John B. Taylor

The results reported in this volume are a valuable addition to our knowledge about macroeconomic policy. Whereas previous model-comparison exercises conducted by the Brookings Institution have looked at the effects on the economy of one-time changes in the instruments of monetary and fiscal policy—that is, *policy multipliers*—this exercise has emphasized comparisons of the response of the economy to monetary policy regimes that are simplified *policy rules*.[1] Such a comparison is welcome not only because it is the first of its kind and is in keeping with modern macroeconomic research, which characterizes macroeconomic policy in terms of policy rules, but also because it has the potential to be of great use in the actual formulation of policy. As this book makes clear, policy rules are not limited to a fixed setting for the policy instruments. However, policy rules are different from discretion in the sense that the response of the instrument of policy to economic events is given.

A comparison exercise such as this one is difficult because of the lack of experience most policy analysts have had with the econometric analysis of policy rules. As a result there has been less standardization of the methodology or of the experiments than is desirable in this type of exercise. For example, the stochastic simulations are done with different methods for creating the shocks (some models draw shocks from the fully estimated variance-covariance matrix, others use approximations), and the policy rules used by the different model groups are not exactly the same.

There are also arbitrary differences among models in what is treated as a "shock" and what is treated as an exogenous variable. These differences are much more important in evaluating policy rules than in comparing the effects of one-time instrument changes. Some models have equations with very few exogenous variables; hence the residuals, or shocks, are larger and the estimated noise is greater. For example, the price of oil might be treated as an exogenous variable in one model but not in another. The results of the stochastic simulations would be very different if the model with exogenous oil prices treated the future path of oil prices as known and the other assumed it was part of the random disturbance.

Many of these standardization problems arise because this type of policy analysis is so new. It is as though *Consumer Reports* did a comparison of different personal computers in 1977, when most PCs were still under development

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1. A third type of model comparison exercise, one of which is now under way under the direction of Phil Howrey, looks at *forecasts* from different models.

in inventors' garages. Until recently very few econometric models had been used to evaluate different policy rules. Not until the rational-expectations revolution of the 1970s underlined the need to consider policy rules to deal with the Lucas critique, to model credibility, and to handle expectations generally did the impetus to such research begin. And most large models required fast algorithms and faster computers, which were developed in the 1980s. Most econometric modelers have focused on the effects of one-time changes in the instruments of policy. In the last few years, however, the number of researchers that have tried to use their models to evaluate policy rules has greatly increased. The type of econometric policy evaluation considered here is fundamentally different from traditional approaches and raises a host of issues that do not arise in the conventional use of econometric models. How to estimate a covariance matrix of a large rational-expectations model is only one example.

There are some advantages, however, to performing this comparison exercise at such an early stage. The comparison itself has greatly contributed to the diffusion of knowledge and has added an element of standardization to the methodology. The experience of different modeling groups has been shared. And in areas where there have been big differences in the results of different models, there has been an effort to uncover the reasons and make adjustments.

All the policy regimes evaluated in the comparison are simplified interest-rate rules. In other words, it is assumed that the central bank uses the interest rate, rather than reserves or the monetary base, as its short-run operating instrument. This is clearly appropriate, given the operating strategies used by most central banks today. The monetary authorities are assumed to adjust their interest rate in response to deviations of the money supply from some target, or deviations of the exchange rate from some target, or a weighted deviation of the inflation rate (or the price level) from some target and the deviation of real output from some target.

The results are very different from model to model. No particular policy rule with particular parameters emerges as optimal for any single country, let alone all countries. Because of the differences among the models and the methodology, I would have been surprised if a clear winner had presented itself.

Yet Ralph Bryant, Catherine Mann, and Peter Hooper in chapter 5 are able to see a consistent pattern emerging from their comparison for several key issues. They find that policies which focus on the exchange rate do not work as well as policies that focus on nominal GNP or on the sum of real output and inflation. They also find that policies which focus solely on the money supply do not work as well. In other words, monetary policy in which the short-term interest rate is raised by the monetary authorities if nominal income is above a target, and lowered if nominal income is below target, seems to work better than the other policies the authors consider. No consensus emerges

on the important question of how much the interest rate should change (as a rule) in response to the state of the economy, but that a consensus is emerging about a functional form shows significant progress and is very promising for this kind of policy research.

That significant progress has been made can be seen by recalling the lack of agreement among some of the models in the 1989 volume *Macroeconomic Policies in an Interdependent World*, edited by Bryant and others. For example, the three papers by Taylor, by Jacob Frenkel, Morris Goldstein, and Paul Masson, and by Warwick McKibbin and Jeffrey Sachs in that volume did not all agree that targeting exchange rates as opposed to targeting domestic prices or nominal income would result in inferior economic performance. In his comments in that volume, Ralph Tryon noted, "It is puzzling, therefore, that two other papers . . . using similar, although not identical, methods, do not confirm Taylor's results. . . . The superiority of nominal income targeting reported by Taylor does not appear [in the other papers]" (p. 149). Tryon guessed that the differences were due to the different parameter values in the different models. Thanks to the work of this model comparison exercise we now know that these models and others are actually quite similar in showing the superiority of some type of nominal-income targeting and some of the difficulties associated with exchange-rate targeting.

Despite this progress we appear to have a long way to go with this general research program. I would emphasize two areas that need particular study. First is the lack of agreement about ranking particular rules and the differences in predicted economic outcomes from different rules—with the exceptions noted above. This lack of agreement makes it difficult to advise policymakers about which rule to use. In my view, achieving greater agreement (full agreement is unlikely) about these issues will probably require greater agreement among the models themselves. Perhaps it is time to talk about a cooperative effort in designing models to supplement the cooperative effort in comparing models. I believe some of the differences among models do not represent strong ideological differences. The example about how many exogenous variables to include is a case in point. We all agree that oil prices are important, but some models include them explicitly and others model them as part of the random disturbance. That makes a big difference in policy evaluation, but is something that could be handled in a cooperative model development effort.

Second is the need to study the practical operation of policy regimes, not just the formal design of simplified policy rules that is the main subject of this book. The operational problem can be put in this way. How could the researchers advise policymakers if the exercise said that one of the policy rules of those listed in chapter 3 was best? None of those policies is specified well enough to be fully operational; for example, the interest rate is a quarterly

or even yearly average in some models. Where would one find the direction to lower the Federal Funds rate by 50 basis points on a given day? And how does the rule deal with obvious increases in inflation that have not yet shown up in the output deflator? The operational problem is even more difficult when researchers disagree about the form of the policy rule, a situation that is not likely to change soon.

Although such research on the operation of policy rules is important, I would argue that the recent focus of this model-comparison work on the design of policy rules is also important, and I hope it continues. There is a growing need to find ways to characterize good monetary policy as something besides pure discretion. A monetary policy that is determined from scratch each day or each month, or when people do not have any idea how the central bank will react to changes in economic conditions, is not a good policy. Economic theory shows that things work better if there is more certainty about the conduct of monetary policy. A good policy will ultimately be like the ones studied in this research—characterized by systematic, regular responses to economic shocks.