

*Macroeconomic Policy  
in a World Economy*



John B. Taylor

STANFORD UNIVERSITY

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*Macroeconomic Policy  
in a World Economy*

*From Econometric Design  
to Practical Operation*



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To my parents



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# Preface

This book deals with some difficult questions of macroeconomics and its practical application to monetary policy, fiscal policy, and international policy. It uses an approach that is an outgrowth of the research that is collectively referred to as the “rational expectations revolution.” It is not, of course, the only outgrowth. Real business-cycle models, new classical models, and new Keynesian models are some of the other strands of the rational expectations revolution.<sup>1</sup>

The theoretical ideas and econometric techniques that define the approach have been the subject of much of my research efforts during the 1980s, especially during the years from 1985 to 1988 at Stanford. Although the theoretical and econometric research was essentially complete by the end of 1988, the preparation of this book was interrupted from 1989 to 1991 while I took leave from research and teaching to serve as a member of the President’s Council of Economic Advisers. This book is considerably different from the book that would have been published three years ago and that was to focus almost entirely on the *design* of policy rules. As part of my macroeconomic and international economics responsibilities on the council, I had to consider from a practical perspective not only the design of policy rules but also their implementation and operation. Although this experience has increased my confidence in the approach, especially in comparison to the other outgrowths of the rational expectations revolution and to pre-rational expectations macroeconomics, it also convinced me of the importance of research on implementation and operation of policy. In completing the book in 1992, I drew on that experience along with the results from the earlier research.

<sup>1</sup>The research underlying the rational expectations revolution in macroeconomics is perhaps best represented by the collection of papers assembled by Lucas and Sargent (1981). Real business cycle theories are reviewed by McCallum (1989), new classical theories by Sargent (1987a), and new Keynesian theories by Mankiw and Romer (1991).

A significant motivation for this research program has been a conviction that if a new policy approach is genuinely to improve on the Keynesian approach to macroeconomics, it must entail replacements of the traditional Keynesian econometric models that have dominated practical Keynesian policy analysis. “It takes a model to beat a model,” is a frequently heard Washington phrase. This is also the view set out by Robert Lucas and Thomas Sargent in their well-known attack on conventional methods of macroeconomic policy evaluation entitled “After Keynesian Macroeconomics” and reprinted in the Lucas and Sargent (1981) collection of readings. They argued,

The Keynesian Revolution was, in the form in which it succeeded in the United States, a revolution in method. This was not Keynes’ (1936) intent, nor is it the view of all of his most eminent followers. Yet if one does not view the revolution in this way, it is impossible to account for some of its most important features . . . . It is the fact that Keynesian theory lent itself so readily to the formulation of explicit econometric models which accounts for the dominant scientific position it attained by the 1960s. (p. 296)

As I hope becomes clear, the econometric approach presented in this book is fundamentally different from traditional Keynesian econometric approaches.

This book requires an econometric and technical economic background more advanced than the typical undergraduate macroeconomics course. However, the view of macroeconomics presented in this book is quite consistent with that presented in the undergraduate macroeconomics text written by myself and Robert Hall, especially in the emphasis on price-wage rigidities and rational expectations. That text presents very simple, illustrative versions of the more technical and practical models used here. Hence, this book could be titled “A Second Course in Macroeconomics” and could be read by students who would like to learn more about macroeconomic policy evaluation than can be provided at the intermediate undergraduate level. It could be used in first-year graduate courses or by specialists in academia and government who focus on macroeconomics and international finance issues. However, it would be a mistake to advertise this book as a text that attempts to explain all the different types of macroeconomic theories that are now seen in graduate schools. No attempt is made to cover the other outgrowths of the rational expectations revolution.

In developing these ideas and techniques I have been driven by the pragmatic goal of solving practical macroeconomic policy problems. I say this without apology, recognizing that in many cases the resulting econometric models are less elegant and less general than I would have tried to make them were it not for this pragmatic aim. Fortunately, there are ongoing efforts to provide more microfoundations for some of the ideas and techniques. Also fortunately, these efforts have thus far been more supportive than critical of the approach.<sup>2</sup>

<sup>2</sup>Phelps (1990) and Stiglitz (1984) summarize the work on microfoundations.



