A synopsis of:

"A METHOD OF MEASURING THE EFFECTS OF TARIFF PROTECTION: UNITED STATES DUTIES ON SELECTED IMPORTS, 1923-1950"

By

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Eighteen commodities, imported from eight countries, are used as examples in testing a statistical method of measuring the effects of changes in the levels of United States import duties.

For each commodity-country example, the following data are collected: (1) a wholesale price index of a commodity-group representing the foreign resource costs of the import, (2) a wholesale price index of a domestic commodity-group representing the resource costs of the domestic competitive commodity, (3) the rates of exchange, (4) the duty levied on the import in each year, (5) the ad valorem equivalents of the duties, and (6) imports of the commodity from the example country as percents of total imports and (7) as percents of domestic production. These data are in time series, for the years 1922-1950, or for shorter periods, for which data were available.

The foreign price index is converted to United States dollars. A ratio is then constructed of foreign/U.S. price indexes, current year ÷ foreign/ U.S. price indexes, base year. This ratio is the change in relative foreign-U.S. costs since the base year. This is multiplied, for each year, by the rate of duty in the base year, to construct a series which is an index of changes in the impact of a given rate of duty. This is called the "protective equivalent of the base year duty." Then the ratio is multiplied by the duty levied in each year; providing an index of changes in all relative foreign-U.S. costs, including the tariff.

The latter index, called the "protective equivalent of the current duty," is correlated with variables (6) and (7). The rank correlation method is used; checked with product-moment correlation in a few cases. This indicates the sensitivity of imports to the changes in all the costs of the import. Examination of the tables in which the data are arrayed permits identification of the events which affected imports,.

Then linear regression is used to attempt to relate changes in the variable (5) with changes in (6) and (7), with the effects of costs (the protective equivalent of the current duty) held constant. Then the effects of costs on variables (6) and (7) are tested, with variable (5) held constant. A linear time trend is removed from each series, to account for any growth factor not related to costs or to the tariff.

Apparel wool from Australia is sensitive to all cost changes; not significantly so to the tariff, but to other costs with a coefficient significant at the ten percent level. Cattle from Mexico correlate significantly at the one percent level with both the tariff and other costs. Tomatoes from Mexico do not correlate significantly with either variable. Both cattle and softwood lumber from Canada are significantly (1% level) related to the tariff, but not to other costs. Alumimum from Canada is significantly

related (5% level) with both tariff and costs, but nickel from Canada is independent of both. Coal-tar colors from Switzerland seem independent of the tariff, but related to costs. Swiss watch works are related to the tariff (1% level), but not to costs. Coal-tar colors from Germany were depressed in price by tariff discrimination, but their quantities were unaffected. Textile machinery from both Germany and the United Kingdom was sensitive to the tariff, but sensitive to costs only in the German case. United Kingdom cotton cloth could not be analyzed. Cattle hides and flaxseed (Argentina), and jute and castor beans (India) could not be analyzed by linear regression methods. Useful analysis of the effects of duties could be performed by inspection of the tables, however.

On the whole, the effort involved in this method may be worthwhile. It arrays the data and brings in some of the non-quantitative information about each commodity, so that the correlations may be interpreted for what they are worth. It avoids the two principle objections to the measures of elasticity of supply of and demand for imports; the grouping of commodities and the failure to account for shifts of the demand or supply schedules. The latter defect is partially corrected with linear time trends, and by decisions to omit certain periods in which shifts were obviously taking place.

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CHAPTER I

INTRODUCTION

Discussions of United States tariff policy almost always assume that the economies of the United States and other nations are significantly affected by the selectivity and the heighth of the American duties. Since 1934, few people have seriously regarded the tariff as a domestic fiscal policy question, or even as a protectionist measure confined to domestic business in its effects.[1] Tariff policy is generally recognized to be a part of the foreign policy of the administration in power--and a new administration feels some obligations to be consistent with policies established by previous administrations.[2] Those who still contend that the tariff should be a domestic question admit that it is not. And they seem to attribute even more importance to the heighth and selectivity of the

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[1] "Dominating our thinking throughout has been the sobering realization that the policies pursued and the actions taken by the United States in respect to foreign economic policy profoundly influence the destinies of all of the peoples of the world." Commission on Foreign Economic Policy (Randall Commission) _Report to the President and the Congress_, January, 1954, p. I.

[2] "In closing this report and in submitting the foregoing conclusions and recommendations to the President and the Congress, the Commission wishes to stress the importance of consistency and continuity with respect to our foreign economic policy." _Ibid._, p. 76.

duties than do those who regard it as properly a part of foreign policy.[3]

These discussions are always handicapped by the inabilities of the discussants to measure or assess with any precision the effects of the tariffs in question. Both those who favor liberalization of tariff policy and those who fear increased imports rely upon bits and pieces of information. Out of this general lack of knowledge comes exaggerated statements alleged to support both sides of the argument.[4]

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3 "Unquestionably, we cannot live in isolation and a part of that atmosphere within which the domestic economy, acting through private enterprise, can flourish.... can be provided only through the medium of international relations, diplomatic, economic and military. But such international relations are not an end in, and of, themselves. They are merely a means to an end--namely, the welfare of the citizens of this country, accordingly, foreign economic policy should be considered primarily in its relation to the domestic economy." Randall Commission, _Minority Report_, January, 1954, p. 2. "One basic factor in that economy [the United States'] is the protection afforded to our essential industries, our agriculture, our workers, by tariffs. Many industries could have been developed only under this protection and without them we would probably have lost World War II." _Ibid._, p. 15.

4 "No other single field [than tariff rates, tariff policy, and customs administration] produced such directly divergent statements of alleged fact, so many shades of opinion, or such diversity of recommendation." Randall Commission, _Report to the President and the Congress_, p. 43.

There is clearly a need for a means of measuring the effects either of the existing tariffs, or of changes in their heighths. This need was brought out forcefully in the Randall Commission report and in the Staff Papers written during its preparation.[5] Some attempts have been made to estimate the heighth or the effective heighth of the duties. The *ad valorem* equivalent of all duties collected is reported by the Tariff Commission. The inadequacy of this as an indication of not only the effects, but even of the heighth of tariffs will be discussed later. Howard S. Piquet has made some estimates of the possible effects of suspension or elimination of the duties.[6] There have been several studies of the elasticity of the demand for and the

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5 "No method has yet been devised for measuring accurately the restrictive effects of tariffs and other international trade barriers, for the reason that there can be no truly scientific way of knowing what adjustments actually would occur were all tariffs to be abolished." Randall Commission, *Staff Papers*, February, 1954, p. 293.

6 Howard S. Piquet, *Aid, Trade and the Tariff*, New York, Crowell, 1953.

supply of imported commodities.[7] These have made some contributions to the problem of measurement. Their usefulness and their relations to the objective of this study will be discussed later.

The objective

The objective of this study is to investigate the possibility of constructing a statistical measure of the changes in the level of protection (or of restrictiveness) provided by a duty on a given commodity. It is not designed to replace any other measure or estimate; neither is it consciously designed to supplement any of them. It is hoped, however, that it may add a small tool to the kits of those interested in estimating the effects of tariffs or of changes in tariffs.

It is not possible, with available data and known methods, to devise a measure of the absolute amount of protection enjoyed by an industry as the result of a tariff.

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7 Guy H. Orcutt, "Measurement of Price Elasticities in International Trade," Review of Economics and Statistics, v. XXXII (1950) pp. 131-132; Randall Hinshaw, "American Prosperity and the British Balance of Payments," Review of Economic Statistics, v. XXVII (1945), pp. 1-9; A. J. Brown, "The Fundamental Elasticities in International Trade," T. Wilson and P. W. S. Andrews, eds., Oxford Studies in The Price Mechanism, Clarendon: Oxford University Press, 1951; D. J. Morgan and W. J. Corlett, "The Influence of Price in International Trade," Journal of the Royal Statistical Society, Series A (General) v. CXIV Part III (1951) pp. 307-352; John H. Adler, Eugene R. Schlesinger and Evelyn Van Westerborg, The Pattern of United States Import Trade Since 1923, New York, Federal Reserve Bank of New York, 1952.

This study must, first of all, disclaim any pretensions in that direction.

It may be possible to construct a measure of changes in the amount of protection. This is all that this study proposes to do. It is suggested that measurements of changes in the protective (or restrictive) level of duties may contribute to knowledge of the magnitudes of the current effects of tariffs, and to estimates of the effects of reducing or removing tariffs.

There have been changes in the past which may be used as the data with which to construct a measuring device. The increases accomplished in the Tariff Act of 1930 and the subsequent reductions brought about under the authority of the Reciprocal Trade Agreements Act provide a large number of changes in rates of duty. Duty rates make up only one type of change, however, which is relevant to the competitive positions of protected producers and their foreign rivals. Costs of the factors of production, techniques of production and rates of exchange also have direct bearing on the competition between protected domestic production and imports. Changes in tariff rates may or may not result in any changes in the positions of imports vs. domestic products, depending on whether they supplement or offset changes in the other variables. There will be an attempt to introduce all of the relevant variables which are subject to statistical measurement into one index. This index will presumably include all of the cost factors affecting the relative positions of a protected domestic product and its supplementary import. This can be used to test the responsiveness of these imports to changes in the total cost situation. Later the information included in this composite measure of costs can be used to isolate the effects of changes in one of its components; the tariff rate. If imports are particularly insensitive to changes in the total cost situation, they may be expected to be insensitive to the tariff rate itself. This supposition may at least be tested. If substantial sensitivity to costs is shown by imports, on the other hand, it should be possible to determine which type of costs, factor costs or the tariff, has caused the greater variation in imports. The process of constructing the index will be standardized and displayed in tabular form, so that the contributions of each of the variables may be examined for each case.

The historical period for which data will be assembled is generally the years 1922 through 1950. Data are not available for all of these years for all commodities selected for study. Also, the years of World War II must be eliminated in some cases. In general, however, this period is used when possible. This twenty-nine year period has some merits for statistical study. The relatively high duties of the protectionist period of the 1920's, the peak

rates of the Tariff Act of 1930 and the negotiated reductions which followed are covered by this span of years.

An index will be constructed for each tariff which is to be used as an example. It will have as a base the tariff rate at the beginning of the period covered for that example, whether it is a specific or an *ad valorem* rate. The other variables will be assembled in convenient form and applied to this base. The other variables will fall into three categories. One will be a measure of changes in the production cost conditions affecting the protected domestic industry. Another variable will be a measure of production cost conditions affecting the corresponding industry in the principal competing country. The third variable will be the rate of exchange between the dollar and the currency of the principal competing country.

The resulting series will be an index consisting of hypothetical or fictitious rates of duty. If the duty itself were to be reduced by fifty percent, other things being equal, the index value would be reduced by fifty percent. This, we would say, reduces the "protective equivalent" of the duty to one-half of its former level, *whatever its former level may have been.* It should be re-emphasized that there is no attempt to state what its protective equivalent might have been; only to say that now it has been cut in half. It may be that the margin of protection afforded by the duty in the base year is so high that reduction of its protective equivalent by one-half would not have any measurable effect on imports. Thus the protective equivalent is not the amount of restriction on imports, but the level of the duty in relation to the relative costs of the foreign and domestic producers. If foreign costs were to be reduced by fifty percent, other things being equal, the index we are constructing would be fifty percent lower. This, too, would reduce by one-half the protective equivalent of the duty which forms the base of the index. Or, if the dollar price of the foreign currency involved should be reduced by one-half, other things remaining unchanged, the protective equivalent would be reduced by one-half, as the index would show.

The index that is called the "protective equivalent" will be constructed in two stages. The first stage will take into account only the changes in the last three variables. It will be called the "protective equivalent of the 1922 duty," if 1922 is the starting date for that example. This index will show what would have happened to the protective equivalent of the duty had the duty itself remained constant. In other words, only the effects of changes in production costs will be recorded by this index. The second index will be called the "protective equivalent of the current duty." This will include changes in the duty brought about by legislation or trade agreement. The duty levied in any year will be adjusted by changes, since the base year, in foreign costs and in domestic costs, and by changes, since the base year, in the rate of exchange. Thus all four of the variables affecting the competitive positions of imports vs. domestic goods will have been put into the second measure. The third measure is available to us from other sources. The duty levied on a commodity as a portion of the original price of the commodity may be considered a measure of the tariff burden borne by the commodity upon entering United States markets. It may over-state or under-state changes in the tariff burden, as an increase in a tariff rate may depress the foreign price of the import, causing the tariff to appear as a larger percent of that price, or *vice versa*.

In the cases in which the duty is levied in the *ad valorem* form, it can be used directly. Specific duties can be expressed as *ad valorem* duties by dividing the duty rate by the price of the commodity, or by dividing the total tariff revenue by the total value of imports. The duty expressed in this way may be correlated with some measure of imports, to determine the restrictive effects of the duty. The other costs will also affect imports, however. The effects of these other costs may be isolated and removed by using the information provided by the protective equivalents.

The details of the methods used to construct protective equivalents and to test for the effects of tariffs will be explained in Chapter II. There are also some statistical problems to be explained and solved in that chapter. Meanwhile, it is necessary to examine the theoretical approach to the problem of measurement, and to determine what use can be made of the measure. A simple comparative cost theory of international trade will be adequate. A restatement of it in the terms applicable to our problems will be helpful.

The Theory

Superficially, goods are traded internationally because of differences in prices. Goods will be imported when the prices of the foreign goods are lower than the prices of comparable goods produced domestically. There are three possible cases.

First, there is an extreme case which is not usually thought of in terms of price difference. This is the case where the importing country does not possess a certain resource which is essential to the production of the good in question. It is not produced domestically at all. The domestic good might be said to have an extremely (or infinitely) high price--thus imports completely displace it. Coffee, nickel ore, castor beans, diamonds, natural rubber and raw jute are a few of the imports in this category.

This short, arbitrary listing of a few commodities illustrates the point that the so-called "lack of resources" is in fact a matter of relative prices. Coffee, castor beans, raw jute and natural rubber are not produced in commercial quantities in the United States because climatic conditions would make the process an extremely expensive and inefficient one. Coffee can be grown, but it is not economically practical. Castor beans have been grown with government subsidy. Commercial production of them for their oil has been abandoned--a few beans have been grown for seed--but these have all been exported to Mexico. In tropical climates, they grow wild perenially; this gives the tropical areas an undisputed advantage over the annual, cultivated production of the termperate zones. Raw jute and natural rubber are similarly barred from domestic production. These products have domestically produced substitutes, however. It is only if the products are narrowly defined that one can say that lack of resources prevents domestic production; and even then it is really a matter of relative prices. Diamonds are not found domestically in commercial quantities and qualities, but there is now a method of synthesizing diamonds; it is again a matter of relative prices. Nickel ore is produced domestically in very small quantities, as a by-product of copper smelting. Whether "enough" could be produced in this way is a matter of conjecture; the point is that the relative prices are such that nearly all nickel consumed in the United States is produced from imported ore or imported crude nickel.

Generally, we cannot be concerned with such products as these, for they are not eligible for tariff protection. However, this list was purposely constructed to include some commodities subject to duties when imported in some forms. Castor beans, nickel in a refined state, and semi-manufactured and manufactured jute are subject to import duties. The reasons for these duties, and some hints of their effects will be discovered in the chapters to follow.

The second case is that in which the resources of the importing country are capable of producing the imported commodity, but international specialization is more efficient. Theoretically this case differs little from the first. In both it is a matter of price differences; in the second case we can simply conceive of domestic production as more "practical." Burlap cloth, a jute manufacture, is an example. All of it is imported, though raw jute is imported for other purposes, and the domestic textile industry could certainly be adapted to its manufacture. Certain types of textile machines are wholly imported, though other types are wholly domestic products, and still other types are partly domestic products and partly imports. International specialization has developed and continued in these instances in spite of tariff protection. If one could assume that, in time, the Swiss watch industry could expand enough with constant or nearly constant costs, watch works would fall into this class. This case is one in which the price differences between imports and domestic products may be rather narrow, but complete specialization would not eliminate them.

Three types of results may follow: there may be no protective tariffs to interfere with specialization; a tariff may exist, but be ineffective; or a tariff may preserve all or a part of the market for domestic producers. If no tariff exists, this study is not interested in the product. The Department of Commerce would class the import as "complementary," or not competitive with domestic production. Practically, as well as theoretically, there is little to distinguish this from an example of our first case. The second result is illustrated by burlap cloth and some specialized textile machines. There is no evidence that an increasing cost condition in either the producing country or the importing country will cause specialization to be less than complete. The third result will be illustrated in our study by castor oil, crude nickel metal, and possibly by watch works. Specialization is not complete; presumably because of an import duty. These are examples in which one may suspect that one is dealing with "increasing-cost" industries. However, the rate at which costs increase with the expansion of an industry may be so slight that complete specialization would result from the absence of protective tariffs.

The third possible case of price differences is that which we readily recognize as one with increasing-cost industries. The allocation of resources is such that some areas are not able to satisfy their demands with local production without prices advancing above those at which other areas are willing to supply substantial portions of the demand. This is the case which most frequently results in what the Department of Commerce calls "supplementary" imports. They compete with domestic production, but could not eliminate it, nor could the imports be eliminated with tariffs falling within any "practical" range. Many of our examples, e.g. wool, softwood lumber, aluminum, cattle, cattle hides are in this category. Sometimes perishable commodities have a seasonal pattern which causes them to be imported. This is really another example of increasing costs due to limited amounts of specialized resources. Fresh tomatoes illustrate this; imports enter to supplement the small amount of winter growing in states with semi-tropical climates, and some hot-house growing in other states.

In this third case, one can most easily observe the effects of tariffs in altering the proportions of supplementary imports to domestic production. Since the limitation on domestic resources is really a matter of increasing costs caused by the use of less and less well-adapted resources, this proportion can easily be affected by altering the prices at which imports may enter. It is in this case, too, that a change in the tariff or a change in production costs in one country relative to those in another will have the most direct effects on the proportions of imports to domestic production.

The three cases of price differences resulting in international specialization and trade can be summarized briefly. The first is the case where there is no domestic production and it is not likely that it will be fostered by protection. Based upon great differences in resources, this is the one referred to as the "case of absolute advantage" in the textbooks. The second is the case where international specialization is more efficient than self-sufficiency, though the latter is conceivable. Trade may be described as the result of comparative advantages and disadvantages in production. The third is the case of incomplete specialization. Neither complete specialization nor self-sufficiency is economical because of imperfect adaptability of resources, and lack of correspondence between the distribution of resources and the distribution of demand. In the first case one would not expect to find protective tariffs; they are used, however, in some instances to protect substitutes or to foster processing industries. In the second case, protective tariffs may or may not be found. Where they exist, their effects may vary from zero to complete elimination of imports. The phenomenon of increasing costs may be present, but its effects are not strong enough in many industries to

prevent complete specialization on the one hand, nor complete autarchy on the other hand. The third case is common where agricultural or extractive industries are involved. Protective tariffs are often levied on such supplementary imports. Superficially acceptable cases for their existence can usually be presented by domestic producers who can show high costs and disturbances of markets caused by changes in the volumes of imports. These tariffs may generate more controversy and dissatisfaction than those on other products. Continual pressure for their increase may come from the protected producers, who can never be "satisfied," because of the nature of costs in their industries. Consumers of these products may be keenly aware of the taxes they are paying for the sake of small increases in the domestic producers' shares of the markets. Industrial processors of protected agricultural products may be especially aware of the cost of protecting raw materials producers. Wool, cattle and lumber are such examples chosen for this study.

Measuring Costs

Given this framework for the understanding of the roles of prices and production costs in the flows of international trade, we can begin to search for means of measuring the costs which will affect the relations of imports to domestic production. One might start by saying that one should find the average costs of production in the domestic industry at a given time, and the average costs (expressed in dollars) in the industry in the principal competing country at the same time. Recording changes in these average costs would presumably yield the indexes of domestic and foreign costs which could be used to modify the tariff rate. The modified tariff rate would form the protective equivalent series described above. Each time foreign costs declined relative to domestic costs, the protective equivalent of a given duty would decline, and each time foreign costs rose relative to domestic costs, the protective equivalent would rise.

There is one practical difficulty, and there are several theoretical difficulties in the way of such a simple solution. Practically, it is virtually impossible to secure reliable data on the average costs of production for an industry. Though some "typical" or "standard" cost data may be published by trade associations in highly organized industries, these should not be relied upon for our purposes. They are apt to be designed to induce standardized prices, to provide a check on the efficiency of members, or both. Even though they might faithfully record an "average" of all firms' unit costs, they are still subject to the theoretical difficulties to be discussed below. It is well known, too, that most industries do not provide such average cost data. Particularly in agricultural production, it is hard to say whether one has an accurate idea of average costs for one crop produced by one farm. "Averaging" costs for all farms' production of a given crop is an extremely difficult task. The search for average costs in a foreign industry encounters all of these difficulties plus differences in accounting procedures, lack of organized data and reluctance to divulge information.[8]

The theoretical difficulties are at least as great as are the practical ones. The unit cost data that could be acquired would not correspond to the theoretical definition of average costs. Suppose the "average cost" in an industry were the mean of the unit costs of the firms, weighted by their proportions of the total industry output. This would not be an average cost for any one firm. Neither would it be an industry average cost. Some firms would have been producing beyond their optimum outputs, with consequently higher unit costs. Others would have been producing below their optimum outputs, also resulting in high unit costs. Marginal firms with high unit costs would contribute to the average. In years when demand was greater than usual, there might be many high-cost firms, and any one firm might report high unit costs because of expansion beyond optimum output. In other words, the unit costs reported by a firm might

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[8] A detailed report of these practical difficulties may be found in United States Tariff Commission, Sugar, A Report to the President of the United States, Washington, G.P.O., 1926.

represent costs at any point along the firm's theoretical average cost curve. The weighted mean for the industry would not necessarily have a locus on the industry's average cost curve.

This lack of theoretical nicety in the statistical average costs for an industry might be tolerated were it not for additional difficulties. Changes in market demand for either the domestic industry or for the foreign industry supplying imports will, by altering outputs in the short-run, move firms along their short-run average cost curves. Even if the statistical cost data did have a locus on the theoretical average cost curve, its location would be a function of the demand for the product of that industry. This means that the costs of the domestic industry would not be independent of the output of the industries supplying imports, and *vice versa*.

This interdependence of costs and outputs in various parts of a world market is to be expected. So long as there is communication and a flow of goods from one part of the market to another, price, output and costs in one part of the market will affect price, output and costs in the rest of the market. Prices, output and costs will be partially "insulated" in segments of the market which are protected by transfer costs, including tariffs. As long as the flow of products is toward the "insulated" segment of the market, however, the amount of "insulation" is known and constant, i.e., the sum of the transfer costs. The interdependence of prices, outputs and costs is not destroyed; a gap equal to transfer costs is merely introduced. A change in output and/or price in the exporting segment of the market will be reflected in a corresponding change in price and/or output in the importing segment. Costs in both segments of the market will be affected by output changes and entry or departure of marginal firms, irrespective of whether technological changes or changes in the relative scarcities of resources have influenced costs.

While these are the normal expectations and not defects of average costs as such, they make average costs inappropriate for our purposes. We wish to find changes in the cost conditions affecting foreign producers which will be independent of the changes in the cost conditions affecting the competing domestic producers, and _vice versa_. Short-run changes in domestic output, caused by changes in foreign output and/or prices should not be reflected in the domestic costs which we measure. Likewise changes in the American tariff should not be reflected in the costs we are measuring for domestic and foreign producers. If changes in the tariff should be so reflected, it would make little sense to say that the protective equivalent of the tariff would be reduced by a decrease in foreign costs relative to domestic costs, or increased by a rise in foreign costs relative to domestic costs. A rise in the American tariff would, if the

United States were a large part of the world market, depress foreign prices and decrease output in the foreign industry. This would have an effect on the average costs in the foreign industry; but the effect would be directly traceable to a change in the United States duty. If the foreign costs were thereby reduced, there is some logic in saying that the protective effect of the American tariff is reduced. In other words, a part of the incidence of the tariff increase is borne by foreign producers, and the cost spread between foreign and domestic producers is widened. This does not mean, however, that the foreign producer is in a better competitive position because of his cost changes. In fact, his costs changed because he was placed in a worse competitive position.

What we should be seeking is a measure of costs which is independent of short-run changes in output, and independent of changes in transport cost or changes in prices in other segments of the world market. Since the cost and price differences which motivate international specialization and trade are based upon resource distributions and production techniques, we should seek measures of costs which are also based on these factors. The supplies of the resources used in the production process in question, and the state of the arts in the industry should be reflected by our cost measure. Other, more transitory, influences, and direct influences of events in other parts of the world

market should be omitted, if possible. Long-run changes in the scale of operation should be reflected in our cost measure, though we would like to omit the effects of short-run changes.

Long-run changes, involving growth in the number and sizes of firms, will press upon the limited supplies of resources. If this should cause costs to rise, we should be cognizant of the fact. This sort of limitation, imposed by the resources of the producing area and other industries' demands on those resources, is one of the determinants of comparative advantage or disadvantage. Also, the state of the arts in this industry in this area will help determine whether the area will have a comparative advantage in the product of the industry. Any change in the relation between the supply of required resources and the demands upon them, and any change in the arts, should be reflected in a measure which would tell us that the comparative advantage possessed by this producing area is increasing or decreasing.

Since the concept of a comparative advantage implies a cost advantage only with respect to other products and other areas, there is no absolute measure. It is always relations with other areas and other products which we seek. There is no satisfactory way to measure the amount of advantage possessed by one area at a given time. The fact that it exports a certain product to another area is sufficient evidence of absolute advantage, greater comparative advantage, or lesser comparative disadvantage in that product; whatever may be the appropriate term to describe the basis of its specialization. The magnitude of this advantage or disadvantage escapes statistical methods. Thus we are interested only in these cost conditions relative to the corresponding cost conditions in other areas. Ratios of the cost indexes in two areas will be necessary; an index of costs for one area alone is not enough.

There is no direct statistical means of measuring costs as we would like to measure them. Indexes of resource scarcity and states of the arts do not exist. However, competitive markets tend to reflect changes in such underlying cost conditions. Competitive markets yield prices for individual commodities which reflect not only these cost conditions, but all of the short-run influences which should not be recorded in a measure of resource scarcity and the state of the arts. Competitive market prices may be combined, however, into composite indexes for industries or commodity groups. Such a composite index may reflect changes in the basic cost conditions affecting all of the products of a given group of resources, say forest products. It may also reflect, of course, all of the transitory influences on those products. However, if one is interested in the cost conditions affecting one of these products, say newsprint, the index of prices of forest products will not be greatly affected by short-run influences on the price of newsprint itself. In other words, a composite price index composed of a group of products coming from the same resources may be a rough indicator of the cost conditions affecting any one of the component products. Short-run market conditions will at any one time be affecting each of the products in the index. These influences will be different for the separate commodities, however, and it may be hoped that they will partially cancel each other. Certainly the short-run market influences on the one commodity whose costs are being estimated would be submerged in the composite index.

Ideally, composite price indexes should be constructed especially for the purpose of measuring changes in the cost conditions affecting a commodity to be studied. Only those commodities using the same resources and similarly advancing production techniques should be included. The composite price index then could be said to measure changes in costs in one or both of two ways. Advances in the individual commodity prices which make up the composite could be measuring the general increase in the price of a resource, such as timber. Or, it could be measuring the increasing values of the alternative uses of the resource, timber. Thus if newsprint were the commodity whose costs were being measured, increases in the prices of softwood lumber, plywood, other paper, etc., would represent increases in the opportunity costs of producing newsprint. A composite price index

carefully constructed of such commodities using common resources would actually measure costs in both ways; it would be impossible to distinguish between a resource price measurement and an opportunity cost measurement.

For the purposes of this study, it was not worthwhile to construct special indexes. Some indexes already constructed and published will be used. There are as yet too many uncertainties about the feasibility of measuring the protective equivalents of tariffs to warrant the use of anything but ready-made price indexes. If this method of measurement proves fruitful enough, it may be that price indexes can be designed for further studies.

Indexes of the wholesale prices of commodity groups were selected from the statistical publications of the countries producing the commodity examples chosen for study. These were not ideally suited to the purpose, but they were chosen in such a way as to approximate the above requirements. Unfortunately, exact comparability of the indexes published by different countries could not be expected. Many commodity examples were rejected because suitable price indexes could not be found for the United States or for the country which was the principal supplier of imports. Some examples were retained, however, though the available price indexes seem of doubtful value.

The conditions under which commodity group price indexes may be used to measure production cost conditions for domestic

products and supplementary imports may be summarized briefly. First, the index used to measure the costs for a commodity must include commodities which are alternative uses of a set of resources. Some "extraneous" commodities may be included, but the bulk of the components of the index must be relevant to the commodity whose costs are being measured. Second, the index must be broad enough so that the weight of the commodity in question is not too great. This requirement prevents the short-run market influences on the one commodity from altering its resource cost measure appreciably. For the first example, Australian wool, a textile price index for Australia will be rejected because wool is about two-thirds of the total weights in the index. United States wool production, or a change in American costs or in the United States tariff would be immediately reflected in Australian wool prices--thus altering its "cost conditions." An index will be chosen which will minimize this feed-back effect, i.e., an index of the prices of a broader group of alternatives to wool, so that wool has a smaller weight.

Third, the individual prices in the composite index must be competitive prices. It would be theoretically proper to limit our choices to indexes containing prices which were all the results of pure competition. Then we could say that prices were equal to average costs, except for transitory rents (positive or negative) due to time lags in the entry or exit of firms. We should be limited to a few agricultural products in that case, however, and it is likely that we should be uneasy about them. A tolerable amount of competition is all that we can expect; enough so that the prices are flexible and have some clear relationships to average costs in their respective industries. For some industrial products, we shall have to be content with considerable price administration and price rigidity. We probably shall pay a high price for this tolerance, in terms of the reliability of the protective equivalent.

Fourth, it must be assumed that the costs of producing the commodity in question move in the same direction and with comparable magnitude as the movements of the index. This would follow from the assumption that the index is measuring the opportunity costs, except for one consideration. It must also be assumed that technology of the product in question neither strongly leads nor seriously lags behind the technology of the other products in the index. If this were not so, then costs for this product might not be moving in the same direction or with the same magnitude as the prices of the alternative products. This will remain merely an assumption in this study. If it is worthwhile to refine the study, measures of labor productivity might be secured which would test this assumption.

Fifth, it must be assumed that the rate of exchange is a valid translator of the foreign currency prices into dollar prices, so that changes in the ratios of foreign to domestic prices represent actual changes in the ratios of resource costs. This assumption rests in turn on two other assumptions. It is assumed that the New York buying rates, as reported by the Board of Governors of the Federal Reserve System, are the rates at which transactions took place. This is an approximation at best, for annual averages of the buying rates are used; otherwise the commodity studies would have to be broken down into periods shorter than one year. Import and production data are often available only in annual periods, so this was not practical. Where special rates for exports were quoted, they were used. It is not known whether other special rates were applied to some commodity transactions, especially in the cases of Germany and Argentina.

The second question that should be raised is one of theory. It may be objected that an alteration of a country's rate of exchange does not affect its resource endowment; therefore it is not proper to allow a depreciation to reduce an index which purports to measure resource costs. A superficial answer to that objection is that whatever may be true of resources, the <u>dollar</u> costs of production have been lowered by depreciation, and that is what affects the foreign producers' competitive positions in American markets.

The matter is more complicated, however, and we need not be content with the superficial answer. The nature of the adjustments in resource uses brought about by

depreciation will determine whether the resource costs of the traded commodity are actually lower after depreciation (whether there has been an increase in the producers' comparative advantage). The traded commodity may rise in price, if the increased exports push against limited production capacity or resources. This would indicate that the effects of the depreciation could be nullified if the resources were not available or were not cheaper after depreciation. The comparative advantage would not have been increased, and our index would show that it had not. The dollar price of the traded good would have returned to something like its old level.

The index which we use is a composite, however, including the alternative uses of these resources. Some are purely domestic goods, some are exported only to non-dollar areas, and some are supplemented by imports. Depreciation will presumably cause shifts of demand between these categories of goods. If the domestic goods, etc., in the index do not rise in price enough to offset the depreciation, it follows that the commodity exported to the United States is now cheaper (in dollars) to produce, because the dollar values of the alternative uses of the resources are lower. Therefore, it can be said that the comparative advantage in

this commodity possessed by the exporting country is greater than before the depreciation.[9]

There is another theoretical objection to the use of exchange rates to translate values from one economy to another. Gilbert and Kravis have pointed out that since tastes and subjective living standards vary from one country to another, one actually cannot convert values to another currency.[10] Particularly, the domestic goods have different meanings to their consumers than do corresponding domestic goods in another society, so that a "dollar's worth" of snails consumed in France has little meaning. This is true, but its effects on a measurement of costs in the comparative advantage sense must be slight. It is no concern of ours what the exact alternative uses made of the resources are which enter our imports, or how the alternatives are valued at the beginning of the time period we study. We can assume that tastes do not change so radically during the relevant time period that the price index loses its ability to measure

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9 E. Victor Morgan in "The Theory of Flexible Exchange Rates," American Economic Review, XLV no. 3, June, 1955, pp. 279-295, points out that depreciation may be regarded as a cheapening of resources, and that the factors may be reallocated so that export and import lists are altered. See especially pp. 282-284.

10 Gilbert and Kravis, An International Comparison of National Products and the Purchasing Power of Currencies, Organization for European Economic Cooperation, 1953

the values of alternatives. This is a question that must be raised regarding the use of index numbers in any context. We simply must accept index numbers for what they are worth; admitting that they are inherently faulty measures of value. A corresponding fault of exchange rates as translators of value must be accepted as gracefully as possible.

The Method

Having established the theoretical possibility of measuring costs in a suitable way, we can proceed to a summary of the method of using them in a study of the effects of tariffs. The entire statistical procedure will be detailed in Chapter II, so that this need only be a brief indication of the approach.

Total imports and imports from the principal supplying country have been recorded for each year of each commodity study. Data on the domestic production of the same commodity, or of a relevant group of commodities have been recorded. Both the physical volumes and the values of imports vary, not only with the competitive positions of foreign producers versus domestic producers, but also with changes in the national income in the United States. This can be corrected for, to some extent, by recording "imports from country X as percents of total imports," or "imports from country X as percents of domestic production." The first will follow the country's share of total imports,

which might be affected by the movements of its costs relative to United States costs and relative to costs in other areas. The second will attempt to correct for the effect of national income changes on United States imports. These corrections assume, however, that the income elasticity of demand for imports of a particular commodity is the same as the income elasticity of demand for the domestic commodity with which it competes. This may not be strictly true. There is, however, no orderly way in which a difference can be estimated. If imports and domestic goods are interchangeable, there should be no difference. If imports can be distinguished and are of slightly different quality, there may be considerable difference. The Randall Commission found some tendency for the income elasticity of demand for imports to be greater than for domestic products.[11] The reasons suggested were the following: United States prices are apt to decline farther than foreign prices, imports may be "luxury" varieties, and the *ad valorem* equivalents of specific tariffs increase during depressions. The first reason is accounted for by our methods. The greater deflation in American prices, if it occurs, is "stripped" out by the use of the cost relatives. The "luxury" problem does not arise where imports are identical to domestic

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11 Commission on Foreign Economic Policy, *Staff Papers*, Washington, United States G.P.O., 1954, pp. 311-313.

products; this is true in most of the cases to be studied. When it is not true, statistical methods are not available to correct for the different income elasticities; verbal reasoning must suffice. The third reason is accounted for by our method of testing for tariffs. The ad valorem equivalent of a specific duty is used in the direct testing of the effects of tariff changes on imports. Though imports may decline more than domestic production of certain goods during a depression, we count this partly as an effect of the increased ad valorem equivalent of the specific duty levied on the import.

Checks on the usefulness of the protective equivalent approach will generally be accomplished in four parts. First, a visual inspection of the relations between costs (including currency prices), tariffs and imports will be made. Second, correlation analysis will be used to determine the sensitivity of imports to all cost factors. Third, the sensitivity of imports to the tariff itself, with the effects of other cost factors removed, will be tested with correlation techniques. This will be reversed, and the effects of costs, with tariff effects removed, will be tested. Fourth, the first three tests will be evaluated in the light of additional knowledge concerning the trade relations between the United States and the country covered by the example. A final evaluation of the results of each attempt at measurement can then be made, and notice taken of any additional information that has been gained from the example.

Summary

This study attempts to explore the possibility of statistically measuring the effects of changes in United States tariffs. Since the tariff rate is only one of the variables affecting the competitive position of imports in United States' markets, the other variables will be quantified and introduced into a measure called the protective equivalent. A tariff rate will be the base of the protective equivalent. The tariff rate will be multiplied, for each year, by a ratio which expresses changes in production costs for the foreign industry relative to changes in production costs for the corresponding domestic industry. Foreign costs will be expressed in dollars.

The problem is to find, for this ratio, production cost data which may be expected to measure comparative advantage or disadvantage. The basis for international trade is differences in prices, which result from differences in costs. There are three types of cases of comparative or absolute advantage; examples will be drawn from each type of case. Primary materials may be wholly imported because domestic production is "impractical," though their processing may be protected by tariffs. Second, products may be produced by specialized areas;

increasing costs in production do not prevent complete specialization, but import duties may be used to prevent it. Third, there are the increasing cost industries, for which supplementary imports are necessary. The proportion of supplementary imports in consumption may be reduced by protective tariffs.

If a commodity is imported in competition with any protected domestic products, the problem is then to find a measure of its production costs which will reflect changes in the comparative advantage possessed by its exporters in relation to the domestic producers. Unit costs reported by industries are not always available, and they would be affected by the interdependence of prices, outputs and costs, if they were. Wholesale commodity price indexes by groups of commodities are selected instead. They measure the opportunity costs of the import, if the following assumptions can be made about each index:

a) A significant portion of the alternative uses of the resources is represented by the index, and not too many unrelated commodities,

b) the weight of the import is not large in the composite index,

c) the prices in the index are competitive prices,

d) the costs of producing the import actually move in the same direction and with comparable magnitude as the price index, and

e) the rate of exchange is a valid translator of the foreign costs to dollar costs.

The protective equivalents constructed on the above theory will then be used in various ways to determine the sensitivity of imports to tariffs and to other costs. It should then be possible to say whether one can in this way assess the effects of changes in tariff rates on the competitive positions of imports. One measure that has been constructed includes, in addition to the tariff, the relevant production cost data. Thus it attempts to relate imports to a composite measure of competitive position. One can measure with this device the sensitivity of imports to all cost conditions. Then one can separate statistically the effects of tariffs from the effects of relative cost changes, and find expressions for the separate contributions of each to changes in the proportions of imports to domestic production.

CHAPTER II

THE STATISTICAL METHOD

The theory of this approach to the measurement of the effects of tariff changes upon imports has been described in the first chapter. This chapter will be concerned only with the mechanics of the process of measurement. First, the process will be explained briefly in general terms. Then, step-by-step, the construction of the statistical tables and the evaluation of the results will be explained in detail. A sample table will be constructed to illustrate the method to be used in the chapters to follow.

In General

Commodities will be selected from commodity classes which are major imports from certain countries. The list of countries to be selected will be first reduced by all of those for which suitable price data cannot be found. From the remainder, those will be selected which contribute significant portions (in all cases more than ten percent; in most cases more than fifty percent) of United States imports of a class of commodities. From the commodity class, a single item will be selected for which a unique tariff rate and exact import data can be obtained. In a few cases it will be necessary to choose a

"representative" rate of duty; as the commodities are classified too narrowly in the tariff schedules to serve our purposes.

For each commodity thus selected, a wholesale price index will be found for the United States which measures the prices of the alternative products of the same set of resources. A similar index will be found for the country in which most of the imports originate. The foreign index will be modified by alterations of the exchange rate, so that it will be expressed in dollars.

The two indexes will be combined into ratios of production costs. These ratios will be multiplied by the tariff rate levied in 1922, or in the year with which each individual commodity study begins. The resulting series will be called the "protective equivalent of the 1922 (or other base year) duty." It will show only the effects of changes in the cost ratios. It can be used as a measure of the effects of changing costs, or as an index of the changing protection afforded by a constant tariff rate.

The cost ratios will also be applied to the duty in effect in each year. The resulting series will be called the "protective equivalent of the current duty." This will show the combined effects of cost changes and tariff rate changes.

The relations between import data and the variables entering the computation of the protective equivalents will be checked visually. It should be possible to identify any immediate effects of such events as exchange depreciations, changes in the tariff rate, or large sudden changes in costs.

Correlation analysis will then be used to find the values and significance of the relationships between the several series that have been constructed on the one hand and import data on the other hand. Specifically, it should now be possible to isolate the effects of the tariff from the effects of changes in costs. This will be done by the use of a multiple regression technique--to relate the tariff (or its *ad valorem* equivalent) to imports, statistically holding the cost ratios constant.

Finally, a general evaluation of each example will be attempted. Success or failure in measuring the effects of costs and/or of the tariff must be determined. There may be incidental lessons to be learned from the example. Ideas for alternative techniques of measurement may be developed for examples which fail to yield information from the application of this standard technique.

The Commodity Tables

The method may now be described in greater detail, with illustrative examples. Each of the major tables (Roman numeralled) will be constructed in a standard form, so that the mechanical process may be followed readily in each of the commodity-country chapters which will follow. A sample table is included in this chapter on page 51.

For each commodity that is to be used as an example, a wholesale price index of the United States Bureau of Labor Statistics will be selected. These indexes are reported in Statistical Abstract of the United States[1] by commodity groups. One will be selected that includes the prices of the commodities which roughly represent the opportunity costs of the example, as explained in Chapter I. This index will be in column 4 of each table. From a statistical yearbook or similar publication, a corresponding wholesale price index for the country supplying the imports will be chosen by the same criterea. It will be shown in column 1 of each table. It will generally not have the same composition as the United States index. All that can be hoped is that it, too, roughly measures the opportunity costs of the imported product. The weight of the imported product will generally not be known, as such information is usually not found in the yearbooks. The description of the index will be used to determine its general breadth and composition, so that excessively narrow or largely irrelevant indexes may be avoided. Several possible commodity examples must be omitted from

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1 United States Department of Commerce, Bureau of the Census, Washington, G.P.O., annual volumes.

this study for lack of a reasonably good foreign price index. There has been no attempt to evaluate the procedures by which these indexes have been constructed. They are in any case what is available, and if faulty, will yield poor results in this study. Their faults could not be corrected in a study of this length, so they must be accepted as they are.

The rate of exchange for each country's currency will be shown in column 2. This is reported by the Board of Governors of the Federal Reserve System in the monthly Federal Reserve Bulletin. It is the certified noon buying rate in New York for cable transfers. These rates will differ from the commercial bill rates with which transactions are completed. The spreads should be nearly constant, so they should not preclude the use of the cable rates. It may be that some transactions were concluded at rates other than those generally quoted. If this has been a sporadic practice, it cannot be discovered within the limits of this study. Where multiple rates are quoted, the one most apt to be applied to exports to the United States is chosen. Other departures from quoted rates (especially those suspected of Nazi Germany) escape our notice, and thus make us subject to error. Annual averages have been used throughout. This allows a study covering from twenty to twenty-nine years to be statistically manageable. It does create awkward discontinuities, especially where depreciations occur in stages through several months. This difficulty is unavoidable, for production data are often available only in annual increments, and the inconvenience of obtaining import data for periods of less than one year would be great.

