developments would have exerted some downward pressure on inflation in the United States. The opening up of China and India, in particular, represents a potentially huge increase in the global supply of mainly lower-skilled workers. And it is clear that the low cost of production in these and other emerging economies has led to a geographic shift in production toward them--not just from the United States but also from other formerly low-cost producers such as Mexico, Korea, Singapore, and Taiwan.<sup>3</sup> Trade surpluses in China and in other East Asian countries have increased sharply over the past decade, and from a U.S. perspective, the ratio of imported goods to domestically produced goods has accelerated noticeably in recent years.

However, the extent of the disinflationary effect of this shift in the pace of globalization is less obvious. Many U.S. goods and most services are still produced domestically with little competition from abroad. In addition, the significant expansion of production in China and elsewhere has put substantial upward pressure on the prices of oil and other commodities, many of which are imported for use as inputs to production in the United States. Indeed, the effects of globalization on domestic inflation need not even be negative, especially in today's environment of strong global growth.

One challenge in assessing the effect of increased globalization is the lack of research on this issue. At a research conference on modeling inflation held at the Federal Reserve Board last fall, none of the papers even touched on issues related to

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<sup>3</sup> See, for example, International Monetary Fund (2005), "Mexico: Staff Report for the 2005 Article IV Consultation," October 2005; and Alan G. Ahearne, John G. Fernald, Prakash Loungani, and John W. Schindler (2003), "China and Emerging Asia: Comrades or Competitors?" International Finance Discussion Paper 2003-789 (Washington: Board of Governors of the Federal Reserve System, December).

globalization. And, although some new and interesting research is emerging from places like the International Monetary Fund and the Bank for International Settlements, much of this work is still quite preliminary.<sup>4</sup> Nevertheless, the existing research does highlight several channels through which globalization might have helped to hold down domestic inflation in recent years. These channels include the direct and indirect effects on domestic inflation of lower import prices, a heightened sensitivity of domestic inflation to foreign demand conditions (and perhaps less sensitivity to domestic demand conditions), downward pressure on domestic wage growth, and upward pressure on domestic productivity growth.<sup>5</sup>

In trying to clarify my own thinking about the likely magnitude of these effects, I find that a useful starting point is a simple reduced-form equation that attempts to explain movements in inflation and then to ask whether and how the statistical relationships embedded in this equation have been affected by globalization. The equation is a standard one in use at the Board and elsewhere. It relates core consumer price inflation--using, say, the index for core personal consumption expenditures (PCE) or the core consumer price index (CPI)--to resource utilization, lagged inflation, changes in relative prices of food and energy, and changes in relative import prices. Using this framework, we can look for the effect of globalization in several ways. First, we can look for influences that are directly controlled for in the model--notably the influence on domestic inflation of changes in import prices. Second, we can look for evidence of globalization-

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<sup>4</sup> Thomas Helbling, Florence Jaumotte, and Martin Sommer (2006), "How Has Globalization Affected Inflation?" *IMF World Economic Outlook* (Washington: IMF, April), chapter 3; Claudio Borio and Andrew Filardo (2006), "Globalization and Inflation: New Cross-Country Evidence on the Global Determinants of Domestic Inflation," unpublished paper, Bank for International Settlements, March.

<sup>5</sup> Ken Rogoff also argues that globalization has increased the incentives for central banks to keep inflation low (Kenneth S. Rogoff, 2003, "Globalization and Global Disinflation," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, a symposium sponsored by the Federal Reserve Bank of Kansas City, pp. 77-112.)

related structural change in the model by examining the stability of the parameter estimates. Third, we can see whether we have omitted from the standard model any variables that might be interpreted as representing changes in globalization. And, finally, we can look for evidence of model errors that would be consistent with the hypothesis that globalization has been restraining inflation. I will focus in particular on the past five years or so, which, judging from the data on U.S. trade shares, is when the pace of globalization appears to have picked up.

