MACROECONOMIC MODELING AND POLICY ANALYSIS FOR LESS DEVELOPED COUNTRIES

Mohammed F. Khayum

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To My Mother

Preface

The context for this study is the empirical fact that while the less developed countries (LDCs) as a group have experienced considerable improvements in output performance over the past three decades, there is an increasing number of countries within this group whose economic performance has not been encouraging. The poor results faced by many of the LDCs not only point to the ineffectiveness of adopted policies but also suggest the need for reformulations of existing approaches in order to provide insights and policies that are consistent with reality.

This study focuses on the need for greater relevance in theoretical frameworks and suggests that economic modeling for LDCs cannot ignore the behavior of the supply side of the economy and the role played by institutional factors in these countries. The conclusion derived from a case study based on Guyana is that short-term economic policies have limited potential for addressing contemporary economic problems unless there is success in the creation of a domestic capital goods sector.

I am grateful to Jay Mandle and James Sackey, who inspired me to pursue a career in economics. Thanks go to Fyodor Kushnirsky, who helped me to reformulate many of my ideas and to clarify their presentation. Special thanks to Dimitrios Diamantaras for introducing me to the typesetting package—TEX—that was used to produce this book. Finally, I wish to thank my wife, Desiree, and son, Omar, for their understanding as they endured prolonged periods of separation and emotional distance during the past three years.

Mohammed F. Khayum

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Introduction

There is general recognition in the economic literature on Less Developed Countries (LDCs) that, despite some success in the growth in output for the group as a whole since the 1950s, the performance of many individual countries has not been consistent, particularly from the early 1970s onwards. Indeed, a large number of LDCs have failed over the past two decades to simultaneously achieve sustained economic growth, prolonged reductions in the rate of inflation, and a viable long-term balance of payments position.

The case of Guyana illustrates the experience of one of the LDCs that has faced severe economic crises for a major portion of the past two decades. The magnitude and persistence of poor economic performance are reflected in low growth in output, high rates of unemployment and inflation and macroeconomic imbalances in the form of severe external indebtedness and large trade and public sector deficits. Even though a wide range of policies including demand management adjustment measures as well as structural and institutional reforms were tried, there was little success in arresting the economic decline. To address the problem, this study proposes a model that can analyze the issues of external imbalance, inflation, and output performance with reference to the economic policies in Guyana.

The building blocks of the model presented are threefold: the IS-LM system which lays the foundation for aggregate demand analysis, an aggregate supply schedule in the neoclassical tradition which provides the basis for the supply side analysis, and the Keynesian formulation of the balance of payments for the analysis of the external sector. The model is tailored to the circumstances and structural characteristics of an economy such as Guyana's, with an emphasis on its open nature. Thus, on the aggregate demand side, the mone-

tary consequences of the balance of payments are taken into account by adopting the open economy monetarist proposition stating that changes in the money stock can be usefully decomposed into changes in net domestic credit plus changes in net international reserves. On the supply side, the production function incorporates the role of external influences, through the inclusion of imported inputs as a factor of production.

Some of the important features of the model are as follows: First, it considers output, the price level, and the current account of the balance of payments in an integrated framework. Second, the model is able to link objectives of macroeconomic adjustment directly to a number of government policies in relation to the exchange rate, the money supply, and the public sector deficit. Third, the model can be used to quantify the effects of external shocks, such as changes in external demand, and in the import price level, on output and the current account balance.

The study is divided into seven chapters, covering an overview of macroeconometric modeling, the practice of macroeconometric modeling for LDCs, a description of the structure and performance of Guyana's economy, the formulation of a theoretical macromodel with the methodology for its estimation, an empirical testing of the model using annual data for Guyana between 1960 and 1984, and a simulation approach to policy evaluation.

