

The Impacts of Globalization on Monetary Policy

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Monetary policy has been dealing with globalization for centuries as the magnificent Galerie Dorée at the main headquarters of the Banque de France reminds us. The Banque de France moved into those beautiful quarters in 1808, exactly two centuries ago, and the statues in the four corners of the Gallery are said to represent the four corners of the globe: Europe, Africa, America, and Asia. I note with some trepidation that the statue in the European corner is wearing Roman legionary dress, with a sword in her hands and a globe at her feet, and is accompanied by a horse, while the American has only a bow and arrow and is accompanied by a lizard. But I take some consolation by reminding myself that fears of globalization are usually unwarranted, and indeed that is a main theme of my remarks today.

I also understand that near the Governor’s offices is a pair of Jacques Joseph Duhem gouaches, two seascape paintings, one entitled *Calm* and the other *Storm*, an ever-present reminder of how the global financial seascape can change suddenly, though none of us need that reminder right now.

A review of the history of the impacts of globalization on monetary thought and practice is essential for understanding the implications of globalization for monetary policy today, and I start with a short review. I won’t go back two centuries, but I will go back a good

fraction of a century, to the period immediately after the collapse of the Bretton Woods fixed exchange rate system in the 1970s.

Looking for a Monetary Framework in a Globalized Economy

This was a time when central banks around the world were groping to find an alternative to the fixed exchange rate international system that had guided many of them in the 1950s and 1960s. It was not a pretty sight. With monetary policy de-linked from the constraints of the Bretton Woods system, inflation in the United States accelerated from the already high levels that put pressure on the international system in the first place. The U.S. inflation rate reached 12 percent in 1975, fell to 5 percent in 1977, and then increased to 15 percent before the 1970s were over. Recessions were frequent. The volatility of real GDP was high, twice as high as it has been recently: The standard deviation of real GDP growth in the United States was 2.8 percent in the 1970s, compared with 1.4 percent in the 1990s.

The lack of a workable framework for monetary policy created similar instabilities in inflation and output in many other countries around the globe. The volatility of real GDP growth in Europe in the 1970s was comparable to that in the United States. In France, for example, the standard deviation of real GDP growth was 2.7 percent in the 1970s compared with only 1.1 percent in the 1990s.

Out of this experience came better monetary theories, better monetary policies, and of course better macroeconomic results. The theories and policies were designed for, or at least influenced by, a certain conceptualization of globalization. Empirical models to evaluate monetary policy moved rapidly in a global direction. The ones I know best were the multi-country models first built at the International Monetary Fund, at the Federal Reserve Board, and at Stanford University, but there are many others. Books published as part of a Brookings

international model comparison project (Bryant, Hooper and Mann (1993)) provide many more details. These multi-country models continue to evolve and improve over time, especially at policy making and policy research institutions, now also including the European Central Bank; see Coenen, Lombardo, Smets, and Straub (2007), for example. A new model comparison project is now underway, jointly sponsored by the Center for Financial Studies (CFS) in Frankfurt and the Stanford Institute for Economic Policy Research (SIEPR) at Stanford University.

Like other modern monetary theories these empirical models are built on the foundations of rational expectations and staggered price and wage setting. But more important for this conference, they are globalized: they assume perfect capital mobility between countries, interdependence of foreign exchange markets, price links between different countries, as well as export and import flows and the current account. Globalized monetary models have strong links between different economies. A slowdown or a recession in one country, for example, will affect growth and inflation in other countries through many financial and “real economy” channels. In this sense, the empirical models are designed to address questions about the implications of globalization for monetary policy. So what do the theories and the empirical models tell us about the implications of globalization for monetary policy?

The Exchange Rate and Interest Rate Decisions

First consider the exchange rate. The exchange rate plays three significant roles in any reasonable international monetary model. First, the expected rate of change of the exchange rate affects the return from holding one currency compared to another. This implies, for example, that a cut in the interest rate in one country will tend to lead to a depreciation of that country’s currency. Second, the level of the exchange rate affects the relative price of goods in

different countries and thus exports and imports. This implies, for example, that an increase in the trade deficit will tend to lead to a depreciation of the currency. Third, the percentage change in the exchange rate affects inflation through the pass-through mechanism.

