Board of Governors of the Federal Reserve System

Speech

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Globalization and Capital Markets: Implications for Inflation and the Yield Curve

I am delighted to be back in Argentina. Today I want to talk about some important macroeconomic and financial developments around the world. Inflation rates and interest rates are at historically low levels, and yield curves are relatively flat nearly everywhere. In addition, until recently, many emerging-market countries simply did not have yield curves because there was effectively no market for debt issued in the domestic currency beyond a very short term. I believe that the taming of inflation and the improved credibility of monetary policy have been crucial to the deepening of domestic capital markets, which is typically associated with higher economic growth. I will explore some possible explanations for these developments, focusing on the prospects for, and risks to, the long-term inflation outlook, particularly in emerging-market economies. Before I continue, please note that the opinions I express here today are my own and not necessarily shared by my colleagues on the Federal Open Market Committee.[1]

In brief, I argue that globalization, deregulation, and financial innovation, in part spurred by the experiences of high inflation in the 1980s, have fostered currency competition that has led to improved central bank performance and, hence, the recent reduction of worldwide inflation. Writing in the 1970s, Friedrich Hayek advocated greater competition among currencies, arguing that it would produce a race to the top rather than a race to the bottom.[2] In practice, regardless of what one might think of Hayek's policy proposals, we have seen increased competition among currencies issued by central banks owing to technological change in a globalized and competitive marketplace.

The increased competition among currencies has changed the ability and the incentives of governments and central banks to pursue high-inflation policies. Such changes have allowed improvements in central bank governance and credibility, thereby leading to better inflation outcomes, especially in many emerging-market economies. In addition, greater central bank credibility has allowed the development of long-term bond markets in many countries and flattened yield curves around the globe as concerns about future inflation risks have declined. Deeper bond markets with a wider range of available maturities encourage long-term planning and investment and thus convey lasting gains, particularly in emerging markets. The important issue is whether the reduction of worldwide inflation will persist or be a temporary phenomenon.

The Worldwide Decline in Inflation

From the 1950s until the late 1960s, inflation rates were relatively contained, and episodes of high inflation were rare. Then, especially following the early-1970s collapse of the Bretton Woods fixed-exchange-rate system, inflation became a worldwide phenomenon. Even in Germany, which had the most stable prices of any country in the world, inflation eroded purchasing power by more than half between 1972 and the launch of the euro, in 1999. In terms of cumulative inflation, $480 would be required today in the United States to purchase $100 worth of goods and services at 1972 prices. For most countries reporting data to the International Monetary Fund (IMF), cumulative inflation has been even higher than that experienced in the United States. Here in Argentina, the price level is now about 177 billion times higher than it was in 1972. But Brazil takes the prize for greatest

inflation of the post-World War II era: The price level in Brazil is approximately 500 billion times higher today than it was in 1972.[3]

Since the early 1990s, however, worldwide inflation has significantly declined. Indeed, the April 2006 issue of the IMF's *World Economic Outlook* shows that, on average, inflation rates in the advanced economies as well as in the developing countries in recent years have been at their lowest levels since at least the early 1970s. The April 2007 issue forecasts inflation in both regions to remain near these recent lows through 2008.

But is this lower inflation regime likely to persist? One way to approach this issue is to investigate what market participants think by examining measures of expected inflation. Overall, these surveys suggest that market participants do expect relatively low inflation to continue in most major industrial and emerging-market countries. In the industrial countries and a few Asian emerging-market economies, for example, long-term inflation expectations dropped below 5 percent a decade or more ago and are currently around 2 percent to 3 percent.[4] In Brazil and Mexico, long-term inflation expectations have declined from a range of 7 percent to 10 percent a decade ago to a fairly steady 3 percent to 4 percent in recent years. In Argentina, long-term inflation expectations are around 7 percent.

In addition, the risks of high inflation appear to have decreased as well. In particular, the volatility of inflation has declined notably, especially in many emerging- market countries.[5] On occasion in the early to middle 1990s, the standard deviation of inflation exceeded 30 percent in Mexico and 100 percent in Argentina and Brazil. In the current decade, however, the standard deviation of inflation has been relatively stable in Brazil, at around 5 percent, and it has been declining in Mexico, where it is now around 2 percent. In Argentina, inflation volatility is currently around 15 percent.

