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STRUCTURAL CHANGE AND PATTERNS
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ABSTRACT

This paper focuses on economists' understanding of the basic determinants of trade patterns and, in particular, on the manner in which these underlying factors change over time and are affected by various policies. A brief survey contrasts the determinants of the structure of trade emphasized by the Ricardian, Heckscher-Ohlin, and imperfect competition models and discusses how well the predictions of these various theories are supported by empirical evidence. The main conclusion of the survey is that trade economists have been reasonably successful in explaining the structure of trade at any point in time but much less successful in understanding how the determinants of the patterns of trade change over time. This inability to explain how the basic determinants of the structure of trade change over time can lead both to poor predictions and bad policy advice.

Given the increased interest in long-term shifts in trading structures, it is argued that trade economists should enlarge their analytical framework by endogenizing to a greater extent the basic economic factors determining these shifts. They must also recognize the endogenous nature of trade policies in their models, if they are to carry out their predictive and evaluative roles in the best possible manner.

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STRUCTURAL CHANGE AND PATTERNS OF INTERNATIONAL TRADE

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I. Introduction

What determines the commodity pattern of trade between countries? Why does one country export textiles and another export wine? This has long been the central question of trade theory.

There seem to be two main reasons why economists are interested in this question, other than a natural curiosity about how economic matters are determined. First, they wish to predict how a country's pattern of trade will change over time in order to give members of the economy the opportunity to take steps to better accommodate to the future. In carrying out this objective, simply collecting evidence on how trade patterns have actually changed over time is not sufficient for extrapolative purposes unless these patterns can be divided into a definite progression of stages. But the "stages" approach has proved to be a notoriously poor predictor of future economic conditions. Consequently, economists try to discover what underlying economic variables may have changed and "caused" changes in variables of interest, such as the structure of trade. Using this information, they develop models that relate changes in basic economic variables to changes in the structure of trade.

Even if economists are able to predict a country's trade pattern, given a particular set of underlying structural variables, this is insufficient for predicting changes in the pattern of trade over time. One must also be able to predict the behavior of the underlying causal variables. In other words, one must have a dynamic theory that explains how the underlying structural causes of trade behave over time and thus how the pattern of trade changes. Unfortunately, a long-standing criticism of international economics has been that, while trade economists have been reasonably successful in explaining trade patterns at a particular point in time given knowledge of the "causal" structural factors, they have done a poor job of explaining how these structural factors themselves change over time and thereby affect the pattern of international trade.

A second reason for the interest of international economists in the determinants of trade is to be able to advise governments how they can influence the economic welfare of particular groups, the nation, or the world as a whole through policy measures that affect trading patterns. What trade measures should be adopted, for example, to raise the income of labor or increase the welfare of the nation as a whole? Thus, trade economists are interested in trade patterns and structural change for normative as well as positive purposes. Satisfactory fulfillment of this normative objective also requires an understanding of how particular policies affect the basic determinants of trade patterns. For example, it may be possible in the short run to increase the

income received by labor by imposing a tax on imports. By adversely affecting the income flow to capitalists, however, this action may also lower the rate of capital accumulation and thereby reduce labor's long-run income.

This paper focuses on economists' understanding of the basic determinants of trade patterns and, in particular, the manner in which these underlying factors change over time and are affected by various policy measures. A brief survey will be presented covering what economists have said about the determinants of the commodity composition of trade and how well their theories have been supported by empirical evidence. Fortunately, Ronald Findlay (1984) has recently written an excellent comprehensive survey of growth and development in trade models that carefully compares the diverse analyses dealing with structural change and international trade.

II. The Ricardian Model

As a prelude to discussing modern trade theory, it is useful to consider the relations between trade and structural change in the model that first set forth in a rigorous manner the basis and benefits of international trade, namely, the model developed by Ricardo in The Principles of Political Economy and Taxation (1817). While Ricardo is best-known for his static theory of comparative costs, his main writings centered on showing how relative prices and the distribution of income changed as the process of economic development occurred in a country. Moreover,

although Ricardo did not do so explicitly, it is quite easy to integrate his static trade theory and his development theory to obtain a dynamic model of structural change and international trade.

