



***Trade
Liberalization
among
Major World
Trading Areas***



John Whalley



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Preface

This book originated in work on a general-equilibrium model of world trade and production begun in 1976 on my arrival at the University of Western Ontario from the London School of Economics. At that time, grant support for initial development work had been obtained through the Ford Foundation's International Economic Order Competition, and the foundation very kindly provided further support with a second grant two years later through the same program. This support enabled both the development of the model and its application to policy issues to proceed, and I am extremely grateful to the Ford Foundation and its staff. During this development phase, data and assistance were provided by the U.S. Special Trade Representative's Office, GATT, UNCTAD, and the Commission of the European Economic Community.

At the University of Western Ontario, in addition to the congenial atmosphere and the constructive criticism of colleagues, help came from a number of quarters. Outstanding research assistance was provided, at differing times, by Jon Fuller, Bob Hamilton, Colleen Hamilton, John Piggott, Randy Wigle, and Bernard Yeung. The Social Sciences Computing Laboratory provided excellent computer assistance. The typists of the Economics Department did a splendid job on the early drafts, and later drafts were efficiently retyped by Mary Cassidy and Barb Ross. Deborah Fretz provided outstanding editorial and technical assistance. The MIT Press provided helpful (and sympathetic) editorial work. I also wish to acknowledge the large number of helpful comments from various academic and other forums to which pieces of this book have been presented.

The text has been written for both nontechnical policy economists and technical economists with policy interests. As a result, certain sections may be somewhat pedestrian in places for one or the other of these groups. The reader is encouraged to skip the pedestrian sections.

A number of the later chapters contain material that has appeared in academic journals. The reader should be aware that most of the results

have been recomputed with later data and revised computer code, and that the numbers differ from those in the corresponding tables in the journal articles.

Finally, on a personal note, other academics will no doubt agree that it is usually families who bear the largest burden of scholarly endeavors. I am indebted to my wife, Maggie, for her tolerance of my endless evenings in the study and her forbearance of the necessary periodic departures from the domestic round which the research for this book required. As regards my children, Alex and Timothy, I can only hope that the world they inherit is (or at least appears) less threatening than the world of my generation, and that global trade-policy initiatives may have played some role in promoting a more enlightened international order.

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The world economy of the early 1980s often seems to provide a threatening and uncertain habitat. Some see the hoped-for continuation of the significant real growth of the postwar period in Western economies imperiled by a combination of global recession and threats of elevated protection. The less-developed economies, in particular, are often portrayed as caught in a vise between shrinking developed-country markets and falling real growth. Recalling the events of the 1930s, some commentators have pointed to the domestic pressure for protection, which builds during recessionary periods. Both the dangers of and the difficulties associated with the removal of protection are frequently stressed. This is all in sharp contrast with the mid-to-late 1960s, when the movement toward freer world trade under the Kennedy Round in the General Agreement on Tariffs and Trade and even within the United Nations Conference on Trade and Development seemed at times irresistible.

The world situation of the late 1980s will surely appear very different from the current situation, but there can be no doubting the importance to all countries of global trade issues. Whether we think we are moving toward freer trade or toward more protection, the potential impacts of changes in global trading arrangements seem to surface time and again in all sorts of policy debates. How significant is trade liberalization to the global economy? In what ways are the interests of the three major developed-market-oriented trading areas (the European Economic Community, the United States, and Japan) similar, and in what ways do they differ? Are nontariff barriers considerably more important than tariff barriers, as is often supposed? In disputes over trade policy, how are the interests of the smaller and the larger developed economies best reconciled? How serious is the threat of a global "beggar-my-neighbor" trade war? How are the interests of developing and less-developed countries affected by various liberalization initiatives? Which countries gain

or lose from GATT multilateral tariff reductions? Is the present multilateral framework of the GATT in the global interest, or does it merely serve particular national interests?

All these wide-ranging questions have, implicitly at least, been analyzed for many years in theoretical work. Who gains from protection and how it affects the allocation of resources have long been classic questions in trade theory. In more recent years, theorists have taken up customs-union theory, the analysis of preferential trading arrangements, the relative efficiencies of tariffs, quotas, and other protective devices, and other topics.

