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Globalization and Monetary Policy
Missions Impossible

John B. Taylor

Globalization is not a new issue in monetary economics. Indeed, for at least three decades the forces of globalization have been presenting challenges for both monetary policy and the theory that underlies it. The challenges never seem easy. When I look back on the history of this period and consider the challenges faced, I am reminded of the theme from Mission Impossible: in one episode after another, people pursued a seemingly impossible mission and in the end the mission was, amazingly, accomplished.

In this chapter, I examine three such missions impossible in the area of globalization and monetary policy. The first—*M:i:I*—begins thirty years ago, the second—*M:i:II*—begins ten years ago, and the third—*M:i:III*—takes place today. For each mission, I discuss: (a) the theory, or the ideas developed to accomplish the mission; (b) the policy, or the implementation of these ideas; and (c) the results. Unlike the movies, the connection between the theory, the policy, and the results is not obvious, but speculating about the connection is intriguing.

12.1 Mission Impossible I

Go back thirty years to the mid- to late-1970s. Inflation in the United States was into double digits and had been rising for a decade. The volatility of inflation was also high: consumer price index (CPI) inflation reached 12

percent in 1975, fell to 5 percent in 1977, and then increased to 15 percent before the decade was over. Like inflation, the volatility of real gross domestic product (GDP) was very high: the standard deviation of real GDP growth was about 3 percent, recessions came frequently, and expansions were short-lived. According to NBER dating, there were recessions in 1969 and 1970, 1973 to 1975, 1980, and 1981 and 1982; and some had chronicled another recession in 1977 and 1978—a growth recession. So there was a recession about every three or four years. There seemed to be a connection between the fluctuations in real GDP and inflation; each time inflation rose and reached a new peak it was followed by a recession, in boom-bust cycle fashion.

There was also a global connection. The Bretton Woods fixed exchange rate system had broken down in the early 1970s. Hence, central banks around the world were groping to find an alternative to the fixed exchange rate that had guided so many of them in the past. The lack of a workable framework for monetary policy, fluctuations in the velocity of money, and an incomplete understanding of the inflation-output trade-off created similar instabilities in inflation and output around the world. The standard deviation of real GDP growth in the other G7 countries was comparable to that in the United States.

12.1.1   The Objective Function and the Mission

It was also during the 1970s that economists—especially macroeconomists and monetary economists—began to focus explicitly on finding policies that could improve this economic performance. Given the dismal macroeconomic conditions at the time, this intense policy focus was not surprising. It was at this time that researchers began to use an explicit objective function in their research papers. The objective was simply to reduce the volatility of inflation and real GDP. Soon it was hard to find a paper in which the policy objective was not stated. It was usually written down algebraically in the form of a quadratic objective function

(1) $\lambda \text{Var}(y) + (1-\lambda)\text{Var}(\pi),$

where y represented real GDP relative to normal levels, π represented the inflation rate, and Var represented the variance, or expected squared deviation of inflation or real GDP from a target. The weight λ described the relative importance of each variable and for most of the models there was a trade-off between these two variances. See, for example, Sargent and Wallace (1975), Kydland-Prescott (1977), and Taylor (1979). The purpose of the research was to find a policy to minimize the objective function, or more simply put, to increase output and price stability. The form of the policy to accomplish this was either a policy rule for the monetary instruments, or alternatively, a dynamic time path for these instruments.

Because the actual $\text{Var}(\pi)$ and $\text{Var}(y)$ were large at the time, the research seemed highly relevant and important. But it also seemed difficult, if not

impossible, and hence the analogy with the dramatic opening of a mission impossible episode: "*Your mission, should you choose to accept it, is to reduce inflation and output volatility around the world.*" The "you" in this analogy—the Impossible Mission Force (IMF)—was the community of researchers and policy makers interested in monetary policy and theory—monetary economists both inside and outside central banks. Focused on the mission, they went about their research, bringing a vast array of new ideas to bear on the problem. They introduced rational expectations into the macro models, devised new theories of price and wage rigidities, estimated parameters with new econometric techniques, solved more and more complex models, and optimized with stochastic control theory and dynamic programming. Many of the new research ideas—including the application of rational expectations, the Lucas (1976) critique, and the time inconsistency problem—led to a greater focus on formulating the policy decisions as a policy rule rather than as a onetime path for the instruments.

