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AN ANALYTICAL SURVEY OF FORMAL AND INFORMAL BARRIERS TO INTERNATIONAL TRADE AND INVESTMENT IN THE UNITED STATES, CANADA, AND JAPAN

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I. Introduction

The purpose of our paper is to assess the role of formal and especially informal barriers in the trade and investment relations of the United States, Canada, and Japan. There has been heightened interest in this issue lately as the result of the very substantial merchandise trade deficit that the United States has been experiencing both overall and with respect to its major trading partners. Japan has been singled out in particular for maintaining a variety of practices and policies that both limit the access of foreign goods to and direct investment in its markets and confer special benefits to its export industries. Similar, although somewhat muted, allegations have at times been directed against certain Canadian policies and administrative procedures deemed detrimental to U.S. interests. For its part, the United States has not been immune from criticism by its major trading partners who have felt aggrieved especially by the increase in administered protection in the guise of antidumping and countervailing actions and the constant pressures to reduce their exports to the United States on a "voluntary" basis.

In order to place formal and informal barriers in perspective, we provide in Section II a list of the major categories of nontariff measures and related policies of governments that are widely observed. We then attempt to draw distinctions between formal and informal barriers and discuss the underlying rationale and possible consequences of differences in informal barriers among countries. We next provide a brief account of the evidence pertaining to formal barriers for the United States, Canada, and

Japan, including post-Tokyo Round (1987) tariffs, coverage indexes and ad valorem equivalents of nontariff barriers (NTBs), and restrictions affecting foreign direct investment. Finally, we consider evidence relating to the major informal barriers that have been identified for the three nations.

In Section III, we first discuss the important conceptual issues involved in measuring the effects of formal and informal barriers. A distinction is drawn here between effects that are specific to particular kinds of NTBs as compared to the general effects of an entire complex of NTBs. Informal barriers fit into this latter category. We then address the question of what is the appropriate analytical framework to use in estimating the effects of barriers to trade. Thereafter, we review and assess the major empirical efforts that have been undertaken to estimate the extent to which Japan's formal and informal trade barriers set it apart from the United States, Canada, and other major countries, and we offer some new results as well. Lastly, we comment briefly on the effects of restrictions on foreign direct investment. Our conclusions and implications for research and policy are contained in Section IV.

II. Formal and Informal Barriers to International Trade and Investment

It is useful to begin by considering what is meant by formal and informal barriers. Formal barriers can be defined as tariffs and nontariff measures that are stated explicitly in official legislation or governmental mandates. Informal barriers refer to impediments arising from: (1) administrative procedures and unpublished government regulations and policies; (2) market structure; and (3) political, social, and cultural institutions. The impediments associated with informal barriers may be the result of a conscious effort by government to favor domestic over foreign interests or the byproduct of practices and policies that are rooted in domestic institutions.

(1) Administrative procedures and government regulations and policies —A list and brief description of the most important nontariff measures in current use are given in

Table 1.[1] While many of the measures listed can be considered to represent formal barriers, the procedures employed to administer the barriers could in themselves constitute an additional impediment. Thus, for example, discretionary licensing could be used in implementing import quotas or export restraints. Customs procedures may rely on specially constructed measures of price for valuation purposes and involve costly administrative methods in order to favor domestic producers. Standards, testing, and certification requirements may also be designed and administered for the benefit of domestic producers. A final example is that antidumping, countervailing duty, and other types of investigation of alleged unfair trade actions may be used to foster a climate of uncertainty for foreign suppliers and as a method of harassment designed to bring about changes in foreign trading practices and policies.

Government regulations and policies may result in a variety of impediments to trade and investment, depending upon their intent and the structural changes and behavioral responses that are induced. The pervasive role of government in economic activity in many countries suggests that it will often be possible to find examples of impediments that may be associated with each of the government policies listed in part III of Table 1. As already mentioned, governments may actively institute measures designed explicitly to benefit domestic producing interests, and there may also be significant external consequences of measures that are intended ostensibly to achieve domestic objectives.

These kinds of policies can and have been addressed in multilateral fora. Thus, it is especially noteworthy in this connection that, in the course of the Tokyo Round negotiations that were concluded in 1979, a number of the most important nontariff interventions were addressed. Agreement was reached to establish codes dealing with antidumping, subsidies and countervailing duties, government procurement, standards, customs valuation, and import licensing. These GATT codes were intended to increase the

transparency and international harmonization of nontariff measures and to reduce the distortionary effects involved.

In their assessment of the GATT codes, Stern, Jackson, and Hoekman (1987) concluded that there have been: (1) noteworthy improvements in the transparency and functioning of antidumping procedures in the signatory countries; (2) some progress in improving the information and bidding procedures relating to government procurement; (3) improvements in the exchange of information, harmonization, and limitations on the discriminatory use of standards; and (4) substantial progress in curbing the use of arbitrary customs valuation methods. There has been less satisfaction with the code relating to subsidies and countervailing duties, but, as Stern et al. note, this reflects disagreements over the wording and interpretation of the code and problems in resolving disputes over agricultural subsidies. It also appears that the government procurement code has had less commercial impact than anticipated.

While there have been important benefits from the GATT codes, there are numerous issues that have yet to be resolved, including: (1) limited membership of developing countries in most of the codes; (2) ambiguities in the design and interpretation especially of the subsidies code; (3) somewhat restricted entity coverage of the procurement code; and (4) difficulties at times in detecting code violations and initiating ameliorative actions. It should also be noted that no agreement on an acceptable safeguards code could be reached in the Tokyo Round negotiations. The experiences with the Tokyo Round codes and current interest in issues such as intellectual property, investment requirements, and restrictions on international transactions in services suggest that both formal and informal barriers arising from government regulations and policies will continue to be of concern.

(2) Market structure — Differences in market structure among nations are often perceived as resulting in impediments to trade and investment. While there may be grounds for such perceptions, it is important to understand what are the determinants of market structure in given circumstances. Again, governmental policies may be important.

Thus, for example, nations may differ in the extent to which they rely on public ownership, monopolization, and the regulation of economic activity. Given these differences, there are bound to be difficulties when national policies impinge on the interests of foreign producers. The issue here is closely tied in with national sovereignty and the domestic objectives that governments believe that they have the right to pursue. Many government policies no doubt result in substantial social costs domestically, and there may be significant potential for an improvement in welfare if existing policies can be liberalized or eliminated altogether. The recent experiences with deregulation in a number of countries suggest that governments have become increasingly cognizant of the significant benefits to be obtained by reducing or removing their intervention. At the same time, these changes may be beneficial to foreign producing interests. Granting all of this, it remains the case nonetheless that governments will continue to pursue (sometimes costly) domestic policies that are believed to be in the national interest. At the same time, other countries may view these policies as detrimental to the initiating country as well as to themselves. The question then is how to address these difficult issues that are so closely tied to national sovereignty. The GATT codes mentioned above are an important beginning, and perhaps more can be accomplished in future negotiations under GATT auspices and possibly in deliberations in the OECD as well.

In addition to the points just stressed relating to how market structure may be shaped by different types of government policy, we should note the important role that may be played by competition or antitrust policies designed to affect the organization and behavior of private business firms. Governments obviously may differ in the extent to which they actively pursue policies to promote competition or condone collusive market structures. Restrictive business practices have been a matter of international concern for a long period of time. Beginning in 1948 with the Havana Charter proposal for an International Trade Organization and more recently with the adoption of OECD antitrust guidelines in the late 1970s and United Nations principles and rules in 1980, efforts have

been made to devise codes of conduct designed to minimize the detrimental effects of restrictive business practices. But in contrast to the aforementioned GATT codes, the codes relating to restrictive business practices are advisory rather than binding, and as Davidow (1984, p. 119) has noted, "major controversies remain ... and implementation procedures are still in their infancy."

Since the monitoring and regulation of restrictive business practices are therefore matters of national policy, differences in competition policies might constitute an important informal barrier to trade and investment. As with other government policies, there may be substantial benefits from more active pursuit of policies to foster competition. Both the domestic economy and other countries may benefit if market access is improved. It may be important accordingly to seek international cooperation in developing guidelines and procedures to deal with the trade distorting effects of restrictive business practices.

(3) Institutional factors — A final consideration has to do with whether differences in political, social, and cultural institutions should be viewed as constituting informal barriers to trade and investment. In a federal system, for example, the locus of economic policies may vary considerably among the central government, states or provinces, and local government. In the United States, state governments are generally not permitted to institute policies that are at variance with those of the federal government. However, conformity may not always be achieved, as witnessed by the preferential procurement policies that some states have attempted to follow and the current dispute over the unitary taxation of multinational corporations. Similarly in Canada, the provinces have their own procurement policies, and there is the unusual practice that permits provincial ownership of natural resources.[2]

Nations may differ markedly in terms of their social and cultural institutions and in the policies that governments believe to be in the national interest. Thus, for example, countries may have different policies affecting the availability of residential housing and land, which could in turn have a significant impact on private savings behavior and on a

nation's current account. To the extent that such effects may be operative between the United States and Japan, this has led some U.S. government officials to urge the Japanese to adopt policies designed to reduce Japanese savings and increase consumption, thereby hopefully reducing pressure on the U.S. current account. Nations may also institute policies designed to enhance their cultural identity and values. Cases in point would be Canadian policies intended to promote the domestic media and film industries. A further issue is that consumer tastes and spending habits will be conditioned by the domestic social and cultural environment, and there may well be a reluctance to purchase foreign products that are considered inferior to their domestic counterparts. The question here is whether national differences in consumer behavior should be considered as an informal barrier to trade. Finally, it should be noted that many nations restrict foreign investment in certain sensitive industries on national defense or cultural grounds or to maintain macroeconomic control over their economy. To the extent that these issues are of legitimate national concern, it is not evident that they should be considered as informal barriers.

It seems clear from our discussion that administrative procedures could be designed and implemented for protectionist purposes. The same is true for a variety of government regulations and policies, except that in these circumstances domestic objectives could be overriding. Impediments to trade and investment may arise from national differences in market structure, which in turn often are conditioned by government policies. Sovereignty considerations thus enter again, but the domestic costs of intervention measures may provide an incentive to reduce or eliminate the intervention altogether. Finally, while social and cultural institutions condition consumer behavior and there may well be some hesitancy in purchasing foreign goods, it is far from obvious that the institutions constitute an informal barrier to trade and investment. This may be the case as well for certain investment restrictions.

Up to this point, our discussion has been rather general. Let us now then consider the available information on formal and informal barriers for the United States, Japan, and Canada in order to put the discussion in perspective.

Evidence on Formal Barriers

We can look first at the evidence on post-Tokyo Round (1987) nominal tariffs indicated in Table 2. These are the tariff rates that were negotiated in the Tokyo Round, which was concluded in 1979. The reductions in the pre-Tokyo Round tariffs were phased in beginning in 1980, and the rates in Table 2 became fully effective as of January 1, 1987.[3] It can be seen in Table 2 that Japan's overall weighted-average tariff rate is 6.2% while the rates for the United States and Canada are 3.3% and 4.6%, respectively.[4] The sectoral breakdown in Table 2 is based on the International Standard Industrial Classification (ISIC). The highest tariff rates for the United States are in wearing apparel (22.7%), textiles (9.2%), footwear (8.8%), and glass and glass products (6.2%). The highest rates for Canada are in wearing apparel (24.2%), footwear (21.9%), textiles (16.7%), and furniture and fixtures (14.3%). For Japan, the highest rates are in food and kindred products (28.5%), agricultural products (21.8%), footwear (15.7%), and wearing apparel (13.9%). Aside from Japan's relatively high tariffs on food and agricultural products, the three countries share in common relatively high tariff rates on labor-intensive consumer goods while their tariffs on semimanufactures and durable manufactures are relatively low.

Evidence on existing NTBs is unfortunately rather more difficult to obtain. UNCTAD has compiled an inventory of NTBs for the major industrialized countries which can be used to calculate indexes of the trade coverage of NTBs. These indexes reflect the degree to which imports are subject to nontariff restrictions,[5] with a value of 100% indicating that all trade in a given sector/country was covered by NTBs and 0% denoting that no NTBs were present. The extent of NTB coverage for sixteen major industrialized countries is given in Table 3, using 1983 own-country imports for weighting purposes. For

all products, Japan was clearly at the low end of the spectrum in terms of formal NTBs while the United States was among the highest of the countries shown. But when fuels are excluded, Japan and the United States appear roughly comparable. If we consider the individual sectors, Japan has a higher degree of NTB coverage than the United States in agricultural products and footwear while the opposite is the case in textiles, iron and steel, electric machinery, and vehicles. Canada is not included in the industrialized countries listed in Table 3 so that it is not clear how it would rank in terms of its NTB coverage.

The NTB coverage indexes have the important drawback that they do not measure how restrictive the measures are in terms of their impact on trade. For this purpose, what is needed are the price-increasing or quantity-reducing effects of the NTBs. Some estimates of the former type measured in terms of the NTB ad valorem equivalents by sector are given in Deardorff and Stern (1987) for the major industrialized countries and are summarized in Table 4.[6] The largest ad valorem equivalents for Japan are in agricultural products, food and kindred products, textiles and wearing apparel, and footwear. For the United States, the largest ad valorem equivalents apply to printing and publishing, food and kindred products, textiles and wearing apparel, iron and steel, and transport equipment. For Canada, the largest ad valorem equivalents are in wearing apparel and textiles, footwear, food and kindred products, and transport equipment. The fact that Japan's overall weighted average ad valorem equivalent is 8.2% reflects the concentration of its formal NTBs in agricultural and food products.

It is of interest, finally, to consider the existing formal restrictions that apply to inward foreign direct investment in each of our three countries. For the United States, there are federal and state regulations that prohibit or limit foreign investment in certain specified industries. Some details on these regulations are given in Appendix Table 1. It is evident that a number of the federal restrictions are in sectors or activities that involve U.S. concerns with national security while there are some state regulations affecting foreign investment in banking, real estate, and insurance. It is admittedly difficult to

determine the impact of these various regulations, but experience suggests that the effects are limited and that the United States appears on the whole to be quite liberal as far as inward foreign investment is concerned.[7] However, some observers have argued that U.S. securities regulations, antitrust policies, and the extraterritorial interpretation of U.S. laws possibly constitute important informal barriers to foreign investment.

Throughout most of the postwar period, Japan maintained numerous restrictions on foreign direct investment. By 1976, however, foreign direct investment had been liberalized in virtually all nonfinancial sectors. With the amendment of the Foreign Exchange and Foreign Control Law, in December 1980 an automatic approval system, which nonetheless required administrative review, was changed to a prior notification system. Under Article 3 of the OECD Code of Liberalization of Capital Movements to which Japan adheres, on being notified, the Ministry of Finance and other relevant ministries may recommend against foreign investment in industries necessary for defense and maintenance of social order. In Japan, this has been understood to include industries producing aircraft, weapons, explosives, gunpowder, atomic power, aerospace, narcotics and vaccines.[8] Under its adherence to the OECD Code, Japan also reserved its right to restrict foreign investment in agriculture, forestry, fisheries, mining, petroleum and hides. It is also possible that Japan will restrict foreign investment being undertaken by a national or company from a country without treaties or reciprocity for Japanese investments.