Column 3 of each table re-expresses the foreign wholesale price index in dollars. This is done in the following way: the index number for each year is multiplied by the ratio of the dollar value of the currency in that year to its dollar value in the year used as a base for the example. This ratio is simply the proportion by which the foreign currency has appreciated or depreciated with respect to the dollar since the base year. By applying this ratio to the price index number for any year, we are stating a new dollar value for the index number based on the new buying rate for the currency as a percent of its buying rate in the first year of the study.

An example will help clarify this deflation process. The Swiss franc was quoted at 19.07 cents in 1922 and at 18.06 cents in 1923. Suppose that a Swiss commodity price index had the following values: 110 in 1922, and 115 in 1923. Let 1922 be the base year; this leaves 110 as the dollar value of the index in that year, for 19.07 is the "base year" exchange rate. For 1923, we have $115 \times 18.06/19.07 = 109$. The dollar value of the index is reduced by the degree of depreciation that has occurred; this is the ratio 18.06/19.07.

The foreign composite price index expressed in dollars (column 3) is used as a series representing the changing costs of producing the imported commodity. The United States price index (column 4) is used as a corresponding series of costs for the same product produced domestically.

Column 5 of each table is the result of constructing cost relatives from the indexes and multiplying them by the tariff rate applicable in the first year of the study. The series thus created is called the "protective equivalent of the 1922 (or other base year) duty." It shows only the effects of changes in costs in one of the two countries relative to the costs in the other country. The absolute amount of the tariff on which the series is based is irrelevant. One might use the number "one" or any other "dummy" number except zero for a base. Proportional changes from year to year, and from any part of the series to any other part are significant, and that is all. The actual duty is used as the dummy number in order to provide visual reference to its height, and to allow comparison with the price of the product, or with the ad valorem equivalent of the duty.

The computation of column 5 for each example proceeds as follows: the base year duty is multiplied by the ratio;

$$\frac{\dfrac{\text{foreign price index number in dollars, current year}}{\text{United States price index number, current year}}}{\dfrac{\text{foreign price index number, base year}}{\text{United States price index number, base year.}}}$$

By looking at this ratio, one can see that the denominator is a constant for each example. It has no meaning, except as a denominator, for the price indexes do not have common bases nor identical compositions. Numbers from the same series appear in the numerator of the large ratio, however. The numerator will be larger than the denominator if the foreign price index has risen more (or fallen less) since the base year than has the United States price index. In any year in which the numerator is larger than the denominator (the large ratio has a value greater than one), the effect on the base year duty of multiplying it by the large ratio is to increase it. Thus if foreign prices (used here to indicate costs) have risen more than corresponding United States prices (costs), the protective equivalent of the base year duty will have a greater value than the duty itself. Conversely, the protective equivalent will be smaller than the duty if foreign prices (costs) have risen less or fallen more than United States prices (costs).

An example is given in table 2 - 1.

Table 2 - 1

Data for Computation of the Protective Equivalent of the 1922 Duty

Year	Price indexes (Measures of costs) United States	Foreign	United States Duty in 1922
1922	105	90	$.40 per pound
1930	130	180	
1936	100	80	

For 1930, the following computation would be performed. The duty of $.40 would be multiplied by the ratio 180/130/90/105. The result would be $.647; the protective equivalent of the 1922 duty in 1930. For 1936, $.40 x 80/100/90/105 = $.374, the protective equivalent of the 1922 duty in 1936. These results would be interpreted to mean that United States producers enjoyed considerably more protection from a 40 cent duty in 1930 than in 1922, and slightly less protection in 1936 than in 1922.

Since the foreign price index in its own currency, the rate of exchange, and the United States price index are shown in columns 1, 2 and 4 respectively, visual inspection will show in what periods foreign costs were causing the changes in the protective equivalent, in what periods exchange depreciation or appreciation caused the

changes, etc. This will be useful both in preliminary appraisal of the cost effects, and in the final evaluation of the results of each example.

Column 6 of each table will contain the tariff levied in each year on the commodity used as an example in that table. It will be listed as it is levied; either specific, *ad valorem*, or composite. In a few cases, a specific duty will vary from year-to-year with changes in the exact composition of imports. This will be done in order to treat a commodity as if it were homogeneous, though it is not so treated by the tariff schedule. Justification for this will be offered in the individual cases. A composite duty will be converted into an *ad valorem* duty in order to simplify its presentation. In some cases, a duty on one small tariff class will be used to represent the duty on a larger class of commodities. This is necessary to secure a single rate for a commodity, because the tariff schedule breaks what is essentially a homogeneous commodity into many tariff classifications. This will be explained in each case in which it is done.

The duty levied in each year will be multiplied by the ratio of cost relatives shown above. The previous example may be modified to illustrate this operation. Hypothetical data are shown in table 2 - 2.

Table 2 - 2

Data for Computation of the Protective Equivalent of the Current Duty

Year	Price indexes (Measures of costs) United States	Foreign	United States Duty In each Year
1922	105	90	$.40 per pound
1930	130	180	.50 " "
1936	100	80	.30 " "

For 1930; $.50 x 180/130/90/105 = $.805. The protective equivalent of the 1930 duty is more than twice the duty ($.40) in the base year. The duty itself had been increased by twenty-five percent; increases in foreign costs relative to domestic costs account for the additional increase. For 1936; $.30 x 80/100/90/105 =$.28. The protective equivalent of the 1936 duty is slightly below its actual value. Reduction of foreign costs relative to United States costs accounts for the additional decrease. In all the protective equivalent has declined, from 1922 to 1936, from $.40 to $.28. The major portion of this is due to a trade agreement reduction of the high 1930 rate to a rate of $.30.

For convenience of reference, the resulting series will be indexed and placed in column 7a. The base year for the example will serve as a base (equal to 100) for the index.

Another column in each table will record the ad valorem equivalent of the duty for each year, in the cases which deal with specific or composite duties. This will generally appear in the last column at the right of each table in which it is appropriate. This will be the measure of the tariff rate whose effect on imports will be tested. It is a measure of the relative heighth of the duty, and, as such, conforms to usual measures of burden, mark-up, tax, etc. The tariff as a percent of value has no special theoretical merits as the measure of tariff burden. However, besides conforming to the above customary ways of expressing a burden, it appears to be superior to a specific duty. The latter may vary from insignificance to a considerable percentage "mark-up," as the price of the import falls. Therefore we shall accept the ad valorem equivalent as the best measure of the price burden of a tariff on a particular commodity. This does not mean that we shall agree that it is the best measure of the burden of tariffs as a whole; indeed, it may be one of the worst, despite its general use for that purpose.

The ad valorem equivalent of specific duties will not be substituted for the specific rates in the computation of the protective equivalents. For the protective equivalent of the base year duty, it makes no difference at all. The base year duty is a dummy number that is held constant for the entire series. It merely serves as a base-line for the effects of changes in relative costs. The protective equivalent of the current duty is a different matter. Here the change in duty is a change in one of the costs of placing imports on United States markets, compared to the cost of placing a competitive domestic product on the market. The question boils down to this: should changes in the tariff burden be recorded as dollar changes in costs, or as changes in costs expressed as percents of the foreign selling price? It is not an easy question to resolve. It has not been resolved: the specific duty is used when that is the form in which it is levied; the *ad valorem* duty when it is levied in that form; and a constructed *ad valorem* duty is used when a composite duty is levied. One objective is to record changes in the duty only when legislation or a trade agreement changes it, and to omit changes in the duty brought about by changes in the price of the imported commodity.

Since it is not convenient to estimate a constant dollar equivalent of an *ad valorem* rate, there is some inconsistency from one example to another. This will affect the measurement of the sensitivity of imports to the total cost situation, for that is what the protective equivalent of the current duty can measure. It will not affect the measurement of the effect of the tariff in isolation, nor the effect of changing relative costs in isolation. In some examples, a check will be made by computing a "protective equivalent of the ad valorem equivalent of the current duty." In these cases, it will be possible to check whether this makes a significant difference.

The remaining columns of each table will contain import data. For the cases in which it makes sense to do so, imports from a country will be recorded as percents of total imports of that commodity. This will provide a check on the competition between principal sources of imports. In another column, imports will be expressed as percents of the domestic production of the same commodity or a relevant group of commodities. One of the serious problems is the gathering of domestic production data for articles corresponding to the imported articles. In some cases, such as wool, lumber, aluminum, cattle, etc., data are readily available. For other products, such as coal-tar colors, jute products, cotton cloth, etc., domestic production data do not correspond closely to the commodity classifications of imports. In these latter cases, our ability to find the effects of costs and tariffs on imports will be dulled by this lack of precise comparison.

Table 2 - 3 is a sample of the tables that will be used for the seventeen commodity examples in Chapters III through IX. The sample has been shortened by the omission of some years.

Table 2 - 3
<u>Sample Commodity Table</u>

	1	2	3	4	5	6	7	7a	8	9	10
Year	Wholesale price index, textile fibers, country A, (1913 = 100)	Rate of exchange, A's currency unit equals ___ cents, U. S.	Wholesale price index, textile fibers, country A, in dollars	Wholesale price index, textile fibers, U. S. (1926 = 100)	Protective equivalent of the 1922 duty on fiber X	Duty levied on each year on fiber X	Protective equivalent of the current duty on fiber X	Index of the protective equivalent of the duty on fiber X (1922 = 100)	Imports of fiber X from country A as percent of total imports of fiber X, quantity	Imports of fiber X from country A as percent of total U. S. production of fiber X, quantity	*Ad valorem* equivalent of duty on fiber X
						¢ lb.					
1922	120	40.00	120	95	5.00	5.0	5.00	100	34	10	25
1923	121	40.00	121	96	4.98	5.0	4.98	99	33	9	24
1924	124	40.00	124	98	5.00	5.0	5.00	100	32	10	25
1925	126	40.00	126	98	5.08	5.0	5.08	102	30	11	23
1930	115	38.50	111	95	4.71	7.5	6.60	132	25	8	50
1931	99	37.00	92	85	4.28	7.5	6.42	128	20	7	56
1932	90	37.00	83	75	4.38	7.5	6.58	131	19	8	55
1933	88	41.00	90	70	5.07	7.5	7.64	153	18	5	49
1934	91	41.00	93	73	5.06	7.5	7.57	151	20	6	46
1935	95	41.00	97	76	5.05	4.0	4.04	81	21	9	26
1936	100	35.00	88	80	4.35	4.0	3.48	70	25	10	20

The effects of depreciation, first of "A" currency, then of the dollar, then of "A" currency again are shown in the alteration of A's price index from column 1 to column 3. Column 5 shows the effects of changes in A's dollar price index relative to the United States' price index. 5.00 is the base for column 5. The protective equivalent of the 1922 duty varies above or below 5.00 as foreign dollar prices (costs) rise or fall relative to United States prices (costs).

Column 6 shows the changes in the specific duty brought about by the Tariff Act of 1930, and by a subsequent trade agreement. Column 7 then differs from column 5 only because its base is changed in 1930 and in 1935. Comparison of columns 2, 5, 7 and 7a will show the timing and the relative importance of changes in the exchange rate, in relative costs, and in the tariff rate. For instance, comparing 1936 with 1922 shows that, in total, the protective equivalent of the current tariff had declined by thirty percent. This was due to a twenty percent reduction of the duty and a thirteen percent reduction in foreign (dollar) costs relative to American costs. Column 2 shows further that this was not true before the depreciation of 1936; i.e., that foreign dollar costs in 1935 were higher than in 1922. Further examination of the cost-exchange rate relation should be explored in an actual example.

The Correlation Tests

After visual examination of the import data, correlation tests will be used to discover the relations between the protective equivalents, imports, costs and the *ad valorem* equivalent of the tariff rate. This will be done in steps. First, all of the cost data represented by the protective equivalent of the current duty will be related to the two measures of imports. In the examples in succeeding chapters, the import measures will be expressed in both quantitative and value terms when data are available, so that it may be possible to observe the changes in the unit values of imports which may be related to the tariff or other costs. This correlation will provide a test of the effects of changes in the total cost situation. Then the *ad valorem* equivalent of the duty (or the *ad valorem* duty) will be correlated with the import measures, with the effects of costs (column 5) removed. Costs will be correlated with the import measures, with the effects of tariffs removed. All of the correlations will first have the effects of time trends removed. The removal of time trends is done to account for any additional influences on imports which have not been accounted for by our methods of expressing the data. The results of the multiple correlation technique should therefore be the "pure" effects of the tariff on the one hand, and of relative costs on the other hand, as nearly as the available data and the correlation method can determine them.

Rank correlation will be employed for the tests of the protective equivalent. This is because correlation achieved by the product-moment method is valid only on the assumption that the data in each series to be correlated are from universes which have normal distributions.[2] This cannot be said of the time series which we are studying. Rank correlation is less powerful, but the use of the more powerful product-moment method is not worthwhile with these data, as long as the rank method will work. Rank correlation has another deficiency; there is no test of the significance of its coefficients derived from small samples. All of our series provide what would be called small samples; the maximum length of a series is twenty-nine years. Because of this, an auxiliary test will be made in a few cases, using the product-moment method and the "student t" test of significance.[3] The "t" test also relies on the assumption that the correlated series are from a normal universe. Therefore strong reliance on the

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2 See G. Udny Yule and M. G. Kendall, An Introduction to the Theory of Statistics, London, Charles Griffin & Co. Ltd., 1948, pp. 246-251.

3 *Ibid.*, pp. 438-443.

results would be dangerous. The weaker rank method will be employed for the first correlation test, and conclusions will be based upon an accumulation of results for several case studies rather than on one case.

Time trends will be removed in the rank correlation tests of the relation of the protective equivalent to imports. This requires the derivation of partial correlation coefficients of the first order. The rank method is not capable of this refinement, if interpreted strictly. For this reason, the two-variable coefficients of zero order will always be reported, as well as results of the attempts to remove the effects of time trends. In most cases, the results appear to be reasonable approximations to an effective correction for trend. Rank correlation does not seem to break down seriously on partial coefficients of the first order; beyond that it seems hopelessly inadequate.

Because partial coefficients of the second order are required to isolate the effects of tariffs and the effects of costs upon imports, product-moment correlation must be used. It has the deficiency, mentioned above, of assuming a normal distribution of the parent universe. The partial coefficients are perfectly regular, however, and are as reliable as are the simple coefficients. There is another difficulty involved in the change to this correlation technique. It is based on a least-squares fit of each series of data to a linear regression. One cannot assume that the data are such as to make linearity the most appropriate fit. Since the form is not known, however, a straight line may be chosen as an approximation as well as any other. Regression or correlation of straight lines fitted by least-squares yield coefficients which express average or overall relations. Year-to-year relations are submerged in this averaging process.

Rank correlation does not fit lines of regression; it merely arranges one series of variables in ascending magnitudes, then notes the arrangement of the magnitudes of the paired quantities from the other series. Since the values of the differences between the items in neither series to be correlated are considered, this is a weaker indication of the degree of correlation, and it breaks down rapidly when more than two variables are correlated. It does treat the time variable more in accordance with our wishes, however. It does not assume that the time trend in the data is linear. The process of removing time trend by rank correlation simply makes immaterial the time sequence of the pairs of the variables other than time. If there is a time trend in the relations between these two variables (e.g., the protective equivalent and imports as percents of domestic production), then the rank method removes its effect from the results, regardless of the shape of the time sequence. Thus the rank method is employed where it does not break down; as it makes no uncomfortable assumptions about the parent universes from which our data are drawn, nor about the shape of the time trends to be removed.

Product-moment correlation is used to find the effects of the tariff in isolation from the effects of costs, and *vice versa*, since the removal of time trends from the same data at the same time requires four variables, or partial coefficients of the second order. We must be satisfied with linear fitting to the tariff, cost, import and time data.

The sample table 2 - 3 will be used to illustrate the correlation tests to be made in succeeding chapters. Let column 7 be designated X; column 8, Y; and the "years" column, Z. Rank correlation of column 7 with column 8, with the time trend removed, may be illustrated in table 2 - 4.

Table 2 - 4

Rank correlation of Protective Equivalent of Current Duty With Imports from A as Percent of Total Imports; Sample Data

X	Y	XY	XY,P=	ZX,P=	ZY,P=
4	11	6	4	6	0
3	10	5	5	7	0
4	9	10	0	6	0
6	8	10	0	5	0
9	6	10	0	2	0
7	4	8	0	3	1
8	2	4	1	2	3
11	1	2	2	0	3
10	4	6	0	0	2
2	5	4	0	0	1
1	6	1	0	0	0
			12	31	10

The third column, XY, is the result of placing the X's in ascending order of magnitude and listing the paired values of Y in the order in which this places them. The fourth column, XY,P=, is a series consisting of the numbers of times each item in XY is exceeded in value by one occurring at a later date (below it). Both X and Y are initially recorded in calendar sequence, so "ZX,P=" and "ZY,P=" are obtained directly by listing the numbers of times each X item is exceeded in magnitude by an item occurring at a later date, and the corresponding numbers for the Y items.

The coefficient $\hat{\tau}$ XY is equal to $\frac{2P}{\frac{N}{2}(n-1)} - 1$. P is the sum of the "XY,P=" column. N is 11; the number of years in the sample. $\hat{\tau}$ XY is thus equal to $\frac{24}{55}$ -1, or -.564. Applying the same formula, $\hat{\tau}$ ZX is +.128, and $\hat{\tau}$ ZY is -.636.

The partial coefficient of the first order, $\hat{\tau}$ XY.Z is equal to $\frac{\hat{\tau}XY - (\hat{\tau}ZX\,\hat{\tau}ZY)}{(1-\hat{\tau}ZX^2)^{\frac{1}{2}}\;(1-\hat{\tau}ZY^2)^{\frac{1}{2}}}$. Its value is -.631 for the sample table 2 - 3. The coefficient $\hat{\tau}$XY$'$:Z, letting Y$'$ equal column 9, is -.594.

Since simple correlation by the product-moment method is well known, it will not be detailed here. The order in which the partial coefficients are derived will be described, and some values for table 2 - 3 will be given.

Let column 5 of table 2 - 3 be W, let column 10 be X , and let columns 8 and "years" be Y and Z as before. The following values are obtained:

$$r_{wx'} = -.404,$$
$$r_{wy} = +.352,$$
$$r_{wz} = -.290,$$
$$r_{x'y} = -.736,$$
$$r_{x'z} = +.214, \text{ and}$$
$$r_{yz} = -.790.$$

Using the above formulae for the partial coefficients, $r_{wy.z}$ equals $\frac{r_{wy} - (r_{wz}\, r_{yz})}{(1-r_{wz}{}^2)^{\frac{1}{2}}\ (1-r_{yz}{}^2)^{\frac{1}{2}}}$; $r_{wx'.z}$ and $r_{x'y.z}$ are derived similarly. $r_{x'y.zw}$ equals $\frac{r_{x'y.z} - (r_{wx'.z}\, r_{x'y.z})}{(1-r_{wx'.z}{}^2)^{\frac{1}{2}}\ (1-r_{x'y.z}{}^2)^{\frac{1}{2}}}$, and $r_{wy.zx'}$ is similarly derived. $r_{x'y.zw}$ equals -.954, $r_{wy.zx'}$ equals -.444, $r_{x'y'.zw}$ equals -.896 and $r_{wy'.zx'}$ equals -.685 for the data in the sample table.

Interpretation

Within the limits imposed by the statistical methods, these can be interpreted to mean that the *ad valorem* equivalent of the tariff, in isolation, has had stronger effects than have costs, in isolation, on imports of fiber X from country A, both as percents of total imports, and as percents of United States production. There is no significant difference between -.954 and -.896. Both coefficients are significantly negative at the "one percent level," even though the sample (eleven years) is a small one. This means that there is less than one chance in one hundred that sampling error would have yielded a negative-valued coefficient from a positively correlated universe. In other words, we are confident, with less than a one percent chance of error, that the universe is one in which the X''s and the Y's vary inversely, and the X''s and the Y''s vary inversely.

Costs, in isolation, seem to have had small effects on imports from A as percent of total imports, and slightly greater effects on imports from A as percents of United States production. The coefficient -.444 is not significant, even at the "ten percent level," while -.685 is significant at the "five percent level," but not at the "one percent level." In other words, we should not be as ready to accept the influence of relative costs as we might accept the influence of tariffs; and we should be more hesitant about the effects of costs on shares of total imports than about their effects on shares of total consumption.

Our knowledge about the nature of the data in a non-hypothetical example might make us more or less confident about attributing significance to the above results. There is no way to quantify this confidence by saying that one level of significance should be acceptable while another

should not be accepted. An accumulation of the results of several samples, combined with all the available knowledge concerning the data and other factors affecting the trade in the example commodities should, on the other hand, enable us to form judgments. Since the sizes of the samples (the lengths of the time series) vary throughout the study, a coefficient of a given magnitude does not always have the same reliability; hence the "student t" test of significance.

Seventeen commodity examples drawn from the United States' trade with eight countries, will be covered in Chapters III through IX. Chapter X will bring the results together and attempt to form some judgments. The principal concern will be with the possibility of measuring the effects of the United States tariff in this way. The measurement of the effects of changes in relative costs will also be interesting. It will be interesting in itself, and because the cost effects must be stripped out to arrive at the "pure" tariff effects. We shall therefore be interested in the accuracy of the measure of cost effects for it will affect the accuracy of the tariff measure. The validity of the use of composite wholesale price indexes as cost measures will therefore be scrutinized carefully. The cost measures might be perfectly efficient, on the other hand, while imports display little sensitivity to changes in relative costs because of the inelasticity of the supply of the imported commodity. Work done by others on some foreign trade elasticities may be useful in this regard. General knowledge of the elasticities existing in certain industries must also be used.

There can be no substitute for the use of common sense and the logic of economics, so no correlation test can be useful out of the context of the economic circumstances of the examples from which they are derived. Therefore, the final conclusions must be based partly on much reasoning that is more general than the statistical model of this study.

CHAPTER III

AUSTRALIA - RAW WOOL, "CLOTHING" AND "COMBING"

The example selected for the first of the tests of the protective equivalent method of measurement is raw wool, of the grades imported principally from Australia. The grades produced in Australia are similar to those produced in the United States, while nearly all of United States imports from other countries are of coarser grades. Thus the wools classified as "apparel wools" ("finer than 44's") are supplementary (competitive) imports, and, since they are a major export from the Australian economy,[1] they serve our present purposes.

Competition Between Australian and American Wools

A brief explanation of the differences in wool grades (or fineness) will serve to indicate the extent of the competition between Australian and United States wool growers. The so-called "carpet wools" are of a fineness classified as "not finer than 40's." They are from the "unimproved" or "native" sheep. The wool is not only

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[1] Fifty-one percent of total exports by value in 1950; eighty-one percent of total exports to the U. S., by value, in 1950, United States Department of Commerce, Foreign Commerce Yearbook, 1950, Washington, G.P.O., 1952, pp. 701-702.

coarse, but it has a resilience desirable for carpet-making. Little of this type of wool is produced in the United States. The unimproved type sheep do not have the gregarious qualities necessary for United States-type open-range sheep husbandry. A small amount is produced on Indian reservations, but it is used in hand-woven blankets, thus it does not enter the market as raw wool.[2] This wool is admitted free of duty (tariff paragraph 1101) when used for floor coverings; otherwise it is dutiable at a rate lower than that applied to finer grades. Its low price and the unsuitability of the sheep to United States husbandry have made it not worth the attempt to foster domestic production. Other wools graded "not finer than 44's" (tariff paragraph 1102a) are imported in small quantities, and are dutiable.[3] These wools are from sheep cross-bred with Merino or English sheep, but where the "blood" is less than one-quarter, the wool may be "not finer than 40's," or "not finer than 44's." In the years 1937-1939, 71% of United States imports of raw wool were of the coarser grades (61 percent free, 10 percent dutiable.)[4] There is

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[2] United States Tariff Commission, Summaries of Tariff Information, v. 11, Wool and Manufactures, Part I, Washington, G.P.O., 1948, p. 10.

[3] Ibid., p. 1.

[4] Ibid., p. 4.

very little United States production of any of the grades "not finer than 44's" (1½ per cent, 1922-1931).[5]

The raw wool imported from Australia is virtually all of the "finer than 44's" grades, and is dutiable under tariff paragraph 1102 (b). Australia is the source of a large portion of such imported wool; especially of the "finer than 56's" grades. In 1937, 60 percent of the "finer than 44's" and 77 percent of the "finer than 56's" came from Australia. In 1947, 54 percent of the "finer than 44's" and 60 percent of the "finer than 56's" came from Australia.[6]

While it thus appears that Australian wool imports offer the most direct competition to United States wool-growers, it must be pointed out that the market is an imperfect one. Besides the tariff, there is direct United States government intervention--to be discussed later--and there are differences in the wools and in the ways in which they are marketed which account for some price differentials and buyers' preferences. The Tariff Commission found:
"In the 12 years ended in 1935, the better preparation for market of colonial wools, compared with American, resulted in an average price premium for colonials of about 8 cents on fine, 6 cents on half blood, and 5 cents on the two

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5 Ibid., p. 24.

6 Ibid., p. 28.

lower grades, or an average of approximately 6 cents per scoured pound on all four grades."[7] These differences are nearly constant, and they reflect the "skirting," or the removal of "off-sorts" from the belly, neck and britch of the fleeces prepared in Australia.

If the estimated constant "skirting" differential is taken into account, there remains another, more variable, but persistent premium for Australian over domestic wools. This amounted to an average of 5.8¢ lb. for all grades finer than 44's for the 1924-1935 period, and varied from 3.5¢ in 1930 to 10.0¢ in 1931-1932. The differential was greatest for the finer grades in 1924-1929 and 1933-1935 and greatest for coarser grades from 1930-1932.

The variations are explained by the Tariff Commission as being due to side-effects of the depression in the 1930's, and to shifts in consumer demand between different grades of domestic wool. In the 1924-1929 period, e.g., an increase in heated apartment house living, the development of the closed automobile, and so forth, shifted demand from the coarser wools used in overcoats, woolen stockings and underwear. After 1929, the prices of all raw wools were so low that clothing manufacturers substituted fine for coarser wools--resulting in finer clothing at no additional

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7 United States Tariff Commission, Wool Prices, Report No. 120, 2nd Series, Washington, United States G.P.O., 1937, p. 4. "Colonial" wools are Australasian and South African wools, p. 44.

cost--and helping to meet increasing competition from the synthetic fabrics. Changes in domestic production lagged behind these shifts in demand, for reasons clearly associated with the sheep's life cycle. Thus domestic coarser grades suffered the greatest price declines, and imports of these grades virtually ceased. A shift to a larger proportion of "three quarter" and "full blood" Merino sheep roughly restored the pre-depression relations between the grades of wool, only slightly reducing the average Australian premium (5.4¢ in 1924-1929; 4.5¢ in 1933-1935). This meant, actually, a decline in wool production east of the Mississippi relative to the "territory" wool of the western mountain states--the latter being the fine grades from the gregarious Merino sheep suitable for open ranges.

The Tariff Commission's explanation for this additional premium price commanded by Australian wool still seems unsatisfactory, however. Much of its analysis is concerned with a "Boston-to-London" price differential, the validity of which will not be investigated. Apropos a "Boston-to-Boston" comparison of colonial and domestic wool prices, the Commission seems to give in addition to the above, the following reasons for the differential:

(1) Marketing practices permit dealers (presumably with knowledge superior to that of the growers) to buy before shearing when price rises are anticipated, and to refuse the spring clip

except on consignment when declines are anticipated,

(2) the influence of fashion on different grades,

(3) the lack of an export market for the United States clip,

(4) the proportions of different grades in the United States clip,

(5) the effect of the duty in stimulating total production and the proportions of different grades,

(6) the competition of other fibers, and

(7) the relation between the prices of wool and lambs.[8]

Whatever the effect of any or all of these seven factors on the market for domestic wool, it would seem strange to expect textile mills consistently to pay premiums for foreign wool, unless it were justified by differences in quality. Number four might be a valid explanation, if grading and separating were inferior, so that a wool class, e.g., "finer than 60's" contained a larger portion of wool "not finer than 60's" than did a foreign shipment given the same class. This, however, is of the same order as the difference in "skirting," which is accepted as the explanation of the consistent 5¢ to 8¢ per pound premium. It would seem that, other than for short-run variations, the differential must all be due to buyers' preferences for

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[8] Ibid., pp. 4, 5. The writer has omitted those which would seem to only affect the Boston-to-London differential.

Australian wool--whatever the immediate justification for the preference.

The fact that the differential was present in 1947 and 1948, both while the Commodity Credit Corporation was selling stored wool, and after it virtually ceased such sales in April of 1948, confirms the impression that the differential was not a short-run phenomenon due to shifts of demand between the several grades of wool. In fact, the increase in the differential (over the pre-war period) is explained by the Tariff Commission as due: "....in part to the greater spread in prices which now prevails between high quality wools and 'off-sorts,' and in part to the greatly increased wages of wool sorters in this country."[9] The latter would suggest even less careful sorting of domestic wool in the later years, and thus a stronger preference for Australian wool.

Whatever the nature and sources of the imperfections in the United States raw wool market the differences in the prices of domestic wool and duty-paid imported wool were as shown in table 3 - 1.

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9 Summaries of Tariff Information, v. 11, Wool and Manufactures, Part I, p. 31.

Table 3 - 1

Price Differential (Price per lb., scoured basis, domestic wool minus duty-paid price of imported wool) for wool of the following grades:

Period	Fine strictly combing (64s/70s)	½ Blood strictly combing (60s)	3/8 Blood strictly combing (56s/58s)	¼ Blood strictly combing (50s)	Simple Average 4 grades
1924-29	-$.175	-$.126	-$.087	-$.068	-$.114
1931-33	- .154	- .141	- .142	- .146	- .146
1934-35	- .124	- .096	- .088	- .082	- .098
1936-39	- .118	- .101	- .112	- .095	- .107
1940-46	+ .090 ap.	+ .080 ap.	+ .080 ap.	+ .070 ap.	+ .080
1947	- .152	- .109	- .068	+ .057	- .068
1948	- .358	- .278	- .280	- .051	- .242

Source: United States Tariff Commission, Summaries of Tariff Information, vol. 11, Wool and Manufactures, Part I, p. 32.

Two specific actions by the United States government during the 1940-46 period resulted in the higher prices for domestic wool. The Commodity Credit Corporation purchased wool from domestic growers at fixed prices, and premium prices were paid by the government for fabrics made entirely or in part from domestic wool.

If this difference is expressed in relative terms it appears to be much more consistent--again except for the years 1940-1946 when Commodity Credit Corporation buying prices and government regulation fixed the domestic wool at high prices. Arbitrarily selecting one domestic grade--"domestic graded territory halfblood" and expressing its price as a percent of "Australia's 64's combing,--duty-paid, Boston,"--one finds a rather stable relation, as summarized in table 3 - 2.

Table 3 - 2

Periods	Simple average of annual prices of domestic graded territory half-blood good French combing and staple as percents of Australia's 64's, combing (duty-paid)	Rate of duty Applicable to all wool "finer than 44's"
1925-1929	84 per cent	$.31 per lb.
1930-1934	79 " "	.34
1935-1939	88 " "	.34
1940-1945	105 " "	.34
1946-1947	92.5" "	.34
1948-1953	82 " "	.255

Source: Albert M. Hermie, Prices of Wool at Boston, Agricultural Information Bulletin, No. 118, Washington, United States Department of Agriculture, January, 1954, p. 29.

The explanation for the consistent differential which is implied by the Department of Agriculture is more straightforward and plausible.[10] Description of the grading systems employed by United States producers and Australian producers indicates that the fleeces are left whole in the United States, the grade assigned being that of the majority of the wool in the fleece. This entails labor cost of sorting by the purchaser and the acceptance of mix which is unknown, except for the certainty of getting the "off-sorts" of neck, britch and belly. Secondly, grading

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[10] Albert M. Hermie, Prices of Wool at Boston, Agricultural Information Bulletin, No. 118, Washington, United States Department of Agriculture, January, 1954, pp.1-8.

is a complex matter, with "fineness" being only one dimension. United States breeders have generally not adopted the Australian methods of breeding for quality wool--thus "territory 64's" would be poorer in many characteristics than "Australian 64's."[11]

Cost and Tariff Effects

Does the existence of these market imperfections make it impossible to determine the effects of tariffs and/or cost changes upon United States imports of Australian wool? It clearly does not invalidate the effects of the tariff in raising the price of domestic wool, nor in penalizing the Australian wool. In spite of the imperfect nature of the substitution, Australian and domestic wools are substitutes in production. The textile industry's preference for the former has a consistent, if not entirely uniform, market value of 10¢ - 15¢ per pound. The index we are constructing is a measure of changes in protection, i.e., the protective equivalent is an ordinal, not a cardinal measure. No protective tariff can eliminate a quality differential but it can--and does--raise the whole structure of prices for a commodity. The differential seems to be unaffected by the change in the tariff (see table 3 - 2), but that is a comparison of duty-paid Australian prices with domestic

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11 "The Trouble With United States Wool," Fortune, January, 1947, p. 92.

prices. The pre-duty differential is by the same token affected by a change in the rate of duty. Thus we are justified in expecting to measure changes in the Australian growers' relative position in the United States market by noting changes in the duty--and changes in money costs in the two producing areas.

The problem of comparing money costs of production in two areas is one that has not been solved in a satisfactory manner. This study will not attempt an "optimum" solution of the problem in any sense. It will rather take, from available published price series, those series which seem to be the best reflections of changes in the resource costs relevant to the commodities studied. In some cases these must be extremely rough measures; this first example is actually provided with two of the better price series for our purposes.

The choice between several agricultural and/or textile series was made on the basis of the criteria discussed in Chapter I, namely: the search for resource costs, either costs of materials, or opportunity costs, and the avoidance of changes due to short-run changes in output or to changes in the world demand for the commodity studied. The Australian index--"basic materials and foodstuffs, all goods principally home produced" (see column 1, Table I, pages 74 to 77)--was the best of the possibilities, though far from ideal. An index called "basic materials and

TABLE I, AUSTRALIA - RAW WOOL -- CLOTHING WOOL AND COMBING WOOL

	1	2	3	4	5	6
Year	Wholesale price index (basic materials & foodstuffs). Australia - all goods principally home-produced.[1] (av. 3 yrs. ending June 1939 = 100)	Rate of exchange, Australian pound[2] equals ----------cents, U.S.	Wholesale price index (basic material & foodstuff) Australia, all goods principally home-produced. in U.S. dollars.	Wholesale price index - farm products - "livestock and poultry" (1926 = 100)[3] U.S.	Protective equivalent of 1929 duty on wool, finer than 44's, tar. par. 1102b.	Duty levied in each year on "wool-clothing and combing, un-manufactured"[4] (¢ per lb. of clean content; wool finer than 44's, in the grease)
1929	118	480.82	118.0	106.1	.31	.31
1930	118	458.43	112.5	89.2	.352	.31 to June 17 .34 aft June 17
1931	99	351.37	72.3	63.9	.315	.34
1932	92	279.83	53.5	48.2	.309	.34
1933	87	337.07	61.0	43.4	.392	.34
1934	89	400.95	74.2	51.5	.402	.34
1935	89	388.86	72.0	85.1	.236	.34
1936	92	395.94	75.8	84.7	.249	.34
1937	98	393.94	80.3	95.5	.234	.34
1938	100	389.55	81.0	79.0	.286	.34
1939	102	353.38	75.0	72.2	.290	.34
1940	103	305.16	65.4	69.2	.263	.34
1941	106	321.27	70.8	91.6	.215	.34
1942	112	321.50	74.9	117.8	.177	.34
1943	121	321.50	80.9	128.7	.175	.34
1944	122	322.80	81.9	124.6	.183	.34
1945	123	321.17	82.2	132.5	.173	.34
1946	126	321.24	84.2	155.6	.151	.34
1947	129	321.00	86.1	210.4	.114	.34
1948	145	321.22	96.9	225.1	.120	.255
1949	173	293.80	105.7	185.8	.159	.255
1950	198	223.16	91.9	195.5	.131	.255

7	7a	8	9	10	11	12
Protective equivalent of current duty on wool finer than 44's tar. par. 1102b.	Index of protective equivalent of current duty on wool (1929=100).	U.S. imports of wool finer than 44's as percent of U.S. consumption of apparel wool in manufacturing.[5]	U.S. imports of clothing and combing wool from Australia as percent of total U.S. imports - Quantity.[5]	Ad Valorem equivalent of U.S. duty on clothing and combing wool tar. par. 1102b.[6]		
.31	100	4.7	26	46.1%		
.352	114	4.9	32	59.6 to Jun 17		
.386	125			73.4 aft Jun 17		
.346	112	4.2	61	89.0		
.339	109	1.9	56	133.0		
.430	139	1.7	23	108.1		
.440	142	1.9	31	80.8		
.259	84	1.2	31	96.0		
.274	88	4.6	37	88.1		
.257	83	11.9	55	69.9		
.313	101	1.2	34	76.4		
.318	103	4.3	39	86.3		
.289	93	5.7	20	88.1		
.236	76	20.3	42	79.6		
.194	63	20.1	42	73.9		
.192	62	41.0	58	77.7		
.201	65	16.4	34	73.1		
.190	61	21.6	35	73.1		
.165	53.	25.5	33	77.7		
.125	40	22.9	43	n.a.		
.099	32	18.2	26	n.a.		
.130	42	16.2	28	n.a.		
.108	35	15.7	21	n.a.		

FOOTNOTES TO TABLE I

1 Australia, Commonwealth Bureau of Census and Statistics, Official Year-book of the Commonwealth of Australia, No. 39, 1953, Commonwealth Government Printer, Canberra, p. 396. Price indices were given for the periods 1928-1929, 1929-1930, etc. The 1928-1929 index was used for 1929, etc., on the assumption that the 1928 fall Australian wool clip is more apt to compete with the 1929 U.S. spring wool clip than with the 1928 U.S. clip. This series (as far as is known now) begins in 1928-1929; so this sample table uses 1929 as a base from which all computations of "protective equivalents" are computed.

2 For years 1929 through 1932, League of Nations, Annuaire Statistique de la Societe des Nations, 1932-1933; computed from "percent of gold parity" given on p 276. For years 1933 through 1940, Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1942. For years 1941 through 1944, Ibid., January, 1946. For years 1945 through 1950, Ibid., September, 1950.

3 For years 1929 through 1932, U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1933, Washington, G.P.O., 1934, p. 281. For years 1933 through 1935, Ibid., 1936, p. 300; 1936 through 1940, Ibid., 1941, p. 356; 1941 through 1943, Ibid., 1944-1945, p. 418; 1944 through 1946, Ibid., 1947, p. 288; 1948 through 1949, Ibid., 1950, p. 280; 1950, Ibid., 1952, p. 275.

4 U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce (later by the Bureau of the Census), Foreign Commerce and Navigation of the United States, annual volumes, 1929-1946. Duty for 1929 through 1933 taken from tables entitled, "Imported merchandise entered for consumption, by articles, with rates of duty and amounts of duty collected". After June 17, 1930, when the rate of $.51 per lb. of clean content for clothing and combing wool was replaced by two rates; $.29 per lb. of clean content for "finer than 40's but not finer than 44's, and $.34 per lb. of clean content for "finer than 44's", the latter ($.34) rate is used because Australian wool is almost all "finer than 44's". From 1934 through 1946, the duty is taken from tables entitled, "Imports for consumption, by articles and countries, with rates of duty and calculated amounts of duty collected". The duty applicable in 1948, 1949 and 1950 is taken from United States Tariff Commission, United States Import Duties (1950), Washington, G.P.O., 1950, pp. XIV and 104. The $.255 per lb. clean content duty is authorized by Treasury Decision 51802, implementing the G. A. T. T., concluded at Geneva in 1947. Se U.S. Department of the Treasury, Treasury Decisions, v. 82, Jan.-Dec., 1947, Washington, G.P.O., 1948, pp. 305-315. The duty for 1947 is assumed to be the same as in the years since 1930.

5 These percentages were computed as follows: for 1929-1940, figures called "wool consumed in manufacturing - apparel class - greasy basis", from

FOOTNOTES TO TABLE I (CONTINUED)

U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1941, Washington, G.P.O., 1942, p. 733. "Apparel class" is defined as "formerly 'combing and clothing". For 1941-1950, data is taken from Ibid., 1953, p. 691. The latter is given on a "scoured" basis; and was converted to a "greasy" basis by taking the equivalence between "scoured" and "greasy" existing in the years 1930-1940, when both bases were given, and applying this to the "scoured" weights given for 1941-1950. The quantities (in tons, greasy basis) imported from Australia were taken from U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States, 1929-1946. The quantities (and, therefore, the percents) from Australia are slightly understated, because the "actual weight" of greasy wool was added to a small amount of scoured wool imported from Australia in each year. Beginning with the year 1943, the classifications of wool in the Department of Commerce statistics became so complex that "wool, unmanufactured, 3501000 - 3541009, imports for consumption" was substituted for "clothing wool" and "combing wool". This also has the effect of understating the proportion of total imports and of total consumption which came from Australia. For 1947 through 1950, imports from Australia were taken from U. S. Department of Commerce, Bureau of the Census, Report No. FT 120, U. S. Imports for Consumption of Merchandise, 1947, 1948, 1949 and 1950, published in March of 1948, 1949, 1950 and 1951. For 1947 through 1950, total U. S. imports of "wool, unmanufactured" were taken from _______, Quarterly Summary of Foreign Commerce of the U. S., published in 1948, 1949, 1950 and 1951.

6 United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States, annual volumes, 1929-1946. The simple arithmatic mean of the a.v. equivalents for "clothing wool" and "combing wool" was taken for each year, since the two were not greatly different in amount. Beginning in 1934, the a.v. equivalents for "finer than 44's" were taken, since only insignificant amounts of coarser wools came from Australia. The a.v. equivalents appear lower than a comparison of the duty rates and prices of wool would indicate, for the a.v. equivalents are expressed per pound of wool "in the grease", while the rates apply to "clean content" of the greasy wool. Comparable information could not be found for the years 1947 through 1950.

foodstuffs, textiles" was rejected on the basis of both criteria--i.e., the textiles include imports, and wool itself composed roughly two-thirds of the total weights. Another, "Wool, cotton, leather, etc.", was rejected by the second criterion, though the exact weight of wool was not known. The index chosen includes wool (with a weight that is not known), and most of the agricultural products, with relatively small amounts of non-agricultural materials. The opportunity costs of the wool resources--land, agricultural labor and a few supplies--are certainly to be found in comparisons with other basic agricultural commodities. The index is given for periods including two half-years, e.g., 1928-29, etc. Such a pair of half-years is matched with the latter year of the United States price index, on the grounds that the "spring" clip in Australia is ready in October or November, to arrive in the United States roughly during the United States spring marketing. This is confirmed by the knowledge that roughly 80 percent of any year's imports arrive by June of that year.