Looking back, the huge amount of research output was amazing. But much more amazing was that the mission was actually accomplished. The variance of inflation and the variance of real GDP did come down, and by a very large amount. Compared to the recession-prone economy of the past, the United States went into a period where recessions occurred only once every nine or ten years on average, far less frequent than once every three or four years. Only two recessions occurred in the twenty-five years between the end of the 1981 to 1982 recession in the United States and 2007, and these two recessions have been very short and mild by historical comparison. The standard deviation of real GDP growth was cut in half to 1.5 percent. Though this improvement began in the United States in the early 1980s, it was not until the 1990s that people began to document and study the decline in volatility of real GDP, a phenomenon that is now called the Great Moderation or the Long Boom. The improvement did not only occur in the United States. Similar improvements were seen in countries around the world. The G7 countries as a whole, for example, also cut the standard deviation of real GDP in half.

There is a debate about the reasons for the improvements. I have argued (Taylor 1998) that they were caused mainly by changes in monetary policy, implying that the mission was accomplished through more than luck alone. There is also a debate about whether the research influenced the changes in monetary policy—about whether these ideas had actual consequences. Although causality and influences are complex and difficult to prove, there is certainly a close relationship in time between the monetary research, the monetary policy, and the improvement in economic stability. This close intertemporal relationship has been nicely captured by Cecchetti et al. (2007). Figure 12.1 is drawn directly from the Cecchetti et al. paper. It takes the Taylor rule as representative of the type of policy recommendation that emerged from the research, and shows that the improvement in economic
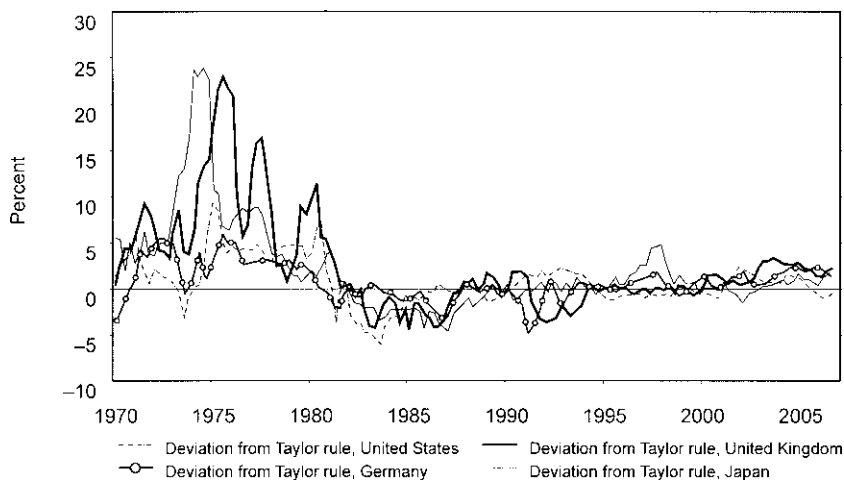
Fig. 12.1   Empirical evidence of monetary policy regime shifts from deviations from a policy rule
Source: Cecchetti et al. (2007).

performance occurred at about the same time that monetary policy began to follow that kind of recommendation. Again this does not prove causation, and indeed the timing is so close that two-way causation may be involved, although it is clear that the monetary policy rules were meant to be normative recommendations rather than simply descriptions of actual policy.

Figure 12.1 also illustrates the global nature of these changes: the close correlation and timing between the greater adherence of actual policy to recommended policy rules and the better economic performance can be seen in other countries, not only the United States. The connection between the ideas, the policies, and the results are a global phenomenon that spread quickly around the world—certainly another manifestation of globalization.

