A Rational Expectations Approach to Macroeconometrics

Testing Policy Ineffectiveness and Efficient-Markets Models

Frederic S. Mishkin

National Bureau of Economic Research

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A Rational Expectations Approach to Macroeconometrics

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To My Father

Acknowledgments

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Contents

	Acknowledgments	xi
1.	**Introduction**	1
Part I	**Econometric Theory and Methodology**	
2.	**The Econometric Methodology**	9
	Appendix 2.1 Identification and Testing	27
	Appendix 2.2 An Annotated Computer Program	32
3.	**An Integrated View of Tests of Rationality, Market Efficiency, and the Short-Run Neutrality of Aggregate Demand Policy**	44
Part 2	**Empirical Studies**	
4.	**Are Market Forecasts Rational?**	59
5.	**Monetary Policy and Interest Rates: An Efficient Markets–Rational Expectations Approach**	76
	Appendix 5.1 Estimates of the Forecasting Equations	97
	Appendix 5.2 Additional Experiments Using the Two-Step Procedure	103
6.	**Does Anticipated Aggregate Demand Policy Matter?**	110

Appendix 6.1 Output and Unemployment Models with Barro and Rush Specification 129
Appendix 6.2 Results with Nominal GNP Growth and Inflation as the Aggregate Demand Variable 133
Appendix 6.3 Results Not Using Polynominal Distributed Lags 143
Appendix 6.4 Jointly Estimated Forecasting Equations 150

7. **Concluding Remarks** 156

References 159

Index 169

1 Introduction

The recognition in recent years that expectations are extremely important to economic decision making has led to a major revolution in macroeconomic analysis. The rational expectations hypothesis developed initially by Muth (1961) has played a critical role in this revolution. Simply put, it states that expectations reflected in market behavior will be optimal forecasts using all available information. (A more precise definition will be developed in Chap. 2.) When this hypothesis is employed to describe expectations formation, serious doubts arise about the use of existing large-scale macroeconometric models for policy analysis (Lucas 1976). With additional assumptions about labor market behavior, the effectiveness of any deterministic policy rule to promote macroeconomic stabilization is even called into question (Sargent and Wallace 1975).

The rational expectations hypothesis has significant implications as well for the way macroeconometric models should be estimated. It leads to serious doubts about the traditional criteria for identifying and estimating these models—the exclusion of variables from some behavioral equations and not from others (Sims 1980). Yet we are not left helpless, because it does provide restrictions of a different sort which do allow identification and estimation, restrictions applying across equations (Sargent 1981).

This book pursues a rational expectations approach to macroeconometrics, yet it is not a comprehensive treatment of the subject. Instead it explores a particular class of models, widely discussed in the macroeconomics literature, which emphasize the effects from unanticipated, rather than anticipated, movements in variables. In these models, cross-equation restrictions implied by rational expectations are of central importance. These restrictions can be a powerful tool of analysis, making it

easier to isolate the phenomenon we want to study. The following chapters will discuss and develop theoretically a unified econometric treatment of these models, and the resulting empirical analysis, based on Mishkin (1981*a*, 1981*b*, 1982*a*, 1982*b*, 1982*c*), will provide evidence on some of the more important macro issues debated today.

How does the econometric methodology in this book fit into the overall subject of rational expectations macroeconometrics? Other econometric methodology recently developed is designed to analyze models where more structure has been imposed than in the class of models discussed here. For example, see Chow (1980), Hansen and Sargent (1980), Sargent (1978), Taylor (1979), and Wallis (1980), all of which can be found in the Lucas and Sargent (1981) collection. Hansen and Sargent (1980) provide a prominent example of this alternative approach to estimating rational expectations models. Their techniques can be used to look at the "deep structure" of economic relationships by estimating parameters describing tastes and technology. This allows the researcher to analyze problems that are out of reach of the techniques described in this book.

However, there are advantages to the econometric approach here. Estimation is simple to execute with the techniques of this book and readily available computer packages, as the following chapter makes clear; this is less true of techniques such as Hansen and Sargent's. Fewer identifying assumptions are required to implement the econometric models analyzed here because the models are less structural. Because economists disagree strenuously about what is the appropriate structure of the economy (see the discussion in Sims 1980), empirical results obtained with fewer identifying assumptions are worth studying. The main conclusion to be drawn from these remarks is not that one set of econometric methodology is preferable to another; rather, all these techniques are needed for us to obtain a better understanding of how the economy works.

