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Comment

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1. Introduction

Two outstanding facts about the last 20 years are that measures of world trade and financial openness have increased and that measures of world inflation have dramatically decreased. What is the connection between these facts?

This interesting and policy-relevant contribution by Prakash Loungani and Assaf Razin provides a formal model that links measures of openness to inflation, as well as developing some suggestive empirical evidence. That the contribution is timely as well is perhaps best illustrated by noting that the most recent *World Economic Outlook* (April 2006) produced by the International Monetary Fund is entitled "Globalization and Inflation."

2. A Quick Look at Some Facts

To fix some key ideas, it is useful to borrow some information from the third chapter of the WEO, which is entitled "How has Globalization affected inflation?" Figure 1 shows that the 1980s and 1990s witnessed a substantial decline in inflation in industrialized countries and in some—but not all—emerging market economies, although with the emerging market decline in inflation having occurred more recently. Figure 2 shows the pattern of increase in trade and financial openness in industrial economies and emerging markets. In the industrialized countries, there have been two rounds of major increases in international trade: the first took place while there was an acceleration of inflation in the 1970s, the second at the low inflation rates of the 1990s. Financial openness increased beginning in the mid-1980s and then accelerated dramatically in the 1990s. For emerging

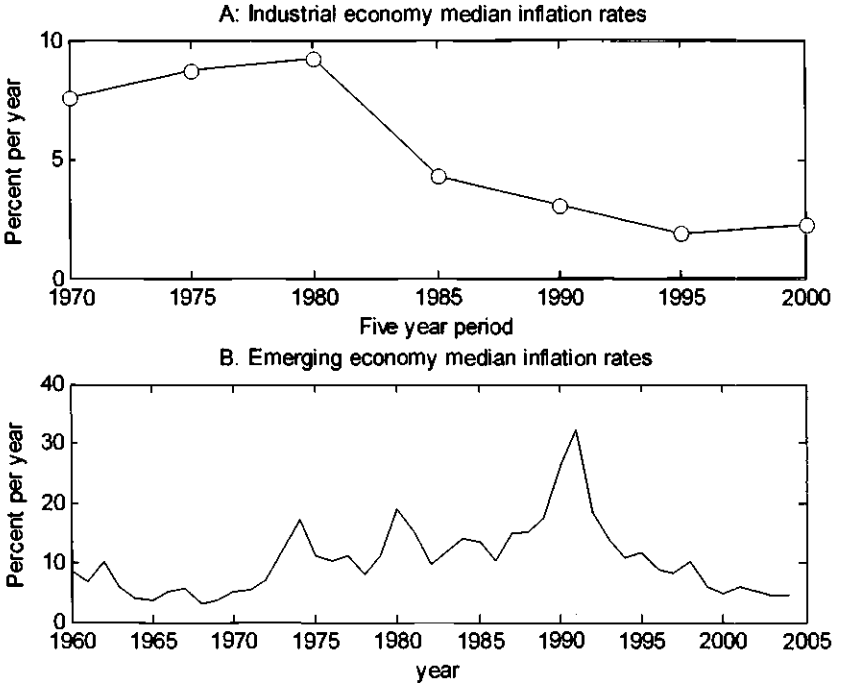

Figure 1
Source: *World Economic Outlook*, 2006, prepared by International Monetary Fund. Panel A is taken from Figure 3.1 in WEO and Panel B is taken from Box 3.1 in WEO.

markets, there has been a broadly similar pattern, although on a different base.

3. A Quick Overview of Some Theory

Many recent macroeconomic models are based on a mixture of Classical and Keynesian components. From the Classical side, they feature explicit microeconomic foundations and no long-run trade-off between inflation and real activity. From the Keynesian side, they feature inflation dynamics that are based on monopolistically competitive firms that set nominal prices in an optimal fashion, but also face some costs of adjusting prices in response to changes in economic conditions. In these models, there is a short-run trade-off between inflation and real activity, particularly if monetary policy is imperfectly credible.

In these monopolistic competition models, domestic adjusting firms—typically a subset of all domestic firms within any short period—set their price P^* as a markup (μ) over nominal marginal cost (Ψ).