The United States wholesale price index selected is that for "livestock and poultry" (see column 4, Table I.) It does not contain wool as a component, and it is not at all parallel to the Australian index. Applying the two criteria to the United States production situation, however, results in this selection. Since agriculture is more varied in the United States, the general "agricultural products" index is not a satisfactory reflection of opportunity costs. The same reasoning results in the rejection of any of the textile indices. Actually, to the United States wool grower, other livestock is the principal alternate.[12] Poultry is unfortunately included, so it must be accepted. The sale of "lambs" for slaughter is immediately competitive with wool production in the United States, and is becoming a more important rival of wool. Cattle compete for range space, and for pasture on the smaller or mixed farming establishments.[13]

The two plausible, if not ideal, cost measures were made comparable by expressing the Australian measure in United States dollars. In column 2 of Table I, the annual average of the weekly quotations in New York for the Australian Pound are shown. Column 3 is the result of multiplying each figure in column 1 by the rate in column 2 for the same year, and dividing by the rate in 1929. Columns 3 and 4 were placed into "cost relatives" in the manner described in Chapter II. These relatives were multiplied by 31¢, the duty levied in 1929, to form column 5. Column 5 thus shows the effect of changes in the cost relatives, with the assumption of a constant rate of

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[12] D. W. Carr and L. D. Howell, Economics of Preparing Wool for Market and Manufacture, Technical Bulletin No. 1028, Washington, United States Department of Agriculture, November, 1953, pp. 7-14.

[13] *Ibid.*, pp. 12-14.

duty--this measure is called the "protective equivalent of the 1929 duty." A comparison of the base (.31) with succeeding figures shows that the relative cost position of Australian producers was worse than 1929 in only four years, 1930, 1931, 1933 and 1934. A comparison of .31 with the last five figures, averaging .135, shows a decided gain for the Australians. Much of the apparent cost gain seems to be correlated with the depreciation of the Pound, however. The Pound, at $2.2316 in 1950, had only 46 percent of its 1929 dollar value. Since the protective equivalent, .131, had 42 percent of its 1929 value, one might conclude that depreciation is the principal explanation for the decline in the protective equivalent. Such a conclusion must be accepted with caution--the relation between the protective equivalent and the exchange rate may be complex. This relation will be discussed in detail at a later point.

Let us note the effects of the tariff changes. They are small and infrequent changes, and their effects on the protective equivalent are small when compared with cost and exchange rate effects. Column 6 records the duty levied, Column 7 is the product of the current duty and the cost relatives, and column 7a is an index of column 7, using 1929 as a base.

Four stages may be selected, in which costs, exchange rate and tariff played different roles. First, between 1929 and 1931, United States costs fell more rapidly, but drastic Australian depreciation almost exactly restored the "1929 equivalent." The effect of the 3¢ tariff increase was therefore a net increase in protection, raising the index of the "current equivalent" to 111.6. In the rest of the depression decade, from 1931 through 1939, Australian and United States depreciations competed with each other, resulting in little net change in the price of the Pound. United States costs continued to fall faster until 1933, raising the "current equivalent;" but then costs rose enough by 1939 so that the "equivalent" index in 1939 of 102.6 represents an elimination of most of the effects of the 3¢ tariff increase of 1930.

Third, from 1941 through 1948, the price of the Pound was stable. United States costs increased so much more rapidly[14] that the "1929 equivalent" declined by 58 percent (from .290 to .120). With the duty reduction to $.255, the index of the "current equivalent" fell to 31.9 in 1948.

Fourth, from 1948 through 1950, United States costs fell, while Australian costs rose; the reason that the protective equivalents increased so little is that there was a 30 percent depreciation of the Pound. During this three-year period, the pre-war price premium for Australian wool returned, and United States wool production declined

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[14] Here one must remember that the price indices used for costs do not have the same composition, do not represent sales in the same markets, etc., so that close estimates of cost relatives may be misleading.

from 278 to 248 million pounds annually, or from 7.4 percent to 6.3 percent of world production. During the same period, Australian production remained constant at about one billion pounds annually, or 27.5 percent of world production.[15]

This occurred in spite of the fact that during the war-time portion of the period the Commodity Credit Corporation bought all of the domestic clip at prices above the import price. This may mean that what the protective equivalent is indicating is a fundamental change in the relative positions of the American and the Australian industries. Both can be assumed to be increasing cost industries. While some portion of the American industry could probably survive without a tariff, the surviving portion might be quite small. Growers have for a long time insisted that the tariff is necessary for the survival of a large industry. Even with a tariff (which amounted to an *ad valorem* equivalent of 78 percent in 1946), the industry declined both absolutely and relative to other livestock products.[16] Changes in a few of the principal

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[15] D. W. Carr and L. D. Howell, *Op. Cit.*, pp. 8-9.

[16] By 1947, cattle outnumbered sheep on United States farms for the first time in recent history--see *Ibid.*, p. 13. Since the "cost" indices in Table I are alternative costs, the protective equivalent may be as nearly a measure of changes in the comparative advantage or comparative disadvantage of an industry as anything we have.

factor costs might account for this. Labor costs can be assumed to have risen in both countries--but since open-range herding is more common in the United States, it increases the disadvantage of the American industry. This is confirmed by the increasing relative importance of Texas fenced-range sheep raising. Open-range land for grazing is slowly becoming scarcer as irrigation projects, national forest grazing limitations and increased cattle grazing cut into the supply available for sheep grazing. The technical knowledge of the market and of methods of preparing wool for the market is much more advanced in Australia than in the American sheep-raising areas. The Australian growers have been convinced, by the high transport costs of shipping "off-sorts," dirt, etc., and by tariff protection, principally in the United States, that their survival depends upon their skill in preparing wool for the market. The American growers, on the other hand, seem convinced that more tariff protection is their only salvation, and seem little interested in better preparation and marketing techniques. This may be interpreted as a scarcity, or a high psychological cost, of the factor "marketing skill."

These observations are only tentative. No conclusions concerning the usefulness of the protective equivalent approach should be attempted until two additional kinds of evidence are inspected. The first kind of evidence is provided in the remaining columns of Table I, and in the correlation of this evidence with the protective equivalent, and with the ad valorem equivalent of the tariff. Column 8 is obtained by dividing the quantities imported from Australia in each year by the total United States consumption of apparel wool in the same year. The purchase and storage of domestic wool by the Commodity Credit Corporation during the years 1944 through 1946 distorted the market's drawing of wool from domestic and foreign sources. Roughly a year's supply was in the hands of the Commodity Credit Corporation by 1947, and was not disposed of until the spring of 1950.[17] This had the effect of increasing imports in 1944-46, and decreasing them in 1947-1950. Inspection of columns 7a and 8 indicates that a negative correlation of a more significant value would be obtained by correcting for this effect. Another distortion is due to the War Department's premium price for fabric made of domestic wool. Since it would be extremely difficult to measure the effects of these distortions upon the percents in column 8, no corrections were attempted.

Simple correlation of column 7 (or 7a) with column 8 by the product-moment method yields a coefficient of correlation of -.73. Rank correlation results in a

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17 Ibid., p. 21.

coefficient of -.54, while the rank partial (with time removed) yields a coefficient of -.38. The product-moment correlation coefficient is significant at the one percent level. This means that there is less than one chance in one hundred that the negative correlation is the result of a sampling error. In other words, we are quite certain that there is an inverse relation between the protective equivalent and imports from Australia as percents of total consumption. We cannot be certain of the value of the inverse relation (negative correlation), but the one we have computed from this sample is large enough to confirm the hypothesis that a negative correlation of some value exists. There is no significance test for the rank correlations. Rank correlation of the protective equivalent and "imports from Australia as percent of total United States imports" (column 9) yields a coefficient of -.01, and the partial (time removed) is -.10. These other imports are largely non-competing wools, so this is not surprising. We can take the coefficient -.73, relating the protective equivalent of the current duty and imports as percents of domestic consumption, to mean tentatively that the "mix" of Australian wool in apparel wool consumption is sensitive to changes in the total costs of landing Australian wool on the United States market, compared to the costs of domestic wool. If this is so, we are prepared to ask the next question: what effects has the tariff itself had, and what effects may be attributed solely to changes in the other costs? Multiple correlation, using the four variables--*ad valorem* equivalent of the duty, the protective equivalent of the 1929 duty (a measure of changes in relative costs), imports as percents of total consumption, and time--is performed as described in Chapter II. The partial coefficient relating the tariff to imports, holding time and other costs constant, is -.23. The series to which this applies is only from 1929 through 1946, as the *ad valorem* equivalent of the duty was not available for later years. The value, -.23, is not significant, even at the ten percent level. In other words, the effect of the tariff is not pronounced enough so that we can be confident that we have isolated and measured it. Our method of removing time trends is not the best; it is possible that the removal of linear trends is a mistake. The effect is not much different, however; the partial coefficient relating the tariff and imports, holding only costs constant is -.18, which is not significant, either.

Relating costs other than the tariff to imports as percents of consumption results in slightly stronger correlation. The partial coefficient is -.34, with the tariff and time held constant. This is significant at the ten percent level. If only the tariff is held constant, the coefficient is -.77, which is significant at the one percent level. In other words, costs other than the tariff seem to have been more important than the tariff in affecting the "mix" of Australian wool in United States consumption. This confirms the impression that was gained by inspection of the data in Table I.

Imports from Australia as percents of total imports do not seem to correlate sensibly with the tariff. The partial coefficient is +.35, with time and other costs held constant. Australian wools do not compete with other imported wools; the latter being almost entirely carpet and other coarse grades. Costs and imports from Australia as percents of total imports correlate with a coefficient of -.48, with time and the tariff constant. This is significant at the five percent level. The meaning of this is clearly that, as Australian costs decline relative to American costs, imports of apparel wool from Australia increase relative to total consumption of wool of all grades, and imports of carpet wools and other coarse wools are not particularly affected. This adds nothing to our information, but confirms the effect of relative Australian-American costs on the position of Australian wool in United States markets. The meaning of the coefficient of +.35 (which is significantly positive at the ten percent level) is not entirely clear. Nearly all of the changes in the *ad valorem* equivalent of the tariff between 1929 and 1946 were due to changes in the price of apparel wool, as the duty was 31 cents per pound until June, 1930, and 34 cents thereafter. Carpet wool enters free; the duties on the small amounts of other coarse wools were reduced by trade agreements. Therefore, a part of the relevant information is missing from our computations, i.e., the duties on the other wools. This could account for the strange result. On the other hand, if changes in the duties on other coarse wools can be ignored, the positive-valued coefficient may mean that as all wool prices declined, finer grade wools were substituted for coarse grades, causing Australian wool to be a larger portion of total imports. Considerable substitution took place within the apparel class of wool; some apparel class wool may have been substituted for coarser wool. This would mean that as wool prices declined, raising the *ad valorem* equivalents of wool duties, imported coarse wools were partially displaced by Australian and domestic apparel grades of wool.

Correlation tests thus confirm the general impression that, since Australian and American wools are close substitutes in consumption, their proportions are sensitive to their relative costs. The coefficient, -.73, significant at the one percent level, assures us of this. A review of the history of costs, the tariff and the wool trade suggests that costs other than the tariff not only changed more, but were more "efficient" in influencing the mix of Australian wool in American consumption. Correlation tests confirm this. This does not deny the "efficiency" of the tariff in exploiting the Australian wool grower, nor in delaying the decline of the American industry. It simply shows that short-run changes have rather small effects. The relation between the tariff and Australia's share of total imports appears strange at first, but may be a reasonable relation, considering the major reasons for changes in the *ad valorem* duty and the nature of the substitutions between grades of wool.

The Australian Balance of Payments

It may now be useful to investigate the major exchange depreciations which occurred during the period 1929-1950, to see what the relations might be between wool sales to the United States, balance of payments difficulties, and exchange depreciations. Some clarification or simplification of the problem may be achieved by setting down in tabular form certain data preceding and accompanying the major depreciations. Table 3 - 3 uses the data in columns 7a and 8 of Table I, and Australian export and import data. It is constructed so as to show changes in the data occurring prior to the depreciation, during the year in which depreciation occurred, and in the year following depreciation. It was found that depreciations of a magnitude of more than 10 percent occurred only in 1931, 1939 and 1949. (Because the rates in Table I are annual averages, each depreciation seems to show up in two years.)

Only the 1931 depreciation contained an "independent" Australian element--the £A fell to 80 percent of the £ Sterling in January and February. A 30 percent depreciation Sterling occurred in the last quarter of 1931, during which the £A retained its position at 80 percent of Sterling. In 1939 and 1949, the £A maintained its relation to Sterling. It is therefore not possible to draw any strong conclusions regarding the effects of the United States wool trade in contributing to the need for depreciation. In the one instance (1931) in which this might be possible, the data are incomplete, and the data available do not yield conclusive evidence. It may be that all that can be done is to see whether the obverse is true--whether depreciation had a significant effect on Australian position in the United States market.

In detail, there is some evidence linking the depreciations of 1931 with the United States wool market. From table 3 - 3 one can see that the protective equivalent dropped by 12.9 points (1931 - 111.6, 1930, 2nd half - 124.5); between 1930 and 1931. Since a 20 percent depreciation occurred in January and February, this is a mechanical, or automatic, result of the computation of the protective equivalent, using a deflated Australian price index. From 1929 to the second half of 1930, the protective equivalent rose by 24.5 points--a direct result of the tariff increase of June 17, 1930. There is no evidence for 1928. From 1931 to 1932 the protective equivalent declined by 2.2 points--the late 1931 depreciations were effective in lowering the annual average £A rate in 1932. Still further decline in the United States price index offset a part of the effect of the depreciation. The protective equivalent, by itself, seems to indicate, then, a logical connection between the United States wool market and the depreciation. An increase in the United States duty, and rapidly falling United States wholesale prices of livestock placed Australian wool at a disadvantage compared to 1930. Australian depreciation almost, but not quite restored the 1930 position. The United States devaluation of 1933 raised the protective equivalent to as high as 141.9 in 1934.

The other data for 1931 do little, however, to confirm this predictive power of the protective equivalent. Changes in Australian wool as a percent of United States wool consumption do not form a rational pattern--the disturbing income effects of the first years of the depression may account for some variation that cannot be explained by relative prices. United States consumption and total United States imports changed so greatly from 1929 to 1932 that imports from Australia as a percent of United States consumption can hardly be used as confirmation of any price effect of United States-Australian costs upon the position of the Australian grower.

Australia's export balance with the rest of the world shows the expected changes from 1929 to 1930, from 1930 to 1931, and from 1931 to 1932. Data for 1928 are missing. The depreciation with respect to the £ Sterling (and part of the depreciation with respect to the dollar) came early in 1931, so that the large increase in that year's export balance may be the result. The magnitude of the change from 1929 to 1930 is so small that it lends but slight support to the hypothesis that the depreciation was precipitated by loss of exports.

Australia's export balance with the United States more nearly confirms the hypothesis that the protective equivalent has measured a part of Australia's difficulty--and it is more relevant than Australia's balance with the world. Though the effects seem to lag (-$43.9 mil. change from 1930 to 1931, while the protective equivalent declined by 12.9 points), changes in export balance with the United States seem to be negatively correlated with changes in the protective equivalent. This itself is not surprising, since we have found strong negative correlation between the protective equivalent and imports of wool from Australia as percents of United States consumption, and wool is a large portion of total exports to the United States. Still, the apparent effect of changes in the protective equivalent upon Australia's dollar exports preceding and following this one "independent" Australian depreciation lends support to the view that the protective equivalent may be useful.

Summarizing the data regarding the 1931 depreciation we find changes in the expected direction in 9 instances, in the unexpected direction in 6 instances, and data missing in 5 instances.

Table 3 - 3 (pages 94 to 96) reveals that the 1939 depreciation, though a Sterling area depreciation, shows nearly as strong confirmation of the protective equivalent test. Seven of the changes were in the expected direction, four in the unexpected direction, five are indeterminate (because depreciation began in the middle of the year), and four items are missing. Of the four "wrong answers," three are for the "3rd preceeding year to the 2nd preceeding year," and thus have the weakest claim to relevance. The protective equivalent, imports of wool from Australia as percent of United States consumption, and Australia's balance of trade with the United States move in expected directions from 1937 to 1938 and from 1939 to 1940. The movements were of sufficient magnitude to be significant. The changes from 1938 to 1939 have no "expected" direction, because calendar year 1939 data average conditions prior to June which might have led to depreciation, and conditions in June and later months, after gradual depreciation had begun.

Table 3 - 3

Variations in Certain Factors Affecting Australia's Balance of Payments in the Three Years Preceding, and One Year Following, Major Depreciations of the Australian Pound

Year in which the £A was Depreciated

1. Change in the index of the current protective equivalent (column 7a of Table I):
   a. from the 1st preceding yr. to the yr. of depreciation
   b. from the 2nd preceding yr. to the 1st preceding yr.
   c. from the 3d preceding yr. to the 2nd preceding yr.
   d. from yr. of dep. to 1st yr. following dep.
2. Change in imports of wool from Australia as percent of total U.S. consumption of clothing wool (col. 8 of Table I):
   a. from the 1st preceding yr. to the yr. of depreciation
   b. from the 2nd preceding yr. to the 1st preceding yr.
   c. from the 3d preceding yr. to the 2nd preceding yr.
   d. from yr. of dep. to 1st yr. following dep.
3. Change in Australia's export balance (including bullion) with the rest of the world:****
   a. from the 1st preceding yr. to the yr. of depreciation
   b. from the 2nd preceding yr. to the 1st preceding yr.
   c. from the 3d preceding yr. to the 2nd preceding yr.
   d. from yr. of dep. to 1st yr. following dep.
4. Change in Australia's export balance (including bullion) with the United States:
   a. from the 1st preceding yr. to the yr. of depreciation
   b. from the 2nd preceding yr. to the 1st preceding yr.
   c. from the 3d preceding yr. to the 2nd preceding yr.
   d. from yr. of dep. to 1st yr. following dep.
5. Change in Australia's total exports of wool:
   a. from the 1st preceding yr. to the yr. of depreciation
   b. from the 2nd preceding yr. to the 1st preceding yr.
   c. from the 3d preceding yr. to the 2nd preceding yr.
   d. from yr. of dep. to 1st yr. following dep.

1931*	1939**	1949***	Expected direction of change (+ or -)
			- for 1931
			? for 1939
-12.9 points	+1.6 points	+10.0 points	+ for 1949
+24.5 "	+18.1 "	-8.4 "	+
---	-5.5 "	-12.9 "	+
-2.2 "	-9.4 "	-7.1 "	-
			+ for 1931
			? for 1939
-.7%(-14% rel)	+3.1%(+250% rel)	-2.0%(-11% rel)	- for 1949
+.2%(+5% rel)	-10.7%(-90% rel)	-4.7%(-20% rel)	-
-.4%(-8% rel)	+7.3%(+160% rel)	-2.6%(-10% rel)	-
-2.3%(-55% rel)	+1.4%(+33% rel)	-.5%(-3% rel)	+
			+ for 1931
			? for 1939
+$175.6 mil	+$.9 mil	+$184.6mil	- for 1949
- 16.3 "	- 113.8 mil	- 94.6 "	-
---	+ 66.4 "	+ 177.7 "	-
+ 18.3 "	- .9 mil	- 288.0 "	+
			+ for 1931
			? for 1939
-$43.9 mil	+$ 48.1 mil	+$ 72.6 mil	- for 1949
- 69.6 "	- 196.3 "	- 127.6 "	-
+ 8.3 "	+189.0 "	- 21.0 "	-
+ 21.9 "	+ 44.2 "	+ 17.8 "	+
			+ for 1931
			? for 1939
- 35.9 "	- 25.6 "	+ 266.5 "	- for 1949
		+ 73.0 "	-
		+ 183.2 "	-
		+ 10.2 "	+

FOOTNOTES TO TABLE 3 - 3

* In January and February of 1931, the £A depreciated slightly with respect to the £ Sterling, and held a fairly constant ratio of 80 percent for the remainder of 1931 and 1932. The £ Sterling was depreciated gradually from $4.85 to $3.37 in September through December of 1931, and rose, then fell to $3.27 by the end of 1932. The depreciation with respect to the £ Sterling therefore was in January and February of 1931, while a more significant depreciation with respect to the dollar came in September-December, 1931, by following the £ Sterling.

** The depreciation came in several stages from June, 1939, to June, 1940, and was of the same order as the depreciation of the £ Sterling, so need not be attributed to Australian conditions--but rather to Sterling area conditions.

*** This came in September, 1949, and was a Sterling area depreciation.

**** The balance on current account (including bullion) was not positive (export) in all cases, but the changes (+ or -) can be measured simply: a change from +$100 mil. to -$10 mil. is a change of -$110 mil. in export balance.

Sources: United States Department of Commerce, Bureau of the Census, Foreign Commerce and Navigation of the United States; _________, Foreign Commerce Yearbook.

The 1949 depreciation was another case in which Sterling was followed downward, but this was all accomplished in September. The changes in table 3 - 3 are in the expected direction in ten cases, and in the "wrong" direction in ten cases. United States imports of wool from Australia as percent of United States consumption and Australia's trade balance with the United States are each "right" in three of four cases. The magnitudes of the former are small, however. It must be concluded that little confirmation of the predictive value of the protective equivalent can be found in the 1949 case.

Reading across table 3 - 3, one finds that the protective equivalent has a better record in "predicting" and "recording" the three depreciations than do the other measures. It is "right" in seven cases, "wrong" in three, with one indeterminate and one missing case. Two of the "wrong" cases are for the third to second preceding years, and thus have the weakest expectations. To be acceptable, this should be "confirmed" however, by the other variables. The next best variable is Australia's balance with the United States, showing eight "right," one indeterminate and four "wrong" changes. Imports of Australian wool as percents of United States consumption show six "right," one indeterminate and five "wrong" changes. The other two variables do not confirm the predictive powers of the protective equivalent, but they, of course, have less

immediate relevance to United States-Australian trade.

To summarize the "exchange depreciation" test of the protective equivalent, it seems strong enough to lend support to the correlation tests. Though the 1949 depreciation as a whole revealed little verification, it could be expected to yield little, as Australia was not one of the weakest of the Sterling area countries simultaneously depreciating in 1949. In fact, her terms of trade with respect to more industrialized nations had changed favorably since 1939. The weaknesses of the verifying effects of the 1931 and 1939 depreciations may be attributed partly to strong income effects, including the war preparation in 1939 and 1940. Read "horizontally," table 3 - 3 shows the protective equivalent strongest in "predicting," followed by the most closely related variables. Though it is disappointing that the other variables do not show stronger confirmation of the hypothesis that the protective equivalent can measure or predict balance of payments difficulties for the exporter, it is not surprising. Though wool accounted for about eighty percent of the value of Australia's exports to the United States in 1950, it accounted for only about 50 percent of total Australian exports in that year. The movements of other exports, capital movements, and the Australian propensity to import were all perhaps just as important as wool in affecting Australia's balance of payments.

Summary

The summary evaluation of the predictive properties of the protective equivalent measure in the Australian wool case must attempt to balance the results of the two principal tests to which it has been subjected. There is no statistical means available for such a balancing; one must rely upon rough guesses.

There are, in all, four principal things to consider--the amount of direct competition between Australian and domestic wool, the usefulness of the price indices employed in the computation, the significance of the results of the correlation test, and the significance of the auxiliary balance-of-payments test.

First, examination of the United States wool market shows that Australian wool is the principal competitor of domestic wool. Neither the imperfections in the market, nor the intervention by the Commodity Credit Corporation nor the consistent preferential prices for Australian wool destroy this relation. Therefore, any changes in production costs or tariff rates which affect the price of one wool or the other will directly affect its position in the United States market.

Second, the admittedly non-comparable price series used to measure cost changes in the two countries must meet some minimum criterion of relevance. Though quite different in composition, "basic materials and foodstuffs, all goods principally home produced" for Australia and "livestock and poultry" for the United States meet the requirement that opportunity costs be measured (though imperfectly). The Australian index is broad enough to reduce greatly the effects of short-run changes in the scale of <u>wool</u> production on the index. Wool is not a component of the United States index, so the short-run scale problem does not arise. Deflating the Australian index with the rate of exchange is a statistically sound procedure, and economically valid for a comparison of the competitive position of the two wools, since it states Australian <u>costs</u> in dollars, and the wools <u>sell</u> in the United States for dollars, converted from £A at going exchange rates.

The first test of the usefulness of the protective equivalent measure is a correlation test. This test yields results which are at least encouraging. Product-moment correlation may not be justified with time series, the form of whose distributions is not known, but it is used, because a significance test can be applied, and because partial coefficients of the second order are desired. Rank correlation, which does not assume a normal distribution of the series, is therefore used as a supplementary correlation test. No test of significance is available for this type of correlation. A review or survey of all of the examples of this study will provide a better basis for evaluation of the protective equivalent, when submitted to various tests under differing circumstances. The correlations are uniformly of the expected negative value. The value of the product-moment correlation (-.73) is significant at the one percent level.

The second question to which an answer is sought by correlation tests is the relative importance of the tariff and other costs in affecting the wool trade. Relative costs seem to have the greater effects; the coefficient, -.34, relating costs to the Australian share of clothing wool consumption being significant at the ten percent level. The coefficient, -.23, relating the tariff to the Australian share is not significant at that level. This confirms the impression gained from a visual inspection of the data of Table I. While the protective equivalent of the current duty declined from .31 to .108, or by 65 percent, the protective equivalent of the 1929 duty declined from .31 to .131, or by 58 percent. Thus nearly ninety percent of the decline is due to cost and exchange rate effects, and little more than ten percent is due to tariff reductions.

The last test is of a different sort, though rough correspondence or correlation is sought. Items are selected which might be indicators of Australia's "dollar" position, or of its general balance of payments position. These items are selected for time periods which include significant depreciations of the £A. The results of this test are not decisive, but offer encouraging supplementary support to the correlation tests. Briefly, the protective equivalent and Australia's balance of trade with the United States contain the largest proportions of changes predicting a depreciation, closely followed by United States imports of wool from Australia as a percent of total consumption. Australia's trade balance with the world, and her total exports of wool fail to reveal as much. The relations of these variables to the depreciations is not being tested, but rather a more or less complete picture of conditions leading to a depreciation is sought. The stronger the complete picture of a depreciation forced by the balance-of-payments situation, the more significant would be the predictive power of the protective equivalent. In the cases of the 1931, 1939 and 1949 Australian depreciations we must be satisfied with something less than complete explanations of the depreciations. We must also be content to notice that the protective equivalent at least points in the expected direction--that it indeed does so as well as does Australia's balance of trade with the United States.

CHAPTER IV

MEXICO -- CATTLE AND FRESH TOMATOES

United States dutiable imports from Mexico amounted to from five percent to fourteen percent of all dutiable imports of the United States from 1922 through 1946. They were of smaller relative importance in the decade of the 1930's, (from five to eight percent) but they increased to about twelve to fourteen percent of United States dutiable imports in the 1940's, or to about the same proportion as they were in the 1920's. Total imports (dutiable and free) from Mexico amount to from two percent to five percent of total United States imports.[1]

From Mexico's point of view, the United States market is of even greater importance. During the 1920's, exports to the United States amounted to from sixty-one to eighty-three percent of total exports. During the 1930's, they amounted to from forty-eight to seventy-four percent of the total, and in the 1940's from eighty-three to ninety-one percent.[2] From one-fourth to one-half of these exports to the United States were dutiable under the United States' tariff laws. It therefore seems that a study of the

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[1] United States Department of Commerce, Bureau of the Census, Foreign Commerce and Navigation of the United States, annual volumes.

[2] Secretaria de Economia, Direccion General de Estadistica, Annuario Estadistico de los Estados Unidos Mexicanos, 1942, Mexico, 1948, pp. 452 and 1136-1139; ________, Compendio Estadistico, 1947, p. 441.

changing impacts of the United States' duties on certain products imported from Mexico might provide an opportunity to test the significance of the duties themselves, and of the statistical device employed to measure their impacts.

Competition in the Two Products

The study of dutiable United States imports from Mexico has been narrowed to include only the two most important United States Department of Commerce commodity classes: class 00, animals and animal products, edible; and class 1, vegetable food products and beverages. This was done in order to be able to select sample commodities, for which rates of duty are available, which will serve as indicators of the fate of large portions of Mexico's exports to the United States. The method of "sampling" employed was not "scientific" in any sense; it consisted of the selection of one of the largest single commodities from each of these two most important commodity classes. The selection of the two classes (00 and 1) is based on their relative importance both to United States dutiable imports and to Mexican exports to the United States. Mexico was found, by checking every fourth year, to be the source of from five percent to twelve and one-half percent of United States dutiable imports of commodity class 00 in the 1922-1946 period. The same check found Mexico to be the source of from two percent to twelve percent of United

States dutiable imports of commodity class 1 in the same period. From Mexico's point of view, these two commodity classes seem to be of similar importance in her total exports to the United States. This has not been ascertained with any degree of accuracy, because the Mexican commodity classes are "materias animales" and "materias vegetales," each of which presumably corresponds roughly with two Department of Commerce commodity classes (00 and 0, and 1 and 2, respectively.) "Materias animales" were from three percent to twenty percent of total Mexican exports to the United States from 1934 to 1946. "Materias vegetales" were from fourteen percent to forty-two percent of total Mexican exports to the United States for the same period. Thus the selection of commodities from commodity classes 00 and 1 is justified on the basis of the importance of the classes in Mexican-United States trade.

"Cattle" (0010600 - 0010900) was the largest item in class 00 for which a single rate of duty could be found and "tomatoes, natural state" (1207000) seemed to be one of the largest items in class 1 to which a single rate of duty was applied. "Cattle" is actually a composite of two classes of cattle, based upon live weight. The method of arriving at the mean specific duty is explained in footnote 4 to Table II, page 119.

The task of this chapter will be to determine whether it is possible to measure the effects of tariff rate changes and cost changes upon Mexico's shares of United States markets for the two products selected. Specifically, the "protective equivalent" computed from data for these two commodities will be subjected to tests similar to those applied to the Australian wool protective equivalent in the previous chapter. The two commodities will be treated separately, but the analysis will be combined, to determine whether some of the Mexican balance-of-payments data confirms the conclusions that might be drawn from each of the commodity studies.

Table II, pages 117 to 120, summarizes the data and the computation of a protective equivalent of the United States duty on cattle. The United States has been a net importer of cattle since 1913, though to a small degree. Imports have varied from less than one to more than three percent of domestic production.[3] Column 8 of Table II shows that since 1922 Mexico's share of these imports has varied widely. Roughly, imports of cattle from Mexico varied from five hundredths of one percent to two and one-half percent of the total receipts by all United States stockyards. Canada is the principal source of imported cattle (see Chapter V below). From 1943 until August 16, 1948, Canada withheld her cattle from our markets however,

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3 United States Tariff Commission, Summaries of Tariff Information, Volume 7, Agricultural Products and Provisions, Part I, p. 4.

and Mexican cattle replaced them. Mexico and Canada together account for virtually all of United States imports, except for a few imported into the Virgin Islands.[4] A sanitary regulation was imposed in December, 1946, which stopped imports from Mexico, but this study ends with 1946.

The cattle from Mexico are predominately of the "light" category (200 lbs. to 700 lbs.), since they are range cattle not yet "finished," or grain-fed. They are usually finished in the Southwest and marketed in that region. The "heavy" cattle (over 700 lbs.) tend to be imported from Canada. Imports of veal calves were not recorded in this study; most of them are imported from Canada. Column 8 of Table II shows "imports of cattle from Mexico as percent of domestic cattle <u>and calves</u> received by all stockyards," so there is some inaccuracy of the percent figures in that column. There is a more serious inaccuracy in column 6 of Table II. The average duty, in cents per pound, of all imports of cattle is recorded there. This is the same duty as is recorded in column 6 of Table V, Chapter V, which deals with cattle imports from Canada. As explained in footnote 4 to Table II, the duty was an average rate for the cattle of the two weight classes. Since <u>some</u> cattle of both weight classes were imported from both countries, and since some cattle were admitted free, the "average" duty

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[4] <u>Ibid</u>., p. 5.

was recorded. It overstates the duty on Mexican cattle, since most of them were of the lighter weight class, bearing a duty one-half cent per pound lower. Changes in the rate of duty will show up in the same absolute amount, however, in spite of this inaccuracy. The duty was increased by one cent per pound in 1930, and reduced by one cent in 1936 for both weight classes. Relatively, the one cent changes appear to be smaller than they actually were for Mexican cattle--one cent is a fifty percent increase on a two-cent duty, but it is a sixty-six and two-third percent increase on a one-and-one-half cent duty. It is hoped that these inaccuracies in the statement of the duty on Mexican cattle (and as a corollary, on Canadian cattle in Chapter V) do not invalidate our attempts to find a relation between the tariff and imports.

There are other limitations on any study of price effects in markets for cattle which may be more serious than a slight inaccuracy in recording the rate of duty. First, there is the geographic separation of markets, mentioned above. Though shipping costs do not isolate markets within the United States, and though the eastern seaboard is supplied by western production, there are preferred paths to markets, determined by transport costs and the locations of feeding establishments. Since Mexican cattle tend to be fed and slaughtered in the Southwest, then, their impact on other parts of the market may be smaller. This limitation cannot be serious, for there is also much domestic production in the Southwest, which must have the choice of competing with the small amount of Mexican imports, or moving east and north to other feeding and/or slaughtering centers.

The second limitation on price analysis is the more serious one. The market for cattle, both in the long-run and in the short-run, is responsive to influences other than price. Changes in marketing and in consumption may in fact appear quite insensitive to price, because of the dominance of these other influences. On the supply side of the market, in the short-run, stock may be withheld from the market or dumped on the market, depending on the availability of winter feed, the severity of the weather, the liquidity position of the grower and other factors. A characteristic of the long-run supply is a production cycle of fourteen to sixteen years.[5] While it is not correct to designate this as a non-price phenomenon, it is a problem in market dynamics, combining price reaction and production lags, similar to the phenomena described by the cobweb theorem. It would tend to make the effect of a change in the protective equivalent of the duty on imported cattle somewhat weaker than if it were not present. Since there is no way to correct statistically for this production

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5 Ibid., p. 9.

cycle, one must be content to have a weaker measure. For the twenty-five year period of this study, however, one can hope that the cyclical expansions and contractions will partially cancel each other.

On the demand side, both short-run changes and secular changes in real incomes cause considerable substitutions between beef and foods considered to be inferior. Since substitute foods are important, there are also shifts in the demand for beef traceable to changes in the supplies and therefore the prices of these other foods. Considering all of these limitations inherent in any study of price effects in the cattle market, one should be satisfied with a modest amount of success in discovering the effects of the tariff.

The markets for vegetables and vegetable food products are probably as complicated as are those for cattle. In particular the fresh tomato market contains enough peculiarities to warrant caution.

Mexico is one of the two sources of imported tomatoes. It provided 56.4 percent of imports in 1936-37, 30.6 percent in 1937-38, 29.3 percent in 1938-39, 96.4 percent in 1942-43, 83.3 percent in 1945-46 and 90.0 percent in 1946.47.[6] Cuba is the other source; never as much as one

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6 United States Tariff Commission, Op. Cit., part 6, p. 75.

percent of imports come from any but these two sources. Imports from Mexico are compared to "total United States imports," therefore, as well as to domestic production. This test is invalidated for the years 1943-45, while shipping limitations greatly reduced imports from Cuba. Otherwise, the Cuban competition can be used as a criterion of the relative position of the Mexican producer. Though Cuba enjoys a tariff advantage, it is a constant twenty percent advantage.

Another, more serious, limitation on a price analysis of this market is the extent to which the weather influences the yields of any growing area. Most imports enter in the months of December through May. They compete with field crops raised in California, Florida, and Texas, and with a smaller amount of hot-house production elsewhere in the United States.[7] Virtually all of the imports are marketed in the fresh state, as are the domestic crops of those months. The difficulty is that the weather hazards to this winter crop are so great that domestic production varies widely--short crops being supplemented by imports, unless short crops abroad or shipping difficulties prevent it.

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7 Ibid., p. 73.

"However, the ratio of imports to production varies widely from year to year because of periodic short and large crops in this country, and because of fluctuations in the size of the crops in Cuba and Mexico. In 1939, this ratio was 14 percent during the import season and 3.6 percent for the entire year. In 1947, however, the ratio of imports to production during the import season was 83 percent, and the ratio of total production for the year was 17 percent."[8]

To this should be added the (unknown) extent to which Cuban and Mexican (and even some American) producers expand or contract tomato production for non-price reasons, or because of mistaken market forecasts. It is known, for instance, that in some years parts of the domestic crop were unharvested because of low prices (see footnote 6, Table III.) It is not known whether any of this occurred during the importing months of December through May. In any case, one must be aware of what is probably not an untypical amount, for agricultural markets, of shifting of the supply due to weather and other factors.

The last matter to consider, before examining the construction of the protective equivalent, is the use of appropriate price indices in lieu of production costs. For the United States, the Bureau of Labor Statistics' "wholesale price indexes, by subgroups of commodities--livestock and poultry" is used as a cost index for cattle production. This is the same index that was used for a

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[8] Ibid., p. 74.

cost index of wool production. The justification of its use is not quite the same in this case--cattle are included in the index, with a weight of roughly 47½ percent. This might lead to a violation of one of the conditions laid down in Chapter II, that increasing or decreasing costs due to short-run expansion or contraction of the industry in question not be reflected in the cost index employed. It is probably not serious in this case, and it is unavoidable. The other condition which must be met--that the opportunity costs be represented--is more nearly satisfied by this price index than by any other. While there is some competition for the use of farm land between cattle and field crops, the large portion of cattle production which uses range grazing competes directly with other livestock--principally sheep. There might be some merit in the use of an index including grains, forage crops and other components of the costs of stock feeding (important in determining decisions to build or reduce herds). Such an index was not found.

There is no really satisfactory price index to use for the costs of the commodity "fresh tomatoes." The Bureau of Labor Statistics' "Wholesale price indexes, by subgroups of commodities--fruits and vegetables" was chosen. While it must include virtually all of the alternative crops--and is not heavily weighted with tomatoes, it includes many products not remotely substitutable for tomatoes in production. The two conditions which were laid down in Chapter II are met, but the price index is really too inclusive for our purposes. This is a defect with which we shall have to contend in many cases, however.

Turning to the price indexes selected from Mexican data, we find hardly more satisfactory approximations of cost information. There was, first, the choice between provincial prices and prices in the City of Mexico. The latter were chosen, on the ground that the vegetable production for United States markets is commercial production--and therefore that a metropolitan market price is a better indicator than a local price. The alternative would have been to determine the provinces in which the major portions of the export crop were grown, and to use a combination of those provincial prices. The former course was chosen, as representing fewer hazards, and as presenting an index more nearly comparable to a nation-wide index of United States prices of "fruits and vegetables." The Mexican index is narrower than that used for the United States, being a "sub-index of consumer goods--vegetables."

The Mexican index used to represent cattle production costs is from the same set as the index used to represent tomato costs. It is the "sub-index of consumer goods--animal products." The City of Mexico index was chosen again for the same reasons. It is not entirely comparable to the United States index of prices of "livestock and poultry," but it has as close a correspondence as any that were available. The weight of beef in the index is not known, but its inclusive title would indicate that it is no greater than the weight of cattle in the corresponding United States index, and likely smaller.

These indexes, as tenuous as they are as indicators of costs, are superior to general price indexes or cost of living indexes. They at least measure the price trends of fairly narrow commodity groups, and therefore can be expected to indicate the directions, and with wide margins of error, the magnitudes of significant changes in the money costs of production of the commodities under study.

The results of the use of these data are summarized in Table II (pages 117 to 120) and Table III (pages 128 to 130). The mechanics of these tables are the same as those of Table I, the description of which is given in Chapter II. Column 3 is the Mexican wholesale price index deflated by the rate of exchange, so that it expresses prices in United States dollars. Column 5 is the result of applying columns 3 and 4 to the first figure in column 6--the average specific duty collected in the first year of the study. Column 5 then indicates the effects of price and exchange rate variations, assuming a constant duty. Column 6 is the actual duty in each year, and column 7 is the duty in each year altered by applying columns 3 and 4. Column 7a is an index of column 7. The remaining columns contain import data and the ad valorem equivalent of the duty.

Cattle

Considering first the cattle example, Table II can be made to reveal the relative effects of duty changes, price changes (changes in the prices used as cost indicators) and exchange depreciations. Since columns 7 and 7a combine all these effects, let us first observe the total effect by scanning these columns. By 1946, the protective equivalent of the current duty had declined to .0112, from .0156 in 1922, or to an index of 72, with 1922 equal to 100. The official duty rate, after an increase in 1930, and a trade agreement effective in 1936, was the same in 1946 as in 1922, and the average duty collected was roughly the same. Therefore all of this 28 percent reduction is due to price and exchange rate variations. This is confirmed by noting that the last figure in column 5 is .0117, or 75 percent of the first figure in column 5. The slight difference is due to the fact that the average duty collected was slightly lower in 1946 than in 1922, because most of the cattle in 1946 were of the lighter category from Mexico. This reduction of the protective equivalent of the 1922 duty can be called the result of a smaller rise (40 percent) in the United States dollar equivalent of the Mexican price index (column 3) than the rise (87 percent) in the United States price index (column 4). This in turn is the result of an

TABLE II, MEXICO - CATTLE

	1	2	3	4	5	6
Year	Index of wholesale prices in the city of Mexico. (1929 = 100). Sub-index of consumer goods - animal products.[1]	Rate of exchange, Mexican Peso equals ---------cents, U.S.[2]	Index of wholesale prices in the city of Mexico (1929 = 100). Consumer goods, animal production in U.S. dollars.	Wholesale price index, U.S., livestock and poultry.[3]	Protective equivalent of 1922 duty on cattle, (0010600 - 0010900) tar. par. 701.	Duty levied in each year on cattle.[4] (0010600 - 0010900) tar. par. 701.
1922	117.9	48.72	117.9	83.2	.0156	.0156
1923	105.3	48.55	104.9	77.7	.0149	.0153
1924	98.6	48.51	98.2	79.3	.0136	.0158
1925	101.0	49.39	102.4	98.9	.0114	.0155
1926	105.2	48.31	104.3	100.0	.0115	.0152
1927	111.3	47.20	107.8	98.9	.0120	.0155
1928	105.4	48.11	104.1	105.4	.0109	.0153
1929	100.0	48.18	98.9	106.1	.0103	.0153
1930	96.6	47.13	93.4	89.2	.0115	.0151 to Jun 17 .0259 aft Jun 17
1931	89.7	35.49	65.3	63.9	.0112	.0255
1932	79.3	31.85	51.8	48.2	.0118	.0252
1933	75.8	28.10	43.7	43.4	.0111	.0251
1934	75.5	27.74	43.0	51.5	.0092	.0252
1935	85.1	27.78	48.5	85.1	.0063	.0267
1936	91.0	27.76	51.9	84.7	.0067	.0214
1937	112.1	27.75	63.9	95.5	.0074	.0225
1938	119.8	22.12	54.4	79.0	.0076	.0218
1939	122.2	19.30	48.4	72.2	.0074	.0192
1940	123.0	18.55	46.8	69.2	.0074	.0198
1941	130.6	20.54	55.1	91.6	.0066	.0202
1942	149.4	20.57	63.1	117.8	.0059	.0212
1943	196.8	20.58	83.1	128.7	.0071	.0168
1944	292.3	20.58	123.5	124.6	.0109	.0150
1945	338.0	20.58	142.8	132.5	.0119	.0152
1946	390.0	20.58	164.7	155.6	.0117	.0150

7	7a	8	9
Protective equivalent of current duty.	Index of protective equivalent of current duty in each year (1922=100)	U.S. imports of cattle from Mexico as percent of "domestic" cattle and calves received by all stockyards.[5] (No. of cattle)	Ad Valorem equivalent of duty on cattle (dutiable) total U.S. imports.[6]
.0156	100	.130	45.84
.0146	94	.054	35.20
.0138	88	.048	34.43
.0113	72	.100	28.86
.0112	72	.202	27.73
.0119	76	.670	24.49
.0153	98	1.145	19.14
.0107	69	1.197	18.31
.0112	72	.848	21.01
.0191	122		38.08
.0184	118	.336	45.37
.0191	122	.522	61.93
.0178	114	.409	96.64
.0148	95	.201	87.50
.0107	69	1.160	60.98
.0093	60	.726	47.02
.0106	68	.886	39.16
.0106	68	1.385	54.99
.0091	58	2.340	38.76
.0094	60	2.019	38.96
.0086	55	2.323	36.35
.0080	51	1.847	32.64
.0077	49	2.459	26.04
.0105	67	1.083	16.03
.0116	74	1.490	17.12
.0112	72	1.561	14.29

FOOTNOTES TO TABLE II

1 Estados Unidos Mexicanos, Secretaria de Economia, Direccion General de Estadistica, Anuario Estadistico de los Estados Unidos Mexicanos, 1942, Mexico, 1948, pp. 1203-1208, for the years 1922 through 1937. For the years 1938 through 1946, _______., Compendo Estadistico, 1947, Mexico, 1947, pp. 185, 186. While these two indices are not identical they overlap for the years 1938-1942, and differ by a maximum of 0.7 in any one of those years.

