THE IMPACT OF TARIFFS AND TRANSPORT COSTS ON LATIN AMERICA'S WOOD EXPORTS TO THE UNITED STATES.

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ABSTRACT

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Latin American exports of solid wood products to the United States have not been as significant as would be expected, considering the great resource base existent in that region. Several tariff and non-tariff barriers have inhibited Latin American exports to North America. Two of the most important barriers are tariffs and transportation costs.

This study uses the effective protective rate approach and empirically estimates the level of effective protection afforded American producers of five solid wood products from Latin American imports by tariffs and transportation costs, and compares the relative importance of the two barriers. It also observes the behaviour of the protective structure relative to the degree of manufacturing of the solid wood products under study.

The estimates indicate that effective rates of protection are considerable larger than corresponding nominal rates. In

addition, effective protection provided by transportation costs are between 2.5 and 10 times more important than the effective protection provided by tariffs. Finally, the estimates show that effective tariff protection for solid wood products does not escalate with degree of manufacturing, in contraposicion to studies carried out by economists over a wider spectrum of industries. On the other hand, the effective protection provided by transportation cost declines with degree of manufacturing, favoring the exports of manufactured solid wood products as opposed to exports of raw material or semi-processed intermediate inputs.

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LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

<u>Appendix</u>

<u>page</u>

Chapter I

INTRODUCTION

1.1 PROBLEM STATEMENT

The recent economic recession, the deterioration in the trade balance, and the soaring indebtedness of many Latin American[1] countries has spurred interest in ways for these countries to use their forest resources for economic growth. This growth would be based upon both domestic consumption (import substitution) and exports (foreign exchange earnings).

Many Latin American countries have a large land base and a climate favorable for wood production. Some have extensive stands of natural forests. A recent study found that some Latin American regions have a comparative advantage in plantation forestry (Sedjo 1983).

An interest in exporting leads, quite naturally, to concern about the factors inhibiting exports. There are a wide range of tariff and non-tariff barriers to trade in forest products, some more important than others. Two of the most important are tariffs and transport cost (Wisdom 1984).

[1] For the purposes of this study, Latin American includes Mexico, Central America, South America and, the West Indies.

Tariffs

Although it is clear that a tariff acts as a barrier to trade and thereby alters the location of production and flow of goods among nations, the relevant question is : how effective is the tariff in protecting domestic producers from foreign competition. This question is particularly important for tariffs on final goods that use as inputs goods also subject to tariffs. Domestic producers will benefit from a tariff on the final product, because it increases the price they can charge for their product, but will suffer from tariffs on traded intermediate inputs, because it increases their production cost. From the producers standpoint, the higher the tariff on final product the more protected is the domestic industry and, the higher the tariff on inputs, the less protected is the industry using the protected input. More precisely, tariffs protect only the value added portion of production costs, where value added represents the difference between the value of the output and the total value of inputs. The smaller the value added portion, the greater the relative effective protection provided the industry.

It is not clear from an examination of nominal tariffs the amount of effective protection provided a domestic industry by a particular tariff structure. Perhaps more important, it is not possible to estimate directly the effects of a change in a tariff on domestic production and welfare. To do this, information on tariffs on inputs and value added shares are needed.

Since the share of value added in total product value differs among products, a particular tariff can have quite different effects on production and welfare across industries and countries and among regions within a country where there are significant regional differences in production techniques.

The interaction between tariffs at different levels of fabrication is important when estimating the effect of changes in tariff structure. For example, a producer of final goods may find it to be both politically and financially advantageous to support a general reduction in tariffs on his product and his imported inputs. If the percentage reduction in the tariff on the imported input is greater than that on the final good, the effective protection provided the final good will actually increase.

The difficulty of measuring the effective protection of a tariff is complicated by transport costs and the tendency for ad valorem transport costs to decline by degree of fabrication and the sensitivity of transport costs to volume of trade on a route and the unit value of the commodity (Wisdom 1984).

Transport Costs

In addition to artificial trade barriers, such as tariff and nontariff barriers, there are "natural" trade barriers, of which transportation cost is perhaps the most important. Whereas artificial barriers distort the optimal flow of goods and allocation of productive resources and thus reduce economic efficiency, natural barriers tend to reflect real economic costs and are less damaging to economic efficiency (Balassa 1967).

Until recently, transportation costs were largely ignored in international trade theory and analyses. They were assumed to be fixed, not subject to policy manipulation, and not distorting the allocation of resources. This assumption has become increasingly unacceptable, because of technological change in the shipping industry and the monopoly power of shipping conferences.

The trend toward containerized cargo, and the strong economies of scale of containerships have reduced the importance of distance as a determinant of transportation costs. In order to attract the enormous amount of cargo necessary to operate at optimum capacity, containerships offer subsidized rates to cargo from all over the United States. These economies of scale, together with the monopoly power of the shipping conferences, encourage the practice of pricing transport service on the basis of product value (e.g., as discriminating monopolists) rather than at marginal cost (Wisdom 1984).

At the same time that changes in the economic structure of the shipping industry have been reducing the importance of distance as a determinant of transport cost, successive reductions in tariffs by multilateral trade negotiations, such as the recent Tokyo Round, have reduced the importance of tariffs relative to transport costs. The continuing upward trend in the value of the U.S. dollar and petroleum price increases have reinforced this trend.

Thus, transport costs no longer fully reflect real economic cost and are increasingly subject to policy manipulation; at the same time, they are becoming an increasingly important part of total trade cost. Transport costs have become as important as tariffs as a barrier to trade and, in some cases, more important.

The growing importance of transport costs complicates trade analyses, because the structure of transport costs across commodities may be quite different than the tariff structure, and transport costs may behave quite differently from tariffs as the level of fabrication increases.

Whereas the effects of tariffs on the level and direction of trade and welfare are well known, little is known about the effects of transport costs, beyond the general notion that they tend to reduce the volume of trade. The joint, or net impact, of tariffs plus transport cost is even less well understood.

Ocean transport costs not only influence the level and direction of trade, they also influence the location of wood processing activities, thereby influencing which products trade. Because many forest products experience a substantial reduction in their weight/value ratio as they pass from one stage of processing to another, transportation costs can change dramatically from one stage to the next. At the same time, the tendency for shipping conferences to increase freight rates with the value of the product, at least partly offsets the cost savings from weight reductions.

1.2 JUSTIFICATION

As already stated, a major thrust of Latin America's economic development policy is to focus upon exports as a vehicle for economic growth. Accordingly, there is a great deal of interest in obtaining a better understanding of the barriers Latin America's exports face in U.S. markets. Tariffs and transport costs are two of the key barriers to greater penetration of the U.S. forest products market by Latin American exporters.

The present study is aimed at making empirical estimates of the level of effective protection afforded U.S. producers of solid wood products from Latin American imports by tariffs and transport costs; and a comparison of the relative importance of the two barriers.

1.3 OBJECTIVES

The general objective of this study is to estimate the impact of tariffs and transportation costs on Latin America's ability to export solid wood products to the United States. Specifically, this study attempts to:

1. Estimate the level of effective protection provided by U.S. import tariffs on solid wood products originated in Latin America.

2. Estimate the level of effective protection provided by transportation costs on solid wood products originated in Latin America.

3. Estimate the combined level of effective protection provided by tariffs plus transportation cost on solid wood products originated in Latin America.

4. Compare the effective protection afforded U.S. forest products producers from Latin American exports by tariffs and transport costs.

5. Compare the level of effective protection by stage of fabrication for tariffs and transport costs separately and jointly.

1.4 THE FORESTRY SITUATION IN LATIN AMERICA

Forest Resource Base

Natural Forest

Natural forests cover an estimated 720 million ha. of Latin America, from the northern part of Mexico to almost the Antarctic in Argentina and Chile. Forests range from sea level to as high as 3500 meters. This wide range of latitude and altitude results in extremely varied coniferous and non-coniferous forests.

The coniferous forests are mainly found in Central America and Mexico. Some 5 million acres of Araucaria forests used to be found in Southern Brazil, but rapid depletion in this area is responsible for the few natural relics remaining. Tropical pines, including *Pinus oocarpa* and *P. caribea*, constitute a major part of these coniferous forest. Together, they cover approximately 22 million ha., 3 percent of the total forest area in Latin America, comprising a growing stock of 1,180 million cubic meters (approx. 53.6 m^3/ha) (Inter-American Development Bank 1983).

The broadleaved hardwood forest is divided into tropical and temperate forests. The tropical hardwood forest is found throughout Latin America, covering 654 million ha., whereas the temperate hardwood forest, constituting 30 million ha., is found only in Chile, Argentina, and Uruguay.

The hardwood forest growing stock is nearly 79,000 million cubic meters (115 cubic meters per ha). Only 10 to 20 m^3/ha are currently used commercially, however, because of marketing, technical, ecological and economic limitations.

Approximately 84 percent (566 million has.) of the tropical hardwood forest is in the Amazon basin. Sixty percent of the Amazon (340 million ha.) lies within Brazil, the region's largest natural hardwood resource. The remaining two-fifths is in Bolivia, Peru, Colombia, Venezuela, Ecuador, Suriname, French Guiana, and Guyana.

Estimates from surveys and mapping projects reveal that at least 85 percent of the Amazon is closed undisturbed forest, and constitutes the richest of all Tropical Moist Forest formations (Myers 1980). The significance is that the Amazon has a tremendous potential for exploitation of forest products of the most diverse types. However, the use of this resource has been very limited to date. For instance, the total contribution of the Amazon to Brazil's Gross National Product is less than 5 percent and, the region's share of total Brazilian timber output is only 10 percent (Myers 1980).

The average deforestation rate of the hardwood forest is about 1 percent of total industrial area (720 million ha) per year, mainly because of expansion of the agricultural frontier. If deforestation rates are considered on a national basis, the forests of Central American countries, with a two percent deforestation rate per annum , are the most affected areas (Lanly and Clements 1979).

Total roundwood removals from natural forests are approximately 350 million cubic meters per year (IDB 1983), or only 0.4 percent of the growing stock, indicating that forests in general are being under-exploited; although, in some regions, like El Salvador or the Altiplano, the forests are over-exploited and are disappearing because of overcutting to satisfy fuelwood needs.

The main contribution of the forest resources of Latin America is to provide the rural population with fuelwood for cooking and heating. In some countries, like El Salvador, Bolivia, and Paraguay the rural population makes up over 75 percent of the total population. Nearly 85 percent of total roundwood removals are used for fuelwood . The remaining, approximately 53 million cubic meters, is industrial roundwood, mainly used to produce sawlogs and veneer logs (IDB 1983).

Pulpwood production from tropical hardwood forests has not been significant. Technology involving the use of short-fibered species in production of pulpwood has only recently been developed. Furthermore, logging costs in tropical hardwood forests are high and only the high valued saw logs and veneer logs can be profitably extracted. Only 1.2 million cubic meters per annum of pulpwood have been extracted in recent years , and significant increases are not expected because of increasing cost of transportation and relatively low cost of wood production in man-made plantations.

Man-made Forests

By 1980, Latin America had approximately 6 million ha of plantations. However, only 3.7 million ha (60 %) of these plantations were suitable for industrial purposes. The bulk of the plantations (94%) were located in South America, with the remainder in Central America. Brazil accounts for 63 percent of all plantations. Combined with Argentina and Chile, over 90 percent of total Latin American plantations are in these three countries (IDB 1983). Coniferous species, mainly tropical pines, constitute two-thirds of total industrial plantations, whereas the remaining third is made up of fast-growing hardwood species, such as eucalyptus and gmelina.

Plantations render very different yields according to the soil and climatic conditions. In Chile, Pinus radiata yields 20 to 30 cubic meters per ha., per year, compared to 15 to 25 cubic meters for Pinus elliotti and Pinus taeda in

Paraguay, Argentina, and Southern Brazil. Eucalypts yield as much as 35 cubic meters per ha. per annum in certain parts of Brazil, and Gmelina produces 20 to 25 cubic meters per ha. per annum in the Amazon basin (Sedjo, 1983).

In contrast to natural forests, plantations have high productivity per unit of area. For example, although man-made forests constitute only 0.6 percent of the total productive forest lands, their contribution, 23 million cubic meters per annum, to total industrial wood production is over 40 percent (IDB 1983).

These plantation are mainly used for wood pulp production (70 %), although an increasing share is allocated for sawnwood and veneer production, as prices for the latter products rise and accessibility of natural forests declines.

Forest Industry

The Latin America lumber industry is characterized by small mills operating with outmoded technology and poorly-trained personnel. The major problems facing the forest industries are: unreliable log supply schedules, inefficient yard inventory practices, inadequate maintenance, and a general lack of management training (IDB 1983). The low utilization of installed capacity, under 50 % on the average, and energy inefficiency raise costs to often prohibit competition in the international market place.

Despite its enormous raw material resources for wood-panel and paper production and rapidly expanding regional markets for both products, Latin America has not fully developed its potential in these areas. The substantial investment, risk , and atomized national markets aggravated by high import tariffs on inputs and machinery, discourage the installation of more pulp and paper mills. However, the development of new technology capable of using short fibers from tropical hardwood, and the improved economy of medium-size pulp and board mills, are expected to stimulate the growth of the wood-based panels and paper industries.

1.5 LATIN AMERICAN EXPORTS TO THE UNITED STATES

Problems Facing Latin American Exporters

Despite a diverse resource base and low labor and wood costs, Latin American forest product exports to the United States constitute only a small portion of total North American forest product imports. According to Gregersen (1971), what prevents Latin America from participating to a greater extent in the North American market, is the overall lack of ability of the Latin American forestry sector to meet basic requirements for entering the U.S. market. These requirements are: uniform quality, sufficient quantity, reliable timing of delivery, and competitive prices.

In general, exporters have not been able to meet these requirements because of the inherent characteristics of the hardwood forests, and a lack of modern and effective marketing channels. For instance, the fact that the natural forests often consist of hundreds of species, only a few of which may have commercial value, means that loggers must search over large areas to obtain the quality and quantity of wood needed. In addition, scheduling of production is very difficult because of uncertain supply to the mills. Supply is hampered not only by the dispersion of commercial species, but also by the difficulty of transport caused by many factors related in general to the inadequacy of transportation infrastructure. For example, in the Amazon, it is not unusual for 6 months to elapse between the placing of an order for logs and their delivery (Gregersen 1971).

Very high transportation costs increase the delivered price of Latin America's forest products exports. For example, the shipment cost for some products from The Philippines or Japan to the United States is lower than for considerably less distant Latin American ports (Gregersen 1971). This situation may be explained by a greater volume of trade, more efficient port facilities, or more competition on the route, among others.

Complex problems have deterred Latin American from increasing its shares of exports to the United States. Some of these problems can be alleviated by improving efficiency (conversion ratios, use of by-products, etc), but others will require structural modifications if Latin American exporters are to fully exploit the opportunity provided by their large forest resource base.

Trends of Latin American Exports to the United States

Latin American exports of forest products to the United States for the period 1974-1983 are summarized in Appendix A. Total quantity imported, total value of imports (current dollars), and unit price (constant dollars) are presented for 13 forest products.

The value of Latin American forest product exports to the United States has increased at an annual average rate of over 20% during the decade 1974-1983. This increase is a result of increased total volume of exports, increased price of forest products in nominal and real terms, and a change in the composition of the products under trade.

The volume of trade has experienced ups and downs in the last decade; however, the trend is clearly increasing. The declining trend of logs and lumber exports since 1974, is more than offset by very rapid increases in particle board, plywood, furniture and, miscellaneous wood products exports.

Brazil is the main exporter of hardwood lumber to the United States, supplying over 17% of total U.S. hardwood lumber imports in 1974, or 81 million board feet (MMBF). Net exports declined to 49 MMBF by 1982, but their relative importance increased to 23% of total U.S. imports. Honduras is the main exporter of softwood lumber to the United States, although a decreasing trend is noticeable between 1974 (37 MMBF) and 1982 (8 MMBF).

Hardwood and softwood veneer have also experienced a decreasing trend in absolute values. In 1974, 251 million square feet (MMSF) of veneer were exported from Latin American to the United States (10.9% of U.S. imports) as opposed to 162 MMSF recorded in 1982 (9.7%). Brazil has been the main veneer exporter to the U.S. In 1982, Brazilian exports accounted for almost 70% of all Latin American exports to the United States. Peru and Costa Rica were also important veneer exporters.

Plywood exports followed an upward trend in the last decade, raising from 21 MMSF in 1974 to 61 MMSF in 1983, which represents an increase of about 200% in ten years. Again, Brazil has been the main exporter, accounting for 30% of total U.S. imports of plywood from Latin America in 1982.

Fiberboard, furniture and, miscellaneous wood products have also experienced sharp increases in level of exports in the last decade. For instance, Brazil alone exported 87000 m^3 of fiberboard in 1983 (20% of total U.S. imports) which represented an increase of 148% over the 35000 m^3 exported in 1976 (FAO 1984). Miscellaneous wood product exports doubled in value from 1974 ($44 billion) to 1982 ($97 billion). Mexico was the main exporter in 1982 with a total of $ 70 billion, followed by Honduras ($7 billion) and Brazil ($6.5 billion). Furniture exports expanded twofold over the decade, with Mexico being the main exporter with a total of $27 billion dollars in 1982.

Prices followed an increasing trend over the decade. Almost all the forest product prices increased with the exception of particle board, paper products and, wood pulp. The sharpest reduction corresponds to particle board with a decrease of over 60% of the original price of $94 per thousand pounds (MLB) in 1974 to $31 MLB in 1983. Paper products price also decreased from $131 per MLB in 1974 to $111 per MLB in 1983 (15% below the original price). Hardwood logs have experienced the greatest increment over the decade, going from $141 per MBF in 1974 to $531 in 1983 (276% over the original price).

There has been a noticeable change in the composition of trade during the decade. Manufactured products show an increasing share in total export whereas raw material and primary processed wood products declined in relative and absolute figures. For instance, hardwood logs and lumber exports declined 90 and 65% percent respectively despite substantial increases in real prices. On the other hand, particle board exports increased 44 times during the same period. This pattern is consistent with policies implemented by Latin American countries in order to increase exports of manufactured products which received high value added through labor intensive processes. Some countries have completely banned the exportation of logs (Paraguay, Argentina, etc.), or have highly taxed exports of low processed goods such as sawnwood. At the same time, policies that highly subsidize exports of furniture and other finished products have sprung up in the last decade.

Chapter II

LITERATURE REVIEW

2.1 TARIFF BARRIERS

Impact of Tariffs on Trade

As early as 1817, when David Ricardo presented his theory of comparative advantage, the gains from trade were clearly stated and understood.[2] Many theoretical studies were designed and successfully implemented to explain the gains from international trade and to indicate how much better off a society would be under free trade conditions. Nevertheless, countries continue to erect barriers to trade, thereby sacrificing some of the potential gains from specialization in production. The single most important restriction is the tariff. A tariff is an artificial cost imposed on an imported good with the objective of hampering its competitiveness, thereby reducing imports and promoting domestic production of the product[3] (Wonnacott & Wonnacott 1969).