Foreign investment, as well as domestic investment, is completely prohibited in Japanese industries which are treated as government monopolies or are otherwise reserved for public corporations. Such industries have included water supply, postal services, telecommunication services, tobacco, industrial alcohol, and salt. As part of Japan's administrative reform program during the 1980s, telecommunication services, tobacco, and some parts of postal services have been deregulated and the public

corporations and other agencies producing these services have been privatized. Substantial foreign investment in at least some of these industries is expected in the future.[9]

The May 1984 Yen-Dollar Agreement provided for the opening of Japanese financial markets to greater competition.[10] Thus far foreign firms have been permitted to participate in trust banking, securities trading, and off-shore banking as well as in insurance and leasing. These recent changes have resulted in large new investments by foreign financial firms.

Despite the substantial changes that have taken place in Japan's statutory framework and in individual provisions governing foreign investment, many foreign observers question the extent of these changes. For example, as Henderson (1986, p. 143) has noted: "... liberalization there has been, but not to open competitive opportunities where it has made real differences to inward transactions in significant Japanese markets, such as the markets that Japanese have come to share in the United States."

In Canada, there are some statutory restrictions that apply to foreign ownership of capital in certain industries. According to Price Waterhouse (1983a), a license to operate a broadcasting station or to operate a network of stations can only be granted to a Canadian citizen or to a corporation that is 80 percent owned or controlled by Canadians. There are also limitations on the percentage of shares that nonresidents may hold in Canadian chartered banks and companies engaged in life insurance, sales finance, or trusts. While there appear to be comparatively few explicit restrictions on foreign investment in Canada and there are no industries that are specifically closed to private enterprise, including foreign investors, it is well known that there was a concerted effort beginning in the early 1970s to screen new investments by means of the Foreign Investment Review Act (FIRA) and in 1980 to increase Canadian ownership and control of its energy industry. These federal policies have been significantly altered in recent years, although, as will be noted below, there are still some sectors in which foreign ownership

and control are subject to restriction. Also, provincial policies may impinge at times on the investment activities of foreign companies.

Evidence on Informal Barriers

In contrast to tariffs and explicit NTBs, there is no unambiguous way to identify informal barriers. What constitutes an informal barrier will be a matter of perception and judgment on the part of firms and governments who believe that their economic interests are being affected adversely by the policies and practices of other countries. Informal barriers can thus be identified presumably on the basis of complaints by the affected parties. The difficulty here of course is to determine if the complaints are valid and how important empirically the economic effects of the alleged informal barriers may be.

In Section 303 of the U.S. Trade and Tariff Act of 1984, the Office of the U.S. Trade Representative (USTR) is directed to submit an annual report on significant foreign barriers affecting goods, services, investment, and intellectual property.[11] It is interesting to consider the specific foreign barriers that the USTR has identified in the cases of Canada and Japan. These are listed in Appendix Tables 2 and 3. Note that the tables include such formal barriers as Canada's relatively high tariffs on manufactures and certain relatively high Japanese tariffs and restrictive quotas on agricultural products and raw materials. As far as the informal barriers in Canada are concerned, they relate especially to federal government policies and procedures involving procurement, freight subsidies, lack of copyright protection for retransmission of broadcast signals, compulsory licensing of pharmaceuticals, the protection of culturally sensitive industries, restrictions on foreign data processing, and encouragement of domestic energy ownership and development. In addition, there are barriers arising from provincial policies and institutions, including provincial liquor boards, procurement, and trucking. It is interesting that provincial resource policies are not listed, especially in the light of the 1986 U.S. action to countervail against the alleged subsidy arising from the softwood-lumber stumpage policies of the major lumber-producing provinces.

As for Japan, it has been singled out for many years, especially by U.S. Government officials, as the leading example of a nation that maintains an endless variety of informal barriers. The United States has been involved with Japan for some time now in efforts to improve access to the Japanese market. Thus, in several instances recent changes have been made in Japanese policies, and these new policies are now being monitored by the United States with regard to their effectiveness in compliance with the GATT codes. This is especially the case for certain items listed under standards, testing, labeling, and certification and government procurement. Nonetheless, there are a variety of other administrative barriers and preferences noted, as, for example, in aluminum fabricating, fish products, the lack of protection of intellectual property, bidding on construction projects, and approval of the introduction of new consumer products. Japanese business practices are listed as a barrier in the case of soda ash. Finally, the regulations restricting the establishment of large scale retail stores call attention to the way in which the organization of Japan's distribution system may serve to reinforce the importance of smaller firms and foster a less efficient system of distribution.

It is of some interest to compare the 1986 USTR list of Japanese barriers with some other recent compilations that have appeared in the literature. Thus, for example, Christelow (1985/86) identifies Japanese restrictive product standards and related inspection and certification procedures, the wholesale and retail distribution systems, and government procurement procedures as the major intangible barriers to imports. Bergsten and Cline (1987, esp. pp. 63–71) include government procurement, regulation, oligopoly behavior, industrial targeting, certain cultural attributes, and the retail distribution system. Rapp (1986) and Balassa (1986) have the most exhaustive list of informal barriers. Between them, they include: administrative guidance; customs procedures; standards, testing, and certification requirements; procurement; regulations concerning intellectual property; distribution channels; academic discounts; policies for the defense of depressed industries; and policies for the promotion of high technology industries.

Presumably many of the informal barriers described by Rapp and Balassa would cover both trade and foreign direct investment, although in several instances their examples appear to be outdated.

Having set forth rather imposing lists of informal barriers for Canada and Japan, it seems natural to inquire about the informal barriers that may exist in the United States. While the USTR (1986, p. 2) admits that all nations have trade barriers, including the United States, they do not provide a list of the U.S. barriers. But such a list has been compiled by the European Community (1987), using a format similar to the one followed by the USTR. The main U.S. barriers are listed in Appendix Table 4. They include such formal barriers as relatively high tariff rates on selected manufactures, customs fees, differential import taxes, and agricultural import quotas. Informal barriers include procedures for administering certain import quotas and restraints on foreign exporters, implementation of testing and inspection requirements for selected products, some particular procedures involving government procurement, a variety of export and domestic subsidies, government funded R&D, procedures for approving foreign patents, administration of U.S. trade laws, repair servicing, and state tax preferences and policies.

While it is not clear whether this list of U.S. barriers covers all of the items of concern to Canadian and Japanese interests, it may nonetheless call attention to the most obvious barriers. This is especially true with respect to the U.S. system of administered protection. We have already noted that there are established procedures in U.S. trade law to enter complaints over such alleged foreign unfair trading practices as dumping, subsidies, and other foreign government policies to limit market access or promote exports. While the procedures for investigating these complaints are on the whole quite explicit, it can be argued that the ease with which an action can be brought may introduce an important element of uncertainty and even harassment of foreign export interests and thus represent an informal barrier. Furthermore, there is evidence that the complaint and investigative process may become politicized, with protectionist measures taken by the

President even though prior investigation may have found little or no evidence to support the complaints of unfair trade practices. Some examples that come to mind here include the U.S. voluntary export restraints on automobiles from Japan, steel from a variety of countries, and the countervailing duty imposed on imports of Canadian softwood lumber.

It might be argued, furthermore, that there are many U.S. government programs and policies that provide special advantages to American firms. Some information is given in Appendix Table 5 on projected expenditures for U.S. industrial support programs for 1984. These involve direct expenditures, the net costs of loans and loan guarantees (i.e., credit expenditures), and a variety of tax expenditures. It is evident that a substantial part of the direct and credit expenditures involves the support of U.S. agriculture and related activities whereas the manufacturing and services sectors are the prime beneficiaries of tax expenditures. It is important to note that the expenditures listed in Appendix Table 5 include only those programs "with the primary intent of promoting commerce and industry." Thus, according to the Congressional Budget Office (1984b, pp. xii-xiii):

> "The tally excludes programs that may have significant industrial effects, but which Congress undertakes for other purposes. Programs excluded have much greater costs than those included. Department of Defense purchases of goods and services are projected to approach $140 billion. Programs to aid individuals, such as medical and housing subsidies, equal $110 billion. Excluded research and development programs exceed $35 billion. In short, 14 programs that are excluded, but have identifiable commercial effects, total almost $300 billion."[12]

It could also be argued that some regulatory policies have benefitted U.S. firms, although the reduction or removal of regulations in many sectors in recent years have

resulted in significant realignments and increased efficiency in particular sectors. Finally, as noted above, U.S. antitrust policies and the extraterritorial interpretation of U.S. laws might be considered by some observers as potentially important informal barriers to inward foreign direct investment.

The point of our discussion should be clear by now. It is simply that informal barriers to trade and investment come in a variety of forms, and these barriers may be important in the United States itself as well as in its two largest trading partners. As mentioned above, it is difficult to assess the validity of the complaints about informal barriers and to determine how countries compare in their reliance on these barriers. Moreover, as McCulloch (1987) has noted, the evidence based on complaints may be seriously biased insofar as no account is taken of the successful and profitable experiences that exporting firms and foreign multinationals have realized in penetrating foreign markets, even in Japan. In any event, it is necessary to analyze the existing informal barriers in an empirical context and it is to this that we now turn.

III. Measuring the Effects of Formal and Informal Barriers

In the preceding section, an effort was made to elucidate the main characteristics of formal and informal barriers and to identify the major barriers that exist currently in the United States, Canada, and Japan. The next step is to determine how important these barriers are empirically in each country. This raises a number of difficult conceptual issues that we first discuss. We then review several studies that have attempted to assess empirically the effects of the barriers, and we offer some new evidence of our own as well.

Conceptual Issues[13]

We have made a distinction in our discussion between formal and informal barriers. If one wished to quantify the effects of some formal barrier, it would be best to look at the specific details of the implementation of that barrier. For example, an explicit quota usually permits an announced quantity of imports of a certain type, and an analysis

of the quota should begin therefore with direct information pertaining to that quantity. There are serious disadvantages to this direct approach, however, in dealing with a variety of formal barriers, and, of course, we are left in the dark with respect to informal barriers.

The direct approach can obviously capture only those barriers that have been identified explicitly. If a country or industry makes use of a particular type of barrier that the investigator does not recognize or include in the analysis, then trade may appear much freer than it actually is. Furthermore, even for those barriers that are included, it is difficult to process the diverse direct information that is available on each barrier in a way that will be comparable across barriers and thus permit them to be aggregated to obtain a total measure of trade interference. An additional point is that if more than one barrier is present in a given industry, it is conceivable that the presence of one reduces the effects of another, so that an analysis of each of them separately may lead to an overstatement of their total effects. Finally, in attempting to evaluate overall levels of protection involving both formal and informal barriers, general equilibrium effects are bound to matter, such as the effects of barriers in one sector on trade in another, and the effects of all together on exchange rates. Thus, even though direct information about barriers is likely to be the most accurate available, it does not provide a good starting point for a general analysis and, in any event, by definition does not apply to informal barriers.

There are in principle two types of general approaches that can bypass some of the difficulties just mentioned, although admittedly introducing new ones. These are: (1) *price-impact measures* calculated in terms of tariff equivalents or price relatives; and (2) *quantity-impact measures* based upon econometric estimates of models of trade flows.

Price-impact measures involve calculating the price effects of existing barriers based on observed differentials between domestic prices and import or world prices. Such measures have the advantage of capturing the complex of formal and informal barriers that may impede trade but cannot be measured explicitly. However, it is difficult to interpret price measures without actual information about import demand and supply

conditions or an approximation of the equilibrium prices in the absence of the barriers, and whether supply conditions are competitive or monopolistic. The data requirements are also formidable, especially insofar as domestic and imported goods are imperfect substitutes. For example, in cases where imports are differentiated by country of origin, where there is monopolistic competition, or where commodity aggregates reflect a diversity of goods, domestic and foreign price comparisons may be difficult to interpret. It is even conceivable that these comparisons could go in the wrong direction, reflecting lower domestic than world prices even when there are barriers to trade. A final point is that comparisons using observed prices will not capture the effects of such barriers as government procurement or other preferential restrictions that may raise the *shadow* price of imports to some domestic purchasers.

The alternative to looking at price-impact measures of barriers is to consider the quantity impacts involved. It would appear that a quantity measure is preferable to a price measure in that it comes closer to telling us what we really want to know about the effects of barriers: that is, by how much they reduce trade. Conceptually, the objective is to estimate what trade would have been in the absence of existing barriers and compare this to the trade that actually occurs. To accomplish this, we need a satisfactory model of the determinants of trade as well as data covering a sufficient variety of trading situations. The latter is needed in order to identify, or extrapolate to, a situation in which trade is at least approximately free.

What is the most appropriate model of trade to use for empirical purposes? This depends to a considerable extent on precisely what we wish to explain. Where inter-industry trade is at issue, the Heckscher-Ohlin model, with its stress on differences in factor endowments as the primary determinants of trade, is generally seen as most helpful. Alternatively, where the focus is on intra-industry trade, the Helpman-Krugman model (1985), which makes product differentiation and scale economies the central forces determining trade, is a plausible alternative. The Helpman-Krugman model is a

development of the last decade while the theoretical aspects of the H-O model have been explored in the literature for many years. In both instances, however, it is only very recently that rigorous and empirical viable frameworks for estimating the determinants of trade have been derived and implemented for either model. These theories, however, are not in conflict, as Helpman and Krugman note (p. 145). That is, the explanation of intra-industry trade in terms of product differentiation, scale economies, and specialization can be entirely consistent with the explanation of inter-industry trade in terms of differences in factor endowments.

In examining this recent empirical work, it is important to call attention to some possibly important qualifications. First, the conceptual procedure of attributing to barriers all departures of trade from what a model's exogenous variables can explain places a large burden on the model that has been used to explain trade. Indeed, the worse is the model of trade flows, the greater will be the estimates of the effects of barriers, suggesting a considerable upward bias in their estimation in given circumstances. While this is a serious objection, it would not appear to apply to comparisons of the effects of barriers across countries unless countries differ among themselves in the extent to which the model is appropriate for explaining their trade.

A second point is that theoretical trade models such as Heckscher-Ohlin and Helpman-Krugman are capable of determining patterns of trade only when a series of highly unrealistic assumptions are made.[14] In their absence, such models can only determine patterns of trade in an average sense and are not adequate to the task of predicting trade exactly for particular industries and countries. Thus a departure of actual trade from what is predicted by a regression model may only reflect this indeterminacy and not the presence of barriers.

Finally, the approach using trade models can really only make comparisons among industries or countries. They cannot tell us how far patterns depart from free trade. For if barriers restrict trade everywhere, that may be embedded in the parameters

of the regressions and will not be reflected in the residuals or coefficients of the dummy variables used to represent unusual characteristics. Subject to these qualifications, the approach based on trade models is useful for identifying *relative* levels of nontariff protection. It is in this context that our review and assessment of the empirical studies of trade structure should be placed.

For our purposes here, there are seven sets of noteworthy studies that have attempted a quantitative assessment of whether national trade barriers are distinctive and therefore serve to limit foreign access into the domestic market. The studies include work by Saxonhouse (1983a, 1986), Leamer (1984, 1987), Bergsten and Cline (1985, 1987), Balassa (1986), Staiger, Deardorff, and Stern (1985, 1987), Noland (1987), and Lawrence (1987). Each of these studies permits us to look at Japan, the United States, and Canada in a comparative context and to determine whether their barriers are of distinctive importance. Given that these studies differ substantially in the time period examined, countries sampled, level of aggregation, and specification employed, it is useful to discuss the conceptual frameworks and issues addressed in them and their principal conclusions. To set the stage for our discussion, we have summarized in Table 5 the main characteristics of the aforementioned studies.

As noted previously, the Heckscher-Ohlin and Helpman-Krugman models have provided the basis for most of the studies of interest to us here. It is useful to begin accordingly with some formal analysis that will be helpful in discussing the relevant empirical issues and findings.