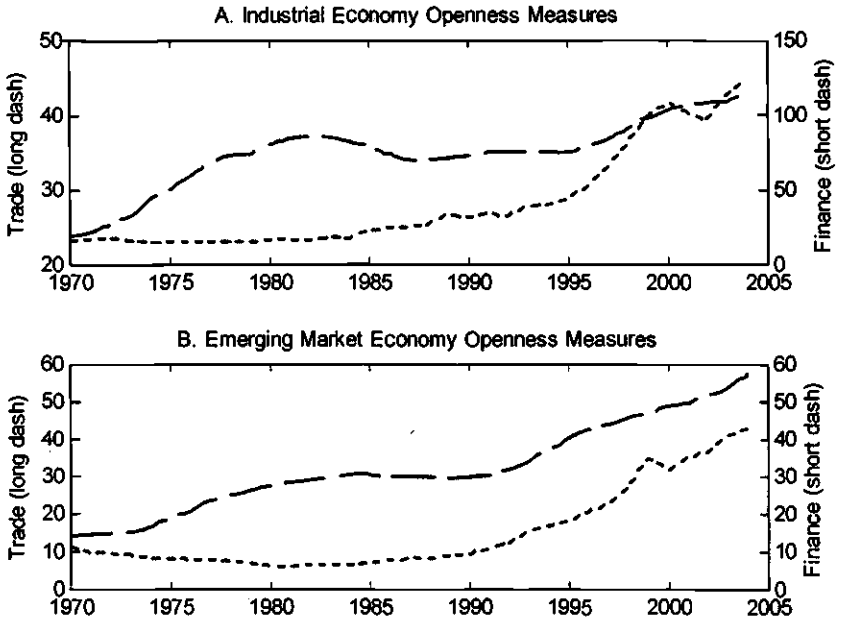

Figure 2
Source: *World Economic Outlook*, 2006, prepared by International Monetary Fund. Both panels are taken from Figure 3.4 WEO.

$$P_t^* = \mu_t * \Psi_t \tag{1}$$

and the price level is a weighted average of prices set now and in previous periods by domestic firms and the prices of some internationally traded goods.

$$\log(P_t) = \theta \left\{ \sum_{j=0}^{J-1} \omega_j \log(P_{t-j}^*) \right\} + (1-\theta)\log(\tilde{P}_t) \tag{2}$$

where $1-\theta$ is the share of imported goods in the price level and $\log(\tilde{P}_t)$ is the average price of these imported goods. Finally, nominal marginal cost depend on real marginal cost and the price level via $\Psi_t = P_t \psi_t$. Taking all of these considerations together,

$$\begin{aligned} \pi_t &= \Delta \log P_t = \log(P_t) - \log(P_{t-1}) \qquad (3) \\ &= \frac{\theta}{1-\theta\omega_0} \sum_{j=0}^{J-1} \omega_j (\Delta \log(\mu_{t-j}) + \Delta \log(\psi_{t-j}) \\ &+ \frac{\theta}{1-\theta\omega_0} \sum_{j=1}^{J-1} \omega_j \pi_{t-j} + \frac{1-\theta}{1-\theta\omega_0} \tilde{\pi}_t. \end{aligned}$$

So, in an accounting sense, inflation depends on changes in markups and real marginal cost, on past inflation, and on imported inflation.

Considering a major industrial country like the United States, globalization could therefore be important for inflation as (a) international competition affects markups or real marginal cost; (b) directly via imported inflation; or (c) via a changing share $1 - \theta$. For concreteness, let's think about the effect of trade with China, which is an important trading partner with the United States. Controversially, Chinese monetary policy seems to mainly involve keeping its currency low and stable vis-à-vis the U.S.

The key point built into the theory is that changes in the levels of real markups and real marginal cost affect the level of prices rather than the inflation rate. Hence, it is only *changes in the rate of growth* of these variables that affect inflation. For globalization to account for a decline in inflation, it must be increasing at an increasing rate. This does not seem to be the case for the United States. Therefore, we must look elsewhere for the sources of a decline in the inflation rate. Further, even with increased trade, the direct effect of imported inflation is not large for U.S. inflation. And, if we were to think carefully about this channel, we would also want to build in a theory of exchange rate determination.

4. Money, Inflation, and Real Activity

It is thus natural that Loungani and Razin are led to consider the effect of financial and commodity market openness on the conduct of monetary policy. Modern macroeconomic models also contain effects of the monetary authority's actions on the evolution of prices. It is easiest to summarize these in terms of the familiar identity

$$M_t v = P_t y_t \tag{4}$$

where M_t is the money stock, v_t is its velocity (assumed constant), P_t is the price level as above, and y_t is output. According to this specification, then, inflation can be accounted for by changes in money, velocity, and real output growth.

$$\pi_t = \Delta \log(M_t) - \Delta \log(v_t) - \Delta \log(y_t). \tag{5}$$

Further, there are two sets of influences on the path of real output within modern macroeconomic models. First, it is influenced by real factors like changing productivity and changing competitive condi-

tions that exert their impact via markups and marginal cost. Second, it is influenced by monetary policy, which also affects markups and marginal cost.