2 Annual averages of noon buying rates for cable transfers in New York. For years 1922 through 1930, Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32; for 1931 through 1938, Ibid., January, 1940, p. 74; for 1939 through 1946, Ibid., January, 1948, p. 125.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States; for 1922 through 1928, 1929, p. 325; for 1929 through 1932, Ibid., 1933, p. 281; for 1933 through 1935, Ibid., 1936, p. 300; for 1936 through 1940, Ibid., 1941, p. 356; for 1941 through 1943, Ibid., 1944-1945, p. 418; for 1944 through 1946, Ibid., 1947, p. 288; for 1947 through 1949, Ibid., 1950; for 1950, Ibid., 1952, p. 275.

4 _______, Foreign Commerce and Navigation of the United States, annual volumes, 1922-1946. For 1922 through 1933, the duties are taken from tables entitled, "Imported Merchandise Entered for Consumption, by Articles, with Rates of Duty and Amounts of Duty Collected". From 1934 through 1946, they are taken from tables entitled, "Imports for Consumption, by Articles and Countries with Rates of Duty and Calculated Amounts of Duty Collected". The Tariff Act, 1922, effective September 22, 1922, placed the duty at 1½¢ per lb. for cattle (other than for breeding) weighing less than 1050 lbs., and at 2¢ per lb. for those weighing 1050 lbs. or more. The specific duties listed in this column are the mean duties for all cattle (0010600 - 0010900) imported. The mean duty was calculated for each year by dividing the total duty collected by the total number of pounds of cattle imported. This amounts to a weighted mean duty. As a measure of the penalty imposed by U.S. tariff laws, it is imperfect, because it ignores the substitution of lighter weight cattle for heavier cattle due to the ½¢ lower duty on the former. If significant substitution did take place (to know whether it did would require more investigation of weights, prices and production of cattle than is justified for present purposes), then the weighted mean duty understates the penalty imposed by the tariff. This inaccuracy seems to be warranted in this case, for in exchange one has a total figure for U.S. cattle imports, and for cattle imports from Mexico, which can be compared with a total figure for U.S. production, which cannot be broken down into the weight classification. The corresponding duties after June 17, 1930 were 2½¢ and 3¢, though the weight classifications were different. The same method was used to arrive at the mean duty. The Trade Agreement rates of 1½¢ and 2¢ became effective January 1, 1936.

FOOTNOTES TO TABLE II (CONTINUED)

5 Imports of cattle from Mexico (number of cattle in thousands) from Ibid., annual volumes, 1922-1946. Domestic cattle and calves, receipts by all stockyards, from _______, Statistical Abstract of the United States, 1924, p. 591 (for 1922), Ibid., 1925, p. 613 (for 1923-1925), Ibid., 1929, p. 651 (for 1926-1928), Ibid., 1933, p. 575 (for 1929-1930), Ibid., 1936, p. 614 (for 1931-1935), Ibid., 1941, p. 721 (for 1936-1938), Ibid., 1944-1945, p. 665 (for 1941-1943), Ibid., 1948, p. 695 (for 1944-1945), Ibid., 1951, p. 634 (for 1946-1950).

6 Values and total duties collected taken from U.S. Department of Commerce, Foreign Commerce and Navigation of the United States, (see note 4). This is computed by dividing duties collected by total value of cattle imports, so it is subject to the same limitations as is the specific duty.

accumulated depreciation of the Peso (58 percent) which reduced the much larger (+230 percent) inflation in the Mexican price index to a 40 percent rise in its United States dollar equivalent.

It might be said, as in the Australian wool case, that the Mexican product gained a price advantage in United States markets by currency depreciation. One must also be cautious, as in the Australian case, in accepting this simple conclusion. Given a price inflation in Mexico of greater magnitude than that in her most important foreign customer, a depreciation of the Peso sufficient to restore a "purchasing power parity" would appear to be necessary. Given, in addition, the facts that the tariff was higher by fifty to sixty-six and two-thirds percent for a six year period, and that the income effects of a depression cut United States consumption and imports drastically during the same period, one can visualize reasons why a depreciation of more than the amount indicated by a crude "purchasing power parity" in these two price indices would be forced upon Mexico. The thirty percent depreciation of the Peso in 1949 was apparently forced upon Mexico by loss of United States markets due to her more rapid rate of inflation. Since the sanitary regulation cutting off the flow of cattle was imposed at the end of 1946 (another factor contributing to deflation), it was impossible to extend this study far enough to include this case.

A period-by-period analysis of the protective equivalent will show more clearly why exchange depreciations might as logically have been results as causes of price and tariff relationships with United States markets. Note first that in 1930, when the duty was increased from one and one-half cents to two and one-half cents, the protective equivalent of the current duty (columns 7 and 7a) increased to an index of 122, and imports from Mexico fell sharply (column 8). The Peso had not been depreciated since 1922, but it was depreciated in 1931 and 1932 by a total of forty-one and two-thirds percent. This did not materially reduce the protective equivalent, because United States prices fell rapidly after 1930. Only when United States prices rose again in 1934 did the protective equivalent return approximately to its 1922 level. Thus, in a period of five years (1930 through 1934) we can observe a sharp tariff increase, a sharp drop in imports (relative to total consumption), and a restoration of the status quo by exchange depreciation and price level changes. Imports recovered their former position by 1935, but only after price rises in the United States outstripped those in Mexico, so that the protective equivalent was reduced to an index of 69. The explanation for this is not at once clear--it may be income effects of the depression, or lag effects traceable to the herd cycle in stock raising. The latter appears to be the more likely. Further depreciation of the Peso almost exactly offset the differential between Mexican and United States price rises, so that the protective equivalent reflected the restoration of the tariff, in 1936, to its old level.

Mexican cattle fared much better in United States markets after the restoration of the low tariff rate than they had in the 1920's. After 1943, this can be attributed to the Canadian embargo on exports, but from 1939 through 1941 Mexican cattle were doing very well (see column 8). Some secular increase due to the growing import status of the commodity is to be expected. If this does not account for all of the increase, and the remainder is not purely a phenomenon of the cattle herd cycle, there might be a lesson here for tariff manipulators. The lesson might be that if a tariff increase forces an exchange depreciation and restrains price rises in the foreign producing area, then a restoration of the low duty puts the foreign producer in a better position than he would have been in had the tariff been let alone. This is, of course, a truism--granted the premises that the tariff forced the depreciation and held down Mexican prices, and that the increase in imports was a result of these events. The point is that these premises are not unreasonable ones in this case--given the importance of the United States market to the Mexican producer, and to the Mexican currency value. This is, then, a corollary of the well-known hypothesis that a large country can, by tariff increases, alter the terms of trade in its favor. The corollary is this--if the high tariff is in force only long enough to alter the terms of trade in favor of the tariff-levying country, then its principal result will be that foreign producers will gain a competitive advantage in the tariff-levying country's markets. This is simply a logical consequence of the terms-of-trade effects of the tariff, and of the tariff's short duration. It remains to be seen whether a significant proportion of the examples in this study will provide support for the hypothesis that the terms of trade can be altered in this way. If so, then the corollary may be offered as a serious proposition.

Correlation tests may now be used to measure more sharply what appear to be some significant cost and tariff effects on imports of Mexican cattle. Rank correlation of the protective equivalent of the current duty on cattle (column 7 of Table II) with imports from Mexico as percents of domestic cattle and calves received by all stockyards (column 8 of Table II) results in a coefficient of -.56. This is moderately satisfactory as evidence of an inverse relation. It may be as much as can be expected, given the limitations one must place on a price analysis of the cattle market.

There is the possibility that the small secular growth in total imports of cattle as percents of domestic production would show up strongly enough to yield this result, whether or not there is a valid causal relation between the protective equivalent and imports from Mexico. This secular growth, plus the advantage given to Mexico by the Canadian embargo of 1943 to 1948, does give an upward trend to Mexico's share of United States consumption. The rank correlation of time with column 8 has a coefficient of +.60. There is a downward trend in column 7--rank correlation with time has a coefficient of -.46. It may not be necessary to remove this trend, because, as indicated above, it reflects in part the alterations in the terms of trade which may have been affected by the impact of the higher duty of 1930-1936. However, if we remove both of these trends, the significant upward trend in the proportion of Mexican to domestic cattle, and the downward trend in the protective equivalent, we still find a coefficient of -.39 in the relation between columns 7 and 8 of Table II.

A product-moment correlation was also computed for the relations between columns 7 and 8 and between columns 9 and 8. While the assumption that the distribution of these series is normal is not valid, a test of significance can be applied to the product-moment coefficient, so it may be worthwhile to check some of the examples with this method. The coefficient of correlation for columns 7 and 8 is -.65. For this series, containing 26 years, this is significant at the one percent level. That is, there is only one chance in one hundred that the correlation would turn out to be positive rather than negative. The coefficient of correlation for columns 9 and 8 (the ad valorem equivalent of the duty and imports from Mexico as a percent of domestic production) is -.30. This is significant at the 10 percent level, but not at the 5 percent level. That is, there are more than 5, but less than 10 chances in one hundred that this relation would have a positive correlation.

Attempting to separate the effects of the United States tariff from other cost effects, one finds that the tariff and other costs were about equally "efficient" in affecting imports. The second order partial coefficient relating the tariff to imports from Mexico as percents of domestic stockyard receipts is -.52. The second order partial coefficient relating the other costs to the same measure of imports is -.55. Both of these are significant at the one percent level. In spite of the qualifications with which the cost data had to be accepted, it has been possible to isolate the cost effects, and by removing them, to measure the tariff effects. Tariff changes and cost changes both appear to be "readable" as causes of variations in imports.

Tomatoes

The tomato example, displayed in Table III (pages 128 to 130), offers a study of a drastic increase in the tariff (from 15 percent ad valorem to 100 percent ad valorem, approximately), with the high tariff in force for a period of thirteen years. The example suffers from two accidents in the nature of the data available. The "fruits and vegetables" index for the United States begins in 1928, so the study cannot begin in an earlier year. Second, the Mexican index, "subindice de consumo--vegetales," was shifted to a new set of weights in 1938. The old index was continued through 1942, but to proceed to 1946 (the latest year for which an index was available at the time the data were gathered) required the use of the new index. While the values of the two indices for any one year differ but little (see column 1), there was no way to link them together. Table III is therefore broken into two overlapping sections. Columns 3, 4, 5, 7 and 7a in the lower portion of the Table are the result of starting fresh with 1938 as a base for computing all of them. It is as if a new example were being constructed.

Looking first at columns 7 and 7a, it is clear that the tariff increase in 1930 of 250 percent (from .5 cent to 3 cents) was not offset by price and exchange rate changes. The protective equivalent of the current duty was at an index value of 404 in 1942, with 1928 equal to 100. Starting with

TABLE III, MEXICO - TOMATOES

	1	2	3	4	5	6
Year	Wholesale price index in the city of Mexico (1929 = 100). Sub-index of consumers goods - vegetables.[1]	Rate of exchange, Mexican Peso equals ———————cents, U.S.[3]	Wholesale price index in the city of Mexico (1929=100). Sub-index of consumer goods - vegetables, in U.S. dollars.	Wholesale price index - fruits and vegetables, U. S. (1926 = 100).[4]	Protective equivalent of 1928 duty in each successive year.	Duty levied in each year on "Tomatoes, natural state" (1207000) tar. par. 772.[5]
1928	93.2	48.107	93.2	96.5	.0050	.005
1929	100.0	48.183	100.2	97.8	.0053	.005
1930	116.2	47.133	113.8	96.6	.0061	.005
						.03
1931	94.9	35.492	70.0	72.4	.0050	.03
1932	78.3	31.850	51.8	58.0	.0046	.03
1933	86.0	28.103	50.2	61.7	.0042	.03
1934	84.9	27.742	49.0	67.5	.0038	.03
1935	84.2	27.778	48.6	63.6	.0040	.03
1936	100.1	27.760	57.8	71.9	.0042	.03
1937	139.1	27.750	80.2	74.2	.0056	.03
1938	140.5	22.122	64.6	58.2	.0057	.03
1939	138.3	19.303	55.5	62.0	.0046	.03
1940	129.5	18.546	49.9	63.1	.0041	.03
1941	135.6	20.538	57.9	67.5	.0044	.03
1942	145.0	20.569	62.0	95.5	.0034	.03
1938	142.2	22.122	142.0	58.2	.03	.03
1939	140.0	19.303	122.2	62.0	.024	.03
1940	132.3	18.546	110.9	63.1	.022	.03
1941	139.3	20.538	129.3	67.5	.024	.03
1942	148.3	20.569	137.9	95.5	.018	.03
1943	178.7	20.577	166.2	121.3	.017	.015*
1944	237.2	20.581	220.7	121.3	.022	.015
1945	261.5	20.581	243.3	122.8	.024	.015
1946	301.3	20.581	280.3	129.9	.027	.015

7	7a	8	9	10	11	12
Protective equivalent of current duty in each year.	Index of protective equivalent of current duty in each year. (p.e. in 1928 = 100; 1938 = 100).	Imports of Tomatoes from Mexico as percent of domestic production - Value.[6]	Imports of Tomatoes from Mexico as percent of domestic production - Quantity.[6]	U.S. imports from Mexico as percent of total U.S. imports of Tomatoes, natural state, (120700), Quantity.[5]	U.S. imports from Mexico as percent of total U.S. imports of Tomatoes, natural state (1207000), Value.[5]	Ad Valorem equivalent of duty on "Tomatoes, natural state", 1207000, tar. par. 772. (Except Cuba - duty 20% lower).[5]
.0050	100	6.37	3.10	73.6	70.8	15.71
.0053	106	5.13	2.20	73.7	72.8	15.64
.0061	122	6.36	2.49	81.8	81.5	16.34
.0366	732	.24	.01			86.86
.0300	600	8.92	2.86	78.7	82.2	91.0
.0277	554	9.91	2.74	77.0	84.4	91.0
.0253	506	3.44	1.13	58.7	67.7	97.7
.0225	450	1.36	.47	31.6	42.1	109.1
.0237	474	2.56	.81	46.4	58.6	100.7
.0250	500	2.46	.81	48.1	62.1	101.6
.0336	672	3.11	1.08	54.8	67.2	100.6
.0345	690	1.30	.43	31.8	43.1	101.9
.0278	556	.77	.28	30.0	42.9	104.1
.0246	492	1.34	.43	27.5	37.9	103.0
.0266	532	3.39	1.26	65.7	77.1	101.8
.0202	404	2.94	1.39	83.1	89.0	94.5
.03	100	1.30	.43	31.8	43.1	101.9
.024	80	.77	.28	30.0	42.9	104.1
.022	73	1.34	.43	27.5	37.9	103.0
.024	80	3.39	1.26	65.7	77.1	101.8
.018	60	2.94	1.39	83.1	89.0	94.5
.008	27	4.67	2.47	95.5	94.8	37.9
.011	37	6.92	2.16	89.6	90.4	21.5
.012	40	7.63	2.59	90.1	91.1	19.9
.013	43	6.36	1.92	81.0	84.3	19.4

FOOTNOTES TO TABLE III

1 Estados Unidos Mexicanos, Secretaria de Economia, Direccion General de Estadistica, Anuario Estadistico de los Estados Unidos Mexicanos, 1942, Mexico, 1948, pp. 1203-1208.

2 New Series, _______, Compendio Estadistico, 1947, Mexico, 1947, pp. 185, 186.

3 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32 (1922-1930), Ibid., January, 1940, p. 74 (1931-1938), Ibid., January, 1948, p. 125 (1939-1947), Ibid., December, 1953, p. 1409 (1948-1952),

4 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1928), Ibid., 1933, p. 281 (1929-1932), Ibid., 1936, p. 300 (1933-1935), Ibid., 1941, p. 356 (1936-1940), Ibid., 1944-45, p. 418 (1941-1943), Ibid., 1947, p. 288 (1944-1946), Ibid., 1950, p. 280 (1947-1949), Ibid., 1952, p. 275 (1950).

5 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table I for specific sources within the volumes. Quantities from Mexico in 1930, to June 17 and after June 17 estimated by assigning 88.3% (percent of total imports entered to June 17) of Mexican imports for the entire year (118.2 mil lbs.) to the period prior to June 17; 11.7% to the later period.

6 Quantities and values for United States production, U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 672 (quantities for 1923-1927), 1931, p. 708 (values for 1925-1930, quantities for 1928-1930), 1935, p. 623 (1931-1934 — quantities include some unharvested because of market conditions — values are for the harvested crop), 1938, p. 668 (1935-1937), 1941, p. 760 (1938-1940 - quantities same remark as 1931-1934).

* Agreement rate effective January 30. A small amount "free—executive order 9177".

a new base in 1938 of 100, the index of the protective equivalent was reduced only to 60 in 1942, the last year of the three-cent duty, and to 43 in 1946. Roughly, this is as if a continuous protective equivalent had risen from 100 in 1928 to a peak of 732 in the second half of 1930, to another peak of 690 in 1938, and had then fallen to 297 (690 x 43 ÷ 100) in 1946. The remarkable thing about this is that 297 represents almost exactly a three fold increase in the protective equivalent, and the rate of duty in 1946 was just three times the rate in 1922. In other words, the exchange depreciations exactly achieved a "purchasing power parity" in Mexican and United States prices of vegetables between these two years. This would have shown up clearly in columns 3, 4 and 5, had we taken the liberty to link together the two Mexican indexes. While this degree of precision is somewhat accidental, and does not hold for intervening years, it is still possible to conclude that exchange and price effects roughly offset each other, leaving the protective equivalent proportional to the actual duty.

In this case, then, the tariff-levying country did not succeed in altering the terms of trade in its favor, except for short periods. After the depreciations of 1931 and 1932, the protective equivalent of the current duty (columns 7 and 7a) was below its nominal index value of 600 for five years, and after the depreciation of 1939, it was below this value for another five years. In each case, rises in the Mexican price index pushed the United States dollar equivalent of Mexican prices to levels comparable to United States "fruits and vegetable" prices, and therefore made the protective equivalent of the current duty again close to the actual duty.

This does not mean that the increase in the duty was immaterial to the depreciation of the Peso. Increases in duties affected many imports from Mexico; these, and drastic price reductions and adverse income effects in the United States must all have contributed to the depreciation of the Peso. What it means, in this case, is that the tariff itself was an effective weapon in altering the relative positions of foreign and domestic producers--in spite of all the non-price variables affecting the market and in spite of the possibility (as in the cattle example) that prices and exchange rates might have absorbed the tariff boost.

For the tomato example, the break in the Mexican price index made it seem wise to correlate two short series for each pair of variables. There were considerable differences in the results for the two series. While it is reasonable to suppose that this represents an actual difference in the data, the shortness of the two series casts doubt on the significance of a correlation coefficient--and there is no test of significance for the rank correlation.

The protective equivalents of the current duty were therefore linked for purposes of correlation over the entire period. The average index of the protective equivalent for the years 1938-1942 is 535 in the first series, and 74.6 in the second series. 535 is equal to 74.6 x 7.16. Each index number for 1943 through 1946 in the second series is multiplied by 7.16--giving a link of the two series for the overlapping years--resulting in approximately comparable values for all of the years 1928-1946. This is no more valid than the linking of the price series, but it results in values for 1943-1946 which are close enough for correlation purposes.

At the same time, the quantity import data were substituted for the value data. The two differ because of the seasonal nature of the imports. The quantity import series has also been used for the isolation of the tariff and cost effects. The latter was done for only the 1928-1942 series. The resulting number of correlation coefficients is large, so they are presented in table 4 - 1.

Table 4 - 1

Correlation Coefficients, Tomato Imports

		1928-1942	1938-1946
1.	Rank correlation, protective equivalent of current duty and imports from Mexico as percent of U. S. production-value	-.30	-.61
2.	Rank partial correlation--protective equivalent of current duty and imports from Mexico as percent of U. S. production-value--with time removed	-.26	-.34
3.	Rank correlation, protective equivalent of current duty and imports from Mexico as percent of total U.S. imports, value	-.12	-.61
4.	Rank partial correlation, protective equivalent of current duty and imports from Mexico as percent of total U.S. imports, value--with time removed	-.08	-.52
5.	Product-moment correlation, *ad valorem* equivalent of duty and imports from Mexico as percent of U.S. production, quantity--with time removed	-.37	
6.	Product-moment correlation, costs and imports from Mexico as percent of U.S. production, quantity--with time removed	+.08	
7.	Partial correlation, *a.v.* equiv. and imports from Mexico as percent of U.S. production, quantity--with time and costs removed	-.36	
8.	Partial correlation, costs and imports from Mexico as percent of U.S. production, quantity--with time and *a.v.* equiv. removed	-.06	

Table 4 - 1 (Cont.)

Correlation Coefficients, Tomato Imports

		1928-1946 linked
9.	Rank correlation, protective equivalent of current duty and U.S. imports from Mexico, as percent of U.S. production, quantity	-.43
10.	Rank partial correlation, protective equivalent of current duty and imports from Mexico as percent of U.S. production, quantity--with time removed	-.44
11.	Product-moment correlation, protective equivalent of current duty and imports from Mexico as percent of U.S. production, quantity	-.66
12.	Product-moment correlation, protective equivalent of current duty and imports from Mexico as percent of U.S. production, value	-.45
13.	Product-moment correlation, *ad valorem* equivalent of duty and imports from Mexico as percent of U.S. production, quantity	-.72
14.	Partial correlation, protective equivalent of current duty and imports from Mexico as percent of U.S. production, quantity, with time removed	-.66
15.	Partial correlation, *ad valorem* equivalent of duty and imports from Mexico as percent of U.S. production, quantity--with time removed	-.73

The absolute values of the rank partial correlations for the two short periods are quite low and the two periods differ considerably (items 1, 2, 3 and 4, table 4 - 1). For the whole period 1928-1946, using quantitative import data, the coefficients are slightly higher (items 9 and 10, table 4- 1). The results of product-moment correlation, without the removal of time, are shown in items 11, 12 and 13. The _ad valorem_ equivalent gives better results than the protective equivalent. The partial correlations, after the removal of time trends, are -.66 for the protective equivalent and -.73 for the _ad valorem_ equivalent (items 14 and 15). Both of these are significant at the one percent level. The separation of the tariff and the cost effects results in showing little conclusive evidence of the effects of either. The tariff alone may have more effects than the other costs, but the coefficient -.36 (item 7) is not significant at the ten percent level. The cost coefficient, -.06 (item 8), is clearly not significant.

The results of table 4 - 1 must be supplemented by recalling two features of the tomato example. First the nature of the market and the changes in production due to weather make the effects of changes in the relative prices of the domestic and the imported product less significant. As discussed above, imports supplement the winter season domestic crop, thus the need for imports fluctuates widely as that crop fails or succeeds. Second, it was noticed in analyzing Table III that the value of the protective equivalent followed quite closely the actual duty levied. This is because the Mexican prices of "vegetables," when expressed in United States dollars, followed quite closely the United States prices of "fruits and vegetables." This makes the protective equivalent reflect principally changes in the tariff; thus there cannot be much difference between it and the *ad valorem* equivalent of the duty, so long as price of tomatoes remains fairly constant. The price of tomatoes was quite stable--the *ad valorem* equivalent of the specific duty of 3 cents per pound varied from 91 percent to 104 percent between 1931 and 1942.

The correlation tests show little conclusive evidence that we have succeeded in measuring or predicting the fate of Mexican vegetable products in United States markets. While all of the coefficients are negative, they are of low or moderate (absolute) values. The fact that all of the coefficients turn out to have negative values does suggest that costs, including the tariff, have some effects on imports.

Balance of Payments

The last test which is to be applied is the analysis of the changes in certain balance of payments items which occurred immediately before and after three depreciations of the Peso. These changes are summarized in table 4 - 2.

Table 4 - 2

Variations in Certain Factors Affecting Mexico's Balance of Payments in the Two Years Preceding, and One Year Following Major Depreciations of the Peso

	1931 Cattle (class 00)	1931 tomatoes (class 1)
1-Changes in Protective Equivalent		
a. from 1st yr. preceding depreciation to yr. of depr.	+46 pts.	+478 pts.
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	+53 pts.	+626 pts.
c. from yr. of depr. to 1st yr. following depr.	+ 4 pts.	- 46 pts.
2-Changes in U.S. imports from Mexico as % of U.S. production		
a. from 1st yr. preceding depreciation to yr. of depr.	-.512(-60%)	-3.1(-4%)
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	-.349(-29%)	+8.1(+11%)
c. from yr. of depr. to 1st yr. following depr.	+.186(+56%)	-1.7(-2%)
3-Changes in U.S. dutiable imports of Dept. of Comm. commodity classes 00 and 1 from Mexico		
a. from 1st yr. preceding depreciation to yr. of depr.	-$3.32 mil	-$1.63 mil
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	- 2.50 mil	+ 1.25 mil
c. from yr. of depr. to 1st yr. following depr.	- .09 mil	- .41 mil
4-Changes in export bal. with U.S.		
a. from 1st yr. preceding depreciation to yr. of depr.	+P71.4 mil	
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	-P66.2 mil	
c. from yr. of depr. to 1st yr. following depr.	-P16.3 mil	
5-Changes in export balance with the world		
a. from 1st yr. preceding depreciation to yr. of depr.	+P 74.6 mil	
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	-P100.0 mil	
c. from yr. of depr. to 1st yr. following depr.	-P 59.3 mil	

Sources: U.S. Department of Commerce, Foreign Commerce and Navigation of the United States, 1928-1939; Secretaria de Economia, Direccion General de Estadistica, Annuario Estadistico de los Estados Unidos Mexicanos, 1942, Mexico, 1948.

1933 Cattle (class 00)	'33 tomatoes (class 1)	1938 Cattle (class 00)	'38 tomatoes (class 1)	Expected direction of Change(+ or -)
- 8 pts.	-48 pts.	0	+ 18 pts.	+(- for 1938)
+ 4 pts.	-46 pts.	+ 8 pts.	+172 pts.	+
-19 pts.	-56 pts.	-10 pts.	-134 pts.	-
-.113(-21%)	-18.3(-24%)	+.499(+56%)	-23.0(-42%)	-(+ for 1938)
+.186(+56%)	- 1.7(- 2%)	+.160(+22%)	+ 6.7(+14%)	-
-.208(-50%)	-27.1(-50%)	+.955(+71%)	- 1.8(- 6%)	+
-$.74 mil	-$2.75 mil	n.a.	n.a.	-(+ for 1938)
- .09 mil	- .41 mil	n.a.	n.a.	-
n.a.	n.a.	+$2.57 mil	+$.14 mil	+
-P 55.3 mil		+P159.6 mil		-(+ for 1938)
-P 16.3 mil		-P 76.3 mil		-
+P102.6 mil		-P 7.0 mil		+
-P 3.7 mil		+P 65.4 mil		-(+ for 1938)
-P 59.3 mil		-P 32.5 mil		-
+P189.2 mil		-P 59.3 mil		+

Two of the variables selected for analysis are from Tables II and III of this chapter--the protective equivalent and imports from Mexico as percents of domestic production. Another is from United States Department of Commerce data--export balance with the world, and export balance with the United States. The purpose of looking at changes in these variables in the years before and after depreciations is to ascertain whether trouble in relations with United States' market contributed to the necessity for depreciation, and if so, whether the protective equivalent would have been a reliable predictor of this trouble. One may start with item 5 in table 4 - 2, and proceed up the page through item 2, from the general to more specific indicators of Mexican balance of payments problems. If this results in establishing any causal link between United States' markets and the depreciation, then one can move up to item 1 to see whether the protective equivalent gives a strong indication of impending trouble.

The 1931 depreciation was the result of cutting the Peso free of gold, allowing the market to establish a free rate. It amounted to a twenty-five percent depreciation, occurring in several stages. Since the depreciation occurred "piece-meal," and since it continued into 1932 and 1933, we shall regard 1931, the year in which it began, as more likely to be a year of difficulties <u>causing</u> depreciation than to be a year of recovery resulting from depreciation. Thus the last column of table 2 shows the expectation that the changes from 1930 to 1931 of items 2 through 5 would be negative. One would expect the change in item 1, the protective equivalent, to be positive, taking into account the difference between tariff rates before June 17, 1930, and after that date--the increases being too large to be offset by price and exchange fluctuations in any one or two-year period.

Item 5, for 1931, shows that Mexico's balance of trade with the world declined by P100 mil. from 1929 to 1930, but increased by P74.6 mil. in 1931 and declined again in 1932. This does little to indicate balance of payments difficulties leading to depreciation. Item 4, changes in export balance with the United States, shows the same results. This is partly due to difficulty in deciding whether 1931 is to be regarded as a year of trouble preceding depreciation (as we have done), or a year of recovery following depreciation, and whether 1932 is to be regarded a year of recovery following the 1931 depreciation, or as a year of trouble preceding the 1933 depreciation. This is a problem in economic dynamics--where one selects arbitrary (calendar) "periods" which do violence to the continuity of the adjustment processes one is studying. The ideal solution for this would be the selection of realistic "planning" and/or "adjustment" periods for which data would be gathered. This is impractical for two reasons: some of the data is available only for annual periods, and the length of an adjustment period is not known.

In item 3, the decreases in dutiable imports of commodity class 00 from Mexico were large prior to depreciation, and negligible in the year following depreciation. For class 1, there was a gain from 1929 to 1930, but a loss from 1930 to 1931, and a negligible loss from 1931 to 1932.

In item 2, the changes were in the expected directions for cattle, and were large relative changes. For tomatoes, there were gains from 1929 to 1930, and small losses in the other two intervals.

Item 1, the protective equivalent, shows very large changes in the expected directions in the two one-year intervals up to 1931 for both commodities. This is because the large duty increases of June 17, 1930, affect both intervals (they are measured from 1929 to 1930, 2nd half, and from 1930, 1st half, to 1931.) In the 1931-32 interval, the protective equivalent for cattle increased by four index points, but moved in the expected (negative) direction for tomatoes.

Summarizing the data for 1931: there are fourteen changes in the expected direction and ten changes in the "wrong" direction. The evidence that would causally link United States markets and the 1931 depreciation is weak, though the indication provided by the protective equivalent is strong. This should not lead us, therefore, to firm conclusions regarding the efficacy of the protective equivalent as a predictor. Only when its strong indication is verified by changes in the balance of payments items should one conclude that it is efficient. In this case, the inclusion of the June 17, 1930 tariff increase in two one-year intervals assured large jumps in the protective equivalent. It has little meaning when one cannot firmly link United States markets to the depreciation of the Peso. One reason, of course, that one cannot is the presence of the drastic income effects of the first depression years.

The evidence surrounding the 1933 depreciation of the Peso is slightly more indicative of a causal link to United States markets. There are sixteen changes in the expected direction, six changes in the "wrong" direction, and two for which data are not available. The evidence in items 2 through 5, linking the depreciation to United States markets is strong (13 "right," 3 "wrong" changes, with 2 "n.a.")--it is the protective equivalent which is weak. This is as discouraging as the 1931 case, for the protective equivalent fails to point out what otherwise seems to be a strong case for assigning blame to United States markets for a depreciation of the Peso.

In the 1938 case, there are thirteen changes in the expected direction, six in the "wrong" direction, one instance of no change, and four with missing data. This is hardly conclusive, either. However, the protective equivalent data contain only one "wrong" change and the examination of the magnitude of the changes in the other data allows one to conclude that there is some justification for linking the 1938 depreciation to United States markets.

Reading across table 4 - 2, one finds twelve expected changes, five "wrong" changes and one instance of "no change" for item 1, the protective equivalent. This is not particularly good, and it is not supported by very strong evidence that the three depreciations were related to United States markets. The results from table 2 may be summarized as follows:

Table 4 - 3

Item from table 2	No. of changes in the direction expected	No. of changes in the direction not expected	No Changes	Data N.A.
1	12	5	1	
2	9	9		
3	9	3		6
4	6	3		
5	6	3		

In summary, the relations between markets in the United States and depreciations of the Peso do not stand out from the data presented here. There are some indications of the importance of the northern markets, however, and the more general data on the importance of the northern markets to Mexican exports given at the beginning of this chapter would lead one to conclude that the data in table 4-2 probably understate their importance to the value of the Peso. Assuming the importance of United States markets, the protective equivalent measure of the tariff's impact should be stronger than it is. Actually, for 1931 and 1938, its performance is satisfactory--one "unexpected" change in six for each case. In 1933 the protective equivalent contains three "errors" in six; this case must be rejected, though the other evidence links northern markets strongly to the depreciation. Actually, the two commodities selected comprise such a small proportion of imports from Mexico that one cannot expect case-by-case verification of any hypothesis. Also, the Peso fluctuated rather freely in the whole period from 1931 through 1933, so that one is not on solid ground in selecting 1933 as a "year of depreciation;" the favorable effects of the 1931 depreciation still might have been working themselves out. Then, too, income effects were so strong in the 1930-1933 period that any effects of price changes may have been swamped.

Summary

A summary of the entire chapter must review the five principal parts of the analysis. First, the nature of the data and the resulting limitations in its use were examined. Second, the limitations of an analysis based upon price effects in markets such as these were admitted. Third, a detailed analysis of the protective equivalent and its component parts was performed. Fourth, the correlation analysis was examined. Fifth, an attempt was made to relate the protective equivalent to other data indicating the relation between United States markets and depreciation of the Peso.

The data were gathered on two single commodities, selected because of their importance within two classes of supplementary (competitive) imports from Mexico, and because a single rate of duty could be obtained for each. The latter condition was only approximately satisfied for cattle, but it was exactly satisfied for tomatoes. The price indexes chosen to represent competitive costs of production of the two commodities are the best of the indexes available--they are far from ideal measures. There is considerable doubt as to how well either the Mexican or the United States indexes measures costs. Theoretically they have some merits, as well as de-merits, however. They are "metropolitan" in the sense that they represent national markets; they measure (imperfectly) the opportunity costs, and (with some reservation concerning United States "livestock") they are relatively free from short-run scale effects.

Second, these markets are subject to non-price influences to such an extent that there can be only rough measures of the effects of price changes or tariffs. There is no way to quantify these weather, herd cycle and other factors, so one must be satisfied with weaker results.

A detailed analysis of the protective equivalents showed that there were two different kinds of results. In the case of cattle, all of the net change in the protective equivalent, from 1922 to 1946, was due to changes in the relation between the United States wholesale price index and the deflated Mexican wholesale price index. The tariff was high for the period of five years, then returned to its former level. By 1930 the protective equivalent of the 1922 duty had declined, and it declined further during the period of high tariff, so that it can be said that the tariff altered the terms of trade, giving little protection to the domestic producer. The tomato example showed a different result. The deflated Mexican price index maintained a fairly constant relation to the American index, so that the tariff changes were accurately reflected in the protective equivalent of the current duty. In this case, it can be said that the terms of trade were not altered by the duty--the full effects of the tariff were felt in higher prices to the consumer, and in smaller sales by Mexican exporters. The last result is not certain, because of the winter-season nature of the imports and because of weather-caused variations in the crop. This helps to explain the lower correlation coefficients for the tomato example.

Fourth, the correlation tests of the two protective equivalents yielded coefficients which all were of the expected negative sign, but some of which were disappointingly low in absolute value. Perhaps this is to be expected, because of the nature of the two markets, and because the two commodities are such small samples of the total trade. The dominance of quantity variations over price variations in the tomato market is pointed up by the constancy of the price relation between the two countries' vegetable price indexes, and by the stable price of tomatoes. Variations in tomato imports are apt to be caused by physical failures or successes of the domestic and foreign crops, rather than by changes in the relative prices of the domestic and foreign products.

Fifth, the conditions surrounding three depreciations of the Peso were examined. In two cases, 1931 and 1938, the protective equivalent proved to be a reliable indicator of impending exchange rate difficulty, though the evidence linking the difficulty to United States markets was not strong. In the other case, 1933, the protective equivalent failed, though the other evidence indicated a relation between United States markets and the depreciation.

On the whole, the examination of this example has been worthwhile. It has revealed the relative contributions of tariff changes on the one hand, and price-exchange-rate changes on the other hand, for two commodities. It has illustrated two kinds of cases: one in which relative prices change, altering the position of foreign producers in the importing country's markets, and one in which relative prices remain constant. This example also permits the statement of a corollary to the hypothesis that a large country may, by levying a tariff, alter the terms of trade in its favor. The corollary, observed in the cattle case, is that if a tariff which is in effect for a short time does shift the price burden to the foreign producers, their industry may adjust its costs to the lower prices, so that they enjoy a greater advantage in the tariff-levying country's markets after the removal of the tariff than before it was levied.

CHAPTER V

CANADA - SOFTWOOD BOARDS, CATTLE, ALUMINUM AND NICKEL

The Selection of Commodities

The economies of Canada and the United States are closely linked by geographic proximity and by an increasing complementarity of resources, as some minerals, timber and grazing lands become relatively scarcer in the United States. Tariffs and other factors affecting the sales of Canadian products in the southern market are of great significance to Canadian producers, and to consumers in the United States. In the years 1926 through 1950, exports to the United States were from 32 percent to 65 percent of total Canadian exports, being between 36 and 39 percent in most years. Imports from the United States were from 54 to 80 percent of total imports, being between 60 and 70 percent in most years.[1]

Being much smaller in population and less "developed" in some ways, Canada is much more dependent upon foreign trade as a whole than is the United States. Canada's exports to the United States amounted to between eight and fourteen percent of her Net National Income in the same years.[2] Contrasting this with the fact that United States'

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[1] Dominion Bureau of Statistics, Canadian Statistical Review 1953 Supplement, No. 1, pp. 124-125.

[2] Ibid., pp. 15, 124-125.

total exports seldom exceed five percent of her National Income points up the fact that the trade relations are quantitatively more important to the northern partner. Qualitatively or strategically, however, the trade is of great importance to the southern partner. Nickel is a metal scarcely available at all domestically, and virtually all nickel consumed originates from Canadian ore or metal. All commodities used as examples in this study are "supplementary," or competing with domestic production. Nickel may appear to be an exception. However, there is some domestic production from imported ores, and this appears to benefit materially from tariff protection. This will be discussed below.

There are many commodities for which the United States is beginning to rely upon substantial supplementary imports. Because of her greater population and more extensive exploitation in the past of certain of her natural resources, these products have become relatively more costly in the United States. The importance of Canadian cattle in this respect was mentioned in the previous chapter. Lumber is a supplement to domestic production, and it may become even more important in the future. Aluminum is a significant supplement to domestic production, though there are several peculiarities in the resource situation and in the market structure of the world aluminum industry which make this an exceptional example. The United States, once nearly self-sufficient in bauxite, the raw mineral, now imports increasingly larger portions of its needs. Canada, since World War II the second largest producer, imports all of its bauxite! The strategic raw material is not the mineral, but inexpensive electric power. Canada is, for the present, more favorably endowed with unused hydro-electric potential, so it may be predicted that she will supply more aluminum to United States markets. The structure of the aluminum market is such that a study based upon competitive assumptions is on dangerous ground, however. The danger is well stated in the following quotation:

> "The future volume of Canadian exports to the United States, however, does not necessarily depend solely on competitive costs or the duty. A factor which may tend to influence the trade is the existence of common directorships guiding the policies of ALCOA and Aluminum, Ltd., the only Canadian producer. The extent to which aluminum might move from Canada to the United States may be determined more by the policies of the two companies concerned than by the rate of duty, notwithstanding the fact that production in the United States is no longer confined to a single company."[3]

The aluminum example may serve as a "control," i.e., as a check against the examples of competitively produced products. Not only do imports depend upon the policies of individual firms, but upon the development (at a rapid rate in the past few years) of Canada's power and aluminum

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[3] United States Tariff Commission, Summaries of Tariff Information, Washington, G.P.O., 1948, v. 3, part 5, p. 17.

reduction facilities. The latter might be the result of lower costs relative to those in the United States, but the timing and the magnitude of the investments were also partly determined by war needs and by capital advances from Great Britain. It might also be said that expansion of Canadian capacity is the result of the policies of Canadian, United States and other firms and of the investment policies of governments.

The selection of the other two commodities, cattle and softwood boards, is an attempt to select "typical" examples of supplementary Canadian products, of sufficient magnitudes in exports to the United States to play noticeable roles in Canada's balance of payments. It cannot be claimed that these two products have any special merits in this respect, or that they represent a large portion of the trade. Wheat is Canada's largest export, but relatively little of it goes to the United States. Second is newsprint, and third wood pulp; these go to the United States in large quantities, but enter free of duty. Flour, other grains and fish are large exports, but principally to Europe. Fourth largest, in recent years, is "planks and boards"--a fair proportion going to the United States, and a dutiable import to the latter, for which a simple rate of duty can be found--as "softwood boards" is a very large portion of the total. Cattle, as Canadian exports, rank with other grains, fish, "other wood and paper,"

"automobiles and parts," copper and aluminum. As imports from Canada, cattle and aluminum are the most important of this group, and simple rates of duty can be obtained for them.