Assume that all goods are differentiated by country of origin.[15] Given identical and homothetic preferences, each country will consume identical proportions of each variety of each good. This means that country j's consumption of all the different varieties of good i can be described by:

$$(1) \quad C_{ij} = M_{ij}^{+} + C_{ij}^{j}$$

$$(2) \quad M_{ij}^{+} = S_j(\overline{Q} - Q_{ij})$$

and

(3) $C_{ij}^{j} = S_j Q_{ij}$

where

$C_{ij} \equiv$ consumption of good i by country j

$C_{ij}^{j} \equiv$ consumption of good i of variety j by country j

$M_{ij}^{+} \equiv$ imports of good i by country j

$Q_{ij} \equiv$ production of good i in country j

$\overline{Q}_i \equiv \sum_j Q_{ij} \equiv$ global production of good i

$\Pi_j \equiv \sum_i Q_{ij} \equiv$ GNP of country j

$\overline{\Pi} \equiv \sum_j \Pi_j \equiv$ global GNP

$S_j \equiv \frac{\Pi_j}{\overline{\Pi}} \equiv$ share of country j in global GNP

Equations (2) and (3) can be combined to obtain:

$$(4) \quad \frac{M_{ij}^{+}}{M_{ij}^{+} + S_j Q_{ij}} = \frac{S_j(\overline{Q}_i - Q_{ij})}{M_{ij}^{+} + S_j Q_{ij}} = \frac{S_j(\overline{Q}_i - Q_{ij})}{S_j(\overline{Q}_i - Q_{ij}) + S_j Q_{ij}} = \frac{S_j(\overline{Q}_i - Q_{ij})}{S_j \overline{Q}_i} = 1 - \frac{Q_{ij}}{\overline{Q}_i}$$

Equation (4) states that imports of good i by country j will be equal to the proportion of good i that is produced outside of j. Thus, the less competitive a country is in the production of good i, the more it will import. Alternatively,

$$(4') \quad \frac{M_{ij}^{+}}{M_{ij}^{+} + S_j Q_{ij}} = 1 - \frac{Q_{ij}}{\overline{Q}_i} = 1 - \frac{(1-S_j)Q_{ij}}{(1-S_j)\overline{Q}_i} = 1 - \frac{X_{ij}^{+}}{(1-S_j)\overline{Q}_i}$$

where $X_{ij}^{+} \equiv$ exports of good i by economy j.

Imports of good i by country j as a proportion of total use by j will be equal to the proportion of foreign consumption of i that is foreign produced.

Equations (4) and (4') explain import shares by the shares of domestic production in global production or by export shares. Imports (and exports) can also be directly explained by national factor endowments. From (2) and (4'), we have:

(2) $M_{ij}^{+} = S_j(\overline{Q}_i - Q_{ij})$ and

(5) $X_{ij}^{+} = (1-S_j)Q_{ij}$.

Now let us assume an indirect trade-utility function H, which expresses the maximum level of utility that an open economy can attain as a function of output prices and national factor endowments.[16] The usefulness of the indirect trade-utility function stems from its convenient properties. In particular, net export functions can be derived directly from it by differentiation, using an extension of Roy's Identity.[17] It is easiest to proceed by recognizing that H is made up of two components: the GNP function, Π, and an indirect utility function, g. Π and g represent the maximum levels of GNP and utility, respectively, that an economy can attain for a given level of output prices and factor endowments. The forms of Π and g are unknown, but a few familiar restrictions will yield equations that can readily be estimated. If it is assumed that Π is a continuous, nonnegative, homogeneous-of-degree-one GNP function and that the utility function from which g is derived is positive, continuous, nondecreasing, quasi-concave, and homogeneous, then with factor price equalization, by extension of Roy's Identity, it is required that:

$$(6) \quad W_s = \frac{\partial H}{\partial L_s} \qquad s=1,2,\ldots,K$$

and

$$(7) \quad \frac{\partial W_s}{\partial L_s} = \frac{\partial^2 H}{\partial L_s^2} = 0 \qquad s=1,2,\ldots,K$$

where

$W_s \equiv$ rental for factor of production s; and

$L_s \equiv$ endowment of factor of production s.

From (2) and (5) and the restrictions on Π and g, we have:

$$(8) \quad S_j = \frac{\sum_j W_{sj} L_{sj}}{\sum_i \overline{Q}_i}$$

and by Hotelling's Lemma from Π we get:[18]

$$(9) \quad Q_{ij} = \sum_s R_{is} L_{sj}$$

where R_{is} is a function of parameters of Π and output prices, all assumed to be constant.

Substituting (8) and (9) into (2), imports and exports of good i in country j will be given by

$$(10) \quad M_{ij}^{+} = \sum_{s=1}^{K} B_{is}^{+} L_{sj} + \sum_{s=1}^{K} \sum_{r=1}^{K} D_{isr}^{+} L_{sj} L_{rj} \qquad i=1,...,N$$

$$(11) \quad X_{ij}^{+} = \sum_{s=1}^{K} R_{is} L_{sj} + \sum_{s=1}^{K} \sum_{r=1}^{K} D_{isr}^{+} L_{sj} L_{rj} \qquad i=1,...,N$$

where B_{is}^{+} and D_{is}^{+} are functions of parameters of Π and output prices and will be constant under the assumptions already made. If equation (10) is subtracted from equation (11), we obtain net exports (Z_{ij}):

$$(12) \quad Z_{ij} = (X_{ij}^{+} - M_{ij}^{+}) = \sum_{s=1}^{K} (R_{is} - B_{is}^{+}) L_{sj} \qquad i=1,...,N$$[19]

By contrast with equations (10) and (11), equation (12) is the traditional Heckscher-Ohlin equation with net exports as a linear function of factor endowments (see Saxonhouse

(1983) and Leamer (1984)). When we consider just *net* trade, as within the Heckscher-Ohlin framework, the nonlinear terms in equations (10) and (11) cancel out. Since equation (12) can be derived from (10) and (11), which are the basic Helpman-Krugman equations, this should demonstrate the compatibility of these two approaches. That is, the incorporation of scale economies and product differentiation into conventional models of international trade in order to account for *intra*-industry trade in no way invalidates the Heckscher-Ohlin interpretation of *inter*-industry trade.

Note that total imports and total exports will be given by:

$$(13)\quad M_j^+ = \sum_i^N \sum_s^K B_{is}^+ L_{sj} + \sum_i^N \sum_{r=1}^K \sum_{s=1}^K D_{isr}^+ L_{sj} L_{rj} \qquad i=1,2,...,N$$

$$(14)\quad X_j^+ = \sum_i^N \sum_s^K R_{is} L_{sj} + \sum_i^N \sum_{r=1}^K \sum_{s=1}^K D_{isr}^+ L_{sj} L_{rj} \qquad i=1,2,...,N$$

As equations (13) and (14) make clear, unlike Heckscher-Ohlin, the Helpman-Krugman approach allows for explanations of total export volumes and total import volumes.

Trade Structure Studies

Equation (12) provides the basis for the estimation framework used by Leamer (1984) with which he attempts to explain cross-national net trade flows for 1958 and 1975 for 60 countries with ten aggregate sectors, using capital stock, three varieties of labor, four varieties of land, coal production, oil production, and mineral production as explanatory variables representing national factor endowments. His conclusions (p. 187) are worth quoting:

> "What emerges from this data analysis is a surprisingly good explanation of the main features of the trade data in terms of a relatively brief list of resource endowments. There are apparent problems with measuring some of the resources, and there is some

> evidence of non-linearities, but overall, the simple linear model does an excellent job. It explains a large amount of the variability of net exports across countries, and it also identifies sources of comparative advantage that we all 'know' are there, thereby increasing the credibility of the results in cases where we do not 'know' the sources of comparative advantage."

If Leamer's conclusions are accepted, they suggest that there may be relatively little role for distinctive sectoral trade policies to play in explaining national trade patterns. National policies promoting or inhibiting sectoral trade may exist and even be important, but may be sufficiently similar across countries, so that when allowance is made for differences in factor endowments, their influence is simply incorporated in the parameters of equation (12).[20] Few countries appear to have cross-nationally distinctive sectoral policies. Alternatively, trade policies may differ significantly across countries, but their impact may be felt exclusively in macro-level, aggregate factor accumulation. Frameworks such as (12) cannot separately distinguish such policy influences from any of the other possible influences on factor accumulations. Thus, (12) is only helpful in identifying sectoral policies. It is at this level, however, that most diplomatic energy is expended, especially in U.S.-Japan relations.

Leamer's attempts to examine how equation (12) explains the trade structure for individual countries in his sample by including country dummy variables in each of his ten equations, one country at a time. A statistically significant country dummy thus suggests an extreme value for a country's net trade that cannot be explained by equation (12). Of 1,200 possible significant country dummies, he found only 77 that were actually statistically significant. These include six Canadian dummies, five U.S. dummies, and only one Japanese dummy (Leamer p. 168). The results are summarized in Table 6. It is important to note that the extreme observations listed in Table 6 may not necessarily be the result of special government intervention. As Leamer points out, given the strong

assumptions made in deriving equation (12) and the crude data used, it is quite possible that errors in specification (e.g., nonlinearities) and errors in measurement may have shaped his findings.[21] Following Bowen, Leamer, and Sveikauskas (1987), it is interesting to consider whether some of the previous assumptions can be relaxed. Thus, suppose that instead of equation (12), we have:

$$(6') \quad a_s W_s = \frac{\partial H}{\partial (a_s L_s)} \qquad s=1,2,...,K$$

$$(7') \quad \frac{\partial a_s W_s}{\partial (a_s L_s)} = \frac{\partial^2 H}{\partial (a_s L_s)^2} = 0 . \qquad s=1,2,...,K$$

and

$$(12') \quad Z_i = \sum_{s=1}^{K} B'_{is} a_s L_s \qquad 1,...,N$$

where $a_s \equiv$ quality of factor s and/or measurement error.

The foregoing equations can be interpreted as international trade equalizing factor prices only when factor units are normalized for differences in quality. Thus, for example, observed international differences in the compensation of unskilled labor may be accounted for by differences in labor quality.[22] This is a substantial weakening of the condition that Leamer imposed on his data.[23]

Equation (12') can be estimated for N commodity groups from cross-national data. Formally, the estimation of (12') with a_s differing across countries and unknown is a multivariate, multiplicative errors-in-variable problem. Instrumental variables methods will allow consistent estimates of the B'_{is}. For any given net-trade cross section, a_s will not be identified. In the particular specification adopted in (12'), however, at any given time there are N cross sections that contain the identical independent variables. This circumstance can be exploited to permit consistent estimation of a_s, which is a measure of

factor quality and data quality for each factor endowment for each country. These estimates of a_s can then be used to obtain new, more efficient estimates of B_{is}.[24]

The preceding approach has been used by Saxonhouse (1983a, 1986). For example, equation (12') was estimated with data taken from 23 countries for 109 trade sectors for the years 1964, 1971, and 1979. The factors treated as central to the explanation of changing trade structure include: directly productive capital stock; labor; educational attainment; petroleum reserves; iron ore reserves; arable land; and distance. The inclusion of distance means that transport services are treated symmetrically with other factor endowments. Economies that are close to their major trading partners can be thought of as well endowed with transport services. Those far away from their trading partners are transport services scarce.

Analogously with Leamer, Saxonhouse has attempted to examine how well estimates of equation (12') explain the trade structure for individual countries by excluding one country at a time from his sample. Using that country's independent variables and the estimates of (12'), a 95% ex post forecast interval was constructed and compared with the actual trade structure. Such forecast intervals were constructed for a number of countries in the sample, including Japan, Canada, and the United States. Saxonhouse found that relatively few of the actual Japanese, Canadian, and U.S. trade flows fell outside the ex post forecast interval. That is, in the estimates of 327 net trade equations over three years, there were 61 instances in which Japanese trade flows fell outside the forecast interval. For Canada and the United States, in only 37 and 30 instances respectively, were observed trade flows outside the forecast interval. These cases are all reported in Table 7. While Japanese extreme observations were for sectors that averaged 6.1% of its gross external trade and the U.S. observations were for sectors that averaged 5.5% of its gross external trade, the extreme Canadian observations were for sectors that averaged 13.4% of external trade.

Inevitably, the proportion of trade in sectors where there is evidence of statistically significant barriers is a downward biased measure of the overall impact of such barriers since trade in these sectors is in all likelihood less important than would be the case in the absence of the barriers. With prohibitive barriers, this measure yields the totally paradoxical finding that no trade at all is being diverted. A better approach for summarizing the influence of trade barriers on trade structure is to test jointly for distinctiveness over all sectors for each country. That is, for all 109 sectors taken together, is trade structure significantly different statistically from what might be expected?

In order to test the null hypothesis that the ex post forecast on the extra sample values of Japanese, Canadian, and U.S. trade structure, respectively, do not differ significantly from their historical values, the test statistic

$$(14) \quad P = \sum_{i=1}^{109} \{(\hat{Z}_{ij} - Z_{ij})/\hat{\sigma}_{\hat{Z}_{ij}}\}^2$$

where $\hat{Z}_i \equiv$ forecast of trade flow in the i^{th} sector and $\hat{\sigma} \equiv$ estimated standard error can be utilized.[25] Since the calculated values of P for Japan, Canada, and the United States are 92.6, 87.1, and 85.8 for 1964, 97.5, 92.0, and 83.1 for 1971, and 102.1, 98.5, and 96.3 for 1979, and the 5% critical value is 109.4, it is apparent that for all three countries, for each of the three sample years, the null hypothesis cannot be rejected. These comprehensive statistical tests therefore reinforce the impression gained from an examination of the sectoral evidence. That is, it does not appear that trade policy has dramatically altered the Japanese, Canadian, or U.S. trade structure.

Lawrence (1987) has argued that empirical work on trade barriers using the Heckscher-Ohlin equations (12) and (12') misses at least one central issue in current policy discussions. As its derivation makes clear, equation (12') is defined for net trade. Yet it is frequently argued that what is distinctive about Japan's trade patterns is its very meager

participation in intra-industry trade in manufactures (Sazanami, 1981). The issue then is that the structure of Japan's net trade flows might appear normal even while its gross trade pattern might be highly distinctive.

The focus on net trade flows in explaining inter-industry trade may ignore the possibility that Japanese policy has worked to keep down both imports *and* exports. From the point of view of the trade policy debate in the United States, however, this may not be a serious omission. The point here is that it is unlikely that, compared to other countries, Japanese policy has unfairly kept down imports in many sectors unless this policy has simultaneously been keeping down exports in precisely the same sectors. From the American side at least, U.S.-Japanese economic conflict is not about this aspect of Japanese policy. Rather, it is about sectoral trade balances, and it would appear that this aspect of the policy debate is well handled by the Heckscher-Ohlin framework of research.

Equations (4) and (4'), which by having gross imports and gross exports as their dependent variable, allow for intra-industry trade, and thus provide the basic framework for Lawrence's (1987) empirical work on cross-national trade structure. However, Lawrence does not use cross-national data on trade structure and production to test the restrictions implied by either (4) or (4'). Rather he argues that (4) and (4') apply only to a world where distance imposes no cost on trade. In a world where transport costs are non-zero and a determinant of trade flows, Lawrence prefers to estimate the logarithmic version of (4) and (4'):

$$(4a)\quad \log\left(\frac{M_{ij}^{+}}{M_{ij}^{+}+Q_{ij}}\right) = U_i + v_i \log\left(\frac{Q_{ij}}{\overline{Q}_i}\right) + y_i \log T_j$$

and/or

$$(4a')\quad \log\left(\frac{M_{ij}^{+}}{M_{ij}+Q_{ij}}\right) = U_i^{*} + v_i^{*} \log\left(\frac{X_{ij}^{+}}{(1-S_j)\overline{Q}_i}\right) + y_i^{*} \log T_j$$

where $T_j \equiv$ transport costs or distance.

