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"INTRODUCTION" TO COMPUTATIONAL ANALYSIS
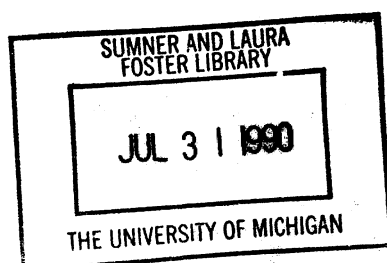## OF GLOBAL TRADING ARRANGEMENTS

by

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Computational Analysis of Global Trading Arrangements

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Chapter

Preface

This book contains many of the papers that we have written between 1985 and 1989, using the Michigan Model of World Production and Trade. In these papers, we have analyzed the economic effects of a variety of actual and hypothetical trade policies for the major industrialized and developing countries. The papers have been edited to eliminate extraneous material and, as seemed useful and appropriate, to bring the discussion up to date.

We owe a debt of gratitude to a number of individuals and organizations that have made our research possible. Deborah Laren and especially John Alfaro have assisted us with many of the programming and technical details involved in organizing the data and in carrying out and reporting the results of the various experiments that we have conducted based on the Michigan Model. Several of our graduate economics students provided invaluable research assistance as well. We would like in particular to thank Filip Abraham, Hilde Abraham-Leliaert, Deborah Clark, Wouter De Ploey, David Gray, Glen Greenlee, Jon Haveman, Bernard M. Hoekman, Christopher Jackson, Kelly McCauley, Gautham Nookala, and Aileen Thompson. Judith Jackson of the Institute of Public Policy Studies has been responsible for most of our manuscript typing and has played a crucial editorial role in carrying out the revisions of the papers for this volume. Finally, we wish to thank the remaining Institute staff for their administrative support and general assistance.

We owe special thanks to the Ford Foundation and, in particular, to Tom Bayard in his capacity as program officer for providing us with generous financial support for our research. Financial support was also received from the U.S. Department of Labor, the Geneva office of the United Nations Conference on Trade and Development (UNCTAD), the Joint Committee on Japanese Studies of the American Council of Learned Societies and the Social Science Research Council, and the Economic Council of Canada.

Our final thanks are to our respective families and above all to our respective wives, Pat Deardorff and Lucetta Stern, to whom we dedicate this book.

Chapter 1

Introduction

In Deardorff and Stern (1986b), we had occasion to bring together in a single volume the important technical features of our Michigan Model of World Production and Trade and a series of applications of the model to a variety of policy issues in the multilateral trading system. Since the publication of that volume, we have continued using the model to analyze numerous additional and important policy and empirical issues. Our efforts in the five years from 1985 through 1989 constitute the primary content of what follows in the present book.

During this most recent period, the structure of the Michigan Model and its data base have remained largely unchanged. In the first decade of the model's development, we devoted a great deal of attention to conceptual issues and refinements. There was a continuous interplay between the theoretical foundations of the model and its applications to policy issues as we sought to improve our own understanding of the model's intricacies and to convey our numerical findings to members of the trade policy and academic communities. Once we felt that we knew the strengths and weaknesses of the model, we decided to continue using it to analyze what we believed to be interesting and important issues arising in the global trading system.

Thus, in the substantive chapters that follow, we deal with applications of the model that are designed, first, to help further the understanding of the characteristics and consequences of protection in a variety of circumstances and, second, to analyze the potential economic effects of different scenarios for trade liberalization that are being considered in the eighth (Uruguay) Round of Multilateral Trade Negotiations being held under the auspices of the General Agreement on Tariffs and Trade (GATT). As the international economic policy environment has changed during the 1980s, we have devoted an increasing amount of attention especially to the assessment of nontariff barriers (NTBs) and related policies that affect trade in both manufactured and agricultural products from

the standpoint of the advanced industrialized and the major developing countries. We have also tried to address some of the issues of trade policy that have characterized the often contentious economic relations between the United States and Japan and to assess the economic effects and ramifications of policy proposals ostensibly designed to reduce the sustained U.S. trade and federal budget deficits. Since our work has been published in a variety of professional journals, conference volumes, and special reports and may not always be easily accessible, we thought that it would be worthwhile to bring everything together in this book.

