Ben S Bernanke: Monetary policy under uncertainty

Remarks by Mr Ben S Bernanke, Chairman of the Board of Governors of the US Federal Reserve System, at the 32nd Annual Economic Policy Conference, Federal Reserve Bank of St. Louis, (via videoconference), 19 October 2007.

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Bill Poole's career in the Federal Reserve System spans two decades separated by a quarter of a century. From 1964 to 1974 Bill was an economist on the staff of the Board's Division of Research and Statistics. He then left to join the economics faculty at Brown University, where he stayed for nearly twenty-five years. Bill rejoined the Fed in 1998 as president of the Federal Reserve Bank of St. Louis, so he is now approaching the completion of his second decade in the System.

As it happens, each of Bill's two decades in the System was a time of considerable research and analysis on the issue of how economic uncertainty affects the making of monetary policy, a topic on which Bill has written and spoken many times. I would like to compare the state of knowledge on this topic during Bill's first decade in the System with what we have learned during his most recent decade of service. The exercise is interesting in its own right and has the added benefit of giving me the opportunity to highlight Bill's seminal contributions in this line of research.

Developments during the first period: 1964-74

In 1964, when Bill began his first stint in the Federal Reserve System, policymakers and researchers were becoming increasingly confident in the ability of monetary and fiscal policy to smooth the business cycle. From the traditional Keynesian perspective, which was the dominant viewpoint of the time, monetary policy faced a long-term tradeoff between inflation and unemployment that it could exploit to keep unemployment low over an indefinitely long period at an acceptable cost in terms of inflation. Moreover, improvements in econometric modeling and the importation of optimal-control methods from engineering were seen as having the potential to tame the business cycle.

Of course, the prevailing optimism had its dissenters, notably Milton Friedman. Friedman believed that the inherent complexity of the economy, the long and variable lags with which monetary policy operates, and the political and bureaucratic influences on central bank decisionmaking precluded policy from fine tuning the level of economic activity. Friedman advocated the use of simple prescriptions for monetary policy – such as the *k* percent money growth rule – which he felt would work reasonably well on average while avoiding the pitfalls of attempting to fine-tune the economy in the face of pervasive uncertainty (Friedman, 1968).

Other economists were more optimistic than Friedman about the potential benefits of activist policies. Nevertheless, they recognized that the fundamental economic uncertainties faced by policymakers are a first-order problem and that improving the conduct of policy would require facing that problem head on. During this decade, those researchers as well as sympathetic policymakers focused especially on three areas of economic uncertainty: the current state of the economy, the structure of the economy (including the transmission mechanism of monetary policy), and the way in which private agents form expectations about future economic developments and policy actions.

Uncertainty about the current state of the economy is a chronic problem for policymakers. At best, official data represent incomplete snapshots of various aspects of the economy, and even then they may be released with a substantial lag and be revised later. Apart from issues

of measurement, policymakers face enormous challenges in determining the sources of variation in the data. For example, a given change in output could be the result of a change in aggregate demand, in aggregate supply, or in some combination of the two.

As most of my listeners know, Bill Poole tackled these issues in a landmark 1970 paper, which examined how uncertainty about the state of the economy affects the choice of the operating instrument for monetary policy (Poole, 1970). In the simplest version of his model, Bill assumed that the central bank could choose to specify its monetary policy actions in terms of a particular level of a monetary aggregate or a particular value of a short-term nominal interest rate. If the central bank has only partial information about disturbances to money demand and to aggregate demand, Bill showed that the optimal choice of policy instrument depends on the relative variances of the two types of shocks. In particular, using the interest rate as the policy instrument is the better choice when aggregate demand is relatively stable but money demand is unstable, with money growth being the preferable policy instrument in the opposite case.