12.1.2   Out of Global Models Came Simple Rules

Although the rational expectations models that were first used to find optimal monetary policy rules in the 1970s were closed economy models, by the early 1980s monetary policy evaluation was moving rapidly in a global direction, and ultimately the recommended policy rules for the interest rate, like the one plotted in figure 12.1, emerged from new multicountry models with rational expectations. Examples include the modeling efforts at the Federal Reserve Board, the International Monetary Fund (IMF), and Stanford (Taylor 1993)—all participants in the Brookings project on monetary policy regimes (Bryant, Hooper, and Mann 1993). This evolution of models in an international direction was motivated by the policy mission. These *M:i:I* models were the first multicountry policy evaluation models with rational expectations, staggered price and wage setting, and a focus on evaluating

monetary policy as a policy rule with a specific objective function. They also usually assumed perfect capital mobility, interdependence of capital and foreign exchange markets, expectations theories of the term structure of interest rates, uncovered interest rate parity, and direct price setting links between different countries. Designed so that they could address questions about exchange rate regimes—fixed versus flexible—the models focused on finding monetary policy rules to minimize objective functions like (1) for many countries.

12.1.3   Zero Response to the Exchange Rate

The exchange rate played a significant role in these models. Its expected rate of change affected relative rates of return from holding one currency versus another, as capital could move around the globe to obtain the best return. Its level affected the relative price of goods in different countries and thus affected exports and imports. Its past rate of change affected inflation through the pass-through mechanism.

With such a significant role for the exchange rate in the models, it was surprising to everyone that they called for monetary policy rules in which the interest rate settings by the central bank should not react directly to the exchange rate. Rather, optimal policy decisions should respond primarily to inflation and real GDP. More technically, to minimize the objective function, the central bank's policy rule for the interest rate rule should include inflation (as a deviation from the target rate of inflation) and real GDP (relative to potential GDP), but not the level or rate of change in the exchange rate. To be sure, more recent work on small open economy models (e.g., Ball 1999) shows that reacting to the exchange rate can improve economic performance, but the gains are small and do not hold up across all models. Nevertheless, as I describe in my following discussion of Mission Impossible III, there is now a generation of *M:i:III* multicountry rational expectations models with staggered price setting. These models might yield different policy results. However, since the *M:i:I* models assumed perfect capital mobility, it is hard to see why more globalization of financial markets alone would change the results.

There are two explanations for the minimal role for the exchange rate (Taylor 2001). First, exchange rates are volatile compared with real GDP and inflation, so reacting to them could cause the interest rate to be too volatile, which would have harmful effects on the economy. Second, responding to inflation automatically provides a response to the exchange rate. A depreciation of the exchange rate, to some degree, passes through to inflation. Thus, raising the interest rate as inflation rises is in part a response to a depreciation of the exchange rate.

12.1.4   Not to Worry about Coordination in the Design of Policy Rules

Given that the international monetary models had strong links between different countries, it was natural to ask whether a central bank in one

country should react directly to events in another country. For example, a recession abroad will tend to lower inflation at home through the impact of import prices and other channels; thus, an optimal response to a foreign recession might be to lower the interest rate to keep the inflation rate on target. The formal way to address this question is to consider the possibility of coordinating the *design* of monetary policy rules across countries (Taylor 1985). Using game theory terminology, the Cournot-Nash solution represents the noncooperative case; it occurs when policymakers in one country take as given policy reactions in the other countries—as if the Fed staff takes the policy rules of other central banks as given when it does alternative policy simulations—and that the Fed reacts optimally given those foreign policy rules. The Cournot-Nash solution assumes that other central banks do the same thing, and that there is an equilibrium where the rule that every central bank takes as given for other central banks is actually optimal for those other central banks. In contrast, the coordinated or cooperative solution is where all central banks jointly maximize a global objective function that incorporates objective functions like (1) for all countries.

The results of the research were that the cooperative solution entailed a smaller response of the interest rate to an inflation rate increase than the Cournot-Nash solution. When a central bank raises its interest rate in response to an increase in inflation rate at home, the exchange rate tends to appreciate in that country and to depreciate in the other countries. The depreciation abroad tends to be inflationary abroad and requires that the central banks in the other countries tighten. It is also optimal to react to inflation developments in other countries, but the response is different in the cooperative versus the noncooperative case. In the cooperative case, the interest rate is cut when inflation rises in the other countries; this provides an appreciation of the currency in the other country and mitigates the inflation rise abroad and the output effects at home. However, according to the estimated models the effects were very small quantitatively, and as a practical matter the policy recommendations could ignore these international effects (Carlozzi and Taylor 1985).