However, what strikes someone approaching this literature on international trade with an interest in policy issues is the limited nature of the attempts to apply trade theory to more concrete policy questions. The theoretical work on trade policy often seems to proceed at such a high level of abstraction that it does not offer policy makers guidance on the merits or demerits of alternative actions. Specific statements from models incorporating more of the institutional detail with which policy makers have to live seem to be needed, rather than the general theoretical framework that theorists use to understand the structure of their trade models.

This book is an attempt to meet this need by bridging theory and application in the analysis of global trade policy. The approach is to preserve the spirit of much of the theoretical work on trade policy, but to give particular numerical specifications of policies and economic environments reflecting both the data and the institutional settings relevant to the questions posed above. The models used name the economies as the EEC, the United States, Japan, and so on, rather than just as A and B. Commodities are specified by name, rather than as X and Y. Demand and production functions with particular elasticity specifications based on literature values are used, rather than general theoretic representations. Policy regimes are specified, as far as possible, with realistic data.

Two related empirically based general-equilibrium models of world trade are presented. These are most easily thought of as Heckscher-Ohlin-type theoretical trade models, but with particular functions and parameter values. Although there are departures in these models from a strict Heckscher-Ohlin formulation, the models are "theoretically pure" general-equilibrium structures in the sense that production sets, preferences, and policy regimes are specified for each of a number of regions and full equilibria are computed. As in theoretical models, equilibria are examined in which demand-supply equalities, zero-profit conditions,

and external-sector balance hold, and equilibria are compared under policy changes using welfare criteria similar to those that appear in theoretical work. However, rather than algebraic analysis of the equilibrium behavior of small-scale abstract models, the approach involves numerical analysis of the equilibria of a larger-scale specific model.

As might be expected, there are many difficulties in specifying such models numerically and in interpreting the findings with respect to policy. I emphasize the problems involved in constructing compatible global data sets, in extracting a believable set of trade and other elasticities from the econometric literature, and in allowing for the diversity and complexity of the trade policies currently in place around the world. Equally, the absence of macroeconomic effects (such as unemployment, balance-of-payments difficulties, or inflation), which do not enter traditional general-equilibrium analysis, may make the policy results unattractive to anyone who considers these issues central to an understanding of the current global trade situation.

Even though the sweep of the brush must remain broad, it is my conviction that the calculations I report provide insights into global policy issues that, while perhaps somewhat controversial, are novel and probably not readily obtained in any other way. Theory stresses the effects of changes in trade policy on the terms of trade, an issue virtually neglected in most previous numerical work on trade policy. Here these effects turn out to be significant. Theory stresses welfare criteria as a basis for evaluating policy alternatives in the area of trade. Much of the previous numerical work on trade policy has emphasized other effects, such as impacts on employment or inflation or which industries expand or contract: as a result, it has often seemed remote from the concerns of theorists. Here the criteria for policy evaluation stressed by theory are emphasized. Theory stresses equilibrium as a fundamental solution concept in which external-sector balance holds. The full equilibrium conditions emphasized by theorists are sometimes missing in other trade-policy work, and this makes it difficult for theorists to interpret results from such work. Here, with the emphasis on theoretical purity, it is hoped that the interpretation of results is a little clearer.

One of the models of global trade and domestic production and demand is a four-region model in which the European Economic Community, the United States, Japan, and a residual "Rest of the World" are identified. The other is a seven-region model incorporating the EEC, the United States, Japan, Other Developed Countries, the Organization of Petroleum-

Exporting Countries, Newly Industrialized Countries, and Less-Developed Countries.