Bill was also a pioneer in formulating simple feedback rules that established a middle ground between the mechanical approach advocated by Friedman and the highly complex prescriptions of optimal-control methods. For example, Bill wrote a Federal Reserve staff paper titled "Rules-of-Thumb for Guiding Monetary Policy" (Poole, 1971). Because his econometric analysis of the available data indicated that money demand was more stable than aggregate demand, Bill formulated a simple rule that adjusted the money growth rate in response to the observed unemployment rate. Bill was also practical in noting the pitfalls of mechanical adherence to any particular policy rule; in this study, for example, he emphasized that the proposed rule was not intended "to be followed to the last decimal place or as one that is good for all time [but] . . . as a guide – or as a benchmark – against which current policy may be judged" (p. 152).

Uncertainty about the structure of the economy also received attention during that decade. For example, in his elegant 1967 paper, Bill Brainard showed that uncertainty about the effect of policy on the economy may imply that policy should respond more cautiously to shocks than would be the case if this uncertainty did not exist. Brainard's analysis has often been cited as providing a theoretical basis for the gradual adjustment of policy rates of most central banks. Alan Blinder has written that the Brainard result was "never far from my mind when I occupied the Vice Chairman's office at the Federal Reserve. In my view, . . . a little stodginess at the central bank is entirely appropriate" (Blinder, 1998, p. 12).

A key source of uncertainty became evident in the late 1960s and 1970s as a result of highly contentious debates about the formation of expectations by households and firms. Friedman (1968) and Ned Phelps (1969) were the first to highlight the central importance of expectations formation, arguing that the private sector's expectations adjust in response to monetary policy and therefore preclude any long-run tradeoff between unemployment and inflation. However, Friedman and Phelps retained the view that monetary policy could exert substantial effects on the real economy over the short to medium run. In contrast, Robert Lucas and others reached more dramatic conclusions, arguing that only unpredictable movements in monetary policy can affect the real economy and concluding that policy has no capacity to smooth the business cycle (Lucas, 1972; Sargent and Wallace, 1975). Although these studies highlighted the centrality of inflation expectations for the analysis of monetary policy, the profession did not succeed in reaching any consensus about how those expectations evolve, especially in an environment of ongoing structural change.

Developments during the second period: 1998-2007

Research during the past ten years has been very fruitful in expanding the profession's understanding of the implications of uncertainty for the design and conduct of monetary policy.

On the issue of uncertainty about the state of the economy, Bill's work continues to provide fundamental insights regarding the choice of policy instrument. Money demand relationships were relatively stable through the 1950s and 1960s, but, in the wake of dramatic innovations in banking and financial markets, short-term money-demand relationships became less predictable, at least in the United States. As a result, consistent with the policy implication of Bill's 1970 model, the Federal Reserve (like most other central banks) today uses the overnight interbank rate as the principal operating target of monetary policy. Bill's research also raised the possibility of specifying the operating target in other ways, for example, as an index of monetary or financial conditions; and it provided a framework for evaluating the usefulness of intermediate targets – such as core inflation or the growth of broad money – that are only indirectly controlled by policy.

More generally, the task of assessing the current state of the economy remains a formidable challenge. Indeed, our appreciation of that challenge has been enhanced by recent research using real time data sets.[1] For example, Athanasios Orphanides has shown that making such real-time assessments of the sustainable levels of economic activity and employment is considerably more difficult than estimating those levels retrospectively. His 2002 study of U.S. monetary policy in the 1970s shows how mismeasurement of the sustainable level of economic activity can lead to serious policy mistakes.

On a more positive note, economists have made substantial progress over the past decade in developing new econometric methods for summarizing the information about the current state of the economy contained in a wide array of economic and financial market indicators (Svensson and Woodford, 2003). Dynamic-factor models, for example, provide a systematic approach to extracting information from real-time data at very high frequencies. These approaches have the potential to usefully supplement more informal observation and human judgment (Stock and Watson, 2002; Bernanke and Boivin, 2003; and Giannone, Reichlin, and Small, 2005).