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[2] According to this theory, countries with comparative advantage in the production of a commodity would tend to specialize in the production of that commodity and would tend to buy other goods from countries that can produce those goods more cheaply.

[3] Tariffs can also be imposed on export goods although with very different objectives.

2.1.1 The Theoretical Framework

Resorting to the two dimensional back-to-back diagram used by Samuelson (1952) to relate the trade of a single commodity between two markets, the effects of tariffs on international trade will be shown. For simplicity we will confine our exposition to the partial equilibrium model (treatment of a single product) as opposed to the general equilibrium model in which many products are allowed to interact simultaneously. Furthermore, we will assume that supply and demand relationships are given and remain constant.[4]

In figure 1, two countries, 1 and 2 ,are represented, and their supply and demand curves are designed S1, D1, S2, and D2 respectively. The excess demand in country 1 is represented by ED1, and the excess supply in country 2 by ES2. The initial equilibrium prices, in the absence of trade, are represented by P_o= \$90 and P_o'= \$40, and are determined by the point of intersection between demand and supply curves in the respective markets. The price differential will induce trade between these countries as long as it is greater than transportation costs or other related costs. Since P_o is greater than P_o' the trade

[4] On the demand side tastes, other prices, and consumer income are fixed. On the supply side, technological changes, externalities, etc., are not allowed to change.

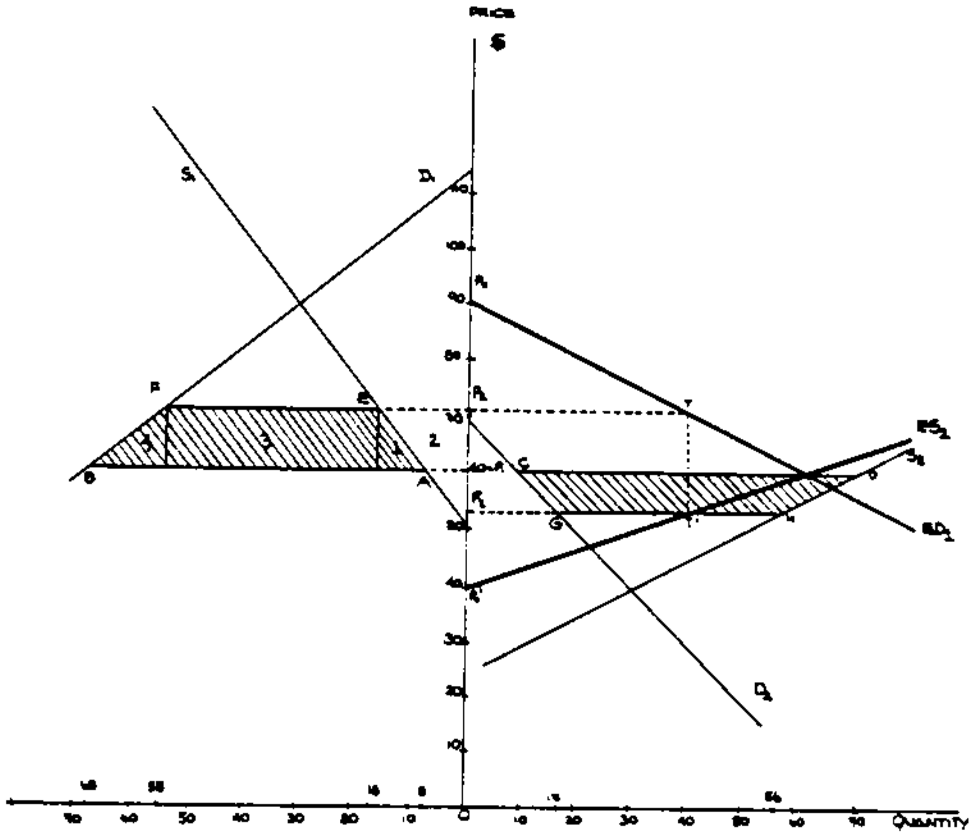

FIGURE 1. EFFECTS OF THE IMPOSITION OF A TARIFF ON THE TRADE BETWEEN TWO COUNTRIES

will flow from country 2 to country 1.

The free-trade equilibrium price (in the absence of transportation costs) is determined by the intersection between excess demand (import demand) and excess supply (export supply), i.e., where the market is cleared. This price is the same for both countries (P_1= \$60) and it determines the level of production (Q_1= 8 units) and consumption (Q_2= 68 units) in country 1 and the level of production (Q_1'= 70 units) and consumption (Q_2'= 10 units) in country 2. The difference between quantity consumed and produced in country 1 (line AB= 60 units) is made up by imports from country 2 (line CD = 60 units).

Suppose an import tariff T-T'= 30% is now imposed by country 1 on imports of the commodity, adding to the price of the imported good in the domestic market. Furthermore, assume that the importing country is big enough to exert influence on the price of the commodity. Under these circumstances, the effects of the tariff will be felt in the domestic market through increased price (P_2=\$70.5) and in the foreign market through decreased price (P_2'=\$52.5).[5] The increase in price in country 1 (\$10.5) was greater than the

[5] If the importing coutry is small, in a freely competitive world economy (many buyers and sellers and no collusion among them) it will face an infinitely elastic export supply, and the entire amount of the tariff will accrue to its domestic market.

reduction in price in country 2 ($7.5) as a response to the more inelastic characteristics of the first country.

The increased price in country 1 induces marginal consumers to quit buying the product and quantity demanded decreases by 13 units, from 68 to 55 units. On the other hand, the higher price encourages domestic producers and quantity supplied increases by 8 units, from 8 to 16 units. As a result of both changes, increased supply and decreased consumption, excess demand decreases by 21 units, from 60 to 39 units (line EF).

At this point there have been transfers of income as a response to changes in price. Consumers in country 1 lose because of the increased price, which results in a reduction of the quantity consumed and, depending on whether demand is inelastic or not, their total outlay will be larger or smaller. In our particular case it decreased by almost 5 percent. Consumer's surplus has been reduced by area 2.

On the other hand, the higher price encourages domestic producers to increase output to 16 units. This situation gives rise to two different effects: the protective and the transfer effects. The protective effect refers to the subsidy of increasingly inefficient domestic production as compared to foreign production. The protective effect is represented by areas 1 and 4 in the diagram. Area 1 represents the additional costs due to inefficient production of the additional 8 units. Area 4 represents the efficiency loss because buyers were prevented from purchasing the 13 units at the lowest available price. The transfer effect, area 2, refers to the higher price consumers have to pay producers for the same product, and represents an increase in producer's surplus.

Finally, there is a third transfer of income, called the revenue effect. This is represented by the tax collected by the government through the customs office, area 3 in the diagram, and is equal to the portion of the tariff ($10.5) times the quantity imported (39 units).

The net loss to country 1 is represented by areas 1 and 4, since area 2 is only a transfer of income between consumers and producers, and area 3 (customs revenues) is supposed to return to the community through public programs.[6]

Examining the situation in country 2, it can be seen that the reduced price encourages domestic consumption and quantity demanded grows from 10 to 17 units. At the same time, domestic production decreases from 70 to 56 units. As

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[6] This is only true if no administrative costs are assumed when handling custom valuations. In many cases, these costs represent a large share of tax collected and hence, they should be considered as transference of income from consumers to public employees.

a result of both changes, total export supply decreases to 39 units (line GH).

There have also been transfers of income because of the change in price. Consumer's surplus has increased by the area P_1P_2'GC but producer's surplus has reduced by the area P_1P_2'HD, resulting in a total loss for country 2 represented by the area comprised by CDHG.

Thus, the imposition of an artificial barrier to trade such as a tariff results in losses for both the importing and the exporting country. The proportion of the tariff burden that each country absorbs is related to the elasticity of their internal supply and demand curves, which are in turn represented by the excess supply and excess demand curves.

2.1.2 The Effective Protective Rate (EPR).

Although the welfare loss caused by the imposition of a tariff is readily demonstrated in theory, it is much more difficult to measure empirically. Over the last three decades econometricians have tried to determine the "height" of a tariff as an indicator of the level of restriction that it imposes on trade flows. The total restrictive effect of a tariff is given by the difference between the current amount of trade and the amount of trade that would exist (potential trade flow) if tariffs were completely removed (Balassa 1965).

Tariffs affect not only imports but also production, consumption, and exports, due to a reallocation of resources towards the protected industry and away from less protected industries. In addition, price increases caused by tariffs have a distorting effect on consumer's choices, changing not only the level of imports but also the composition of trade (Balassa 1968). Finally, duties on inputs used in the production of protected final goods complicate the determination of potential trade flows, and the expenditure of government revenues collected through tariffs distort the use of resources.

2.1.3 The Effective Rate of Protection Model.

Trade in forest products is primarily trade in raw materials and intermediate goods. Tariffs influence the level of production and trade in final goods directly by increasing the domestic price of imported competing final goods, and indirectly by increasing the costs of tariff-burdened inputs. It is desirable to collapse the entire protective structure provided a final good into a single meaningful index of protection. One approach developed by trade theorists (e.g. Corden 1966, Johnson 1965, and Balassa 1965) is the concept of effective protection rate, or EPR.

The concept of EPR can be illustrated by the example of hardwood veneer and plywood. The United States has a tariff on both hardwood veneer and plywood imports, products actively traded on the world markets.

If there was no tariff on veneer, the nominal tariff on plywood would accurately reflect the protection provided the value added portion of domestic plywood. The prices of non-traded inputs are able to rise by the amount of the tariff. No protection is provided domestic veneer because the plywood manufacturer can always import veneer at world prices. A tariff protects only the non-traded portion of the total value of the protected good. For simplicity, we shall refer to this non-traded portion as value-added, although it is possible that some intermediate goods are not traded as well. In its simplest form, EPR can be defined as the ratio of the difference in value added, with-and-without protection divided by value added without protection. Symbolically:

$$EPR_j = (V'_j - V_j) / V_j$$

where V'_j and V_j represent value added with and without protection of good j, respectively.

Assume the market price of plywood is $10 per sheet. The cost of veneer, the only input with an import substitute, is $8. Value added is thus $2. Suppose the government imposes a 10 percent tariff on plywood. As a result, the domestic price of plywood would rise to $11, and the value added would rise to $3, since the tariff has no effect on the price of imported veneer. Thus, a nominal tariff of 10 percent on the final good has permited its value added to increase 50 percent. Using the simple EPR formula:

$$EPR_j = (V'_j - V_j) / V_j = (3 - 2) / 2 = 0.5$$

Now, suppose a 5 percent tariff is imposed on veneer, in addition to the 10 percent tariff on plywood. As a result, the cost of veneer raises to $8.40, and the value added in plywood is reduced to $2.60. The EPR is:

$$EPR_j = (V'_j - V_j) / V_j = (2.60 - 2.00) / 2.00 = 0.3$$

Thus, a 5 percent tariff on veneer reduces the effective rate of protection on plywood by 20 percentage points.

A more operational version of the simple EPR formula can be obtained by recognizing that free trade value added (V_j) and protected value added (V'_j) can be represented as follows;

$$V = (1- \sum_{i=1} a_{ij})$$

$$V' = (1 + t_j) - \sum_{i=1} a_{ij} (1 + t_i),$$

where;

a_{ij} = the ratio of the value of traded inputs i per unit value of final product j, expressed on a percent basis;

t_j = ad valorem tariff on final product j, and

t_i = ad valorem tariff on input i (both expressed in percent)

Substituting these values into the original formula, we have:

$$EPR_j = \frac{t_j - \sum_{i=1} a_{ij} t_i}{1 - \sum_{i=1} a_{ij}} \qquad (2)$$

This definition of EPR assumes: (1) all production functions are of a fixed coefficient form with zero elasticity of substitution between intermediate inputs and the primary factors of production, (2) primary factors (labor and capital) are internationally immobile, and (3) import supply is perfectly elastic, whereas demand for exports is infinite. These three assumptions are common to most comparative cost trade models. Their effect is to assure that the a_{ij} coefficient is constant, that only raw materials and intermediate inputs are traded, and that traded intermediate input and final product prices are world prices (Yeats 1974). Thus, if a tariff, t_j, is imposed on imports of furniture, the price of furniture in the domestic market will rise by t_j. Since veneer supply is assumed to be perfectly elastic, there will be no increase in a_{ij}. The entire increase will accrue to the value added in the manufacture of furniture.

The expression for protected value added,

$$V_j' = (1 + t_j) - \sum_{i=1} a_{ij}(1 + t_i)$$

can be restated as follows:

$$V_j' = V_j + t_j - \sum_{i=1} a_{ij}t_i$$

The latter expansion shows more clearly how a tariff on inputs reduces the effective protection provided by a final goods tariff. The greater is the proportion of intermediate good in the total cost of the final good, the greater will be the reduction in EPR from a tariff on the intermediate good; and if sufficiently large, the tariff can completely eliminate the protection afforded value added.

It is necessary to make one further adjustment in the formula before it is fully operational. The a_{ij} coefficient represents the input share of total final good value under free trade. In practice, the observed input coefficients, a'_{ij}, are likely to be distorted by tariff on inputs and final products. We can approximate their free trade equivalents using the approximation formula developed by Yeats (1974):

$$a_{ij} = a'_{ij} \, [(1 + t_j)/(1 + t_i)]$$

2.1.4 Previous Work

The first mention of the EPR is by Barber (1955), who evaluated the Canadian tariff structure and the economic policy applied by The Crown. Some years later, Johnson (1965) gave a full exposition of the EPR theory, and developed a framework that could be used by econometricians to estimate the effects of the EPR on manufactured goods, exports from developing countries, imports, employment, etc.

Central to Johnson's theory was the recognition that goods are not all consumer goods; some are raw materials or intermediate inputs in the process of manufacturing final goods. Johnson concluded that only after considering the total effect of tariffs on both intermediate inputs and final output, would a true measure of the protection be achieved. The mathematical model developed by Johnson is as follows:

$$EPR_j = (t_j - \sum_{i=1} a_{ij}\, t_i) / V_j$$

where;

EPR_j = effective protective rate of output j, calculated as a percentage of the value of the commodity.

t_j = nominal tariff on commodity j, expressed as ad valorem percentage.

a_{ij} = inputs of commodity i into one unit of output of commodity j expressed as a percentage of total value of output j.

t_i = nominal tariff on commodity i, expressed as ad valorem percentage.

V_j = value added in the process of manufacturing commodity j, expressed as percentage of the total value of final output.

If the combined impact of tariffs on inputs is greater than the nominal tariff, the EPR will be negative . This means that the tariff structure not only discourages domestic production, but it encourages imports, which is disfunctional.

One of the basic assumptions of the EPR concept is that value added includes all non-traded inputs in the commodity manufacturing process. Labor and capital are considered to be the primary non-tradeable inputs. It may be argued, however, that capital is internationally mobile and, hence, can be considered a tradeable good (Ellsworth and Clark 1964). This was the approach used by Basevi (1966) to calculate the EPR for a sample of industries. Actually, he carried out both analyses: the EPR of value added (including capital and labor as primary products), and the EPR for labor only.

The models developed by Basevi are as follows:

$$EPR_j = \frac{V'_j}{\dfrac{S'_j}{1+t_j} + \dfrac{\sum_{i=1} M'_{ij}}{1+t_i}} - 1$$

$$EPRL_j = \frac{L'_j}{\dfrac{S'_j}{1+t_j} + \dfrac{\sum_{i=1} M'_{ij}}{1+t_i} - K'_j} - 1$$

where;

EPR_j = effective protective rate;

V'_j = value added to production of good j (at domestic prices);

S'_j = final value of the output j(at domestic prices);

M'_{ij} = value of input i into production of output j (at domestic prices);

$EPRL_j$= effective protection rate to labor;

L'_j = value of labor used in domestic production of output j;

K'_j = return to capital used in the domestic production of output j;

t_j = tariffs on final output j;

t_i = tariff on input i into production of output j;

It is interesting to note that these two models are very similar if the return to capital (K'_s) is considered to be constant, as the world price of any other input.

Basevi drew two interesting conclusions from his study. First, the EPRs of U.S. industries were much higher than nominal tariffs. For example, in the case of plywood, effective protection was 113 percent higher than the nominal tariff. Second, the effective protection of labor was even larger when capital was excluded from the value added component. This is consistent with the principle that the smaller the percentage of value added in a process, the greater the effective protection afforded by the tariff structure. Treating capital as traded input not included in value added, reduced the relative proportion of value added in the total value of the final product, and increased effective protection.

Balassa has performed extensive empirical work to demonstrate the difference between effective and nominal tariffs. In 1965, using 1958 input-output tables for Belgium and The Netherlands, and average tariffs according to the Brussells Tariff Nomenclature (BTN), he calculated EPRs of manufactured products for five of the most important developed countries (Balassa 1965). With few exceptions, effective rates were found to be greater than nominal tariffs .

In a 1968 study of the impact of the protective structure on exports of processed goods from developing countries, Balassa found that there was an escalation of effective tariff with degree of processing. Effective tariffs for sawnwood and roundwood were very low whereas effective protection of plywood was very high, indicating that imports from Less Developed Countries (LDC) serve the interests of the manufacturing industry in developed countries (Balassa 1968). This finding was cited as evidence of the bias of Most Favored Countries' (MFC) tariff structure against the exports of manufactured goods from LDCs. This finding was supported by the negative correlation between the degree of manufacturing and the volume of developed countries imports from LDCs (Balassa 1968).

The impact of effective tariff rates on exports from LDCs was estimated in a study by Yeats (1974). The distinguishing feature of this study was that it used updated input-output tables and tariffs from the Kennedy Round negotiations. Even after including the substantial reduction of nominal tariffs produced by the Kennedy Round, Yeats found that escalation still represented a significant barrier for exports of manufactured goods from developing countries.

2.1.5 Forest Products Tariffs

Tariffs have been the traditional way of protecting the U.S. forest products industry. As far back as 1909, the extremely high protection provided by tariff to the manufactured American forest products, compelled the Canadian's to retaliate by imposing a duty on unprocessed wood exports (Taussig 1964).

There has also been an implicit bias in the American way of custom valuation. Most U.S. tariffs on wood products are ad valorem tariffs, assessed as a percentage of the f.o.b. value, as opposed to the c.i.f. value applied in Europe.[7] When tariffs are assessed as a percentage of f.o.b. value, the Combined Effective Protective Rate (CEPR), which is the summation of the impact of tariffs and transportation costs, is simply represented by the sum of the rate of effective tariff and effective freight factor protection. But, when tariffs are assessed as a percent of c.i.f. value, the CEPR is not only the sum of effective tariff plus the effective freight factor, but it includes also a term representing the part of tariff applied to the freight cost component of total landed value (Clark 1978).

