

1. Introduction, Part 1

The inevitable never happens. It is the unexpected always. **J.M. Keynes**

Alan Greenspan began a speech by saying that “Uncertainty is not just an important feature of the monetary policy landscape; it is the defining characteristic of that landscape” (2003, p. 1). He went on to say that “As a consequence, the conduct of monetary policy in the United States at its core involves crucial elements of risk management, a process that requires an understanding of the many sources of risk and uncertainty that policy-makers face” (p. 1).

More than 20 years earlier Henry Wallich (1980), explaining the Federal Reserve policy shift of October 1979, wrote that “Policymakers must take into account at all times the fact that both the economy and the demand for money may exhibit instability.” It followed that “The optimum strategy depends on circumstances. Changing circumstances, as the Federal Reserve’s recent action shows, can determine changes in strategy.”

Greenspan articulated a flexible risk management approach to monetary policy. To critics who argue that such an approach is “too undisciplined – judgmental, seemingly discretionary, and difficult to explain” (p. 5), he responded that tying “policy to the prescriptions of a formal rule is unlikely to lead to an improvement in economic performance” (p. 5).

The importance of the nature of uncertainty for the choice of a monetary policy strategy has long been recognized in the academic literature. The study of the nature of this relationship within formal stochastic macroeconomic models has been an active research area in the years since 1970. The issue Alan Greenspan raised about the role of formal rules versus more flexible frameworks such as what he terms a “risk-management paradigm” is likewise an area of longstanding interest in the academic literature. This book is a study of what has been learned from these lines of research.

The literature on the choice of a monetary policy strategy in an uncertain environment has been influenced by developments in macroeconomic theory and by events during the post-1970 years. Poole’s (1970) model, the starting point of our analysis, was a stochastic version of the fixed-price Keynesian *IS–LM* framework where the policy goal was to stabilize the level of output. As inflation rose and became more variable, models that allowed for price changes and in which price stability was an additional

policy goal came into use. Expectations of inflation and shocks to aggregate supply, that were a significant source of inflationary pressure in the 1970s, were also incorporated into models to study optimal monetary policy. As the industrialized economies became more integrated in the 1970s and 1980s, both in terms of trade and of capital flows, optimal monetary policy in open economy models received greater attention. The advent of the new classical economics, with the concept of rational expectations, produced important modifications to the earlier Keynesian and monetarist analysis of optimal stabilization policy.

The rational expectations concept was central to the time inconsistency problem recognized by Kydland and Prescott (1977). Analysis of the time inconsistency problem was part of a broader process of coming to grips with strategic (or game theoretic) considerations in monetary policy formation. The search for policy strategies that avoid an inflationary bias resulting from policy by discretion led to increased attention to policy rules.

Over the past decade, again in response to events and theoretical developments, analysis of optimal monetary policy has employed new frameworks and considered new issues. Recent analysis is characterized by the virtual disappearance of the money supply as target or instrument of monetary policy, the resurgence of the Phillips Curve in a New Keynesian form as a central element of the framework, and an increased emphasis on model consistency with optimizing behavior of economic agents, including policymakers, within intertemporal settings.

Our survey of this literature on optimal monetary policy has three features. First, we emphasize the way in which optimal policy depends on information available to policymakers: what the policymaker is assumed to observe, at what point the observation is made, and with what accuracy it is made. In this literature different “optimal” policies across studies often result from varying assumptions about information sets. This is obvious only when information sets are explicitly compared. The information or *signal extraction* aspect of the optimal policy question has been subject to relative neglect in the literature of the past decade.

Second, we attempt to sort out the often confusing terminology in the optimal monetary policy literature. Benjamin Friedman (1975) pointed out that while “keeping one’s eye on the ball is often an important precept in games of skill and games of chance” for monetary policy “a recurring problem has been the difficulty of determining what is the real ball”. He was referring to confusion over concepts such as instruments, targets (ultimate or intermediate) and indicators for monetary policy. In the recent literature we find, if not confusion, certainly complexity, for example with reference to policy rules. There are instrument rules that are implicit, explicit, simple, mechanical or forecast-based. Target rules are general,

specific, simple, forecast-based or combinations of these types. We attempt to clarify and if possible simplify terminology to get at “the real ball”.

Third, we take a long view, tracing the development of the literature on monetary policy under uncertainty back to the early contributions of Poole (1970) and Brainard (1967). The literature at particular times reflects the concerns of that time often using models which ignore considerations not central to issues of the day. For example, many recent models make unrealistic informational assumptions such as current observability of output and inflation; the particular information sets available to policymakers are not the current concern. Many recent monetary policy models have no financial sectors, just interest rate rules for policy. This is adequate and convenient for some questions. A broader context is, however, useful to consider the full range of monetary policy issues involved in choosing optimal monetary policy strategies.

The book is divided into two parts. In Part 1 (Chapters 2–6) optimal policy is considered within an aggregate supply and demand framework. Chapter 2 employs a fixed price version of this model to examine the instrument problem as considered by Poole (1970) and Brainard’s (1967) contribution on optimal policy in the presence of multiplier uncertainty. Chapter 3 considers the role of intermediate targets and information variables. Chapter 4 brings in the supply side and inflationary expectations. Chapter 5 extends the analysis to the open economy, considering models characterized by either perfect or imperfect mobility of capital. Chapter 6 surveys literature on the time inconsistency problem analyzed in Kydland and Prescott (1977) and Barro and Gordon (1983a). The chapter also considers later papers suggesting institutional arrangements that could improve central bank performance. These arrangements include delegation mechanisms analyzed by Rogoff (1985) and Lohmann (1992) and performance contracts for central banks examined in Walsh (1993) and Waller (1995).

In Part 2, the focus shifts to an *IS* schedule and Phillips Curve as the core of the closed economy framework. Chapter 7 introduces the new framework. Policy in this framework is represented by interest rate rules reflecting the current strategy of major central banks. Within this framework, often termed New Keynesian, there are different specifications of the Phillips Curve. In Chapter 8 we analyze the microeconomic foundations of the recent incarnations of the Phillips Curve: the Calvo (1983) model of sticky prices; Rotemberg’s (1982) quadratic price adjustment model; the Taylor (1979, 1980) model of staggered wage contracts and the Mankiw and Reis (2002), Ball, Mankiw and Reis (2005) model of incomplete information.

Chapters 9–11 consider optimal monetary policy with a “forward-looking” Phillips Curve specification. Policies conducted by target and instrument rules are considered and compared in Chapter 9. Chapter 10 presents

a number of extensions of the forward-looking model. The *timeless perspective* to optimal monetary policy suggested by Woodford (1999) is explained. Alternative frameworks which involve delegation to a policymaker who acts under discretion and pursues goals such as price level targeting, a speed-limit policy or average inflation targeting are considered as alternatives to policy under commitment. Chapter 11 analyzes optimal policy in an open-economy version of the forward-looking model.

Chapter 12 completes Part 2 with an analysis of the backward-looking Phillips Curve specification of the model considered by Ball (1999a, 1999b) and others. We look at optimal monetary policy issues in both an open and a closed-economy version of the model.