Like Leamer, Lawrence examines how well equations (4a) and (4a') explain trade structure for individual countries in his sample by including country dummies in each of twenty-one sectoral equations and a pooled equation for each of the years included, one country at a time. Compared to the other twelve countries included in his sample, the Japanese dummy variable is most often statistically significantly less than zero. That is, imports are a smaller share of domestic consumption than might be expected, given the share of the world market held by Japanese exports or given Japan's share of global production. By contrast, for some years, the United States and Canadian dummies are significantly positive, suggesting that the United States and Canada import more than expected. Lawrence's results are summarized in Table 8.

While Lawrence's findings are in striking contrast with the aforementioned works by both Leamer and Saxonhouse, his findings are nonetheless not necessarily inconsistent with these works. It is important to remember that Lawrence is explaining gross trade, while Leamer's and Saxonhouse's dependent variables are net trade. Despite this difference, it is extremely difficult to reconcile Lawrence's conclusion that, in the absence of unusual trade barriers, Japan's manufactured goods trade surplus would have declined by $9.4 billion with either Saxonhouse's results for 1979 (Table 7) or Leamer's for 1975 (Table 6).

Leamer, Saxonhouse, and Lawrence all assume homotheticity in their empirical work. Lawrence's use of production shares and export shares rather than factor endowments as explanatory variables, however, makes homotheticity the driving force of his interpretation of differences in trade structure. Lawrence's empirical work may thus be viewed primarily as a test of this assumption.[26] Unfortunately, Lawrence's test results may be qualified by a number of specification errors.

Quite apart from unresolved issues such as what functional form is appropriate when transport costs are introduced into the Helpman-Krugman model and indeed,

whether it is appropriate to introduce transport costs at all into an export share version of this model, Lawrence's import share, export share, and production share variables are all jointly determined. The issue of simultaneity here is a very real one. In addition to nontrivial estimation bias, there are some important identification issues. While Lawrence is careful in interpreting his results to suggest that there is something distinctive about Japanese trade structure, he does not make it clear why this distinctiveness should be associated with possible Japanese import barriers. For example, in his export share model, there are only two significant Japanese sectoral dummies in 1970, but no less than nine significant sectoral dummies in 1983. Thus, one may ask: is it really plausible to infer that Japanese protection for manufacturing increased substantially between 1970 and 1983? The point is that this is precisely the period when virtually all formal Japanese barriers to the import of manufactured goods were eliminated. If Japanese trade structure did become more distinctive between 1970 and 1983, this can be more properly attributed to increasing foreign barriers against Japanese exports. Japan's import shares of manufactures may well be a better index of Japanese competitiveness than its export shares.

Equations (10) and (11) can be estimated in an effort to reconcile the contrasting approaches of Leamer/Saxonhouse and Lawrence. Like Lawrence, equations (10) and (11) come from the Helpman-Krugman model and, by using gross imports as a dependent variable, they do not net out intra-industry trade. Like Leamer and Saxonhouse, however, simultaneity problems are avoided by using factor endowments as the central explanatory variables. We have estimated equations (10) and (11) for the same 109 trade sectors and the same seven factor endowments as in Saxonhouse (1983a, 1986). In the present case, however, the sample is restricted to a single year 1979, but enlarged to include observations on the 55 economies that are listed in Table 9.

Following the approach taken in Saxonhouse (1983a, 1986) and reported in Table 7, we have constructed 95% ex post forecast intervals based on equations (10) and (11) for

Japan, Canada, and the United States, and compared the results with actual trade flows. The results are reported in Table 10. Of the 109 sectoral gross imports forecast for 1979 for Japan, 24 fell outside the forecast interval. By contrast, 12 sectoral export flows fell outside the forecast interval.[27] For Canada, 21 import flows and 12 export flows were observed outside the forecast interval. And for the United States, 15 import flows and 9 export flows were found outside the forecast interval.[28]

With so many instances of Japanese import flows falling outside the forecast interval, it might appear that the estimation of equations (10) and (11), unlike the estimation of equations (4) and (4'), suggests a distinctive Japanese trade structure. But, when the null hypothesis is tested, using equation (14), that the ex post forecast on the extra sample values of Japanese import and export structure do not differ significantly from their historical values, we obtain the same result as before, namely that the null hypothesis cannot be rejected.[29] The finding that Japanese trade structure conforms to international patterns thus appears invariant to whether it is the Helpman-Krugman model or the Heckscher-Ohlin model that is being estimated.

Trade Volume Studies

By contrast with the work just discussed, the studies by Bergsten and Cline, Balassa, and Noland listed in Table 5 examine the impact of barriers on the total volume of trade rather than the structure of trade. Bergsten and Cline (1985, 1987) attempt to explain intercountry differences in the ratio of imports to GNP for 11 countries plus the EEC for a pooled cross section from 1974 to 1984. The Bergsten-Cline explanatory variables include: (1) the logarithms of GNP, per capita crude oil production, and per capita arable land; (2) dummy variables for significant iron ore reserves and for Japan; and (3) an index of transportation costs. Of their six explanatory variables, Bergsten and Cline find that only the Japanese dummy is statistically insignificant. From this they conclude (1983, p. 78):

> "The cross-section statistical test confirms the simple scatter diagram: Japan is basically on the line for international norms of imports relative to GNP after taking account of natural resource endowment and transportation costs as well as country size. These results suggest there is nothing special about Japan's import-GNP ratio to attribute to an unusual degree of protection."

While this finding is similar to the conclusions reached by Leamer and Saxonhouse as already noted, the foundation for the Bergsten-Cline equation is by no means obvious. Because Bergsten-Cline use a trade-GNP ratio as their dependent variable and because most of their explanatory variables enter logarithmically, following the derivation given in the Technical Appendix, their equation might be given a translog interpretation as in

$$(A4) \quad X^* = \rho + \sum_{s=1}^{K} \delta_{is} \ln L_s$$

where $X^* = \frac{X}{\pi}$ and

where π is assumed constant.

Unfortunately, such an interpretation of the Bergsten-Cline work requires putting aside the distinction between net and gross trade and ignoring their entering factor endowments on a per capita basis and their use of GNP as an independent variable.[30]

In contrast to Bergsten-Cline, Balassa (1986) has chosen to explain the logarithm of total imports (and imports from developing countries and industrialized countries, separately) relative to GDP (and total primary imports relative to GDP and total manufactured imports relative to GDP, separately) for a cross section of eighteen industrial countries for 1973–1983. He uses as explanatory variables: (1) logarithms of per capita GDP and population; (2) transportation costs and ratio of primary products

imports to total imports; and (3) dummy variables for Japan, the EEC and EFTA. Unlike Leamer, Saxonhouse, and Bergsten-Cline, Balassa (p.8) found his dummy variable for Japan to be negative and highly significant:[31]

> "The results show Japan to be an 'outlier' among industrial countries, irrespective of whether one considers imports from all sources, from the industrial countries, or from developing countries. The Japan dummy is significant at the 1 percent level in all the equations and its introduction raises their explanatory power."

Balassa's inspiration for his import equation is based on Chenery (1960), which was an early attempt to provide a general equilibrium rationalization for cross-national work on trade structure. Unfortunately, however, there is no rationale given either by Chenery or by Balassa for why aggregate trade volumes might differ among countries. That is, Chenery (p. 28) moves from a theory of comparative advantage in terms of net imports to a theory of gross imports by simply adding exports to net imports and to his list of independent variables. But even as a framework for studying the determinants of the pattern of net trade, Chenery's approach is a puzzling point of departure for the research that Balassa has undertaken. A reading of Chenery's work shows that he made many arbitrary choices to obtain the precise import equations that were estimated. These compromises were dictated by lack of data on such variables as capital stock and natural resource endowments and by the limits of economic science at the time that he began what has become thirty years of research on structural change. Even though Balassa presents 28 estimated versions of his import equation, quite apart from the problem of distinguishing between gross and net trade in his analysis, none of Balassa's variants can be derived from a conventional specification of production technology and demand.[32]

Ignoring conceptual problems and issues of specification error, Balassa attributes his distinctive findings to his use of transport costs rather than distance as an explanatory variable.[33] If Balassa's findings were at variance only with studies that use distance as

an independent variable, this reasoning would be compelling. However, his findings are at odds not only with studies that use a distance variable (Saxonhouse), but also with studies that use transport costs variables (Bergsten-Cline and Noland) and with studies that use neither distance nor transport costs (Leamer, Saxonhouse).[34] Furthermore, Balassa uses a measure of transport costs which is orders of magnitude different from many other estimates.[35] Unfortunately, Balassa's special findings rest critically on the specific construction of his transport cost variable.[36]

Like Lawrence and the work presented in Table 10, Noland (1987) is guided by Helpman-Krugman in his empirical work. But unlike these other studies, Noland does not attempt a direct test of Helpman-Krugman. Rather, he uses some of the variables suggested by them in an equation that attempts to explain differences in trade volumes. He assumes that the logarithm of trade volume (or total imports or total exports) is a function of: (1) the logarithm of GDP and the logarithm of GDP per capita; (2) a measure of factor endowment similarity; and (3) a measure of transport costs.[37] He estimated this equation for 45 countries for 1980, and then calculated the "studentized" residuals for each of the countries in his sample. This procedure is equivalent to adding a dummy variable that selects out a single country at a time and calculating its t-statistic.[38] Noland's studentized residuals for Japan, Canada, and the United States were all statistically insignificant, which is consistent with the results obtained by Leamer, Saxonhouse, and Bergsten-Cline already described. It should also be noted that our equations (13) and (14) do provide the basis for equations explaining total import and/or total export volumes, which, unlike Noland's equation, can be directly derived from the Helpman-Krugman model. In light of these equations, Noland's analysis and results appear compromised by serious specification error.

The final studies worth noting are by Staiger, Deardorff, and Stern (1985, 1987). Taking the Heckscher-Ohlin model as a point of departure, they have used the Michigan Model of World Production and Trade to calculate the effects of Japanese and American

tariffs and NTBs on the factor content of trade and employment in the two countries. For this purpose, as mentioned earlier, they constructed approximations of the ad valorem equivalents of the pre-Tokyo Round NTBs for the United States and Japan. These approximations presumably may reflect formal and to some extent informal barriers for the individual sectors. Their computational results suggest that the effects of Japan's NTBs are greater than their tariffs, and that these effects are concentrated especially in the agricultural sector. The effects of NTBs for the United States also appeared to be greater than tariffs, but these effects were spread among a variety of U.S. industries. It is thus especially interesting that if Japanese and American barriers were to be removed, the effects would be primarily to reduce farm employment in Japan and increase it in the United States, while manufacturing employment in the United States is estimated to decline. The results obtained by Staiger et al. are interesting because they suggest that Japan's barriers limiting the importation of agricultural products and food and kindred products may be the dominant forces in its trade policy. This conclusion may be misleading, however, since only Japan and the United States are being compared. As noted earlier, Honma and Hayami (1986) have done a cross-country study of the determinants of agricultural policies and found that Japan does not appear unusual compared to other industrialized countries when differences in national endowments and related characteristics are taken into account.

The Lawrence and Balassa studies not withstanding, the general conclusion that emerges from our review and assessment of empirical studies of trade structure is that national trade policies do not appear to be an important determinant of trade structure once account is taken of cross-country differences in factor endowments and distance considerations. Thus, while Japan has been singled out for having a relatively low share of manufactures in total imports as well as a smaller share of manufactured imports from the developing countries in comparison to the United States and other major trading countries,[39] there is no convincing case to be made that the structural characteristics of

Japan's trade reflect its distinctive nontariff barriers. This conclusion seems broadly consistent with the evidence on formal and informal barriers that we presented in the preceding section. That is, when we consider the trade coverage of NTBs, Japan does not appear distinctive in comparison to the other major industrialized countries. We also noted that while a litany of informal barriers can be cited in the case of Japan, it is possible to identify a host of such barriers in the United States, Canada, and presumably other industrialized countries as well. There may well be significant protection in a number of sectors in the major trading countries, which represent important departures from the ideal of free trade. But the available evidence based on inventories of barriers and econometric estimates of the determinants of trade flows do not enable us to single out individual countries in terms of the impact of their trade policies.[40]

Restrictions on Foreign Direct Investment

In contrast to the empirical research that we have just examined which assessed the barriers to trade for the United States, Japan, and Canada, we know comparatively little about the effects that barriers to foreign direct investment may have. It would appear that there are at present relatively few formal barriers to foreign direct investment in the three countries. With respect to informal barriers, some observers might argue in the case of the United States that certain aspects of national security policies, antitrust policies, securities regulations, and the extraterritorial interpretation of U.S. laws may serve to impede inward direct investment. Canada has maintained administrative procedures for reviewing new foreign direct investment initiatives since the 1970s, but these procedures have been considerably relaxed in recent years. It is true in any event that Canada has relatively substantial foreign ownership in many of its manufacturing industries especially.

In Japan, it might appear that historically there was a reluctance to permit foreign direct investment in a variety of Japanese industries, and that there is presently a much smaller degree of foreign ownership as compared with other major industrialized

countries. This may well be the case, but it remains to be determined whether Japan is distinctive in terms of its observed pattern of foreign ownership and control as compared to other major industrialized countries, after allowance is made as before for Japan's otherwise distinctive characteristics. The point here is similar to the one made in our preceding discussion concerning the allegations of pervasive trade protectionism by Japan. That is, it remains to be seen whether or not the available empirical evidence would lead one to identify Japan as an outlier in terms of the structure of foreign direct investment.

There is an evident need therefore for more research on barriers to foreign direct investment. This is the case not only to learn more about the effects of these barriers, but also to explore the relation between trade barriers and investment barriers. An interesting issue here is whether the Heckscher-Ohlin framework can be used to analyze investment barriers, and, if so, what the appropriate empirical specification might be. Alternatively, Helpman and Krugman address in theoretical terms the behavioral determinants of multinational enterprise activities and the possible impacts on trade that may occur. What is needed then is an effort to parallel our work on trade structure in order to sort out what these different models may contribute in furthering our understanding of cross-country differences in the patterns of foreign direct investment.

IV. Conclusions and Implications for Research and Policy

We have made an effort in this paper to clarify a number of analytical and empirical issues concerning the nature and consequences of informal barriers to trade and investment with particular reference to the United States, Canada, and Japan. Three main categories of informal barriers were identified: (1) administrative procedures and government regulations and policies; (2) market structure; and (3) political, social, and cultural institutions. While there may be difficulties in distinguishing exactly between formal and informal barriers in given circumstances, there is nonetheless reason to believe that informal barriers exist and may possibly serve to impede international trade and investment in individual sectors and countries.

The issue then is to devise an empirical framework that can be used to determine whether and to what extent informal barriers may in fact distort national trade patterns. We have emphasized the ways in which the Heckscher-Ohlin and Helpman-Krugman models can be adapted for empirical purposes and the results of cross-national studies of trade structure that take into account a variety of national factor endowments as the proximate determinants of trade. Our review of the important studies that have been done in recent years concluded that the H-O model does fairly well in explaining cross-national differences in trade structure and that NTBs do not appear to exert a major influence on this structure. This finding does not change even when allowance is made for intra-industry trade within the Helpman-Krugman model. This conclusion is important especially with reference to Japan, for it means that there is not much evidence to support the contention that Japan relies on a variety of informal barriers for the purpose of influencing the structure of its trade. That is, when account is taken of cross-national differences in factor endowments — including capital, labor, and a variety of natural resources — Japan's trade structure does not appear distinctive relative to other major countries.