Factors Behind the Taming of Worldwide Inflation

My brief review of worldwide inflation performance suggests that in general, over the past decade, inflation has become substantially lower and less volatile, and expectations of future inflation have also become substantially lower. In understanding the key factors behind this change, we can also shed further light on the question of whether this low-inflation regime will persist.

In a nutshell, I believe that the factors of globalization, deregulation, and financial innovation, arising partly in response to episodes of high inflation, have effectively eroded the central bank monopoly on the provision of monetary services and have enhanced global competition among currencies. These changes have, in turn, altered the incentives for central banks to behave badly and for finance ministries to use central banks as "piggy banks" to finance their fiscal policies. The resulting constraint on monetary policy, combined with increased public understanding of the costs of inflation, have led to institutional changes in central bank governance that bolster their credibility for maintaining price stability in the future. Thus, improved central bank performance and credibility are the consequences of this combination of factors.

To develop this explanation in more detail, I will start by describing how globalization, deregulation, and innovation can alter the ability and incentives of a government to pursue a high-inflation policy.[6] These factors are closely related and mutually reinforcing in many respects. Many countries have turned increasingly to private markets and trade to deliver growth and progress. The resulting deregulation and greater openness has boosted innovation and has helped increase global competition, or globalization, by shrinking the barriers of time and distance. Accordingly, trade and financial linkages between countries have soared to record levels in recent years.

How does this affect inflation? When governments resort to printing money to finance their spending, inflation rises and nominal assets lose their value. This loss of value is also known as the inflation tax. Globalization, deregulation, and innovation make it easier for citizens to move their

wealth out of nominal assets in the domestic currency should their government resort to an inflation tax. When the tax base shrinks in response to inflation, governments have a reduced incentive to resort to the inflation tax.

The specific channels by which globalization, deregulation, and financial innovation affect competition among currencies are many. Increased circulation of banknotes in dollars or other hard currencies enable citizens to conduct transactions and store liquid wealth without holding inflationary currency. The fraction of U.S. currency estimated to be held in foreign countries rose dramatically over the 1980s and 1990s, from less than 20 percent to about 60 percent, and it has remained near this high level even as inflation rates have come down globally.

Substantial financial innovations--including advances in electronic payment and trading systems as well as more widespread credit card networks and increased use of mutual funds--have enabled consumers, investors, and banks to shift wealth cheaply and quickly away from currencies and assets subject to inflation and related risks.

Given the stronger competition among currencies, a government that pressures a central bank to pursue an inflationary policy gets much less benefit from increased inflation because people can more rapidly and conveniently switch out of the domestic currency. Indeed, the website of the Central Bank of Brazil explicitly acknowledges the role of inflation in driving financial innovations that enabled firms and households to economize on cash balances in that country. It states that, "Prior to the mid-1990s [when inflation was stabilized], changes in the payment system in Brazil were motivated by the need to cope with high inflation rates. During that time, the system achieved significant technological progress, especially aimed at enhancing the speed of processing financial transactions." [7]

In addition to encouraging financial innovation, the painful experience of high inflation helped to educate the public and economists about the costs of inflation.[8] Although the specific experiences differed across countries, public opinion almost everywhere eventually reinforced the trend against inflationary policies. Economists and central bankers also devoted great attention to understanding the causes and consequences of inflation, providing the intellectual underpinning to policies oriented toward price stability.

The fundamental forces I have described today--globalization, deregulation, financial innovation, and public understanding about the costs of inflation--provided the impetus for fighting inflation and opened the path for policies that enhance central bank credibility. As the benefits of stable prices accrue and as financial markets deepen and become more sophisticated, the benefits of sound economic policies will help create support for institutional reforms that make returning to inflation harder--albeit not impossible--for future governments.