Despite these significant roles for the exchange rate, the theories and the empirical models tell us that monetary policy should not react directly to changes in the exchange rate. More specifically, if you characterize policy as a monetary policy rule for setting the interest rate in a way that aims to keep the fluctuations of inflation and real output low, then that rule should respond primarily to inflation and real GDP, or perhaps forecasts or nowcasts of inflation and real GDP, but not directly to the exchange rate. In my view this is a pretty robust result, and it has held up over time. Some research on small open economy models (Ball (1999)) shows that reacting by a small amount to the exchange rate—decreasing the interest rate when the exchange rate appreciates—can improve macroeconomic performance, but the gains are small and are not robust across all models. Recent work by Batini, Levine, and Pearlman (2007) finds that not responding directly to the exchange rate in the monetary policy rule is nearly optimal.

What is the intuition behind this finding? First, exchange rates are more volatile than macro variables like real GDP and inflation; reacting to them can cause herky-jerky movements in the interest rate, which have harmful effects on the economy. Second, having interest rates respond to inflation or expected inflation automatically provides a response to the exchange rate. (See Taylor (2001)). A depreciation of the exchange rate increases inflation in the empirical models. Hence, increasing the interest rate when inflation rises due to a depreciation is an indirect response to the exchange rate.

Cooperation and Interest Rate Decisions

Another broader set of questions concerns whether globalization implies that central banks should be reacting in different ways to inflation or real GDP in other countries. Should the central bank in country A react more directly to economic events in country B under globalization, and if so how does that affect the policy decisions in country B? Clearly there is a “we’re looking at you and you’re looking at us” aspect of central bank decisions in a globalized world.

A formal way to address this question is to consider the gains from central banks cooperating in the *design* of monetary policy rules (Taylor (1985)). Estimating the size of such potential gains empirically is essential because it is likely that they are positive in principle and we need to know if they are material in practice.

To be specific we can use some concepts from game theory. Though it may sound abstract, let me define a *global cooperative policy* as one where central banks *jointly* choose their policy responses to bring about good performance globally. To be sure, I am thinking about a joint international choice, by central banks, of the parameters of their policy *rule* for the interest rate—a global cooperative policy rule. This means they agree on a global objective, such as price stability and output stability for the global economy, which would, of course, depend on price stability and output stability in each country.

In contrast, a global policy rule without cooperation can be defined as in the non-cooperative case of game theory; that is, a Cournot-Nash policy. Such a global non-cooperative policy rule occurs when policy makers in each country take as given policy reaction coefficients in the other countries. One can easily imagine the central bank staff taking the policy rules of other central banks as given when they do alternative policy simulations. They then determine the best response of the interest rate in their own country to bring about

price and output stability. The central bank thereby creates a policy rule conditional on the foreign central banks' policy rules. The global Cournot-Nash policy assumes that other central banks do the same thing. The equilibrium is where the rule that every central bank takes as given for other central banks is optimal for those other central banks. That equilibrium is the global non-cooperative policy rule.

Believe it or not, it is computationally feasible to calculate these policies with empirical multi-country models. The computations show that the policy rules are, perhaps not surprisingly, different for the cooperative as compared with the non-cooperative policies. For example, the global cooperative policy entails a smaller response of the interest rate to the inflation rate than the global Cournot-Nash policy. Why? When a central bank raises its interest rate in response to an increase in the inflation rate, the exchange rate tends to appreciate in that country and to depreciate in the other countries. The depreciation abroad is inflationary abroad and this requires that the central banks in the other countries raise interest rates. In the cooperative case the smaller initial response reduces these interactions.

However, according to the empirical models the gains from using the cooperative policy rule are very small quantitatively compared with using the non-cooperative policy rule, and as a practical matter the policy could easily ignore these international complications (Carlozzi and Taylor (1985)). The global non-cooperative rule generates a workable international system and the extra complexity of cooperating as defined here is not worth it. By focusing optimally on the goals of price and output stability in each country separately, the non-cooperative policy is already a great improvement over sub optimal policies of the 1970s. More recent research by Coenen, Lombardo, Smets, and Straub (2007) also investigates the gains from monetary policy cooperation among countries using a slightly different concept of cooperation and non-cooperation ("open-loop" rather than "closed-loop"). They also find that these gains are small.

Cooperation in the Broader Sense

It is important to note, however, that even this non-cooperative global Cournot-Nash policy, as defined here, involves a significant amount of cooperation in the ordinary sense of the word. At the least, it is necessary for central banks to cooperate in providing clear and transparent information about their own policy reactions. Meeting together and exchanging views as is done in such forums as the BIS, the OECD, and the IMF is important so that policy makers can make their decisions taking other policymakers into account.