The development of these two models reflects an evolutionary process. First the four-region model was constructed to analyze developed-country trade issues, and then this model was expanded in regional content to evaluate trade issues between developed countries and developing countries. The models are distinct, however. The four-region model has more commodity detail; the seven-region model has more flexibility in the way demand-function and production-function substitution possibilities appear. The two models use data for different years. If it seems confusing to be continually referring to two different (though related) models, the reader should keep in mind that each model has features that make it more suitable for the analysis of certain policy issues than the other. One is an outgrowth of the other, and only limits on the availability of resources for modeling have prevented more thorough attempts to ensure complete compatibility between the two.

Each of the models is used to evaluate changes in trade policy and other changes on both a national and a global basis. Using the models, it is possible to analyze which regions of the world gain or lose from changes in their own or their partners' protection policies and to evaluate the potential worldwide gains from alternative trade-liberalization initiatives. Broad issues, such as the impacts of current global trading arrangements on developing countries, can also be analyzed. Narrower questions, such as the effects of using one precise tariff-cutting formula rather than another to guide tariff reductions under the GATT, may also be evaluated.

The institutional framework that provides the setting for the book is that of the global trade arrangements that have been in place since the end of the Second World War. In this period, the main features of global trade policy have been the widespread belief in the desirability of multilateral trade liberalization and the accompanying liberalization that has proceeded through a number of rounds of negotiations among developed countries under the GATT. This framework has produced repeated negotiations covering an ever larger number of developed countries, although within the negotiating group the United States, the EEC, and Japan have been most influential. More recently, issues concerning trade between developed and developing countries have begun to move to the top of the global trade-liberalization agenda, with the current "North-South" discussions at the United Nations and elsewhere providing the main impetus.

The models and computations reported here are offered in the hope

that they contribute to the debate on these issues. Is there a clear global gain from trade liberalization? Who gains and who loses? How important, quantitatively, is the whole process for the global economy?

The modeling effort described here is also part of a wider set of developments since the early 1970s in what has come to be called "applied general-equilibrium analysis."¹ These developments have their origins in the work on general-equilibrium computation by Scarf (1967, 1973). In many of the specialized fields of economics, including international trade, general-equilibrium analysis has long been accepted as the unifying theoretical approach. However, its application to policy issues in other than a qualitative way and for highly simplified models is relatively new. Applied general-equilibrium analysis involves building specific general-equilibrium models, usually for policy analysis, with particular production and demand functions and for a larger number of products than economists usually deal with in diagrammatic analysis. The effort described here represents the extension of these developments into the area of international trade.

The approach here is also similar to the modeling effort of Deardorff and Stern (1979), used in their 1981 evaluation of the Tokyo Round GATT agreement. The Deardorff-Stern model is richer than the models described here in including 18 separate Organization for Economic Cooperation and Development countries and more adequately capturing the impacts of quantity constraints on trade, such as quotas. The models differ in that factor markets do not clear in the Deardorff-Stern model, and thus only an incomplete equilibrium is determined when policies change. A further difference is that exchange rates enter the Deardorff-Stern formulation and appear to have real effects, a feature not typical of traditional general-equilibrium models. There are also similarities between the models described here and the approach used by Cline et al. (1978) in evaluating GATT trade liberalization in the Tokyo Round. Cline et al. incorporate substantially more commodity detail than the present models but use an approach closer to traditional partial-equilibrium analysis.

Applied General-Equilibrium Analysis as a Tool for Policy Appraisal

The set of techniques used in this book to analyze alternative policy initiatives toward global trade liberalization are labeled "applied general-equilibrium analysis." In simple terms, these techniques involve the construction of a numerical general-equilibrium model of world trade,

along with demand, production, and a policy specification in each of the trading regions. The model is then used to simulate behavior in the world economy as trade policies change. A reduction in a tariff alters consumption patterns in the tariff-reducing country so that more imports are bought. This changes relative prices of imports and other goods in the importing country. Exporting countries, however, also experience larger trade volumes and higher prices, which implies that they can buy more imports. This has impacts on resource allocation in the exporting country, and these cause further changes in the global economy. A wide range of interactive effects typically results from changes in trade policy.