Competition Between Imports and Domestic Production

Table IV, pages 161to 163, shows the computation of the protective equivalent and other data for the product "softwood boards." Department of Commerce commodity classes 4103300--4108000 were selected, omitting cedar from the softwoods, and omitting the large timbers, known as "dimension" lumber. This provides a single rate of duty, under tariff paragraph 401 and the United States Internal Revenue Code.

The lumbers imported from Canada (the source of eighty to ninety-five percent of imports) are directly competitive with domestic lumber--being of the same varieties of Douglas fir, hemlock, spruce and pine, though spruce is more important in imports than in domestic production. Since shipping charges are a large part of delivered prices, some imports are due to geographic location, as eastern Canada tends to supply eastern United States markets.[4] Labor costs are roughly fifty percent of the total consumer price (exclusive of transportation), and Canada has a labor-cost advantage. Lower wages are not

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[4] Ibid., v. 4, p. 7.

offset by lower skills--the traditions and mechanical skills of lumbering seem as well developed in one country as in the other. Though "stumpage," or timber costs are only fifteen percent of finished costs, the availability, accessability and size of timber is important in determining over all production efficiency. Canada has a distinct advantage in this respect. Her commercial forests are slightly larger (500 million acres vs. 461 million acres[5]), and domestic demand much smaller. Canada exports about one-half of its production, while the United States exported less than ten percent of its production in the 1930's, and only small amounts since then.

For the United States, the index "lumber," a sub-group under "building materials" is used to measure costs of production of softwood boards. There is no doubt that this represents changes in the competitive costs of lumber production. In spite of some price-fixing attempts by trade associations in the 1930's, lumber production in the United States is essentially competitive, with a market-determined price. Since the Bureau of Labor Statistics' indexes measure prices at the manufacturers' level, without delivery costs, these prices probably reflect changes in material and labor costs. The most serious defect of the index, for our purposes, is the fact that "softwood boards"

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[5] Ibid., v. 4, pp. 6-14.

make up roughly one-half of the weights. The prices of softwood boards themselves greatly affect the index, therefore, so that increases in prices brought about by increases in demand for these products, or by increases in the tariff on the imported products, are allowed to affect our cost measure. The one saving feature of this is that so much excess capacity existed in the 1930's that a large amount of the expansion of recent years could take place without new investments--implying constant-cost conditions with respect to milling facilities. It is not true that constant-cost conditions exist with respect to the timber resources, nor to the costs of processing the timber. As production expands, lumbermen begin to cut trees that are smaller, trees that are in smaller stands, and less accessible trees, involving more transportation and cutting costs. Smaller scale milling and logging operations start up during periods of expansion--these are high cost operations which tend to disappear when the market contracts again. These increasing costs are largely reflections of the scarcity of timber resources and increases in wages. They may, therefore, be taken to represent resource costs.

The Canadian wholesale price index of lumber and timber is used. The weight of softwood boards in the index is not known. Though it includes timber, it is not broad enough to be free of the fault attributed to the United States index of lumber prices. However, it must represent roughly

the costs, measured directly and alternatively, of lumber production in Canada. The United States and Canadian indexes are comparable, except that timber, a raw material, is not included in the former.

Table V, pages 169 to 171, shows the cattle example for Canada. United States production conditions and the selection of the livestock and poultry price index were discussed in the previous chapter. Canadian production methods and conditions are much like those in the United States. Production for export is concentrated in the western provinces. Grazing land is still somewhat more plentiful, grain for feeding is cheaper, and farm labor wages are lower. In spite of these advantages, one cannot expect large imports from Canada. Competition of other crops has kept herds from expanding; they have even decreased since 1946.[6] Large amounts of Canadian exports go to Great Britain; in fact an embargo was placed on shipments to the United States from 1943 to 1948, partly to assure greater supplies to Britain. In normal times, however, it is suspected that the high United States duty on live cattle is an important factor limiting Canadian expansion for sales in our markets. This is the question to be investigated.

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[6] Ibid., v. 7, part 1, p. 8.

The index of wholesale prices representing Canadian costs is a broader one than that used for United States costs. "Animals and their products" includes fish, hides, leather, shoes, milk and eggs, as well as livestock. While some of these are irrelevant, others are either competing or complementary products.

Table VI, pages 174 to 176, shows the aluminum example. Indexes of prices of non-ferrous metals are used for both countries. Since the other non-ferrous metals (copper, lead, zinc, nickel) do not compete for the same raw minerals, the use of the composite index cannot be strongly defended. Smelting equipment, supplies and labor are similar for the different metals, however, so there is some logic in selecting a composite of this group. Actually, bauxite and electric power are the principal raw materials. It was impossible to secure a combination of prices of these. Furthermore, the electric power used in aluminum reduction is specially produced at low cost for this purpose, so that indexes of general electric power prices would be misleading. One is left with a choice between aluminum prices and composite non-ferrous metals prices. The latter were selected.

The indexes of wholesale prices of non-ferrous metals are also used as costs of nickel production. They have the same merits and shortcomings for this purpose as they have for measuring the costs of aluminum production. The imports of nickel and nickel alloy in such crude forms as pigs, ingots, shot, cubes, grains and cathodes are used as the example of the product "nickel" in Table VII, pages 181 to 183. From two-thirds to four fifths of the nickel purchased in these forms is imported from Canada. Nickel in structural forms is almost all manufactured in the United States. The duty on the crude nickels has been much lower than on the structural shapes. The former has varied from three cents to one and one-fourth cents, amounting to from 12 percent to probably less than five percent _ad valorem_. The duty on the latter has been twenty-five percent _ad valorem_, with five or ten percent added to cold-rolled products; reduced as late as 1948 to twelve and one-half percent, with five percent added to cold-rolled products.[7] The matter has not been investigated, but it seems probable that the duty differential has been instrumental in preventing all but small amounts of imports of the finished products--placing the fabricating plants south of the border. Domestic production of crude nickel uses a small amount of raw material derived from copper mining, a slightly larger amount derived from domestic scrap, and substantial imports of nickel matte and oxide from Canada. Imports of the latter are duty free. Total domestic production of crude nickel from these materials

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7 _Ibid_., v. 3, part 5, pp. 114 and 121.

varied from twenty-three to fifty-three percent of total imports of crude nickel from 1937 through 1948.[8] Thus, though virtually all nickel is derived from Canadian ores, its manufacture into both the crude forms and the structural shapes is a domestic industry relying upon tariff protection. The striking differences in the tariff treatments of matte and oxide (free), pigs, ingots, etc. (now about 5 percent *ad valorem*) and structural shapes (now about 12½ percent - 17½ percent) indicates at least an attempt to maintain the domestic industry. It is unfortunate that complete data on domestic production could not be obtained. Data for only six years of domestic production does not permit a correlation analysis of imports and domestic production.

Softwood Boards

Returning to the softwood boards example, a detailed inspection of Table IV will provide some indications of the effects of the duties imposed since 1930. The statistical device employed here, which uses a tariff rate as a base, is not capable of showing a difference between dutiable and free imports. Prior to June 17, 1930, softwood boards were entered free of duty. Imports from Canada were from five to six percent of domestic production in the decade of the 1920's. (This is not shown in Table IV.) This is roughly

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[8] *Ibid.*, v. 3, part 5, p. 115. The years 1940, 1941, 1942, 1944 and 1945 are omitted.

TABLE IV, CANADA - SOFTWOOD BOARDS

	1	2	3	4	5	6
Year	Wholesale Price Index, Canada, Lumber and Timber (1935-39 = 100)[1]	Rate of exchange, Canadian dollar equals ---------------cents, U.S.[2]	Wholesale price indexes, Canada, Wood, Wood Products and Paper (1935-1939 = 100) in U.S. dollars.	Wholesale price index, U.S., lumber (1926 = 100)[3]	Protective equivalent of 1930 duty in each year.	Duty levied on Softwood Boards, (4103300 - 4108000) tar.par. 401.[4] M bd.ft.
1930	100.3	99.842	103.8	85.8	.55	$ .28
1931	84.5	96.326	84.5	69.5	.55	.55
1932	75.3	88.090	66.5	58.5	.51	1.50
1933	78.1	91.959	74.8	70.7	.48	3.99
1934	87.2	101.006	91.5	84.5	.49	3.98
1935	86.4	99.493	89.2	81.0	.50	3.95
1936	97.0	99.913	100.5	84.5	.54	1.98
1937	109.7	100.004	113.9	99.0	.52	1.78
1938	99.2	99.419	102.1	90.4	.51	1.59
1939	106.4	96.018	106.2	93.4	.51	1.21
1940	118.5	85.141	104.9	102.9	.46	1.37
1941	137.1	87.345	124.2	122.5	.46	1.48
1942	152.8	88.379	140.2	132.8	.48	1.53
1943	170.2	89.978	159.0	138.5	.54	1.58
1944	183.9	89.853	171.7	152.7	.51	1.60
1945	185.2	90.485	174.3	155.1	.51	1.61
1946	197.7	93.288	191.5	178.4	.48	2.11
1947	262.7	91.999	250.6	277.2	.41	2.00*
1948	330.1	91.691	314.0	313.0	.45	1.00
1949	349.2	92.881	337.7	286.0	.53	1.00
1950	388.2	91.474	378.5	327.4	.52	1.00

7	7a	8	9
Protective equivalent of current duty in each year.	Index of Protective equivalent of current duty, 1931 = 100.	Imports of Softwood Boards (4103300-4108000) from Canada as percent of total U.S. production of Softwood lumber - Quantity.[5]	Ad valorem equivalent of duty on Softwood Boards, (4103300-4108000) tar. par. 401.[4]
.28	51	4.97%	1.26%
.55	100	3.23	2.75
1.41	256	3.59	8.12
3.47	630	2.34	18.96
3.56	648	1.77	16.60
3.58	650	2.05	16.82
1.95	354	2.47	8.81
1.68	305	2.27	7.04
1.48	269	2.28	7.32
1.13	205	2.60	5.35
1.15	309	2.16	5.24
1.24	226	3.88	4.96
1.33	242	4.37	4.56
1.49	270	2.15	9.37
1.48	269	2.64	3.49
1.49	270	3.31	3.28
1.78	324	2.07	3.03
1.49	271	3.10	n.a.
.82	149	n.a.	n.a.
1.00	182	10.26	n.a.
.95	173	3.14	n.a.

FOOTNOTES TO TABLE IV

1 Canada, Dominion Bureau of Statistics, Canadian Statistical Review, 1953 Supplement, Ottawa, Queen's Printer, 1953, p. 56.

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125, December, 1953, p. 1409.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1926-1928); Ibid., 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-45, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1952, p. 275 (1950). Indices for 1940-1950 are from the new series beginning in 1936, and are not strictly comparable to the preceding series. This difficulty is ignored, since the cost measure for which the series is used is an extremely rough one.

4 ________, Foreign Commerce and Navigation of the United States, annual volumes, see Table No. I, note 4 for specific sources within these volumes. Free until June 17, 1930. The computation of a protective equivalent must begin with 1930, but previous data is given for comparison of free imports with imports under the duty. The specific duty and its ad valorem equivalent are here computed by dividing the total duty collected by the total quantity (M bd. ft.) imported, and by the total value of imports, respectively. This is not an accurate measure of the impact of a duty, to the extent that there is significant cross-elasticity of demand for the different types of softwood boards. The error is negligible ire this case, however, as the discrimination between types was not consistent. Rather it is of this type: duty effective June 18, 1930 is $1.00 per M bd. ft., except some from Canada free, Canada being a "contiguous country admitting free of duty (certain U.S. lumber)"; duty effective June 21, 1931 is $4.00 per M bd. ft. on fir, hemlock, spruce and Pine. $3.00 per M bd. ft. on other softwood boards, except $3.00 per M bd. ft. on above types from "contiguous country admitting free....."; and for 1933, 1934 and 1935, none was admittedfree, and there was a "countervailing duty" of $3.00 per M bd. ft. on other softwood.

5 United States Imports obtained from Ibid. same volumes and tables as for the duties. U. S. production from ________, Statistical Abstract of the United States, 1948, p. 723 (1923, 1925, 1927, 1929-1941), and Ibid., 1943, p. 703 (1922, 1924, 1926, 1928). The U.S. production data excludes mills cutting less that 50 M bd. ft.

* Data on duty actually collected not available. The rate on softwood lumber (except ceder) is 50¢ per M bd. ft.+$1.50 per M bd. ft. IRC (not applied to domestic lumber). T.D. 48033 effective January 1, 1936, T.D. 51802, effective January 1, 1948, reduced the duty to 25¢ per M bd. ft.+75¢ IRC.

twice the level of imports since 1930. Our first conclusion, arrived at in this rough manner, is that the imposition of the tariff was effective in reducing imports, or in protecting domestic producers.

The more detailed analysis is confined to the years 1930 through 1950, during which various rates of duty were imposed. 1931 is used as the base year for the computation of the protective equivalent, as it was the first full year in which the duty was effective. The duties in column 6 are the sums of the tariff schedule duty and an Internal Revenue Code excise tax which was levied on imported, but not on domestic, boards, and a countervailing duty. (See footnote 4 to Table IV.) Small amounts were admitted free, or at reduced rates, causing the figures in column 6 to show more variation than the statutory changes in the duty and excise tax provided for. The fifty-five cent rate shown for 1931 is the result of large amounts of free imports--actually the rate was $1.00 per thousand board feet, the same as it was in 1948-1950, after the Geneva Agreement.

An examination of column 5, which modifies the 1931 duty of fifty-five cents by applying cost (price) relatives for each year, shows that changes in costs or prices had little effect on the protection afforded by the duty. The fifty-five cent base is fictitious, as explained above, but this makes no difference. If one should use the $1.00 statutory rate, it would be modified in the same proportions

--the figure for 1950 would be 94 or 95. It is not the absolute value of any of the figures in column 5, but the small differences between any of the figures that indicate the constancy of the relative prices of Canadian and United States lumber.

This result is probably "built in," and due to the narrow coverage of the price indexes employed. Each index is virtually a price series for the commodity used as an example. Since the United States market is the larger, and of great importance to Canadian producers, their lumber prices probably follow the United States prices closely. Had we been able to obtain indexes of factor costs which were less influenced by current prices of softwood boards, we might have observed different results. Common sense leads one to suspect that, as the timber becomes smaller, scarcer and less accessible in the United States, and as more virgin timber becomes commercially accessible in Canada, the latter's industry gains cost-wise relative to the former's industry. One cannot be certain of this, however, and there is not available to us a set of cost indices that would test the hypothesis.

One might next ask whether the tariff, imposed in 1930, subsequently raised, then lowered, might not have depressed the Canadian prices of lumber--i.e., whether the small, exporting, country was forced to bear the burden of the tariff. Since the tariff increased after 1931, and did not return to the 1931 level, and since the figures in column 5 are consistently below .55 for all years after 1931, it appears that some of the burden was absorbed by the Canadian producers. The *ad valorem* equivalent of the duty was never great (between three percent and seven percent in all but the years 1932-1936, and between eight and nineteen percent in those years); so the small decreases in the protective equivalent of the 1931 duty (column 5) may reflect the absorption of a good part of the burden by Canadian producers. There is not a close relation between the *ad valorem* equivalent of the duty and the decrease in Canadian prices relative to United States prices. From 1931 through 1936, the tariff averaged 12.7 percent *ad valorem*, while the figures in column 5 were depressed below 55¢ by an average of 5.1 percent. From 1936 through 1940, the tariff averaged 6.7 percent *ad valorem*, while column 5 averaged 7.3 percent below 55¢. From 1941 through 1945, the tariff averaged 5.1 percent *ad valorem*, while column 5 averaged 9.1 percent below 55¢. It is safe to conclude that Canadian prices did bear a part of the burden of the tariff--we cannot say that they consistently bore any given portion of it.

Columns 7 and 7a show the duty collected in each year, modified by the price relatives. As expected, these do not differ much from the unadjusted duties given in column 6, though they are consistently lower. All that we can conclude from this is that the tariff, and changes in the tariff (including the excise tax, the countervailing duty and the allowance of free imports), were much more important during the period studied than were changes in prices. Also, comparing imports in this period with imports in the 1920's (five to six percent of domestic production) confirms the importance of the tariff.

Correlation analysis yields confirmation of the effect of the tariff on imports. Rank correlation of the index of the protective equivalent of the current duty (column 7a) with imports as a percent of domestic production (column 8) has a coefficient of -.47. Removing the time trends from both series leaves a coefficient of -.49. Coefficients of this size are not convincing, but they indicate some sensitivity to the cost components of the protective equivalent. When separated from other costs, the tariff shows up as a strong influence on imports. The second order partial coefficient relating the duty to imports, with other costs and time constant, is -.68. This is significant at the one percent level. The other costs, by themselves, do not appear significant. The corresponding second order partial coefficient for costs is -.24, which is not significant at the ten percent level. The closeness with which Canadian lumber prices followed United States prices probably accounts for this.

Cattle

The cattle example, shown in Table V, is limited to the years before 1942, because of the embargo discussed above. Here one is dealing with a much greater tariff burden--the *ad valorem* equivalent ranging from eighteen percent to more than ninety-six percent. Here, apparently, Canadian producers absorbed little of the tariff burden in the form of depressed prices for cattle and related products until 1935. The protective equivalent of the 1922 duty (column 5) shows little decline below its 1922 figure of .0156 until 1935; then its maximum decline is 27.5 percent, to .0113 in 1935 and in 1937. The average value of column 5 for 1935 through 1941 is 21 percent below .0156. Columns 3 and 4 clearly show that a rapid rise in United States livestock and poultry prices occurred in 1935, which was not matched by a rise in Canadian "animals and their products." This is not due to the use of a broader index of Canadian prices--a check of Canadian livestock prices[9] shows that they rose no more rapidly than the prices shown in column 1 of Table V.

The tariff collected in each year is shown in column 6. It is "constructed" as the average duty per pound of cattle entered. From 1922 through June 17, 1930, it averages the one and one-half cent rate on light cattle and the two cent

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[9] Dominion Bureau of Statistics, *Op. Cit.*, p. 55.

TABLE V, CANADA - CATTLE

	1	2	3	4	5	6
Year	Wholesale price index, Canada - weighted, animals and their products (1926 = 100).[1]	Rate of exchange, Canadian dollar equals ——— cents, U.S.[2]	Wholesale price index, Canada-weighted, animals and their products (1926=100) in U.S. dollars.	Wholesale price, U.S. livestock and poultry. (1926 = 100).[3]	Protective equivalent of 1922 duty in each year.	Duty levied in each year on cattle, (0010600—0010900) tar. par. 101.[4]
1922	96.0	98.478	96.0	83.2	.0156	.0156
1923	95.0	98.035	94.6	77.7	.0165	.0153
1924	91.8	98.732	92.0	79.3	.0157	.0158
1925	100.3	99.962	101.8	98.9	.0139	.0155
1926	100.0	99.989	101.5	100.0	.0137	.0152
1927	101.9	99.972	103.4	98.9	.0141	.0155
1928	108.1	99.909	109.7	105.4	.0141	.0153
1929	109.0	99.247	109.9	106.1	.0140	.0153
1930	99.1	99.842	100.5	89.2	.0152	.0151
						.0259
1931	73.9	96.326	72.3	63.9	.0153	.0255
1932	59.7	88.090	53.4	48.2	.0150	.0252
1933	59.4	91.959	55.5	43.4	.0173	.0251
1934	67.2	101.006	68.9	51.5	.0181	.0252
1935	70.4	99.493	71.1	85.1	.0113	.0267
1936	71.8	99.913	72.8	84.7	.0116	.0214
1937	78.4	100.004	79.6	95.5	.0113	.0225
1938	76.7	99.419	77.4	79.0	.0132	.0218
1939	74.1	96.008	72.2	72.2	.0135	.0192
1940	79.1	85.141	68.4	69.2	.0134	.0198
1941	92.4	87.345	82.0	91.6	.0121	.0202

7	7a	8	9	10	11	12
Protective equivalent of current duty in each year.	Index of protective equivalent of current duty (1922 = 100).	U.S. imports of cattle from Canada as percent of domestic receipts of cattle and calves by all stockyards (no. of cattle).[5]	Ad valorem equivalent of duty on cattle (0010600-0010900) tar. par. 101.[6]			
.0156	100	.887	45.84			
.0161	103	.492	35.20			
.0159	102	.551	34.43			
.0138	89	.618	28.86			
.0134	86	.684	27.73			
.0140	90	1.245	24.49			
.0138	89	1.294	19.14			
.0137	88	1.213	18.31			
.0147	94	.2742	21.01			
.0253	162		38.08			
.0250	160	.100	45.37			
.0242	155	.035	61.93			
.0278	178	.008	96.64			
.0292	187	.007	87.50			
.0193	124	.522	60.98			
.0159	102	1.037	47.02			
.0163	105	1.317	39.16			
.0185	119	.667	54.99			
.0166	107	1.341	38.76			
.0170	109	1.077	38.96			
.0157	101	1.106	36.35			

FOOTNOTES TO TABLE V

1 Canada, Minister of Trade and Commerce, The Canada Yearbook, 1939, Queens Printer and Controller of Stationery, Ottawa, 1939, p. 855 for years 1922-1938. Ibid., 1942, p. 731 for years 1939-1941. This series is not continued beyond 1941, so the study must be terminated with that year, as no comparable series is available. The index is called: "Annual weighted index numbers of wholesale prices of commodities by groups (1926=100) — animals and their products (74-76 products)".

2 See Table I, note number 2 . For years 1939-1941, the free rate is used rather than the "official rate".

3 See Table II, note 3.

4 See Table II, note 4.

5 See Table II, note 5.

6 See Table II, note 6.

rate on heavy cattle. From June 17, 1930, through 1935 it averages the two and one-half and three cent rates; from 1936 through 1941 it averages the Trade Agreement rates of one and one-half and two cents, with some higher rates for imports above a tariff quota. The discussion of cattle from Mexico in Chapter IV pointed out that these averages are for all imports; thus understating the duty on Canadian cattle, which tend to be in the "heavy" category.

It is clear that, through 1934, changes in the tariff had marked effects on the imports of cattle from Canada as a percent of domestic production (column 8). Beginning in 1935, a combination of tariff reduction and increases in domestic costs (prices) are associated with a recovery of imports to their pre-1930 level. The income effects of the first depression years, and the herd cycle phenomena of the cattle market serve to make one less confident of any precise conclusions, but the association is too clear to be dismissed because of these qualifications. Common sense confirms this result, since one can see that declines in cattle prices caused the 1933 duty to be 96.6 percent _ad valorem_, and cattle imports virtually ceased in that year.

Correlation tests show that there is a clear relation between the tariff and imports as percents of domestic stockyard receipts. The protective equivalent of the current duty, which includes all costs, including the tariff, correlates with imports as percents of domestic stockyard receipts with a coefficient of -.83. This is the result of product-moment correlation with a time trend removed. It is significant at the one percent level. Rank correlation, with time removed, has a coefficient of -.48. The *ad valorem* equivalent of the tariff correlates with imports as percents of domestic stockyard receipts with a coefficient of -.70, with time effects accounted for. With the removal of the effects of the other costs, the second order partial coefficient becomes -.68. This is significant at the one percent level. The other costs correlate with imports with a coefficient of -.25; not significant. Thus the effect of the tariff shows up quite strongly, with or without removal of the effects of the other costs. The other costs themselves do not seem to have a clear effect on imports.

Aluminum

Aluminum imports and tariffs are analyzed in Table VI. The tariff (column 6) was reduced several times--this was one of the very few rates reduced in 1930; it was reduced by Trade Agreement in 1939, and by the Geneva General Agreement on Tariffs and Trade in 1948. Column 5 shows that changes in relative prices were slight through 1938. These prices are for non-ferrous metals in both cases. Virgin aluminum ingot had a weight of only 3.1 percent in

TABLE VI, CANADA - ALUMINUM

	1	2	3	4	5	6
Year	Wholesale price indexes, Canada non-ferrous metals (1935-39 = 100)[1]	Exchange rate, Canadian dollar equals ---------cents, U.S. [2]	Index of wholesale prices, Canada, non-ferrous metals in U.S. dollars.	Wholesale price index, U.S., non-ferrous metals (1926 = 100)[3]	Protective equivalent of 1923 duty on Aluminum (630210O) tar. par. 374.	Duty levied in each year on Aluminum metal, crude and alloy (6302100)[4]
1926	136.0	99.989	136.0	100.0	5.00	5¢ lb.
1927	124.4	99.972	124.4	91.8	4.98	5
1928	125.1	99.909	125.0	94.0	4.89	5
1929	134.9	99.247	133.9	106.1	4.64	5
1930	109.7	99.842	109.5	82.4	4.89	4.53
1931	87.9	96.326	84.7	61.9	5.03	4
1932	80.2	88.090	70.7	49.8	5.22	4
1933	87.5	91.959	80.5	59.6	4.97	4
1934	87.5	101.006	88.4	67.7	4.88	4
1935	95.7	99.493	95.2	68.6	5.10	4
1936	97.6	99.913	97.5	71.6	5.01	4
1937	107.7	100.004	107.7	89.6	4.42	4
1938	98.9	99.419	98.3	72.8	4.96	4
1939	100.0	96.018	96.0	78.0	4.52	3
1940	106.9	85.141	91.0	81.3	4.12	3
1941	107.2	87.345	93.6	84.4	4.08	3
1946	108.0	93.288	100.8	99.7	3.72	3
1947	130.2	91.999	119.8	140.3	3.14	3
1948	146.9	91.691	134.7	157.5	3.14	2
1949	145.2	92.881	134.9	144.3	3.44	2
1950	159.5	91.474	145.9	150.5	3.56	2

7	7a	8	9	10	11	12
Protective equivalent of current duty on Aluminum metal, crude and alloy (6302100) tar. par. 374.	Index of protective equivalent of current duty on Aluminum (1926 = 100)	U.S. imports of Aluminum from Canada as percent of total U.S. imports of Aluminum (6302100) - Quantity [4]	U.S. imports of Aluminum from Canada as percent of total U.S. imports of Aluminum (6302100) - Value [4]	U.S. imports of Aluminum (6302100) from Canada as percent of U.S. production of Aluminum primary metal - Quantity [5]	U.S. imports of Aluminum (6302100) from Canada as percent of U.S. production of Aluminum primary metal - Value [5]	Ad Valorem equivalent of U.S. duty on Aluminum metal and alloy, (6302100) tar. par. 374. [4]
5.00	100	25.8	25.7	13.1	11.7	21.75
4.98	100	58.2	55.2	25.7	21.5	23.51
4.89	98	61.3	60.1	11.0	9.7	24.12
4.64	93	58.8	55.3	12.5	9.6	25.62
4.43	89	46.3	40.5	5.1	3.7	24.75
4.02	80	23.1	19.0	1.8	.6	23.0
4.18	84	34.2	32.5	2.6	2.0	25.0
3.97	79	12.3	10.6	2.4	2.0	22.3
3.84	77	16.8	15.4	4.2	3.9	20.6
4.08	82	24.7	26.3	4.4	4.3	23.1
4.01	80	11.9	14.5	1.3	1.4	24.7
3.54	71	57.3	60.3	8.8	7.3	26.4
3.97	79	13.9	15.6	.8	.7	28.5
2.71	54	41.9	42.2	2.3	1.6	21.6
2.47	49	86.3	85.5	7.3	5.3	22.6
2.45	49	99.1	98.8	4.1	3.3	23.2
2.23	45	99.9 *	99.8	10.1	8.6	21.4
1.88	38	98.2	98.7	2.8	2.3	26.5
1.26	25	93.1	88.9	12.4	10.5	17.0
1.37	27	91.8	86.9	11.8	9.9	
1.43	29	87.9	84.5	21.6	17.3	

FOOTNOTES TO TABLE VI

1 Canada, Dominion Bureau of Statistics, Canadian Statistical Review, 1953 Supplement, Ottawa, Queen's Printer, 1953, p. 57.

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p.74, January, 1948, p. 125, December, 1953, p. 1409.

3 U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1922-1928); Ibid, 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-45, p. 418, (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1952, p. 275 (1950).

4 --------, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. Duties in 1947-1950 from --------, Schedule A, August 1, 1950, corrected to May 1, 1952. Imports in 1947-1950 from --------, Report No. FT110, U. S. General Imports of Merchandise, annual summaries. Duty for 1922 is computed as 2.84¢ lb. -- duty was 2¢ lb. until September 21 and 5¢ lb. thereafter. Since it is not known what portions of 1922 imports came in the two periods, time is used as the weight, i.e. 2¢ x .72 + 5¢ x .28 = 6¢ weighted average duty for the year. Duty in 1930 is computed as 4.53¢ lb. -- it changed from 5¢ to 4¢ on June 17; 53% of total U. S. imports were entered before June 17, and 47% after June 17 -- hence .53 x 5 + .47 x 4 = 4.53¢.

5 Imports from Ibid. U. S. production from --------, Statistical Abstract of the United States, 1950, p. 697, and 1952, p. 721.

* Approximately 27% of imports from Canada free of duty in 1946.

the United States index[10], and an unknown weight in the Canadian index. The fact that aluminum prices in both countries were subject to administration by monopolistic firms with common elements of control did not, then, assure this constancy of the price relatives. Other non-ferrous metal prices may have been subject to administration, and may not be entirely relevant to aluminum costs, but these are the best indicators that could be found.

After World War II the picture changed a little. The war years were omitted because of government intervention in the importing of aluminum. The post-war years found domestic prices increasing more rapidly than prices in Canada, so that column 5 shows a decline in the protective equivalent of the 1926 duty for 1946 through 1950.

The protective equivalent of the current duty (columns 7 and 7a) reflects almost exactly changes in the statutory tariff rate for the entire pre-war period. By 1948, however, the equivalent was reduced to 25 percent of its 1926 level; whereas tariff reductions would have reduced it only to 40 percent of the 5 cent 1926 rate. It cannot be inferred that even the combination of post-war tariff and price effects was solely responsible for the great increase in imports from Canada relative to total

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10 United States Department of Labor, Wholesale Prices, 1950, Washington, G.P.O., 1950, p. 32.

imports and relative to domestic production (columns 8, 9, 10 and 11). There were too many changes in productive capacity in all the producing nations, and too many rapid changes in demand for the metal, to be able to state such a result with confidence.

In this example, in which we should be content to admit that tariffs and costs might play little part in determining imports, we obtain interesting results from correlation tests. The results are summarized in table 5 - 1.

Table 5 - 1

Results of Correlations of ad valorem equivalent of the duty, of other costs, and of the protective equivalent of the current duty with imports of aluminum from Canada

	Simple Correlation	Time held Constant
1-Partial correlation, a.v. equiv. of the duty with imports from Canada as percents of domestic production, quantity --with time and costs constant		-.44
2-Partial correlation, costs with imports from Canada as percents of domestic production, quantity--with time and the duty constant		-.47
3-Rank correlation, the p.e. of the current duty with imports from Canada as percents of domestic production, value	-.35	-.72
4-Rank correlation, the p.e. of the current duty with imports from Canada as percents of total U.S. imports, value	-.33	-.15
5-Rank correlation, the p.e. of the current duty with imports from Canada as percents of domestic production, quantity	-.25	-.47

In the first place, it seems as if isolation of the tariff effects results in showing a negative correlation between the tariff and imports, by quantity, that is significant. The coefficient, -.44, is significant at the five percent level. Second, isolation of the other costs results in the same order of relation; the coefficient, -.47, is also significant at the five percent level. Third, item 5 of table 5 - 1 shows that rank correlation of the protective equivalent with imports by quantity, removing time, results in a coefficient of -.47. There is no significance test for the latter. Fourth, rank correlation of imports as percents of domestic production, by value, with the protective equivalent results in a coefficient of -.72. Item 4 of table 5 - 1 shows coefficients of little significance relating the protective equivalent to Canada's share of total imports. These results are surprising, considering the common ownership of the industry in both countries. One would expect that the division of the market would be accomplished along lines convenient to the joint owners, and that it would be quite insensitive to market price influences. Rationally, however, the joint owners would be correct to allow the market to be divided according to changes in the costs in the two producing countries. Thus perhaps such a product would be as sensitive to cost changes as would one produced in highly competitive industries. One basic fact is hard to explain:

why there should be a tariff separating two parts of such a market. Historically, imports from Europe were of considerable importance; perhaps justifying protection, in the eyes of Canadian-United States producers. In recent years, the United States market is shared by several producers, so protection will probably continue.

Nickel

The nickel example of Table VII uses the same price series that was used for the aluminum example. The war years were also omitted, for the same reason. The protective equivalent of the current duty therefore reflects principally changes in the tariff rate--and there was only one pre-war change--the reduction of January 1, 1939. In the post-war years, the tariff rate was reduced by fifty percent, in 1948, and domestic prices rose faster than Canadian prices. Inspection of columns 7 and 8 shows little relation between the protective equivalent and Canada's contribution to imports. Canada had become the source of more than ninety percent of imported crude nickel by 1929, and there has been little change, except that all imports came from Canada in some war years. Data on domestic production are available for only six years. The six years' data do not show any relation between the protective equivalent and Canada's contribution to total consumption of crude nickel. This is to be expected, for a

TABLE VII, CANADA - NICKEL

	1	2	3	4	5	6
Year	Wholesale price indexes, Canada, Non-ferrous metals, (1935-39 = 100)[1]	Rate of exchange, Canadian dollar equals ———— cents, U.S.[2]	Wholesale price indexes, Canada, Non-Ferrous metals, (1935-39 = 100) in U.S. dollars.	Wholesale price index, U.S. Non-Ferrous metals (1926 = 100).[3]	Protective equivalent of 1926 duty on Nickel and alloys in pigs, ingots, etc., (654200) tar. par. 389.	Duty levied in each year on Nickel and alloys in pigs, ingots, etc., (654200) tar. par. 389.[4]
1926	136.0	99.989	136.0	100.0	3.00	3.0 ¢ lb.
1927	124.4	99.972	124.4	91.8	2.99	3.0
1928	125.1	99.909	125.0	94.0	2.93	3.0
1929	134.9	99.247	133.9	106.1	2.78	3.0
1930	109.7	99.842	109.5	82.4	2.93	3.0
1931	87.9	96.326	84.7	61.9	3.02	3.0
1932	80.2	88.090	70.7	49.8	3.13	3.0
1933	87.5	91.959	80.5	59.6	2.98	3.0
1934	87.5	101.006	88.4	67.7	2.88	3.0
1935	95.7	99.493	95.2	68.6	3.06	3.0
1936	97.6	99.913	97.5	71.6	3.00	3.0
1937	107.7	100.004	107.7	89.6	2.65	3.0
1938	98.9	99.419	98.3	72.8	2.98	3.0
1939	100.0	96.018	96.0	78.0	2.71	2.5
1940	106.9	85.141	91.0	81.3	2.47	2.5
1941	107.2	87.345	93.6	84.4	2.45	2.5
1946	108.0	93.288	100.8	99.7	2.23	2.5
1947	130.2	91.999	119.8	140.3	1.88	2.5
1948	146.9	91.691	134.7	157.5	1.89	1.25
1949	145.2	92.881	134.9	144.3	2.06	1.25
1950	159.5	91.474	145.9	150.5	2.14	1.25

7	7a	8	9	10	11	12
Protective equivalent of current duty on Nickel and alloys, in pigs, ingots, etc. (654000) tar. par. 389.	Index of protective equivalent of current duty on Nickel and alloys (654000) (1925 = 100).	U.S. Imports of Nickel and alloys (654000) from Canada as percent of total U.S. imports of Nickel and alloys (654000) - Quantity.[4]	U.S. Imports of Nickel and alloys (654000) from Canada as percent of total U.S. imports of Nickel and alloys (654000) - Value.[4]	Ad valorem equivalent of U.S. duty in each year on Nickel and alloys (654000) tar. par. 339.[4]	U.S. Imports of Nickel and alloys (654000) from Canada as percent of total U.S. production of Nickel[5] and Nickel Alloy Metal, quantity.	
3.00	100	73.1	62.3	11.2%		
2.99	100	74.6	66.8	11.4		
2.93	98	85.4	80.7	11.9		
2.78	93	91.4	87.6	11.8		
2.93	98	99.3	99.3	12.0		
3.02	101	80.9	97.5	12.0		
3.13	104	86.9	84.5	12.0		
2.98	99	96.6	95.9	12.1		
2.88	96	92.5	91.3	11.8		
3.06	102	97.8	97.0	11.9		
3.00	100	98.4	97.8	11.9		
2.65	88	97.7	97.4	12.1	378	
2.98	99	98.0	97.6	12.0	316	
2.26	75	98.5	98.2	10.0	420	
2.06	69	99.9	99.9	10.0		
2.04	68	100.0	100.0	10.0		
1.86	62	99.4	99.1	9.2	314	
1.57	52	96.5	97.0	n.a.	267	
.79	26	94.3	94.9	n.a.	286	
.86	29	93.1	93.9	n.a.		
.89	30	93.7	93.9	n.a.		

FOOTNOTES TO TABLE VII

[1] Canada, Dominion Bureau of Statistics, Canadian Statistical Review, 1953. Supplement, Ottawa, Queen's Printer, 1953, p. 57.

[2] Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125, December, 1953, p. 1409.

[3] U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1926-1928); Ibid., 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid. 1941, p. 356 (1936-1940); Ibid., 1944-45, p. 418 (1941-1943), Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1952, p. 275 (1950).

[4] _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. Duties in 1947-1950 from _______, Schedule A, August 1, 1950, corrected to May 1, 1952. Imports in 1947-1950 from _______, Report No. FT110, U.S. General Imports of Merchandise, annual summaries. Duty reduced effective January 1, 1939, Trade Agreement and effective January 1, 1948, G.A.T.T., T.D. 51802.

[5] Imports from Ibid. United States production from U.S. Tariff Commission, Summaries of Tariff Information, volume 3, part 5, p. 115.

commodity such as nickel, produced by a very few firms, would not be responsive to small changes in protection. The tariff is not high; its *ad valorem* equivalent being from nine to twelve percent. While protection may be important in maintaining domestic smelting and fabricating industries, the effects of changes in the level of protection could not be expected to show up in a short time series.

Correlations show little of significance, as might be expected. Rank correlation of the current protective equivalent with imports from Canada as percent of total imports yields a coefficient of -.31. Removal of time trends from both series leaves a coefficient of -.11. Rank correlation of the *ad valorem* equivalent of the duty with the same measure of imports yields a coefficient of +.08. Removal of time trends leaves a coefficient of +.54. The partial coefficient of the second order, relating the tariff to Canada's share of total imports, is +.67. That relating the other costs to Canada's share is +.02. Nothing can be learned from this, except that it is fruitless to try to find the effects of small price or cost changes in this type of market. It may be that only agricultural and forest products commodities will yield meaningful results, though aluminum showed surprisingly "good" results.

Balance of Payments

The next test of the protective equivalent is an examination of the occasions in which the Canadian currency was depreciated with respect to the United States dollar. If it can be shown that depreciation was related to failure to sell enough in United States markets, then one can ask whether the protective equivalents of the current duties on some of the major imports from Canada are indicating this difficulty.

There are several obstacles in the way of making such a test of the protective equivalents of duties on commodities imported from Canada. First, there have been no major depreciations of the Canadian dollar. In 1932 the free rate fell from 96 cents to 88 cents, and in 1940 it fell from 96 cents to 85 cents. It is not known what proportion of all transactions took place at the free rate, and what proportion were completed at the official rate, or at rates specified in previous contracts. Even if large dollar volumes of transactions took place at these reduced rates, the reductions are not large. They were not the results of official action, thus they do not necessarily indicate that there was any pressure on the Canadian government to correct a balance of payments condition.

The second difficulty in the way of using this test is the fact that our commodity sample is so small a portion of Canadian exports to the United States. Canada is not a "small country" in the sense that Australia or Mexico is "small." It does not depend upon one or a few products to provide its foreign exchange, nor to provide its United States dollars. Rather, the Canadian economy is linked to the United States economy with thousands of well developed commercial relationships. Neither four nor twenty commodities would be sufficient to indicate the nature of Canadian-United States trade. Canada, though closely related to Great Britain in trade, is not considered to be in the Sterling Area, but rather, in the "dollar area." While Sterling area currencies depreciated by thirty percent in relation to the United States dollar in 1949, the Canadian dollar became stronger, soon selling at a premium in New York. The small discount on the Canadian dollar which existed for most of the 1930's and 1940's was probably due as much to Canada's capital position as to trade relations. It is undoubtedly true that increases in United States duties made it less likely that the discount on the Canadian dollar would disappear, but it would be hard to identify the commodities which would illustrate this with any certainty.

The attempt to discover whether the protective equivalent can tell us anything about Canada's balance of payments problems is summarized in table 5 - 2. The attempt must be ruled a complete failure. There is no need to analyze the results in detail, for casual inspection of

Table 5 - 2

Variations in certain factors affecting Canada's balance of payments in the two years preceding, and one year following depreciation of the Canadian dollar

	1932		
	Softwood Boards	Cattle	Aluminum
1-Changes in the Prot. Equiv.			
a. from 1st year preceding depreciation to yr. of depr.	+158 pts.	- 5 pts.	+4 pts.
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	+ 53 pts.	-66 pts.	-9 pts.
c. from yr. of depr. to yr. following depr.	+282 pts.	-23 pts.	-5 pts.
2-Changes in U.S. imports from Canada as percent of domestic production			
a. from 1st year preceding depreciation to yr. of depr.	+ .36%	-.065%	+ .8%
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.	-1.74%	-.174%	-3.3%
c. from yr. of depr. to yr. following depr.	-1.25%	-.027%	- .2%
3-Changes in Canada's balance on current account with the U.S.			
a. from 1st year preceding depreciation to yr. of depr.		+$ 9 mil.	
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.		+ 35 mil.	
c. from yr. of depr. to yr. following depr.		+ 14 mil.	
4-Changes in Canada's balance on current account with all countries			
a. from 1st year preceding depreciation to yr. of depr.		+$20 mil.	
b. from 2nd yr. preceding depr. to 1st yr. preceding depr.		+ 40 mil.	
c. from yr. of depr. to yr. following depr.		+ 23 mil.	

Source: Dominion Bureau of Statistics, Canadian Statistical Review, 1953 Supplement, Ottawa, 1953, p. 126.

	1940		
Softwood Boards	Cattle	Aluminum	Expected direction of Change
+ 2 pts.	+ 2 pts.	- 5 pts.	-
-64 pts.	-12 pts.	-25 pts.	+
- 2 pts.	- 8 pts.	0	-
- .44%	-.264%	+5.0%	+
+ .32%	+.674%	+1.5%	-
+1.72%	+.029%	-3.2%	+
	-$44 mil.		+
	+ 8 mil.		-
	- 7 mil.		+
	+$ 5 mil.		+
	+ 7 mil.		-
	+ 86 mil.		+

table 5 - 2 will show that nothing can be learned from this test. Nickel was omitted from the table, because there are no data on domestic production. In the last column, the "expected direction of change" of the variables is based on the assumption that the depreciation would have effects on trade in the year in which it occurred. That is, the protective equivalent should decline, imports as percent of domestic production should increase and Canada's balance on current account should change in the positive direction. It makes little difference what assumption is made--no consistent results can be observed. Disregarding the magnitudes of the changes shown in the table, there are a few more changes in the "wrong" direction than there are in the expected direction. This is roughly true of all of the variables in the table. The best result that can be inferred from this test is that at least the protective equivalent does not provide a "false reading." It indicates nothing, and the other variables indicate nothing.