We were not able to reach any conclusions regarding barriers to foreign direct investment. More research is needed accordingly on the appropriate framework to use in analyzing the structure of foreign direct investment and its interaction with the structure of trade.

Finally, it seems appropriate to ask what policy implications, if any, are suggested by our analysis. Perhaps the main implication is that, in terms of United States-Japan economic relations, it is difficult to build a strong and convincing case that Japan's trade and domestic policies are the root causes of the existing bilateral trade imbalance. The causes of the trade imbalance and the possible solutions should therefore be sought elsewhere, in particular in the macroeconomic structure and determinants of absorption and output in the two countries.

Technical Appendix

If we impose more structure on Π, the GNP function, by approximating it as either General Leontief or translog, we have:

$$\text{(A1)}\quad \Pi(P,L) = \sum_{i=1}^{N}\sum_{j=1}^{N}\sum_{s=1}^{K} d_{is}\left(\tfrac{1}{2}P_i^2 + \tfrac{1}{2}P_j^2\right)^{\frac{1}{2}}L_s + \sum_{i=1}^{N}\sum_{s=1}^{K} c_{is}P_iL_s +$$

$$\sum_{i=1}^{N}\sum_{s=1}^{K}\sum_{r=1}^{N} f_{sr}L_s^{\frac{1}{2}}L_r^{\frac{1}{2}}P_i$$

where $d_{is} = d_{si}$; $f_{rs} = f_{sr}$; $d_{ii} = 0$ for $i = 1,2,\ldots,N$;

$d_{ss} = 0$ for $s = 1,2,\ldots,K$; and $P_i \equiv$ price of good X_i

or

$$\text{(A2)}\quad \ln \Pi(P,L) = \alpha_0 + \sum_{i=1}^{N}\alpha_i \ln P_i + \tfrac{1}{2}\sum_{i=1}^{N}\sum_{j=1}^{N}\gamma_{ij}\ln P_i \ln P_j + \sum_{i=1}^{N}\sum_{s=1}^{K}\delta_{is}\ln P_i \ln L_s$$

$$+ \sum_{s=1}^{K}\beta_s \ln L_s + \frac{1}{2}\sum_{s=1}^{K}\sum_{r=1}^{K}\phi_{sr}\ln L_s \ln L_r$$

where $\sum_{i=1}^{N}\alpha_i = 1$; $\sum_{i=1}^{N}\delta_{is} = 0$ for $s=1,\ldots,K$;

$\sum_{j=1}^{N}\gamma_{ij} = 0$ for $i=1,\ldots,N$; $\sum_{i=1}^{N}\gamma_{ij}$ for $j=1,\ldots,N$

$\gamma_{ij} = \gamma_{ji}$;; $\sum_{s=1}^{K}\beta_s = 1$; $\sum_{s=1}^{K}\delta_{is}$ for $i=1,\ldots,N$;

$\sum_{r=1}^{K}\phi_{sr} = 0$ for $s=1,\ldots,K$ and $\sum_{s=1}^{K}\phi_{sr}$ for $r=1,\ldots,K$.

When (A1) or (A2) is combined with g to form the indirect utility function H', using Roy's Identity and Hotelling's Lemma, we get by differentiation of H':

$$(A3)\quad X_i^* = \theta_i + \sum_{s=1}^{K} Q_{is} L_s^* + \sum_{s=1}^{K}\sum_{r=1}^{K} f_{rs} L_s^{*\frac{1}{2}} L_r^{*\frac{1}{2}}$$

$$\text{where } Q_{is} \equiv \sum_{j=1}^{N} d_{ij}\left(\tfrac{1}{2}P_i^2 + \tfrac{1}{2}P_j^2\right)^{-\frac{1}{2}} P_i + C_{is}$$

and where the starred variables have been normalized by π; and

$$(A4)\quad X_i^* = \rho_i + \sum_{s=1}^{K} \delta_{is} \ln L_s$$

$$\text{where } \rho_i = \theta_i + \alpha_i + \sum_{j=1}^{N} \gamma_{ij} \ln P_j$$

As before, equation (A4) can be adjusted to take account of a quality and measurement error term:[41]

$$(A4')\quad X_i^* = \rho_i + \sum_{s=1}^{K} \delta_{is} \ln a_s + \sum_{s=1}^{K} \delta_{is} \ln L_s$$

Assuming all consumers have access to goods at the same prices, equations (A3), (A4), and (A4') provide a framework for examining the assumption of factor price equalization. For example in (A3) or (A4), with factor price equalization, equation (7) implies that:

$$f_{sr} = 0,\ \delta_{is} = 0 \text{ for } s, r, = 1,\ldots,K$$

$$i = 1,\ldots,N$$

These implications can be tested if equations (A3) or (A4) are estimated.

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Footnotes

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[1]The table is based on the classification used by GATT in compiling and maintaining its inventory of existing NTBs, with the exception that the government category (III) has been expanded somewhat. Inventories of NTBs are also maintained by UNCTAD and the IMF. The UNCTAD classification is based on the apparent intent of the measures and further distinguishes them according to whether they operate through quantitative restraints or through costs and prices. The IMF classification relates chiefly to restrictive exchange-rate practices and international financial measures. NTBs are also monitored in such U.S. Government agencies as the Office of the U.S. Trade Representative and Department of Commerce. The various inventories and monitoring systems are generally organized by types of NTBs, country, and sector, and may also contain information on the relevant trade categories and related economic magnitudes.

It should be noted that the nontariff measures in Table 1 include trade-expanding policies such as subsidies in addition to trade-restricting policies. Subsidies might then be understood to be negative NTBs designed to stimulate trade and investment.

[2]Thus, the 1986 softwood lumber case was in effect directed by the United States against British Columbian stumpage fees. While the case was resolved, at least temporarily, on a binational level, the federal and provincial governments in Canada have still to coordinate their respective policies.

[3]Actually in several instances, Japan accelerated its tariff reductions as part of its various market opening initiatives prior to 1987.

[4]The tariffs are weighted by 1976 trade, which was the reference period used in the Tokyo Round negotiations. The actual rates in effect presently may differ somewhat from those indicated in Table 2 insofar as the composition of trade may have changed since 1976. If we were to remove agricultural products, food and kindred products, and petroleum from the weighting process and focus only on industrial products, Japan's weighted-average tariff rate becomes 2.9% as compared to 4.3% for the United States and 5.2% for Canada. For further details, see Deardorff and Stern (1986, p. 51).

[5]According to Nogués, Olechowski, and Winters (1986, pp. 182–84), the NTBs include border measures that are product specific and for which internationally comparable data are available. Five groups are covered: quantitative import restrictions; voluntary export restraints; measures for the enforcement of decreed prices; tariff-type measures; and monitoring measures. Subsidies are excluded as are the various informal barriers mentioned in our discussion above.

[6]Some reservations on the use and interpretation of the measures of price effects of NTBs are discussed in Deardorff and Stern (1985, esp. p. 21). The NTB ad valorem equivalent estimates given in Table 4 are based on estimates in the literature and have been adjusted according to the NTB coverage indexes reported in Table 3. For details on the sources utilized and the methodology underlying the estimates, see Deardorff and Stern (1987, App. B).

[7]As noted by Bale (1983, pp. 37–38):

> "Some of the restrictions can be overcome by simply incorporating (thus establishing U.S. citizenship) in one of the fifty U.S. states. There are few restrictions on the naturalization of foreign enterprises, and this approach generally overcomes barriers in banking, insurance, and mineral leasing operations. Notwithstanding certain restrictions in these sectors, foreign-owned or controlled enterprises have extensive

interests in U.S. banking, insurance and federal on-shore and off-shore mineral properties."

[8]Five years of bilateral U.S.-Japan negotiations have led to more transparent testing, certification and approval procedures for new drugs and vaccines being sold in Japan. This has stimulated renewed foreign direct investment in this industry in Japan.

[9]Since the domestic telecommunications market was opened up to private firms on April 1, 1985, a large number of foreign firms have made significant investments. It is widely believed, however, that continuing efforts by the Ministry of Posts and Telecommunication to limit competition in this industry have prevented more foreign investment from taking place.

[10]See Frankel (1984).

[11]As noted in USTR (1986, p. 5), the Reagan Administration declared in September 1985 its commitment to "free and fair trade" by opening markets and instituting an aggressive attack on unfair foreign trade practices. A Trade Strike Force was established under the direction of the Secretary of Commerce. The actions taken in the first year are listed in USTR (1986, pp. 293–95).

[12]These amounts refer presumably to 1984. For information on U.S. programs of support for R&D and innovation and for high-technology industries, see Congressional Budget Office (1984a, 1985). By comparison with American efforts, Japanese government tax expenditures and direct subsidies to promote industries other than agriculture are relatively modest. See Saxonhouse (1983b).

[13]This section is based in part on Deardorff and Stern (1985).

[14]See the assumptions outlined in Leamer (1984, Ch. 1) and Helpman and Krugman (1985, Ch. 1).

[15]As noted in Saxonhouse (1983), differentiated products can easily be introduced into the familiar utility function which is positive, continuous, non-decreasing, quasi-concave and homogeneous. See also Helpman and Krugman (1985, Chap. 6).

[16]This formulation rests critically on the existence of direct community utility functions. For conditions under which this might be true, see Samuelson (1956) and Eisenberg (1961). For a more general discussion, see Woodland (1982).

[17]For a discussion of Roy's Identity, see Varian (1984, p. 126).

[18]The GNP function π as previously defined needs to allow for differentiated products and economies of scale. Following Helpman and Krugman, this can be done by including optimal firm scale in π. Provided optimal firm scale is small relative to market size, changes in industry output can be achieved by changes in the number of identical firms. This means at an industry level that there will be constant returns to scale.

[19]In the likely case that the number of goods exceeds the number of factors ($N>K$), trade will be indeterminant. In estimating models of this kind, Leamer (1984, pp. 18) suggests that the indeterminacy can be resolved by assuming small international transportation costs that deter and determine trade but are otherwise negligible. Alternatively, Saxonhouse (1983a, 1986) assumes that $N=K$, but that the included and excluded dependent and independent variables have properties such that the exclusion of relevant variables does not bias the parameters that are estimated.

It should be noted that the derivation of equation (11) does not necessarily require that the trade balance be zero or exogenously fixed at all. If securities are incorporated into the indirect trade utility function, then, with trade taking place in securities as well as in goods, it is possible to use the same model to examine the influence of sectoral trade policy on both trade structure and the overall current account on international transactions. See Helpman and Razin (1978).

[20]A similar conclusion has been drawn explicitly with reference to agricultural policy in Honma and Hayami (1986).

[21]Bowen, Leamer, and Sveikauskas (1987) find that the Heckscher-Ohlin equations linking input requirements, resource supplies, and trade should be rejected in favor of weaker

models that allow for measurement errors, technological differences, and/or factor price differences.

[22]This line of reasoning was first advanced as a possible explanation for the empirical failures of the simple H-O model by Leontief (1956).

[23]Note, however, that as long as 20 years ago, Krueger (1968) challenged the traditional viewpoint that factor prices are greatly disparate across countries. As she noted (pp. 657–58):

> "...that more than half of the differences between United Nations estimates of per capita income of each of the less developed countries in the sample and the United States is explained by demographic variables alone must surely cast some doubt on the degree of conviction with which the factor-price equalization model is held to be unrealistic."

Also, see Leamer (1984, pp. 28–29).

[24]The approach taken here is analogous to the two-step "jack-knife" procedures proposed in Guilkey and Schmidt (1973) and Zellner (1962). To illustrate further, let $a_s = 1 + a'_s$, assuming that $E(a'_s) = 0$. Using instrumental variable techniques in the presence of multiplicative errors allows consistent estimates of the B'_{is}. Using these estimates, for each economy an NX1 vector $[V_i]$ of net trade equation residuals can be formed for each time period. Consistent estimates of the quality and measurement error terms for each time period can then be obtained from:

$$\{[\hat{B}'_{is}L_s]'[\hat{B}'_{is}L_s]\}^{-1}\{[\hat{B}'_{is}L_s]'[V_i]\}$$

[25]A similar test on the distinctiveness of Japanese trade structure using a different sample is described in Saxonhouse (1987).

[26]Bowen, Leamer, and Sveikauskas (1987), in the course of their investigation of the Heckscher-Ohlin model, find that they cannot reject the hypothesis that cross-national data

are consistent with homotheticity. For contrary evidence that supports nonhomotheticity, see Markusen (1986, esp. pp. 1003–1004).

[27]Unlike the import equations, the gross export equations given by (10) will have many zero observations. This suggests that these equations should be specified as a Tobit model. The estimation method used here is described in Greene (1981).

[28]The approaches taken in equations (12) and (12') can be extended in a number of directions. A set of equations that are linear in factor endowments is not the only possible specification for a model explaining trade structure. Thus, suppose that the assumption of factor price equalization is dropped altogether. In the absence of equations (6) and (7) or (6') and (7'), an explicit equation to replace (12) or (12') can only be obtained by imposing more structure on Π, the GNP function. As indicated in the Technical Appendix below, the approximation of (12) as either Generalized Leontief or translog can be shown to yield estimating equations which are nonlinear in factor endowments but otherwise linear in parameters. The Generalized Leontief, translog and related flexible forms are discussed in Diewert (1974). For other functional forms that might be used, see Gallant (1981). Such a framework is more general than those previously used by Leamer and Saxonhouse and offers the possibility of testing for factor price equalization without actually using factor price data.

[29]The calculated valuues of P for import and export forecasts are 96.3 and 81.5, respectively.

[30]Equation (A4) does not suggest using GNP as an independent variable except perhaps as a proxy for other omitted variables.

[31]Balassa (p. 18) also found a dummy variable for the United States to be negative and significant, but he does not attribute this result to the existence of American barriers to trade.

[32]Like Bergsten and Cline, Balassa (p. 73) moves towards a translog specification by replacing his dependent variable by its anti-logarithm and finds that his results are not

markedly changed by this substitution. Unfortunately, while this is a step in the right direction, it is still insufficient to provide his work with an adequate conceptual foundation. Abstracting from the need to conduct his empirical work on a more disaggregated basis and then aggregate upwards in order to explain trade volume rather than net trade, if Balassa's empirical work is to follow from a translog specification of the indirect trade utility function as noted in our Technical Appendix below, his independent variable represented by per capita income also needs to be altered. Once again this is a problem that follows from Balassa being guided too much by Chenery's earlier work. Chenery introduced per capita income into his work as a proxy for physical capital per unit of labor and human capital per unit of labor. Unfortunately, the same translog specification that makes his new dependent variable attractive also suggests his capital variables should not be entered in factor-intensive form.

Further, even if Balassa could enter his capital variables properly, the difficulties in providing a translog-indirect trade utility function foundation for his work would not end. In this instance, while he would finally have a conceptual foundation for a net import equation, he would still face difficult problems in interpretation should he still find the Japan dummy significant. It is especially noteworthy that Balassa makes no allowance in his empirical work for differences in factor quality across countries. Since factor endowments enter his equations logarithmically, a statistically significant dummy variable would more likely reflect statistically significant differences in the quality of Japanese factors rather than special features of Japan's trade policy. This can be seen from equation (A4') in the Technical Appendix.