12.2   Mission Impossible II

For our second example we go back to another period of dismal economic performance: the period of emerging market crises in the 1990s, or more precisely from 1994 to 2002. Table 12.1 lists the large number of crises that occurred around the world during this period—starting with the Mexican crisis in 1994 and the associated Tequilla contagion, continuing onto the Asian crisis and its contagion, the Russian crisis and its contagion, and ending with Uruguay in 2002. Guillermo Calvo (2005) aptly characterized the crises during this period in his Graham Lecture at Princeton University, saying, "Their frequency and global spread set them apart from anything

else that we have seen—at least since World War II." The frequency and spread was so great and unusual that the period is better described as one "eight-year financial crisis" rather than eight years of financial crises.

Thousands of research papers have been written about this crisis period, many with the goal of better understanding and ultimately bringing an end to the crisis period. Hence, again we have the analogy with the dramatic opening of a mission impossible episode: "*Your mission, should you choose to accept it, is to reduce the frequency and global spread of financial crises.*" The "you" in Mission Impossible II is the international community of monetary and finance experts both inside and outside of governments and central banks, with the IMF and its staff playing a much bigger role than in Mission Impossible I. Examples include the participants in the NBER project on crises in emerging markets under the direction of Jeffrey Frankel, Sebastian Edwards, and Michael Dooley; this project alone resulted in thirteen conferences and eight books during the crisis period (see www.nber.org/crisis/).

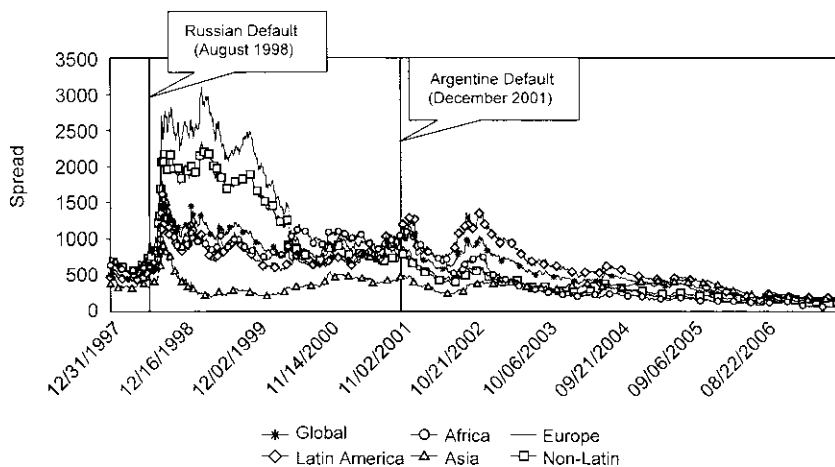### 12.2.1   The End of the Eight-Year Crisis

Remarkably, and similarly with Mission Impossible I, this impossible mission also seems to have become a mission accomplished. As table 12.1 shows, we have not had a financial crisis or contagion of the kind we experienced regularly during the crisis period anywhere on the globe since 2002. And while we will certainly have financial crises in the future, the eight-year crisis period has come to an end. Figure 12.2 plots the spread between the interest rates on sovereign debt in emerging market countries and interest rates on U.S. Treasuries. It shows how much risk levels have declined since the crisis period; even allowing for some overshooting there has been a dramatic change.

The debate about why this crisis period ended has just begun, and only a few papers have been written about it, is in contrast to the debate about what caused the Great Moderation, which has been going on for a decade. In my view, changes in economic policy, motivated in part by new economic ideas, played a big role in ending the crisis period; there were changes both in individual policies in the emerging market countries and in international monetary policy conducted by the International Monetary Fund and its major shareholders. Because comparatively little has been written to explain the improved performance since 2002—it is only the five-year anniversary—it is more difficult to trace causality than in the case of Mission Impossible I, though the correlation and the timing between the ideas, the policies, and the results are equally clear.