Cooperation is also essential for the part of monetary policy that does not entail changing the overnight interest rate, including efforts to provide liquidity, agreements on swaps, and employing new facilities such as the Fed's new term auction facility. Exchange of information in a prompt and transparent manner is essential in times of financial market crisis.

What Has Been the Experience?

In my view, the actual monetary policy framework that has been put in place during this period by the central banks has been reasonably close to this theory and the recommendations implied by the empirical models. At least until recently there has been a pretty explicit policy of not reacting to exchange rates other than indirectly through inflation and real GDP effects. Many central banks have been following such a strategy as part of their general approach to inflation targeting. However, as Edwards (2005) has noted estimated reaction functions show that some emerging market countries have been taking exchange rates into account even when such actions are not part of their stated strategy. I will return to this issue later in my remarks.

Another aspect of today's international monetary policy framework that is consistent with the theory is that central bank behavior is reasonably well described by a global Cournot-

Nash policy. Central banks make their best assessments of the likely response of other central banks and then find their own appropriate responses. With many central banks following such an approach, the resulting policy fits the Cournot-Nash concept closely. They have wisely resisted the temptation to obtain the extra gains from cooperation in the formal game theory sense, but they have cooperated by exchanging information about their policies.

Overall the experience has been very good. Price stability and output stability have improved dramatically since the 1970s. At the same time, however, the policy framework and the increased stability have led to other changes and these have implications for policy going forward, as I consider next.

Globalization and the Decline in Pass-Through

One of the most significant changes in the global economy in recent years is the sharp reduction in degree of exchange rate pass-through. This has been empirically documented in many countries. Some have credited this decline to increased globalization and in particular to increased foreign competition. They argue that the resulting “price pressure” prevents firms from passing along the full cost increase when the price of imported goods rise.

I have argued (Taylor (2000)) that the declining pass-through has been more likely due to a more credible focus of monetary policy on price stability and a less accommodative stance regarding inflation. If inflation is expected to remain low, then firms will recognize the temporary nature of nominal price increases and have less reason to pass through a cost increase. Many empirical papers have tried to test which theory has more explanatory power.

The two explanations have widely different implications for monetary policy. If the first explanation is correct, then policy makers could take the low level of pass-through as a given, a structural feature of the economy which is invariant to monetary policy. If so, then optimal

policy would entail a larger interest rate reduction in response to a decline in output because the exchange rate depreciation caused by the lower interest rate would not feedback into inflation very much. However, if the lower level of pass-through is due to a non-accommodative policy itself, then such accommodative actions could reverse the decline in pass-through and have a larger impact on inflation than expected.

Observe that in this case globalization is making monetary policy more difficult by confusing the source of the decline in pass-through. The same type of signal distortion is evident in the cases I consider next.

Globalization and Short Run Inflation Dynamics

Other significant changes in the world economy pertain to the short run relation between inflation and output. Explanations for these changes frequently invoke globalization in some way. For example Rogoff (2004, 2006) showed that increased competition associated with globalization would be expected to make the short run Phillips curve steeper by making prices more sensitive to shifts in demand. This increased price sensitivity has been cited as a reason for the excellent inflation record of the last two decades, because a steeper Phillips curve reduces the short run output benefits that surprise inflation might bring; it therefore reduces the incentives of policy makers to deviate from their inflation objectives.

Empirical evidence has shown, however, that the slope of the Phillips curve has flattened rather than steepened (see Roberts (2006)), and there have been a host of explanations for this phenomenon. The most widely discussed explanation is again globalization, and namely that the lower slope of the Phillips curve is due to global aggregate demand effects on inflation, through which inflation in one country is related to output gaps or unemployment in other countries. However, for this effect to work, the lower coefficient on a country's output in

the Phillips curve would have to be offset by higher coefficients on other countries' output in those Phillips curves. Kohn (2006) has shown that there is little evidence for this. See also Ihrig and others (2007).

Another globalization-related explanation is that there are direct linkages between wages in different countries due to the off-shoring of labor services, as modeled by Grossman and Rossi-Hansberg (2006). However, evidence of an increased international wage to wage connection has yet to be presented.