The key initiator of growth in the Ricardian model is the capitalist class who, rather than consume most of their income (profits), invest these funds to hire additional labor and thereby expand production. (Landowners and workers, the other two productive factors, consume all of their income.) While this action bids up the wage rate for a given size labor force, it also has the effect of increasing the supply of labor as the wage rises above its "natural" level and death rates are reduced. Increasing the use of labor in the manufacturing sector always increases output in the same proportion, but the application of labor to agricultural production is subject to diminishing marginal productivity because of the fixed supply of high-quality land. Consequently, as capital accumulation takes place (mainly in the form of a larger wages fund), the prices of agricultural products rise relative to manufactured goods (the labor theory of value) and competition for better-quality lands causes an increasing proportion of the output of a given amount of labor employed on high-quality land to be transferred to the landowner in the form of rent. In the agricultural sector, not only is the increased relative value of the output of a given amount of labor on high-quality land absorbed entirely by the landlord but, as in the manufacturing sector, the increased relative cost of

subsistence wages squeezes the profit rate earned by capitalists. Consequently, capital accumulation and population growth tend to decline until a stationary state is reached.

Comparative differences among countries in the labor required to produce agricultural and manufactured goods based on differences in land/labor ratios or in technological knowledge serve as the basis for trade at any point in time. For England, as Ricardo realized, the comparative-cost situation favored exports of manufactured goods and imports of agricultural products. This meant that the stationary state could be postponed by obtaining cheaper food than could be produced at home, thereby raising profit rates. Protection of the agricultural sector (or any other tax that falls directly or indirectly on profits) merely slows growth by raising agricultural prices and relative wages and cutting into profits. Ricardo and other classical writers also recognize in their chapters, "On Colonies," that international capital flows aimed at providing infrastructure investment in transport facilities in land-abundant countries can bring about even lower agricultural prices.

The process of structural change for a country like England is, for Ricardo, one of capital accumulation and population growth accompanied by a relative increase in manufacturing production and an increase in the proportion of the country's agricultural needs being met by imports. Ricardo was, however, unable to convince himself that this process could continue

indefinitely and thus he predicted that the stationary state was inevitable at some point in time.

The Ricardian model is useful to review not because of the accuracy of its static and dynamic predictions about trade patterns but because it is an illustration of a complete model of structural change and trade patterns that explains why and how the structural factors change over time and how these changes affect the pattern of trade. Indeed, while the results of predicting trade patterns on the basis of relative labor productivities support Ricardo's static trade theory (though, as Deardorff (1984) points out, they can also be expected in the Heckscher-Ohlin model), Ricardo's long-run predictions have proved so contrary to casual historical observation that they are discussed mainly for their importance in the development of economic thought.

III. The Heckscher-Ohlin Model

The core of modern trade theory is the Heckscher-Ohlin model, a framework that relates intercountry differences in comparative costs to differences in relative factor endowments. The basic theorem states that countries tend to export those goods that use relatively intensively their relatively abundant factors.

Although there has been recent discussion of the extent to which the many empirical analyses of trading patterns in the Heckscher-Ohlin framework constitute rigorous tests of the pure

model, there seems to be an abundance of empirical support for the importance of relative factor endowments in explaining the commodity structure of trade. The recent study by Leamer (1984), in which he regressed the net exports of each of 10 aggregate commodities for 60 countries on measures of the relative supplies of 11 factors of production for these countries, is the most comprehensive analysis of this relationship. On the basis of his painstaking measurement efforts and careful econometric analysis, Leamer concludes that "the main currents of international trade are well understood in terms of the abundance of a remarkably limited list of resources" and that, in this sense, "the Heckscher-Ohlin theory comes out looking rather well" (Leamer, 1984, p. xvi).