Because we have always viewed the Michigan Model as a practical and useful tool for the analysis of trade policies, we have made a concerted effort over the years to maintain close and continuing contacts with staff members of those agencies in the U.S. government and the international organizations that have primary responsibility in dealing with trade matters. This has involved the wide circulation of the Discussion Paper Series from The University of Michigan Research Seminar in International Economics, specially arranged meetings with pertinent officials and staff in different locations, and the periodic convening of conferences on important trade issues. At the same time, we have contributed papers based on our model to, and participated as discussants in, a number of academic conferences. Many of our papers have been published in refereed journals. Our objective accordingly has been to provide useful inputs into the policy process and simultaneously to maintain recognition and respect from our academic peers.

It is difficult for us to assess whether and to what extent our research has affected the policy process since in the normal course of events we would not be privy to the channels of communication in government and in international organizations. But we do have the benefit of written peer evaluations in the form of reviews of our 1986 book. Since these reviews were published in professional journals, they tend to emphasize the more technical aspects of our work. This should not be a drawback, however, since the praise and criticisms of our peers should be helpful to policy officials and their staffs as

well as to other interested individuals in forming judgments about what we have done. It may be useful accordingly to mention briefly some of the criticisms that reviewers have made of our work. In doing so, we shall skip the praise of the reviewers lest it seemed too self-serving.

1. Peer Reviews of the Michigan Model

While our 1986 book was reviewed in a number of publications, we have selected for purposes of discussion here the reviews by Whalley in the *Journal of International Economics* (1987), Tower in the *Southern Economic Journal* (1987), Winters in the *Economic Journal* (1987), and Cuddington in the *Journal of Economic Literature* (1988).

Of these four individuals, Whalley is especially well known for his work on the general equilibrium modeling of trade policies (see Whalley 1984). In his review, Whalley mentioned four areas in particular where he thought that our work may have been deficient: (1) understatement of the importance of terms-of-trade effects; (2) a possibly unsatisfactory closure rule for our model; (3) real effects stemming from changes in nominal variables (e.g., the exchange rate); and (4) insufficient attention to actual trade policy issues such as those on the agenda of the Uruguay Round. Tower took us to task especially for: (1) our failure to experiment with different closure rules; (2) the absence of clearly articulated macroeconomic policies, especially for dealing with labor market disequilibria; and (3) lack of cost-benefit analyses of the different policies being examined. Winters was critical on several grounds, including: (1) the scope of the model covering only merchandise trade and thus abstracting from trade and investment in services, international asset transactions, macroeconomic adjustments and policies, etc.; (2) focus on short-to-medium run analysis; (3) overemphasis on the production effects of changes in trade policies and insufficient attention to effects on consumption; (4) low substitution elasticities; and (5) excessive attention to issues derived from theory rather than more empirically relevant matters. Winters also raised the issue of how policymakers might use or misuse a model such as ours. Finally, Cuddington criticized the macroeconomic

assumptions of the model, especially: (1) the handling of labor market disequilibrium; and (2) the closure rule regarding aggregate income and expenditure.

In chapter 2, which follows, we set out the formal structure of the Michigan Model in equation form and discuss its main features for the benefit of the more technically inclined reader. In doing so, we address the most important conceptual criticisms mentioned in the reviews above, in particular the ways in which we have handled macroeconomic closure, labor-market disequilibrium, exchange-rate effects, changes in consumption and economic welfare, and national product differentiation (i.e., terms-of-trade effects). It is interesting that none of the reviewers took us to task for assuming conditions of perfect competition and constant returns to scale in production, especially in light of developments in the "new" trade theory with emphasis on product differentiation, imperfect competition, and increasing returns to scale. We shall have more to say on this and other matters in our concluding chapter when we look back at what we have learned and what still remains to be done.

In constructing the Michigan Model, we obviously had to make a number of crucial decisions concerning the theoretical structure and implementation of the model. It will be up to the reader in working through the individual chapters that follow to decide whether to take our modeling results on their own merit. Some of the other criticisms of the model that were noted in the reviews relate mainly to how we have used the model, in particular whether we have placed too much emphasis on illustrations drawn from economic theory as compared to more relevant policy and/or empirical issues. Here, it is our view that the model applications in the following chapters have been more explicitly designed to address relevant issues than may have been the case in our previous book. The reason is that in our earlier work we were more consciously trying to adapt and implement the model, often with theoretical considerations in mind.