[7] F.o.b. stands for free-on-board and represents the price of the commodity on board ship at the port of exportation. C.i.f. stands for cost-insurance-freight and represents the commodity's value at the port of importation.

The two different mathematical expressions follow:

$$CEPR_{fob}=\frac{(d_j+t_j)-\sum\limits_{i=1} a_{ij}(d_i+t_i)}{(1-\sum\limits_{i=1} a_{ij})}$$

$$CEPR_{cif}=\frac{(d_j+t_j)-\sum\limits_{i=1} a_{ij}(d_i+t_i)}{(1-\sum\limits_{i=1} a_{ij})}+\frac{(d_jt_j)-\sum\limits_{i=1} d_it_i}{(1-\sum\limits_{i=1} a_{ij})}$$

where;

d_j= freight factor for importing final good j;

d_i= freight factor for importing intermediate input i;

and all the other variables as before.

The American valuation method favors the more remote countries because the duty does not consider transportation or insurance costs. In other words, the f.o.b. valuation system subsidizes goods originated at a greater distance as compared with goods produced nearby, because the tariff is not applied to the transportation and insurance cost components.

Since 1930, there has been a steady reduction on U.S. nominal tariff for forest products.[8] After the Kennedy Round negotiations, tariffs on raw materials, such as pulpwood and sawnwood, were completely eliminated, and tariff on paper and related articles were reduced by as much as 65 percent of their previous levels. Currently, most unprocessed forest products carry no duties, semi-processed wood faces duties between 1 and 6 percent, and final products pay between 10 and 15 percent of their f.o.b. values.

This seemingly modest level of tariffs can be misleading, as already noted, because the tariff only protects the added value portion of the final product, and its effective protection can be several times greater than that indicated by the nominal tariff (Yeats 1974, Balassa 1965, Basevi 1966).

[8] As a response to the Great Depression the Smoot-Hawley Act imposed the highest tariff ever on almost all imported goods.

2.2 TRANSPORT BARRIERS

Impact of Transport Cost on Trade

International trade has been the subject of intense study in recent years as a result of the increasing awareness by LDCs of the importance of fully exploiting their comparative advantages. Tariffs are one of the most important restrictions to trade. Hence, they have been given special attention, and today there is better understanding of the pattern and level of protection provided by the tariff structure of developed countries. In contrast, transportation costs have been largely excluded from international trade analyses. The reasons for ignoring transport costs include:(1) The effect of transportation cost was considered to be small relative to other types of barriers, such as tariffs and quotas; (2) transportation costs were considered to be a "natural barrier", i.e., bound to geographical distance only and, therefore, not subject to manipulation by policy makers.

Recent studies have cast doubts upon these arguments. Finger and Yeats (1976), after comparing the effective protection afforded by tariffs and transportation costs to U.S. domestic industry , concluded that "...the overall degree of protection afforded by international transportation costs is at least as high as that afforded by tariffs". This conclusion was reaffirmed by Sampson & Yeats (1977), Sampson & Yeats (1978) and Conlon (1982). In addition, studies have shown that distance is not always the most important factor in determining the freight rates. Others factors affecting the transportation rates include commodity unit value, port costs, and the commodity volume/ weight ratio (Wisdom 1983). Furthermore, the belief that transportation costs are outside of the influence of policy control has been challenged by Sampson & Yeats (1977) and Binkley & Harrar (1981), who argued that these costs are subject to a high degree of policy control through subsidies and economies of scale, among others.

Transportation costs act as restriction on trade , by raising the cost of the imported good to the consumer in the same manner as tariffs. Transportation costs influence which countries trade, the volume of trade, and even the degree of manufacture at which goods are traded (Yeats 1977).

2.2.1 The Theoretical Framework

Again we resort to the back-to-back diagram to explain the effect of transportation costs on the international trade of a single commodity (partial equilibrium analysis) between two countries.

In addition to the assumption of fixed supply and demand curves in both countries, we will also assume that there is an infinitely elastic transport supply (constant transport costs) fixed at a particular level of price.

In figure 2, the demand and supply curves for a single commodity in countries 1 and 2 are represented by D1, S1, D2, and S2. The excess demand of country 1 and the excess supply of country 2 are designed ED1 and ES2 respectively.

Transport demand is a derived demand bound to the demand for the final product and the cost of all other inputs into the production of the final product. For example, if the final product in country 1 were plywood, the inputs into its production would be plywood from country 2 plus transportation. As a result, the excess demand in country 1 is the demand for final product and, the excess supply in country two represents the total cost of other inputs, transportation costs excluded. The line DT shows the derived demand curve for transportation services. The vertical distance between ED1 and ES2 is the maximum amount that can be spent on transporting the commodity. In absence of transportation costs (T=0) the equilibrium quantity and price are determined by the intersection between the excess demand and the excess supply. On the other hand, when transportation cost is equal to the price differential

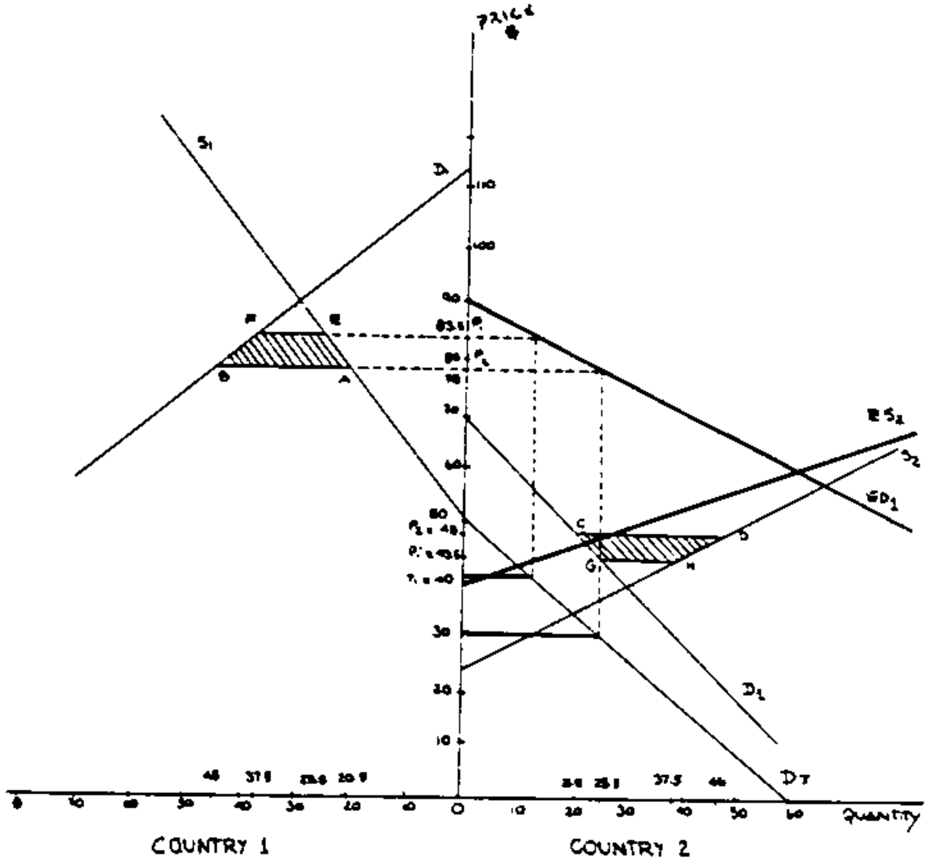

FIGURE 2 EFFECTS OF CHANGES IN TRANSPORTATION COSTS ON THE TRADE BETWEEN TWO COUNTRIES

between country 1 and 2 ($T = P_o - P_o'$), there will be no incentives to trade anymore.

The intersection between transportation demand (DT) and the perfectly elastic transportation supply (horizontal line) curves, determines commodity equilibrium prices in both countries and the volume traded. For instance, at transportation costs T_1= \$40, price in country 1 will be P_1=\$83.5 and price in country 2 P_1'= \$43.5. The volume of trade will be 12 units (lines EF and GH respectively).

Suppose now that country 2 is a Latin American country willing to increase exports to the United States, and decides to make investments in improving port facilities. As a result, the <u>net</u> transportation costs decline to T2= \$30. The point of intersection of the new horizontal supply and the demand for transportation curves determines the new equilibrium prices in both countries (P_2=\$78 and P_2'=\$48), and the new level of trade (24.5 units or lines AB and CD respectively).

As in the case of tariffs, there are transfers of income between producers and consumers in response to a change in prices. In country 1, price decreased, quantity consumed increased, quantity supplied decreased, and there was a net welfare gain by consumers at the expense of producers (ABFE). In country 2, price increased, quantity consumed decreased, quantity supplied increased, and there was a net welfare gain by producers at the expense of domestic consumers (CDHG).[9] These net welfare gains are a result of a more efficient allocation of resources, brought about by specialization and trade.

2.2.2 Previous Work

As a result of the increasing importance of transportation costs in the total cost of exportation, attempts have been made to include transportation costs in the analysis of trade barriers. Balassa (1968) included transportation costs along with tariffs as part of the effective protection provided to developed countries. Johnson (1966) developed a formula to compute the "natural rate of protection" brought about by transportation costs. Waters (1970) computed the total effective protection provided by tariffs and transportation costs and found that the combined impact of tariffs and freight factors was substantially greater than that of tariffs alone.

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[9] Welfare gains must be adjusted by cost of improvement, which is not free. The adjustment depends on which sector (producers, government, etc.) of the economy pays for the expenditure.

Determinants of Transportation Costs

Moneta (1959) studied West German trade and concluded that unit value and distance were the most important factors determining freight factors. These variables varied positively with transportation costs.

Following the belief that distance was the single most important determinant of freight factors, economists used distance as a proxy variable for transport costs. Buongiorno, Tenni, and Gillnes (1980) used distance as a proxy variable for the freight factor.[10] They concluded that distance was an adequate variable in explaining the variations of freight rates of international transportation of tropical logs. However, other studies found that distance by itself not always explained very effectively differences in freight factors. Furthermore, the studies suggested that other factors, such as ship size and speed, port facilities, and volume of trade, should be included in the model (Binkley and Harrar 1981, Wisdom 1983).

The Economic Commission for Latin America (ECLA)(1969) carried out a comprehensive study of the patterns of transportation costs and the main variables influencing transport costs. The ECLA study distinguished between the

[10] Unit freight rates expressed as a percent of import unit value (ad valorem rates) are commonly called "freight factors," to distinguish them from "freight rates," quoted on a weight or volume basis.

structure and the level of freight rates. The rate structure explains differences among commodities on the same route. The rate level explains variances in the rate for the same commodity on different routes. According to this study, the main variables affecting rate structure were the unit value and the stowage factor.[11] These two variables were found to explain most of the variation in freight rates among exported goods. The degree of competition, distance, and port costs, were the most important explanations of the level of freight rates.

The ECLA's two-model approach was used by Bryan(1974) to study Canadian exports. Unit value and stowage factor were found to be the most significant variables in explaining the structure of freight rates. The importance of unit value suggests that liners behave as oligopolies in setting the freight rates. At the same time, the importance of stowage factor supports the hypothesis that bulkyness is undesirable and explains the higher opportunity cost that forest products must pay in international transportation (Jones, 1984).

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[11] Stowage factor is defined as the number of cubic feet of ship space occupied by one long ton of a commodity, including packaging.

Prewo (1978), used the ECLA's structure-level approach to examine the variation of Latin American exports from different countries to various destinations. His most important conclusion was that although distance and stowage factors do increase transport costs, they do not increase costs proportionately.

Wisdom (1983) analyzed data concerning forest products using the structure-level approach and determined that distance, unit value, and volume of trade, were the most important variables in determining the pattern of variation of freight factors. Stowage factor, he concluded, did not perform satisfactorily, probably because of its lack of sensitivity to detailed commodity classification.

Clark (1978) carried out a study of the structure of transportation costs in international trade. The most important finding of this work was that freight factors, unlike tariffs, de-escalated for the majority of the products considered. This conclusion is very important, since it suggests that transportation costs act to offset the escalation trend followed by developed countries' tariff structure.

2.2.3 Transport Costs in Forestry

Transportation costs exert a strong influence on forest products prices at almost every level of processing. In some Latin American countries, such us Brazil and Paraguay, transportation costs constitute over 90 percent of total logging costs. This is a result of a combination of low wages and very high fuel and machinery costs.

Evensen (1975), in a study on exports of tropical hardwood from Asia to Europe, found that transportation costs comprised up to thirty percent of total costs of plywood exports and as much as 75 percent of roundwood exports.

Most forest products have a very high volume/weight ratio, which represents very high opportunity costs in ship cargo space, and thus they are penalized with higher freight rates. These higher prices are passed on to consumers through final goods, and to producers through intermediate inputs. Thus, to a large extent, transport costs determine the direction and volume of forest products trade, the composition (degree of manufacture) of trade, and the delivered price of forest products.

From another point of view, a reduction in transportation costs can make marginal timberland profitable, and increases the economic availability of timber. For instance, one of the explanations of the development of the forest industry in the Southern United States is the region's extensive network of roads, which reduces the cost of transportation. On the other hand, prices of Canadian forest products are expected to rise in the international market because of the shift to more inaccessible forest lands, which translates into higher transportation costs (USDA 1983).

A theoretical explanation of the impact of transportation costs on forest products trade has been developed by Wisdom (1984). Employing the concept of derived demand and assuming an infinitely elastic transport supply, Wisdom shows that a net reduction in transport costs will induce an increase in commodity prices and production, a decrease of consumption, and a transfer of income from consumers to producers in the exporting country. At the same time, commodity prices and production will fall, consumption will increase in the importing country, and there will be a transfer of income from producers to consumers. There will be a net gain in welfare in both societies, because of increased specialization and trade.

Foresters have long recognized the influence of transportation costs on forest products prices, the location of forest industry and the economic accessibility of timber. The high cost of transporting bulky, low-valued wood played a key role in the development of the sustained yield principle in forestry. Less attention has been paid to the protection transport costs provide domestic forest products industry from external competition. For example, the American furniture industry was able to develop from a crude cottage industry into a technologically sophisticated industry behind high transport costs that permitted the import of only the finest quality English and French furniture (Wisdom & Wisdom 1983). Modern shipping has reduced the importance of distance in transport costs, and today American furniture manufacturers find themselves competing with Taiwan furniture imports manufactured from American hardwood lumber.

Transport costs increase the cost of imported substitutes of domestic goods and protect domestic producers just as do tariffs. The impact of transport costs on the location of processing and direction of trade can, however, be quite different than that of tariffs. The reason is that ad valorem transport costs tend to decline by level of fabrication, whereas the level of tariffs tends to increase. For example, the tariff on plywood is higher than that on logs in most countries, whereas the ad valorem transport cost for logs is substantially higher than that for plywood (Jones 1984)

Because of the conflicting response of transport costs and tariff to degree of fabrication, it is difficult *a priori* to evaluate the net effect of a particular tariff structure, or, more importantly, to predict the impact of a tariff change on production, trade, and welfare.

This situation is further complicated by evidence that transport costs are sensitive to the volume of trade on a route, and the volume of trade is, in turn, sensitive to tariff levels. A reduction in the level of a tariff will tend to increase the volume of the good shipped, which will tend to reduce transport costs because of increased competition and economies of scale in shipping. The reduction in transport cost will shift the exporting countries' supply curve to the right, increasing exports. Thus, the interaction between transport costs and volume shipped will tend to increase the effect of a tariff change over that which would otherwise be estimated.

Chapter III

METHODS AND PROCEDURES

3.1 SELECTING THE AREA

When the decision to examine the impact of tariffs and transportation cost on international trade was made, it was necessary to restrict the study to a specific region of the world in order to limit the scope of the study to the time available.

Latin America contains much of the world's unexploited forest resources and hence, has been designited by international agencies, such as the United States Agency for International Development, as a priority region for forestry development. In addition, Latin America is already an important producer of the forest products involved in trade negotiations, such as plywood, particle board, etc., and its potential is even greater. Finally, Latin America has a special appeal to the author since it is there where he will apply his forest knowledge.

The United States was selected as the market for Latin America's wood exports because of its proximity and its current overall importance to the Latin American region. In addition, the U.S. Department of Commerce publishes information on U.S. imports on both a C.I.F. and F.A.S.

basis.[12] This provides information for estimating transportation costs. Few other countries publish this sort of data, and none of these are important markets for Latin American wood products. Although this study focuses on the United States, recent studies related to the structure of ocean freight rates have shown that it is possible to extrapolate conclusions on U.S. imports to other developed import markets (Sampson & Yeats 1977).

3.2 SELECTING THE REGIONS AND THE COUNTRIES

Latin America was divided into four regions, and one country was selected to represent each region. The regions are: East Coast of South America, West Coast of South America, Mexico and Central America, and the West Indies. The countries selected to represent each region are: Brazil, Chile, Honduras, and Jamaica, respectively.

Brazil was selected to represent the East Coast due to its high level of export of forest products to the U.S., the great variety of those exports, and its enormous forest resource base. In addition, a population of 130 million represents a high presure on the government to promote

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[12] F.A.S. stands for free-alongside-ship and represents the price of the commodity alongside the ship at the port of exportation. C.I.F. stands for cost-insurance-freight and represents the commodity's value at port of importation.

economic growth and to expand the job market through exports of more manufactured natural resources.

On the west coast, Chile is the most important supplier of forest products to the U.S. Her 750,000 has. of man-made forests, adequate infrastructure for transportation, and a reasonably updated production technology, allow this country to respond very quickly to changes in world demand.

Honduras was selected as the most representative country for forest products exports in Central America. Honduras exports significant quantities of softwood and hardwood logs and lumber to the U.S., and despite the recent slow down in exports, a revival is expected as a response to the comparative advantages in forest product exports this country has, such as relative closeness to the U.S. markets.

Even though Mexico has been a very important supplier of forest products to the U.S. in the last 10 years, her position is changing from a net exporter to a net importer. This is mainly due to a very fast population and economic growth which results in production being diverted from exports towards domestic consumption. In addition, since most of the transportation between Mexico and the U.S. is overland, data on transportation costs are not available.

Guatemala and Costa Rica are also important suppliers of forest products to the U.S.; however, Honduras is better equipped than Guatemala in terms of forest infrastructure, and it has more forest resources than Costa Rica. Including Guatemala and/or Costa Rica would only complicate the study, and would not produce significant differences compared to the use of Honduras.

Jamaica was selected to represent the West Indies because it is the only country that still has some forest resources left. In addition, it is the most important supplier of furniture and parts of furniture to the U.S. from that region. Furthermore, a recently signed agreement between the World Bank and Jamaica , by which the former provides funds to develop the furniture industry in the latter, will boost the exports of furniture from Jamaica to the United States.

The United States was also divided into regions in order to see the impact of transportation costs on different U.S. regional markets. The six regions are: The North, The Northeast, The Southeast, Puerto Rico, The South, and The West. The countries included in the Latin American regions, and the ports included in the U.S. regions are shown in Appendix B and C respectively.