One of the most valuable recommendations that came out of the research on financial crises is that individual emerging market countries could take steps to prevent or at least significantly reduce the likelihood of crises. Models of financial crises developed in the 1990s and the actual experiences of policymakers with crises in the 1990s showed that currency

Table 12.1   Eight years of crises or one eight-year crisis?

Tequila effect
    Mexico: 1994–1995
    Argentina: 1995–1996
Asian crisis contagion
    Thailand 1997–1998
    Indonesia 1997–1998
    Malaysia 1997–1998
    Korea 1997–1998
Russian contagion
    Russia: 1998
    Brazil: 1998–2002
    Romania: 1998–1999
    Ecuador: 1998–1999
    Argentina: 1999–2001
    Turkey: 2000–2001
    Uruguay: 2002
No major crises or contagion: 2002–present

Fig. 12.2   Emerging Markets Bond Index (EMBI) 1 spread by region

mismatches—including large stocks of debt denominated in foreign curren-
cies—could convert a currency depreciation into a major debt crisis (Gold-
stein and Turner 2004). They also showed that overly expansionary mon-
etary policies under a fixed exchange rate could lead to a sudden and sharp
depreciation, once investors realized that reserves would be insufficient to
maintain the increasingly overvalued exchange rate.

    The policy implications of this research were clear: avoid currency
mismatches, get inflation down and keep it down, adopt a more flexible
exchange rate policy, keep the debt to GDP ratio sustainable, and accumulate

more foreign reserves. Many emerging market countries have learned such lessons and have moved toward these sensible policies. Certainly reserves are higher and inflation is lower than during the eight-year crisis period. And, just as predicted by the theory and hoped by the theorists, the number of crises has declined.

In addition the contagion of the crises has declined sharply, which has itself reduced the likelihood of crises. To see this, compare the global contagion that occurred following the Russian financial crisis in 1998 with the complete absence of contagion following the Argentine crisis just three years later in 2001 (Taylor 2007a, chapter 3). More recently, flare ups in Thailand or Turkey seemed to have little impact abroad, unlike the 1990s. I believe that policy changes in the operation of the international financial system have been largely responsible for this decline in contagion, and that these changes were also motivated by theory.

12.2.2   Predictability and the Exceptional Access Framework of the IMF

The most important international monetary policy lesson learned from the crisis period was the need for the IMF to change the way it responds to financial crises—most importantly, to be more deliberative and "predictable" about when it would exceed normal lending limits and provide large-scale assistance. In my view, this lack of predictability was a factor in the contagion of crises. According to most economics theories of contagion, in which uninformed traders tend to follow informed traders, surprise changes in policy are much more likely to cause contagion than predicted or anticipated changes in policy. Of course, the idea that anticipated policy changes have a smaller impact than unanticipated changes goes back to the early days of rational expectations modeling.

The lack of predictability was most evident in the case of Russia, where the IMF increased support in July 1998 and then one month later (in August 1998) indicated that it would remove support. This surprise was a reason for the global contagion at the time. There was also a lack of predictability of IMF responses in other crises. The Asian countries still feel that the IMF was not as responsive to their crises as it was in the case of Mexico. The initial refusal to provide additional funds to Uruguay in 2002 which, if not reversed, would have severely disrupted the payments system was another example (Taylor 2007b). This assessment is not meant to be critical of individual people at the IMF. Indeed, the lack of predictability was due to a lack of a clear framework about how the IMF should operate in such situations; it reflected considerable disagreement among the shareholders about the role of the IMF.

Fortunately, the shareholders of the IMF have come into much closer agreement on this issue, and they did so at about the same time the crisis period ended. They asked that the IMF introduce a more predictable decision framework into its operations, and the IMF has done so. Called

the *exceptional access framework* (EAF), it was put in place at the IMF in early 2003. The EAF represents a significant change in policy for the IMF, and it reflected a change in position by the G7 countries, and in particular by the United States. In an action plan in April 2002 the G7 said "we are prepared to limit official sector lending to normal access levels except when circumstances justify an exception. . . . Limiting official sector lending and developing private sector lending are essential parts of our Action Plan." The EAF stated exactly what the exceptions were. It lists a set of principles or rules that determine whether IMF support will be provided. Its aim, again in the words of the G7, was "to increase predictability and reduce uncertainty about official policy actions in the emerging markets."