General-equilibrium analysis takes explicit account of these interdependencies through the construction of a model in which demands and supplies for each commodity depend on all relative prices in the system. Such a model can be used to examine situations of equilibrium (that is, sets of relative product prices such that all markets in the system clear). In the context of international trade, the countries in the model are identified as market participants, and equilibria change as trade policies are altered. The analysis can be used to assess the impacts of policy changes on trade volumes, whether countries gain or lose from the change, and even which groups within countries gain or lose.

The word “applied” is used to contrast the general-equilibrium analysis used here with theoretical general-equilibrium work in international trade, which usually limits itself to highly simplified assumptions and small dimensions in order to arrive at qualitative statements of conditions under which a country might gain or lose from a given policy change. The latter approach often involves using restrictive assumptions in order to generate unambiguous qualitative conclusions.

In applied general-equilibrium work, the focus of the analysis is on quantitative and not qualitative findings from the modeling effort. Although this does require specific functional forms for demand and production functions along with particular parameter values, the need for extreme simplification to generate qualitative predictions disappears. There is no need to assume identical demand patterns and production structures across countries, as in much of trade theory. Instead, data for the countries being investigated can be used to generate parameter values for the functions representing demand and production patterns in the model. The frequent limitation in trade theory to two goods, two countries, and two factors no longer applies. The constraints on dimensionality become, instead, the ease with which large-dimensional general-equilibrium systems can be solved numerically on the computer and the availability of

reliable data for the parametrization of the model. It is not necessary to assume that other policies do not operate in the economy in analyzing any one policy change. Many policy interventions can be simultaneously incorporated into an applied model, and their compounding or offsetting effects can be captured.

The techniques adopted for this purpose involve counterfactual-equilibrium analysis, the empirical analog of the comparative-static analysis that is common in theoretical work. Counterfactual-equilibrium analysis begins with an assumption that the global economy is in an equilibrium situation in the presence of existing trade policies for some chosen year's data. Data from national and international sources are then arranged in a form such that all the required conditions for a general equilibrium hold. These involve demand-supply equalities for all commodities, zero-profit conditions for industries, and external-sector-balance conditions for each country. These data provide an "observed" or "benchmark" equilibrium data set, which serves as the point of comparison for model simulations of counterfactual-equilibrium situations calculated for any hypothetical policy change or other change in the model.

The benchmark data set also provides the basis for model calibration: the choice of parameter values for the functions in the model consistent with the observed equilibrium. Using these data, one chooses parameter values so that the model will replicate the benchmark equilibrium through a model solution in the case of no policy change. The way this is done depends critically on the functional forms used to represent demand and production. With the constant-elasticity-of-substitution (CES) forms used extensively in the models described below, extraneous elasticities based on literature estimates need to be specified. However, once these elasticities are fully specified through calibration, the model can be solved for an equilibrium for any given policy change, and the counterfactual and observed equilibria can be compared.

Major Trading Areas in the World Economy

This book examines major trading areas in the world economy in two related models. In the four-region model, trade among major developed-country regions is analyzed; in the seven-region model, trade among developed- and developing-country regions appears. As a perspective on the policy analyses that follow, it may help readers to have an overall sense of the trade patterns of these regions.

Table 1.1 gives data on trade flows for each of the three major de-

Table 1.1

Size and regional composition of 1973 merchandise trade for United States, EEC, and Japan.

	U.S.		EEC		Japan	
	Imports	Exports	Imports	Exports	Imports	Exports
Trade category as percentage of GDP	5.4	5.4	8.8	9.4	8.3	8.9
Trade percentage with trading regions						
U.S.	-	-	17.3	15.5	23.7	25.8
EEC	22.4	23.3	-	-	8.2	11.9
Japan	13.6	11.6	4.5	2.7	-	-
Trade percentages with other regions						
Canada	24.4	21.1	3.2	2.3	5.2	2.7
EFTA ^a	3.4	3.1	18.9	25.6	2.0	3.5
Middle East	1.8	3.1	18.9	25.6	14.6	4.3
Asia	9.9	9.3	5.6	5.0	20.3	24.1
Africa	3.1	2.1	11.9	9.4	2.9	6.7
LAFTA ^b	10.8	10.8	5.8	4.8	3.6	4.3
1973 current price						
GDP at market prices	\$1297.5 billion		\$1046.3 billion		\$409.3 billion	