Implications of Low Inflation for Bond Markets

What are the implications of low inflation and low inflation volatility for interest rates and yield curves? I believe that market confidence in continued low inflation has helped drive down the slope of the yield curve around the world by reducing the premium demanded for holding long-term nominal assets. The taming of inflation also has extended bond maturities and yield curves further into the future than ever before, most notably in many emerging-market countries.

The current low level of long-term yields in the United States and other advanced economies is widely acknowledged as somewhat of a puzzle, or, as some have called it, a conundrum.[9] Of course, flat and even inverted yield curves in advanced economies are nothing new--we know that the short end of the yield curve is dominated by monetary policy and cyclical factors.

To abstract from the potential effect of cyclical factors on the yield curve, consider the pattern of forward rates many years into the future, at which point the effects of current cyclical shocks would

be expected to have dissipated. The yield on a ten-year bond, for instance, can be thought of as an average of a series of consecutive forward rates. If you could borrow and lend at the same rate as the U.S. Treasury, then you could lock in a three-month loan ten years from now by borrowing for ten years and three months and simultaneously lending the same principal for ten years. The difference between the interest you pay and the interest you earn on this transaction determines the implied forward rate ten years from today. The forward rate reflects not only the market expectation of the future short-term interest rate but also a "term premium" to compensate for the risk of a commitment to extend credit so far in the future, including the risk of future inflation.

At any point in time, then, we can calculate the short-term forward rate ten years ahead using the yield curve of U.S. Treasury coupon securities. This "far forward" rate has hovered around 4-1/2 percent to 5 percent over the past two years, a level about 2 percentage points below its average since 1990. Far-forward rates in other advanced economies have also declined over the past decade and are currently at or near historic lows. [10]

To some extent, low forward rates may reflect a persistent decline in expected future real rates of interest or in the real term premium. Chairman Bernanke has suggested that an excess of ex ante global saving relative to global investment has held down real interest rates around the world.[11] Some of the factors behind this excess of saving over investment include the surge in revenues of oil and commodity exporters, a retreat in Asian investment demand from the boom that preceded the late 1990s, and a reduction in fiscal deficits in some Latin American countries. But these low bond yields also have a nominal aspect. The declines in inflation rates, in the volatility of inflation, and in long-term inflation expectations all point to a reduction in the compensation required by investors for the effects of future inflation on the returns to holding long-term bonds.

This development is particularly remarkable in many emerging-market countries, in which longer-dated fixed-coupon bonds issued in domestic currencies had ceased to exist during the inflationary 1970s and 1980s. The recent lengthening of maturities of domestic-currency debt has, in many cases, not only extended the yield curve but--and this is one of the key results of the taming of inflation--effectively created a domestic-currency yield curve that previously did not exist.

Since 2000, ten-year nominal fixed-coupon bonds in the domestic currency have been introduced in Brazil, Chile, Colombia, Indonesia, Mexico, and Russia. Korea and Thailand introduced ten-year fixed-coupon bonds in their respective currencies in the 1990s. Last year the government of Mexico issued a thirty-year fixed-coupon bond in pesos for the first time. The proportion of domestic-currency debt in Mexico maturing within one year was nearly 90 percent in 2002 and is now less than 75 percent.[12] The Korean government continues to increase the proportion of its domestic-currency debt in longer maturities, with the one-year-and-under segment falling from roughly one-half in 1999 to less than one-fifth by the end of last year. Moreover, maturity extension is not limited to emerging-market countries. France and the United Kingdom, for example, issued fifty-year bonds in 2005.

Besides the fact that yield curves have been extended in many countries, they have also been relatively low and flat worldwide, at least in part because of the decline in inflation. The flattening or slight inversion of yield curves in the major industrial economies, such as the United States, Japan, the euro area, the United Kingdom, and Canada is well known. For example, ten-year yields in the euro area are less than 25 basis points higher than three-month yields, and the yield curve is currently downward sloping in the United Kingdom.