There is another explanation for slope reduction which has nothing to do with globalization. It is due to Roberts (2006) and it fits the facts very well. As Roberts (2006) has shown, the estimated slope could have declined simply because monetary policy has become more aggressive in controlling inflation. An increase in output appears to have a smaller effect on inflation because monetary policy is expected to take action to prevent such increases.

As with the case of pass-through, the different explanations for the change in the Phillips curve slope have widely different policy implications. If the slope is flatter because of structural changes due to globalization, then making policy more accommodative to inflation would emerge from an optimal monetary policy exercise and might make sense. But if the lower slope was due to the policy non-accommodative policy in place, then such change to a more accommodative policy rule would not be justified.

There is another frequently discussed though conceptually different explanation for the impact of globalization on inflation. It is a simple direct effect through which low priced imports from low cost developing countries such as China holds down the inflation rate. However, as with the case of pass-through there is another more traditional explanation for which we have much evidence over many years, namely that monetary policy itself has been the key factor in keeping inflation low and stable around the world. The "competition from

abroad” explanation of the disinflation over the years is very popular, but it does not have a solid basis in monetary theory. Competition is a level rather than a rate of change effect and inflation is ultimately caused by higher monetary growth.

Globalization and the Impact of the Exchange Rate on Policy in Practice

Finally let me return to the finding that recently some central banks appear to be responding to exchange rates when setting interest rates, as Edwards (2005) has argued citing regression evidence that exchange rates appear in policy rules. Additional evidence of this phenomenon is that central banks sometimes mention how the prevailing interest rate around the world affects their decisions. If there is concern about exchange rate fluctuations, then moving the interest rate away from prevailing international interest rates could cause the currency to appreciate or depreciate, something that the central bank might want to avoid, perhaps due to political pressures. Many central bankers, even those with flexible exchange rate policies, watch the U.S. federal funds rate carefully when making policy decisions.

To illustrate this issue consider the relationship between Eurozone interest rates and U.S. interest rates during the past few years. Consider in particular the deviation of the overnight interest rate target for the European Central Bank from a simple guideline for that interest rate—the Taylor rule—which depends on the inflation rate and the gap between real GDP and its potential level. For this purpose I measure the inflation rate as the four quarter average rate of change in the harmonized index of consumer prices and the real GDP gap as the percentage deviation of real GDP from a trend estimated by a popular statistical procedure called the Hodrick-Prescott filter.

Now if one examines the relationship between this deviation and the actual federal funds rate in the United States during the period from 2000 through 2006, one finds a close

empirical correlation between the two. An estimated linear relationship with the deviation on the left hand side has a coefficient on the federal funds rate of 0.21, which means that each percentage point reduction in the federal funds rate was associated with a 1/5 percentage point reduction in the ECB interest rate below what would otherwise be desirable on European price stability and output stability grounds (See Taylor (2007)). The relationship is highly significant statistically (t-statistic equals 3 ½). For part of this period the ECB policy rate was below this guideline and according to these estimates a significant part of the deviation is “explained” by the U.S. federal funds rate being lower than normal. I have found similar strong foreign interest rate effects for other central banks.

These correlations suggest another implication of globalization: the danger that central banks could move off course due to concerns about the exchange rate. If this causes central banks to veer off the framework that has proved effective in the past, it could be destabilizing. More specifically if it causes central banks to reduce interest rates below levels needed for price stability it could be inflationary.

Conclusion

In these remarks I have considered the impacts of globalization on monetary policy using monetary theory, empirical models, and monetary experience. I reviewed how a workable monetary framework to deal with globalization was developed after the 1970s as international economic connectivity grew in importance following the end of the Bretton Woods system. The international framework involved focusing on a target for inflation, adjusting the interest rate instrument of policy in each country to changes in inflation and output in that country, and cooperating with other central banks in exchanging information about interest rate policies as well as policies to provide liquidity in times of payments crises. In principle, the framework has

not involved reacting directly to exchange rate movements or jointly setting a systematic strategy for interest rate decisions, whether a target for inflation or the systematic reactions of interest rates to macroeconomic developments.

This framework has worked well for nearly a quarter of a century. Now, however, globalization is threatening the same successful monetary framework which was designed to deal with globalization twenty five years ago.

