MODELS AND MONETARY POLICY: MORE SCIENCE THAN ART?

by Kevin L. Kliesen

According to published minutes of the Federal Open Market Committee meeting held June 30 and July 1, 1998, the FOMC, worried that conditions were ripe for rising inflation, reaffirmed its previous policy position that a "bias toward restraint"—a tightening of monetary policy—was needed. Just four months later, though, confronted with the fallout reportedly stemming from the "Asian contagion," the FOMC decided to lower the federal funds rate—an action the committee repeated in October and November.

Are large-scale macroeconomic forecasting models helpful to the monetary policy process in instances like this? Or, when expectations of the future change suddenly, does a monetary policy-maker instead feel like the circus performer who, while tied to a spinning wheel, faces an onslaught of knives thrown by a blindfolded person?

Policy Challenges

One of the most important challenges confronting U.S. public policy-makers is the design and implementation of economic policies that best promote rising living standards over time. To most monetary policy practitioners, price stability—generally defined as an inflation rate low enough *not* to factor into the planning horizon of consumers and producers—is the necessary first step to ensuring this outcome. The economy's long-run growth rate, however, is largely influenced by "real" factors that tend to change rather slowly: population growth, labor productivity and the rate of technological advancement. The problem facing monetary policy-makers is that their actions have little *direct* influence over these factors.

Over shorter horizons, unforeseen economic disturbances—what economists call shocks—can influence economic outcomes. These shocks, if allowed to propagate, can affect the economy's health over the long term. But because these disturbances can't be predicted, gauging their effect is difficult—witness the recent turmoil in Asia that has spread to other regions and affected financial markets worldwide.

In some instances, however, these disturbances have certain traits in common with previous disturbances. For example, Federal Reserve Chairman Alan Greenspan has argued that the Asian situation is similar in many respects to the 1995 Mexican peso crisis. If so, then macroeconomic models may help policy-makers understand how the economy would respond to such a shock. These models may also help policy-makers formulate a policy response that minimizes the effects of these shocks.

To do this effectively requires a model that can systematically predict the change of headline variables like GDP growth, inflation and the unemployment rate. Alas, no model can accomplish all that. To help minimize the uncertain nature of the forecasting business, economists have developed several types of models to help them project the path of the economy over time. Whether any of these models can reliably inform policy-makers of future outcomes in response to unusual events—and thus effectively add to the process—is open to debate, however.

Model Types

The types of models used in the policy process can generally be described as either *structural models* or *forecasting models*. Structural models that use a Keynesian *systems of equations* approach are most prevalent in the policy arena. These models, which can have several hundred equations and identities, attempt to forecast such variables as output (real GDP), prices and employment from the ground up—in other words, as suggested by economic theory.[1]

In older structural models, such as the Federal Reserve's MPS model, the forward-looking aspect of the model's structure—which is termed *expectations*—was usually assumed to be a function of past behavior.[2] By contrast, in newer structural models, such as the Federal Reserve Board's FRB/US Macroeconomic Model and the International Monetary Fund's MULTIMOD model, the formation of expectations is quite different. These newer models assume that the economy's producers and consumers are rational in their decision-making processes—in other words, that they know the structure of the economy (and thus the model).[3]

In contrast, forecasting models eschew the systems of equations approach, employing just a few equations to forecast future developments. These models, which are also known as *time series models*, instead rely on established statistical correlations between current and previous observations (hence the name time series) of one or more economic variables. The most popular of these are plain vector autoregression (VAR) models and VARs that employ an error correction process.[4] An example of the latter is the Vector Error Correction Model (VECM) developed by researchers associated with the Federal Reserve Bank of St. Louis.[5]

Unlike structural models, forecasting models like VARs regard all variables as simultaneously determined and, hence, have an equation for every variable in the model. In other words, they do not assume a unique behavioral relationship like a consumption, investment or money demand equation, which is assumed by structural models. In terms of sheer forecasting power, forecasting models generally do better than structural models. Conversely, forecasting models are not useful for evaluating alternative monetary policies—for example, looking at what would happen to the growth of real GDP and inflation if the federal funds rate were raised or lowered 25 basis points.