If relative factor endowments are a reasonably good explanatory variable for the intercountry commodity structure of trade at any point in time, an understanding of how factor supplies change over time should provide an adequate explanation of how this trade structure changes over time. Modern trade economists have generally not pursued the issue of the causes of changes in factor endowments, however. In their comparative static and dynamic analyses they assume the existence of intercountry differences in such endowment-related variables as savings propensities, growth rates of population, and rates of foreign investment and then trace the effects of these differences on trade and growth patterns.

Like economists in other specialized fields of economics,

trade economists have tended to leave the study of changes in factor endowments to growth and development economists, presumably because they believe changes in factor endowments are more directly related to changes in income than to shifts in trade patterns. Unfortunately, neither economists who have analyzed the growth process in advanced countries nor those who have been interested in explaining the development process in the poorer nations have been particularly successful in explaining changes in factor endowments. While they have discovered that changes in endowment-related variables such as relative expenditures on education and a country's propensity to save are related to levels of income (see, for example, Chenery and Syrquin, 1975), development economists have yet to understand very well the complex interactions between income growth and increases in factor supplies. Just as international economists have been quite successful in accounting for those factors that affect intercountry differences in trade patterns, growth and development economists have been quite successful in accounting for the sources of growth. But, like trade economists, they have not been successful in ascertaining how the determinants of the relationship in which they are interested change over time.

With only a crude understanding of the factors that affect how relative factor endowments shift over time, trade economists utilizing the Heckscher-Ohlin model are limited mainly to investigating the effects of autonomous changes in factor endowments on trading patterns. Fortunately, this has still

proved to be a useful activity, both because observed trends in factor endowment changes usually continue for some period of time and because shifts in trade patterns seem to respond slowly to these endowment changes. But one is restricted to relatively short-run predictions and even these can be far off the mark when there are significant changes in factor conditions.

One important question that has been investigated using computable general equilibrium models based on the Heckscher-Ohlin framework of fixed factor endowments is the effect of existing tariffs and nontariff trade barriers on the structure of trade and world welfare. Deardorff and Stern (1983), for example, estimate that the elimination of all tariffs in the industrialized countries would increase exports by \$29 billion or by about 3.9% and raise world welfare by \$619 million or 1/100 of one percent. Whalley (1985) places the gain in world welfare resulting from the abolition of all forms of protection by the developed countries at \$28 billion or about 4/10 of one percent of world income. (He does not present figures on the estimated change in the volume of trade.)

While the large absolute magnitude of these estimated trade and welfare changes suggest that efforts by governments to obtain these gains are very worthwhile in benefit/cost terms, the small percentage changes in welfare seem to indicate that existing distortionary trade policies do not have a significant adverse effect on world real income. This conclusion contrasts sharply with the historical experience of both developing and developed

countries in the last 40 years. There is an abundance of evidence, especially for the developing countries, indicating that countries that have pursued liberal trade and exchange-rate policies have grown significantly faster than those that have favored restrictive, inward-looking trade and exchange-rate measures. The failure of existing trade models to capture these real world effects of trade policies appears to be due to failure of these models to take account of how trade policies affect changes in factor endowments and other basic determinants of growth rates.

Without an adequate understanding of the feedback of policy-induced, short-run changes in the structure of trade on the underlying determinants of this structure, economists are in danger of recommending policies that reduce a country's economic welfare in the long run. There is considerable evidence, for example, that most trade economists' recommendation to developing countries after World War II to impose import protection to stimulate the development of domestic manufacturing proved to be counter-productive because of the adverse long-run consequences of import substitution on basic factor conditions.

While the lack of understanding of traditional economic relationships between public policies and factor endowments is a likely cause of the bad advice economists have sometimes offered, so too is a lack of understanding of the political processes by which public decisions are reached in democracies. Too often economists assume that public officials are able to promote the

same national welfare goals in which economists are interested rather than recognizing that these officials are often constrained by the self-interests of various pressure groups upon whom they must rely for political support.