Trade statistics are from *United Nations Yearbook of International Trade Statistics*, 1974, vol. 1, pp. 24-25. Import and export valuations correspond to those used in national merchandise trade statistics. Exports are valued on f.o.b. basis, and imports (except in the case of the United States) on c.i.f. basis.

a. European Free Trade Area (Austria, Faeroe Islands, Finland, Iceland, Norway, Portugal, Sweden, Switzerland).

b. Latin American Free Trade Area (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, Nicaragua).

veloped-country regions appearing in the four-region model (the EEC, the United States, and Japan) for 1973, the year of the model analyses. These regions are identified separately in the model because they are large economies that have each played a major role in trade-liberalization negotiations under the GATT. Table 1.1 indicates that in 1973 trade as a share of economic activity was relatively small in all three regions; 5.4 percent of the gross domestic product (GDP) was traded in the United States, and around 9 percent in both the EEC and Japan. In contrast, the regions themselves comprise a majority of global economic activity in the year. The United States accounted for approximately 25 percent of gross world product in 1973, the EEC approximately 20 percent, and Japan a little under 10 percent.

Even though these large trading regions are the main focus of the analysis in the four-region model, it is important to remember that there are other important trading partners for each of these regions. For instance, a substantial amount of the trade among the member countries of the EEC is lost in the level of aggregation reported in table 1.1. Also, each of the three major trading areas has one (or more) key trading partners outside these three regions that is (are) important for that region but less important for the others. These trading partners provide what might be termed "satellite" trading relationships. For the United States, trade with Canada is as important as trade with the EEC and more important than trade with Japan. For the EEC, trade with other European countries (the Scandinavian countries, Switzerland, Austria, and so on) is as important as trade with the United States and more important than trade with Japan. Similarly, for Japan, trade with other Pacific Basin countries (South Korea, Taiwan, Hong Kong, Singapore) is as important as trade with the United States. For each of the three larger trading areas, trade with the other two is only around 25–30 percent of total trade, and trade with remaining countries constitutes the largest fractions. On the other hand, these important satellite trading partners have relatively little trade with the other two major regions; for example, Canada's trade with the EEC and Japan is substantially smaller than Canada's trade with the United States.

Table 1.2 outlines the main characteristics of 1977 merchandise trade among the regions in the seven-region model used to analyze linkages in trade between developed and less-developed countries (often referred to as "North-South" trade). Included in the Other Developed Countries group are the Soviet Union and the Eastern European states, which trade primarily with each other. The many newly industrialized countries

Table 1.2

Size and regional composition of 1977 world merchandise trade between regions of seven-region model.^a

	EEC	U.S.	Japan	ODCs ^b	OPEC	NICs	LDCs
Size, as represented by region's GNP and trade (\$ billion)							
1977 GNP at factor cost	1,909.9	2,202.5	806.5	2,351.0	256.2	677.3	879.7
Value of 1977 imports	195.7	150.5	71.2	196.7	83.4	62.7	94.1
Value of 1977 exports	212.1	117.7	80.3	163.6	145.2	53.5	82.2
Share of trade between regions							
	" of imports from to	" of exports to	" of imports from to	" of exports to	" of imports from to	" of exports to	" of imports from to
EEC	13.2	16.8	6.6	51.7	42.3	20.9	33.9
U.S.	4.4	21.9	14.6	20.5	16.5	23.3	33.5
Japan	38.8	8.8	23.0	7.9	12.9	16.7	10.6
ODCs	21.6	27.8	34.4	19.3	9.5	13.5	17.2
OPEC	7.6	11.7	32.6	7.2	4.8	20.0	8.1
NICs	14.2	15.1	15.3	9.2	8.0	5.8	2.7
LDCs							

a. The classification of individual countries into these regions is given in chapter 3.

b. Other developed countries.