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Chapter Title: Introduction to "Commodity Markets and Latin American Development -- A Modeling Approach"

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1 Introduction

There are a number of reasons for examining the role of commodity markets in the economic development of Latin American economies. The majority of Latin American countries are heavily dependent on primary commodities for the bulk of their export earnings, and this situation is unlikely to change significantly in the near future. While many of these commodities are of the "traditional" agricultural type, we are entering an era in which a foreseen relative scarcity of food resources will make many of these commodities extremely valuable. Industrial raw materials are also becoming more valuable as new scarcities arise. Dependence on these commodities, however, means suffering from frequent and wide price swings. This has led to recent action to consider forming producers' agreements among countries that export these commodities, for example, the Intergovernmental Council of Copper Exporting Countries (CIPEC) and the Bauxite Producers Exporting Committee (BAUPEC). In any event, studying commodity markets is essential to understanding and formulating Latin American policies on a domestic and international level.

Among problems that commodities have posed in planning for national growth in Latin America, the following can be cited. (1) The commodities involved make these countries dependent on industrialized countries for investment, technology, trade, and general know-how. (2) The trade dependence of any single country is often on one or two rather than a group of commodities. This dependence can become particularly difficult as it has in the past when commodity prices decline as a consequence of world recession. Indeed over the past two decades the terms of trade of their primary commodities have not increased. (3) The exported commodities are highly sensitive to substitution from synthetics produced within the importing countries. (4) Most of the industrial countries offer a degree of protection against

these commodities. (5) The "new" export promotion policies being studied can only be effective if the future of "low" and "high" growth commodities is correctly assessed. (6) Little is known about the "mechanics" linking commodity exports and GNP growth in the various countries. (7) Up to now a clear picture has not emerged as to the potential impact of proposed international commodity stabilization schemes on Latin America.

The hope of solving some of these problems provides a need for a methodological approach that would examine the relation between commodities and growth and improve planning in this area. This book attempts to introduce to economists and planners some of the latest advances in commodity modeling methodologies that can help meet this need. While some of these advances relate to the basic commodity model, two others of interest deal with its application to trade and development processes. The first of these would employ commodity models as well as commodity sectoral models in conjunction with macroeconometric models. The second would transform commodity models to analyze and to predict the outcomes of commodity price stabilization schemes.

ORGANIZATION

The structure of the book is designed to provide a perspective on the relation between primary commodities and economic development in Latin America. The approach taken from a disciplinary point of view is basically a quantitative or modeling one. However, embellishments of a qualitative nature would seem necessary to make the examination of commodity impacts more comprehensive. The organization of the book is in four parts. The first part surveys Latin America's commodity markets from the point of view of policy planning needs and related modeling methodologies. The second part presents models of commodity markets of importance to Latin America. The third part studies the interrelationships between commodity markets and their dependent national economies with special emphasis on the mineral and agricultural sectors. Featured are the latest advances in models which analyze this interrelationship. The fourth part extends the modeling analysis by examining the international initiatives currently being taken in regard to stabilization and the related UNCTAD Integrated Program. For those readers less familiar with modeling methodologies, Chapters 2, 3, and 9 provide a general introduction to important policy issues concerning commodities and development. A brief account of the material presented in the four parts of this book is given below.

MODELING APPROACHES TO LATIN AMERICA'S COMMODITY PLANNING

The first issue examined is the role that quantitative models of commodity markets can play in planning for Latin American development from a national and an international point of view. In Chapter 2, Labys points to the strategic importance of primary commodities in Latin America's export structure and growth experience. Because of the many different problems involved in primary commodity planning, a perspective is provided that shows policymakers how models for the more important commodities might be integrated into the planning framework. A bridge is then provided between the planning needs and the modeling methodologies that could help to meet those needs. The methodologies presented and analyzed include market models, process models, optimization and programming models, input-output models, trade-flow models, systems dynamics models, and more general systems models. The applications of these models are then stressed in forecasting, in linkage with models of national economies and in price stabilization analysis.

Given the relative importance of input-output modeling as a planning technique, Simpson shows in Chapter 3 how its present use in Latin America can be expanded further and how input-output models can be used as a method for analyzing the impact of primary commodities on the national economy. Some crucial aspects of these models are then taken up separately; for example, regional models, interregional applications, and disaggregation studies. Planning potential is shown in marketing, natural resource utilization, and forecasting by projecting technical coefficient matrices. The remainder of the chapter concentrates on the disaggregation approach, drawing examples from previous work on beef export policies in Argentina, Brazil, Paraguay, and Uruguay. The techniques employed together with the multiplier analysis are applicable to other commodities in many Latin American countries.

MODELS OF LATIN AMERICA'S COMMODITY MARKETS

This section of the book is concerned with models applicable to planning in individual commodity markets. As a starting point, Chapter 4 analyzes the problem of planning mineral investment. Dammert addresses investment possibilities in the copper industry in Latin America within a worldwide framework. The method employed is a

cost-minimizing multiperiod linear mixed integer programming model that takes into account economies of scale in the investment activities as well as the impact of declining ore grades. Detail is provided for planning investments in mining as well as in smelting, refining, and semimanufacturing.