The past decade has also witnessed significant progress in analyzing the policy implications of uncertainty regarding the structure of the economy. New work addresses not only uncertainty about the values of specific parameters in a given model of the economy but also uncertainty about which of several competing models provides the best description of reality. Some research has attacked those problems using Bayesian optimal-control methods (Brock, Durlauf, and West, 2003). The approach requires the specification of an explicit objective function as well as of the investigator's prior probabilities over the set of plausible models and parameter values. The Bayesian approach provides a useful benchmark for policy in an environment of well-defined sources of uncertainty about the structure of the economy, and the resulting policy prescriptions give relatively greater weight to outcomes that have a higher probability of being realized. In contrast, other researchers, such as Lars Hansen and Thomas Sargent, have developed robust-control methods – adapted from the engineering literature – that are aimed at minimizing the consequences of worst-case scenarios, including those with only a low probability of being realized (Hansen and Sargent, 2007).

An important practical implication of all this recent literature is that Brainard's attenuation principle may not always hold. For example, when the degree of structural inertia in the inflation process is uncertain, the optimal Bayesian policy tends to involve a more pronounced response to shocks than would be the case in the absence of uncertainty (Söderstrom, 2002). The concern about worst-case scenarios emphasized by the robust-control approach may likewise lead to amplification rather than attenuation in the response of the optimal policy to shocks (Giannoni, 2002; Onatski and Stock, 2002; and Tetlow and von zur Muehlen, 2002). Indeed, intuition suggests that stronger action by the central bank may

[1] A recent example is Faust and Wright (2007).

be warranted to prevent particularly costly outcomes.
Although Bayesian and robust-control methods provide insights into the nature of optimal policy, the corresponding policy recommendations can be complex and sensitive to the set of economic models being considered. A promising alternative approach – reminiscent of the work that Bill Poole did in the 1960s – focuses on simple policy rules, such as the one proposed by John Taylor, and compares the performance of alternative rules across a range of possible models and sets of parameter values (Levin, Wieland, and Williams, 1999 and 2003). That approach is motivated by the notion that the perfect should not be the enemy of the good; rather than trying to find policies that are optimal in the context of specific models, the central bank may be better served by adopting simple and predictable policies that produce reasonably good results in a variety of circumstances.

Given the centrality of inflation expectations for the design of monetary policy, a key development over the past decade has been the burgeoning literature on the formation of these expectations in the absence of full knowledge of the underlying structure of the economy.[2] For example, considerations of how the public learns about the economy and the objectives of the central bank can affect the form of the optimal monetary policy (Gaspar, Smets, and Vestin, 2006; Orphanides and Williams, 2007). Furthermore, when the public is unsure about the central bank's objectives, even greater benefits may accompany achieving a stable inflation rate, as doing so may help anchor the public's inflation expectations. These studies also show why central bank communications is a key component of monetary policy; in a world of uncertainty, informing the public about the central bank's objectives, plans, and outlook can affect behavior and macroeconomic outcomes (Bernanke, 2004; and Orphanides and Williams, 2005).

Conclusion

Uncertainty – about the state of the economy, the economy's structure, and the inferences that the public will draw from policy actions or economic developments – is a pervasive feature of monetary policy making. The contributions of Bill Poole have helped refine our understanding of how to conduct policy in an uncertain environment. Notably, we now appreciate that policy decisions under uncertainty must take into account a range of possible scenarios about the state or structure of the economy, and those policy decisions may look quite different from those that would be optimal under certainty. For example, policy actions may be attenuated or augmented relative to the "no-uncertainty benchmark," depending on one's judgments about the possible outcomes and the costs associated with those outcomes. The fact that the public is uncertain about and must learn about the economy and policy provides a reason for the central bank to strive for predictability and transparency, avoid overreacting to current economic information, and recognize the challenges of making real-time assessments of the sustainable level of real economic activity and employment. Most fundamentally, our discussions of the pervasive uncertainty that we face as policymakers is a powerful reminder of the need for humility about our ability to forecast and manage the future course of the economy.

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[2] Bernanke (2007) and the references therein.

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