Chapter 2 presents a survey and classification of the macroeconometric models in existence into certain types of macroeconometric systems. The basic features of each of these systems are identified and discussed. It is also shown that, although there are distinctions that separate each of these systems, there are some similarities in terms of analytical techniques, the critical aspects of economic behavior and economic structure emphasized, and the role of theoretical issues such as the formation of expectations. The emphasis on one particular system, the Keynes–Klein system, among the operational macroeconometric models that have been utilized for LDCs is made in Chapter 3. The reasons for the choice of this system given by the analysis are the lack of consolidation of other macroeconometric systems, problems of coverage in the available data, the complexity of the various economic and econometric problems involved, and the dichotomy between the implications and emphasis for policy in the other systems and the orientation within many LDCs for government

intervention as a means of dealing with the problems of growth and adjustment.

Chapter 4 examines the circumstances surrounding the poor economic performance of Guyana's economy between 1960 and 1984. It identifies the close relationship between expansion of the public sector, with its acquisition of market power while crowding out the private sector, and the inertia that presently characterizes the official economy. The rise of parallel markets as a response to these conditions and the circumvention of policies enacted by the authorities has been shown to be a critical area for corrective measures if the economy is to become vibrant. The institutional structure and behavioral characteristics identified have been important considerations in the specification of the model in Chapter 5.

The model specification also seeks to address the growth oriented strategy in the context of balance of payments problems, severe external indebtedness, and inflation. The main implications from an analysis of the comparative static properties of the model are that policy measures involving changes in the exchange rate, or the public sector deficit, affect both the demand and supply sides of the economy so that in principle output and price level outcomes are ambiguous.

The feasibility of the approach and its potential for policy analyses, as well as empirical application to Guyana's economy is presented in Chapter 6. The model is estimated using both the Ordinary Least Squares (OLS) and Two Stage Least Squares (TSLS) techniques and the empirical results are commented upon. Besides the examination of parameter estimates, emphasis is placed on empirical results relevant for economic policy issues. The following are examples of these "policy oriented" findings:

- estimation of the actual multipliers which indicate the impact of policy induced shocks such as changes in the exchange rate, money supply, and the public sector deficit on output, the price level, and the current account balance.
- simulations of the path of output, the price level, and the current account of the balance of payments under different scenarios for policy variables, for example, the exchange rate.

The concluding chapter summarizes the main findings and highlights some of the directions in which the proposed framework can be

extended and likely areas for future research. The study provides a quantified assessment of the elasticities of the aggregate demand and aggregate supply schedules which suggests that demand management policies would have a negligible impact on output but policies that can shift the aggregate supply schedule would have considerable impact on the level of output. However, based upon the existing supply side bottlenecks facing the economy this raises the alarming possibility of limited policy options extending beyond the short term unless a domestic capital goods sector is developed to ease production constraints.

One direction of improvement is to make the model dynamic so as to consider longer run issues in relation to growth rates and inflation rates.

Another area for further work concerns the issue of model stability, particularly when it is considered that in response to certain external shocks such as foreign price increases production may decline faster than absorption resulting in continued current account deficits. The model can also be elaborated through a greater degree of disaggregation and the disequilibrium aspects of the economy—in the sense that there are imbalances between demands and supplies in various sectors—needs to be investigated and modeled, perhaps within the framework of recent developments in disequilibrium macroeconometric modeling. Considerable scope also exists for further econometric work, particularly, in relation to issues such as non-linear estimation and the application of other system estimation methods such as three stage least squares. Finally, since the broader purpose of this study is the development of theoretically founded and operational macroeconometric models for LDCs, the suggested model can be tested for other LDCs that share structural and institutional characteristics similar to Guyana's using a larger data base.

2

Macroeconometric Modeling: An Overview

Background

Since the 1930s when Tinbergen first constructed a macroeconometric model with the purpose of analyzing the business cycle in the United States economy, macroeconometric modeling has emerged as one of the more widely used tools of quantitative economic analysis. Accompanying this trend has been the growth of a related literature encompassing developments in macroeconomics and in the econometric approach to economy-wide model building. Within the macroeconomic literature recent developments include the rational expectations theory, supply-side economic policy, and open economy macroeconomics.[1] In the econometric literature many of the related research areas bear some connection to the methodological issues surrounding structural estimation of an entire economy. Some of the issues cover problem areas such as exogeneity and model selection, and the use of appropriate models for data generation processes and policy analysis.[2]

