Comments on "Monetary Policy Under Uncertainty," a conference sponsored by the Reserve Bank of New Zealand

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It was a pleasure for me to attend the "Monetary Policy Under Uncertainty" conference held at the Reserve Bank of New Zealand in June 1998. The eight papers and the thoughtful commentary from the conference—now contained in this conference volume—represent a valuable contribution to monetary policy research. The new ideas and empirical results documented in the volume are useful for helping policymakers both deal with uncertainty and reduce it in many cases.

In order to examine these policy issues, the authors of the papers employ a new, but increasingly common, research methodology. In most applications of this methodology—and in all the papers at this conference—it is taken as given that there is an inflation target (or target range) for monetary policy. The task of policy research is to find and/or evaluate alternative strategies for changing the instruments of policy so as to keep the inflation rate close to the target when the economy is hit by shocks—both internal shocks and external shocks. Because of its focus on what monetary policy should do, this new methodological approach is usefully called the "new normative macroeconomics." It makes use of policy models and policy rules to evaluate alternative monetary policies.

The policy models

The policy models in this volume are dynamic, stochastic, economy—wide (general equilibrium) models. They take the mathematical form of difference equations:

$$f_i(y_t, y_{t-1},\ldots,y_{t-p}, E_t y_{t+1},\ldots,E_t y_{t+q}, a_i, x_t) = u_{it}, \qquad i = 1,\ldots,n, \qquad (1)$$

y_t is a vector of endogenous variables at time t,

x_t is a vector of exogenous variables at time t,

u_{it} is a vector of random variables at time t,

a_i is a parameter vector, and

E_t is the conditional expectations operator at time t.

The function fi may be either linear or non-linear depending on the application.

The dynamic nature of the models is captured by the lags and the expected leads of the endogenous variables. The inclusion of expectations of the future leads of the endogenous variables indicates the importance of exceptions in models of the monetary transmission mechanism. The inclusion of lagged endogenous variables indicates that there is slow adjustment in the economy. The stochastic nature of the model is captured by the random variables.

The inclusion of random variables indicates that the economy is constantly hit by unanticipated shocks, whether to consumption, exports, exchange rates, aggregate supply or some other variable. For example, shocks to potential GDP, an important source of uncertainty in practice, are examined in the papers by Aaron Drew and Benjamin Hunt, by Frank Smets, and by Peter Isard and Douglas Laxton in this volume.

The parameters of the model are estimated or calibrated using data from different countries. In order to address the question of uncertainty, a number of the papers go beyond having a constant parameter vector ai; for example, the paper by Geoffrey Shuetrim and Christopher Thompson assumes that ai may be random, reflecting uncertainty about the model.

In addition to having this mathematical form, the models used in the papers at the conference have other similarities, including the use of price and wage rigidities (frequently some version of staggered price or wage setting) to capture the impact of changes in money on the real economy, and a monetary transmissions mechanism that works through financial market prices, usually interest rates and exchanges rates. The models are viewed as "structural" by the model builders in the sense that the parameters do not change very much for the types of policies considered; hence, the models are designed for policy evaluation.

There are also interesting differences in the models, including their size and the degree of openness. The model used in the paper by Bob Tetlow, Peter von zur Muehlen and Frederico Finan is small and is focused on a closed economy, while the models used by Robert Amano, Don Coletti and Tiff Macklem, by Hans Dillen and Jonny Nilsson, and by Aaron Drew and Benjamin Hunt are somewhat larger and incorporate important open economy features. Many of the models used at this conference assume some form of rational, or model consistent, expectations—though the models used by Frank Smets and by Chris Salmon and Ben Martin are more like "time series models" that implicitly assume an extrapolative expectations structure.

The use of policy rules

Perhaps the most noticeable characteristic of the research presented at this conference is the use of policy rules to examine the issue of uncertainty. This is also a characteristic of new normative macroeconomic research in general. Policy rules are guidelines that describe how the instruments of policy should change depending on what is happening in the economy. The use of policy rules has exploded in the 1990s and is another characteristic of new normative macroeconomics. To be sure, there was some normative analysis with policy rules starting with the work of A.W. Phillips in the 1950s. But the use of rational expectations in macroeconomics has greatly increased the use of policy rules. With rational expectations there is a need for a policy rule to specify future policy actions in order to estimate the effect of policy. In effect, policy rules are a way to deal with the problems pointed out by the Lucas critique.

How are the policy rules evaluated? How does one determine whether uncertainty implies that the response to policy should be more aggressive or less aggressive as a result of uncertainty? The typical method of evaluating these questions about policy rules can be summarized as a series of steps: first, stick a candidate policy rule into model fi (.); second, solve the model; third, look at the behavior of the variables, such as inflation or real output, that this policy rule leads to; fourth, choose the rule that gives the most satisfactory performance.

Overall results on the impact of uncertainty

What are the impacts of uncertainty on monetary policy according to the papers and commentary in this volume? To some degree the answer depends on the nature of the uncertainty—whether it is about potential GDP (Drew-Hunt, Smets) or about the shape of the Phillips curve (Isard-Laxton), for example. Hence, answers to the question must be found by looking at the individual papers in the volume. However, I think there are some general policy-relevant conclusions that can be drawn from the volume as a whole. I list five of these conclusions in this summary.

First, it appears that simple policy rules—for example, policy rules in which the interest rate responds to inflation and output, as I have suggested as a guideline for the Fed—are robust to many different forms of uncertainty.

Second, such simple rules can be improved upon when one knows the source of the uncertainty; for example, uncertainty about potential GDP suggests that less weight should be placed on the output gap, according to the calculations in the Smets paper.

Third, general uncertainty about the parameters may suggest a more aggressive policy rule as demonstrated in the Shuetrim-Thompson paper. Their paper is a useful reminder that parameter uncertainty does not necessarily lead to more timid policy responses. They find that uncertainty about persistence (the size of the coefficients on the lagged dependent variables) leads to more aggressive policy that offsets the caution implied by simple static multiplicative uncertainty.

Fourth, more credible monetary policy that lowers uncertainty will improve the tradeoff between output variability and inflation variability. The simulations in the Dillen-Nilsson paper and the Amano-Coletti-Macklem paper show this nicely. The latter paper also shows how the policy rule itself should be changed when there is a change in credibility.

Fifth, forecast-based rules, in which a forecast of inflation several years out replaces the smoothed inflation rate, do not necessarily lead to an improvement in economic performance. In his comments on the Drew-Hunt paper, Ralph Bryant notes that improvements from inflation forecast-based rules are model specific and that there may be some loss of transparency from such rules because they are based on forecasts, which may be subjective, rather than on actual data, which are objective. Moreover, if one takes an optimal control viewpoint, then all policy decisions must be backward-looking in the sense that they depend only on available information.

Impetus to future research

Despite the progress achieved by the papers in this volume, there are other important issues about uncertainty in monetary policy that are yet to be resolved. For example, how should monetary policy deal with uncertainty about whether an external shock is to the terms-of-trade or to net exports? More research will be required to answer such questions. In fact, additional work on uncertainty is now ongoing, partly stimulated by the papers in this volume, and another conference on monetary policy under uncertainty is now planned at the European Central Bank later this year. Through the impetus to do additional work and through the useful results already achieved, this conference volume is very useful to policy makers and researchers alike.