At the same time that maturities have been extended, bond yields in the domestic currencies of emerging-market countries have also declined. It is perhaps not surprising that, given the high rates of saving and generally high level of development in their economies, the governments of Hong Kong and Korea can borrow at levels close to those in the advanced economies. More notable, however, is that the Mexican government can borrow in pesos at a thirty-year maturity at roughly 8 percent. Although Mexico is perhaps the most striking example, it is not alone. Other middle-income emerging-market countries with single-digit yields on fixed-rate ten-year bonds in the

domestic currency include Chile, Colombia, Malaysia, Russia, South Africa, and Thailand, to name but a few. The computation of forward rates for most of these countries is difficult because of the relative sparseness of the maturity distribution, but for those countries in which five-year forward rates can be computed, they have been declining and have reached very low levels in the past year or so.

Overall, the combination of lower and less volatile inflation worldwide has reduced inflation expectations and perceived inflation risk and resulted in a lower premium in long rates for inflation uncertainty. I believe that these factors have been key contributors to the lower long-term yields and the flattening of yield curves, particularly in emerging markets. The establishment of markets for long-term nominal government and corporate debt in countries in which they did not exist a decade ago is powerful evidence of the faith that investors place in a future environment of price stability.

Broader Economic Benefits

The economic benefits of price stability are too numerous and well known for me to cover here in detail. Long-run price stability certainly is essential for achieving maximum employment. However, I would like to underscore some often-overlooked benefits related to the development of markets for long-term bonds.

Price stability boosts growth by deepening financial markets. Given stable prices, savers and investors have more confidence about the ultimate value of their investments and are more willing to enter long-term financial contracts. A number of studies have concluded that the development of banking and financial markets is a key driver of economic growth. Thus, greater central bank credibility, which permits more development of local financial markets, can have an economic benefit beyond the financial sector. [13]

The increasing issuance of local-currency bonds is leading to an improved distribution of risk. When emerging-market countries borrowed mostly in dollars or other foreign currency, they bore the exchange rate risk while lenders bore default risk. This was a key reason why currency crises of the past few decades were so costly: Sharp depreciations of the exchange rate boosted the domestic-currency value of foreign debt and wreaked havoc with government finances and corporate balance sheets. With reduced reliance on foreign-currency borrowing, emerging-market economies should be able to weather future storms with less disruption than in the past.

The development of long-term domestic-currency bond markets is one of the factors that help lower the costs of long-term planning and enhance the ability to undertake long-term investments In particular, investment decisions are less likely to be constrained by having only short-term financing available for longer-term projects, thereby allowing improved decisionmaking for governments, firms, and individuals. These improvements enhance the prospects of economic development.

Higher and more-stable growth combined with a better ability to undertake long-term plans can also improve the fiscal outlook for a country. A better fiscal outlook, in turn, increases confidence, facilitates financial market development, and thus further boosts growth. And, in a virtuous cycle, it reinforces prospects for continued price stability. More-prudent fiscal policies, including lower deficits, longer debt maturities, and reduced foreign-currency debt can reduce the likelihood and potential severity of financial crises. These policies make the financial positions of emerging-market governments less vulnerable to movements in interest rates and exchange rates. A reduction in the perceived risk that a government may not be able to service its debts makes changes in investor sentiment and financial contagion less likely, thereby reducing financial market volatility.

Maintaining Progress

I have argued that globalization, deregulation, and financial innovation, in part spurred by recent experiences of high inflation, have fostered currency competition that has led to improved central

bank performance and, hence, the reduction of inflation worldwide. The resulting enhancement of central bank governance and credibility has allowed the development of long-term bond markets in many countries and the flattening of yield curves around the globe.

I want to conclude by returning to the question of whether these phenomena are likely to persist. Globalization and innovation are genies that may prove difficult to put back in their bottles. Nonetheless, although I am an optimist, I would be remiss if I did not point out some risks. In particular, deregulation and global competition may be subject to change. The difficulty of reaching agreement in the Doha Round of trade negotiations highlights the risk of renewed protectionism and backtracking on deregulation. Trade barriers and regulations are anathema to globalization and competition. Barriers to the free flow of goods, services, capital, and technology would also diminish the force of innovation that has been so beneficial in the struggle against inflation. Transaction taxes and administrative barriers may hinder the development and liquidity of bond markets, and much progress that is still required in many emerging-market countries on these fronts.