3.3 SELECTING THE PRODUCTS

The extreme diversification of forest products (there are over 3,000 paper products alone) made it necessary to focus only on solid wood products. The reasons for choosing solid wood products were: 1) Solid wood products have the highest tariffs in the U.S. and their imports are the most controversial; 2) the production of solid wood products is generally less capital intensive than paper products and, therefore, they represent the best opportunity to promote rural-based forestry development in Latin America. The selected solid wood products are: wood flooring, plywood, particle board, furniture, and miscellaneous wood products.

3.4 ESTIMATES OF TARIFFS EFFECTIVE PROTECTIVE RATE (TEPR)

The model developed by Johnson (1965) was used to obtain the empirical estimates of the Tariffs Effective Protective Rate (TEPR). Although there are similar models cited in the literature, such the one developed by Basevi, we chose Johnson's because it is more suitable for studying the protection provided by the tariff structure to the total value added portion, our major interest, as opposed to the protection to the labor factor only.

It is important to note that the model does have its shortcomings. First, and one of the most important, the model assumes fixed proportion product coefficients and does not allow substitution among inputs in final output. This means that the supply function is perfectly elastic (horizontal line), and does not allow the combination of inputs to react to changes in prices or changes of technology.[13] Second, the approach assumes that primary production factors are internationally immobile, which may be argueable under the long run analysis, specifically for capital (Basevi,1966). Finally, the TEPR model assumes that the exchange rate remains the same before and after the imposition of the tariff.[14] This assumption may not be realistic under real world trade conditions.

The basic TEPR model relates the value added to production of final product j with (V') and without (V) tariffs. The expression is:

$$\text{TEPR}= \frac{V_j' - V_j}{V_j} \qquad (1)$$

Where;

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[13] Yeats (1976), points out that changes in technology over time can lead to very different levels of protection.

[14] The TEPR is defined as the percentage increase in value added per unit in an economic activity made possible by the tariff structure relative to the situation in the absence of tariff (Corden, 1966).

$V_j = 1 - \Sigma a_{ij}$,

That is, the value added without tariff is equal to the total unit value of the output minus the value of inputs into the production of one unit of j,
and,

$V_j' = 1 + t_j - \Sigma a_{ij}(1+t_i)$, where

t_j = the ad valorem tariff imposed on imports of product j and,
t_i = the ad valorem tariff imposed on imports of inputs into the production of product j. Substituing these into formula (1), and simplifying, we obtain;

$$TEPR_j = \frac{t_j - \sum_{i=1} a_{ij} t_i}{1 - \sum_{i=1} a_{ij}} \qquad (2)$$

This formula defines TEPR as the difference between tariff on final product j, (t_j) and the total value of taxed inputs ($\sum_{i=1} a_{ij} t_i$) divided by the value added to the production of final product j, or ($1 - \sum_{i=1} a_{ij}$).

This formula was used to compute effective protection provided by U.S. tariff structure to the five solid wood product categories in this study. An example of the use of this formula can be found in Appendix D.

3.5 ESTIMATES OF FREIGHT EFFECTIVE PROTECTIVE RATE (FEPR)

Johnson also developed a formula similar to (2) to compute effective protection provided by transportation cost. The development of the effective freight factor model[15] parallels that of the effective tariff model, with the additional assumption that domestic prices of traded goods equal world prices plus transportation costs.

In this case the effects of transportation costs are isolated, whereas the effects of tariffs are excluded from the computations. The value of final product j with (V_j') and without (V_j) freight protection are once again related:

$$FEPR_j = \frac{V_j' - V_j}{V_j} \qquad (3)$$

Again we recognize that $V_j = 1 - \sum_{i=1} a_{ij}$

and that $V_j' = 1+d_j - \sum_{i=1} a_{ij}(1+d_i)$

where;

a_{ij} = percentage value of input i into value of final product j;

d_j = freight factor for importing final good j;

d_i = freight factor for importing input i;

Substituting into the original formula;

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[15] A formula that shows how to derive freight factors can be found in page 65.

$$FEPR_i = \frac{d_j - \sum_{i=1} a_{ij} d_i}{1 - \sum_{i=1} a_{ij}} \qquad (4)$$

Thus, FEPR is the difference between the freight factor on final good j and the sum of freight charged inputs, divided by the share of value added to final product j in production. This was the model used in this study to determine the protection provided by transportation costs to the five categories of solid wood products. The formula and an example of its use can be found in Appendix D.

3.6 THE COMBINED EFFECTIVE PROTECTIVE RATE (CEPR)

The combined, or net, effective protection provided by tariffs and freight factors together can be estimated as the sum of the rates of effective tariff and effective factor protection. That is:

$$CEPR_j = TEPR_j + FEPR_j$$

$$= \frac{t_j - \sum_{i=1} a_{ij} t_i}{1 - \sum_{i=1} a_{ij}} + \frac{d_j - \sum_{i=1} a_{ij} d_i}{1 - \sum_{i=1} a_{ij}}$$

$$= \frac{\{(1+d_j+t_j) - \sum_{i=1} a_{ij}(1+d_i+t_i) - (1-\sum_{i=1} a_{ij})\}}{1 - \sum_{i=1} a_{ij}}$$

$$= \frac{(d_j+t_j) - \sum_{i=1} a_{ij} (d_i+t_i)}{1 - \sum_{i=1} a_{ij}}$$

where all symbols are as before and a_{ij} represents the ratio of value of inputs to value of final products in the absence of freight factors and tariffs, i.e. the free-trade-frictionless world cases (Clark, 1978).[16] This formula and an example of its use can be found in Appendix D.

3.7 A COMPARISON OF EFFECTIVE TARIFF PROTECTION AND EFFECTIVE TRANSPORT COST PROTECTION

This objective was formally addressed in the study by testing the following hypothesis:

The effective protection rate of transport cost is as great or greater than that of tariffs.

A combination of tabular and correlation analysis was used. First, nominal and effective tariffs and freight factors were tabulated by product, and the number of times effective rates exceeded nominal rates were noted and conclusions drawn. Next, Spearman rank correlation coefficients and simple correlation coefficients between nominal and

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[16] This is the formula used to estimate the Combined Effective Protective (CEPR) when the f.o.b. valuation method is applied. For more details, refer to section 2.1.5

effective rates for tariffs, freight factors and the combination of both were computed. These coefficients were examined to identify any pattern of industrial protection.

3.8 A COMPARISON OF EFFECTIVE PROTECTION BY STAGE OF FABRICATION

This objective was also addressed by testing the following hypothesis:

> The effective protection of the U.S. tariff structure escalates by degree of fabrication. In contrast the, effective protection of transport costs declines by degree of fabrication.

This hypothesis was tested by arranging the five categories of solid wood products by increasing degree of manufacturing and observing the behavior of the level of effective protection at each stage of fabrication, for tariffs, freight factor and, combined protection.

3.9 DATA SOURCES

The estimation of effective rates of protection required three kinds of data:

1. U.S. import tariffs (t_i, t_j) for the five final products and for all inputs in the domestic manufacture of these products. For the purpose of this study, we treat softwood lumber as a final protected product, since housing is not traded.
2. Freight factors (d_i, d_j) for all forest products imported from Latin America and all imported inputs used in the manufacture of forest products, including intermediate forest products from non-Latin American countries.
3. Material input coefficients (a'_{ij}) for all imported inputs into the manufacture of the five final products.

U.S. Import Tariffs

Two different kinds of information on U.S. import tariffs were used: tariffs on the final products and tariffs on inputs. Tariffs for the five solid wood products (t_j) were calculated and precision kept up to the fourth digit, because the model was very sensitive to changes with t_j's. Tariffs for imported wood and non-wood inputs (t_i) were also calculated. In order to match the I-O classification sytem, several items with different tariffs had to be aggregated using 1983 U.S. imports as weights. For instance, plywood and veneer are classified together under the I-O system, whereas the Tariff schedule brakes them down into several sub-items such as hardwood and softwood plywood and hardwood and softwood veneer.

All tariffs were obtained from the "Tariff Schedules of the United States, Annotated,1984" and supplements, published by the U.S. International Trade Commission (USITC,1984). Special care was taken to identify any particular tariff preferential treatment by the U.S. tariff structure to certain countries or regions of the world.

Most forest products tariffs are ad valorem. When a specific tariff was encountered, its ad valorem equivalent was estimated as a weighted average, using 1983 imports as the weights. For instance, when some tariffs on paper products were given on a short ton basis, the average price of a short ton was calculated by dividing total Custom Value by total quantity imported in 1983. Then, the specific rate was converted to an ad valorem basis using this average unit value. In a few cases, the quantity imported was not available and the average unit cost of a similar product was used to estimate the ad valorem rate.

The relevant tariffs were identified by examining the inputs into the manufacture of each solid wood product category, as indicated by Table 1 of the U.S. Input-Output Tables (USDC,1984)

Freight Factors

Freight factors were derived indirectly, since freight factors are not published. The U.S. Department of Commerce publishes the value of U.S. imports on both a Customs Value (CV) and Cost, Insurance and Freight (C.I.F.) basis. C.V. is the value of the cargo at the port of embarkation, including mill price plus inland transportation and handling cost. The C.V. is equivalent to the previouly defined free-alonside-ship (F.A.S.) value. The C.I.F. value is the C.V. (F.A.S.) plus the cost of ocean freight and insurance, but excluding any import tariff and inland transportation charge in the importing country. The difference between C.V. and C.I.F. is essentially the freight cost, since insurance normally makes up only one percent or less of product value. Thus, the freight factors were derived using the formula:

$$FF_{(a),x} = \frac{C.I.F._{(a),x} - C.V._{(a),x}}{C.V._{(a),x}} \times 100$$

where;

$FF_{(a),x}$ = the freight factor for import a from country x;

$C.I.F._{(a),x}$ = the cost, insurance, and freight value of import a from country x, and

$C.V._{(a),x}$ = the customs value of import a from country x.

Freight factors were needed for both final products and inputs in order to estimate the effective protection provided by transport costs. The freight factors for the five solid wood categories (d_j) were obtained from unpublished U.S. Department of Commerce report IM 145-X, entitled , " U.S. Imports for Consumption and General Imports, Dec. 1983". This report records U.S. imports by country of origin and by U.S. port of entry on both a customs value , and c.i.f. basis. The freight factors were calculated from these data using the formula discussed above.

In principal, 5 x 6 x 4 = 120 different freight factors could be calculated, one for each of the five solid wood categories, six U.S. districts and four Latin American countries. However, some countries did not export all products to all districts in 1983, and thus freight factors were not available for some regions. The freight factors for inputs (d_i) were obtained from the U.S. Dept. of Commerce publication, FT-135, " U.S. General Imports and

Imports for Consumption, Schedule A, Dec. 1983". This publication presents data on U.S. imports by country of origin only. The freight factors calculated using this report represent average freight factors for the United States. As in the case of tariffs, the relevant inputs were identified from the Input-Output Tables (USDC, 1984).

It is important to note that the freight factors used for the five solid wood categories used as inputs into the production of another final product, were average freight rates to the U.S. For instance, in the case of wood flooring, the nominal freight factor as final product (d_j) was 22% ad valorem, whereas the nominal freight rate as input into the production of furniture (d_i) was only 16%, the average freight factor from all world sources. Finally, an average nominal freight factor for the United States as a whole was also computed.

The Input-Output Coefficients

There is a controversy in the literature surrounding the input-output coefficients, which stems from the fact that some of the inputs are traded and others are not (electricity, transportation services, etc.). The argument is whether to treat these non-traded inputs as primary factors or to treat them as any other tradeable input, with zero tariff and transportation cost. The estimated level of protection will differ, depending upon which approach is adopted, since the value added coefficient will differ.

Balassa (1965) and Basevi (1966), treated non-traded inputs just like any other tradeable input with zero tariff and transportation costs. The defense for this position is that the EPR refers to the effect of the tariff structure on value added per unit of product j, and to obtain value added all inputs, whether traded or not, should be excluded. Corden (1966), on the other hand, argues that non-traded inputs should be treated as primary factors and, therefore, as part of value added. The rationale of this approach is that a tariff on final product j not only protects the industry that produces it, but also the industries producing non-traded inputs used in the production of the final good j.

Corden's approach seems to have a stronger theoretical base. The EPR theory assumes that inputs have infinitely elastic supply and hence, their prices are given by world markets. This assumption is set in order to force the entire amount of the tariff to accrue to the value added portion of the output value. It is a safe assumption when dealing with traded inputs, or when dealing with non-traded inputs that have also infinitely elastic supply. However, as Corden states "...in the absence of unemployment and excess capacity a user industry can obtain extra non-traded inputs only at increased costs, and some part of the increment in the price of final good on account of the tariff will not increase value added per unit but will raise the price of the input". As a result, the effects of the tariff on primary factors or on non-traded inputs cannot be separated. Corden's approach was adopted in this study.

The values of inputs into the production of the final goods were obtained from the U.S. Department of Commerce report, "The Detailed Input-Output Structure of the U.S. Economy, 1977, Volume 1, The Use of Commodities by Industries". Even though the input-output table in this report is eight years old, there were three reasons for using it. First, it contains a convenient and consistent set of data, suitable to the purposes of our study; second, the technology used in the production of solid wood products in the United States has not changed much in the last years and; third, it would have been expensive and time consuming to develop estimates of input proportions specifically for this study.

There were three different commodity classification systems; one for U.S. imports, another for U.S. tariffs, and yet another for the Input-Output classification. The I-O classification system was used as the base, and the others were matched to it as close as possible. The Standard Industrial Classification Manual was used to identify which products were included under each I-O classification number.

The data on inputs was originally expressed as total value of input i purchased by manufacturing industry j. In order to obtain the relative importance of each input, these values were converted into percentages. Wood flooring, particle board, and plywood, are identified separately in the I-O tables; however, furniture and manufactured wood products required the aggregation of several manufacturing industries.[17] A weighted sum of the inputs listed in each column of the I-O table was calculated to obtain the inputs into furniture and miscellaneous wood products. These weighted inputs were then divided by the weighted total output and multiplied by 100 to obtain their relative importance. The formula used for this calculation follows:

$$Fur_i = \frac{\sum_{j=1} x_{ij} \, (W_j)}{\sum_{j=1} X_j \, (W_j)} \times 100$$

where;

[17] The industries under each category, as determined by the input-output table, are shown in Appendix G.

Fur_i = input i into production of furniture, expressed in percent,

x_{ij} = input i into production of industry j, expressed in absolute values,

X_j = value of total output of industry j, expressed in absolute values,

W_j = relative weight of industry j;

Since the input values were given in U.S. domestic prices, which are distorted from their world values by the tariffs and transportation costs, they had to be deflated by the corresponding tariffs and freight factors. The formula used to approximate free-trade-frictionless input values was:

$$a_{ij} = a'_{ij}\frac{1+ d_j + t_j}{1+ d_i + t_i}$$

where, a'_{ij} is the observed value from the I-O tables and a_{ij} is the estimated frictionless value.

Chapter IV

EMPIRICAL RESULTS

4.1 ESTIMATED TARIFF EFFECTIVE PROTECTIVE RATES (TEPR)

The estimated EPR's are summarized in Table 1. The formula used to obtain average tariff rates and an example are presented in Appendix E. In every case, the effective tariff was greater than the nominal tariff, ranging from 3% for wood flooring to 18% for plywood. The EPR for plywood was 100% higher than the nominal rate. This means that the effective protection provided plywood value added is about two times the protection provided by the nominal tariff. On the other hand, furniture showed very little difference between the effective and nominal tariff protection, with an increase of only 2.2% (figures were rounded in table). This is mainly due to the fact that the manufacture of furniture depends less on imported inputs (40%) than plywood (60%), and has a smaller value added portion. As already mentioned, the model is very sensitive to levels of value added, and smaller value added per dollar of output will result in higher levels of effective protection.

Table 1. Estimated Nominal, Effective, and Combined Effective Rates of Protection for Tariffs and Freight Factors, by products, all figures in %.

I-O Sector	Industry	Nominal Protection			Effective Protection			Inflection Point	
		Tariffs*	Freight* Factors	Combined Protection	Tariffs	Freight Factors	Combined Protection	Tariffs	Freight Factors
20.0300	Wood Flooring	2	22	24	3	33	36	<1	1.3
20.0902	Particle Board	6	48	53	7	77	83	1.5	2.4
20.0600	Plywood	9	22	31	18	47	65	1.4	2.9
22.0101	Furniture	6	15	21	6	21	27	2.2	2.6
23.0400	Miscellaneous	5	17	22	6	24	30	1.3	2.1

* Average, weighted by total 1983 U.S. imports

Estimates of the tariff inflection point for the five solid wood products are also given in Table 1. The inflection point represents the level of nominal rates at which the effective protection becomes negative, i.e., the point at which the tariff structure is such that it encourages imports and discourages domestic production. This situation arises when the sumation of the product of inputs times tariffs on inputs ($\sum_{i=1} a_{ij} t_i$) is greater than the nominal rate for the final product (t_j). In this particular case, given the input shares and tariffs determined by our model, inflection point values are very small, meaning that even low nominal tariff rates would provide positive effective protection to the domestic final product industry. For instance, a tariff rate of only 1% on wood flooring would still provide positive protection to the domestic industry mainly because of low tariffs levied on its relevant inputs.

4.2 ESTIMATED FREIGHT EFFECTIVE PROTECTIVE RATES (FEPR)

The estimated effective protection rates provided by transportation costs are also shown in Table 1. The estimates are based on weighted average nominal freight factors for the United States as a whole, and represent the protection rates for each of the five solid wood products from the Latin American countries to the U.S. The formula used to derive average freight factors and an example are presented in Appendix F.

Since transportation costs from Brazil to the U.S. differ substantially from the transportation costs from Honduras or Jamaica to the U.S., another set of nominal and effective freight factors was calculated and are shown in Table 2. In this case, the data used was broken down by country of origin, and hence the effective rates are averages for exports of the five solid wood products to the United States, from each of the four Latin American countries. The formula used to obtain the freight factors is the same as the one used for data set one. However, the raw data used to derive these freight factors was manipulated in different ways. In the first case, all exports from the four Latin American countries to the United States were combined and only one weighted average freight factor was obtained for each solid wood product category. In the second case, exports from Brazil were separated from exports from Honduras or Chile, and therefore, four different freight factors (one for each country) were obtained for each solid wood categories.

Table 2. Estimated Nominal and Effective Rates of Protection for Freight Factors, by products and country of origin, all figures in %.