2. Plan of the Book

Part 1 contains two chapters that deal with the modeling of global trading arrangements. In chapter 2, we begin with an overview of the model and then present its structure in equation form. We discuss thereafter many of the important conceptual details of the model and illustrate some of its essential features. The chapter concludes with a comparison with other models. The implementation of the model is discussed in chapter 3 in terms of its data requirements and parameters, solution procedure, and reporting of results.

Part 2 consists of eight chapters devoted to computational analysis of the effects of protection. In chapter 4, we use the model to examine the question of whether foreign tariffs as well as own-country tariffs should be considered in evaluating a country's protection and, in addition, the importance of considering NTBs in evaluating protection due to tariffs. In chapter 5, we investigate the question of how sensitive the measured effects of protection are to the structure of input-output tables and to the use of incorrect input-output tables to characterize technology in cases where national input-output tables are lacking. Chapter 6 deals with the "neighborhood" effects of developing country protection, by which we mean whether own-country protection has additional adverse or beneficial effects for developing countries as a group in relation to the advanced industrialized countries.

Chapter 7 (written with Robert W. Staiger) examines the effects of protection in Japan and the United States on the factor content of their trade. The issues here are the extent to which each country's tariffs and NTBs distort their own and each other's trading pattern and factor markets and which factors of production are the most likely gainers or losers from protection or liberalization in the respective nations. Chapter 8 (written with Robert W. Staiger) explores a related question in the context of Japanese and American foreign trade, namely whether existing protection may account for discrepancies between

observed patterns of trade and those predicted by national factor endowments according to the Heckscher-Ohlin model of international trade.

Chapters 9 through 11 deal with the implications of recommendations that have been made urging the United States to impose tariffs on a unilateral basis for the ostensible purpose of reducing the U.S. trade and/or federal budget deficits. In chapter 9, written with Filip Abraham, we investigate the use of general and selective import surcharges by the United States, taking into account the effects on the trade and government budget deficits, sectoral output and employment, and the competitive position of U.S. industries. Chapter 10 deals with how the other major trading countries might be affected by a unilateral U.S. import surcharge and how large a surcharge might be required if these countries wanted to offset the detrimental effects that the U.S. action had on them. Chapter 11, written with Filip Abraham, investigates the question of whether protection could strengthen the profitability of import-competing industries in the United States and in other major countries without at the same time reducing profitability in exporting industries even more.

Part 3 deals with the computational analysis of different aspects of multilateral trade negotiations. In chapter 12, we compare the magnitudes and composition of the sectoral adjustments in the first half of the 1980s in the United States and Canada that may have been associated, on the one hand, with the tariff reductions implemented as a result of the Tokyo Round of Multilateral Trade Negotiations, and, on the other hand, with changes in U.S. macroeconomic policies that occurred. In chapter 13, we explore the economic effects of a number of scenarios for trade liberalization in the Uruguay Round negotiations involving the removal of existing tariffs and NTBs in the major industrialized and developing countries. The purpose is to identify the interests and tradeoffs that individual countries may have in different aspects of the negotiations. Chapter 14 is devoted to an examination of different types of temporary safeguards protection− − −unilateral/multilateral tariffs, quotas, or domestic subsidies− − −that

might be adopted by the United States and other industrialized countries to deal with the potentially disruptive domestic effects of surges in imports.

Finally, in part 4, we consider what we have learned from our efforts of the past five years in terms of conceptual issues involved in modeling global trading arrangements and understanding and assessing the economic effects of protection and trade liberalization. We also discuss our future agenda for research.

Chapters 4 through 14 have been edited from the original published versions to remove extraneous material and to add further clarifying discussion when appropriate. The computational results reported in the individual chapters are based on 1976 as the reference year for the model. While our data base has remained largely unchanged since 1983, we have added some national input-output tables for selected countries and made other minor adjustments in the data in the intervening years. Because of time and resource constraints, we have chosen not to rerun everything using a common data base throughout. Some of the results may therefore differ slightly between chapters, but the orders of magnitude remain broadly correct and the conclusions are unchanged.

Part 1.

Modeling Global Trading Arrangements