[33]As he notes (p. 68):

> "The next question concerns the introduction of transportation costs in the estimating equation. Using distance for this purpose will not be appropriate since transportation costs are several times lower by sea than by land and decline greatly with distance. In particular,

> employing a distance variable as a proxy for transportation costs introduces a bias in regard to Japan that cannot use the land route in its international trade and, apart from Australia, has by far the longest average distance from its trading partners among industrial countries.
>
> Thus, the use of the distance variable gives rise to a problem of identification in the case of Japan as to whether the statistical results pertaining to this variable reflect transportation costs or other country characteristics, in particular, trade policies."

[34]Reestimating equation (12') in Saxonhouse (1986) without using a distance variable, there were 68 instances in 327 cases where Japanese trade flows fall outside the forecast interval. These accounted for 7.6% of Japan's gross external trade.

[35]For example, Balassa assumes that transport costs as a proportion of total value of manufactured goods to be one-sixth of what was found in the well known work by Lipsey and Weiss (1974).

[36]As noted above, Balassa is critical of using distance as an explanatory variable. Contrary to his contention, however, treating distance as a linear term in a trade equation is quite compatible with the assumption that average transport costs decline with distance. Of course, a linear term only assumes that marginal cost is constant. In a semi-logarithmic translog trade equation, treating distance symmetrically with other independent variables is entirely compatible with both declining average and marginal costs. This is also true for Balassa's logarithmic formulation.

[37]Noland (p. 7) states that the equation that he estimates is formally derived from the Helpman-Krugman model that he presents in his Appendix A. A comparison of his Appendix A with his estimated equation, however, makes it difficult to see the basis for this claim.

[38]See Belsley, Kuh, and Welsch (1980, p. 20).

[39]It is interesting to note in this regard that Japan's import shares of manufactures have in fact increased substantially in recent years. See Sazanami's discussion in Chapter 3 above for details.

[40]A similar conclusion is to be found in Winters (1987). For a Japanese perspective on these issues, see Japan Economic Research Institute (1984).

[41]Equation (A3) is not adjusted for a quality and measurement error term because, in the absence of assuming factor price equalization, a_s cannot be identified within the Generalized Leontief framework.

Table 1

Major Categories of Nontariff Measures and Related Policies

I. Quantitative restrictions and similar specific limitations

1.	Import quotas	–	Restrictions on quantity and/or value of imports of specific commodities for some given time period; administered globally, selectively, or bilaterally.
2.	Export limitations	–	Same as above but with reference to exports.
3.	Licensing	–	Some system of licensing is required to administer the foregoing restrictions. Licensing may be discretionary and also used for statistical purposes.
4.	Voluntary export restraints	–	Restrictions imposed by importing country but administered by exporting country; administered multilaterally and bilaterally; requires system of licensing; essentially similar to an orderly marketing arrangement.
5.	Exchange and other financial controls	–	Restrictions on receipts and/or payments of foreign exchange designed to control international trade and/or capital movements; will generally require some system of licensing; may involve multiple exchange rates for different kinds of transactions.
6.	Prohibitions	–	May be selective with respect to commodities and countries of origin/destination; includes embargoes; may carry legal sanctions.
7.	Domestic content and mixing requirements	–	Requires that an industry use a certain proportion of domestically produced components and/or materials and labor in producing final products.
8.	Discriminatory bilateral agreements	–	Preferential trading arrangements that may be selective by commodity and country; includes preferential sourcing arrangements.
9.	Countertrade	–	Arrangements involving barter, counterpurchases of goods, and payments in kind.

Table 1 (continued)

II. Nontariff charges and related policies affecting imports

1.	Variable levies	–	Based on a target domestic price of imports, a levy is imposed so that the price of imports reaches the target price whatever the cost of imports.
2.	Advance deposit requirement	–	Some proportion of the value of imports must be deposited in advance of the payment, with no allowance for any interest accrued on the deposit.
3.	Antidumping duties	–	Imposition of a special import duty when the price of imports is alleged to lie below some measure of the costs of production of foreign firms; minimum foreign prices may be established to "trigger" antidumping investigations and actions.
4.	Countervailing duties	–	Imposition of a special import duty to counteract an alleged foreign government subsidy to exports; normally required that domestic injury be shown.
5.	Border tax adjustments	–	When indirect (e.g., sales or value added) taxes are levied on the destination principle, imports will be subject to such taxes but exports will be exempt; the effects on trade will be neutral except in cases in which the adjustments more than compensate for the taxes imposed or exempted, or when the size of the tax differs across commodities.

III. Government participation in trade, restrictive practices, and more general government policies

1.	Subsidies and other aids	–	Direct and indirect subsidies to export and import-competing industries, including tax benefits, credit concessions, and bilateral tied aid programs.
2.	Government procurement policies	–	Preferences given to domestic over foreign firms in bidding on public-procurement contracts, including explicit cost differentials and informal procedures favoring procurement from domestic firms.
3.	State trading, government monopolies, and exclusive franchises	–	Government actions which may result in trade distortions, including government-sanctioned, discriminatory international transport agreements.
4.	Government industrial policy and regional development measures	–	Government actions designed to aid particular firms, industrial sectors, and regions to adjust to changes in market conditions.

Table 1 (continued)

5.	Government financed research and development and other technology policies	–	Government actions designed to correct market distortions and aid private firms; includes policies relating to intellectual property (patents, copyrights, and trademarks) and technological spillovers from government programs, such as defense and public health.
6.	National systems of taxation and social insurance	–	Personal and corporate income taxation, unemployment insurance, social security, and related policies which may have an impact on trade.
7.	Macroeconomic policies	–	Monetary/fiscal, balance-of-payments, and exchange-rate actions which have an impact on national output, foreign trade, and capital movements.
8.	Competition policies	–	Antitrust and related policies (e.g., intellectual property regulations) designed to foster or restrict competition and which may have an impact on foreign trade and investment.
9.	Foreign investment policies	–	Screening and monitoring of inward and/or outward foreign direct investment, including performance requirements affecting production and trade.
10.	Foreign corruption policies	–	Policies designed to prohibit or restrict bribes and related practices in connection with foreign trade and investment.
11.	Immigration policies	–	General or selective policies designed to limit or encourage international movement of labor and which have an impact on foreign trade and investment.

IV. Customs procedures and administrative practices

1.	Customs valuation procedures	–	Use of specially constructed measures of price rather than the invoice or transactions price for the purpose of levying tariffs.
2.	Customs classification procedures	–	Use of national methods of customs classification rather than an internationally harmonized method for the purpose of levying tariffs.
3.	Customs clearance procedures	–	Documentation, inspection, and related practices which may impede trade.

Table 1 (continued)

V. Technical barriers to trade

1.	Health and sanitary regulations and quality standards	–	Technical regulations designed for domestic objectives but which may discriminate against imports.
2.	Safety and industrial standards and regulations	–	See above.
3.	Packaging and labeling regulations, including trademarks	–	See above.
4.	Advertising and media regulations	–	See above.

Source: Adapted from Deardorff and Stern (1985, pp. 13–14).

Table 2
Post-Tokyo Round (1987) Tariffs by Sector in the Major Industrialized Countries
(Percent; Weighted by 1976 Own-Country Imports)

Sector	ISIC	ALA	ATA	BLX	CND	DEN	FIN	FR	GFR	IRE
Agr., For., & Fisheries	(1)	7.5	8.6	4.7	2.2	5.0	11.0	4.6	4.7	5.2
Food, Bev., & Tobacco	(310)	21.9	20.7	10.1	6.1	13.4	23.8	9.1	11.2	10.8
Textiles	(321)	21.2	15.9	7.2	16.7	8.7	22.5	7.3	7.4	7.8
Wearing Apparel	(322)	61.8	36.2	13.4	24.2	13.2	35.5	13.2	13.4	13.2
Leather Products	(323)	20.3	7.7	2.5	6.3	1.8	9.3	1.6	3.2	1.8
Footwear	(324)	33.8	23.4	11.4	21.9	11.5	17.4	11.3	11.7	11.9
Wood Products	(331)	12.5	3.7	2.4	3.2	3.4	0.4	2.4	2.9	2.5
Furniture & Fixtures	(332)	31.2	22.1	5.6	14.3	5.5	5.5	5.6	5.6	5.7
Paper & Paper Products	(341)	7.7	12.3	6.9	6.7	7.9	4.5	5.5	5.2	8.0
Printing & Publishing	(342)	1.8	1.5	1.5	1.0	2.8	1.1	2.2	2.1	1.5
Chemicals	(35A)	5.4	4.7	8.0	7.5	8.5	1.8	7.6	8.0	7.6
Petroleum & Rel. Prod.	(35B)	0.2	4.4	1.5	0.3	3.3	0.1	0.5	1.8	3.8
Rubber Products	(355)	11.2	9.9	4.2	6.7	4.4	13.5	3.5	3.8	3.7
Nonmetallic Min. Prod.	(36A)	11.5	5.9	3.7	6.4	5.0	2.9	4.7	3.6	4.5
Glass & Glass Products	(362)	18.9	12.9	8.0	7.2	7.5	22.3	7.4	7.9	7.3
Iron & Steel	(371)	10.8	5.8	4.6	5.4	5.5	4.2	4.9	4.7	5.9
Nonferrous Metals	(372)	4.2	3.3	1.6	3.0	6.6	0.8	2.6	1.9	6.5
Metal Products	(381)	23.7	10.4	5.4	8.5	5.5	7.7	5.4	5.5	5.4
Nonelectric Machinery	(382)	13.9	6.4	4.3	4.5	4.4	6.1	4.4	4.5	4.3
Electric Machinery	(383)	21.6	14.7	7.4	5.8	7.1	6.0	7.7	8.3	7.2
Transport Equipment	(384)	21.2	22.1	7.9	1.6	7.2	3.8	7.9	7.7	10.2
Misc. Manufacturing	(38A)	12.8	8.7	3.0	5.4	6.1	12.6	5.8	5.6	6.5
All Sectors		14.8	11.3	5.4	4.6	6.4	6.2	4.9	5.7	6.6

Sector	ISIC	IT	JPN	NL	NZ	NOR	SWD	SWZ	UK	US
Agr., For., & Fisheries	(1)	6.1	21.8	4.7	3.8	1.5	1.8	5.2	4.5	1.8
Food, Bev., & Tobacco	(310)	7.7	28.5	10.6	16.2	8.7	3.7	13.3	10.3	4.7
Textiles	(321)	5.6	3.3	8.5	12.3	13.3	10.3	6.6	6.7	9.2
Wearing Apparel	(322)	13.2	13.9	13.5	58.5	21.7	14.2	12.4	13.3	22.7
Leather Products	(323)	0.7	3.1	3.0	15.3	5.8	4.0	2.1	1.2	4.2
Footwear	(324)	10.4	15.7	11.2	40.7	21.7	13.7	9.0	12.5	8.8
Wood Products	(331)	0.8	0.3	2.8	11.4	1.6	0.7	3.2	3.1	1.7
Furniture & Fixtures	(332)	5.6	5.1	5.6	38.3	5.1	4.0	9.2	5.6	4.1
Paper & Paper Products	(341)	2.6	2.9	6.2	20.5	1.9	2.4	4.3	4.9	0.2
Printing & Publishing	(342)	1.8	0.1	2.2	1.1	4.3	0.2	0.7	2.1	0.7
Chemicals	(35A)	8.1	4.8	8.1	8.1	6.2	4.8	0.9	7.9	2.4
Petroleum & Rel. Prod.	(35B)	0.6	2.2	1.0	0.6	0.1	0.0	0.0	1.1	1.4
Rubber Products	(355)	2.7	1.1	4.1	9.5	6.6	6.1	1.7	2.7	2.5
Nonmetallic Min. Prod.	(36A)	2.8	0.5	3.3	12.7	2.4	2.8	2.5	2.4	5.3
Glass & Glass Products	(362)	7.6	5.1	7.5	13.5	8.0	7.1	3.1	7.9	6.2
Iron & Steel	(371)	3.5	2.8	5.6	5.2	1.7	3.7	1.7	4.7	3.6
Nonferrous Metals	(372)	1.8	1.1	3.6	4.1	0.9	0.7	2.4	1.7	0.7
Metal Products	(381)	5.5	5.2	5.4	26.5	4.4	4.0	2.8	5.6	4.8
Nonelectric Machinery	(382)	4.5	4.4	4.3	22.1	5.2	3.5	1.2	4.2	3.3
Electric Machinery	(383)	8.0	4.3	7.8	19.6	6.9	4.5	1.6	8.1	4.4
Transport Equipment	(384)	8.8	1.5	9.0	26.8	2.2	5.1	6.1	7.2	2.5
Misc. Manufacturing	(38A)	5.8	4.6	5.2	18.2	7.4	4.6	1.1	3.0	4.2
All Sectors		4.4	6.2	5.7	13.8	4.5	3.9	3.5	4.9	3.3

Source: Calculated by Deardorff and Stern (1986), based on information provided by the Office of the U.S. Trade Representative.

Table 3

NTB Coverage Percentages by Product Category for the Major Industrial Countries, 1983

Industrial Country Markets	All Products	All, less Fuels	Agriculture	Manufactures	Textiles	Footwear	Iron & Steel	Electrical Machinery	Vehicles	Rest of Manufactures
EEC	22.3	21.1	36.4	18.7	52.0	9.5	52.6	13.4	45.3	10.3
Belgium-Luxembourg	26.0	33.9	55.9	33.6	38.2	12.3	47.4	19.5	54.3	30.6
Denmark	11.7	15.9	28.5	13.2	46.5	13.6	49.9	6.7	35.0	5.4
France	57.1	28.1	37.8	27.4	48.4	6.6	73.9	41.7	42.9	19.4
West Germany	12.4	18.3	22.3	18.5	57.0	9.7	53.5	6.8	52.0	6.6
Greece	13.4	23.2	46.4	20.4	21.8	22.8	54.5	13.5	65.5	8.5
Ireland	13.4	15.0	24.8	13.8	31.7	8.8	23.0	0.5	65.8	6.6
Italy	6.9	14.6	39.9	9.3	37.2	0.2	48.6	7.1	10.2	2.6
Netherlands	25.5	28.0	51.9	17.8	57.3	12.0	35.5	4.0	49.7	10.7
UK	14.3	17.5	34.9	14.8	59.6	12.2	42.1	12.7	44.3	6.7
Australia	34.1	24.1	36.1	23.6	30.9	50.0	55.6	48.7	0.7	21.6
Austria	4.9	6.0	41.7	2.4	2.2	0.1	0.0	0.0	2.9	3.0
Finland	34.9	9.2	31.5	6.7	31.0	68.8	43.9	0.0	0.0	0.4
Japan	11.9	16.9	42.9	7.7	11.8	34.1	0.0	0.0	0.0	7.7
Norway	5.7	5.8	24.2	4.1	42.9	5.4	0.1	0.0	0.2	0.4
Switzerland	32.2	23.6	73.4	17.6	57.4	0.0	3.9	28.1	1.1	14.6
USA	43.0	17.3	24.2	17.1	57.0	11.5	37.7	5.2	34.2	6.1
All Industrial Country Markets	27.1	18.6	36.1	16.1	44.8	12.6	35.4	10.0	30.4	8.8

Source: Adapted from Nogues et al. (1985).