Summary

In summary, Canadian trade and United States import duties have been studied via a sample of four commodities--one agricultural, one forest and two mineral products. The cattle, lumber and aluminum examples are clearly supplementary products, whose increasing imports are due to relatively more abundant resources in Canada than in the

United States. The fourth, nickel, is supplementary in the smelted and fabricated states, though it is complementary (i.e., the United States produces only a small portion of its needs) in the raw state.

The Canadian case was approached in much the same way that the Australian and Mexican cases were approached, with some modifications caused by differences in the commodity examples and the data concerning them. The limitations to be expected from the use of such data were admitted. The non-price characteristics of some of the markets were made explicit. A detailed analysis of the component parts of the protective equivalents was performed. This was briefer than the analyses of the two preceding chapters, because there was less to learn from the examples in this chapter. Fourth, results of a correlation analysis were presented. Fifth, an attempt was made to relate depreciations of the Canadian dollar to the evidence provided by the studies of the protective equivalents.

First, the commodities were selected more on the basis of convenience of the data than on any other basis. The data were satisfactorily complete for the first three examples, but not for the fourth. Price indexes to be used as measures of costs are hard to choose in most of these examples. Comparability between Canadian and United States indexes was achieved for softwood boards and for the mineral products. The "animals and their products" Canadian index was not comparable to the "livestock and poultry" index of the United States, but examination of a livestock Canadian index showed that little difference resulted. The principal complaint against the livestock and lumber indexes is that they are too narrow--i.e., that the price of the example commodity affects the composite too much. The complaint against the non-ferrous metals indexes is that many of their components may be irrelevant. In any case, the best available were used, and the results must suffer for the inadequacies.

Second, doubts concerning the usefulness of price analysis in some of the markets were justified in the nickel case. For cattle and lumber, produced under competitive conditions, the price analysis of this chapter makes sense, in spite of the reservations. In the two minerals markets, our worst fears are realized only for the case of nickel. That is not a truly supplementary import; this fact may be the source of the difficulty.

Third, the construction of the protective equivalents yielded some direct knowledge and some by-product knowledge in the competitive cases, and little knowledge in the concentrated minerals industries cases. It is clear that the tariff was effective in limiting imports of softwood boards, though the rates were low. It is also clear that Canadian lumber and timber prices follow closely those of the United States. There also seems to have been some absorption of the tariff burden by Canadian producers--not enough, however, but that changes in the tariff rate caused changes in imports. The duties on cattle were much higher--as high as 96.6 percent *ad valorem* in one year. Through 1934, there were little changes in Canadian prices of livestock relative to United States prices, but tariff changes caused large changes in imports. In 1935 and later years, Canadian prices suggest some absorption of the tariff burden, and these plus lowered duties were associated with recovery of their portion of the market by Canadian producers. Aluminum (non-ferrous metal) prices in the two countries maintained a remarkably constant relation to each other through 1938, but Canadian prices fell behind after that time. The price changes and the several tariff rate changes seemed to have equally modest effects upon imports, however. The non-competitive nature of the market and the growth pattern of the industry were not sufficient to eliminate all of the price effects. Nickel shows different results. The tariff rates were modest, Canada is the source of more than ninety percent of imports, and there is not much more to discover.

Fourth, correlation tests yielded results consistent with the visual examination of the tables. For cattle, the result of rank correlation is of the same order as it was for the Mexican cattle example. Multiple correlation showed that the tariff was closely related to imports, while costs were not so closely related. For lumber, multiple correlation gave the same sort of results. It was surprising that fairly strong cases could be made for both tariff and cost effects upon imports of aluminum. The nickel case yielded no useful results. In all, correlation seems to provide a good check of the common-sense or informal analysis--yielding results in the cases in which we expect them.

The fifth part of the analysis was brief because it was so obviously disappointing. Excuses can be made: the Canadian dollar was really not depreciated, and Canada is not a "small country," but the fact remains that nothing was learned from an analysis of Canadian dollar depreciation. There is a small ray of light. At least the protective equivalent did not lead us to believe that we could learn something.

The Canadian example has suggested a hypothesis--perhaps an obvious one--but one which confirms the necessity of one of this study's basic assumptions. The assumption is that the price indexes employed in the study reflect competitive costs. The hypothesis is that only when there are competitive conditions in the domestic and foreign industries can one measure the effects of changes in the effective tariff rate. This can be said in spite of the results of the aluminum example. Competitive-type adjustments of market division between two parts of a single enterprise are rational. If the Canadian and American industries were owned by two rival monopolies, the market adjustments might be more like those involved in duopoly; i.e., more akin to strategy than to competitive price adjustments.

CHAPTER VI

SWITZERLAND - COAL-TAR COLORS AND WATCHES

Production Conditions

Switzerland's external trade is vital to the maintenance of her small economy deficient in food and raw materials. She concentrates on dairy products, to which her agricultural economy is suited, and on light manufactures which require small amounts of imported raw materials and large amounts of skilled labor. Watches are typical Swiss exports, amounting to twenty-five percent of the value of total exports in 1947.[1] Coal-tar colors make up another important group of exports for Switzerland. Before World War II, Switzerland was second only to Germany in total exports of dyes. After the destruction of large parts of the dye industries in Germany and Japan, Switzerland became even more important as a supplier of expensive coal-tar colors. Her exports of these to the United States were somewhat smaller after the war than before, however, because the United States industry had expanded, and Germany's and Japan's former markets were taking the Swiss exports.

These two products were selected as the examples of United States imports from Switzerland because of their

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[1] United States Tariff Commission, Summaries of Tariff Information, Washington, G.P.O., 1948, v. 3, part 3, p.223.

importance, and not because of the ease with which data could be gathered, nor because they might conform to the necessary competitive conditions.

Coal-tar colors were imported principally from Germany and Switzerland prior to World War II; from thirty to fifty percent coming from Switzerland (see columns 8 and 9, Table VIII, pages 200 to 202). They can be precisely identified as Department of Commerce Commodity Classes 8050100 through 8050700, to which a single rate of duty is applied. However, they cannot readily be compared with data on domestic production. There are many lower-priced grades of coal-tar colors produced in the United States for consumption and for export, which are not imported at all. The average unit value of domestic production for sale in 1939 was $.63; the unit value of imports was $1.57.[2] Imported colors compete with only a part of domestic production; another large part of the domestic industry is an export industry--exporting inexpensive dyes to the Orient. These parts of the domestic industry cannot, however, be separated, with the data available.

Coal-tar colors are manufactured under somewhat competitive conditions in the United States. There were, in 1942, 47 domestic producers of coal-tar dyes, though nine

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2 *Ibid.*, v. 1, part 2, p. 101.

largest accounted for 94 percent of domestic production.[3] The situation abroad has been much less competitive. A cartel controlled markets, prices and patents. I. G. Farben-industrie of Germany was, before the war, the dominating firm of the cartel, and Basler Interessen Gemeinshaft in Switzerland was an important member.[4] Firms in the United States were also allied with the cartel, so one may not be able to find competitive-type responses to changes in the prices of these products.

Watches and watch movements make up a much more complex commodity example. Rates of duty vary for watches and watch movements, depending on the number of jewels, the width of the pillar plate, and extra features. Since it was not practical to construct a rate of duty for all classes of watches, only the imports of one grade of watches were recorded. Watches with more than 15, but not more than 17, jewels were selected for this purpose. These watches made up the largest class of imports, though not the majority of imports prior to World War II. Taken together, the various classes of less expensive (0 to 15 jewels) watches were imported in larger quantities during the 1920's and 1930's, but the problems of compiling import and tariff data were too complex. The watches with more

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3 Ibid., v. 1, part 2, p. 98.

4 Ibid., v. 1, part 2, p. 95.

than 15 but not more than 17 jewels were 64.5 percent of imports in 1946, and 68.3 percent of imports in 1947.[5] Virtually all imports are from Switzerland.

The competitive situation is rather complex. Most imports are of watch movements, which are cased, banded and sold by American firms. Some of the importing firms own the plants in Switzerland which manufacture the cases. These domestically assembled watches, and some imports of cased watches (7 percent of imports by quantity in 1937-1939)[6] compete with domestically produced watch works and cases. There is a large domestic industry producing cheaper watches with pin-lever escapements, rather than jeweled movements. Virtually none of this type is imported.

The watch industry seems to be much more competitive than the coal-tar color industry. Though Switzerland is the source of virtually all imports, production does not seem to be controlled by a cartel--in fact there are some American-owned firms producing works in Switzerland. In the United States, there are nearly 100 members of the American Watch Assemblers Association, and about 100 non-member firms engaged in assembling watches. While there are only a few domestic producers of jeweled-lever watch works, there are many manufacturers of cases, and a number of

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5 Ibid., v. 3, part 3, p. 221.

6 Ibid., v. 3, part 3, p. 221.

manufacturers of inexpensive pin-lever type watch works. Continuous competitive pressure from imports, from improved "dollar watch" types, and of course, the anti-trust tradition, seem to have kept the domestic industry on a rather competitive basis. There might be some chance, then, that carefully gathered data would be able to test the effects of changes in the tariff rates on watches. There are, however, two rather serious obstacles to this objective. Prior to the Trade Agreement with Switzerland effective in 1936, there was reported to be a large amount of smuggling. The lowered duties of the Trade Agreement and the cooperation of the Swiss government are said to have greatly reduced the smuggling after 1936.[7] This tends, of course, to distort import figures, and make it less likely that the negative correlation between the protective equivalent and imports will have a high value.

Coal-tar Colors

The data of the first commodity example, coal-tar colors, are found in Table VIII, pages 200 to 202. The price index, "Wholesale prices, by groups of merchandise--carburants and lubricants (including chemicals)," is used

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[7] *Ibid.*, v. 3, part 3, p. 225.

TABLE VIII, SWITZERLAND, COAL-TAR COLORS

	1	2	3	4	5	6
Year	Index of Swiss wholesale prices by groups of merchandise - carburants and lubricants (including chemicals) (1914 = 100)[1]	Rate of exchange - Swiss franc equals -----------cents, U.S.[2]	Index of Swiss wholesale prices - carburants and lubricants (including chemicals) (1914 = 100) in U.S. $.	Wholesale price index, chemicals, U.S. (1926 = 100).[3]	Protective equivalent of 1926 duty on coal-tar colors (8050100 - 8050700).	Duty in each year on coal-tar colors -composite rate from 1926 through 1935 expressed as a.v. equivalent of 51%.[4]
1926	149	19.313	149	100.0	.070¢ + 45.0%	51%
1927	134	19.262	134	100.0	.063 + 40.5	51
1928	127	19.260	127	101.3	.059 + 37.9	51
1929	129	19.279	129	99.1	.061 + 39.3	51
1930	126	19.382	126	93.7	.063 + 40.6	51
1931	107	19.401	107	83.0	.061 + 38.9	51
1932	95	19.405	95	79.5	.056 + 36.1	51
1933	93	24.836	120	79.6	.071 + 45.5	51
1934	90	32.366	151	79.6	.089 + 57.3	51
1935	93	32.497	156	86.9	.084 + 54.2	51
1936	98	30.189	153	87.9	.082 + 52.6	40
1937	113	22.938	134	88.2	.071 + 45.9	40
1938	110	22.871	130	86.4	.071 + 45.4	40
1939	115	22.525	134	84.7	.074 + 47.8	40
1940	184	22.676	216	85.1	.119 + 76.7	40
1941	298	23.210	358	87.2	.193 + 124.0	40
1946	226	23.363	273	99.8	.128 + 82.5	40
1947	199	23.363	240	118.7	.095 + 61.0	40
1948	198	23.363	239	126.7	.089 + 57.0	32
1949	187	23.314	225	117.4	.090 + 57.8	32
1950	177	23.136	211	122.0	.081 + 52.1	32

7	7a	8	9	10	11
Protective equivalent of current duty on coal-tar colors.	Index of protective equivalent of current duty. (1926 = 100).	Imports of coal-tar colors from Switzerland as percent of total U.S. imports - Quantity.[4]	Imports of coal-tar colors from Switzerland as percent of total U.S. imports - Value.[4]	Imports of coal-tar colors from Switzerland as percent of U.S. production of coal-tar colors - Value.[5]	Ad valorem equivalent of duty on coal-tar colors (8050100 - 8050700).[4]
51.0	100	37.5%	38.8%	2.21%	51.34%
45.9	90	27.1	30.3	1.77	51.34
42.9	84	26.2	29.1		51.35
44.6	87	33.9	35.7	2.59	51.28
46.0	90	31.5	31.1		51.52
44.1	86	37.0	38.1	3.02	51.0
40.9	80	39.5	39.2		51.0
51.6	101	46.6	41.4	4.04	51.0
64.9	127	50.2	46.2		50.4
61.4	120	51.8	48.6	3.37	50.3
46.7	92	44.6	49.5		45.0
40.8	80	41.4	47.3	2.06	44.9
40.4	79	34.6	42.0		45.5
42.5	83	42.6	52.7	3.76	44.5
68.1	134	38.3	50.5		44.6
110.2	216	59.7	69.2		42.6
73.5	144	95.9	95.6	2.05	40.0
54.3	106	95.2	97.3	1.44	40.0
40.6	80	97.8	98.6	1.66	32.0
41.1	81	95.8	98.2	1.54	32.0
37.1	73	70.7	85.4	2.16	32.0

1 Switzerland, le Bureau Federal de Statistique, Annuaire Statisque de la Suisse, Basel, Birkhauser, 1952, p. 343.

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125, December, 1953, p. 1409.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, (1926--1928), 1929, p. 325, (1929 - 1932), 1933, p. 281; (1933 - 1935), 1936, p. 300; (1936 - 1940), 1941, p. 356; (1941 - 1943), 1944-1945, p. 418; (1944 - 1946), 1947, p. 288; (1947 - 1949), 1950, p. 280; (1950), 1952, p. 275.

4 ______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I, note No. IV for specific sources within the volumes. The difficulty of constructing a single protective equivalent from a composite duty is solved in this case by noting that the 7¢ lb. + 45% duty through 1945 amounted to ad valorem equivalents varying from 50.3% (1935) to 51.52% (1930), and being between 50.78% and 51.35% in eight of the eleven years. Thus an equivalent of 51% is a close approximation. Since the protective equivalent does not attempt to show changes in the impact of a tariff due to changes in the price of the commodity taxed (which a changing a.v. equivalent does), it is better to use a constant "mean" or "representative" a.v. equivalent so long as the tariff rate itself does not change.

5 Imports from Ibid. U.S. production from ______, Statistical Abstract of the United States, 1931, p. 857; 1941, p. 889; 1948, p. 868, 1950, p. 800; 1952, p. 801.

to measure Swiss costs of coal-tar colors. The weight of coal-tar colors in the index is not known, but this group of products will represent generally the alternatives and the factor costs in a chemicals group, of which coal-tar colors is a part. The United States index, "chemicals," includes all products of the domestic industry identified as primary producers of chemical products, not including drugs and pharmaceuticals. In 1950, coal-tar dyes made up 6.4 percent of the chemicals index.[8] This is as good a cost measure as can be found for our purposes. It is narrower than the Swiss index, and its components are probably more relevant to coal-tar dye production. It was not possible to find a narrower composite index of Swiss chemicals prices. Of course, the existence of cartel-type arrangements and administered prices greatly reduce the effectiveness of the composite indexes as measures of costs. Since the prices making up the composite index are apt to be insensitive to cost changes, it must be similarly insensitive.

Columns 1, 2, 3 and 4 show that Swiss "carburants and lubricants" prices fell more rapidly than did United States chemicals prices until 1934, then rose more rapidly. The Swiss franc retained its gold content while the American

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[8] United States Department of Labor, Wholesale Prices, 1950, Washington, G.P.O., 1950, pp. 42-44.

dollar was devalued in 1933. This caused the dollar equivalent of Swiss prices to rise. In 1937, the Swiss franc was devalued to something slightly more than its pre-1933 price in dollars. From 1933 through 1950, then, Swiss chemicals prices, in dollars, rose and remained higher, relative to earlier years, than the index of chemicals prices in the United States. In 1950, the dollar prices of Swiss Chemicals were 42½ percent above their 1926 level, while United States chemicals prices were 22 percent above 1926.

The effect of higher Swiss prices is shown in column 5. The composite duty on coal-tar colors was, through 1935, 7 cents per pound plus 45 percent <u>ad valorem</u>. Column 5 shows the two parts of this rate, both modified by the price relatives for each year through 1950. The constant rate would have appeared to be more than doubled, protection-wise, in 1941 (.193 + 124.0 vs. .07 + 45.0). Some decline of Swiss prices, and an increase of American prices lowered the protective equivalent to little more than its 1926 level by 1950 (.081 + 52.1 vs. .07 + 45.0). The 37 percent reduction in the tariff which took place in two stages over the period resulted, then, in a 27 percent reduction of the protective equivalent of the current duty (see column 7a).

Column 6 must be explained. A composite duty is difficult to fit into the statistical methods employed here.

Fortunately this duty, 7 cents per pound plus 45 percent _ad valorem_, can be converted to an approximate _ad valorem_ equivalent. Since the duties levied after 1935 were simple _ad valorem_ rates, this seems to be the best way to arrive at a comparable expression of the 1926-1935 duty. The prices of imported coal-tar colors changed very little so that the 7 cent specific duty amounted roughly to 6 percent _ad valorem_ in each year--making the total 51 percent. This can be verified by inspection of column 11, where the _ad valorem_ equivalent of the duties collected varied only from 50.3 percent to 51.52 percent from 1926 through 1935.

Thus column 6 shows a constant rate of duty of 51 percent through 1935, the actual duty levied of 40 percent through 1947, and 32 percent through 1950. The explanation of the _ad valorem_ equivalents in column 11 (of more than 40 percent from 1936 through 1941) is that the trade agreement reduction was not extended to Germany. Since about one-half of imports came from Germany, through 1940, and some imports as late as 1941, the _ad valorem_ equivalent shows the average of the rates on German and other countries' products. The agreement, effective February 15, 1936 (T.D. 48093) actually specified that the rate "shall be 40 percent _ad valorem_, but not less than 3½ cents per pound, plus 22½ percent _ad valorem_." The latter provision was not effective, as the prices of coal-tar colors did not decline far enough to cause it to be the higher of the two.

Actually, this composite alternative was probably designed to be applied to some of the cheaper dyes, such as synthetic indigo and sulphur black, which are produced in large quantities domestically and exported to the Orient and to South America. No sulphur black has been imported for twenty-five years, and the last reported import of synthetic indigo was in 1927.[9]

The existence of a high duty with a specific element in it probably had a great deal to do with the exclusion of these products and the development of the large domestic industry. This, however, is only speculation upon a history which is not being examined in this study. The well-known development of the American industry is summarized in the following statement:

> "The synthetic coal-tar dye industry of the United States was unimportant before World War I. During that war, with imports from Germany cut off, United States firms rapidly expanded production. The United States Government gave assistance to the infant dye industry by releasing seized foreign-owned patents to domestic producers, and by providing substantial tariff protection. By the end of the interwar period the domestic industry had developed into one of the world's largest dye industries with exports two or three times imports."[10]

The relevance of the tariffs in holding down imports and in developing a domestic industry cannot be denied. If this

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9 United States Tariff Commission, Op. Cit., v. 1, part 2, p. 101.

10 United States Tariff Commission, Op. Cit., v. 1, part 2, p. 95.

study should show a weak indication of the tariff's effects, it must be due to the difficulty of constructing a statistical model, and not to the lack of long-run effectiveness of the tariff.

Columns 7 and 7a are the results of the application of price relatives to the constructed and actual duties in column 6. All of the changes in prices, exchange rate and duties are reflected in the changing values of the protective equivalent of the current duty. Reading column 7a, it is clear that the tariff reduction of 1936 slightly more than offset the relative rise of the Swiss price index. Devaluation of the franc in the next year reduced the protective equivalent to an index of 80, but relative increases in the Swiss price index raised the equivalent by 1941 to more than twice its 1926 level. Increases of United States chemical prices reduced this to 106 by 1947, and the decrease in the tariff effective January 1, 1948 returned the protective equivalent to 20 percent less than its 1926 level. Further reduction of Swiss prices placed coal-tar colors in a better position in United States markets than any they had enjoyed during the other twenty-four years of this study. This assumes that their advantage was never so great during the years of the war, which were omitted from the study because of the distortion of trade.

Imports from Switzerland as percents of total imports are shown in quantitative and in value terms, in columns 8 and 9, respectively. It seems to make little difference whether we use the quantity or the value figures--the unit values of Swiss dyes seem slightly higher than other imported dyes in all but five years. Scanning columns 7a and 8 fails to reveal any close relation between the protective equivalent and Switzerland's share of United States imports. This, however, may be expected, for several reasons. First, the pre-war cartel arrangements must have provided some stability in division of the market, which would not have been disturbed by small changes in the effective tariff on Swiss products. Second, being high-priced specialized dye products, they might well be sold through customary channels by long-term arrangements which would not be altered because of small changes in duties or in relative prices. Of course, the years after World War II are distorted by the destruction of the German industry--so that one does not expect to find a price reaction in those years. The remarkable thing is that, during 1936 through 1940 when the trade agreement rate was applied to Swiss but not to German products, the Swiss products did not gain a larger share of the American market. Germany held its share--this is shown by data on coal-tar colors from Germany; included in the next chapter.

Correlation analysis confirms the short-run insensitivity of imports to changes in the protective equivalent of the tariff. It was mentioned above, and it should be emphasized here, that the long-run effects of the tariff have been considerable. It is possible that considerable short-run insensitivity does exist. It is also possible that the statistical model employed here is inadequate, or that the data are too sparse or too coarse. The data on United States production are spotty; existing for only thirteen of the twenty-one years covered.

Rank correlation of the protective equivalent of the current duty with imports from Switzerland as percents of total imports (quantity) yields a coefficient of +.14. Removal of the time trends from both series results in a coefficient of +.24. This is the first positive correlation that we have discovered between a protective equivalent and imports. Since it has the "wrong" sign, we cannot logically say that it measures any effect of changes in the protective equivalent. Swiss contributions to imports must be independent of changes in the protective equivalent, or other factors which we have failed to account for must be operating.

Rank correlation of the protective equivalent of the current duty with imports from Switzerland as percents of domestic production yields a coefficient of +.10. Removal of time trends leaves +.03. This, too, has the "wrong" sign. The *ad valorem* equivalent of the duty, correlated with imports from Switzerland as percents of domestic production, has a coefficient of +.18. The *ad valorem* equivalent has a very high negative correlation with time, however, so the removal of time trends leaves a coefficient of -.08. Separation of the tariff's effects from the effects of other costs does little but confirm the impression that little can be learned about imports by the analysis of this example. The partial coefficient relating the tariff to imports from Switzerland as percents of domestic production is +.66. That relating the tariff to Switzerland's share of total imports is +.67. The coefficients relating costs to imports from Switzerland as percents of domestic production and as percents of total imports are -.45 and +.74, respectively. Little sense can be made of this. One must conclude one of two things. Either the attempt to discover the sensitivity of imports to the various elements of costs has been a failure, or one has discovered a remarkably insensitive import. The latter conclusion is the more likely. Considering the results of previous examples, it seems entirely possible to distinguish those cases in which imports respond to changes in tariffs or in the other costs. The price indexes which measure costs are not irrelevant; chemicals prices should be the best criterea. These prices cannot be said to be competitive prices, however. This makes them unreliable as measures of costs. When costs are not measured accurately, they are not accurately "stripped" from the measure of the tariff's effects. However, the same non-competitive conditions make reactions to the tariff less predictable. The high-valued positive coefficients relating the tariff and imports are not apt to be entirely due to faulty measurements of costs, but must be at least partly due to an actual insensitivity to the tariff.

Watches

The watch example is shown in Table IX, pages 212 to 214. The price indexes used for this example are quite unsatisfactory. Watches, watch movements, cases or clocks are not included in any of the United States Bureau of Labor Statistics' wholesale price indexes. "Metals and metal products" was selected because, lacking a composite index of commodities closely related to watches, it was thought desirable to use an index covering a broad range of commodities. If one must arbitrarily select a broad index, then one which covers metal products may be better than any other. Products of agriculture, forestry, petroleum, textiles, etc. would be quite irrelevant, while the manufacture of various kinds of machinery would employ skills and equipment somewhat like that employed in watch manufacturing. It must be admitted that this is weak justification for its use as a measure of costs in the watch and clock industry. What we have, rather, is a general price index for a sector of the economy--and it is

TABLE IX, SWITZERLAND - WATCHES

Year	1 Wholesale price index - Switzerland Metals (1914 = 100).[1]	2 Rate of exchange, Swiss franc equals cents, U.S.[2]	3 Wholesale price index - Switzerland Metal products, in U.S. prices.	4 Wholesale price index, U.S. Metals and metal products.[3]	5 Protective equivalent of 1926 duty on watches of more than 15, not more than 17 jewels (9560300-9560360).	6 Duty levied in each year on watches, more than 15, not more than 17 jewels (9560300-9560360).[4]
1926	123	19.313	123.0	100.0	3.32	$ 3.32 ea.
1927	117	19.262	116.7	96.3	3.27	3.21
1928	115	19.260	114.7	97.0	3.19	3.22
1929	126	19.279	125.8	100.5	3.38	3.38
1930	104	19.382	104.4	92.1	3.06	3.51
1931	82	19.401	82.4	84.5	2.63	4.20
1932	66	19.405	66.3	80.2	2.23	4.03
1933	65	24.836	83.6	79.8	2.83	4.00
1934	61	32.366	102.2	86.9	3.17	3.89
1935	61	32.497	102.6	86.4	3.21	3.79
1936	71	30.189	111.0	87.0	3.44	2.34
1937	113	22.938	134.2	95.7	3.79	2.38
1938	95	22.871	112.5	95.7	3.17	2.32
1939	104	22.525	121.3	94.4	3.47	2.31
1940	154	22.676	180.8	95.8	5.09	2.30
1941	206	23.210	247.6	99.4	6.72	2.28
1946	214	23.363	258.9	115.5	6.05	2.21
1947	241	23.363	291.5	145.0	5.43	2.21
1948	263	23.363	318.2	163.6	5.25	2.21
1949	235	23.314	283.7	170.2	4.50	2.21
1950	209	23.136	250.4	173.6	3.89	2.21

7	7a	8	9	10	11	12
Protective equivalent of current duty on watches of more than 15, not more than 17 jewels (9560300–9560360).	Index of protective equivalent of current duty on watches (9560300–9560360) - 1926 = 100.	Imports from Switzerland as percent of total, U.S. imports - all watches and watch movements, 1926–1933; watches 16–17 jewels, 1934–1950—Value.[4]	Total U.S. imports of watches having more than 15, not more than 17 jewels - thousand dollars.[4]	Total U.S. imports of watches having more than 15, not more than 17 jewels, as percent of U.S. production of clocks, watches, time recording devices and parts, exc. cases - Value.[5]	Ad valorem equivalent of duty on watches having more than 15, not more than 17 jdwels - total U.S. imports.[4]	Imports of jeweled watches and movements as percent of total U.S. sales of jeweled watches (except 0-1 jewel), quantity.[6]
3.32	100	97.3%	1034.4		42.7%	58.2%
3.16	95	97.9	817.7	1.15	47.1	62.1
3.10	93	97.7	778.0		38.9	60.8
3.44	104	97.6	842.2	1.09	41.0	66.2
3.23	97	97.8	1218.9		64.8	66.2
3.33	100	98.3	885.6	1.94	83.9	45.5
2.71	82	97.2	368.4		96.6	44.1
3.41	103	98.9	295.5	.93	78.7	40.1
3.72	112	99.4	466.9		71.3	46.8
3.66	110	99.5	736.1	1.20	76.8	47.7
2.43	73	99.7	2191.8		64.5	54.0
2.71	82	99.7	4357.0	4.45	71.5	58.6
2.22	67	99.9	3495.0		65.2	62.9
2.41	73	99.9	4308.0	5.08	65.6	60.4
3.53	106	100.0	5688.0		64.1	60.0
4.62	139	100.0	7371.9		57.8	60.7
4.03	121	100.0	40123.0		34.3	84.2
3.61	109	100.0	33750.5	9.89	n.a.	75.9
3.49	105	100.0	36280.8		n.a.	72.8
2.99	90	100.0	30576.4		n.a.	72.2
2.59	78	99.8	35377.2		n.a.	75.5

1 Le Bureau federal de statistique, Annuaire Statistique de la Suisse, Basel, Birkhaüser, 1952, p. 343.

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125, December, 1953, p. 1409. Quotations not available for 1942-1945.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1926-1928); Ibid., 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-1945, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1953, p. 275 (1950).

4 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. Duty is an average of the duties on all watches in the category -- computed by dividing total duty by total number of watches imported. Different duties and "extras" for special features on the watches make it difficult to select a "representative" duty for the class. The possibility that a substitution between watches bearing high duties and those bearing lower duties may have occurred is ignored; i.e. this average duty is taken to be the impact of the duty. On September 22, 1922, the duty was changed from 30% a.v. to various specific duties. A specific duty for the entire year was estimated from the data. Duties were raised in 1930, and reduced February 15, 1936 by a Trade Agreement with Switzerland, affecting all imports except those from Germany (T.D. 48093). The duties were not changed again. An average rate for 1930 was estimated. The rates in 1947-1950 were estimated to be the same as in 1943-1946 (i.e. the duty was not changed, and it was estimated that the composition of imports remained the same). Imports from Switzerland of watches having more than 15 but not more than 17 jewels were not available from 1922-1933, so imports of all watches and watch movements from Switzerland, and the total for the United States were recorded for those years. Imports for 1947-1950 are from _______, Report No. FT 110, United States General Imports of Merchandise, annual summaries.

5 Imports, Ibid., United States production from _______, Statistical Abstract of the United States, 1933, p. 713, 1938, p. 770, 1941, p. 871, 1950, p. 775.

6 United States Tariff Commission, Investigation No. 4 Under Part III of Executive Order 10082, Brief in Behalf of American Watch Association, Inc. New York, 1951, p. 29.

hoped that prices in this sector will be better indicators of changes in costs than any other general index we could select.

For Switzerland, the same situation exists. The index, "wholesale prices--metals" was selected for the same reasons. At least the two indexes are somewhat comparable, though the exact composition of the Swiss index is not known.

The Swiss index, expressed in dollars, is shown in column 3. Its changes relative to the American index may be followed by reading the protective equivalent of the 1926 duty in column 5. Through 1935, in spite of depreciation of the dollar, the Swiss dollar prices declined relative to United States prices, leaving the protective equivalent of a $3.32 specific duty at $3.21 in 1935. From 1936 through 1948, the Swiss index rose much more rapidly than the American index. Its decline after 1948, and the continued rise of the American index returned the protective equivalent of the 1926 duty to $3.89 in 1950, or 14½ percent above the 1926 duty of $3.32. Some of the 33-1/3 percent tariff reduction which took place during that interval was then offset by a net increase in Swiss prices relative to United States prices. It is not known, of course, how directly this change in relative prices affected the costs of watch production in either country.

General trends of prices in broad sectors of the two economies are shown, and that is all.

Column 6 records the duty collected in each year, in the form of a constructed specific rate per unit. The total duty collected, including the different rates for the 16 and 17 jewel watches of different sizes and the additional duties applied to the special features of the watches, was divided by the number of units imported. It was not possible to construct the duty in this way for 1947-1950, so the rate of duty collected in the years 1943-1946 was recorded for 1947-1950. (See footnote 4, Table IX for a fuller explanation.)

Column 7 is the result of the multiplication of each year's duty (column 6) by the price relatives. As expected, this protective equivalent of the current duty is below the actual duty in all but one year through 1935, then above the actual duty in all but one year through 1950. The net result, at the end of the period, is that the 33-1/3 percent reduction of the actual duty shows up as a 22 percent reduction in the protective equivalent (column 7a).

Inspection of columns 7, 7a, 8, 9, 10 and 12 reveals little relation between the protective equivalent and any measure of imports recorded here. Comparing columns 6 and 9, however, shows that the 1936 reduction of the duty was followed by a great increase in total imports of watches of this class. Figures for these imports from Switzerland were not available for years prior to 1934, so total imports of watches with more than 16 and 17 jewels are listed for previous years. Since more than 97 percent of all watches imported are from Switzerland, this makes little difference. One must remember that considerable smuggling is said to have taken place prior to 1936--this is a more serious inaccuracy in the import data. Yet it does not seem likely that all of the change can be due to the elimination of smuggling.

Rank correlations of the protective equivalent with the various measures of imports yield inconclusive results. Since more than 97 percent of all watch imports come from Switzerland, one cannot expect much enlightenment from correlation of the protective equivalent with imports from Switzerland as percent of total United States imports. The coefficient of rank correlation is +.07. Removal of the time trends from both series leaves a coefficient of +.06. Correlation of the <u>ad valorem</u> equivalent of the duty with the same measure of imports yields a coefficient of -.34; with time trends removed, it is -.12. A more significant measure is imports from Switzerland as percents of domestic production of the same general types of watches, as shown in column 12. The rank correlation coefficient is +.03, relating the protective equivalent to this measure of imports. The <u>ad valorem</u> equivalent of the tariff, however, correlates with a coefficient of -.70 with this measure of imports. Separating out the effects of costs with product-moment correlation results in a second order partial coefficient of -.77, relating the tariff to this measure of imports. The other costs related with a coefficient of -.15, which is not significant. The coefficient -.77 is significant at the one percent level. Thus, in spite of the poor indexes of costs which were used, the tariff shows up as a significant factor in Swiss watch imports. The indexes of prices of "metals" may be regarded simply as indexes of general price levels in the two countries. The effects of the tariff seem to be so evident that the removal of cost effects by this very crude method does not do any harm, though it may do no good. The protective equivalent of the current duty is of no value in this example. This is partly because the costs used in its construction are of little value and partly because the specific duties used in its construction are less useful than their *ad valorem* equivalents.

There can be no question, really, but what the tariff is important in determining the share of watch consumption provided by imports--and Switzerland is the only major source of these imports. Inspection of columns 6, 9 and 10 of Table IX gives a clear impression of the effects of tariff reduction. Statements by domestic producers, both of domestic works and of assemblies made with imported works, lead one to believe that reduced tariffs increase the competitive pressure on the domestic makers of works. The difficulties of one leading domestic watch manufacturer have been attributed to reduced tariffs. Also, the reaction of Swiss watchmakers to the recent increase in the duties is based on a firm conviction that the duties are effective.

Summary

For the previous examples, this study has attempted to relate the tariff, imports from the country in question, and some facts concerning the country's balance of payments, to depreciations of the country's currency. This has been done in order to determine whether the United States tariffs, combined with the price (cost) effects used to construct the protective equivalent, had had harmful effects upon the international position of the currency of the country involved. In the cases of Australia and Mexico, when United States markets were important to countries with relatively few commodities on their export lists, some indication that depreciations were related to United States markets was found. In the case of Canada, a "larger" country, no such relation could be found.

In the case of Switzerland, there has been no depreciation of the currency with respect to the United States dollar. In 1933 and 1934, the dollar was devalued--the Swiss franc was not devalued until late 1936. There is some evidence that this may have corrected a difficult situation with respect to the American market. United States imports of watches increased rapidly in 1936 and in 1937, and the Swiss price index of metals rose rapidly. This, however, cannot be separated from the reduction of the tariff which took place in 1936. In other words, two possibly causal events took place almost simultaneously--restoration of approximately the old relation between the Swiss and American currencies, and a lowering of the barriers against Swiss watches. The events which might be the results--a 200 percent increase in watch imports (less previous smuggling) and a reversal of the falling price trend in Switzerland--took place at approximately the same time. What the causal relation is, or how much effect the tariff reduction and/or the devaluation of the franc may have had cannot be determined from the data of this example.

The coal-tar color example lends little support to the possibility that the devaluation of the franc and the reduction of tariff might have influenced either Swiss prices or Swiss exports to the United States. Imports from Switzerland, as percents of total imports, actually declined. This may be due, of course, to special efforts on the part of Germany to offset her tariff disadvantage after being omitted from the benefits of the 1936 Trade Agreement. There is not enough domestic production data to determine whether imports from Switzerland as percents of total domestic production were affected by the tariff reduction and devaluation. Swiss chemicals prices did rise a little in 1937, but rose no more until 1940, when the unusual war demands would have been felt.

This chapter can be summarized in five parts, as follows: (a) the selection of commodity examples and typical rates of duty applied to them, (b) the extent of competition in the production and sale of the selected commodities, and the competition between imports and domestic products, (c) the selection and usefulness of the price indexes employed as cost measures, (d) the insensitivity of coal-tar dyes imports to tariff changes and the sensitivity of watch imports to tariff changes, and (e) the difficulty of relating tariff changes to the Swiss balance of payments.

(a). The commodities, coal-tar colors and watches, were selected because of their weights in Swiss exports, their weights in United States imports from Switzerland and their importance in competition with domestic protected industries. The selection of a single rate of duty was not difficult for the product coal-tar colors, as the commodity classifications 8050100 - 8050700 are all subject to the same rate. The composite duty of seven cents per pound plus forty-five percent _ad valorem_ appears difficult to handle, but it was reduced to an approximate _ad valorem_ equivalent of fifty-one percent. The alternative composite rate effective beginning in 1936 could be ignored because prices remained above the point where it would become effective. The selection of a single rate for watches was not possible. The general class of watches and watch works (16 and 17 jewel) was selected for import data. To arrive at a single duty, the average duty per unit was recorded for each year.

(b). The existence of cartel-type organization and behavior in the dye industry make it doubtful that the effects of small changes in duties and prices can be measured. Though there is direct competition between imported coal-tar dyes and domestic production of the higher-priced types of colors, there is a large domestic output of cheaper dyes, with no corresponding imports. It is likely that the existence of the tariff (in particular the composite-rate alternative duty) excludes the low-priced colors. This, however, cannot be ascertained by our study, and the ratio of imports to domestic production is made less meaningful by this difference in composition.
We can safely assume the existence of some competitive conditions in watch production, though this should not be pressed too far. Particularly, the large number of domestic assemblers suggests competition among them and between them and domestic producers of watch works. Direct competition between imports and domestic production cannot be measured very well with the data of Table IX, but other data compiled by the Tariff Commission provided useful ratios of imports to consumption.

(c). The selection of price indexes to be used as indicators of costs was not difficult for the coal-tar color example. While no claims can be made for the accuracy with which "carburants and lubricants, including chemicals" in Switzerland, or "chemicals" in the United States measure costs, they are at least relevant prices. For watches, it must be admitted that no good measures of costs can be found. This deficiency actually resulted in failure to be able to construct a useful protective equivalent measure. It did not obscure the effects of the tariff, however.

(d). It was found that imports of coal-tar colors were insensitive to changes in the tariff, or in the computed protective equivalent. The ratio of imports to consumption of watches appears to be quite sensitive to tariff changes. The use of the protective equivalent, however, obscured this relation. This may be attributed to the faulty data used to compute the protective equivalent. The correlation technique employed for each of the commodity examples probably did reveal the degree of sensitivity of imports to tariff changes which inspection of the data and general knowledge suggests for each example. Coal-tar dyes imports are insensitive to the tariff, and watch imports are quite sensitive. These results may be due to the differences in the degrees of competition existing in the two industries.

(e). There is little point in trying to relate changes in the tariff with Switzerland's currency values, or with the condition of her balance of payments. The only changes in the value of the (gold standard) Swiss franc occurred when the United States currency was devalued, and when the franc was returned in 1936 to a value only slightly greater than its old dollar value. No relation between this and coal-tar color imports can be seen, and the evidence linking watch imports and the value of the Swiss currency is not convincing.

CHAPTER VII

GERMANY - COAL-TAR COLORS AND TEXTILE MACHINERY

Competition in the Two Commodities

Several difficulties attend an analysis of imports from Germany. The analysis is terminated with the year 1941, for obvious reasons, but three major difficulties remain. First, the typical pre-war imports from Germany were industrial products. We have already discovered that these products do not show the nice responses to price changes that would permit statistical analysis of the type employed here. Second, German industry was cartellized to a greater extent than in some other countries; adding to the difficulty of securing valid cost measures from composite price indexes and reducing the likelihood of our finding responses to price changes. Third, the state-trading and multiple-exchange rate practices of the Nazi government may have had effects on United States imports from Germany.

Nevertheless, it was thought worthwhile to attempt an analysis of a small number of commodities. Germany was one of the principal sources of several products which were also imported in large quantities from some of the other countries studied. Specifically, coal-tar dyes were imported principally from Germany, and most of the remainder came from Switzerland. Germany was the principal supplier of textile machinery, with the United Kingdom second and Switzerland third. There was also an attempt made to study the imports of special types of high-grade steel, as Germany, Sweden and the United Kingdom supplied them. The latter was given up entirely because of the difficulty of recording imports and tariff rates on many different grades; especially since the classifications and tariff rates changed.

Germany, then can be studied as a supplement to the studies of Switzerland and the United Kingdom. Product-by-product comparisons can be made to determine whether the greater amount of price rigidity and state interference presumably present in the German industries materially decreases the possibility of discovering the effects of tariffs and prices on imports into the United States. Also, a 1936 Trade Agreement reduced the duties on coal-tar colors and a 1939 Agreement reduced them on textile machinery, but both excluded German products from the new rates. One may discover whether this retaliatory discrimination against German products actually hurt them in our markets. Two factors decrease the likelihood of arriving at a clear answer to this question: the specialized natures of the products and the Nazi government's intervention in trade. Nevertheless, one cannot simply assume that the effects of tariff discrimination were wished away; the matter should be investigated.

The reasons for selecting coal-tar dyes and textile machinery as the German sample commodities have been given. It cannot be said that competitive conditions exist in either industry in Germany or the United States, to the extent that such conditions exist for the production of agricultural or forest products. Textile machinery, however, is produced by many firms of varying sizes, and there is no evidence of domestic monopoly--except that provided by patents on special features and improvements. The German competitive situation is not known--the industry was likely subject to more private and governmental restrictions than is the domestic industry, but also it is likely that producers of such varied products as textile machines were not as completely cartellized as were the producers of coal-tar colors. The textile machinery industries will be discussed more fully below.

The coal-tar dye industry was discussed in the preceding chapter. The limited amount of direct competition to domestic producers which the imports offer was also discussed. The Tariff Commission found that, in the decade preceding the war, only about one-fifth of the imports were classified by the customs authorities as "competitive."[1] This is one of the limitations which made the Swiss example

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1 United States Tariff Commission, Summaries of Tariff Information, v. 1, part 2, p. 103.

less informative, and it can be expected to have the same effect on the German example. On the whole, United States imports have been small proportions of consumption: 6.2 percent in 1929, 4.0 percent in 1939 and a much smaller proportion since the war. However, since Germany was the world's largest producer and exporter before the war, and since many of the techniques have been derived from the German industry, it is worth looking at its pre-war contribution to our consumption.