I will start with the import price channel--the hypothesis that increased globalization has depressed import prices and thus domestic inflation. Importantly, the estimated strength of this channel should capture not only the direct effects of import prices on the cost of living in the United States but, also, at least a portion of the indirect effects of actual and potential import competition on the prices of goods produced domestically. In the reduced-form model that I've just described, the effects of import prices on inflation show up quite clearly; furthermore, the estimated effects appear to have increased over time, with the increase apparently stemming primarily from the upward trend in the share of imported consumer goods in household spending.<sup>6</sup>

We can use the model to get a rough idea of how relative changes in import prices have influenced domestic inflation by simulating how core consumer prices would have behaved if relative import prices had instead remained constant. In particular, the increase in core import prices since the mid-1990s has averaged about 1-1/2 percentage points less per year than the increase in core consumer prices. According to the model simulation, which also builds in the associated reduction in inflation expectations, the

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<sup>6</sup> As is standard in such models, we use a price measure for "core" imports, defined as imports of goods excluding energy, computers, and semiconductors. When the change in relative import prices is weighted by the import share, the coefficient in the model is fairly stable.

direct and indirect effects of this decline in the relative price of imports held down core inflation by between 1/2 and 1 percentage point per year over this period, an estimated effect that is substantially larger than it would have been in earlier decades. However, much of the decline in import prices during this period was probably driven by movements in exchange rates and the effects of technological change on goods prices rather than by the growing integration of world markets.<sup>7</sup>

In addition, import prices have risen at about the same average pace as core consumer prices over the past several years and thus no longer appear to be acting as a significant restraint on inflation in the United States. This step-up in the rate of change of import prices obviously reflects, to some extent, recent movements in the dollar, especially its depreciation in 2004. However, it also reflects large increases in the prices of a number of imported commodities, which have been attributed in part to the rapid expansion of activity in China and other Asian countries.

A second hypothesis is that increases in global capacity have held down U.S. inflation in recent years by limiting the ability of U.S. producers to raise prices in response to increases in the domestic costs of production. At a basic level, the elevated profit margins of U.S. producers over the past few years seem inconsistent with this hypothesis. But it does raise a broader issue about the determinants of inflation--that is, whether U.S. inflation is now less sensitive to domestic demand pressures and more sensitive to foreign demand conditions than it was earlier. In the context of the inflation

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<sup>7</sup> Research at the Board examined the direct effects of Chinese exports on global import prices from the mid-1990s to 2002 and found only a modest effect of U.S. import prices. Of course, it is possible that China's influence on import prices has grown in recent years as its trade share has expanded. Refer to Steven B. Kamin, Mario Marazzi, and John W. Schindler (2004), "Is China 'Exporting Deflation'?" International Finance Discussion Paper 2004-791 (Washington: Board of Governors of the Federal Reserve System, January).

model, we can examine this issue in two ways. First, we can look for evidence that the coefficients on the domestic output or unemployment gaps have fallen over time.

Second, we can add a measure of foreign excess demand to the model to see whether it helps to explain domestic inflation in recent years.

With regard to the first test, we do find evidence that the coefficient on the unemployment gap has fallen in the United States. In particular, the coefficient from a model estimated over the past twenty years appears to be about one-third lower than when the model is run over a forty-year period. Of course, globalization is not the only potential explanation for this result, and numerous other researchers have cited persistently low inflation and the improved credibility of monetary policy as having played a more important role. In fact, in rolling regressions, the timing of the decline in the sensitivity of inflation to the unemployment gap appears to be too early to be associated with the more recent acceleration in the pace of globalization.

This aspect of the globalization hypothesis would be bolstered if the decline in the sensitivity of inflation to domestic demand was accompanied by an increased sensitivity to foreign demand. Efforts to find such a link have met with mixed results, with some researchers having found large effects and others having found no effect.<sup>8</sup> Our own analysis of this issue indicates that these results are sensitive to how the foreign output gap is defined and to how the inflation model is specified, suggesting that any effect may not be especially strong.