I-O		Brazil		Chile		Honduras		Jamaica		Weighted Average	
Sector	Industry	Nominal	Effective	Nominal	Effect.	Nominal	Effect.	Nominal	Effect.	Nominal	Effect.
20.0300	Wood Flooring	21	32	31	48	29	45	--	--	22	33
20.0902	Particle Board	65	106	26	41	--	--	--	--	48	77
20.0600	Plywood	22	47	--	--	--	--	--	--	22	47
22.0101	Furniture	16	22	20	29	11	14	11	14	15	21
23.0400	Miscellaneous	17	24	19	27	16	25	16	22	17	24

Finally, since transportation costs from Brazil to Puerto Rico are not the same as transportation costs from Brazil to Seattle, a third set of nominal and effective freight rates was calculated. These rates are depicted in Table 3 and they show the freight factors from Latin America to the six U.S. regions. In this case, exports from Brazil to Puerto Rico were separated from exports to New York, and exports from Chile to Houston were separated from exports from Chile to Miami. These rates provide the most sensitive measure of the effect of transportation costs on the level of effective protection.

Inflection point estimates for freight factors are shown in Table 1. These inflection points were calculated in the same way as those for tariffs, and , as in the case of tariffs, due to low estimated freight factors for traded inputs, even low levels of transportation costs of final products would still provide positive protection to U.S. domestic industries.

DATA SET ONE

The results presented in Table 1 show that the range of effective freight factor among the five solid wood categories goes from 21% as in the case of furniture to 77% as in the case of particle board, indicating a variation of over 260%.

Table 3. Estimated Nominal and Effective Rates of Protection for Freight Factors, by product, country of origin and, entry districts.

Products & U.S. District	Brazil Nominal	Brazil Effect.	Chile Nominal	Chile Effec.	Honduras Nominal	Honduras Effect.	Jamaica Nominal	Jamaica Effect.
Plywood								
N. East	34	77	--	--	--	--	--	--
S. East	32	71	--	--	--	--	--	--
South	19	36	--	--	--	--	--	--
West	--	--	--	--	--	--	--	--
North	--	--	--	--	--	--	--	--
P. Rico	21	51	--	--	--	--	--	--
Particle Board								
N. East	--	--	--	--	--	--	--	--
S. East	81	133	26	40	--	--	--	--
South	--	--	--	--	--	--	--	--
West	--	--	--	--	--	--	--	--
North	--	--	--	--	--	--	--	--
P. Rico	19	28	--	--	--	--	--	--
Wood Flooring								
N. East	--	--	--	--	--	--	--	--
S. East	21	32	--	--	--	--	--	--
South	21	32	--	--	--	--	--	--
West	34	53	--	--	--	--	--	--
North	--	--	--	--	--	--	--	--
P. Rico	15	22	31	49	--	--	--	--
Furniture								
N. East	16	23	21	30	--	--	38	59
S. East	13	17	27	41	9	11	10	12
South	17	24	7	8	17	23	29	45
West	17	24	14	19	--	--	--	--
North	17	24	24	36	--	--	--	--
P. Rico	17	24	--	--	14	19	24	36
Miscellaneous wood products								
N. East	15	21	17	24	12	16	59	93
S. East	20	29	20	29	15	21	--	--
South	19	28	19	27	15	21	6	7
West	20	29	24	36	28	42	--	--
North	18	26	22	32	--	--	8	10
P. Rico	18	26	6	7	24	36	--	--

As already mentioned, the most protected category was particle board with a rate of 77%. This means that the American particle board industry is protected against particle board imports from Latin America by an effective freight factor of 77%, on the average. In other words, if any of the Latin American countries want to export particle board to the U.S., it will have to produce particle board at about 43% less the cost of American producers to be competitive in the U.S. industry. Of course, this estimate does not consider other transfer costs, such as import duties. The largest difference between effective and nominal rates corresponds to plywood with an effective rate 113% higher than its corresponding nominal rate. The least protected industry was furniture, with an average protection of 21% of the f.o.b. value, or a 40% increase over the nominal freight factor of 15 percent.

The pattern shown in Table 1 seems to support the hypothesis that low-valued, bulky products are penalized with higher nominal freight factors. High-valued products, such as furniture, may have higher nominal rates in absolute terms, but when expressed on an ad valorem basis, the freight factors are the lowest. Since the model is so sensitive to final product freight factors (d_j), higher nominal factors are likely to lead to higher effective rates.

DATA SET TWO

Plywood and Particle Board

Since Brazil was the only country exporting plywood to the U.S. in 1983, the protection rate is the same as the one obtained in data set one. As expected, the effective protection rate was greater than the nominal protection. Particle board from Brazil had the highest effective protection, with a rate of 106%, which is 63% higher than the nominal rate. Chile, the other exporter, carried a rate of 41%, which represents a 57% increase over the nominal rate.

Wood Flooring

The heaviest burden on wood flooring is carried by exports from Chile (48%), followed by Honduras (45%) and Brazil (32%) with the lowest rate. Jamaica did not export wood flooring to the U.S. in 1983. The average effective protection rate was 33%, very close to the Brazilian rate, mainly because over 90% of U.S. imports of wood flooring from Latin America in 1983 originated in Brazil.

Furniture

The highest rates of protection for furniture were faced by imports from Chile (29%), followed by imports from Brazil (22%). The lowest rates were from Honduras (14%) and Jamaica (14%). These estimates might reflect the proximity of these two countries to U.S. markets.

Miscellaneous wood products

Imports of miscellaneous wood products from Chile suffer the highest protection rate (27%), followed by Honduras (25%) and, Brazil (24%). The lowest barrier is faced by Jamaica, with a rate of 22%. However, this figures are not significantly different and for practical pourposes should be considered the same.

In summary, breaking the data down by country of origin increased the precision of our results and showed that there are significant differences in the effective protective rate for the same product from different countries. For instance, the nominal freight rate for particle board imported from Brazil was 150% greater than the freight rate for Chilean exports of the same product. Furniture and Miscellaneous wood products did not show significant variation of freight rates according to the country of origin. In addition, the data show that there are some inconsistencies among freight factors. For example, wood flooring exports from Chile face an effective rate 50% greater than that for Brazil. On the other hand, Brazilian particle board exports face a rate 150% larger than that for Chile. This result supports the argument that distance is not the only variable influencing the setting of freight rates. The use of time-series data could shed more light on this matter.

DATA SET THREE

Plywood

Brazil was the only plywood exporter to the United States in 1983. Brazilian exports entered the U.S. markets through the Northeast (NE), the Southeast (SE), Puerto Rico, and the South (S). As expected, due to difference in distance, the highest effective rate was for exports to the NE (77%), followed by the SE (71%). The lowest rate corresponded to the South (36%). The average Brazilian effective freight rate was close to the rate for Puerto Rico (51%),because the bulk of the U.S. imports of Latin American plywood enters through San Juan and Miami.

Particle Board

Brazil and Chile both exported particle board to the U.S. in 1983. Brazilian exports entered the U.S. through the SE and

Puerto Rico, whereas Chile only recorded exports to the SE. Brazilian's exports to the SE faced an effective freight rate of about 2.3 times greater than Chilean's (133% and 40% respectively).

Wood flooring

Brazil and Chile were the exporters of wood flooring to the U.S. in 1983. Brazilian exports entered through the South East, Puerto Rico, the South, and the West. The highest effective rate was encountered in the West (53%), followed by the South (32%) and the Southeast. Puerto Rico presented the lowest rate (15%). Chile's wood flooring exports entered only through Puerto Rico and therefore, the effective rate (49%) is the same as for data set two.

Furniture

All the countries studied recorded furniture exports to the U.S. in 1983. Brazil's exports entered the U.S. through all six U.S. regions. The lowest effective rate was for exports entering through the Southeast (17%) although all regions showed a surprising similarity in nominal and effective rates of freight protection. The difference between the highest and the lowest rates was only three percentage points for the nominal rate and seven for the effective rates. For practical purposes the rates are the same.

Chilean exports faced the highest effective rate when entering through the Southeast (41%), and the lowest when entering through the South (8%). This low value, however, is the product of only one observation recorded between Chile and the South, and therefore, it may not reflect the real freight factor but an exceptional situation such as a sample shipment. Honduran exports to the Southeast face the lowest freight factors (11%). Likewise, Jamaica's exports to the South are the least burdened with freight charges (12%).

This is the first case in which there is enough data to ascertain any pattern in the effective freight factors. The results indicate that differences in the distance from the exporting country to the particular U.S. market generally leads to differences in the levels of freight protection. For instance, Brazil, Honduras and, Jamaica (all in the east coast) faced their lowest rates when entering through the Southeast. Chile (in the west coast) faced its lowest level of protection when entering through the South or the West, and its highest level in the Southeast.

From the point of view of the protected domestic industry, for example, the Southeast, the closest country, Honduras, showed the lowest nominal and effective freight factors, followed by Jamaica, the second closest country. The highest rates pertain to Chile, which is also the most distant country. In short, the correlation between distance and level of freight factor is very high, although the relationship is not perfectly linear.

Miscellaneous wood products

In 1983, all of the countries under study exported miscellaneous wood products to the United States. Brazil's exports had the highest effective rate in the West and Southeast (29%) and the lowest in the Northeast (21%). The same pattern was followed by exports from Chile and Honduras, although at different levels of protection. Jamaica's exports had the highest protection when landing at ports of the Northeast (93%), and the lowest when landing at the South (7%). This low figure is also a product of only one observation recorded between Jamaica and the South, and hence, it should carefully be considered.

Distance seems not to be the main factor influencing the freight rates on miscellaneous wood products, since rates for the Northeast were smaller than for the Southeast. Perhaps the level of aggregation and the heterogeneity of the products included in this category obscure the real pattern.

In summary, the inclusion of data broken down by U.S. districts (Table 3) did not produce significant differences as compared to those obtained for the U.S. in general (Table 2). Only in the case of particle board from Brazil there was a significant difference (81% to the SE and 19 to Puerto Rico), and since these factors were derived from only one observation on each case, we can not resort to the "law of the large numbers". In short, the high level of dissagregation resulted in decreased confidence on the available data.

4.3 ESTIMATES OF COMBINED EFFECTIVE PROTECTIVE RATES (CEPR)

Estimates of CEPR are also shown in Table 1. Both components of the combined effective rate (effective tariff and effective freight factor) show higher levels of effective protection relative to nominal rates. As a result, the effective combined rates were also higher than the corresponding nominal rates. Although the effective protection provided by tariffs were relatively small (particle board = 7%), the combined effective rate turned to be very large (83%) as a result of high levels of effective protection provided by transportation costs (particle board = 77%). This means that, even if all the tariffs were abolished, the effective protection will still be significant due to the important protection provided by transportation costs. The formula to obtain the Combined Effective Protective Rate and an example are presented in Appendix D.

4.4 TEST OF THE FIRST HYPOTHESIS

Effective freight factor protection was in all cases more important than the effective tariff protection, posing a much higher barrier to entries of solid wood products from Latin America into U.S. markets (Table 1). In relative terms, the difference between effective freight factors and effective tariffs ranges from 8% , in the case of miscellaneous wood products shipped from Jamaica to the U.S. South, to 1800% (18 times larger), for Brazilian exports of particle board to the Southeast (Table 3). In general, we can say that freight factors are 2.5 to 10 times more important than tariffs whether considered on a nominal or effective basis (Table 1).

The finding that the protection provided by transportation costs is greater than that provided by tariffs is verified by both the Pearson correlation coefficient (Table 4) and the Spearman rank correlation coefficient (Table 5). In the first case, the correlation between effective tariff protection and effective combined protection was .58, whereas the correlation between effective freight factor protection and effective combined protection was .96. A similar pattern is found when correlating nominal tariffs with nominal combined (.29), and nominal freight factor with nominal combined (.97). These relationships suggest that transportation costs dominate the pattern of industrial protection.

In the second case, the Spearman rank correlation coefficient between effective tariff protection and effective combined was only .6, which means that these two

Table 4. Pearson Correlations Coefficients Between Nominal and Effective Protection Measures for the United States.

	Nominal Freight Factors	Nonimal Tariffs	Combined Nominal	Effective Freight Factors	Effective Tariffs	Combined Effective
Nominal Freight Factors	1.000	.086 (.88)	.97 (.004)	.95 (.01)	.07 (.91)	.84 (.07)
Nominal Tariffs		1.000	.29 (.62)	.33 (.58)	.94 (.01)	.54 (.34)
Combined Nominal			1.000	.98 (.002)	.26 (.99)	.93 (.02)
Effective Freight Factors				1.000	.36 (.34)	.96 (.007)
Effective Tariffs					1.000	.58 (.29)
Combined Effective						1.000

Level of significance in parenthesis.

Table 5. Spearman Rank Correlation Coefficients Between Nominal and Effective Protection Measures for the United States.

	Nominal Freight Factors	Nominal Tariffs	Combined Nominal	Effective Freight Factors	Effective Tariffs	Combined Effective
Nominal Freight Factors	1.000	.10 (.87)	1.000	1.000	.60 (.28)	1.000
Nominal Tariffs		1.000	.10 (.87)	.10 (.87)	.70 (.18)	.10 (.87)
Combined Nominal			1.000	1.000	.60 (.28)	1.000
Effective Freight Factors				1.000	.60 (.28)	1.000
Effective Tariffs					1.000	.60 (.28)
Combined Effective						1.000

Level of significance in parenthesis.

parameters do not rank the solid wood categories in the same way. On the other hand, the rank correlation coefficient between effective freight factor and effective combined protection was 1.0 , which means that there is a perfect positive correlation between the ranking of the two parameters. This indicates that either the EPR for transportation as the combined EPR can be used to rank the five solid wood products according to degree of effective protection. Again, transportation cost coefficients dominated the combined effective protection, suggesting that transportation costs are more important than tariffs in terms of barriers to trade in solid wood products between Latin America and the U.S.

An important finding was that there were changes in the ranking of products according to level of protection as a result of including transportation costs in the analysis. For instance, according to level of protection provided by tariffs alone, wood flooring was ranked fifth (3%), and particle board was ranked second (7%). When transportation costs were included, the combined effective protection moved wood flooring to the third position (36%), and particle board to number one (83%).

This finding supports the hypothesis that the domestic production of bulky products enjoy high levels of protection because of transportation costs. Since transportation costs are much more important that tariffs, the combined protection provided to bulky products (mostly less manufactured products) is greater than the protection provided to high valued, semi-finished or finished products.

4.5 TEST OF THE SECOND HYPOTHESIS

The estimates of effective protection do not support the hypothesis that effective tariff protection escalates with the degree of manufacturing. Furniture and miscellaneous wood products, both at the final stage of processing had lower effective tariff rates than either plywood or particle board, which represent earlier stages in the manufacturing chain.

Our finding does not coincide with conclusions reached by similar studies (Balassa, 1965 , Basevi, 1966). The difference may stem from the fact that these previous works were carried out at a high level of aggregation and over a broad range of manufacturing industries, whereas our study is a detailed analysis of an industry group. At this level of disaggregation the ability of industry members to organize and lobby for protective measures becomes important. The plywood and particle board industries are relatively concentrated and well-organized compared to the furniture and miscellaneous manufactured wood products industries. In fact, the latter tend to be a very heterogeneous group of wood using companies.

On the other hand, the estimates of effective protection do support the hypothesis that effective freight rates decrease with the degree of fabrication. The higher the value added to a product by the fabrication process, the lower, in general, the cost of shipping it to the United States.

The combined rates of protection also show a declining pattern. This is mostly due to the great influence that transportation costs have on combined protection.

Chapter V

CONCLUSIONS

5.1 IMPLICATIONS FOR LATIN AMERICAN EXPORTS

The estimated effective protection rates presented in this report must be evaluated within the framework, assumptions and limitations of the study. Somewhat different results might be obtained if more recent and more precise data on the input-output relationship were available. In addition, the assumption of fixed input proportions can be challenged, since cross-elasticities probably play a crucial role in determining the level and combination of inputs. Furthermore, data pertaining to transportation costs do not include inland transportation costs in the importing country, which will add to or subtract from the protection provided domestic producers, in proportion to the distance between final markets and the ports of entry.

Despite these limitations, the results reveal some facts that have implications for Latin American forest products exports. First, in all cases effective protective rates were greater than nominal rates. This finding reconfirms the argument that it is the effective rate which should be borne in mind when negotiating reductions of barriers to entry with developed countries. Even more important, Latin American countries interested in increasing their wood exports to the United States should firmly oppose any reduction in tariffs that offers a greater percentage reduction of protection on intermediate inputs than on finished products, because it will actually increase the effective protection on final products. The least that can be accepted should be an across-the-board reduction, meaning that the whole tariff structure would be reduced by the same percentage, or the tariff on final products reduced more than those on inputs. Without considering inter-commodity substitution, an equalized reduction on tariffs levied on final and intermediate product will indeed mean a reduction of effective protection.

By the same line of reasoning, Latin American countries should be aware that their own tariff structure may be hampering their export possibilities. This happens when tariffs on imported inputs for the production of exportables are very high, thereby increasing production costs and reducing competitiveness in world markets. For instance, an important component of the total cost of plywood production in Brazil is synthetic glue, partly because the domestic production of glue is heavily protected through taxes on imports. Thus, the tariff structure is indirectly taxing the production of an exportable product.

Second, the acceptance of the hypothesis that transportation costs are more important than tariffs in terms of barriers to trade implies that efforts should shift to ways to reduce transport costs. This is not to say that negotiations to reduce tariff should be abandoned, but to say that more energy and resources should be devoted to the study of ways to reduce transportation costs. Latin American countries could expand exports much more significantly reducing transportation costs than through reduction in tariffs in their overseas markets.

Reductions in transportation costs can be achieved through economic and political measures. Among the economic measures, changing the composition of trade, taking advantage of economies of scale, and improving port facilities are worth of mention. Changing the composition of trade from low-valued bulky products to more manufactured good would reduce freight factors and reduce the impact of transportation costs on forest product exports. Economies of scale in shipping can be achieved by bigger vessels with standardized loading and unloading equipment, and by consolidating cargo so that overhead costs can be reduced. Improved port facilities will reduce the "dead-time" of ships at harbor, and a rationalized scheduled of arrivals and departures will result in savings in transportation costs.

Most Latin American countries export low volumes of cargo which usually results in high freight costs; high freight costs, in turn, often discourage expansion of exports (Wisdom,1983). In order to break this vicious circle, a temporary subsidy on transportation costs could be implemented as part of the political measures suggested. It must be understood that this subsidy is temporary and only aimed to help the exporting industry to develop economies of size. After a certain period of time this subsidy must be removed and the industry should be able to compete in the international market if it actually has comparative advantages.

The oligopolistic nature of the liner conferences may transform cost saving efforts in only higher profits for the shipowners. This situation can be avoided by improving the bargaining position of exporters, perhaps through the creation of active export groups, such as cooperatives of exportation, with strong countervailing power. The government can then actively participate in price-setting negotiations.

Third, our analysis has shown that effective tariffs on forest products do not always escalate with degree of manufacturing. In addition, it has been shown that transportation costs relative to final value do decrease with degree of fabrication. Therefore, the combination of tariff and transportation costs favors the export of manufactured products as opposed to exports of raw material and/or low manufactured products. This implies that if Latin American countries are interested in expanding exports to the United States they should specialize in exporting finished goods, which would reduce the combined impact of transportation costs and tariffs. In addition, exporting commodities at higher stages of fabrication will tend to generate employment.