"Textile machinery" is a broad class of industrial machinery, produced by many firms, including some types produced by textile mills for their own use. Imports of United States Department of Commerce commodity classes 7495000 - 7515900 were recorded for this study. This includes a wide range of specialized textile spinning, weaving and knitting machines and parts and accessories for them, but excludes sewing machines of all types. The latter are used by the cutting trade rather than by the textile industry, so may conveniently be excluded.

It should not be said that there is a unique and homogeneous "industry" producing textile machinery. The machines are so highly specialized that only a small range of them tends to be produced by any one firm; many firms produce only one variety of one machine. Each machine, i.e., a spinning machine, or a loom, or a lace-making machine, tends to have a unique history of discovery and development.

Also, different textile materials require different types of equipment. This distinctness of each type of machine is reinforced by the accumulation of patent rights and production skills, so that countries may specialize in certain machines. For instance, there is a French type of carding and spinning machinery for worsted yarns, making the yarns by what is known as the "French system;" while the Bradford (English) system operates differently, results in cheaper but harder yarn, and uses machinery made in England.[2]

Does this uniqueness of the machines and the scattering of production to many types of firms in different countries destroy the possibility that imports could be considered to be competitive with domestic production? It is true that many imports are of the supplementary type (e.g. no machinery for spinning flax, and virtually no lace making machines are produced domestically), but there is substantial competition between domestic and foreign firms in many types of machines. Excerpts from the Tariff Commission study of textile machinery will perhaps serve best to express the degree of competition which imports offer domestic producers.

> "Some machines are produced in the United States in sufficient quantities and varieties to satisfy the demand from domestic textile mills. They have been developed over a long period of years and

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2 United States Tariff Commission, Op. Cit., v. 3, part 4, p. 70.

have been especially adapted to working conditions in the United States. They are generally preferred by domestic mills ....

"On the other hand, certain machines--among which are lace, flax, jute, and the principal types of embroidery machines--are not manufactured on an established basis in the United States. ....Lace, flax, and jute machines have been imported almost wholly from the United Kingdom, where their manufacture is centered, whereas embroidery machines have come principally from Switzerland, France, and before the war, from Germany.

"There are a number of types of machines which fall within an intermediate position. This group includes machines which are produced in the United States in insufficient quantities and varieties to meet the requirements in the home market. Among such machines are flat knitting machines which are imported from Switzerland and, in prewar years, from Germany; a particular type of circular knitting machine that was developed and patented in the United Kingdom; Bradford or Noble combs for the English system of spinning worsted yarns; certain types of machinery used in the French worsted system; and textile pins, ..."[3]

Forty percent of pre-war imports were full-fashioned hosiery knitting machinery; these were by far the most important type of textile machine imported. At the same time, the United States was the second largest producer of full-fashioned hosiery machinery. Germany was the largest. During the 1920's, about fifty percent of the domestic hosiery industry's requirements were met with imports; slightly less than fifty percent were imported in the 1930's.[4] Apparently, some of these imports were

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3 Ibid., pp. 39-40.

4 Ibid., p. 48.

complementary, i.e., some types were not produced domestically. Yet, whether an import is supplementary or complementary may depend on the length of the time period used in the analysis. A part of the relative decline of German machines in the 1930's is said to have been due to the expansion and diversification of the domestic textile machinery industry.[5] Thus, in the long-run, German machines were preferred by mill owners, though their counterparts were available from domestic sources. Others were not manufactured domestically prior to the war.

Rayon machines were first developed in Germany, and imports supplied our earliest mills. Now the United States is the leading producer. Germany was the leading pre-war producer and supplier of braiding machinery. Germany was also the principal producer of warp knitting machinery before the war; having been replaced by the United Kingdom.

In total, since the war, the United States is not only the largest user of textile machinery, but has become the largest producer. She is now a major exporter; the stiffest competition in world markets coming from German and British machines. As is the case with many of the commodities used in this study, World War II changed the "center of gravity" of world production and trade in textile machinery. Specialization and trade is supposedly based upon the presence of

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[5] Ibid., p. 48.

comparative advantages and disadvantages which flow from the quantities and the qualities of the resources possessed by the trading countries. The possibilities of decreasing costs are probably more prevalent than has been supposed, however, and war-born self-sufficiencies leave new, healthy industries, or greatly expanded and diversified old industries. Going outside of the bounds of this study, one may point to the synthetic rubber industry--probably there are hundreds of less dramatic instances.

Coal-tar Dyes

To return to the duller prose of a statistical study, let us turn to the coal-tar color example, shown in Table X, pages 233 to 235. Column 1 shows the remarkable stability of German chemicals prices. A plateau was maintained from the restoration of the mark in 1925 until the depression break of 1931 and 1932; then another remarkably level plateau was maintained. This is significant for this study, yet the significance may be that we could be deceived by this apparent stability. Of course, it must be admitted that prices of chemical products in many countries were rather rigid. The structures of the industries, their international inter-connections, and the joint-cost natures of their products would all lead to price rigidities. Yet this German case is extreme. Either especially effective price controls, or controls which caused the reporting of

TABLE X, GERMANY - COAL TAR COLORS

	1	2	3	4	5	6
Year	Wholesale price index, Chemicals, Germany, (1913 = 100).[1]	Rate of exchange, Reichsmark equals cents, U. S.[2]	Wholesale price index, Chemicals, Germany, (1913 = 100) in U. S. dollars.	Wholesale price index, Chemicals, U. S. (1926 = 100).[3]	Protective equivalent of 1925 duty on Coal Tar Colors (8050100-8050700), tar. par.	Duty on Coal Tar Colors, (8050100-8050700), tar. par.[4]
1925	127.3	23.801	127.3	104.1	.07 lb. + 45.0%	7¢ lb. + 45%
1926	123.0	23.800	123.0	100.0	.070 + 45.3	7 + 45
1927	124.2	23.764	124.0	100.0	.071 + 45.6	7 + 45
1928	126.3	23.861	126.6	101.3	.072 + 46.0	7 + 45
1929	126.8	23.802	126.8	99.1	.073 + 47.1	7 + 45
1930	125.5	23.854	125.8	93.7	.077 + 49.4	7 + 45
1931	118.1	23.630	117.3	83.0	.081 + 52.0	7 + 45
1932	105.0	23.749	104.8	79.5	.075 + 48.5	7 + 45
1933	102.5	30.518	131.4	79.6	.094 + 60.7	7 + 45
1934	101.1	39.375	167.3	79.6	.120 + 77.3	7 + 45
1935	101.2	40.258	171.2	86.9	.113 + 72.5	7 + 45
1936	101.7	40.297	172.2	87.9	.112 + 72.1	7 + 45
1937	102.5	40.204	173.1	88.2	.112 + 72.2	7 + 45
1938	101.6	40.164	171.4	86.4	.114 + 73.0	7 + 45
1939	101.6	40.061	171.0	84.7	.116 + 74.3	7 + 45
1940	102.0	40.021	171.5	85.1	.115 + 74.2	7 + 45
1941	102.7	39.968	172.5	87.2	.113 + 72.8	7 + 45

7	7a	8	9	10	11	12
Protective equivalent of current duty on Coal Tar Colors. The rate amounted to approx. 51% a.v. for all years for Germany.	Index of protective equivalent of current duty (1924 = 100).	Imports from Germany as percent of total U. S. imports - Quantity.[4]	Imports from Germany as percent of total U. S. imports - Value.[4]	Imports from Germany as percent of U.S. production of "coal-tar dyes and other finished products."[5]		
51.0	100	50.4	51.9	3.6%		
51.3	101	43.9	41.3			
51.7	101	58.9	55.5	3.2		
52.1	102	65.0	61.8			
53.4	105	61.6	59.3	4.3		
56.0	110	62.6	62.9			
58.9	115	57.3	55.7	4.4		
55.0	108	53.6	54.2			
68.8	135	49.2	55.1	5.4		
87.7	172	47.4	51.6			
82.2	161	46.0	49.8	3.5		
81.7	160	51.2	47.2			
81.9	161	53.3	48.8	2.1		
82.7	162	60.5	53.6			
84.2	165	52.5	42.8	3.0		
84.0	165	55.0	44.9			
82.5	162	33.8	27.1			

FOOTNOTES TO TABLE X

1 Berlin Statistischen Reichsamt, Statistisches Jahrbuch für das Deutsche Reich, 1932, p. 256 (1924-1931); Ibid., 1942, p. 358 (1937-1940); Statistisches Bundesamt, Statistisches Yahrbuch für das Bundesrepublik Deutschland, Weisbaden, 1953, p. 466.

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125. Annual averages of noon buying rates for cable transfers in New York. 1925 is the first year past World War I in which the Reichmark displayed relative stability, hence the base year for this example must be 1925. No rates are quoted for 1942-1945, so the study ends in 1941.

3 1925 through 1928, United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325; 1929 through 1932, Ibid., 1933, p. 281; 1933 through 1935, Ibid., 1936, p. 300; 1936 through 1940, Ibid., 1941, p. 356; 1941, Ibid., 1944-1945, p. 418.

4 United States Department of Commerce, Foreign Commerce and Navigation of the United States, annual volumes, see Table No. I, footnote 4 for specific sources within the volumes. The Trade Agreement rate of 40% ad valorem, effective in 1936, was not applied to German products.

5 Imports from Germany from Ibid., U. S. production from ________, Statistical Abstract of the United States, 1929, p. 826, 1933, p. 730, 1936, p. 771.

"official" prices, while others prevailed in the market, seem to be indicated. The nature of most of the data gathered from German sources left the following impression: the care and precision with which they had been gathered and reported was obvious; yet they did not appear genuine. Genuine or not, these prices do not tell us much about what may have happened to the costs of producing coal-tar colors in Germany. While the use of wage controls and state intervention in the materials and capital goods markets may have actually resulted in stable costs, it does not seem likely that costs were as stable as these prices indicate. This is probably true of the relation between costs and chemicals prices in the United States, too. Prices did decline by more than 20 percent in the United States, however, and then rose by more than 20 percent by 1941 (see column 4).

Since there was only one change in the relation between the mark and the dollar, column 3 shows the same stability of German chemicals prices when they are expressed in dollars. The only difference is that they seem to rise, in 1933, 1934 and 1935 to a higher plateau. The official value of the mark did not follow the dollar's devaluation. This may be deceiving, too, for we do not know what proportion of the trade in dyes was conducted at the official rate, nor what proportion at special rates. Since German (dollar) chemicals prices were thirty-five percent higher in 1941 than in 1926, and United States chemicals prices were sixteen percent lower, the burden of the tariff on coal-tar colors appears to have been sixty-two percent greater in 1941 than in 1946. (See columns 5, 7 and 7a.)

Column 6 records the composite duty on coal-tar colors of 7 cents per pound plus forty-five percent ad valorem. Since German products were excluded from the trade agreement of 1936, the rate was unchanged. Column 5 is the result of applying the price relatives to both parts of the composite duty. Column 7 results from converting the composite to its approximate ad valorem equivalent of fifty-one percent, and multiplying by the price relatives. Column 7a is an index of column 7, showing the gradual increase of the protective equivalent, as German prices rose more rapidly than American prices.

Columns 8 and 9 list the proportions of total coal-tar color imports which came from Germany, in quantitative and value terms, respectively. A comparison of these two columns provides a clue as to how German products may have overcome their tariff disadvantage after 1936, when Swiss dyes were subject to a duty of only 40 percent. Germany's percents of total United States imports were lower in value terms than in quantity terms from 1936 through 1941, i.e., the unit values were lower. From 1932 through 1935, the unit values of the German products had been higher than other dye imports. In other words, export prices may have been adjusted downward to absorb at least a part of the tariff disadvantage. We cannot be certain of this, for coal-tar colors were imported in many types and grades; slight shifts in the composition of imports would affect unit prices. Also, it must be admitted that German unit values were lower than the average of all imports from 1926 through 1931.

Germany kept its quantitative share of United States imports after 1936 by some means, though its share fell slightly in value terms. In fact, its quantitative (column 8) share was higher from 1936 through 1940 than it had been from 1933 through 1935. The rank correlation of column 8 with time has a coefficient of -.19. The product-moment correlation coefficient is -.34. These measure the slight over all decline after the late 1920's--there is little decline after 1936. 1941 is an exception--it should have been omitted from the correlations, because it is clearly affected by war conditions.

Correlation tests with the product-moment method were made of the relation between the protective equivalent and Germany's share of total imports in both value and quantity terms (columns 8 and 9). The coefficient of correlation between the protective equivalent and Germany's quantitative share of imports is -.40. Both series were correlated with time, and the time effects were removed--leaving a coefficient of -.25. This proves to be not significant at the ten percent level. In other words there is at least one chance in ten that sampling fluctuation would account for a negative value of the coefficient. Simple correlation of the protective equivalent with Germany's value share of imports yields a coefficient of -.52. This is not much better, but the removal of time trends leaves it at -.47. This is significant at the five percent level.

If this difference in the significance of the quantitative and value correlations has any economic meaning, it is this: Germany attempted to maintain her physical share of our markets by reducing the unit values of exports of coal-tar colors to us. It was necessary to reduce prices because Swiss dyes enjoyed a tariff advantage after 1935.

This hypothesis was subjected to a multiple correlation test. The tariff variable was the ratio of the duty on German dyes to the duty on Swiss (and other) dyes. The cost variable was the protective equivalent of the 1926 duty. The import variables were Germany's share, by value, of total United States imports, and Germany's share by quantity. The time variable was omitted. It makes less sense to remove linear time trends from the data for this purpose, for it is the simple change, over time, in the ratio of the two duties which is the causal factor. If there are other factors in addition to costs which, over time, are influencing Germany's share of United States imports, we must risk allowing them to obscure the causal relation between the duty and imports. Thus there are four partial coefficients of the first order. That relating the ratio of duties to Germany's value share, with costs constant, is -.37. It is significant at the ten percent level. That relating costs to Germany's value share, with the ratio of duties constant, is -.14, which is not significant. That relating the ratio of the duties to Germany's quantity share, with costs constant, is -.14. That relating costs with Germany's quantity share, with the ratio of duties constant, is -.37; significant at the ten percent level.

These results, though far from conclusive, suggest confirmation of the hypothesis that German prices were reduced in order to maintain Germany's quantity share of United States dyes imports. The change in the ratio of the duty on German dyes to the duty on Swiss dyes had no clear effect upon Germany's quantitative share, but a discernable effect upon her value share. Conversely, German "costs," as measured by the index of German chemicals prices, had no clear relation to her value share, but correlated significantly with her quantitative share.

A more careful examination of the relation between the protective equivalent and Germany's quantity and value shares of our imports is necessary to be able to say positively that the correlation and significance tests have economic meaning. First, let us recall the nature of the data which make up the protective equivalent. The prices of German chemicals fell in marks, but increased in dollars, relative to the prices of American chemicals. This is why the protective equivalent increased; the duty remained constant for German products. The German prices were too stable for long periods of time to be market-determined prices--they were governmentally or privately administered. This being the case, they may not have been representative of costs of coal-tar color production. If not, then the protective equivalent is fictitious--it does not measure anything. However, comparison with the Swiss case may reveal something. Swiss chemicals prices were more flexible, prior to 1941, though Swiss firms belonged to the same international cartel arrangements. Since the franc was devalued while the official mark was not, the dollar prices of Swiss chemicals did not rise as much, prior to 1940, as did the dollar prices of German chemicals. Yet the unit values of the United States' imports of Swiss dyes increased, while the unit values of imported dyes from Germany declined. This must mean two things: (a) the opportunity costs of German coal-tar color exports to the United States (measured by world chemicals prices and coal-tar colors prices) were rising, and (b) in spite of rising costs, German firms accepted lower prices for their exports to the United States, to offset Switzerland's advantage gained by the reduced American duty and the devalued franc. Thus we can accept as being crudely valid the rise in the protective equivalent due to rising German (dollar) costs relative to

American costs, and we can therefore interpret falling German export prices as a partial absorption of the differential tariff burden on her products. We do not know whether the producers bore this burden; whether the government bore it in the form of export subsidies; or whether preferential exchange rates were used to lower the dollar prices. In any case, we can say that we have discovered some effects of tariff discrimination against German products. We can now recall that, in the Swiss case, the best correlation coefficient was obtained between the _ad valorem_ equivalent of the duty and Switzerland's value share of coal-tar color imports. This was for the years 1926 through 1939, in which Germany was the principal competitor.

Turning to the proportions of German dyes to total United States production, we have less complete data, and can probably learn much less. Only rank correlation was used, because of the short ($n = 8$) series of imports from Germany as percents of domestic production (column 10). The coefficient of correlation with the protective equivalent is -.14, and with time trends removed, it is -.15. This is not revealing. Meaningless results were obtained in the Swiss case, too, where the coefficient of rank correlation was +.03. The Swiss case included the postwar years, when both Switzerland and the United States had expanded industries which were supplying world markets formerly supplied by Germany and Japan. One should not expect, then, a meaningful relation based simply on relative prices and rates of duty. The entirely pre-war, German, example does yield a negative correlation, after removal of trends. The value of the correlation is so low, however, that we cannot confidently say that we have separated a price-and-tariff effect from secular or random changes due to growth of the American industry, shifts in demand or other causes.

Textile Machinery

Textile machinery is analyzed in Table XI, pages 244 to 246. The German wholesale prices, "arbeits-machinen" display the same remarkable stability as did German chemicals prices. For the United States, there was no satisfactory index of wholesale prices. "Iron and steel" was chosen, merely as a measure of costs of a related material. The broader index, "metal and metal products" could have been used; in which textile machinery would have appeared with a small weight. This price index was grossly misleading in the Swiss watch example, however, so the prices of an important material were chosen. This index really does not promise much: steel is a small part of the costs of machinery, and steel prices are known to be administered--though the price-setters do claim to follow labor costs in pricing steel. United States iron and steel prices, in spite of their notorious rigidity, show more

TABLE XI, GERMANY - TEXTILE MACHINERY

	1	2	3	4	5	6
Year	Grosshandelspreise, arbeits - machinen, Germany, (1913 = 100) 1	Rate of exchange. Reichsmark equals ---------cents, U.S. 2	Grosshandelspreise, arbeits - machinen, Germany, (1913 = 100) in U.S. dollars.	Wholesale price index, U. S. Iron and Steel (1926 = 100) 3	Protective equivalent of 1924 duty on "other textile machines and parts" (751590) tar. par. 372.	Duty levied in each year on "other textile machines and parts" (751590) tar. par. 372.4
1924	128.2	22.998	128.2	109.4	35.0	35.0%
1925	138.0	23.801	142.8	102.2	41.7	35.0
1926	139.7	23.800	144.6	100.0	43.2	35.0
1927	139.5	23.764	144.1	95.9	44.9	35.0
1928	144.8	23.861	150.2	93.5	48.0	35.0
1929	147.8	23.802	153.0	94.9	48.2	35.0
1930	149.7	23.854	155.3	89.1	52.1	36.7
1931	146.0	23.630	150.0	83.3	53.8	40.0
1932	132.9	23.749	137.2	79.4	51.6	40.0
1933	129.2	30.578	171.8	78.6	65.3	40.0
1934	128.4	39.375	219.8	86.7	75.7	40.0
1935	127.8	40.258	223.7	86.7	77.1	40.0
1936	128.1	40.297	224.5	87.6	76.5	40.0
1937	128.2	40.204	224.1	98.2	68.2	40.0
1938	128.2	40.164	223.9	98.6	67.8	40.0
1939	128.5	40.061	223.8	95.8	69.8	40.0
1940	128.4	40.021	223.4	95.1	70.2	40.0
1941	128.3	39.968	223.0	96.4	69.1	40.0

7	7a	8	9	10	11	12
Protective equivalent of current duty on "other textile machines and parts" (7515900) tar. par. 372.	Index of protective equivalent of current duty on (7515900) (1924=100)	U.S. imports of textile machinery from Germany as percent of total U.S. imports of textile machinery,[4] (7495000-7515900) - Value.	U.S. imports of textile machinery from Germany as percent of total U.S. production of textile machinery and parts - Value.[5]			
35.0	100	37.0	1.33			
41.7	119	47.1	2.09			
43.2	123	73.0				
44.9	128	65.2	3.95			
48.0	137	66.2				
48.2	138	70.2	4.84			
54.6	156	71.8				
61.5	176	64.2	1.85			
59.0	169	63.4				
74.6	213	45.7	1.06			
86.5	247	38.4				
88.1	252	40.0	.76			
87.5	250	46.1				
77.9	223	60.3	1.67			
77.5	221	63.2				
79.7	228	53.4	1.34			
80.2	229	1.9				
79.0	226	1.0				

FOOTNOTES TO TABLE XI

1 Berlin Statistischen Reichsamt, Statistisches Jahrbuch für das Deutsche Reich, 1932, p. 256 (1924-1931); Ibid., 1942, p. 358 (1937-1940); Landerrat des Amerikanischen Besatzungsgebeite, Statistisches Handbuch von Deutschland, 1928-1944, Munchen, 1949, p. 460 (1932-1936).

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125.

3 United States Department of Commerce, Statistical Abstract of the United States, 1929, p. 325 (1924-1928); Ibid., 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941 (1936-1940); Ibid., 1944-1945, p. 418 (1941).

4 ________, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. Item (7515900) was selected as "typical" or "representative", to avoid the problem of finding a mean rate - which itself would not be a perfect measure of the impact of the duty. The duty on (7515900) changed when other duties changed, and was roughly equal to the ad valorem equivalent of all duties on textile machinery (7495000 - 7515900). The latter was 36.3% in 1922, and 39.58% in the second half of 1930. The duty for 1930 is estimated by rating that 67% of total U.S. imports of (7495000-7515900) by value entered before June 17, at 35%, and 33% entered thereafter at 40%. .67 x .35 + .33 x .40 = .367. Duty was lowered to 25% (roughly) by Trade Agreement with United Kingdom, effective January 1, 1939. This was not extended to Germany's products.

5 Imports, Ibid., U.S. production, ________, Statistical Abstract of the United States, 1929, p. 832, 1933, p. 715, 1936, p. 756, 1938, p. 772, 1941, p. 874, 1950, p. 816.

variation in the 1930's than the German prices. This probably resulted from different governmental policies and employment situations in the two countries.

Since United States prices fell by 1939 (the last year used in correlation analysis); and since the mark appreciated relative to the dollar, the protective equivalent of the original 1924 duty almost doubled. Whether or not this is a genuine doubling of the burden of a given rate of duty depends upon all of the qualifications discussed in connection with the coal-tar colors example--plus the dubious value of the United States iron and steel index.

The rate of duty selected to represent the duty on all textile machinery imports is the rate applied to "other textile machinery and parts, 7515900." There were several different rates for different machines. This one was selected because these miscellaneous imports came from several countries, because they made up a large item in total imports, and the rate was roughly an average of other rates. See footnote 4 to Table IX for a detailed explanation. There is actually some disadvantage in the use of this rate for German machinery; the largest import item before the war was full-fashioned hosiery knitting machinery, which came from Germany, and it was taxed at forty percent *ad valorem* in all the years covered by this study. The thirty-five percent "typical" rate shown for the years 1924 through 1929 then understates the tax on German products.

The protective equivalent of the current duty (columns 7 and 7a), therefore, shows a slightly greater rate of increase than it should. It would be difficult to compute the magnitude of this error. At its greatest, it would be a 27.5 percent error in rate of increase (if all imports from Germany had been taxed at 40 percent from 1924 through 1929). Granting the maximum possible error, the ranking of column 7 for purposes of correlation was re-done; only one year's rank was affected. This would have made but little difference in the value of the rank correlation coefficients.

The tariff reduction to 25 percent *ad valorem* provided for in the trade agreement with the United Kingdom effective January 1, 1939, was not extended to German products, so does not show here. Its effects might have been shown, except that there is only one year of experience before the war. We may learn a little more in the study of the United Kingdom case, but not much is possible.

There was some decline in Germany's share of United States imports; its rank correlation with time has a coefficient of -.2. Visual inspection of column 8 reveals that the decline was not at all steady. A great deal of random change should be expected when dealing with such specialized equipment. The investment acceleration principle would also be expected to create a great deal of variation in such imports, as domestic capacity might be adequate or excess in some years and inadequate in other years.

It is remarkable that correlation results are as favorable to the usefulness of the protective equivalent as they are for this example. The coefficient of rank correlation of the protective equivalent with Germany's share of imports is -.37. With time trends removed, it is -.60. We can compare this later with the results for textile machinery imports from the United Kingdom.

Testing for the effects of the tariff by itself, it is found that a coefficient of -.30 relates the tariff to imports from Germany as percents of total imports, with costs constant. This is not significant at the ten percent level. The partial coefficient relating costs to Germany's share of imports, with the tariff constant, is -.40, which is significant at the ten percent level. Thus our measure of costs in Germany and the United States, consisting of <u>arbeits-machinen</u> and iron and steel price indexes, seems to have some influence on Germany's share of imports, while the tariff rate has less influence. This is to be expected, for tariff rate discrimination against German products did not begin until 1939, the last year used in the correlation. German costs, on the other hand, would be expected to affect Germany's share, unless they were to be exactly offset by changes in costs in other producing countries.

Rank correlation of the protective equivalent with imports from Germany as percents of domestic production yields a coefficient of -.39. Correction for time trends leaves a coefficient of -.32. While this is not remarkably good, it is probably as much relationship as we should expect for a list of such products. Unfortunately the series of domestic production contains only nine observations. They are census of manufactures figures; being given only in alternate years through 1939. The production figures for 1923 were matched with the protective equivalent for 1924, to add the ninth figure to the series. One cannot have much reliance on correlation of such short series, and unfortunately, there is no test of significance for rank correlation.

The relation between the protective equivalent and the ratios of imports from Germany to domestic production is interesting enough to be worth another test. Simple and partial correlations were performed with the product-moment method for the short series; a test of significance can be applied which accounts for the small number of observations. The coefficient of simple correlation is -.55. The partial coefficient, with time trends accounted for, is -.61. Due to the small number of observations, this is not quite significant at the five percent level. There is less than one chance in ten, but more than one chance in twenty, that sampling fluctuation would have given us a negative value for this correlation.

In spite of the shortness of the series, it was decided to use multiple correlation to isolate the effects of the tariff and of costs upon imports from Germany as percents of domestic production. The tariff correlated with a coefficient of -.82, which is significant at the five percent level, even though the series contains only nine observations. This is remarkable evidence of the sensitivity of such an import to the tariff. The shortness of the series, and the fact that the duty, being levied as an *ad valorem* rate was altered only once during the period raise doubts concerning the possibility of measurement. The significance test accounts for the shortness of all of the series, but not for the single break in the tariff series. The removal of linear time trends from the tariff, cost and import series accounts but imperfectly for this; it amounts to "straightening out" the kink and relating the deviations from a straight line in one series to the deviations from a straight line in another series. This is not an ideal plan for isolating and measuring the effects of the tariff. Yet, the results are strong enough, and consistent with the results obtained by rank correlation of the protective equivalent, which contained both the cost and the tariff variations. Rank correlation removed time by another method, which did not assume linear trends, and was not affected by the single, sharp break in the tariff series.

Costs, in isolation, correlated with imports from Germany as percents of domestic production with a coefficient of -.64. This is significant at the ten percent level, but not at the five percent level. The same comments apply to this test, except that the cost series does not contain the single, sharp break. There are three tests: rank correlation of the protective equivalent, partial correlation of the tariff and partial correlation of costs with imports as percents of domestic production. They give results consistent with each other, and pointing in the direction of significant measures of the sensitivity of these imports to all costs, to the tariff and to other costs.

Summary

For the two commodity examples studied for Germany, we were able to find some significance in comparisons of Germany's shares of United States imports of coal-tar colors, and in the ratios of German to domestic textile machines. The significance of the first was that it showed the absorption by German sellers (or by their government) of a part of the burden created by tariff discrimination and higher German dollar prices. This was done to maintain Germany's share of total imports. The significance of the second was that it showed, for imports which were mostly supplementary, a fall in imports relative to domestic production as the tariff burden increased. The tariff burden increased because of higher German prices (in dollars) and because of the slight increase in the 1930 duties. Tariff discrimination against the German machines did not begin until 1939, and no correlations included years beyond that date.

Very little can be done to relate United States tariffs, imports from Germany and Germany's balance of payments. In the first place, after 1934, Germany's external trade was subject to so much state control that very little price effect upon her exports could be discovered. The effects of the devaluation of the dollar, while the mark officially maintained its former gold price, cannot even be determined, because external trade took place at several rates of exchange. We have used the official rate to calculate the burden of the tariff, but we are not certain that we have been able accurately to calculate it with such data.

The main purposes of the German study have been to view the principal sources of two of the commodities, and to examine the effects of tariff discrimination. We have found that German contributions to total imports of both commodities were maintained at more than fifty percent up to the beginning of the war. The ratios of imports from Germany to domestic production declined for both commodities. This may be partly attributed to growth and diversification of both domestic industries. Both are relatively new industries in the United States; synthetic dyes and textile machines having reached high states of development abroad before much development occurred in the

United States. The German case was not carried beyond 1941, and for some purposes not beyond 1939. It is known, however, that the war caused great expansion and diversification of both industries in the United States, so that the slight pre-war downward trend of the ratios of total imports to domestic production was accelerated.

The effects of tariff discrimination could be measured indirectly in the case of coal-tar colors. Differences between Germany's quantitative shares and the value share of United States imports of dyes could be observed. The negative value of the coefficient of partial correlation between the protective equivalent and Germany's value shares was significant at the five percent level, while the corresponding coefficient for her quantity shares was not significant at the ten percent level. The use of the protective equivalent had not proven worthwhile for Swiss coal-tar colors, but it was used for Germany for two reasons: a) the actual duty did not change, so it provided no basis for correlation, and b) the movements of Swiss chemicals prices and coal-tar colors prices convinced us that German costs (at least in the opportunity-cost sense) actually rose to a degree approximated by the German chemicals price index. Thus we could deductively reason that while costs were rising, German exporters lowered prices in order to sell in competition with the Swiss products which came in under the lower duty. This was tested by using the ratio of the duty on German dyes to the duty on Swiss dyes as a variable to be correlated with Germany's share of imports. A coefficient (-.37) significant at the ten percent level resulted when the import share was measured by value; a non-significant coefficient resulted when the import share was measured quantitatively. When costs were correlated with imports, "stripping" out the ratio of the duties, a significant coefficient was obtained for quantitative shares, and a non-significant coefficient for value shares. Thus all the tests available to us point in the same direction; i.e., toward the conclusion that the tariff discrimination caused downward adjustments in German coal-tar dyes prices, for the purpose of maintaining Germany's share of United States dyes imports.

Textile machinery did not offer quite the same opportunity to observe changes in Germany's share of United States imports. One could not observe the effects of tariff discrimination, because it did not begin until 1939. One could not measure differences between quantity and value imports, because one cannot sensibly quantify imports of textile machines. Taking the more than one hundred percent rise in the protective equivalent at its face value (i.e., assuming that the price indexes approximately measure relative costs), its correlations with declining (value) shares of total imports and of domestic production indicated that we might be measuring something. The -.60 coefficient of rank correlation with value shares of imports is better than for most examples--and quite remarkable for commodities like textile machines. When broken down into tariff effects and other cost effects by the multiple correlation method, this results in a significant correlation between the other costs and value shares of imports, and a negative-valued, but non-significant correlation between the duty and value shares of imports.

The rank correlation coefficient with imports as percents of domestic production of -.32 is not revealing, and the small number of observations precludes the drawing of conclusions. Product-moment partial correlation yielded a coefficient of -.61, however, which is significant at the ten percent level. Thus, rising German costs were associated with falling German shares of textile machines used by our mills. The isolation of the tariff and other cost effects resulted in surprisingly significant results in this case. The tariff correlated with imports as percents of domestic production with a partial coefficient of -.82; significant at the five percent level. Other costs correlated with a coefficient of -.64; significant at the ten percent level. The effects of time trends were removed by the partial correlation process, so that presumably this is not simply a reflection of the technological growth of the American industry.

We cannot be certain that these are entirely causal relations between German costs and United States tariffs on the one hand and United States imports from Germany on the other hand. There are many random, cyclical and technical causes of variation that have not been isolated. However, the several tests cannot be ignored. We may be forced to admit that some tariff and cost effects can be isolated and observed for industrial products. The Canadian crude nickel metal case and the Swiss coal-tar colors case point to the great difficulties of discovering price-cost reactions in such markets. The two German examples, taken from industries which are not particularly competitive in Germany, yield results which appear rational, however.

CHAPTER VIII

THE UNITED KINGDOM -- COTTON CLOTH AND TEXTILE MACHINERY

Cotton Cloth - Competition

There are many commodities that might be selected as examples of United States imports from the United Kingdom. The principal difficulties arise in the selection of price data to use for costs, and in the selection of a single rate of duty for a class of imports. Clearly, textiles and machinery have been important historically in imports from the United Kingdom. There are many others: cutlery, chinaware, bicycles, spirits, fabricated nickel, and other manufactured products. During the period from 1922 through 1950, textiles and machinery were consistently among the most important of the imports. Alcoholic spirits were important only after 1933. Bicycles were of minor importance until after World War II. Price indexes for United Kingdom non-ferrous metals could not be obtained.

Of the textiles, the largest group was that designated "cotton cloth." There is a large number of classifications of cotton cloth--the three groups of cotton cloth not further manufactured were selected as the imports to measure. These are United States Department of Commerce commodity classes 30403047 to 30603067, called "cotton cloth, unbleached, bleached and printed or dyed." There are several hundred individual commodities listed within these three groups. The method of selecting a rate of duty will be explained below.

There is not a good means of comparing the imports of these cotton goods with domestic production. In some years, Census of Manufactures data could be obtained for "cotton goods and small wares industries" output, and in other years for "cotton broad woven goods" production. This makes a series that is not homogeneous, and it has much too broad a coverage to give a clear measure of the competition between cloth from the United Kingdom and domestic cloth of the same categories.

The cotton cloths of the sort selected for this example are known as "countable cotton cloths" because quality or grade is based upon the average number of yarns per pound of cloth. Various ad valorem or specific duties are levied, depending on the number of yarns per pound and the value per pound of the cloth. More than 90 percent of the cotton cloths manufactured in the United States and imported in 1939 and 1947 were "countable."[1]

For many years the United States has been, on the whole, self-sufficient in cotton cloth, exporting more than is imported. Though imports and potential imports are considered by the industry to threaten domestic firms in

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[1] United States Tariff Commission, Summaries of Tariff Information, v. 9, p. 29.

our markets, many of these firms sell abroad in competition with European and Japanese producers. The reasons why imports continue and exports increase at the same time are the differentials in labor and machine costs and differences in the techniques of producing different grades and varieties of cloth.

United States firms export principally printcloth, sheetings, carded broadcloths and other fabrics of coarse and medium yarns.[2] The machines manufactured domestically are designed for high output and low labor utilization in the weaving and finishing of fabrics of these types. It is thus possible for American producers not only to supply their principal markets (the Philippine Republic and western hemisphere nations) but to sell small quantities in the Sterling Area and in Europe's colonial markets.

One class of imports is medium grades of cotton cloth (of average number of yarns 31's to 50's) which came from Japan through the 1930's, and more recently also from Mexico and Brazil. Much of this is unbleached or bleached, and is given further finishing in the United States.[3] Some of it is then re-exported to Latin America or to Africa. Cloth of this type is imported over tariff barriers because it is cheaply produced with American-type machines, with

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[2] Ibid., p. 36.

[3] Ibid., p. 31.

low-wage labor. The duties on cloths of these grades were raised by Presidential proclamation in 1936, under the authority of section 336 of the Act of 1930.[4] The Trade Agreements with Switzerland (1936) and the United Kingdom (1939) did not reduce these duties.

The other principal class of cotton cloth imports consists of the finer grades, with thread counts of sixty to more than one hundred. The United Kingdom and Switzerland supply, between them, ninety percent of these imports. Small amounts came from France, Belgium and, until 1948, from Czechoslovakia. France and Belgium are more important as suppliers of lace and specialty fabrics than of the cloths included here. The imports from the United Kingdom and Switzerland are fine muslins, voiles, "Swiss" lawns, etc., generally made from combed cotton yarns.

These grades of cotton cloth are not consumed in large quantities--usually not more than ten percent of domestic production is of these types. This fact makes their imports seem relatively more important than one is led to believe by looking at raw import data. Imports of cloth are very small percents of domestic production, but imports of these grades are substantial portions of consumption of these grades. To arrive at some rough idea of their relative importance, we can assume that ten percent of

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4 _Ibid_., p. 39.

production in any year is of the finer import grades. An average of the ratios of total imports to domestic production for alternate years from 1921 through 1933 amounts to 1.2 percent.[5] By 1933, imports from Japan, Mexico and Brazil of the medium and coarser grades were still negligible. If we count all imports as the European grade, then they amounted to something like twelve percent of domestic production of the same grades. This is still small, but more important than one would at first think.

European producers may enjoy some advantage in the production of these types of cloth that is greater than their advantage in the cheaper grades. Some are made from Egyptian or Peruvian long-staple cotton. The United States protective tariff on raw long-staple cotton places our mills at a disadvantage--cotton is a duty-free import to the United Kingdom and Switzerland. The rest of their advantage lies in the differential labor-time required by the European methods.

In general, domestic textile machines, used for ordinary grades of cloth, are built to produce more per man-hour of operation. This reduces the European advantage due to lower wage rates, and in some cases entirely eliminates it; witness American sales in their markets. The same is not so true of voiles, fine muslins, etc. Either

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[5] Ibid., p. 41.

because it is technically impossible, because machines have not been domestically developed as well for these grades of cloth, or because of concentration on the common grades, the labor-time has not been reduced as much for fine grades. Since the price of (short-staple) cotton is about the same in all countries, the production-cost differential is found in capital and labor costs. Textile machines of the types imported must be somewhat more expensive in the United States, because of the existence of tariff rates from 15 percent to 30 percent. Domestically made machines may be no more expensive--and since they are designed for greater output--they may be cheaper on a per-yard-of-production basis.[6] The great differential in favor of European producers is therefore labor costs. Where labor is a larger component, then, their advantage is greater.

All of these advantages have been offset to some degree by tariff rates. Rates have been higher for finer grades, presumably for the above reasons. These rates were reduced by the trade agreement with Switzerland in 1936 and the trade agreement with the United Kingdom in 1939. Rates on

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6 This is especially true so long as the Lancashire area in England sticks to the one-shift per day method of production, contrasting with round-the-clock operation of American cotton mills. Since machines become obsolete about as rapidly as they physically depreciate, there is much saving in their continuous use. See Economic Cooperation Administration, The Sterling Area, London, Her Majesty's Stationery Office, 1951, p. 597.

the intermediate grades imported from Japan and Mexico had been increased in 1936, while rates on coarse grades have not been altered. Therefore, relative to other grades and former years, the imports from the United Kingdom and Switzerland now enjoy tariff advantages.

Tariff reductions do not seem to correlate well with imports. This poor reaction will be analyzed fully; it is the principal task of the cotton cloth portion of this chapter. Meanwhile, however, more should be said concerning the world production conditions for cotton textiles.

In the first place, the United Kingdom is declining as an exporter of cotton textiles. The war caused shortages of manpower, obsolescence and deterioration of equipment and difficulty in securing supplies of raw cotton. Before this, however, former customers, particularly Japan and India, had developed their own industries and were exporting in competition with British producers. Between 1918 and 1940, 800 Lancashire cotton mills were shut down, 21 million spindles were broken up, 360 thousand looms were abandoned and 345 thousand workers left the industry.[7] Stating her losses in another way, 85 percent of British production was exported in 1913, while in 1938 only 50 percent of an output less than half as great was exported.[8] In 1949-50,

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7 Ibid., p. 596.

8 United States Tariff Commission, Op.Cit., v. 9, p.43.

the quantity exported was only half as great as in 1934-38.[9] In the face of this drastic decline, little could be done to revive British exports to the United States. This is especially true because the American industry, though not entirely healthy during that period, nevertheless moved southward, expanded and greatly increased its efficiency. Production per man-hour and per machine-hour in the American industry greatly out-stripped the British industry. Though wages have increased more rapidly in the United States, increases in productivity have left the cost relatives virtually unaltered. Thus there could be no hope of expanding British sales in the American market, especially since Japan, Mexico, Brazil and lately the Carribean areas offer stiff competition in cheaper fabrics.

Various measures have been undertaken in Britain. Many of them have been restrictive--the destruction of spindles and horizontal combinations of producers. Since 1946, however, studies of American methods and re-definitions of working rules promise other solutions. Since India is now a net exporter to Britain, and since Japan has recovered most of her war losses, there does not seem to be much hope that Britain will recover more than a small portion of her former world cotton textile markets.

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9 E.C.A., Op. Cit., p. 599.

The second major factor affecting world production of cotton is the development of synthetic fabrics. While cotton textile consumption seems to increase in underdeveloped areas as their production skills and incomes rise, it remains fairly stable in high-income countries, with synthetics satisfying the growth in total textile demand. Synthetic fabrics require weaving and finishing facilities similar to those required by cotton, so much of this capacity can be shifted from one to the other. Reduction of the raw material to liquid form and spinning it, however, require new techniques more apt to be developed in the advanced countries. To date, the most important ingredient of the synthetic textiles has been research, so that the advanced countries have clear advantages. If a country like the United Kingdom is to have a future in the textile market, it must lie in synthetics and in specialty fabrics.

The rise of synthetics also means that competition between different grades of cotton fabrics has less meaning that it once had. Thus competition between one of the fine fabrics imported from the United Kingdom or Switzerland and a domestic fabric may be entirely altered by the replacement of one or both by a synthetic.

Cotton Cloth - Statistical Analysis

With all of this in mind, let us proceed to examine the cotton cloth example that has been constructed for this chapter. The data is presented in Table XII, pages 268 to 272. Price data for the United Kingdom could not be secured in a continuous form. The table is therefore broken into three segments. The years 1922 through 1934 use the "index numbers of wholesale prices by groups -- cotton (1913 = 100)." Another such index has 1930 as a base, and a third has 1938 as a base. Though there was some overlap between the first two, it was not possible to obtain a linked series or any of the three extended backward or forward far enough to construct a continuous table. Table XII is therefore three separate tables. Calculations using 1922 as a base continue only through 1934. Beginning with 1930 in the second segment, all calculations use that year as a base--and thus are independent of the calculations of the first segment. The same is true for the third segment. It is unfortunate that observations over a longer period of time cannot be made, but we shall see later that this makes relatively little difference.