The Forecasting Process

At each FOMC meeting, committee members are presented with a forecast generated by the Board of Governors' staff. This forecast, which is the staff's best guess as to the probable direction of the economy over the next several quarters, is put together in a deliberative fashion. In other words, there is much interaction between a large number of people responsible for monitoring every major sector of the U.S. economy, as well as foreign economic developments. What role, if any, do models play in this process? A recently published article outlines three ways models factor into the forecasting process.[6]

First, a forecast—termed a baseline projection—is made about how the economy is expected to behave over the next four to eight quarters. The baseline projection, in which the staff projects the likely *direction* of real GDP growth and inflation, takes as its starting point the final forecast generated from the previous FOMC meeting. The reason for this is that the economic outlook typically does not change dramatically between FOMC meetings. Nevertheless, between meetings new data become available, and/or previously released data get revised. In this way, new economic and financial information is used to update the old forecast (from the previous FOMC meeting), which then becomes the new baseline forecast (for the current FOMC meeting). At this stage, the staff generally still assumes an unchanged federal funds rate.

Second, assumptions are made about variables that are outside of the process (exogenous variables). These "conditioning assumptions," as they are called, include judgments about the future stance of monetary and fiscal policy, foreign economic developments and oil prices. For example, if oil prices are expected to increase, this may contribute to an increase in inflation. Each participant in this process might then alter his or her view of the future in response to this anticipated change, making further give and take between the staff—sometimes involving the use of output generated by model-based forecasts—necessary. Eventually, the process converges to produce a final forecast that is used as a jumping off point at each FOMC meeting.

The baseline forecast is often termed a "judgmental forecast" because the staff does not rely very heavily on pure model-based forecasts. During times of high uncertainty, however, there may be more reliance upon the forecasting model and less reliance upon the judgment of the forecasters. Again, the Asian "crisis" would be a good example of this.

Finally, a forecast is made showing how, for example, economic growth and inflation will respond to a change in the federal funds rate target, a significant change in equity prices or major tax legislation. Thus, the policy-maker is presented with a baseline forecast (no change in policy) and a forecast contingent on a specific action. The latter is intended to provide the policy-maker with a framework for thinking about how a policy action may affect economic growth over the near term.

Policy Hurdles

The deliberative process cannot mask the numerous uncertainties policy-makers face. For example, if there is no agreement on the type of model to use—and there is not—then all parties will not agree on the strength or weakness of the economy going forward. Data revisions, which, in some instances, can change the forecast complexion significantly, further cloud the judgments of policy-makers. Finally—and this ultimately may be the biggest hurdle of all—there is uncertainty about the policy process itself. For instance, there is no overarching consensus about how actions taken by the FOMC will influence the economy in the short run, what the policy-maker's main objective should be, or whether a policy rule should be followed.[7]

For better or worse, monetary policy-making involves a good deal more than simply—and blindly—following a forecast generated by a complex model. After all, simple forecasting models like VARs and VECMs still do a good job of forecasting. Although structural models have evolved along with economic theory, policy-makers will probably remain skeptical of them for evaluating alternative policies. In the end, models, while useful tools, are not likely to replace the deliberative process currently in use—a process in which forecasts are just one more piece of information for policy-makers to consider.

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ENDNOTES

1 An identity is an equation that is true by definition. The best known identity is that for GDP: GDP = C + I + G + X – M, where C is consumer spending, I is investment, G is government spending, X is exports and M is imports. Embedded within the model are equations that are used to forecast each component and all of the major subcomponents.

2 See Kmenta (1982).

3 This assumption is termed "rational expectations" and can best be explained by President Lincoln's famous maxim that, "You can fool some of the people all of the time and all of the people some of the time, but you can't fool all of the people all of the time."

4 Simply put, an error correction process enables the model to incorporate long-run statistical relationships between one or more variables that *may* help the forecaster do a better job.

5 See Anderson et al. (1998).

6 See Reifschneider et al. (1997).

7 An example of a policy rule is the Taylor Rule, named after Stanford University Professor John B. Taylor. The Taylor rule is intended to provide the monetary policy-maker with some assessment of an appropriate level for the federal funds rate target, based on: 1) the strength of the economy relative to its potential; and 2) the current inflation rate relative to a preferred inflation rate.

FOR FURTHER READING

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