12.2.3   Time Inconsistency and More Predictable Restructurings of Sovereign Debt

One of the barriers to adopting the EAF was the lack of a reliable framework for countries to engage with their private sector creditors if and when sovereign debt had to be restructured. Without such a framework it would be very difficult for the IMF to adhere to any limits or rules. In typical time inconsistency fashion, the IMF and their shareholders could say they were adopting limits, but then, when the crisis occurred, would be expected to abandon those limits. To deal with this time inconsistency problem, a new mechanism was proposed for the bond contracts. This mechanism—called collective action clauses (CACs)—allowed bond holders to agree with their sovereign debtors to restructure debt if need be. Hence, a feasible and understandable plan B would be available to countries, allowing the IMF to say no if the limits were exceeded.

After a year of intense discussions in the international community, Mexico issued bonds in New York with collective action clauses (CACs) for the first time in February 2003. Many other countries then followed. These clauses represent a great improvement in the process of restructuring debt. In fact, they go hand-in-hand with the EAF: the reason why the EAF was acceptable to IMF shareholders, management, and staff was that there was a procedure (the CACs) that countries could use to restructure their debt without large-scale borrowing from the IMF. In technical terms, the CACs solved the time inconsistency problem.

12.3   Mission Impossible III

The third example of globalization and monetary policy takes place in the present, and it flows naturally from the first two examples: *"Your mission, should you choose to accept it, is to prevent the forces of globalization from reversing the missions already accomplished."* The "you" for Mission Impossible III is again the international community of monetary experts inside and outside central banks, including, of course, those who presented

papers at the conference (included in this volume) and many others doing research on the global dimensions of monetary policy: Fisher (2006); Helbling, Jaumotte, and Sommer (2006); Kohn (2006); and Rogoff (2006) are recent examples. In deciding whether or not to accept this mission, you might ask, "Do we really need a mission?" Well, why else do this research; why publish another NBER conference volume? Or you might question the mission: "Is this mission really ambitious enough? Shouldn't we try to do more with Mission I and II?" Well, it is hard to see how macroeconomic conditions around the world could get much better than they have been for the past two plus decades. Preventing them from deteriorating so that the world economy can grow smoothly is difficult enough. Indeed, it may be the most challenging of the three missions impossible I describe here.

12.3.1   Do Not Switch Regimes without a Very Good Reason

In some ways the chapters in this conference volume are already pursuing this mission by building and simulating multicountry rational expectations models to evaluate monetary policy rules. For example, the paper presented in this conference volume by Nicoletta Batini (chapter 5), finds that not responding to the exchange rate in the monetary policy rule is nearly optimal, similar to the research described in Mission Impossible I. Another example is the paper presented by Frank Smets (chapter 3, this volume), which investigated the gains from monetary policy coordination among countries; they find that these gains are small, much as the research I described under Mission Impossible I, though as Chris Sims argued in his comments on that paper, there is still a need to consider coordination in the design of interest rate rules.

There is an important difference in the papers used in Mission Impossible III compared with those in Mission Impossible I, however: the recent $M\!:\!i\!:\!III$ models are based on a more thorough set of microfoundations and employ a welfare analysis based on individual utility rather than on the objective of reducing the fluctuations in real GDP and inflation (see Woodford 2003). Therefore, they may be better able to deal with sudden changes in the global economy for which we have little empirical experience.

Nevertheless, the results of very recent research suggest that the forces of globalization should not change the way monetary policy has operated in the United States and other countries during the past two decades. But is the world changing more rapidly than models? Are there changes that central banks should be on the lookout for as the globalization process continues?

12.3.2   Be on the Lookout for These Changes

How could the forces of globalization lead to a deterioration of monetary policy? One of the most notable structural changes in the global economy in recent years is the sharp reduction in exchange rate pass-through. Some have

attributed this decline to globalization and the increased foreign competition; others see it as due to the greater focus on monetary policy on price stability (Taylor 2000). Whatever the reason, the reduction in exchange rate pass-through due to a more inflation-focused monetary policy has reduced further the need to coordinate policy in the game theory sense that I discussed previously. Hence, while the forces of globalization might suggest the need for more coordination, the reality could be just the opposite.