High inflation can destroy an economy and result in enormous hardship for everyone involved, as Argentina painfully experienced not long ago. The benefits achieved through more-stable prices are substantial. Fortunately, economic forces have led to better central bank behavior around the world during the past decade. If citizens and politicians lose sight of these benefits, and the forces that have led to enhanced currency competition are thwarted, these gains could prove fleeting. I believe that we must continue to work hard to lock in the gains achieved so far. The lessons of the high-inflation episodes are too important to forget.

Footnotes

1. Joseph E. Gagnon, of the Board's Division of International Finance, contributed to this speech, portions of which draw on Randall S. Kroszner (2006), "The Conquest of Worldwide Inflation: Currency Competition and Its Implications for Interest Rates and the Yield Curve," speech delivered at the Cato Institute Monetary Policy Conference, Washington, November 16, www.federalreserve.gov/newsevents/speech/kroszner20061116a.htm. Return to text

2. Friederich A. von Hayek (1976), *Denationalisation of Money: The Argument Refined: An Analysis of the Theory and Practice of Concurrent Currencies* (London: Institute of Economic Affairs). Return to text

3. Data for Germany based on 1972-88 changes in consumer prices, and data for the United States, Argentina, and Brazil based on 1972-2006 changes; IMF (various years), *International Financial Statistics* (Washington: IMF). Return to text

4. Long-term forecasts refer to forecasts six to ten years ahead from the April and October surveys of Consensus Economics, www.consensuseconomics.com. Return to text

5. Volatility is defined as the twenty-quarter rolling standard deviation of annualized inflation. Return to text

6. This section draws on aspects of Randall S. Kroszner (2003), "Currency Competition in the Digital Age," in David E. Altig and Bruce D. Smith, eds., *Evolution and Procedures in Central Banking* (New York: Cambridge University Press), pp. 275-99; and Randall S. Kroszner (2006), "Why Are Yield Curves So Flat and Long Rates So Low Globally?" speech delivered at the Institute of International Bankers, New York, June 16, www.federalreserve.gov/newsevents/speech/kroszner20060615a.htm. Kenneth Rogoff has proposed another effect of globalization on inflation. According to Rogoff, greater competition leads not only to lower but also to more-flexible prices. When prices are more flexible, a central bank's ability to temporarily influence output is diminished, and its influence on inflation is enhanced. Thus, more-competitive markets naturally help central banks achieve price stabilization. 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, Jackson Hole, Wyo. (Kansas City: the Reserve Bank), pp. 77-112. Return to text

7. www.bcb.gov.br/?PAYSYSREFORM Return to text

8. This hypothesis was raised in the discussion of Rogoff, "Globalization and Global Disinflation," pp. 119-30. Evidence that voters in Latin America in recent years have punished politicians for bad inflation outcomes is in Eduardo Lora and Mauricio Oliveira (2005), "The Electoral Consequences of the Washington Consensus," *Economia*, vol. 5 (Spring), pp. 1-61. Return to text

9. Alan Greenspan (2005), statement before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, February 16, www.federalreserve.gov/boarddocs/hh/2005/february/testimony.htm. Return to text

10. Although far-forward rates in yen are up about 1 percentage point from the historical lows associated with the Japanese deflation scares of 1998 and 2003, they are obviously still low in historical context. Return to text

11. Ben S. Bernanke (2005), "The Global Saving Glut and the U.S. Current Account Deficit," Sandridge Lecture at the Virginia Association of Economists, March 10, www.federalreserve.gov/boarddocs/speeches/2005/200503102. Return to text

12. I have included floating-rate debt in the one-year maturity category. Return to text

13. Refer to Ross Levine (2005), "Finance and Growth: Theory and Evidence," in Philippe Aghion and Steven Durlauf, eds., *Handbook of Economic Growth* (New York: Elsevier); and Randall S. Kroszner and Philip E. Strahan (2006), "Regulation and Deregulation of the U.S. Banking Industry: Causes, Consequences, and Implications for the Future," unpublished paper. Return to text

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