Because the investment in reading a book is far greater than that in reading a short journal article, the reader deserves to be convinced that he or she will be involved in a productive activity. The first step in this process is to show that the methodology in this book is well worth studying because it is applicable to a wide range of research problems. With the increasing prominence of rational expectations in the last few years, there has been a veritable explosion in the number of empirical studies that either use or can use the methodology outlined in this book. These include studies of consumption behavior (Bilson 1980; Flavin 1981), the question whether government bonds are net wealth (Plosser 1982), the behavior of foreign exchange markets (Dornbusch 1980; Frenkel 1981; Hartley 1983; Hoffman and Schlagenhauf 1981*b*), the demand for money (Carr and Darby 1981), money and interest rates (Makin 1981; Mishkin 1981*a*, 1982*c*; Shiller 1980), money and stock

prices (Rozeff 1974), the rationality of inflation and interest rate forecasts (Mishkin 1981*b*), asset returns and inflation (Bodie 1976; Fama and Schwert 1977, 1979; Jaffee and Mandelkar 1976; Nelson 1976; Schwert 1981), relative price variability and inflation (Fischer 1981), the effects of nominal contracting on stock returns (French, Ruback, and Schwert 1981), stock exchange seats as capital assets (Schwert 1977*a*), regulatory effects of the securities exchange commission (Schwert 1977*b*), costs of financial intermediation and the Great Depression (Bernanke 1982), and the policy ineffectiveness proposition (Barro 1977, 1978, 1979; Barro and Hercowitz 1980; Barro and Rush 1980; Björklund and Holmlund 1981; Germany and Srivastava 1979; Gordon 1979; Grossman 1979; Hoffman and Schlagenhauf 1981*a*; Leiderman 1979, 1980; Makin 1982; Mishkin 1982*a*, 1982*b*; Sargent 1976*a*; Sheffrin 1979; Small 1979; Wogin 1980).

This broad list of empirical topics above should persuade the reader that future research can profit from use of the methodology developed in the following chapters. However, the reader may still want to ask, What specifically is to be gained by reading this book? It is designed to be read on several levels and a brief "road map" of the analysis should help answer this question and save the reader both time and effort. The main body of the book is divided into two parts. Part 1 on econometric theory and methodology is the more technical. It will be of particular interest to the reader already convinced that the class of models analyzed in this book is worth studying, and who may want to pursue empirical work along these lines.

The opening chapter of Part 1 describes the models to be analyzed in this book and discusses the details of their estimation. It covers such theoretical statistical issues as the consistency and efficiency of different estimation procedures. However, it is primarily a practical "how to" chapter that should help the interested researcher to apply the book's econometric techniques. To aid in the applications, an appendix to this chapter contains an annotated computer program that has been used to generate empirical results in Part 2 of the book. This program makes use of a standard econometric package available on many universities' computers and the techniques outlined here should be easily accessible to most researchers. Another purpose of this chapter is to provide sufficient information on the techniques used in the empirical work in the following chapters, so that this work is opened to scientific scrutiny. This chapter, however, also is intended to be a fairly general treatment because the techniques discussed are applicable to many empirical issues not analyzed in this book.

The next chapter treats theoretically the relationship among tests of rationality, market efficiency, and the short-run neutrality of policy. It provides information about how the tests conducted in this book relate to other tests in the literature, and it discusses the circumstances in which

the resulting test statistics are generally valid. This chapter is useful in understanding both the empirical tests in this book and some of the previous literature on rational expectations models.

Part 2 is much less technical and contains empirical studies on topics of potentially widespread interest. Chapters in Part 2 will be sufficiently self-contained so as not to require knowledge of Part 1 to be understood. Readers who are interested in the macroeconomic issues studied here but who are not technically inclined, or who are not yet convinced of the value of the econometric techniques, should read this section first. They may then find it worth investing in a careful reading of Part 1.

The opening chapter of Part 2 provides information on the question of whether market forecasts are rational. Recent studies have found that forecasts of interest rates and inflation derived from well-known surveys are not consistent with the rational expectations hypothesis. For reasons discussed in this chapter, the survey measures may not reflect market behavior. We then want to know whether markets display rationality of expectations in contrast to the survey measures. If they do, doubt is cast on the survey measures as a description of market behavior. Tests similar to those conducted on survey data are used to provide evidence on this issue for the bond market. They do cast doubt on the usefulness of these survey measures and indicate for the most part that bond market forecasts are rational.

Chapter 5 explores the relationship of monetary policy with both long- and short-term interest rates. The impact of a money stock increase on nominal interest rates has been hotly debated in the monetary economics literature. The view most commonly held—also a feature of most structural macroeconometric models—has an increase in the money stock leading, at least in the short run, to a decline in interest rates. Monetarists dispute this view because they believe it ignores the dynamic effects of a money stock increase. The use of the rational expectations (or equivalently, the efficient markets) hypothesis in this analysis imposes a theoretical structure on the relationship that permits easier interpretation of the empirical results as well as more powerful statistical tests. In the interest of ascertaining the robustness of the results, many different empirical tests are conducted, and they do not support the proposition that increases in the money supply are correlated with declines in interest rates.

Recent equilibrium business cycle models, which incorporate features of the natural-rate model with the assumption that expectations are rational, lead to an important neutrality result: Anticipated changes in aggregate demand will not evoke an output or employment response. One deterministic policy rule is, therefore, as good as any other from the point of view of stabilizing the economy. Chapter 6 conducts an empirical investigation of this policy ineffectiveness proposition. Not only do the

results strongly reject the proposition, but, in addition, unanticipated movements in aggregate demand policy are not found to have a larger impact on output and unemployment than anticipated movements.

The final chapter furnishes some concluding remarks and a general perspective on the empirical results and the econometric methodology.