Demmler and Tilton in Chapter 5 consider the importance of trade patterns in commodity planning. A country's choice of trading partners may facilitate or impede its access to markets if the country is an exporter, or its access to available raw material supplies if it is an importer. An econometric trade-flow model is employed to analyze policy problems related to these patterns. This method has the advantage of identifying the fundamental factors shaping trade and of tracing their relative importance. The results of several trade modeling exercises are reported for commodities of prime importance to Latin America: aluminum, bauxite, copper, iron ore, nickel, tin, and zinc. Specific issues such as growing public ownership in the mineral sector and the upgrading and expanding of domestic processing activities are also analyzed.

In Chapter 6 attention shifts to modeling analysis of important policy planning problems for agricultural commodities. Gemmill reports on the construction and use of the spatial-equilibrium methodology to model the world sugar economy. The specific agricultural policies tested with the model are trade oriented: tariffs, quotas, variable levies, and export taxes. Included in the analysis are the major sugar supply and demand regions in Latin America as well as in the rest of the world. The results of the policy analysis are analyzed and welfare implications are drawn in terms of producers' and consumers' surplus as well as government revenues. Of particular interest are the implications for U.S. and EEC protectionism and the present system of sugar marketing.

MODELING THE RELATIONSHIP BETWEEN COMMODITY MARKETS AND NATIONAL ECONOMIES IN LATIN AMERICA

This part of the book broadens our understanding of the "mechanics" that link commodity exports and exchange earnings with economic growth. A number of reasons are typically given to explain the relationship between exports and economic growth. These include concentration of investment in efficient sectors of the economy, improved potential to import, increased economies of scale, opportunities to improve competitiveness, as well as others.

Concerning the export sector effects of primary commodities, these can be seen as working through the impacts of export income flows and through externalities. This process is sometimes explained within the context of capital formation theory, based on a disaggregated multiplier-accelerator mechanism. Commodity export growth thus impinges on the economy through investment opportunities: (1) in the commodity industry itself, (2) in industries supplying inputs to the export sector, (3) in industries employing the export commodity as an input, and (4) in industries producing consumer goods for factors of production employed in the export sector. These linkages are typically described as backward, forward, technological, final demand, and fiscal.

In Chapter 7, Adams and Roldan analyze the impact of fluctuations in coffee production and prices on the economy of Brazil. The method used is the coupling of a coffee sector model explaining Brazilian production and world market adjustments with a macromodel of the Brazilian economy. Three important aspects of this linkage are stressed. The coffee sector of the economy is highly disaggregated and integrated with other sectors of the economy; feedback in the form of two-way linkages between the country model and the commodity model are featured; and domestic policy variables are introduced that can serve to offset coffee market fluctuations. Scenarios are then tested for coffee production and exports to test the impact of countercyclical policies such as export taxes, neutralization of foreign exchange earnings, and trade restrictions.

A similar attempt is made by Lira in Chapter 8 to analyze the impact of copper market fluctuations on the Chilean economy. Fluctuations in the world copper market are generated exogenously and their impacts on the economy are subsequently determined through the use of a macroeconometric model. No commodity model has been incorporated in the study. The research effort is contributary in its attempt to model and evaluate a wide range of copper industry policies, including investment and corporate tax rates as well as exchange rates.

MODELING THE IMPACT OF PRICE STABILIZATION SCHEMES

The final section of the book deals with international commodity policies of importance to Latin America's position in the New International Economic Order. As mentioned above, the recent policy discussions conducted in relation to the UNCTAD Integrated Program specifically consider the impact of buffer stock schemes on Latin

American economies. Attempts to analyze these impacts have involved methodologies ranging from simpler theoretical and empirical approaches to single and multicommodity modeling exercises.

The background to these attempts is reviewed by Lord in Chapter 9. He begins by considering the relationship between economic development and export instability and also evaluating the empirical techniques used to measure this relationship. Considered next is the degree of instability in Latin America's export earnings caused by the regionally significant commodities included in the UNCTAD Integrated Program as well as their responsiveness to fluctuations in both export price and volume. The final section deals with the feasibility of international commodity price stabilization arrangements for stabilizing or improving the region's export proceeds.

In Chapter 10, the final chapter, Behrman and Tinakorn simulate models for a number of commodities to determine the impact of the implementation of the integrated program on export earnings. A more global form of market model is employed for the following commodities: coffee, cocoa, tea, sugar, cotton, jute, rubber, sisal, copper, and tin. Each model includes production and demand relations for each of three country groups: developed economies, developing economies, and centrally planned economies. There is also a global inventory equation that attempts to capture speculative behavior as well as buffer stock adjustments. The models are then simulated, subject to buffer stock price controls of a given degree, and the present discounted values of gains to Latin American exporters are computed. The results obtained can very well serve as guidelines to governments who have to enter negotiations on one or more of the included commodities.