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<sup>8</sup> Borio and Filardo (2006) and Gamber and Hung (2001) found that foreign resource utilization had sizable effects on U.S. inflation, while Tootell (1998) found little to no effect. Refer to Borio and Filardo, "Globalization and Inflation"; Edward N. Gamber and Juann H. Hung (2001), "Has the Rise in Globalization Reduced U.S. Inflation in the 1990s?" *Economic Inquiry*, vol. 39 (January), pp. 58-73; and Geoffrey M. B. Tootell (1998), "Globalization and U.S. Inflation," Federal Reserve Bank of Boston, *New England Economic Review* (July/August), pp. 21-33.

Similarly, the evidence that globalization has helped to restrain unit labor costs in recent years is mixed. One hypothesis is that the increase in the supply of low-skilled workers associated with the emergence of China and other East Asian countries as low-cost centers of production has put downward pressure on the growth of nominal wages in the United States. However, a model of changes in aggregate labor compensation that is similar in structure to the price-inflation model that I described earlier does not detect a stable relationship between measures of globalization (for example, import price changes or the BIS estimates of the foreign output gap) and aggregate wage dynamics in the United States. That said, the recent changes in some, though not all, measures of aggregate compensation seem to have been somewhat lower than such models would have predicted. Of course, several purely domestic factors could help to account for any shortfall, such as the aftereffects of the unusually sluggish recovery in job growth early in this expansion or a possible downward drift in the nonaccelerating-inflation rate of unemployment. But it also is a pattern that would be consistent with downward pressures from an expansion in global labor supply. In support of this link, some cross-section studies have found a relationship between industry wage growth and import penetration, while the research on wage inequality tends to relate some of the relative decline in wages of low-skilled workers to trade, although in both types of studies the effects are generally relatively small.<sup>9</sup> Similarly, research from the Federal Reserve Bank of New

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<sup>9</sup> See, for example, Helbling, Jaumotte, and Sommer, "How Has Globalization Affected Inflation?"; and William R. Cline (1997), *Trade and Income Distribution* (Washington: Institute for International Economics).

York shows a modest relationship between exchange rate fluctuations and wage growth, with larger effects evident for the wages of lower-skilled workers.<sup>10</sup>

A second possibility is that globalization has restrained unit labor costs by raising productivity. Increasing volumes of trade should bolster productivity as economies concentrate their resources in those sectors in which they are relatively more efficient. But I have seen little direct evidence on the extent to which globalization may have boosted aggregate productivity growth in the United States in recent years. Nevertheless, research at the Board finds that multinational corporations, which may have the greater opportunities to realize efficiencies by shifting production locations, accounted for a disproportionate share of aggregate productivity growth in the late 1990s.<sup>11</sup> And some microeconomic studies have found a relationship between global engagement and productivity at the firm level.<sup>12</sup> Thus, it seems possible that the persistently high growth rates of multifactor productivity in recent years may partly be due to the productivity-enhancing effects of globalization.

In this regard, I would note that a potential shortcoming of my approach to assessing the effects of globalization on inflation is that these effects may be too recent to be captured adequately by the data. That is, it may be too soon for globalization to have generated statistically observable changes in the parameter estimates or structure of the standard inflation model. Nonetheless, if the influence of globalization on inflation is as

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<sup>10</sup> Linda Goldberg and Joseph Tracy (2003), "Exchange Rates and Wages," unpublished paper, Federal Reserve Bank of New York.

<sup>11</sup> Carol Corrado, Paul Lengeremann, and Larry Slifman (2005), "The Contribution of MNCs to U.S. Productivity Growth, 1977-2000," unpublished paper, Board of Governors of the Federal Reserve System.

<sup>12</sup> For example, Mark E. Doms and J. Bradford Jensen (1998), "Productivity, Skill, and Wage Effects of Multinational Corporations in the United States," in D. Woodward and D. Nigh, eds., *Foreign Ownership and the Consequences of Direct Investment in the United States: Beyond Us and Them* (Westport, Conn.: Quorum Books), pp. 49-68.

substantial as many claim, we might have expected the standard model to have had difficulty in predicting recent inflation trends. For example, if recent increases in world labor supply are restraining domestic unit labor costs to a significant degree or if there are other important influences on inflation that are related to globalization but difficult to quantify in the context of the standard model, we would expect to have seen sizable model errors over the past several years.