Globalization is certainly an important influence on the ongoing reorganization of United States economic activity, particularly for specific industries. Globalization may also be important for raising productivity growth in particular sectors, since greater returns can be realized from investments in new and better products.

However, from the aggregate perspective that is important for thinking about inflation, there are very modest effects on the growth rate of output. My sense is that little of the decline in inflation in industrialized countries can be explained by faster output growth, at most one out of the 8 percent median decline in Figure 1. So, as Milton Friedman suggested long ago, the explanation of the inflation decline in the United States and other industrialized countries must lie in the behavior of their monetary authorities.

4.1 Optimal Inflation with Commitment

Modern macroeconomic models suggest that the monetary authority has limited ability to affect the level of real economic activity via the average rate of inflation. This attribute is not much changed by openness. Thus, an optimizing monetary authority under commitment typically chooses a low rate of inflation (close to zero).

4.2 Equilibrium Inflation with Discretion

A discretionary monetary authority may choose a higher rate of inflation, for reasons familiar from Barro and Gordon's (1983) work on the inflation bias that arises when there is no commitment. Further, Romer (1993) uses an extension of the discretionary equilibrium to an open economy to develop the prediction that the extent of openness should be negatively related to the inflation rate (because the monetary authority's ability to influence real activity in the short-run is more modest) and finds that this holds in a cross-section of countries.

Loungani and Razin are therefore motivated to study the effect of commodity and financial market openness on the objectives and constraints of a monetary authority within a modern macroeconomic model. The idea—in line with some general observations and a simple model in Rogoff (2004)—is that increased openness has changed the

objectives and constraints of monetary authorities in ways that account for reduced inflation. The Loungani-Razin analysis is carefully worked out and buttresses the arguments of Rogoff.

4.2.1 Inflation and Discretion from the Closed Economy Perspective
It is an open question whether a discretionary monetary policy model can explain the rise and fall of inflation in the United States, other industrialized economies, and emerging market economies. For economists working from a closed economy perspective, where time series analysis is key, there is embarrassing little applied research on this topic, despite the exhortations of Baxter (1988). Fortunately, the recent work of Ireland (1999), which suggests that U.S. inflation is driven by an evolving natural rate of unemployment as predicted by the Barro-Gordon model, is stimulating some further work on this important topic.

4.2.2 Inflation and Discretion from the Open Economy Perspective
Following the work of Romer (1993), there has been more applied work by open economy macroeconomists, which mainly focuses on a cross-section of countries. Using the import share as his measure of openness, Romer summarizes his core findings as follows:

"the estimated impact of openness on inflation is quantitatively large. The point estimates in column (I), for example, imply an average rate of inflation of 18 percent for a closed economy, 14 percent for an economy with an import share of 25 percent, 11 percent for an import share of 50 percent, and 8 percent for an import share of 75 percent. Finally, the fraction of the variation in inflation explained by the regression is non-trivial: openness alone accounts for over 10 percent of the cross-country variation in average inflation rates."

If import shares are one-half of the export+import shares used in Figure 2, then we can use these cross-sectional estimates to make a prediction about the time-series relationship: an increase in industrialized country trade openness in Figure 1 from about 36 in 1985 to about 43 in 2004 should correspond to an increase in the import share from about 18 to about 22. In terms of Romer's calculations, an increase from autarchy to 25 percent import share will change the inflation rate by only 4 percent. Thus, the prediction would be that a very small part—less than 1 percent—of the decline in industrialized country inflation from about 9 percent to about 2 percent was based on the interaction of openness with monetary policy outcomes. This is a fairly small effect and

it seems completely consistent with my reading of the history of the major industrialized countries.

In terms of the emerging markets, export+import shares rose from about 29 percent in the early 1990s to about 57 percent in recent years. Cutting these in half (say, to 15 percent and 30 percent) and applying Romer's estimates, we would conclude that inflation should decline by at most a few percent. This is small potatoes in terms of the drop in median inflation from 30 percent to 5 percent shown in panel B of Figure 1.

Taking the results of these industrial and emerging market exercises together, my conclusion is that there is a substantial tension between the cross-section estimates of Romer and the attempt to attribute major parts of the decline in inflation in industrial and emerging market economies to increased globalization. At the same time, analysis along the lines of Loungani and Razin is useful because it potentially sharpens the predictions of the theory and allows for a more systematic empirical investigation.

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