Another important change is the reduction in the slope of the short-run Phillips curve (Roberts 2006). Some have argued that this change has been due to globalization (Rogoff 2003) with greater competition reducing prices, though this is inconsistent with inflation being a monetary phenomenon, unless one can show that the greater competition affects monetary policy decisions. Another possibility is that the lower slope of the Phillips curve is due to a greater impact of inflation in other countries. If so, then the lower coefficient on output in the inflation equation would be offset by higher coefficients in other countries' inflation equations, but Ihrig et al. (2007) show that this is not the case. Another possibility is that direct linkages between wages in different countries have strengthened due to off-shoring, though there is still little evidence of an increased wage-to-wage connection. Another explanation is due to Roberts (2006), who argues that the slope has gotten flatter because monetary policy has become more responsive—the coefficients in the central bank's policy rule have increased. In other words, it is not changes in the global economy that have caused the Phillips curve to flatten, but rather successful monetary policy. If so, adjusting policy to be more accommodative to inflation—which might be called for if this were a structural change—would lead to a return to suboptimal performance.

Another example of how globalization can adversely affect monetary policy decisions may have already begun, though much more study is needed. When thinking about monetary policy in an international setting, it is often stated that central banks need to consider the interest rate set by other central banks. If there is concern about exchange rate fluctuations, then moving the interest rate too far or too rapidly away from prevailing international interest rates could cause the currency to appreciate or depreciate, something that the central bank might want to avoid. Many central bankers, even those with flexible exchange rate policies, watch the U.S. federal funds rate set by the Federal Reserve when making policy decisions. In principle, the Fed could also take foreign interest rates into account, especially interest rate decisions of large trading partners such as the eurozone or Japan.

Consider the case of a two-country model; it could apply to Europe and the United States. Suppose that interest rates at the Fed and the European Central Bank (ECB) are set according to the following policy rules:

(2) $$i = \alpha i^* + 1.5\pi + .5y$$

$$i^* = \alpha^* i + 1.5\pi^* + .5y^*,$$

where the asterisk represents the ECB and i is the short-term policy interest rate, π is the inflation rate, and y is the deviation of real GDP from trend growth. It is reasonable to assume that $0 \leq \alpha < 1$ and $0 \leq \alpha^* < 1$. Without the foreign interest rate terms ($\alpha = \alpha^* = 0$), these equations would be two Taylor rules, which for the sake of this argument we take as optimal. (Assuming that another rule is optimal will lead to similar results.) Solving these two equations for the interest rates results in:

(3) $$i = \frac{1}{1 - \alpha\alpha^*}[1.5\pi + .5y + \alpha(1.5\pi^* + .5y^*)],$$

with an analogous equation for Europe. In other words, the inflation and output response coefficients in the optimal rule are multiplied by one over one minus the product of the two interest rate response coefficients. For reasonably large responses to the foreign interest rate in both countries, the results could be a significant departure from what would otherwise be an optimal policy for each country. Unless it is offset by changes in other parameters, large foreign interest rate reactions could lead to a policy mistake.

How plausible is this kind of mistake? How large could it be? Some estimated values for the response coefficients are suggestive. For the eurozone, consider the sample from 2000.1 to 2006.4. For this period, I measured inflation as the four-quarter rate of change in the harmonized index of consumer prices and the real GDP gap as the deviation of log real GDP from its Hodrick-Prescott trend. I first computed the residual from a Taylor rule. I then regressed this residual on a constant and on the federal funds rate. The estimated coefficient on the federal funds rate is .21 and statistically significant with a standard error of .056. The plot of the actual and fitted values from this regression is shown in figure 12.3. A good part, but not all of the negative residual (where the ECB policy rate is below the rule) is "explained" by the federal funds rate being lower than normal. If one simply adds the federal funds rate to an estimated policy rule (with a constant term) in the eurozone during this period—rather than use the residuals from the Taylor rule—the estimated coefficient is .11.