5.2 AREAS FOR FURTHER RESEARCH

Due to the limitations of time and data availability this study was restricted to the impact of tariff and transportation costs on U.S. imports of solid wood products from Latin America. The approach used was the EPR theory, whose main weakness stems from the use of fixed coefficient proportions in the input-output relationships. These limitations can be avoided by obtaining cross-product substitution elasticities (especially for those inputs which make up over 10% of the final value of output) and, by obtaining more recent data pertaining the technology used in the production process. In addition, data on transportation cost could be more precise if the cost of inland transportation in the importing country were included.

In addition to these internal modifications of the model, there are others external to it that could provide a better understanding of the impact posed by import barriers on Latin American exports to the United States. First, the research could be expanded to estimate the impact of non-tariff barriers, such as quotas, technical standards, and the like. Because these are real barriers, stopping Latin American exports from more freely entering the United States, the overall effective protection would not be achieved until all barriers were properly assessed in the model.

Second, the data used to obtain freight factors were U.S. imports for 1983. It is likely that the use of data pertaining to other years will render different sets of estimates which may or may not change the conclusions of this research. A time series analysis would provide a more reliable and consistent tool to assess the effective protection provided by transportation costs to U.S. domestic producers from solid wood products originated in Latin America.

Finally, this research could be expanded to include pulp and paper products protection. This would provide a more complete picture of the barriers forest products face in the United States and conclusions regarding forest resource allocation in Latin America could be pursued.

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A P P E N D I X

Appendix A: Latin American Exports of Forest Products to the United States.
Unit values are in constant dollar. 1974=100

Product	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	Unit
Hardwood logs											
Quantity	1794	n.a.	n.a.	205	125	n.a.	126	282	n.a.	176	MBF
Value	254	n.a.	n.a.	65	63	n.a.	76	128	n.a.	140	1000 $
Unit value	141	n.a.	n.a.	300	405	n.a.	453	337	n.a.	531	$/MBF
Softwood logs											
Quantity	1854	n.a.	n.a.	n.a.	4806	17330	n.a.	n.a.	n.a.	n.a.	MBF
Value	56	n.a.	n.a.	n.a.	334	2001	n.a.	n.a.	n.a.	n.a.	1000 $
Unit value	30	n.a.	n.a.	n.a.	42	64	n.a.	n.a.	n.a.	n.a.	$/MBF
Hardwood lumber											
Quantity	151444	81987	96508	80318	118884	125325	130671	120758	75023	48247	MBF
Value	34781	22219	27216	32909	36246	40953	55273	60073	36542	38050	1000 $
Unit value	229	320	303	388	245	238	318	369	352	527	$/MBF
Softwood lumber											
Quantity	75740	36031	40620	19378	63515	36968	15180	13302	12640	20160	MBF
Value	11179	6694	7477	7824	12781	13309	6636	7274	5307	6101	1000 $
Unit value	148	196	157	287	123	200	267	337	276	173	$/MBF
Wood pulp											
Quantity	63	n.a.	n.a.	1604	11114	47749	77690	134305	143579	144739	STN
Value	18	n.a.	n.a.	457	2495	14633	30910	54551	51422	43709	1000 $
Unit value	286	n.a.	n.a.	220	183	211	227	222	205	189	$/STN
Particle Board											
Quantity	2161	n.a.	n.a.	917	932	n.a.	n.a.	1291	16050	95341	MLB
Value	203	n.a.	n.a.	70	68	n.a.	n.a.	117	1120	5879	1000 $
Unit value	94	n.a.	n.a.	62	49	n.a.	n.a.	49	36	31	$/MLB
Hardwood veneer											
Quantity	244328	130772	240412	159060	212924	148466	157660	164494	159928	194813	MSF
Value	5984	4394	7431	7192	9968	7646	9986	12687	10837	13713	1000 $
Unit value	25	37	33	46	43	40	46	56	49	51	$/MSF
Softwood veneer											
Quantity	6202	n.a.	2400	8360	11770	5512	11149	3486	1963	6241	MSF
Value	245	n.a.	88	660	494	302	1118	301	158	385	1000 $
Unit value	40	n.a.	31	56	26	31	61	53	53	35	$/MSF
Hardwood plywood											
Quantity	19081	14576	18320	24081	27513	53621	45672	29815	23483	41819	MSF
Value	3435	1907	3956	4477	5207	9842	10750	10069	7127	10748	1000 $
Unit value	180	143	230	190	175	141	173	245	218	187	$/MSF
Softwood plywood											
Quantity	1468	768	1532	7292	15335	5873	988	1657	3615	19659	MSF
Value	131	71	411	2026	4395	1859	301	538	1101	4898	1000 $
Unit value	89	86	202	175	164	183	184	198	202	150	$/MSF
Paper products											
Quantity	4213	7398	15214	12047	31035	67007	61344	68662	77005	165539	MLB
Value	552	1095	2151	889	2497	9723	5603	6021	6711	29321	1000 $
Unit value	131	113	107	57	65	100	52	48	50	111	$/MLB
Miscellaneous											
Value	44492	32015	51474	67736	91056	107825	86681	89434	86623	97048	1000 $
Furniture											
Value	25590	18497	26683	31029	38120	48922	43980	39459	38104	48578	1000 $

n.a.= non available

Source: USDC, 1984."U.S. Imports for Consumption and General Imports, Dec. 1983." IM 145-X.

Appendix B: Regions and Countries of Latin America

I. Mexico

Mexico

II. Central America

Belize
Guatemala
Honduras
El Salvador
Nicaragua
Costa Rica
Panama

III. South America

Venezuela
Colombia
Ecuador
Peru
Suriname
Guyana
French Guiana
Brazil
Bolivia
Paraguay
Chile
Argentina
Uruguay

IV. West Indies

Bermuda
Bahamas
Cuba
Jamaica
Cayman Islands
Haiti
Dominican Republic
Barbados
Trinidad & Tobago
Netherland Antilles
French West Indies
LW & WW Islands

Appendix C: U.S. Regions and Ports

I. Northeast

Portland, Me.
St. Albans, Vt.
Boston, Ma.
Providence, R.I.
Bridgeport, Conn.
New York, N.Y.
Philadelphia, Pa.
Baltimore, Md.
Washington, D.C.

II. Southeast

Norfolk, Va.
Wilmington, N.C.
Charleston, S.C.
Savannah, Ga.
Miami, Fla.

III. South

Tampa, Fla.
Mobile, Ala.
New Orleans, La.
Port Arthur, Tex.
Laredo, Tex.
El Paso, Tex.
Houston, Tex.
Dallas, Tex.
Nogales, Ariz.

IV. West

San Diego, Cal.
Los Angeles, Cal.
San Francisco, Cal.
Portland, Or.
Seattle, Wa.
Anchorage, Al.
Honolulu, Ha.

V. North

Great Falls, Mt.
Pembina, N. Dak.
Minneapolis, Minn.
Duluth, Minn.
Milwaukee, Wis.
Detroit, Mich.
Chicago, Ill.
Cleveland, Oh.
St. Louis, Mo.
Buffalo, N.Y.
Ogdensburg, N.Y.

VI. Puerto Rico

Virgin Islands
San Juan, P. Rico

Appendix D: Formulas and Examples to Calculate EPR for Tarrifs, Freight Factors, and Combined Protection

1. EFFECTIVE TARIFF PROTECTION

$$TEPR_j = \frac{T_j - \sum_{i=1} a_{ij} t_i}{1 - \sum_{i=1} a_{ij}}$$

$$TEPR_{plywood} = \frac{.09 - .0149398}{1 - .59076} = 18.34\%$$

2. EFFECTIVE FREIGHT FACTORS

$$FEPR_j = \frac{D_j - \sum_{i=1} a_i d_i}{1 - \sum_{i=1} a_{ij}}$$

$$FEPR_{plywood} = \frac{.22 - .0293196}{1 - .590760} = 46.59\%$$

3. COMBINED EFFECTIVE PROTECTION

$$CEPR_j = \frac{(D_j + T_j) - \sum_{i=1} a_{ij}(d_i + t_i)}{1 - \sum_{i=1} a_{ij}}$$

$$CEPR_{plywood} = \frac{.31 - .0442594}{1 - .590760} = 64.93$$

Appendix E: Formula Used to Obtain Weighted Average Tariffs and an Example.

$$WAT_j = \sum_{i=1} T_i \; (FAS_{iv} / \sum_{i=1} FAS_i)$$

where;

$WAFF_j$ = weighted average tariff for final product j (in %).

T_i = tariff of sub-item i.

FAS_i = F.A.S. value of 1983 imports of sub-item i.

$\sum_{i=1} FAS_i$ = total value of 1983 imports of category j.

Example of Calculation of Weighted Average Tariff

Category	Sub-Item	Tariffs	F.A.S. Value* ($1000)	Weights	Contribution
plywood	Spanish Cedar	12.5%	65981	.1458	1.8225
	Parana Pine	7.8%	8065	.0178	.1388
	Other Softwood	20.0%	22249	.0491	.9820
	Other Hardwood	7.6%	356097	.7873	5.9810
			452392	1.0000	8.9243

* Imports from all over the world.

$$WAT_j = 12.5(.1458) + 7.8(.0178) + 20.0(.0491) + 7.6(.787) = 8.9243$$

Appendix F. Formula Used to Obtain Weighted Average Freight Factors and an Example.

$$WAFF_j = \sum_{i=1} FF_i \ (FAS_{iv} / \sum_{i=1} FAS_i)$$

where;

$WAFF_j$ = weighted average freight factor for final product j, in percent.

FF_i = freight factor for sub-item i, in percent.

FAS_i = F.A.S. value of 1983 imports of sub-item i, in %.

$\sum_{i=1} FAS_i$ = total value of 1983 imports of category j.

Example of Calculation of Weighted Average Freight Factor

Category	Sub-Item	Freight Factors	F.A.S. Value	Weights	Contribution
Plywood	Spanish Cedar	16.4%	1158645	.1039	1.704
	Parana Pine	26.4%	432099	.0380	1.030
	Other Softwood	26.6%	152593	.0130	.036
	Other Hardwood	22.3%	9397657	.8451	18.810
			11140994	1.0000	21.850

* Imports from Selected 4 Latin American countries.

$WAFF_j$ = 16.4(.1039) + 26.4(.0380) + 26.6(.0130) + 22.3(.845)= 21.850%

Appendix G: Classification of Selected Solid Wood Products.

PRODUCT	SCHEDULE A (imports)	U.S. TARIFF	INPUT-OUTPUT
I. Plywood			
Spanish Cedar	6347070	240.10	20.0600
Parana Pine	6347010	240.12	20.0600
Other Hardwood	6347020	240.16	20.0600
	6347030	240.14	
	6347040	240.17	
	6347050	240.19	
	6347060		
Softwood	6347080	240.21	20.0600
II. Particle Board			
Particle Board	6343200	245.45	20.0902
		245.50	
III. Wood Flooring			
Wood Flooring	6353025	202.56	20.0300
		202.60	
IV. Furniture			
Folding Chairs	8218055	727.23	22.0101
		727.25	23.0100
Non-folding chair	8218065	727.27	22.0101
		727.29	23.0100
Other furniture	8218070	727.35	22.0101
	8218075	727.40	22.0108
	8218090		22.0200
			22.0400
			23.0100
V. Miscellaneous Manufactured Wood Articles			
Moldings	6348020	202.62	20.0903
	6348040	202.64	
Carvings	6348060	202.62	20.0903
		202.64	
Packing Boxes	6351000	204.25	21.0000
		204.27	
		204.30	

Appendix G: Continue.

PRODUCT	SCHEDULE A (imports)	U.S. TARIFF	INPUT-OUTPUT
Doors & Windows	6353010	206.30	23.0400
	6353020	207.45	23.0700
	6353045	207.55	
	6343050		
Wood frames	6354100	206.60	23.0700
Forks, spoons	6354220	206.45	23.0700
		206.47	
Jewelry Boxes	6354925	204.35	23.0700
	6354945	204.40	
		204.50	
Paint brush	6359125	206.52	23.0700
		206.53	
Dowel rods	6359540	206.85	23.0700
	6359550	206.87	
Tools	6359145	206.50	23.0700
		206.54	
Blinds, shutters	6359570	206.65	23.0700
		206.67	

Source: USDC, 1984." U.S. Imports for Consumption and General Imports, Dec. 1983". IM 145-X.

Appendix H: Nominal Tariff and Freight Factors for Selected Inputs. All figures expressed on a percent basis.

I-O CLASS. NUMBER	SELECTED INPUTS	TARIFFS	FREIGHT FACTORS
4.0002	LANDSCAPE AND HORTICULTURAL SERVICES	N.T.	0.00
7.0000	COAL MINING	FREE	16.56
12.0201	MAINT. AND REPAIR OF NON-FARM BUILD.	N.T.	0.00
14.2103	WINE, BRANDY, ETC.	20.35	12.67
14.2104	DISTILLED LIQUORS, EXCEPT BRANDY	96.69	6.09
14.2400	COTTONSEED OIL MILLS	20.00	0.00
16.0100	BROADWOVEN FABRIC MILLS	18.57	6.41
16.0200	NARROW FABRIC MILLS	7.98	5.10
16.0400	THREAD MILLS	10.61	6.42
17.0400	PADDING AND UPHOLSTERY FILLINGS	FREE	9.10
17.0500	PROCESSED TEXTILE WASTE	FREE	9.90
17.0600	COATED FABRIC, NOT RUBERIZED	7.56	2.97
17.0900	CORDAGE AND TWINE	7.43	11.35
18.0300	KNIT FABRIC MILLS	13.97	6.54
18.0400	APPAREL MADE FROM PURCHASED MATERIAL	16.69	7.21
19.0100	CURTAINS AND DRAPERIES	18.45	6.82
19.0304	AUTOMOTIVE AND APPAREL TRIMMINGS	5.65	5.10
20.0100	LOGGING CAMPS AND LOGGING CONTRACTORS	FREE	1.96
20.0200	SAWMILLS AND PLANING MILLS	0.08	3.60
20.0300	HARDWOOD DIMENSION AND FLOORING MILLS	2.20	16.11
20.0400	SPECIAL PRODUCTS SAWMILLS	3.10	0.42
20.0600	VENEER AND PLYWOOD	6.40	10.92
20.0901	WOOD PALLETS AND SKIDS	FREE	0.00
20.0902	PARTICLE BOARD	5.55	1.07
20.0903	WOOD PRODUCTS	6.38	8.57
21.0000	WOOD CONTAINERS	5.33	11.22
22.0101	WOOD HOUSEHOLD FURNITURE	5.78	9.67
22.0103	WOOD TV AND RADIO CABINETS	3.40	9.70
22.0200	UPHOLSTERED HOUSEHOLD FURNITURE	3.40	9.40
22.0400	MATTRESSES AND BEDSPRINGS	8.37	9.46
23.0100	WOOD OFFICE FURNITURE	5.78	9.59
23.0400	WOOD PARTITIONS AND FIXTURES	6.85	6.99
23.0700	FURNITURE AND FIXTURES	6.31	9.51
24.0200	PAPER MILLS, EXCEPT BUILDING PAPER	2.75	2.71
24.0400	ENVELOPES	5.50	7.60
24.0500	SANITARY PAPER PRODUCTS	4.70	6.77
24.0701	PAPER COATING AND GLAZING	1.97	7.51
24.0702	BAGS, EXCEPT TEXTILE	6.05	3.98
24.0703	DIE-CUT, PAPER AND BOARD	3.30	5.52
24.0706	CONVERTED PAPER PRODUCTS	3.95	4.44
25.0000	PAPERBOARD CONTAINER AND BOXES	5.50	6.34

Appendix H: Continue.

I-O CLASS. NUMBER	SELECTED INPUTS	TARIFFS	FREIGHT FACTORS
26.0200	PERIODICALS	FREE	4.45
26.0301	BOOK PUBLISHINGS	FREE	4.81
26.0400	MISCELLANEOUS PUBLISHINGS	FREE	7.11
26.0501	COMMERCIAL PRINTINGS	4.71	7.68
26.0601	MANYFOLD BUSINESS FORMS	6.50	2.27
26.0602	BLANKBOOKS AND LOOSELEAF BINDERS	5.20	0.00
26.0801	ENGRAVE AND PLATE PRINTING	4.40	3.85
27.0100	IND. INORG. AND ORG. CHEMICALS	9.04	5.16
27.0402	ADHESIVES AND SEALANTS	6.77	8.65
27.0406	CHEMICAL PREPARATIONS	3.84	6.17
28.0100	PLASTIC MATERIALS AND RESINS	8.20	6.66
30.0000	PAINT AND ALLIED PRODUCTS	3.78	5.50
31.0101	PETROLEUM REFINING	1.29	4.03
31.0102	LUBRICATING OIL AND GREASES	5.37	4.50
32.0100	TIRES AND INNER TUBES	3.75	6.10
32.0302	FABRICATED RUBBER PRODUCTS	6.37	7.30
32.0400	MISCELLANEOUS PLASTIC PRODUCTS	6.37	7.30
33.0001	LEATHER TANNING AND FINISHING	4.86	5.02
35.0100	GLASS AND GLASS PRODUCTS	9.05	6.99
36.1600	ABRASIVE PRODUCTS	0.95	3.61
36.1800	GASKET, PACKING, AND SEALING DEV.	4.10	6.47
37.0101	BLAST FURNACES AND STEEL MILLS	2.89	8.72
37.0103	STEEL WIRE AND RELATED PRODUCTS	4.04	9.19
37.0401	METAL HEAT TREATING	6.27	7.70
38.0100	PRIMARY COPPER	4.33	3.04
38.0700	COPPER ROLLING AND DRAWING	6.38	3.02
38.0800	ALUMINUM ROLLING AND DRAWING	4.05	2.38
41.0100	SCREW MACHINES PROD., BOLTS, ETC.	4.77	6.49
41.0203	METAL STAMPINGS	4.40	5.50
42.0100	CUTLERY	9.90	4.85
42.0201	HAND AND EDGE TOOLS	5.62	4.68
42.0202	HAND SAWS AND SAW BLADES	3.18	2.68
42.0300	HARDWARE	4.78	4.40
42.0401	PLATING AND POLISHING	11.86	6.49
42.0402	METAL COATING AND ALLIED SERVICES	11.86	6.89
42.0500	MISCELL. FABRICATED WIRE PRODUCTS	7.18	4.89
42.1100	FABRICATED METAL PRODUCTS	5.65	7.19
47.0300	SPECIAL DIES AND TOOLS	5.70	2.80
48.0300	WOOD WORKING MACHINERY	4.15	4.85
49.0500	POWER TRANSMISSION EQUIPMENT	6.08	4.07
49.0700	GENERAL INDUSTRIAL MACHINERY	4.01	4.13
50.0002	MACHINERY, EXCEPT ELECTRICAL	5.34	3.30

Appendix H: Continue.