Table 4
Estimated Ad Valorem Equivalents of Non-Tariff Barriers
in the Major Industrialized Countries
(Percent)

Sector	ISIC	ALA	ATA	BLX	CND	DEN	FIN	FR	GFR	IRE
Agr., For., & Fisheries	(1)	1.4	7.0	18.4	1.0	9.4	10.4	10.9	3.6	8.2
Food, Bev., & Tobacco	(310)	9.2	11.4	14.3	4.1	7.3	8.1	8.8	4.5	6.3
Textiles	(321)	3.3	0.1	5.3	6.7	12.3	4.4	12.3	7.9	8.4
Wearing Apparel	(322)	16.6	0.1	5.3	21.7	6.5	2.1	4.3	7.0	4.4
Leather Products	(323)	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Footwear	(324)	13.0	0.0	3.2	5.3	3.5	18.0	1.9	2.5	2.3
Wood Products	(331)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Furniture & Fixtures	(332)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paper & Paper Products	(341)	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0
Printing & Publishing	(342)	0.0	0.0	0.0	0.0	0.0	0.0	10.1	0.0	0.0
Chemicals	(35A)	1.7	3.0	0.0	0.0	0.0	0.3	1.5	0.0	0.0
Petroleum & Rel. Prod.	(35B)	17.5	0.2	9.8	0.0	0.0	16.8	89.2	0.0	0.0
Rubber Products	(355)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5
Nonmetallic Min. Prod.	(36A)	0.0	0.0	1.1	0.0	0.0	0.5	2.0	0.2	0.0
Glass & Glass Products	(362)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iron & Steel	(371)	16.7	0.0	14.2	0.0	15.0	13.2	22.2	16.1	6.9
Nonferrous Metals	(372)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Metal Products	(381)	0.8	0.0	1.9	0.0	0.8	0.7	0.7	0.0	0.0
Nonelectric Machinery	(382)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electric Machinery	(383)	7.0	0.0	2.8	1.4	1.0	0.0	10.0	1.0	0.1
Transport Equipment	(384)	0.1	0.3	6.2	3.9	4.0	0.0	4.9	5.9	7.5
Misc. Manufacturing	(38A)	2.2	0.3	3.1	0.0	0.5	0.0	4.5	0.0	0.0
All Sectors		4.0	1.2	5.7	1.9	3.0	5.3	24.4	2.5	2.6

Sector	ISIC	IT	JPN	NL	NZ	NOR	SWD	SWZ	UK	US
Agr., For., & Fisheries	(1)	13.2	48.5	17.1	0.4	12.7	3.1	22.8	11.5	0.3
Food, Bev., & Tobacco	(310)	10.2	27.1	13.3	4.1	15.7	6.3	18.3	8.9	14.5
Textiles	(321)	8.8	5.2	15.1	10.1	11.3	3.2	15.2	9.7	12.4
Wearing Apparel	(322)	1.1	2.7	8.0	8.3	12.4	11.4	8.0	9.1	17.8
Leather Products	(323)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Footwear	(324)	0.1	6.1	3.1	0.0	1.4	29.1	0.0	3.2	4.3
Wood Products	(331)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Furniture & Fixtures	(332)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paper & Paper Products	(341)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Printing & Publishing	(342)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.3
Chemicals	(35A)	3.4	1.1	0.0	1.7	4.5	1.1	4.3	1.7	0.0
Petroleum & Rel. Prod.	(35B)	0.0	1.3	3.9	6.1	0.9	0.0	16.8	0.0	0.0
Rubber Products	(355)	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nonmetallic Min. Prod.	(36A)	1.0	1.1	1.1	0.8	0.0	0.5	0.0	0.0	0.0
Glass & Glass Products	(362)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iron & Steel	(371)	14.6	0.0	10.6	0.0	0.0	0.0	1.2	12.6	11.3
Nonferrous Metals	(372)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Metal Products	(381)	1.4	0.0	1.9	0.8	0.7	0.0	0.2	0.0	0.0
Nonelectric Machinery	(382)	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electric Machinery	(383)	1.0	0.0	0.6	0.7	0.0	0.0	4.0	1.8	0.2
Transport Equipment	(384)	1.2	0.0	5.7	2.4	0.0	0.0	0.1	5.1	3.9
Misc. Manufacturing	(38A)	1.0	0.8	0.1	0.4	0.0	0.0	0.1	0.0	0.0
All Sectors		4.0	8.2	5.1	2.5	2.2	1.3	6.3	3.3	2.4

Source: Adapted from Deardorff and Stern (1987).

Table 5

Studies of the Quantitative Impact of Trade Barriers

Author(s) of Study	Time Period	Countries in Sample	Level of Aggregation	Dependent Variable	Independent Variable	Model	Findings
Balassa (1986)	1973-1983	17	One economy wide sector, imports disaggregated by type, manufacturing, primary, and by source; developing, industrialized economies	Log Import/GNP Import/GNP	Log GNP/per capita log population primary imports/ total imports transport costs	Stylized version of Chenery (1960) model	Significant dummy variables for Japan, United States
Bergsten-Cline (1985, 1987)	1974-1984	11	One economy wide sector	Import/GNP	Log GNP, log crude, log oil per capita, log arable land per capita, transport costs, iron reserves, dummy	Stylized version of Heckscher-Ohlin	Insignificant dummy variable for Japan
Lawrence (1987)	1970, 1980, 1983	13	21 manufacturing sectors	Imports/total domestic use	Exports/total OECD use; production/ total OECD production; distance	Helpman-Krugman	Generally significant Japanese dummies indicating underimporting of manufactures; some significant U.S. and Canadian dummies indicating overimporting of manufactures
Leamer (1984)	1958, 1975	60	10 sectors	Net trade	Capital, 3 varieties of labor, 4 varieties of land, coal, oil, minerals	Heckscher-Ohlin with factor price equalization	Generally significant Canadian dummies for 1958; two significant dummies each for U.S., Japan and Canada for 1975

Table 5 (continued)

Author(s) of Study	Time Period	Countries in Sample	Level of Aggregation	Dependent Variable	Independent Variable	Model	Findings
Saxonhouse (1983a)	1959, 1962 1964, 1967 1969, 1971 1973	9	109 sectors	Net trade	Capital, 2 varieties of labor, petroleum reserves, iron ore deposits, arable land distance	Heckscher-Ohlin with factor price equalization normalized for factor quality	17 significant Japanese dummy variables out of 109 possible instances; covers 4.9% of total trade; 11 significant dummy variables for Canada
Saxonhouse (1986)	1964, 1971, 1979	22	109 sectors	Net trade	Capital, 2 varieties of labor, petroleum reserves, iron ore deposits, arable land, distance	Hecksher-Ohlin with factor price equalization normalized for factor quality	61 out of 327 instances Japanese trade outside forecast interval; covers 6.1% of Japanese gross external trade; 39 out of 327 instances for Canada; 30 out of 327 instances for United States
Noland (1987)	1980	45	One economy wide sector	Log imports, log exports, log trade volume	Log GDP, log GDP per capita, factor endowment similarity index, transport costs	Stylized version of Heckscher-Ohlin and Helpman-Krugman	Insignificant dummy variables for U.S., Canada, and Japan
Staiger, Deardorff, and Stern (1985,1987)	1970's	34	22 traded sectors; 7 nontradables	Employment; net trade; factor content of trade	Capital, 8 categories of labor	Multi-sector, multi-country computational model	Japanese barriers have greatest impact on its agricultural sector and thus on U.S. agricultural interests

Table 6

Leamer's Unusual Net Trade Observations for Canada, the United States, and Japan

1958
Canada exports less forest products than expected. Canada imports less labor-intensive products than expected. Canada imports less capital-intensive products than expected. Canada imports less chemical products than expected. U.S. imports less raw materials than expected.
1975
Canada exports less forest products than expected. Canada imports less chemical products than expected. U.S. imports more petroleum than expected. U.S. imports less forest products than expected. U.S. imports less tropical products than expected. U.S. exports more cereals than expected. Japan exports more capital-intensive products than expected.

Source: Adapted from Leamer (1984, p. 168).

Table 7

Saxonhouse's Extreme Observations for Japanese, Canadian, and United States Trade Flows

Japan	
Commodity	**Years**
Maize, unmilled	1964,1971,1979
Other cereals	1964,1971,1979
Bananas and plantain	1964,1971,1979
Other fruits & nuts	1964,1971,1979
Saw-veneer logs-conifer	1979
Saw-veneer logs-non-conifer	1964,1971,1979
Shaped wood	1964,1979
Pulp and waste paper and cork manufactures	1964,1971,1979
Veneer plywood	1971,1979
Silk	1979
Crude fertilizers	1964,1979
Leather, pressed fur	1964,1971,1979
Plastic materials	1964,1971
Glass	1964,1971,1979
Pearls, precious & semi-precious stones	1964,1971
Aluminum	1964,1971,1979
Zinc	1964,1971,1979
Aircraft engines	1971,1979
Other clothing equipment	1971,1979
Footwear	1964,1971,1979
Medical instruments	1964,1971,1979
Photo, cinema supplies	1964,1971,1979
Pianos & other musical instruments	1964,1971,1979
Fishing, hunting & sports equipment	1964,1979
Canada	
Commodity	**Years**
Fish & preparations	1964,1971
Saw-veneer logs conifer	1964,1971,1979
Saw-veneer logs non-conifer	1964,1971,1979
Shaped wood	1964,1971,1979
Pulp & waste paper	1964,1971,1979
Iron ore concentrates	1964,1979
Leather, pressed fur	1964,1971
Paper, paperboard and manufactures	1964,1971,1979
Glass	1971,1979
Nickel	1964,1971,1979
Zinc	1964,1971
Paper mill machinery	1964,1979
Electric distrib. machinery	1964,1971,1979
Footwear	1964
Medical instruments	1971
Pianos & other musical instruments	1964,1979

Table 7 (continued)

United States	
Commodity	**Years**
Wheat	1971,1979
Maize, unmilled	1964,1971,1979
Other cereals	1964,1971,1979
Manganese ores	1964,1971,1979
Petroleum products	1971,1979
Plastic materials	1964,1971,1979
Rubber manufacturers	1979
Glass	1971,1979
Lead	1964,1979
Ball & roller bearings	1964,1979
Print & binding machinery	1964,1971,1979
Clothing	1964,1971,1979
Motor vehicle parts	1979

Source: Adapted from Saxonhouse (1986).

Table 8
Lawrence's Unusual Gross Import Observations
for Canada, the United States, and Japan

1970	
Production Share Model (Equation 4a)	
Pooled Results	**Sectoral Results**
Canada imports more then expected Japan imports less than expected	Japan imports less than expected of the following products: electrical components, motor vehicles, rubber/plastics, other transportation, stone/clay/glass, ferrous metals, fabricated metals, paper products, wood/furniture
Export Share Model (Equation 4a')	
Canada imports more than expected Japan imports less than expected	Japan imported less than expected of the following products: motor vehicles, wood/furniture
1980	
Production Share Model (Equation 4a)	
Canada imports more than expected United States imports more than expected Japan imports less than expected	Japan imports less than expected of the following products: electrical components, electrical machinery, motor vehicles, non-electrical machinery, rubber/plastic, other transportation, stone/clay/glass, ferrous metals, fabricated metals Japan imports more than expected of the following products: non-ferrous metals
Export Share Model (Equation 4a')	
Japan imports less than expected	Japan imports less than expected of the following products: electrical machinery, motor vehicles, non-electrical machinery, rubber/plastic, stone/clay/glass, fabricated metals Japan imports more than expected of the following products: non-ferrous metals

Table 8 (continued)

1983	
Production Share Model (Equation 4a)	
United States imports more than expected Japan imports less than expected	Japan imports less than expected of the following products: electrical components, electrical machinery, motor vehicles, non-electrical machinery, rubber/plastic, other transportation, fabricated metals, wood/furniture, clothing/shoes Japan imports more than expected of the following products: non-ferrous metals
Export Share Model (Equation 4a')	
Japan imports less than expected	Japan imports less than expected of the following products: electrical components, electrical machinery, motor vehicles, non-electrical machinery, rubber/plastic, other transportation, fabricated metals, wood/furniture Japan imports more than expected from the following products: non-ferrous metals

Adapted from Lawrence (1987), Tables 8 and 9.

Table 9
Country Sample for a Test of Differentiated Products and Factor Endowments, 1979

Sample		
Argentina	Honduras	Nigeria
Australia	Hongkong	Norway
Austria	Iceland	Pakistan
Bangladesh	India	Panama
Belgium	Indonesia	Paraguay
Brazil	Ireland	Peru
Canada	Israel	Philippines
Chile	Italy	Portugal
Colombia	Ivory Coast	Saudi Arabia
Costa Rica	Jamaica	Singapore
Denmark	Japan	Spain
Dominican Republic	Jordan	Sri Lanka
Ecuador	Korea	Sweden
Egypt	Malaysia	Switzerland
Finland	Mexico	Thailand
France	Morocco	Trinidad
Germany	Netherlands	Turkey
Greece	New Zealand	United Kingdom
		United States

Table 10
Extreme Observations on Japanese, Canadian, and U.S. Trade Flows, 1979

Imports		
Japan	**Canada**	**United States**
Meat and preparations	Dairy products & eggs	Manganese ores
Dairy products and eggs	Fish & preparations	Petroleum products
Tobacco & manufactures	Oil seed, excl. soya beans	Plastic materials
Saw/veneer logs — conifer	Crude & synth. rubber	Rubber manufactures
Saw/veneer logs — non-conifer	Saw/veneer logs — conifer	Silk fabrics, woven
Shaped wood	Saw/veneer logs — non-conifer	Nickel
Rubber manufactures	Shaped wood	Zinc
Cork manufactures	Leather, pressed fur	Ball & roller bearings
Veneer plywood	Rubber manufactures	Painting & binding machinery
Glass	Paper, paperboard and manufactures	Motor vehicle parts
Pearls	Silk fabric, woven	Clothing
All other iron & steel	Glass	Footwear
Silver & platinum	Nickel	Optical equipment
Aluminum	Zinc	Photographic equipment
Lead	Piston engines	Pianos & other musical instruments
Zinc	Paper mill machinery	
Tin	Print & binding machinery	
Aircraft engines	Pump & centrifuges	
Print & binding machin.	Electric distrib. machinery	
Clothing	Switch gear	
Footwear	Pianos and other musical equipment	
Optical equipment		
Photographic equipment		
Fishing, hunting, & sport equipment		

Exports		
Japan	**Canada**	**United States**
Plastic materials	Fish & preparations	Fish& preparations
Rubber manufactures	Shaped wood	Wheat, unmilled
Wool fabrics, woven	Paper, paperboard & manufactures	Maize, unmilled
Glass	Nickel	Oil seeds, excl. soya beans
Pearls	Zinc	Shaped wood
All other iron & steel	Paper mill machin.	All other fertilizers & crude materials
Aircraft engines	Elect. power machines	Coal, coke, & briquette
Other clothing equip.	Elect. distrib. mach.	Aircraft engines
Print & binding mach.	Passenger motor veh.	Aircraft parts
Aircraft & parts	Ships and boats	
Pumps & centrifuges	Clothing	
Photo & cinema supplies	Fishing, hunting, & sports equipment	

Appendix Table 1

Federal and State Regulations Potentially Affecting Foreign Investment in the United States

	Sector/Activity		Regulations
1.	Air transportation	–	Foreign acquisitions and provision of certain air services by foreign investors require U.S. Government approval. U.S. air carriers must be U.S. citizens.
2.	Ocean and coastal shipping	–	Operators and those seeking government benefits must meet certain U.S. citizenship requirements.
3.	Banking	–	Federally chartered banks must have a majority of U.S. citizens on their boards. Some states restrict foreign owned banks.
4.	Insurance	–	Some states impose special requirements on foreign owned insurance operations.
5.	Access to classified information	–	In the absence of an applicable treaty, foreign firms may be unable to obtain the security clearances necessary to perform certain government contracts.
6.	Government insurance and loan programs	–	Overseas investment insurance programs, agricultural emergency loans, and guarantees for electric vehicles are subject to U.S. citizenship requirements.
7.	Energy and power production	–	Foreign investors may generally not receive licenses to own or use nuclear materials and facilities. Leases and licenses for geothermal power, ocean thermal energy conversion facilities and hydroelectric power facilities require domestic incorporation.
8.	Mineral resources	–	Exploitation of certain federal lands requires domestic incorporation and reciprocity. A few states also restrict the access of foreign investors to mineral resources on state land.
9.	Fishing	–	Foreign flag vessels are subject to certain restrictions. Special government assistance is limited to U.S. citizens.
10.	Customhouse brokers	–	Licenses are limited to U.S. citizens.
11.	Ownership of real estate	–	Publicly owned lands may not be sold to non-U.S. citizens or non-U.S. corporations. Foreign holders of agricultural land must report their ownership. Foreign investors must report their holdings or real property to the Internal Revenue Service. About 30 states control ownership of land in some fashion.