For the United States, I also measured inflation as the four-quarter rate of change in the consumer price index and the real GDP gap as the deviation of log real GDP from its Hodrick-Prescott trend. Using the same procedure as before with the foreign interest rate given by a Special Drawing Rights (SDR)-weighted interest rate (excluding the United States and reweighting), the coefficient on the foreign interest rate is .93 with a standard error of 0.15. For the period from 2000.1 to 2006.3 the actual and fitted values from the regression estimated over that period are shown in figure 12.4. Again, a substantial part of the gap between the actual policy and the policy rule is "explained" by the foreign interest rate.

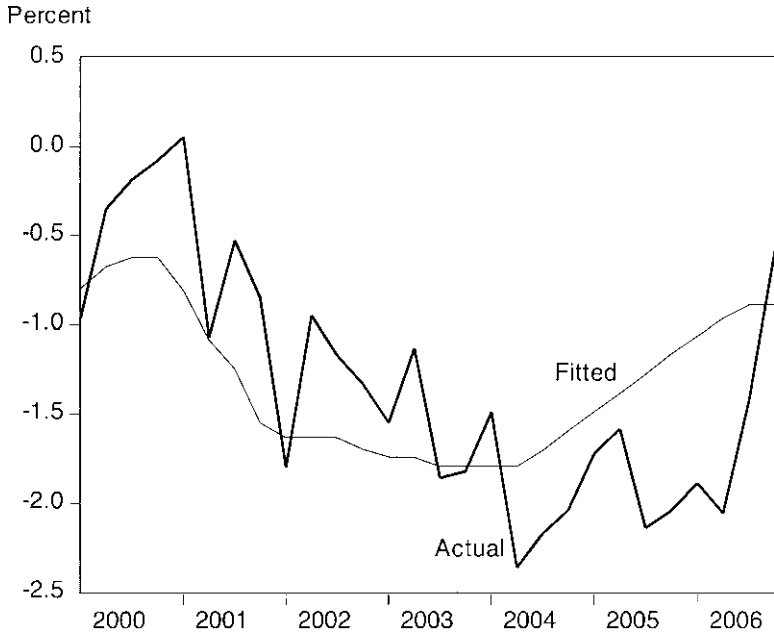These strong foreign interest rate effects are not unusual, and are found

Fig. 12.3 Residual from eurozone policy rule (1.5, 0.5)
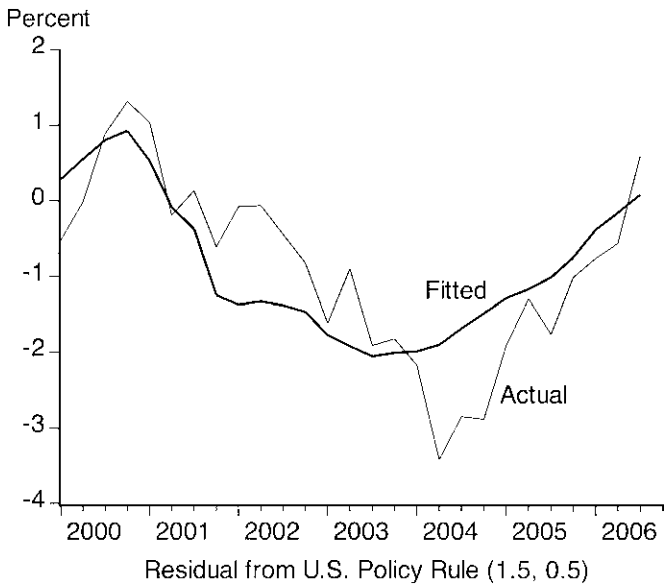

Residual from U.S. Policy Rule (1.5, 0.5)

Fig. 12.4 Residual from U.S. policy rule (1.5, 0.5)

in estimates of policy rules at other central banks. They could, of course, be spurious. During this sample period the Federal Reserve apparently was worried about the risks of deflation and therefore may have cut the interest rate below what it otherwise would be.

Nevertheless, if Mission Impossible III is to be achieved, it is necessary for researchers inside and outside central banks to be on the lookout for the type of problem illustrated by this and my other examples.

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