Again, the evidence points to some limited influence of globalization on U.S. inflation. If we use out-of-sample dynamic simulations of a model for core PCE price inflation estimated from 1985 through the end of 2001, we find that, although the model overpredicts inflation over the past several years, the errors average only 0.1 to 0.2 percentage point per year, considerably less than one might have expected given the anecdotes in the popular press. In contrast, the forecast errors from a model of core CPI inflation are larger (averaging roughly 1/2 to 1 percentage point per year since mid-2001), perhaps suggestive of some influence from globalization.

What do I conclude from all of this evidence? My own assessment is that, quite naturally, the greater integration of the U.S. economy into a rapidly evolving world economy has affected the dynamics of inflation determination. Unfortunately, huge gaps and puzzles remain in our analysis and empirical testing of various hypotheses related to these effects. But, for the most part, the evidence seems to suggest that to date the effects have been gradual and limited: a greater role for the direct and indirect effects of import prices; possibly some damping of unit labor costs, though less so for prices from this channel judging from high profit margins; and potentially a smaller effect of the domestic output gap and a greater effect of foreign output gaps, but here too the evidence is far

from conclusive. In particular, the entry of China, India, and others into the global trading system probably has exerted a modest disinflationary force on prices in the United States in recent years.

Moreover, we should recognize that these disinflationary effects could dissipate or even be reversed in coming years. They reflect, at least in part, the global imbalances that are the subject of this conference, rather than just the integration of emerging-market economies into the global trading system. For example, the fact that China and some other emerging-market economies have resisted upward pressure on their exchange rates and are running trade surpluses has undoubtedly contributed to their disinflationary effects on the rest of the world. The prices of their exports are lower than they would be if market forces were given greater scope in foreign exchange markets, and they are supplying more goods and services to the rest of the world than they themselves are demanding. These imbalances are not likely to be sustained indefinitely. The elevated rates of national saving in these economies--and, in some, relatively restrained rates of investment--are not likely to persist in the face of ongoing improvements in the functioning of their financial markets, increases in the depth of their product markets, and fuller development of economic safety nets. As individuals in these countries are increasingly drawn to investing at home and consuming more of their wealth and as their real wages catch up to past productivity gains, the upward pressures on their currencies will intensify, their demand will come into better alignment with their capacity to produce, cost advantages will decline, and these economies will exert less, if any, downward pressure on inflation in the United States.

This observation brings me to my final point, which is about monetary policy. Clearly, the greater integration of the world's economies does leave the United States more open to influences from abroad. In one sense, a more open economy may be more forgiving as shortfalls or excesses in demand are partly absorbed by other countries through adjustments of our imports and exports. And, to the extent that the United States can draw upon world capacity, the inflationary effect of an increase in aggregate demand might be damped for a time. But we are also subject to inflationary forces from abroad, including those that might accompany a shift to a more sustainable pattern of global spending and production, or those that might emanate from rising cost and price pressures. Moreover, a smaller response of inflation to domestic demand also implies that reducing inflation once it rose could be difficult and costly. And, from another perspective, integrated financial markets can exert powerful feedback, which may be less forgiving of any perceived policy error. For example, if financial market participants thought that the FOMC was not dedicated to maintaining long-run price stability--a notion that I can assure you is not correct--they would be less willing to hold dollar-denominated assets, and the resulting decline in the dollar would tend to add to inflationary pressures. Clearly, policymakers need to factor into their decisions the implications of globalization for the dynamics of the determination of inflation and output.

In the end, however, policymakers here and abroad cannot lose sight of a fundamental truth: In a world of separate currencies that can fluctuate against each other over time, each country's central bank determines its inflation rate. If the FOMC were to allow the U.S. economy to run beyond its sustainable potential for some time, inflation

would eventually rise. And, this pickup would become self-perpetuating if it became embedded in inflation expectations. Thus, while a better understanding of the implications of globalization will aid in our understanding of inflation dynamics, it is also clear that such developments do not relieve central banks of their responsibility for maintaining price and economic stability.