Appendix Table 1 (continued)

	Sector/Activity		Regulations
12.	Radio and television broadcasting	–	Foreign governments, foreign enterprises, and foreign controlled domestic corporations may not hold common carrier licenses.
13.	Submarine cable service	–	The Federal Communications Commission can deny licenses to foreigners.
14.	Communications Satellite Corporation	–	Foreigners may own no more than 20 percent of COMSAT.

Source: Adapted from Bale (1983, pp. 45–46).

Appendix Table 2

USTR Identification of Canadian Barriers, 1986

	Barrier		Description
1.	Tariffs and other import charges		
a.	Tariffs	–	Despite the reductions in the Tokyo Round, Canadian tariffs on manufactures are among the highest of all industrialized nations.
b.	Provincial liquor boards	–	Certain provincial liquor boards do not carry particular U.S. products, they may charge discriminatory markups, and access to distribution systems may be limited.
c.	Canadian Wheat Board (CWB) licensing requirements	–	The CWB only issues permits for the import of wheat, oats, barley, and related products when the product cannot be found in Canada.
d.	Footwear	–	Canadian footwear quotas were extended on women's and girls' footwear in 1985 at the same time as all other footwear quotas were eliminated.
2.	Standards, testing, labeling, certification		
a.	Plywood	–	The plywood standards of the Canadian Standards Association exclude major U.S. plywood species.
3.	Government procurement	–	Where the GATT Government procurement code does not apply, federal and provincial government agencies and Crown Corporations favor Canadian-based firms if there is sufficient competition among these firms.
4.	Export subsidies	–	The Western Grain Transportation Act of January 1, 1984 increased the number of products eligible for freight-rate subsidy and designates the United States as an eligible export market for subsidized freight rates.
5.	Lack of intellectual property protection		

Appendix Table 2 (continued)

	Barrier		Description
a.	Copyright protection	–	U.S. copyright owners are not compensated for unauthorized cable system retransmission of broadcast signals containing their works.
b.	Compulsory pharmaceutical patents licensing	–	Section 41 of Canada's patent law provides for compulsory licensing of pharmaceutical patents and a nominal 4 percent royalty payment.
6.	Services barriers		
a.	Border broadcasting	–	Since 1976, Canadian firms have been denied tax deductions for the cost of advertising in foreign media (mainly TV) when the advertising is directed primarily at Canadians.
b.	Restrictions on Canadian advertising in U.S. publications	–	Nondeductibility of Canadian advertising in U.S. publications and restrictions on advertising in U.S. publications exported to Canada.
c.	Trucking	–	Some provinces limit market access of U.S. trucking firms.
d.	Data processing requirements	–	Processing and maintenance of Canadian bank operating records must be done in Canada.
e.	Discriminatory postal rates	–	Since 1979, there have been higher second-class postal rates on foreign publications mailed in Canada than on Canadian publications.
7.	Investment barriers		
a.	Unreasonable entry restrictions	–	The Investment Canada Act of June 30, 1985 permits the Government to limit U.S. and other foreign investment. Investments and acquisitions in culturally sensitive areas(both publishing and distribution, film and video, music recordings and print music) are especially subject to review, and certain types of foreign investment in oil and gas are discouraged in order to foster Canadian ownership.

Appendix Table 2 (continued)

	Barrier		Description
b.	Lack of national treatment	–	Canada maintains limits on granting national treatment to foreign-owned investments in a wide range of activities.
c.	Performance requirements	–	Canada reserves the right to impose domestic performance requirements on foreign investment.

Source: Adapted from USTR (1986, pp. 47–60).

Appendix Table 3

USTR Identification of Japanese Barriers, 1986

	Barrier		Description
1.	Tariffs and other import charges		
a.	Cigarette and tobacco products	–	Relatively high tariffs and excise taxes, restricted distribution, and a ban on foreign manufacturing limit U.S. exports to Japan.
b.	Wood and paper products	–	Relatively high tariffs, a restrictive approval system, and discriminatory regulatory procedures limit U.S. sales to Japan.
c.	Alcoholic beverages and wine	–	Japanese tariffs are relatively high, and internal consumption taxes are greater on imports of higher value spirits and wines.
d.	Aluminum	–	Japan has made an effort to develop its aluminum fabricating industry through government financial assistance and other measures.
e.	Fresh grapefruit		Japan has a relatively high tariff on imports during its own growing season and a reduced tariff off season.
f.	Walnuts	–	Japan has a relatively high tariff on shelled and unshelled walnuts.
g.	Candy and chocolate confectionary	–	Japan has relatively high tariffs on candy and chocolate confectionary.
2.	Quantitative restrictions		
a.	Fish products	–	Japan's quotas, tariffs, and licensing rules impair the development of Japan's market for U.S. fishery products.
b.	Agricultural products	–	Japan maintains quotas on several agricultural imports, especially beef and citrus products.
c.	Leather and leather footwear	–	Japan maintains a tariff quota system on imports of leather and leather footwear.

Appendix Table 3 (continued)

	Barrier		Description
3.	Standards, testing, labeling, certification[a]		
a.	Japanese industrial standards (JIS)	–	The administration of the JIS system is not sufficiently transparent and does not permit effective foreign participation in drafting JIS quality standards.
b.	Pharmaceuticals/ medical devices	–	There is ongoing U.S. concern with government involvement in licensing relationships, regulatory and testing issues, and the health insurance reimbursement system.
c.	Food additives	–	Japan's Ministry of Health and Welfare has resisted U.S. processed food manufacturers' interest in approving new food additives.
4.	Government procurement[a]		
a.	Satellites	–	Japanese government entities are prohibited from buying U.S. built satellites.
5.	Export subsidies	–	There is U.S. concern that Japan and other OECD countries are abusing the use of tied aid credits to promote commercial exports.
6.	Lack of intellectual property protection		
a.	Copyrights	–	Enforcement of Japan's copyright laws is lax, and there is not full cooperation with U.S. firms to enforce copyright protection.
b.	Patents	–	Japan's patent registration system is especially slow, and its judicial procedures do not adequately protect foreign holders of patents.
c.	Trademarks	–	The trademark registration process is especially slow so that U.S. firms may be deterred in introducing their products to Japan.

Appendix Table 3 (continued)

	Barrier		Description
7.	Services barriers[a]		
a.	Construction and engineering	–	The Japanese system of designated bidding has hindered foreign firms seeking to bid on and obtain contracts, especially for the $8 billion Kansai International Airport project.
b.	High cube containers	–	Regulatory impediments and paperwork requirements have limited the economical use of high cube containers in Japan.
c.	Tobacco shipping	–	U.S. shipping lines are limited in transporting leaf tobacco to Japan.
8.	Other barriers[a]		
a.	Soda ash	–	There may be anticompetitive activities by Japanese soda ash companies that discriminate against purchases from U.S. suppliers.
b.	Japanese marketing practice restrictions	–	Japan's "fair competition codes" may inhibit the introduction of new foreign consumer products in Japan.
c.	Japanese law on large retail stores	–	There are restrictions on the establishment of large scale retail stores that serve to perpetuate the complexity and costliness of the existing distribution system.

[a]Excludes barriers listed by the USTR that are currently being addressed by Japan.

Source: Adapted from USTR (1986, pp. 144–62).

Appendix Table 5

Projected Expenditures for Industrial Support Programs in the United States, 1984

Category	Amount Billions of $
Expenditures	
Direct expenditures	$13.7
Commodity Credit Corporation	6.1
Energy supply R&D	1.8
Economic development	1.4
Agricultural research and services	1.2
Aeronautical research and technology	0.7
Water transportation	0.5
Mining	0.5
Other	1.4
Credit expenditures[a]	8.8
Rural Electrification Administration	4.0
Commodity Credit Corporation	2.1
Agricultural Credit Insurance Fund	0.8
Export-Import Bank	0.9
Small Business Administration	0.6
Other	0.4
Tax expenditures	[b]
Accelerated cost recovery system	18.3
Preferential treatment of capital gains	16.4
Investment tax credit	15.7
Reduced rates on corporate income	6.5
Interest exclusion on state and local bonds	5.0
Expensing of R&D expenditures	2.5
Depletion allowances on fuels	2.1
Safe harbor leasing provisions	1.9
Deferral of income on DISCs	1.2
Expensing of exploration and dev. costs for fuels	1.2

[a]Represents the net cost, including both interest subsidies and defaults, of loans and loan guarantees, which were projected to total $20.9 billion and $12.7 billion, respectively.

[b]Because of interactions between different tax provisions, the true total may not equal the arithmetic sum of individual tax expenditures. No total is given therefore.

Source: Adapted from Congress of the United States, Congressional Budget Office (1984b, pp. x, 25, and 30).

Appendix Table 4

European Community Identification of U.S. Barriers, 1987

	Barrier		Description
1.	Tariffs and other import charges	–	
a.	Tariff barriers	–	Tariffs on selected textiles, chemicals, ceramics, porcelain, knives, cheese, and shoes remain exceptionally high.
b.	Customs and other user fees	–	Fees for processing formal entries of merchandise, arrivals of foreign passengers and commercial vessels, immigration inspection, and harbor maintenance are burdensome to commerce.
c.	Superfund taxes	–	Differential taxes are levied on imported petroleum products and imported chemical derivatives of feedstocks to help finance cleanup of toxic waste sites.
d.	Tariff reclassifications	–	Unilateral changes in U.S. tariff classification of imported products may result in increased duties, but U.S. compensation as specified in the GATT has not been forthcoming.
2.	Quantitative restrictions and import surveillance		
a.	Agricultural import quotas	–	U.S. import quotas on selected dairy products, sugar and syrups, articles containing sugar, certain cotton staples, cotton waste and strip, and peanuts are covered by a 1955 GATT waiver, which may not be justifiable.
b.	Import licensing for quota measures	–	Invoice clearance for merchandise shipped subject to quota cannot be obtained until the merchandise has landed and a determination made that the quota has not been filled.
c.	Machine tools	–	Maximum market share levels have been imposed on some exporters in the absence of a formally negotiated restraint arrangement.

Appendix Table 4 (continued)

	Barrier		Description
d.	Beverages and confectionary	–	Certain imported products were made subject to quotas in connection with a trade complaint lodged by the United States.
e.	Firearms and munitions	–	Imports of firearms and munitions are prohibited except when authorized by the Secretary of the Treasury to meet certain purposes.
3.	Customs barriers		
a.	Origin marking for pipes and tubes	–	Origin marking is required for certain imported but not for domestic pipes and fittings.
b.	U.S. origin rules for textiles	–	The EC as such does not qualify in determining the origin of textile products.
4.	Standards, testing, labeling, and certification		
a.	Telecommunications	–	EC suppliers of switches and transmission equipment are subject to unusually lengthy and costly approval procedures in attempting to sell in the U.S. market.
b.	Federal Aviation Administration (FAA) requirement on spare parts for aircraft	–	Inspection requirements are being applied without advance notice and retroactively to imports already entered into the United States.
c.	Parma ham	–	Imports remain prohibited despite a finding that no health hazard exists.
5.	Public procurement		
a.	Buy American policy on machine tools	–	U.S. procurement of machine tools for defense-related purposes must be from U.S. or Canadian sources.
b.	Foreign built dredges and other vessels	–	Only U.S. registered vessels can be used in U.S. territorial waters for dredging, towing, salvaging, etc. Vessels engaged in coastal commerce must be built in the U.S.

Appendix Table 4 (continued)

	Barrier		Description
c.	High voltage power equipment	–	U.S. firms are given a 30% preference for equipment to be supplied to selected entities.
6.	Export subsidies		
a.	Export enhancement program	–	The U.S. Department of Agriculture is authorized to use up to $1.5 billion of existing government stocks to subsidize U.S. exports of selected commodities.
b.	Targeted export assistance	–	The Secretary of Agriculture is authorized to provide $110 million annually to offset the adverse effect of foreign subsidies, import quotas, or other unfair trade practices.
c	Corn gluten feed and other cereals substitutes	–	These products benefit from various direct and indirect subsidies and tax incentives involving the processing of corn.
d.	Foreign sales corporation	–	The tax deferment provided under the previous Domestic International Sales Corporation (DISC) legislation has been converted into definitive tax remission.
e.	Public R&D funds	–	Defense-related R&D expenditures may be directly beneficial to U.S. manufacturers of commercial aircraft.
7.	Intellectual property		
a.	Section 337 of the Trade Act of 1930	–	U.S. International Trade Commission investigation of foreign patent validity may impose undue delays and costs and possibly be in violation of the national treatment clause of the GATT.
b.	Other issues	–	The United States uses the date of an international patent application in defining the state of the art and rules out prior inventive activity abroad in granting a U.S. patent.

Appendix Table 4 (continued)

	Barrier		Description
8.	U.S. legislation and practice on countervailing and antidumping duties	–	The United States has several legislative ambiguities and questionable practices, including the treatment of upstream subsidies, the definition and calculation of a subsidy or dumping margin, imposition of duties even before imports have occurred, and automatic assessment of duties on the basis of the preliminary finding rather than the final determination.
9.	Section 301 of the Trade Act of 1974	–	The United States may introduce unilateral measures against unjustifiable, unreasonable, or discriminatory foreign acts, policies, or practices that burden or restrict U.S. commerce.
10.	Exports controls/ restrictions on technology transfer	–	Export controls based on foreign policy considerations may be instituted in a purely discretionary and extraterritorial manner by the United States.
11.	Semiconductors agreement	–	The U.S.-Japan agreement on prices in third country markets and promises of market access may be prejudicial to the interests of other nations.
12.	Repair servicing		
a.	Foreign repair of U.S. aircraft	–	The scope of repair and maintenance work performed in foreign repair stations has been severely curtailed.
b.	Repairs of ships abroad	–	The United States applies a 50% tariff on most repairs of U.S. ships abroad.
13.	Tax barriers		
a.	Tax treatment of small passenger aircraft	–	Purchasers of small aircraft produced in selected states are entitled to special tax benefits under U.S. law.

Appendix Table 4 (continued)

	Barrier		Description
b.	State unitary taxation	–	Corporate income taxes on foreign owned companies in certain states may be levied on income earned outside the state's jurisdiction.

Source: Adapted from European Community (1987).