I-O CLASS. NUMBER	SELECTED INPUTS	TARIFFS	FREIGHT FACTORS
53.0400	MOTORS AND GENERATORS	6.77	2.09
55.0100	ELECTRIC LAMPS	3.84	5.54
55.0200	LIGHTING FIXTURES AND EQUIPMENT	7.34	8.80
56.0100	RADIO AND TV RECEIVING SETS	4.80	3.04
58.0100	STORAGE BATTERIES	6.50	3.12
58.0400	ENGINE ELECTRICAL EQUIPMENT	3.40	2.63
59.0302	MOTOR VEHICLES PARTS AND ACCESSORIES	3.20	2.42
62.0500	SURGICAL APPLIANCES AND SUPPLIES	6.78	1.60
63.0200	OPHTALMIC GOODS	12.03	2.70
63.0300	PHOTOGRAPHIC EQUIPMENT AND SUPPLIES	6.26	3.04
64.0400	SPORTING AND ATHLETIC GOODS	4.46	5.88
64.0502	LEAD PENCIL AND ART GOODS	6.80	4.80
64.0503	MARKING DEVICES	5.44	7.10
64.0504	CARBON PAPER AND INKED RIBBON	7.23	5.88
64.0702	NEEDLES, PINS AND FASTENERS	13.02	8.63
64.0800	BROOMS AND BRUSHES	5.93	10.18
64.1200	MANUFACTURING INDUSTRIES	7.85	6.15
65.0100	RAILROAD AND RELATED SERVICES	N.T.	N.T.
65.0200	PUBLIC PASSENGER TRANSPORTATION	N.T.	N.T.
65.0300	MOTOR FREIGHT TRANSP. AND WAREH.	N.T.	N.T.
65.0400	WATER TRANSPORTATION	N.T.	N.T.
65.0500	AIR TRANSPORTATION	N.T.	N.T.
65.0600	PIPELINES, EXCEPT NATURAL GAS	N.T.	N.T.
66.0000	COMUNICATION, EXCEPT RADIO AND TV	N.T.	N.T.
68.0100	ELECTRIC SERVICES (UTILITIES)	N.T.	N.T.
68.0200	GAS PRODUCTION AND DISTRIBUTION	N.T.	N.T.
68.0301	WATER SUPPLY AND SEWERAGE SYSTEMS	N.T.	N.T.
68.0302	SANITARY SYSTEMS,STEAM SUPPLY,IRRIG.	N.T.	N.T.
69.0100	WHOLESALE TRADE	N.T.	N.T.
69.0200	RETAIL TRADE	N.T.	N.T.
70.0100	BANKING	N.T.	N.T.
70.0200	CREDIT AGENCIES, OTHER THAN BANKS	N.T.	N.T.
70.0300	SECURITY AND COMMODITY BROKERS	N.T.	N.T.
70.0400	INSURANCE CARRIERS	N.T.	N.T.
71.0200	REAL ESTATE	N.T.	N.T.
72.0100	HOTEL AND LODGING PLACES	N.T.	N.T.
72.0201	LAUNDRY, CLEANING, SHOE REPAIRS	N.T.	N.T.
72.0204	ELECTRICAL REPAIR SHOPS	N.T.	N.T.
73.0101	MISCELLANEOUS REPAIR SHOPS	N.T.	N.T.
73.0102	SERV. TO DWELLING AND OTHER BUILD.	N.T.	N.T.
73.0103	PERSONNEL SUPPLY SERVICES	N.T.	N.T.
73.0104	COMPUTER AND DATA PROCESSING SERV.	N.T.	N.T.
73.0105	MANAGEMENT AND CONSULTING SERVICES	N.T.	N.T.

Appendix H: Continue.

I-O CLASS. NUMBER	SELECTED INPUTS	TARIFFS	FREIGHT FACTORS
73.0106	DETECTIVE AND PROTECTIVE SERVICES	N.T.	N.T.
73.0107	EQUIPT. RENTAL AND LEASING SERVICES	N.T.	N.T.
73.0108	PHOTO LABS, PHOTOCOPY, COMM. PHOTO.	N.T.	N.T.
73.0109	OTHER BUSINESS SERVICES	N.T.	N.T.
73.0200	ADVERTISING	N.T.	N.T.
73.0301	LEGAL SERVICES	N.T.	N.T.
73.0302	ENG., ARCHIT., SURVEYING SERVICES	N.T.	N.T.
73.0303	ACC., BOOKKEEPING, AUDITING SERV.	N.T.	N.T.
74.0000	EATING AND DRINKING PLACES	N.T.	N.T.
75.0001	AUTO RENTAL AND LEASING SERVICES	N.T.	N.T.
75.0002	AUTO REPAIR SHOPS AND SERVICES	N.T.	N.T.
76.0201	THEATER PROD., BAND, ENTERTAINERS	N.T.	N.T.
76.0203	COMMERCIAL SPORTS, EXCEPT RACING	N.T.	N.T.
77.0402	COLLEGES, UNIV. AND PROF. SCHOOLS	N.T.	N.T.
77.0501	BUS. ASSOC., PROFESS. MEMBERSHIPS	N.T.	N.T.
77.0504	OTHER MEMBERSHIPS ASSOCIATIONS	N.T.	N.T.
77.0600	JOB TRAINING AND RELATED SERVICES	N.T.	N.T.
78.0100	U.S. POSTAL SERVICE	N.T.	N.T.
79.0300	OTHER GOVERNMENT ENTERPRISES	N.T.	N.T.
80.0000	NON-COMPARABLE IMPORTS	N.T.	N.T.

Appendix I: U.S. Tariffs For Solid Wood Products, all figures in %.

I-O SECTOR #	INDUSTRY	TARIFF
	1. Plywood	
20.0600	Spanish Cedar	12
20.0600	Parana Pine	8
20.0600	Other Hardwood	8
20.0600	Softwood	20
20.0902	2. Particle Board	6
20.0300	3. Wood Flooring	2
	4. Furniture	
22.0101	Folding Chairs	6
23.0100		
22.0101	Non-Folding Chairs	6
23.0100		
22.0101	Other Wood Furniture	5
22.0108		
22.0200		
22.0400		
23.0100		
	5. Misc. Manufactured Wood Arts.	
20.0903	Moldings	2
20.0903	Carvings & Ornaments	2
21.0000	Packing Boxes	6
23.0400	Doors & Windows	7
23.0700		
23.0700	Wood Frames	6
23.0700	Forks,Spoons, Utensils	5
23.0700	Jewelry Boxes	6
23.0700	Paint Brush and Roller	3
23.0700	Dowel Rods, Pins	7
23.0700	Tools, Bodies & Handles	5
23.0700	Blinds, Shutters, Screens	12

Appendix J: F.A.S. and C.I.F. Import Values and Freight Factors (%) for Five Wood Products, by country of origin and U.S. regions.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
I. Plywood					
Spanish cedar	P. Rico	Brazil	48282	53556	10.9
	P. Rico	Brazil	1158645	1349556	16.4
Parana pine	Savannah	Brazil	1848	2505	35.5
	N. Orleans	Brazil	8704	11256	29.3
	P. Rico	Brazil	432099	546434	26.4
Softwood	Tampa	Brazil	600	771	28.5
	P. Rico	Brazil	152593	193245	26.6
Hardwood	Norfolk	Brazil	770	1003	30.2
	Tampa	Brazil	13124	15565	18.6
	P. Rico	Brazil	2394740	2816419	17.6
	Miami	Brazil	39372	47579	20.8
	N. York	Brazil	76996	100774	30.8
	Philadelphia	Brazil	379458	512224	35.0
	Norfolk	Brazil	10212	12399	21.4
	Charleston	Brazil	39607	50889	28.5
	Savannah	Brazil	27316	38424	40.6
	Savannah	Brazil	218977	296945	35.6
	N. Orleans	Brazil	7831	9593	22.5
	P. Rico	Brazil	6147172	7441396	22.7
	Virgin Is.	Brazil	8705	9406	8.1
	Miami	Brazil	24415	31745	30.0
	Houston	Brazil	1396	1662	19.1
	P. Rico	Brazil	9732	11692	20.1
II. Particle Board					
	Miami	Chile	2763	3492	26.4
	P. Rico	Brazil	869	1033	18.8
	Miami	Brazil	2505	4533	80.9
III. Wood Flooring					
	Miami	Honduras	28644	36992	29.1
	Mobile	Brazil	4327	5599	29.4
	P. Rico	Chile	38219	46341	21.3
	Tampa	Brazil	12173	15064	23.7

Appendix J: Continue.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
	N. Orleans	Brazil	50854	61227	20.4
	Miami	Brazil	25360	30628	20.8
	Houston	Brazil	832142	1007198	21.0
	P. Rico	Chile	5000	9218	84.4
	N. Orleans	Honduras	500	584	16.8
	Cleveland	Brazil	1919	2571	33.9
	P. Rico	Brazil	21689	24971	15.1
	Virgin Is.	Brazil	7675	8341	8.6
	P. Rico	Chile	10682	14809	38.6
	N. York	Brazil	3490	3490	00.0
	Savannah	Brazil	76841	93507	21.7
	P. Rico	Brazil	17956	20432	13.8
IV. <u>Furniture</u>					
Folding Chairs	N.York	Brazil	1838	2677	45.6
	Tampa	Honduras	294	300	2.0
	N. Orleans	Honduras	800	1050	31.2
	N. York	Brazil	6280	6887	9.6
	Philadelphia	Brazil	14741	18349	24.5
	Savannah	Brazil	1620	1975	21.9
	N. Orleans	Brazil	426	470	10.3
	L. Angeles	Brazil	358	1777	396.4
	P. Rico	Brazil	1191	2191	83.9
Non-Fold. Chair	Miami	Brazil	1838	2677	45.6
	P. Rico	Honduras	400	502	25.5
	Miami	Honduras	350	609	74.0
	Savannah	Honduras	1460	1665	14.0
	Tampa	Honduras	10702	11661	9.0
	N. Orleans	Honduras	3428	4449	29.7
	Laredo	Honduras	460	460	00.0
	Miami	Honduras	15479	17088	10.4
	Houston	Honduras	6228	7178	15.2
	N. York	Jamaica	400	500	25.0
	N. Orleans	Jamaica	1917	2481	29.4
	Miami	Jamaica	15122	15855	4.8
	N. York	Brazil	7385	11316	53.2
	L. Angeles	Brazil	450	1313	191.7
	Miami	Brazil	2091	2460	17.6
	N. York	Brazil	105899	124967	18.0
	Philadelphia	Brazil	32149	38697	20.3
	Norfolk	Brazil	173198	203319	17.4

Appendix J: Continue.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
	Tampa	Brazil	530	1152	117.3
	N. Orleans	Brazil	900	990	10.0
	L. Angeles	Brazil	213327	241106	13.0
	S. Francisco	Brazil	1000	1165	16.5
	Detroit	Brazil	2055	2580	25.5
	P. Rico	Brazil	531948	621587	16.8
	Houston	Brazil	69752	80695	15.7
Other Furnit.	Savannah	Honduras	3181	3627	14.0
	N. York	Chile	110736	134565	21.5
	Philadelphia	Brazil	41835	46643	11.5
	L. Angeles	Brazil	10293	12374	20.2
	Minneapolis	Honduras	309	383	23.9
	P. Rico	Honduras	1100	1508	37.0
	Miami	Honduras	1669	1815	8.7
	Tampa	Honduras	24184	27007	11.7
	Mobile	Honduras	14164	15078	6.4
	N. Orleans	Honduras	280578	323578	15.3
	Laredo	Honduras	735	735	00.0
	P. Rico	Honduras	12264	13739	12.0
	Miami	Honduras	266966	286465	7.3
	Houston	Honduras	6145	6979	13.6
	Miami	Jamaica	916	1344	46.7
	N. York	Jamaica	735	1067	45.2
	N. Orleans	Jamaica	4706	6089	29.4
	Miami	Jamaica	123883	137587	29.4
	Miami	Chile	4345	5514	26.9
	Houston	Chile	2778	2985	7.4
	N. York	Chile	76542	91252	19.2
	L. Angeles	Chile	19733	22483	13.9
	N. York	Brazil	30624	35613	16.3
	Wilmington	Brazil	1646	2963	80.0
	N. Orleans	Brazil	12498	13783	10.3
	P. Rico	Brazil	10664	14427	35.3
	Miami	Brazil	3189	3751	17.6
	Boston	Brazil	25474	30551	19.9
	N. York	Brazil	945317	1105725	16.9
	Philadelphia	Brazil	841166	967488	15.0
	Baltimore	Brazil	16350	18533	13.4
	Norfolk	Brazil	1147345	1278869	11.4
	Wilmington	Brazil	1012	1415	39.8
	Tampa	Brazil	23653	28266	19.5
	N. Orleans	Brazil	715	850	18.9
	L. Angeles	Brazil	171120	205334	20.0

Appendix J: Continue.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
	S. Francisco	Brazil	2799	3861	37.9
	Seattle	Brazil	3595	4877	35.7
	Minneapolis	Brazil	43840	50957	16.2
	Detroit	Brazil	289904	345906	19.3
	Chicago	Brazil	1845	3358	82.0
	Cleveland	Brazil	312	1111	256.1
	St. Louis	Brazil	138441	152837	10.4
	P. Rico	Brazil	680574	800265	17.6
	Miami	Brazil	37820	45896	21.3
	Houston	Brazil	83102	98191	18.1
	Dallas	Brazil	1774	4779	169.4
Furnit. Parts	Miami	Honduras	1800	1910	6.1
	Tampa	Honduras	3119	3558	14.0
	N. Orleans	Honduras	22359	31740	41.9
	Miami	Honduras	853622	931112	9.0
	Dallas	Honduras	4254	4721	10.9
	Miami	Jamaica	546	621	13.7
	Miami	Jamaica	17841	19123	7.1
	Detroit	Brazil	267	267	00.0
	P. Rico	Brazil	2123	2213	4.2
	N. York	Brazil	1365	3338	144.5
	Philadelphia	Brazil	21445	24238	13.0
	Norfolk	Brazil	323906	363112	12.1
	Wilmington	Brazil	551	2150	290.2
	N. Orleans	Brazil	451724	526672	16.6
	L. Angeles	Brazil	241188	280245	16.2
	P. Rico	Brazil	117837	135768	15.2
	Miami	Brazil	50309	55452	10.2
	Houston	Brazil	6393	7410	15.9
V. <u>Miscellaneous Products of Wood</u>					
Moldings	P. Rico	Honduras	877	1040	18.6
	P. Rico	Brazil	138336	163658	18.3
	P. Rico	Brazil	120330	143194	19.0
	Houston	Brazil	90961	106618	17.2
	P. Rico	Honduras	137443	162618	18.3
	Norfolk	Brazil	5001	6128	22.5
	P. Rico	Brazil	581269	674283	16.0
	Houston	Brazil	613801	732746	19.4
Carvings & Or.	P. Rico	Honduras	1150	1613	40.3
	P. Rico	Honduras	73477	84602	15.1

Appendix J: Continue.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
	Miami	Honduras	50122	62642	24.9
	P. Rico	Brazil	2860	3311	15.7
	N. York	Brazil	1366972	1536669	12.4
	P. Rico	Brazil	56540	66440	17.5
	Philadelphia	Honduras	32889	35170	6.9
	Savannah	Honduras	2417	2756	14.0
	Miami	Honduras	2184	2523	15.5
	Houston	Honduras	1396	1439	3.1
	Chicago	Jamaica	500	614	22.8
	Houston	Jamaica	1970	2091	6.1
	Mobile	Brazil	1110	1349	21.5
	Miami	Brazil	1000	1093	9.3
	N. Orleans	Brazil	977	1237	26.6
	S. Francisco	Brazil	1050	1460	39.0
	Detroit	Brazil	810	979	20.8
Packing Boxes	N. York	Honduras	14100	20810	47.6
	Philadelphia	Honduras	61274	65171	6.4
	Tampa	Honduras	2998	3100	3.4
	N. York	Jamaica	320	330	3.1
Jewelry Boxes	Houston	Honduras	714	740	3.6
	Cleveland	Jamaica	1200	1226	2.1
	N. York	Chile	798	1025	28.4
	Miami	Brazil	552	855	54.9
	Dallas	Brazil	256	280	9.3
	N. York	Brazil	414	451	8.9
	Miami	Brazil	1616	1867	15.5
Doors & Windows	P. Rico	Honduras	4087	4898	19.8
	N. Orleans	Honduras	450	504	12.0
	P. Rico	Honduras	18606	21924	17.8
	P. Rico	Brazil	2470	2843	15.1
	Tampa	Brazil	29859	33290	11.5
	P. Rico	Brazil	1263859	1503740	19.0
	N. Orleans	Honduras	259	399	54.0
	Miami	Honduras	1639	2127	29.7
	Houston	Honduras	2310	2470	6.9
	Tampa	Honduras	400	500	25.0
	P. Rico	Honduras	12045	14812	22.9
	Miami	Honduras	515	971	88.5
	Dallas	Honduras	418	608	45.4
	St. Louis	Chile	352	429	21.8
	Miami	Brazil	630	1404	122.8

Appendix J: Continue.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
	Philadelphia	Brazil	52800	78709	49.0
	Norfolk	Brazil	3634	4874	34.1
	Tampa	Brazil	45636	50668	11.0
	P. Rico	Brazil	307715	370451	20.4
	Miami	Brazil	26770	35537	32.7
	Tampa	Honduras	1838	1933	5.1
	Miami	Brazil	324	642	98.1
	P. Rico	Brazil	2249	2859	27.1
	P. Rico	Brazil	2921	3167	8.4
	Norfolk	Brazil	3415	4581	34.1
	P. Rico	Brazil	10708	13808	29.0
Forks, Spoons,	N. Orleans	Honduras	489	548	12.0
Utensils, etc.	Boston	Brazil	52220	55120	5.5
Tools, Bodies,	Miami	Honduras	8853	10196	15.1
and Handles	Houston	Honduras	334	380	13.7
	N. Orleans	Honduras	940560	1080252	14.8
	L. Angeles	Honduras	45494	58266	28.0
	P. Rico	Honduras	129809	174394	34.3
	Miami	Honduras	1248380	1423954	14.0
	N. York	Brazil	68823	84450	22.7
	P. Rico	Brazil	58184	66999	15.1
	N. Orleans	Honduras	9129	9990	9.4
	P. Rico	Honduras	11284	15316	35.7
	Miami	Honduras	40378	47391	17.4
	Houston	Honduras	5871	6911	17.7
	N. York	Chile	66410	79392	19.5
	Charleston	Chile	63018	75755	20.2
	L. Angeles	Chile	27719	35362	27.6
	N. York	Brazil	1246	1991	59.8
	N. York	Brazil	233157	249970	7.2
	Philadelphia	Brazil	83693	106038	26.7
	Portland, Or.	Brazil	12517	23574	85.1
	Seattle	Brazil	46064	49571	7.6
	P. Rico	Brazil	58325	69099	18.4
	Miami	Brazil	3094	3154	1.9
Wood Frames	Miami	Honduras	811	869	7.1
	Philadelphia	Jamaica	400	818	104.5
	N. York	Brazil	2380	2571	8.0

Appendix J: Continue.