IV. Technology, Imperfect Competition, and Increasing Returns

Although the Heckscher-Ohlin model performs reasonably well in explaining commodity trading patterns, the restrictiveness of some of its assumptions suggests that the introduction of other variables besides relative factor endowments could improve its empirical performance. For example, the assumption of identical production functions among countries for all industries is difficult to accept in view of the observed unevenness in the sources of technological change coupled with the lack of perfect international movement of technological knowledge due to the patent system and other barriers to knowledge transfer. Casual observation suggests that the unique technological knowledge possessed by some countries is the source of their comparative advantage in certain industries. Similarly, the assumptions of perfect competition and constant returns to scale have also long made trade economists uneasy about the Heckscher-Ohlin model, since again casual observation seems to suggest an explanatory role for imperfect competition and increasing returns to scale. For example, instead of the volume of trade decreasing as the endowments of the industrial countries became more similar, as the Heckscher-Ohlin theory predicts, trade among these countries

has increased in relative importance, especially for differentiated manufactured products.

Posner (1961) and Vernon (1966) are perhaps the best-known modern economists who have stressed the importance of differences in technological knowledge in accounting for the intercountry commodity pattern of trade. Both emphasize that new technology is constantly being created and older technology transferred among countries, thus yielding at any point in time differences among countries in production functions as a source of variations in trading patterns. However, other than some discussion of the influence of income-level-related differences in demand and relative factor prices on the commodity composition of technological progress (a relationship that could be combined with the standard analysis of the effects of various factor-saving forms of technological progress to develop a dynamic theory of the behavior of a country's trading pattern), they do not explain what determines intercountry differences in the rate and nature of technological progress.

The existence of a series of orderly steps in the transfer of technology across countries (Vernon's product cycle) may enable economists to predict the ultimate trade-pattern effects of given technological changes, but the apparent jumps in the traditional sequence of steps evident in the experience of some of the newly industrialized countries suggest the need for considerable caution in using a stages approach to predict the trade consequences of known technological changes. And, of

course, the problem emphasized in discussing the Heckscher-Ohlin model still exists, namely, an inability to explain satisfactorily the causes and nature of technological progress in the long term and the manner in which public measures aimed at promoting technological change affect other basic determinants of income and the structure of trade.

Undoubtedly, the most active area of trade theory at the present time is the introduction of imperfect competition and increasing returns to scale into trade models. Initially, modern interest in imperfect competition arose because of the desire to explain the growing volume of intraindustry trade, while interest in increasing returns stemmed mainly from the belief that this factor as well as intercountry differences in technology was a needed modification to the Heckscher-Ohlin framework. However, there is a growing belief by some trade theorists, such as Helpman and Krugman (1985), that the explanatory power derived from introducing imperfect competition and increasing returns ranks in importance with relative factor endowments, especially for trade in manufactured goods. This new approach offers rich, as yet unexploited, opportunities for important empirical research.

In some ways trade models with imperfect competition are even more deficient in their dynamic implications than the Heckscher-Ohlin model. In models where differentiated products are introduced, for example, the question of which country produces a particular variety of a product is indeterminate.

Consequently, this particular feature of the commodity structure of trade is not explained in either a static or dynamic framework nor is attention given to how the set of possible product varieties changes over time. In oligopolistic models with homogeneous products and identical tastes across countries, the direction of trade no longer depends only on the conventional supply-oriented determinants of comparative advantage but also on such factors as the relative market sizes of the countries and the number of firms producing each product. However, these variables are generally not, in turn, made endogenous in a broader theory explaining the behavior of trading patterns over time. Consequently, as trade economists improve upon their explanations of the determinants of the structure of trade at any point in time, the inadequacy of trade theory from a general dynamic perspective becomes more apparent.

V. The Need for a Broader Framework for International Economics

As the preceding brief survey of trade theories and tests of these theories indicates, modern international economics is quite weak in explaining how the structure of trade changes over time. The basic determinants of the nature of this structure at any point in time have been identified reasonably well, but the manner in which these basic factors behave over time has not received much attention by trade theorists. Typically, comparative static or dynamic analyses assume an exogenous change in an underlying factor such as the capital stock, technology, or

consumer preferences and then trace the effects of this change on the pattern of trade and other variables of interest, such as factor returns.