First, the concept of globalization has tended to muddy the waters of our monetary theories as the world has changed. Whether it is the reduced pass-through, the flattened Phillips curve, or the disinflation over the past 25 years, globalization is often invoked as an explanation. But one does not need globalization to explain these phenomena. The monetary policy framework is sufficient, and, in my view, the correlation between globalization and these phenomena is spurious. The danger is that using globalization as an explanation for these phenomena can lead to deterioration of monetary policies, as I have shown in these remarks. For this reason alone globalization is a challenge to monetary policy makers. The best way to meet this challenge is with rigorous economic research on globalization and monetary policy as Fisher (2006, 2007) has called for. This would help clarify the theories and sort out the spurious from the genuine.

Second, though the monetary framework calls for little direct interest rate action to deal with exchange rates, it appears the central banks have been taking exchange rates into account in their interest rate responses. We still do not know all the reasons for these responses or how large a problem they are in practice, though I offered some suggestive evidence in my remarks. In the current environment they could be inflationary, and they may even be a part of the explanation for the elevated levels of global inflation that we see today. Perhaps there is more to gain than previously thought from a globally cooperative policy that simply emphasizes the

goal of global price stability. Again more research is needed to address this problem, which is likely to persist for a long time.

References

- Ball, Laurence (1999), "Policy Rules in Open Economies," in John B. Taylor *Monetary Policy Rules*, University of Chicago Press, Chicago.
- Batini, Nicoletta, Paul Levine, and Joseph Pearlman (2007), "Monetary Rules in a Partially Dollarized Small Open Economy with Financial Market Imperfections," paper presented at NBER conference on "International Dimensions of Monetary Policy," Girona, Spain, June
- Bryant, Ralph C., Peter Hooper, Catherine L. Mann (1993), *Evaluating Policy Regimes: New Research in Empirical Macroeconomics*, Brookings Institution, Washington, D.C.
- Carlozzi, Nicholas and John B. Taylor (1985), "International Capital Mobility and the Coordination of Monetary Rules," in *Exchange Rate Management under Uncertainty*, Jagdeep S. Bhandari (Ed.) 186-211, MIT Press, Cambridge, Massachusetts.
- Coenen, Gunter, Giovanni Lombardo, Rank Smets, and Roland Straub (2007) "International Transmission and Monetary Policy Cooperation," paper presented at the NBER Conference on "International Dimensions of Monetary Policy," Girona, Spain
- Edwards Sebastian (2005) "The Relationship Between Exchange Rates and Inflation Targeting Revisited," prepared for a conference at the Central Bank of Chile
- Fisher, Richard (2006) "Coping with Globalization's Impact on Monetary Policy," Remarks at the National Association for Business Economics, Panel Discussion at the 2006 Allied Social Science Associations Meeting, Boston, Massachusetts (January 6).
- Fisher, Richard (2007), "Globalizing the Knowledge Economy," Remarks before the Houston World Affairs Council, Houston, Texas, April 13
- Ihrig, Jane E., Steven B. Kamin, Deborah Linder, Jaime Marquez (2007), "Some Simple Tests of the Globalization and Inflation Hypothesis," Federal Reserve Board
- Kohn, Donald L. (2006), "The Effects of Globalization on Inflation and Their Implications for Monetary Policy, Economic Conference, Federal Reserve Bank of Boston.
- Roberts, John (2006), "Monetary Policy and Inflation Dynamics," *International Journal of Central Banking*, September, Vol. 2, No. 3, pp. 193-230

- Rogoff, Kenneth (2004), "Globalization and Global Disinflation," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, Jackson Hole Symposium sponsored by the Federal Reserve Bank of Kansas City.
- Rogoff, Kenneth (2006) "Impact of Globalization on Monetary Policy," in *The New Geography: Effects and Policy Implications*, 2006 Jackson Hole Symposium, Federal Reserve Bank of Kansas City.
- Taylor, John B. (1985), "International Coordination in the Design of Macroeconomic Policy Rules," *European Economic Review*, Vol. 28, pp. 53-81.
- Taylor, John B. (2000), "Low Inflation, Pass-Through, and the Pricing Power of Firms," *European Economic Review*, Vol. 44, 1389-1408.
- Taylor, John B. (2001), "The Role of Exchange Rates in Monetary Policy Rules," *American Economic Review, Papers and Proceedings*, Vol. 91, No. 2, 263-267.
- Taylor, John B. (2007), "Globalization and Monetary Policy: Missions Impossible," NBER Conference on the International Dimensions of Monetary Policy, Girona, Spain, June 2007