### *The Research Path*

The origins of this book can be traced to my 1979 *Econometrica* paper “Estimation and Control of a Macroeconomic Model under Rational Expectations.” That paper represented a prototype model to illustrate the approach and to demonstrate its feasibility. The simplicity of the model enabled me to not only estimate the parameters using rational expectations methods available at the time but also to simulate it and actually compute optimal policy rules. This permitted me to account for policy-induced parameter changes that the Lucas critique pointed out, deal with time-inconsistency issues by examining policy rules, and address some current policy issues by computing inflation-output trade-offs in terms of variances of inflation and real output rather than in terms of their levels. In a short follow-up paper, which I presented at the 1980 American Economics Association annual meeting [Taylor (1981)], I showed that the optimal policy rule could be approximated by a simple rule that embodied a concise principle: macroeconomic policy should not accommodate inflation but should be countercyclical. I have been gratified by the favorable reaction to this early work, and I still think that this basic principle is essentially correct. The model has been replicated many times, used for pedagogical purposes, and cited in debates about the major macroeconomic controversies. But in important respects, such a prototype model did not have the “horsepower” to tackle many practical macroeconomic policy problems.

Three key hurdles had to be crossed before that horsepower could be achieved. First, I had to develop a computationally tractable wage- and price-determination system consistent with the long-run neutrality implied by rational expectations but rich enough to explain wage-price and business-cycle dynamics. This task led me to the simple staggered wage-setting model, hinted at in an appendix to my 1979 *Econometrica* paper, but first published with the kinks worked out in the *Journal of Political Economy* in 1980.<sup>3</sup> That simple uniform-length contract structure needed to be generalized to multiple contract lengths with varying degrees of synchronization before it was able to fit wage data for different countries with a wide variety of wage-setting institutions. That generalization is presented in this book.

Second, rapid rational expectations solution algorithms and estimation techniques that could be applied to large nonlinear systems had to be developed. Stochastic simulations are essential for the macroeconomic policy evaluation approach I was developing, and without fast algorithms, the large number of required replications would be computationally infeasible

<sup>3</sup>I first tried to use the formulations of Phelps and Taylor (1977) or Fischer (1977), but I soon found that these would not work empirically: they could not explain the inertia/persistence of either wage-price movements or real output without the imposition of a large amount of ad hoc exogenous serial correlation. I developed the staggered contracts model to explain these dynamics endogenously with plausible, and eventually verifiable, assumptions about the length of wage- and/or price-setting intervals. Phelps (1990) recalls my excitement about the first computer runs, at the Columbia University Computer Center, which provided this verification.

even with supercomputers. Ates Dagi and I (1984) extended the linear symmetric procedures developed by Hansen and Sargent (1981) to linear nonsymmetric systems, which occurred in my models, but it was the nonlinear method developed by Ray Fair and myself and published in the 1983 *Econometrica* that turned out to be most useful. That method has since become a workhorse for most large-scale rational expectations models. It is used extensively throughout this book.

Third, international linkages between countries needed to be developed. Empirically speaking, by the late 1970s neither the small open-economy model nor the closed-economy model made any sense for empirical or policy work for the United States. Hence, I decided that a multicountry model was needed and settled on a linkage system with perfect financial capital mobility as in the Mundell-Fleming model and with time-varying risk premia in foreign exchange and capital markets. Developments during the last few years have convinced me that this was a correct decision.

### *Brief Overview of the Book*

The book is organized as follows. In the first chapter I give examples and categorize some of the major policy questions macroeconomists face. I also outline, using very stylized models, a general approach to answering such policy questions. The remaining chapters of the book use that approach to address actual policy issues by using estimated econometric models.

Chapter 2 starts with a linear econometric model of the U.S. economy. In addition to describing the estimation of the parameters of this model, Chapter 2 shows how the model is used for policy evaluation with both stochastic and deterministic simulations.

Chapter 3 describes the equations of a multicountry model of the G-7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States). The description focuses on the functional form and parameters of the ninety-eight stochastic equations. Chapter 4 describes the stochastic structure of the model as estimated over the sample period. Chapter 5 explores the effects of one-time changes in the policy instruments in the model.

The last three chapters focus on three modes of policy evaluation that correspond to the categories of questions defined in the opening chapter. Chapter 6 considers general policy-*design* issues, including the classic question of fixed versus flexible exchange rates. Chapter 7 considers *transition* problems, including choosing paths toward fiscal balance and low inflation. Chapter 8 considers the problem of everyday *operation* of policy rules.

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