This procedure can lead both to poor predictions and bad policy advice. If, for example, an increase in the physical stock of capital has effects on trade patterns and income which in turn affect the magnitude of the capital stock (either by their effects on savings and investment or on the propensity to save) and other basic determinants of the structure of trade, the usual analytical approach is inappropriate for predicting the behavior of the structure of trade. Furthermore, post-World War II economic history strongly supports the view that the nature of the policies adopted for the purpose of increasing basic factor endowments has significant effects on the rate of economic development. Since economists generally do not include such effects in their models, the advice they provide about how factor supplies can best be increased may be poor. Of course, it can be argued that feedback effects can be ignored for short-term predictions. But, as we have learned from modern macroeconomic analysis, expectations about the future are likely to influence the current behavior of economic agents so that to ignore these feedbacks also leads to an improper analysis of short-run effects.

In view of the difficult structural problems faced by the industrialized countries of Europe and North America coupled with the rapidly changing trade patterns of Japan and many developing

countries, trade economists are being called upon to an increasing extent to predict the long-run implications of these conditions on the trading structure of individual countries and the world as a whole. Trade economists pride themselves on analyzing issues within a general equilibrium framework. Moreover, they have done much in recent years to counter the criticism that trade theory is too static. But to respond to some of the most politically important issues of the present time, they must enlarge their dynamic general equilibrium framework by endogenizing to a greater extent the basic economic factors that determine the structure of trade.

To meet this challenge, more trade economists must undertake research on subjects traditionally studied mainly by growth and development economists and economic historians and by scholars in other disciplines. While there is a group of trade/development economists who have moved somewhat in this direction, it is much too small to deal adequately with the important issues at hand. More specifically, we must try to understand better the determinants of the rate of accumulation of both physical and human capital, the rate of population growth, the rate of utilization of natural resources, the extent of entrepreneurial vigor, the structure of markets, taste changes, and the rate, nature, and diffusion of technological knowledge. These are enormously complex relationships and progress made over the last 40 years in understanding them has been disappointing. But greater consideration of these matters is necessary if the

analysis of trade economists is to be useful for dealing with the major trade issues of the times.

Economists (international and otherwise) also need to devote more attention to the political economy aspects of their areas of specialization. The key idea in the political economy field is that public policies are endogenous rather than exogenous variables. There are both good positive and normative reasons for widening the framework of analysis to recognize that measures such as tariffs or quotas are the outcome of a balance of lobbying activities between those who benefit from such measures and those who lose. For example, predictions of what will happen to particular economic variables when actions by public officials are involved are likely to be incorrect without an understanding of the political and economic pressures under which public policy decisions are made.

The Multi-Fiber Arrangement provides a good illustration of how the actual economic outcome of a policy action can differ widely from what the traditional model might lead economists to expect. The argument for protection of the textiles industry in the early 1960s was that the industry needed "some breathing space" for a short period so it could secure sufficient profits to purchase modern capital equipment to make the industry internationally competitive again. Yet we have seen that public officials in the industrialized countries have been subject to such strong political pressures from workers and management in the industry that they have been required to continue protection

at increasingly restrictive levels. Those who thought protection could be imposed only temporarily were proved to be very wrong in their predictions. Modern political economy analysis suggests that what actually happened should not have been unexpected and might have been avoided if assistance to the industry had been rendered in a different form.

The normative grounds for viewing public policy matters in political economy terms are equally important. Lobbying for public measures such as tariffs that increase the profits of domestic firms is perfectly consistent with the rational behavior that economists assume firms follow in seeking to increase their profits through the production of goods and services. Furthermore, lobbying activities involve costs, as does the production of goods. Consequently, in assessing the welfare effects of a particular public policy, economists should take into account the value of the real resources expended in the lobbying activities associated with the introduction and continuation of the policy. As Bhagwati (1980) has demonstrated, national welfare may be either greater or less when the resources used in implementing a welfare-distorting public measure are taken into consideration. But the main point economists should recognize is that particular public policies are introduced and maintained as the result of a complex lobbying process and that they must include these activities in their analytical framework in order to carry out their predictive and evaluative roles in the best possible manner.

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