PRODUCT	PORT OF ENTRY	COUNTRY OF ORIGIN	FAS VALUE	CIF VALUE	FREIGHT FACTORS
	Miami	Brazil	1619	2650	63.7
	N. York	Brazil	65139	72837	11.8
	Norfolk	Brazil	10691	13609	27.3
	P. Rico	Brazil	9725	11836	21.7
	Miami	Brazil	9578	11478	19.8
	Houston	Brazil	400	457	14.2
Blinds, Screens	N. York	Honduras	26565	29681	11.7
Shutters, etc.	Houston	Chile	1094	1176	7.4
	P. Rico	Chile	17002	18066	6.2
	P. Rico	Brazil	26000	28641	10.2
Dowel Rods,	L. Angeles	Brazil	539	627	16.3
Pins, etc.	N. York	Brazil	107678	128447	19.3
	Philadelphia	Brazil	202545	238302	17.6
	L. Angeles	Brazil	53711	60456	12.5
	Baltimore	Chile	338824	394741	16.5
	N. Orleans	Chile	20962	24962	19.1
	L. Angeles	Chile	142780	176910	23.9
	N. York	Brazil	37599	44334	17.9
	Philadelphia	Brazil	72582	86943	19.8
Household	Savannah	Honduras	1787	3038	14.0
Utensils	Miami	Honduras	727	761	4.6
	Houston	Honduras	444	460	3.6
	N. York	Chile	3389	4232	24.8
	Boston	Brazil	75704	88365	16.7
	N. York	Brazil	254279	299532	17.8
	Philadelphia	Brazil	61085	68153	11.6
	Baltimore	Brazil	6554	7226	10.2
	Norfolk	Brazil	932	1271	36.4
	N. Orleans	Brazil	23436	28472	21.5
	L. Angeles	Brazil	2227	3900	75.1
	Milwaukee	Brazil	9506	11026	15.9
	Detroit	Brazil	500	772	54.4
	Miami	Brazil	9879	12681	28.4

Source: USDC, 1984." U.S. Imports for Consumption and General Imports, Dec. 1983". IM 145-X.

Appendix K: Traded Inputs into Production of Five Solid Wood Products.*
All figures expressed on a percent basis.

I-O CLASS. NUMBER	PLYWOOD	PARTICLE BOARD	WOOD FLOORING	FURNITURE	MISCELLANEOUS WOOD PRODUCTS
4.0002	0.0040	0.0000	0.0121	0.00267	0.00672
7.0000	0.0220	0.0663	0.0121	0.04848	0.00842
12.0201	0.4852	1.0166	0.3742	0.58817	0.66932
14.2103	0.0020	0.0000	0.0000	0.00534	0.00439
14.2104	0.0060	0.0000	0.0362	0.01982	0.01757
14.2400	0.0000	0.0000	0.0000	0.12526	0.00000
16.0100	0.0000	0.0000	0.0000	5.27437	0.00000
16.0200	0.0000	0.0000	0.0000	0.07493	0.00000
16.0400	0.0000	0.0000	0.0000	0.13057	0.00000
17.0400	0.0000	0.0000	0.0000	0.44510	0.02999
17.0500	0.0000	0.0000	0.0000	0.02013	0.00000
17.0600	0.0000	0.0000	0.0000	0.82924	0.10222
17.0900	0.0000	0.0000	0.0000	0.00046	0.00000
18.0300	0.0000	0.0000	0.0000	0.01527	0.04926
18.0400	0.0080	0.0221	0.0241	0.02669	0.03686
19.0100	0.0000	0.0000	0.0000	0.01085	0.00000
19.0304	0.0000	0.0000	0.0000	0.02908	0.00000
20.0100	27.6584	1.6354	5.3832	0.00000	3.15546
20.0200	0.7946	10.4751	26.4575	7.38207	7.37375
20.0300	0.0000	0.0000	0.2293	4.15480	0.87335
20.0400	0.0000	0.0884	0.0000	0.01885	0.20790
20.0600	15.3616	0.5304	0.0000	2.04814	1.22368
20.0901	0.0000	0.0000	0.0000	0.01278	0.07309
20.0902	1.1320	0.1768	0.0966	1.00963	1.79461
20.0903	1.4415	0.0000	0.0000	1.59043	4.88460
21.0000	0.0000	0.0000	0.0000	0.13476	0.08264
22.0101	0.0000	0.0000	0.0000	0.10693	0.00000
22.0103	0.0000	0.0000	0.0000	0.00174	0.00000
22.0200	0.0000	0.0000	0.0000	0.03243	0.00000
22.0400	0.0000	0.0000	0.0000	0.00579	0.01868
23.0100	0.0000	0.0000	0.0000	0.01043	0.00000
23.0400	0.0000	0.0000	0.0000	0.00000	0.10319
23.0700	0.0000	0.0000	0.0000	0.02028	0.06539
24.0200	0.0000	0.0000	0.0000	0.00000	0.01527
24.0400	0.0040	0.0000	0.0000	0.01110	0.00745
24.0500	0.0040	0.0000	0.0121	0.01122	0.01208
24.0701	0.0000	0.0000	0.0000	0.17747	0.22092
24.0702	0.0000	0.0000	0.0000	0.00000	0.00916
24.0703	0.0040	0.0000	0.0121	0.01260	0.00891
24.0706	0.0000	0.0000	0.0000	0.00267	0.00305

Appendix K: Continue.

I-O CLASS. NUMBER	PLYWOOD	PARTICLE BOARD	WOOD FLOORING	FURNITURE	MISCELLANEOUS WOOD PRODUCTS
25.0000	0.0659	0.0000	1.0742	1.12100	1.03197
26.0200	0.0040	0.0000	0.0121	0.01283	0.00891
26.0301	0.0000	0.0000	0.0000	0.00267	0.00305
26.0400	0.0040	0.0000	0.0121	0.00700	0.00806
26.0501	0.0000	0.0000	0.0000	0.03100	0.01758
26.0601	0.0299	0.0442	0.0845	0.12451	0.07983
26.0602	0.0020	0.0000	0.0121	0.00727	0.00586
26.0801	0.0000	0.0000	0.0000	0.00267	0.00000
27.0100	0.0020	0.0000	0.0000	0.01148	0.30007
27.0402	2.3220	20.0000	0.3983	0.14568	1.93502
27.0406	0.0000	0.0000	0.0000	0.00465	0.00000
28.0100	0.0859	0.0000	0.0000	0.05539	0.40930
30.0000	0.2955	0.8619	0.2414	1.46575	1.48390
31.0101	0.3514	3.0939	2.5588	0.59087	1.23759
31.0102	0.0280	0.0663	0.1448	0.06547	0.06985
32.0100	0.0100	0.0442	0.1810	0.02320	0.02310
32.0302	0.0000	0.0000	0.0000	0.04850	0.01600
32.0400	0.0918	0.9061	0.0000	3.13300	2.05120
33.0001	0.0000	0.0000	0.0000	0.41940	0.00000
35.0100	0.0000	0.0000	0.0000	0.57230	0.24970
36.1600	0.2056	1.5028	0.7483	0.42930	1.08480
36.1800	0.0080	0.0221	0.0121	0.00440	0.04890
37.0101	0.0000	0.0000	0.0000	0.17970	0.62640
37.0103	0.0000	0.0000	0.0000	0.49120	0.41350
37.0401	0.0000	0.0000	0.0000	0.00150	0.00000
38.0100	0.0000	0.0000	0.0000	0.00080	0.00250
38.0700	0.0000	0.0000	0.0000	0.00000	0.05490
38.0800	0.0000	0.0000	0.0000	0.04600	0.13610
41.0100	0.0000	0.0000	0.0000	0.59460	0.57570
41.0203	0.0000	0.7072	0.0000	0.01690	1.30840
42.0100	0.0000	0.0000	0.0000	0.00150	0.00000
42.0201	0.9064	0.0221	0.0362	1.17860	0.19640
42.0202	0.1617	0.0000	0.3138	0.29480	0.05710
42.0300	0.0000	0.0000	0.0000	1.80030	0.51520
42.0401	0.0000	0.0000	0.0000	0.01690	0.05440
42.0402	0.0000	0.0000	0.0000	0.02530	0.08150
42.0500	0.0000	0.0000	0.0000	0.94270	0.23820
42.1100	0.0539	0.6409	0.0483	0.13150	0.57760
47.0300	0.0240	0.0663	0.0724	0.09060	0.08750
48.0300	0.0759	0.0663	0.2052	0.12550	0.11000
49.0500	0.0000	0.0000	0.0000	0.01710	0.05520
49.0700	0.0000	0.0000	0.0000	0.00460	0.01320

Appendix K: Continue.

I-O CLASS. NUMBER	PLYWOOD	PARTICLE BOARD	WOOD FLOORING	FURNITURE	MISCELLANEOUS WOOD PRODUCTS
50.0002	0.0659	0.1547	0.1810	0.16230	0.34560
53.0400	0.0000	0.0000	0.0000	0.04790	0.15460
55.0100	0.0060	0.0000	0.0121	0.01220	0.01250
55.0200	0.0000	0.0000	0.0000	0.00000	0.00940
56.0100	0.0000	0.0000	0.0000	0.00420	0.00310
58.0100	0.0020	0.0000	0.0241	0.00310	0.00310
58.0400	0.0000	0.0000	0.0121	0.00150	0.00000
59.0302	0.0040	0.0221	0.0845	0.01260	0.01420
62.0500	0.0140	0.0221	0.0362	0.02830	0.02810
63.0200	0.0120	0.0000	0.0121	0.00000	0.01530
63.0300	0.0060	0.0000	0.0121	0.01420	0.01640
64.0400	0.0000	0.0000	0.0000	0.00270	0.00000
64.0502	0.0000	0.0000	0.0000	0.00150	0.00000
64.0503	0.0020	0.0000	0.0000	0.00420	0.00440
64.0504	0.0020	0.0000	0.0000	0.00420	0.00310
64.0702	0.0000	0.0000	0.0000	0.10180	0.00000
64.0800	0.0000	0.0000	0.0000	0.00000	0.00920
64.1200	0.0060	0.0000	0.0121	0.02130	0.01330

* These are coefficients given by domestic tables, i.e., distorted by the tariff structure.

Source: USDC. The Detailed Input-Output Structure of the U.S. Economy, 1977. TAble 1. The Use of Commodities by Industries.

Appendix L: Traded Inputs into Production of Five Solid Wood Products.* All figures expressed on a percent basis.

I-O CLASS. NUMBER	PLYWOOD	PARTICLE BOARD	WOOD FLOORING	FURNITURE	MISCELLANEOUS WOOD PRODUCTS
4.0002	0.00490	0.00000	0.01260	0.00308	0.00767
7.0000	0.02700	0.07070	0.01260	0.05598	0.00962
12.0201	0.59510	1.08390	0.39010	0.67917	0.76436
14.2103	0.00180	0.00000	0.00000	0.00463	0.00377
14.2104	0.00360	0.00000	0.01860	0.01129	0.00989
14.2400	0.00000	0.00000	0.00000	0.12053	0.00000
16.0100	0.00000	0.00000	0.00000	4.87303	0.00000
16.0200	0.00000	0.00000	0.00000	0.07652	0.00000
16.0400	0.00000	0.00000	0.00000	0.12883	0.00000
17.0400	0.00000	0.00000	0.00000	0.47109	0.03139
17.0500	0.00000	0.00000	0.00000	0.02115	0.00000
17.0600	0.00000	0.00000	0.00000	0.86630	0.10561
17.0900	0.00000	0.00000	0.00000	0.00045	0.00000
18.0300	0.00000	0.00000	0.00000	0.01463	0.04668
18.0400	0.00790	0.01900	0.02030	0.02487	0.03397
19.0100	0.00000	0.00000	0.00000	0.01000	0.00000
19.0304	0.00000	0.00000	0.00000	0.03032	0.00000
20.0100	33.27090	1.71010	5.50410	0.00000	3.53426
20.0200	0.94000	10.77210	26.60300	8.22152	8.12194
20.0300	0.00000	0.00000	0.20200	4.05507	0.84301
20.0400	0.00000	0.09100	0.00000	0.02103	0.22935
20.0600	16.05950	0.48200	0.00000	2.01584	1.19114
20.0901	0.00000	0.00000	0.00000	0.01475	0.08347
20.0902	1.30220	0.17680	0.09450	1.09343	1.92220
20.0903	1.53810	0.00000	0.00000	1.59762	4.85273
21.0000	0.00000	0.00000	0.00000	0.13351	0.08097
22.0101	0.00000	0.00000	0.00000	0.10695	0.00000
22.0103	0.00000	0.00000	0.00000	0.00177	0.00000
22.0200	0.00000	0.00000	0.00000	0.03320	0.00000
22.0400	0.00000	0.00000	0.00000	0.00568	0.01810
23.0100	0.00000	0.00000	0.00000	0.01044	0.00000
23.0400	0.00000	0.00000	0.00000	0.00000	0.10352
23.0700	0.00000	0.00000	0.00000	0.02022	0.06448
24.0200	0.00000	0.00000	0.00000	0.00000	0.01654
24.0400	0.00430	0.00000	0.00000	0.01134	0.00752
24.0500	0.00440	0.00000	0.01130	0.01162	0.01238
24.0701	0.00000	0.00000	0.00000	0.18718	0.23044
24.0702	0.00000	0.00000	0.00000	0.00000	0.00951
24.0703	0.00450	0.00000	0.01160	0.01337	0.00935
24.0706	0.00000	0.00000	0.00000	0.00284	0.00321

Appendix L: Continue.

I-O CLASS. NUMBER	PLYWOOD	PARTICLE BOARD	WOOD FLOORING	FURNITURE	MISCELLANEOUS WOOD PRODUCTS
25.0000	0.07230	0.00000	1.00130	1.15738	1.05375
26.0200	0.00470	0.00000	0.01210	0.01419	0.00974
26.0301	0.00000	0.00000	0.00000	0.00294	0.00332
26.0400	0.00460	0.00000	0.01180	0.00755	0.00859
26.0501	0.00000	0.00000	0.00000	0.03184	0.01786
26.0601	0.03370	0.04330	0.08100	0.13218	0.08382
26.0602	0.00230	0.00000	0.01200	0.00797	0.00636
26.0801	0.00000	0.00000	0.00000	0.00285	0.00000
27.0100	0.00210	0.00000	0.00000	0.01161	0.30007
27.0402	2.46750	18.47510	0.35980	0.14575	1.91457
27.0406	0.00000	0.00000	0.00000	0.00488	0.00000
28.0100	0.09170	0.00000	0.00000	0.05569	0.40695
30.0000	0.33160	0.84090	0.23030	1.54878	1.55071
31.0101	0.40920	3.13210	2.53280	0.64782	1.34194
31.0102	0.03120	0.06430	0.13740	0.06881	0.07260
32.0100	0.01110	0.04290	0.17180	0.02430	0.02400
32.0302	0.00000	0.00000	0.00000	0.04930	0.01600
32.0400	0.09910	0.85020	0.00000	3.18380	2.06150
33.0001	0.00000	0.00000	0.00000	0.44070	0.00000
35.0100	0.00000	0.00000	0.00000	0.56950	0.24570
36.1600	0.24120	1.53240	0.74610	0.47410	1.18480
36.1800	0.00890	0.02130	0.01140	0.00460	0.05050
37.0101	0.00000	0.00000	0.00000	0.18590	0.64100
37.0103	0.00000	0.00000	0.00000	0.50090	0.41710
37.0401	0.00000	0.00000	0.00000	0.00160	0.00000
38.0100	0.00000	0.00000	0.00000	0.00080	0.00270
38.0700	0.00000	0.00000	0.00000	0.00000	0.05740
38.0800	0.00000	0.00000	0.00000	0.04990	0.14600
41.0100	0.00000	0.00000	0.00000	0.61710	0.59090
41.0203	0.00000	0.68610	0.00000	0.01770	1.35960
42.0100	0.00000	0.00000	0.00000	0.00160	0.00000
42.0201	1.00790	0.02140	0.03420	1.23390	0.20340
42.0202	0.18740	0.00000	0.30900	0.32160	0.06160
42.0300	0.00000	0.00000	0.00000	1.90400	0.53890
42.0401	0.00000	0.00000	0.00000	0.01640	0.05240
42.0402	0.00000	0.00000	0.00000	0.02460	0.07840
42.0500	0.00000	0.00000	0.00000	0.97130	0.24270
42.1100	0.05860	0.60560	0.04460	0.13450	0.58450
47.0300	0.02710	0.06520	0.06960	0.09650	0.09210
48.0300	0.08540	0.06490	0.19620	0.13300	0.11520
49.0500	0.00000	0.00000	0.00000	0.01790	0.05720

Appendix L: Continue.

I-O CLASS. NUMBER	PLYWOOD	PARTICLE BOARD	WOOD FLOORING	FURNITURE	MISCELLANEOUS WOOD PRODUCTS
49.0700	0.00000	0.00000	0.00000	0.00500	0.01390
50.0002	0.07440	0.15180	0.17370	0.17250	0.36330
53.0400	0.00000	0.00000	0.00000	0.05090	0.16230
55.0100	0.00670	0.00000	0.01150	0.01290	0.01300
55.0200	0.00000	0.00000	0.00000	0.00000	0.00920
56.0100	0.00000	0.00000	0.00000	0.00450	0.00320
58.0100	0.00220	0.00000	0.02300	0.00330	0.00320
58.0400	0.00000	0.00000	0.01190	0.00170	0.00000
59.0302	0.00460	0.02230	0.08340	0.01370	0.01530
62.0500	0.01580	0.02170	0.03480	0.03010	0.02960
63.0200	0.01280	0.00000	0.01100	0.00000	0.01520
63.0300	0.00670	0.00000	0.01150	0.01500	0.01710
64.0400	0.00000	0.00000	0.00000	0.00280	0.00000
64.0502	0.00000	0.00000	0.00000	0.00160	0.00000
64.0503	0.00220	0.00000	0.00000	0.00430	0.00450
64.0504	0.00220	0.00000	0.00000	0.00430	0.00310
64.0702	0.00000	0.00000	0.00000	0.09660	0.00000
64.0800	0.00000	0.00000	0.00000	0.00000	0.00900
64.1200	0.00650	0.00000	0.01100	0.02150	0.01330

* These are friccion-less coefficients, i.e., they have been deflated using the corresponding tariff and freight factors.

Source: USDC. The Detailed Input-Output Structure of the U.S. Economy, 1977. TAble 1. The Use of Commodities by Industries.

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