These developments have raised theoretical and empirical questions that have placed macroeconometric modeling at a crossroads. From the theoretical standpoint there is a lack of consensus about the "true" structure of economies. The Keynesian-Monetarist debate, for instance, offering alternative visions of how the economy functions on the demand-side, currently overshadowed by the New Classical Macroeconomics and the focus on supply-side issues is indicative of the competing approaches that are in existence. In addition to the empirical questions specific to each approach such as making the models operational, there is the consideration that empirical results are a major avenue for testing the relevance of existing models. However, the empirical experience in the latter direction has been far from satisfactory since a number of plausible contending theories cannot

be rejected on the basis of estimated results to date.[3] This problem of empirical model selection has led to divergent trends in macroeconometric modeling ranging from the rejection of structural estimation to the search for economic structure in the form of the parameters of preference and technology.[4]

This chapter presents an overview of the macroeconometric modeling literature. In order to conduct an exercise of this nature, the discussion will be based on a broad classification of the major types of macroeconometric systems with specific reference to two recurring themes in the evolution of this literature. This is followed by an indication of a trend towards rapprochement between some of the existing approaches in spite of the distinctions that appear to justify their separate existence. Finally, the discussion will be extended to consider the kind of research methodology that has grown in parallel with the problems of structural estimation. All of this will be setting the stage for an evaluation of macroeconometric modeling with specific reference to the less developed countries (LDCs).

Macroeconometric Systems

Amidst the huge growth in the volume of research on macroeconometric modeling two sets of issues have featured persistently in the evolution of this literature. The first involves the concern over the micro-foundations of macroeconomic relations and conditions for valid aggregation. The second pertains to the concerns of policy makers over a varying array of problems of an economy-wide nature.

The first aspect has consistently been an area of interest largely because it emanates from a perspective that has been highly favored within the economics profession, namely, that for macro propositions to be meaningful they must possess explicit micro-underpinnings. The basis of this position can be traced to the economic literature which predated the micro-macro distinction. However, its relevance for the evolution of the macroeconometric modeling literature was established with the outcome of an early methodological debate on aggregation. The favored position at the time was that held by one of the pioneering figures in macroeconometric modeling, who argued that a primary theoretical concern is to meet the challenges of making

macroeconomic relations conformable with the postulate of rational behavior.[5]

The tradition set in train was one of a consistent concern with micro-theoretical detail on the part of macroeconomic modelers. It is not uncommon, therefore, to find the established theories of household and firm behavior highly visible in the macroeconomic specification of investment, production and consumption functions of large scale models currently in use—see Kmenta and Ramsey (1981) and Klein (1983). It should be noted, however, that recent research has raised questions about this predilection for micro-underpinnings in relation to macroeconomic propositions from a number of perspectives. Schlicht (1985), for example, resurrected from Pu (1946) and May (1946) the perspective that aggregation may proceed without detailed knowledge of micro behavior suggesting that it is feasible to have meaningful macro propositions without explicit micro-underpinnings. Here, a number of anomalies in making the transition from micro behavior to macro relationships are identified. These have been articulated in terms of differences in the qualitative relationships between microeconomic and macroeconomic laws because of the smoothing effect, the elimination effect and the system effect.[6]

Kalman (1979, 1980, 1983) has argued that, because system-theoretic questions come to the fore before the basic economic phenomena may have been understood, economic theory is of limited value to the process of building precise quantitative models for prediction or policy analysis.[7] Finally, there are the indications that even within the standard macroeconomic writings there is a growing skepticism about the feasibility and usefulness of building macro relations from micro perceptions (see Fisher 1983). At this stage, however, these perspectives have not had considerable impact on macroeconometric modeling and, while they are likely to exercise greater influence in the future, model formulation continues to portray a concern for an adequate micro-macro nexus.

The second major aspect that has had considerable impact on the evolution of macroeconometric modeling is the requirements of economic policy in the context of changing economic circumstances. The development of economics, in general, has been characterized by a symbiotic relationship between empirical trends and economic theory and economic policy.[8] The increased evidence of a widening and