The price series available for United States and United Kingdom cotton textile costs are probably as good as any we have used in these examples. At first it may appear that we have indexes that are too narrow, like the lumber

TABLE XII, GREAT BRITAIN - COTTON

	1	2	3	4	5	6		
Year	Index numbers of wholesale prices, Great Britain, by groups, Cotton (1913 = 100; 1922-1934) (1930 = 100; 1930-1937) (1938 = 100; 1938-1949).[1]	Rate of exchange, Pound Sterling equals ————cents, U.S.[2]	Index numbers of wholesale prices, Great Britain, Cotton in U.S. dollars.	Wholesale price index, Cotton goods, U. S. (1926 = 100).[3]	Protective equivalent of 1922, 1930 and 1938 duties on Cotton Cloth (304.0060).	Duty in each year on Cotton Cloth (304,0060) - unbleached, containing yarns average number not exceeding number 60.[4]		
1922	182.2	442.917	182.2	104.3	.270	.27	lb., n.l.t.	25%
1923	201.9	457.483	208.5	116.9	.276	.27	-	25
1924	227.8	441.706	227.2	114.4	.307	.27	-	25
1925	209.8	482.894	228.7	110.0	.321	.27	-	25
1926	158.8	485.824	174.2	100.0	.269	.27	-	25
1927	154.7	486.102	169.8	97.9	.268	.27	-	25
1928	164.2	486.622	180.4	101.2	.276	.27	-	25
1929	154.4	485.688	169.3	98.8	.265	.27	-	25
1930	121.2	486.213	133.0	84.7	.243	.27	-	25
						.33	-	31
1931	96.8	453.50	99.1	66.1	.232	.33	-	31
1932	95.8	350.61	75.8	54.0	.217	.33	-	31
1933	96.2	423.68	92.0	71.2	.200	.33	-	31
1934	106.9	503.93	121.6	86.5	.217	.33	-	31
1930	100.0	486.213	100.0	84.7	.330	.33	-	31
1931	79.0	453.50	73.7	66.1	.312	.33	-	31
1932	78.3	350.61	56.5	54.0	.292	.33	-	31
1933	78.7	423.68	68.6	71.2	.269	.33	-	31
1934	87.5	503.93	90.7	86.5	.293	.33	-	31
1935	86.7	490.18	87.4	83.4	.293	.33	-	31
1936	88.8	497.09	90.8	80.3	.316	.33	-	31
1937	97.7	494.40	99.3	84.3	.329	.33	-	31

7	7a	8	9	10	11	12
Protective equivalent of current duty on Cotton Cloth (304.0060).	Index of protective equivalent of current duty (1922 = 100, 1930 = 100 and 1938 = 100).	Imports of Cotton Cloth (30403047-30603067) from Great Britain as percent of total U.S. imports of Cotton Cloth - Quantity.[4]	Imports of Cotton Cloth (30403047-30603067) from Great Britain as percent of total U.S. imports of Cotton Cloth - Value.[4]	Imports of Cotton Cloth (30403047-30603067) from Great Britain as percent of U.S. production.[5]		
.270	100	n.a.	62.8			
.276	102	79.8	78.8			
.307	114	n.a.	81.5			
.321	119	81.6	83.0	1.22 %		
.269	100	70.9	74.2			
.268	99	67.4	67.6	.65		
.276	102	63.3	63.1			
.265	98	58.1	61.6	.62		
.252	93	50.8	53.7			
.283	105	29.6	35.7	.30		
.265	98	29.3	33.6			
.244	90	27.7	30.3	.21		
.266	99	19.5	32.5			
.330	100	50.8	53.7			
.312	95	29.6	35.7	.30		
.292	88	29.3	33.6			
.269	82	27.7	30.3	.21		
.293	89	19.5	32.5			
.293	89	16.5	30.6	.25		
.316	96	11.9	28.3			
.329	100	8.5	23.8	.31		

TABLE XII, GREAT BRITAIN - COTTON (CONTINUED)

	1	2	3	4	5	6		
Year	Index numbers of wholesale prices, Great Britain, by groups, Cotton (1913 = 100; 1922-1934) (1930 = 100; 1930-1937) (1938 = 100; 1938-1949).[1]	Rate of exchange, Pound Sterling equals ———— cents, U.S.[2]	Index numbers of wholesale prices, Great Britain, Cotton in U.S. dollars.	Wholesale price index, Cotton goods, U. S. (1926 = 100).[3]	Protective equivalent of 1922, 1930 and 1938 duties on Cotton Cloth (304.0060).	Duty in each year on Cotton Cloth (304.0060) - unbleached, containing yarns average number not exceeding number 60.[4]		
1938	100.0	488.940	100.0	65.4	.330	.33	-	31
1939				67.2		.24	-	22.5
1940	149.9	383.00	117.4	71.4	.355	.24	-	22.5
1941	165.3	403.18	136.3	94.2	.312	.24	-	22.5
1942	168.5	403.50	139.1	112.4	.267	.24	-	22.5
1943	163.5	403.50	134.9	112.7	.258	.24	-	22.5
1944	183.7	403.50	151.6	115.7	.283	.24	-	22.5
1945	193.7	403.02	159.7	121.4	.284	.24	-	22.5
1946	207.3	403.28	171.0	150.5	.245	.24	-	22.5
1947	239.1	402.86	197.0	200.6	.212	.24	-	22.5
1948	359.2	403.13	296.2	207.1	.309			
1949	384.3	368.72	289.8	176.1	.355			
1950	400.0	280.07	229.1	197.0	.251			

(CONTINUED)

7	7a	8	9	10	11	12
Protective equivalent of current duty on Cotton Cloth (304.0060).	Index of protective equivalent of current duty (1922 = 100, 1930 = 100, and 1938 = 100).	Imports of Cotton Cloth (30403047-30603067) from Great Britain as percent of total U.S. imports of Cotton Cloth - Quantity.[4]	Imports of Cotton Cloth (30403047-30603067) from Great Britain as percent of total U.S. imports of Cotton Cloth - Value.[4]			
.330	100	12.4	28.6			
		11.8	31.8			
.258	78	10.5	35.6			
.227	69	13.8	45.4			
.194	59	37.7	66.9			
.188	57	34.3	52.3			
.206	62	18.3	29.0			
.206	62	2.6	3.9			
.178	54	11.0	17.9			
.154	47	n.a.	n.a.			

FOOTNOTES TO TABLE XII

1 Great Britain, Central Statistical Office, Annual Abstract of Statistics, 1939, p. 255 (original series 1922-1934); Ibid., no. 83, 1940, p. 257 (revised series, 1930-1937); Ibid., no. 88, 1952, p. 302 (1938-1949). The index no. 400.0 was assumed for 1950, to test the effects of the 1949 devaluation.

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32 (1922-1930); Ibid., January, 1940, p. 74 (1931-1938); Ibid., January, 1948, p. 125 (1939-1947); Ibid., December, 1953, p. 1409 (1948-1950).

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1922-1928); Ibid., 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-1945, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1952, p. 275 (1950).

4 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. For 1947-1950, duties are from _______, Schedule A, August, 1950, corrected to May, 1952. Imports are of 3 categories, 3040347 to 30603067, Cotton Cloth, unbleached, bleached and printed or dyed. This includes all weights and grades of Cotton cloth, not further manufactured. The duty on 3040060 is selected as "representative", since it changed when most of the others changed, and since its ad valorem equivalent was roughly equal to that for all Cotton Cloth.

5 Imports, Ibid., United States production, _______, Statistical Abstract of the United States, 1929, p. 823, 1933, p. 699, 1936, p. 740.

indexes of Chapter V. It is true that "cotton cloth (30403047 - 30603067)" makes up roughly seventy-five percent of the total weights in the Bureau of Labor Statistics wholesale price index of cotton goods. This would make it seem that we are simply recording an index of the prices of the commodities imported--and thus guilty of allowing changes in demand and in the scale of production to alter the measure which is supposed to be indicating cost conditions in the industry producing the commodities. If we remember that the types of cloth actually imported from the United Kingdom amount to only about ten percent of domestic production, then we can accept the wholesale price index as a broader measure showing, though imperfectly, the opportunity costs of producing these import grades. In 1950, actually, the import grades totalled nine percent of the weights in the "cotton goods" index.[10]

The United Kingdom index must be at least as broad. The weights of the types of cloth sold to American markets is not known. The total composition of United Kingdom production, including that for home consumption and that for export to other markets, is similar to the composition of American production, so the relative importance of the

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[10] The basis for estimating these two weights is found in United States Department of Labor, Wholesale Prices, 1950, Washington, G.P.O., 1950, pp. 20-22.

muslins, percales, etc. must not be much greater than in the United States index. Therefore we cannot complain about the nature of the cost data--except that it is in non-linked short series.

Conditions in the British cotton textile industry from 1922 through 1934 are reflected in the price index shown in columns 1 and 3. Though the pound Sterling had appreciated with respect to the dollar by 1934, the dollar prices of British cotton textiles had declined relative to American cotton textiles prices. This is reflected in column 5. Here the specific duty of 27 cents per pound, applicable in 1922, was altered for each year by the price relatives, to form the "protective equivalent of the 1922 duty." In 1934 it was .217, or eighty percent of its 1922 value. This occurred in spite of the fact that American cotton textile prices had declined drastically from 1929 to 1932, and then had recovered substantially by 1934.

The decline in British prices relative to American prices occurred in the 1920's. This is confirmed by looking at the second segment of the data in Table XII. Starting with 1930 as a base, there is practically no change in the protective equivalent of the 1930 duty of 33 cents, through 1937. The pound's dollar price changed little--so prices in the two countries actually maintained a constant relation to each other.

The period of the war and post-war recovery, up to 1950, was complicated by many interferences with textile production and exports, but the price picture is simple enough. By scanning column 5, one can see the following: a) the depreciation of the pound in 1940 slightly more than offset a rise in British relative to American prices, b) until 1947, American prices then rose more rapidly than British, c) from 1947 until 1949, British inflation was more rapid than that in America, and d) the 1949 depreciation of the pound more than offset the greater rise in British prices. Looking at the 1938-1950 period as a whole, we can see that British cotton textile prices rose to 400 percent of their 1938 level, but that depreciation of the pound caused the dollar rise to be only to 229 percent. American prices rose to approximately 300 percent of their 1938 level. The net effect of these changes is shown in the protective equivalent of the current duty, being, in 1950, 76 percent of its 1938 value.

The protective equivalent of the constant duty shows in this example roughly the same results that it showed in the Australia and Mexico chapters. Rates of inflation had been greater in these countries than in the United States. The 1949 depreciations slightly more than offset this differential. These three arbitrarily selected examples, then, tend to confirm a part of the reasoning behind the decisions to depreciate. In other words, differential inflation had placed the Sterling area countries and Mexico in difficult positions with respect to dollar markets, and depreciations of about thirty percent would place them in positions slightly better than their pre-war positions. The rest of the reasoning is that world demands for their products are elastic enough to result in larger dollar earnings, or in more sales in competition with dollar goods, after depreciation. This part of the theory is neither confirmed nor denied by this study. In some cases the demand is relatively elastic, and in some cases it is not. No direct test of the 1949 depreciation has been made, since the data are not extended beyond 1950. Inferences can, however, be made from the earlier responses to changes in the protective equivalent.

The duty recorded in column 6 of Table XII is a rough indication of the duty on cotton textile imports from the United Kingdom. It is the duty on unbleached cotton cloth of thread count 60's. The _ad valorem_ equivalent of this duty remained close to the mean _ad valorem_ equivalent of all the duties on imports, and it changed at the same times and to about the same degrees as did the duties on imports from the United Kingdom. There is not much else about it that can be called typical of the rates of duty. The rates on unbleached cloth, of which this is one, are expressed alternatively as specific or as _ad valorem_ rates. The others are _ad valorem_ rates. This is near the lower end of the rates applied to the types of cloth imported from the United Kingdom--it is near the mean of all rates. This does not destroy its usefulness, as long as its changes are proportionate to the changes in the rates applicable to British goods. Actually, the rates of duty in these examples are "dummy" figures, since they are operated on in such a way that they are altered only <u>in proportion</u> to some other changes, i.e., prices and exchange rates. The resulting equivalents are then correlated with other variables, so that it is always proportional change that is significant, and not absolute level. One could well use a dummy number such as 1 on the first lines of columns 5, 6, and 7. The reason for using an actual duty is to provide a visual reminder at all times of the height of the duty.

Provided that we are correct in the judgment that the duty recorded in column 6 of Table XII changes proportionately with duties on cotton cloth imported from Britain, we can proceed to construct a protective equivalent of current duties. This is in column 7, and is indexed in column 7a. It differs from column 5 only in that the two changes in duty affect it in 1930 and in 1939. (1939 British price data are missing, so that is a blank line.) We can see that the increase of 1930 restored the duty nearly to its 27 cent level of 1922; i.e., the effects of the relative decline of British prices were virtually wiped out. This is a specific duty--so its ad valorem equivalent would have been considerably higher, as cotton cloth prices fell. The duty on unbleached cloth has the specific and ad valorem alternatives, but the higher of the two would be effective.

In the 1930-1937 segment of the table we can see that neither the tariff rate nor relative prices changed. This assumes that the types of cloth imported from the United Kingdom were not affected by the 1936 agreement with Switzerland. This is only approximately true, of course. Each agreement dealt with the items in which the parties were most interested, but there is some interest shared by the two countries in certain products. The "most favored nation" clause would make the reductions immediately applicable to imports from all but Germany.

In the 1938-1950 segment of the table, the combined effect of the 1939 reduction and the greater rate of American price inflation is shown. Import and tariff data for 1948-1950 became too complicated to make it worthwhile to estimate them, so columns 6 through 10 remain blank for the last three years. The war and postwar years are omitted from the attempt to find correlation relations, so there is no necessity of filling in the data at the risk of making dubious approximations.

Columns 8 and 9 are the quantity shares and the value shares of Britain in total United States imports of the three broad classes of cotton cloth--"unbleached, bleached and dyed or printed." These are not as meaningful as we would like them to be--their secular decline shows several things at once. First, Japan, Mexico and Brazil began, in the middle 1930's, to sell considerable quantities of medium-grade cloth in the United States. The United Kingdom's share thus declined, without necessarily having been displaced by directly competitive products. The change in the composition of imports is reflected in the difference between the quantity share and the value share of Britain. The latter declines much less than the former, as the lower-priced imports became more important.

Scanning columns 7a, 8 and 9 reveals no clear relation between the protective equivalent and Britain's share of imports. Correlation analysis confirms this lack of relation. Only the years through 1937 were correlated, to avoid the effects of the war. This eliminates any effects of trade agreement tariff reduction, as the one reflected in the protective equivalent took place in 1939. Only changes due to prices and exchange depreciations are taken into account. In order to link the years 1935, 1936 and 1937 with earlier years, the overlapped years in each of the first two segments of column 7a were averaged. The ratio of the averages was used to convert the 1935, 1936 and 1937 figures to values corresponding to the first segment. This is not entirely justified, as we do not know what changes were made in the weighting of the new British price index on which the second segment is based. However, it is probably a good enough approximation for purposes of rank correlation. The rank correlation coefficient of column 7a with column 9 is +.37. When time trends are allowed for, it becomes +.29. The only possible sensible interpretation of this would be that the demand for British textile imports is relatively inelastic. This would be sensible only if a reduction of the British price index relative to the American index actually resulted in a lowering of the prices of the British textiles sold in American markets, and the lower prices yielded less revenue than the higher prices.

This is not the explanation of the positive sign of the correlation coefficient, however. Inspection of column 8, the quantitative shares of British goods in total imports of cotton cloth, reveals that it has almost exactly the same ranking as column 9. Correlation with column 7a would yield nearly the same coefficients. Certainly their signs would be positive. The explanation is that the protective equivalent is not related to Britain's share of our imports of cotton cloth in any way that we can discover with this approach. Columns 9 and 10 show the decline of the ratios of imports of the finer British types of cloth to the medium grades imported from Japan, Mexico and Brazil. They are not competitive, and thus nothing relevant to the effects of the tariff is shown. It is also true that only one change in the tariff, and minor changes in the price (cost) relatives are reflected in columns 7 and 7a, so unless the demand were quite elastic, little response could be expected.

The data in columns 8 and 9 show changes in Britain's share of our cotton cloth imports due to changes in the composition of our imports, and due to a secular decline in total imports. Anything else that may be there is submerged by these phenomena. The low-valued coefficient with a positive sign is simply not significant.

The difficulty of obtaining a good series on domestic production was mentioned earlier. It is not a homogeneous series, and it is so inclusive that imports from the United Kingdom are all but lost in the comparison. One could use the information that about ten percent of domestic production in any year is of the grades imported from the United Kingdom. However, this would simply cause the figures in column 10 of Table XII to be ten times larger. Any impression of greater accuracy or relevance created by this would be misleading. Not much can be expected from this type of data. Rank correlation of column 7a with column 10 yields a coefficient of +.62; with trends removed it is +.56. It would be hard to interpret this as a significant result. While a positive correlation between price relatives and values of imports might indicate extreme inelasticity of demand, that is not its meaning here. Unit values of imports from the United Kingdom did not decline enough to have given this result. The unit values were \$.30 per yard in 1929, \$.24 in 1935, and \$.29 in 1937.[11]

An additional check was made of the relation between the protective equivalent and the ratios of imports from Britain to domestic production. United States Tariff Commission data on domestic production of countable cotton cloth was secured.[12] The ratios of imports from Britain to domestic production of countable cotton cloth were as follows:

1922	3.4 percent
1923	3.3
1925	2.3
1927	1.2
1929	1.15
1931	.5
1933	.4
1935	.37
1937	.42

Rank correlation of this series with the protective equivalent results in the same order of coefficient; +.26, with time trends removed. If, rather than removing the simple trend over time from both series, one uses the ratios of total imports to domestic production as a correction, the result is not much different. The coefficient thus corrected is +.29. In the process of making this correction,

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11 United States Tariff Commission, Op. Cit., v. 9, p. 32.

12 Ibid., v. 9, p. 28.

it is noticed that the ratios of total imports to domestic production have a coefficient of rank correlation with time of -.39, for 1922 through 1937. This is a part of the explanation of the decrease in Britain's shares of our market--in spite of increasing imports from Japan, domestic production has been replacing imports for a number of years.

It does not seem possible, with the data gathered for this example, to establish a sensible relation between the protective equivalent and imports from the United Kingdom, whether one compares the latter to total imports, or to domestic production of countable cotton cloth. We have some obligation to discover the reason for this failure.

A possible explanation is that changes in relative prices simply have no bearing on imports of the type coming from the United Kingdom. If one looks at the history of protection for the domestic cotton textile industry, one will find this hard to accept. It is true that technological progress and expansion of the domestic industry have removed much of the threat formerly offered by imports. Many of the duties are probably inoperative; especially those on the types of cloth exported by our firms. Yet the minute differentiations in the schedule of rates and the raising of the duties on the grades coming from Japan in 1936 point to a conviction on the parts of the industry and the tariff designers that price differentials imposed on imports will be effective. On the whole, duties amounting to from 25 percent to 35 percent ad valorem on competitively produced commodities will have some effects. Changes in those duties, whether in their statutory rates or in their protective levels due to relative price changes, must have effects on some imports. Increases will have effects on the imports which are competitively priced and competitive in variety and quality. Decreases will have effects on those which, though excluded by the higher rates, can be competitively priced with the lower rates.

The alternative explanation of our failure is that our methods are too crude to measure the effects of the tariffs. This explanation has some merit if one recalls the nature of the import and production data that were employed. There was no way to separate the various elements which might have caused the secular decline of imports from the United Kingdom. There was no way to measure changes in the ratios of imports from the United Kingdom to production of the same types of cloth. Last, there was no way to measure the effects of the 1939 and 1948 tariff reductions on the British-type imports.

This study may make a negative contribution to the type of problem presented in this example. It demonstrates that a measurement of the effectiveness of tariffs may depend upon precise definitions of competitive products and precise measurements of their production and imports. For a group of products like cotton textiles, an intra-industry study would be necessary. There can be little doubt that the differentiation of the rates on cloth have some logical basis in production costs. Careful estimates of costs and changes in costs for several classes of cotton textiles would be necessary. The rates of duty on specific grades of cloth would have to be recorded. Data on domestic production of these grades, to be compared with data now available on their imports, would have to be gathered. Such data could be secured from the industry or intelligent estimates could be made.

The data of this study are those which are published in standard sources. One of the purposes of the study is to determine whether efficient measures of the effects of tariffs can be constructed from such data. The answer must be in the negative for this example. The method has proved useful enough for other examples using commodities produced under competitive conditions so that we can tentatively conclude that it is the data, and not the general method that is at fault.

Further search for domestic production data results in finding census of manufactures data for the odd-numbered years through 1939. The census of manufactures was not taken again until 1947, so there is a considerable gap in the data. Census of manufactures data were employed for the total United States production of cotton cloth; they also reveal the production of the various grades, e.g. lawns, nainsooks, cambrics, and voiles. It is possible to relate imports from the United Kingdom to domestic production of these grades. Two difficulties are encountered. First, the United Kingdom price series are in three short segments, so taking alternate years from 1923 through 1933 results in only six observations. Second, import data for those years show that imports from the United Kingdom were not confined to narrow classes of fine (high thread count) fabrics, as they have been in more recent years. Taking the short series of six observations, and relating imports from the United Kingdom to domestic production of lawns, nainsooks, cambrics and voiles reveal little rational relation between either costs or the tariff and imports from the United Kingdom. The partial coefficient of the first order (omitting a time trend correction) relating costs to imports is +.26. The first order partial coefficient relating the tariff to imports is -.05. Neither of these is meaningful. It is still possible, however, that the extremely spotty nature of the data is responsible for this failure. Since imports from the United Kingdom changed in character over the years, it is extremely difficult to find any aggregation of domestic production with which to compare them. Since a continuous price series is not available for the United Kingdom, the problem is doubly difficult. One must conclude that a study of imports for this industry would be a special problem requiring much more time than is warranted for present purposes.

Textile Machinery - Statistical Analysis

The British textile machinery example is shown in Table XIII, pages 288 to 292. Price indexes to be used as measures of changing costs were not easy to obtain. "Iron and steel" prices were used for the United States, for the reasons given in Chapter VII. A roughly comparable index from British statistics is the one with the same designation. It is presented in three segments, however, and it was not possible to link the segments nor to obtain a continuous series. Therefore this table, like the previous one, consists of three independent segments.

For the period covered by the first segment, 1922 through 1934, there was virtually no net change in the protective equivalent of the 1922 duty (see column 5). Both British and American prices of iron and steel declined about twenty percent over the period. Depreciation of the pound had its effects in 1932, but subsequent depreciation of the dollar offset these effects.

For the period 1930-1938, the pound was valued roughly the same at the end as at the beginning. The price index for the United Kingdom increased at the greater rate, resulting in a 26 percent increase in the protective equivalent of the 1930 duty. The 1930 duty of 36.6 percent was constructed by taking the weighted mean of the duties levied

TABLE XIII, UNITED KINGDOM - TEXTILE MACHINERY

	1	2	3	4	5	6
Year	Wholesale price index numbers of price groups, United Kingdom, Iron and Steel (1913=100 for 1922-1934) (1930=100 for 1930-1938) (1938=100 for 1938-1949).[1]	Rate of exchange, British Pound equals ---------------cents, U.S.[2]	Wholesale price index numbers of price groups, United Kingdom, Iron and Steel - in U.S. dollars.	Wholesale price index, U.S., Iron and Steel. (1926 = 100).[3]	Protective equivalent of 1922, 1930 and 1938 duties on "other textile machinery and parts" (7515900).	Duty levied in each year on "other textile machinery and parts" (7515900) tar. par. 372.[4]
1922	136.8	442.92	136.8	98.1	25.0 %	25.0 %
1923	147.2	457.48	152.0	117.3	23.2	35.0
1924	142.9	441.71	142.5	109.4	23.4	35.0
1925	126.0	482.89	137.4	102.2	24.1	35.0
1926	123.5	485.82	135.5	100.0	24.3	35.0
1927	119.9	486.10	131.6	95.9	24.6	35.0
1928	112.3	486.62	123.4	93.5	23.7	35.0
1929	114.2	485.69	125.2	94.9	23.7	35.0
1930	112.7	486.21	123.7	89.1	24.9	36.6
1931	104.9	453.50	107.4	83.3	23.1	40.0
1932	103.7	350.61	82.1	79.4	18.5	40.0
1933	105.8	423.68	101.2	78.6	23.1	40.0
1934	109.6	503.93	124.7	86.7	25.8	40.0
1930	100.0	486.21	100.0	89.1	36.6	36.6
1931	92.8	453.50	86.6	83.3	33.9	40.0
1932	91.5	350.61	66.0	79.4	27.1	40.0
1933	94.3	423.68	82.2	78.6	34.1	40.0
1934	98.7	503.93	102.3	86.7	38.5	40.0
1935	100.5	490.18	101.3	86.7	38.1	40.0
1936	106.6	497.09	109.0	87.6	40.6	40.0
1937	129.6	494.40	131.8	98.2	43.8	40.0
1938	139.1	488.94	139.9	98.6	46.3	40.0

7	7a	8	9	10	11	12
Protective equivalent of current duty on "other textile machinery and parts" (7515900) tar. par. 372.	Index of protective equivalent of current duty. (1922=100) (1930=100) (1938=100).	U.S. imports of textile machinery from United Kingdom as percent of total U.S. imports of textile machinery (7495000-7515900) - Value.[4]	U.S. imports of textile machinery from United Kingdom (7495000 - 7515900) as percent of U.S. production, - Value.[5]			
25.0	100	10.24				
32.5	130	5.03	2.62			
32.7	131	3.97				
33.7	135	3.74	1.66			
34.0	136	1.90				
34.4	138	2.73	1.65			
33.1	132	2.57				
33.1	132	2.09	1.45			
36.4	146	2.06				
37.1	148	2.42	.70			
29.8	118	2.21				
37.0	148	4.00	.93			
41.3	165	3.76				
36.6	100	2.06				
37.1	101	2.42	.70			
29.6	81	2.21				
37.3	102	4.00	.93			
42.1	115	3.76				
41.6	114	4.69	.89			
44.3	121	3.06				
47.8	131	2.96	.82			
50.6	138	2.47				

TABLE XIII, UNITED KINGDOM - TEXTILE MACHINERY (CONTINUED)

	1	2	3	4	5	6
Year	Wholesale price index numbers of price groups, United Kingdom, Iron and Steel (1913=100 for 1922 - 1934) (1930= 100 for 1930 - 1938)(1938=100 for 1938 - 1949).	Rate of exchange, British Pound equals ——————cents, U.S. 2	Wholesale price index numbers of price groups, United Kingdom, Iron and Steel - in U.S. dollars.	Wholesale price index, U.S., Iron and Steel. (1926 = 100).3	Protective equivalent of 1922, 1930 and 1938 duties on "other textile machinery and parts" (7515900).	Duty levied in each year on "other textile machinery and parts" (7515900) tar. par. 372.4
1938	100.0	488.94	100.0	98.6	40.0 %	40.0 %
1940	114.5	383.00	89.7	95.1	37.2	25.0
1941	130.2	403.18	107.4	96.4	43.9	25.0
1942	131.2	403.50	108.3	97.2	43.9	25.0
1943	131.4	403.50	108.4	97.2	44.0	25.0
1944	132.4	403.50	109.3	97.2	44.3	25.0
1945	135.7	403.02	111.9	99.2	44.5	25.0
1946	150.4	403.28	124.1	110.3	44.4	25.0
1947	159.2	402.86	131.2	133.7	38.7	25.0
1948	169.4	403.13	139.7	155.1	35.5	15.0
1949	181.8	368.72	137.1	165.7	32.6	15.0

(CONTINUED)

7	7a	8	9	10	11	12
Protective equivalent of current duty on "other textile machinery and parts" (7515900) tar. par. 372.	Index of protective equivalent of current duty. (1922=100) (1930=100) (1938=100).	U.S. imports of textile machinery from United Kingdom as percent of total U.S. imports of textile machinery (7495000-7515900) - Value.				
40.0	100	2.47				
23.3	58	8.06				
27.5	69	8.91				
27.5	69	9.49				
27.5	69	8.62				
27.7	70	8.76				
27.8	70	7.71				
27.7	70	6.41				
24.2	61	7.01				
14.2	36	7.02				
12.6	32	6.51				

FOOTNOTES TO TABLE XIII

1 Great Britain, Central Statistical Office, Annual Abstract of Statistics, 1937, p. 239, 1939, p. 255, 1949, p. 257, 1953, p. 297.

2 Board of Govenors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32, January, 1940, p. 74, January, 1948, p. 125, December, 1953, p. 1409.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1922-1928); Ibid., 1933 p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-1945 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949).

4 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. Duties for 1947-1949 from _______, Schedule A, August 1, 1950, corrected to May 1, 1952. Imports for 1947-1949 from _______, Report no. FT 110, U.S. General Imports of Merchandise, annual summaries. Duty on "other textile machinery and parts" (7515900) is taken to be "representative" of the duties on "textile machinery" (7495000-7515900), to avoid the problem of finding a mean duty which would still not accurately reflect the impact of the duties. Duty for 1922 is estimated — 20% was levied to September 21, and 35% thereafter, 66% of U.S. imports entered to September 21. Thus .66 x .20 + .34 x .35 = .25. Duty was changed to 40% June 17, 1930, 68% of U.S. imports entered to June 17. For 1930, .68 x .35 + .32 x .40 = .366. Duty was reduced to 15% January 1, 1948, G.A.T.T., T.D. 51802.

5 Imports, Ibid., U.S. production from Statistical Abstract of the United States, 1929, p. 832, 1933, p. 715, 1936, p. 756, 1938, p. 772, 1941, p. 874, 1950, p. 816.

in each half of the year. Footnote 4 of Table XIII explains this more fully.

For the 1938-1949 period, the protective equivalent of the 1938 duty declined by 18 percent. This was the net result of several changes. British prices rose more rapidly than American prices through 1945. Though the pound depreciated in 1940, dollar British prices still increased a little more than American prices. After 1945, American prices increased more rapidly. This, plus the 1949 depreciation of the pound, had the net effect of reducing the protective equivalent after 1945.

The duties recorded in column 6 are the same as those used for the German example, except that the reduced duty of 25 percent is shown after 1939. Nineteen thirty-nine price data are missing for the United Kingdom, so nothing is recorded for that year. These duties, on "other textile machinery and parts" are probably more accurate for imports from the United Kingdom than they were for imports from Germany, as imports from the former are more varied. In 1938, the United Kingdom was the source of 96 percent of the imports of lace machinery and parts, 65 percent of the circular knitting machine imports, from 60 percent to 75 percent of carding, spinning and twisting machinery imports and 27 percent of "miscellaneous machines and parts" imports.[13] British machines replaced many varieties of German machines during and after the war, but no inferences (regarding the effects of the tariff) may be drawn from this. The rate of duty on lace machinery was 30 percent until 1948, then 15 percent. On circular knitting machines it was 40 percent until 1939, 20 percent until 1948, and 15 percent thereafter. On carding, spinning and twisting machines, the duty was 35 percent until 1930, 40 percent until 1939, 20 percent until 1948, and either 20 percent or 10 percent, depending on specific type, after 1948. "Other textile machinery" was, of course, taxed at the rates shown in column 6.[14]

Inspection of columns 7, 7a and 8 shows that the protective equivalent had little bearing on the proportions of total imports which came from the United Kingdom, if one stops at 1938. During and after the war, the relation seems to be a close one, but one cannot accept that, because the other principal source had been Germany. Correlation analysis was therefore terminated with 1938. Rank correlation of column 7a with column 8, through 1938, yielded a coefficient of -.07. This signifies nothing, and the correction for time trends changed it to +.08, which also signifies nothing. This is somewhat different from the

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13 Ibid., v. 3, part 4, pp. 44, 50, 67, 69 and 77.

14 Ibid., v. 3, part 4, pp. 31, 32.

German case, where the corresponding coefficients were -.37 and -.60. It is not easy to discover an explanation for the difference. Germany's share of United States imports had declined--it had a correlation coefficient, with time, of -.20. Britain's share had a corresponding coefficient of -.16. There is no practical difference in these--both were losing relative to Switzerland and other countries. There seems to be no explanation that our analysis can discover.

Simple correlation and multiple correlation of the product-moment type were tried for this case. Using the linked series through 1938, the coefficient of simple correlation between columns 7a and 8 is -.32. This is not significant at the ten percent level. The time trends in the protective equivalent and in the proportions of imports coming from Britain have coefficients of +.90 and -.38, respectively. When these are included in the analysis, the multiple correlation yields a meaningless coefficient -- +.08. It must therefore be concluded that, though the protective equivalent seemed to make some sense as an indicator of German textile machines' shares of American imports, it makes no sense for British machines.

Rank correlation of imports from the United Kingdom as percents of domestic production yields a coefficient of -.45, with corrections for time trends. This might be taken as significant, and comparable to the corresponding coefficient of -.32 for German textile machines. While simple and partial correlations of the product-moment type resulted in a coefficient significant at the ten percent level for Germany, however, the same test for Britain results in a coefficient of -.03, which is not significant at any level. Thus doubt is cast on the rank correlation test of Britain's shares of United States textile machine consumption. Without correction for trends, the simple correlation coefficient is -.80, which is significant at the one percent level. One could take the position that the removal of time trends is not appropriate. In that case, one would be saying that changes in the tariff and its effective level might not affect year-to-year imports, but rather that a trend in the tariff might establish a trend in imports, so that the un-corrected correlation coefficients might be the more significant indicators of the effects of the tariff. Because of the variety of the machines, the specialized techniques of producing various lines, and the historical specialization of different countries, year-to-year effects of tariffs and prices on imports may be negligible, while trends may be established or accelerated by tariffs. This would be acceptable, but for the fact that year-to-year correlation was significant at the ten percent level in the German case.

Common sense nevertheless tells us that the year-to-year effects of changes in the tariff rate or in relative prices must be small on imports of machines not produced domestically, or for which there is inadequate domestic capacity. Common sense also indicates that the rate at which domestic capacity might develop would be affected by the existence of a tariff, though small changes in its level or its impact would have negligible effects. Other factors such as cyclical changes in the demand for textile plant and equipment would be expected to have stronger effects on imports than would any price effects. Secular growth in domestic machine production is affected by the special demands for high output per man-hour in the American textile industry. As this demand makes European types obsolete, imports will decline, regardless of tariff reductions. Therefore, one can expect to find very poor correlation between the tariff and imports, though the tariff may be high enough to affect the rate of growth of domestic production. It was remarkable that, in spite of these considerations, the German case showed sensible correlations between the protective equivalent and the two measures of imports, and between the tariff and imports, and between costs and imports. There seems to be no obvious explanation of why the results should be different for Britain than for Germany. One possibility, of course is the poor index of machinery costs used for the United Kingdom. For Germany, an "arbeits-machinen" price index was available. For the United Kingdom, as for the United

States, "iron and steel" prices were used. It may be that the use of price series more closely related to machinery production would have given better results for both examples --particularly for Britain.

A further test was applied, to determine whether some sense could be made of the relation between imports, costs and the tariff. The first two segments of the protective equivalent of the 1922 duty were "linked" together, by averaging the values for the overlapping section. This is not a procedure to be relied upon, for the weights of the United Kingdom's price index changed in a way that is not known. However, it adds four years to the series, making possible a study extending from 1922 through 1938, and the possibility of error is not great, for the two British indexes behave much the same. Working on the assumption that the removal of time trends is not appropriate, first order partial coefficients are calculated to attempt to isolate the effects of the tariff and the effects of the other costs.

The coefficient relating the tariff to imports of textile machinery from Britain as percents of total imports is -.58. This is significant at the one percent level. There seems to be no logical reason why this relationship should be a significant one. It was not until 1939 that the tariffs on textile machinery were reduced by trade agreement. At that time Germany was excluded from the benefits of the agreement, so that Britain (and Switzerland) might be expected to gain relative to Germany as a result. This series goes only as far as 1938, so tariff discrimination does not explain the significant correlation. Examination of the German case does not provide an explanation, either. After 1930 (the date of the general increase in the tariff), Germany's share declined slightly, but German costs rose relative to American costs. The relation between costs and Germany's share of imports was -.40; significant at the ten percent level. The relation between the tariff was -.30, not quite significant at the ten percent level. The difference between these two coefficients should not be regarded as significant. The serious barrier to interpretation of either the German or the United Kingdom case is the absence of Switzerland, which provided a large share of the remaining textile machine imports. Interpretation of the effects of the tariff or of costs on the shares of Germany and the United Kingdom cannot be confidently advanced in the absence of this information.

Imports from the United Kingdom as percents of domestic production show a highly significant relation to the tariff. The coefficient is -.96. A coefficient as low as -.80 would be significant at the one percent level. Roughly the same was true for Germany's contribution to textile machine consumption. In other words, the general increase in the tariff seemed to benefit domestic producers at the expense of both German and British producers. The absence of information on Swiss machines does not prevent this conclusion, for whatever happened to Swiss machines, Germany and Britain were still contributing together 87.9 percent of United States imports in 1938.

The relations between the other costs and imports of British machines are not significant, for either of the two measures of imports. This differs from the German case, in which the other costs had a relation significant at the ten percent level for both measures of imports. The meaning of this difference is not at once clear. However, if time trends are not removed from the German data, the relations are not significant. It appears as if the removal of time trends would make the British cost tests more nearly significant, though this was not actually tried.

The net result of the correlation tests of the two textile machine cases is the conclusion that the tariff significantly affected imports from both countries, as percents of domestic production. Three other questions remain unanswered. One is whether the relative positions of the principal supplying countries were affected by general tariff changes or by tariff discrimination. The second is whether changes in costs relative to American costs affected significantly either country's sales of machines in United States markets. The third is whether it is appropriate to remove linear time trends from data concerning a commodity like textile machinery, where changes in production may take place only gradually over time, and not significantly by year-to-year shifts. The hypothesis that the time trends should not be removed was verified by the results of neither the German nor the British case. Therefore, one must conclude that time trends should be removed unless there is stronger evidence to the contrary.

Textile Machinery - World Competition

A review of world trade in textile machinery may help us to understand United Kingdom-United States trade in these machines. First, though production of machinery tends to be concentrated in the hands of a few firms in each country, textile machines may be exceptional. Specialty producers of particular types may be small firms, and there may be many who actually or potentially may be producing a given machine. Except for exclusive patents and traditional country specialization in certain types, there seems to be considerable world competition for the more widely used machines. Second, prices of textile machines are not sensitive to changes in market conditions --demand is thought to be inelastic, and producers fear new entrants during periods of strong demand. Third, eighty percent of world exports of all machinery originated in Germany, the United Kingdom and the United States before the war. After the war, all machinery exports increased by seventy-five percent, and three-fourths of the exports originated in the United Kingdom and the United States.[15] Fourth, machinery is the largest group of commodities in British exports, accounting for one-fifth of export earnings before the war. Textile machinery was ten percent of this group in 1949 and 1950.[16] Last, the differences between United Kingdom and United States textile machinery and the division of the world into currency areas tend to separate British and American markets, except for specialized machines. Therefore, expansions of the production and exports of both countries are influenced by non-price factors. For example, India is a leading importer of textile machines. Those produced in Britain, being of older design requiring more labor-time in cloth production, are satisfactory, and require only Sterling, not dollars. On the other hand, Canada has dollars and requires the more advanced American-type machines. Both American and British production have expanded rapidly to satisfy domestic and export needs. The trade between them therefore tends to be minor, and the result of some intra-industry specialization rather than being the result of differential costs. It is granted that there are differentials in the costs of production. It must also be granted that tariffs have been

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15 E.C.A., Op. Cit., p. 569.

16 Ibid., pp. 566, 577.

used and are probably still effective in offsetting some of the cost differentials. Yet the protection provided by tariffs is a minor part of the pattern of textile machine trade. Therefore one can expect to learn relatively little from a study of tariffs. It is remarkable that our analysis was able to identify some effects of tariff changes.

Britain's Dollar Position

There will be no formal attempt to relate tariffs on and trade in these two examples to the balance of payments of the United Kingdom. Her post-war difficulties with dollar shortages, blocked Sterling balances and adverse shifts in terms of trade are well known. Dislocations caused by the war so far outweigh the effects of United States import duties that it would be futile to attempt to pin down any specific effects of the duties. In the pre-war period, it might be more reasonable to expect to observe a relation between the protective equivalent of United States tariffs and Britain's dollar earnings in world trade. Except for the general effects due to divergent price level movements, it is not likely that much can be observed. The two commodities studied in this chapter, though each of importance in trade, make up such small portions of the varied trade between the two countries that their effects would be negligible.

There were three major downward adjustments of the dollar value of the Pound Sterling. A little may be said about each. They were certainly not unrelated to United States markets and United States tariffs, but they were also related to much broader considerations.

In 1931 and 1932, the Pound Sterling declined from $4.8621 to $3.5061, or by twenty-eight percent. The tariff increases of 1930 were not without importance. The protective equivalent of the duty on textile machinery rose from an index of 132 in 1929 to an index of 148 in 1931, including the offsetting effects of a small amount of depreciation. The protective equivalent of the duty on cotton cloth rose from an index of 98 in 1929 to an index of 105 in 1931. These two commodities, though they may have contributed to the difficulties of 1931 and 1932, were small proportions of Britain's exports to the United States. However, the tariff increases were general, and most prices in the United States fell more than did the corresponding prices in Britain. These two factors would combine to cause a protective equivalent to rise for nearly any commodity in that period, if one were computed. In a sense, then, relative price changes and tariff increases, the components of the protective equivalent, can be said to have contributed to the depreciation of the Pound Sterling in 1931 and 1932.

Also, however, the income and direct trade effects of the depression had their influences separately from those of prices and tariffs. The capital position of Britain and the loss of confidence associated with the abandonment of gold also had their effects. It would therefore be presumptious to attribute too much to American tariff policy and relative price changes.

In 1939 the Pound Sterling was depreciated from $4.889 to $3.83, or by twenty-two percent. In 1941 it was stabilized at approximately $4.03 by governmental action. Little evidence is provided by the two examples of this chapter to substantiate the view that either tariffs or relative prices contributed to this depreciation. It is known, in fact, that the events accompanying the beginning of war in Europe were the major factors.

In 1949, it is well known that relative prices were important factors leading to the decision to depreciate. It cannot be said that increased tariffs were in any way responsible, for they had in fact been reduced. One might ask whether further tariff reduction might have reduced the amount of depreciation advisable. There is little evidence upon which to base an answer. The two examples of this chapter result in an ambiguous answer. Textile machinery imports seem quite sensitive to tariff changes, but insensitive to relative price changes. This might mean that exchange depreciation would have little effect, but one cannot be certain. Cotton cloth imports from the United Kingdom are small proportions of consumption, and are of special grades of cloth. A downward revision of the whole schedule of tariffs on cotton goods might have allowed increased imports of other varieties of cloth. This seems hardly likely as a permanent source of dollar earnings for Britain. Rapid advances in American technology and the shifts of American capital to southern states and the Carribean would probably recapture most of the market for American firms. However, exchange depreciation of the producer's currency has the same effect on the prices of their goods as would a general tariff reduction by the importing country. If it was thought that exchange depreciation would be effective, then general tariff reduction would have been effective. There were some effects--British bicycles, liquors, autos, etc. sold in increasing amounts in American markets. The effects of the depreciated Pound were probably more important, however, in the competition between British and American goods in other markets, and tariff reduction by the United States would not have helped there.

Summary

In summary, we can list several results of the studies of this chapter, though most of them are negative in character. First, it was discovered that one could not measure anything with the above approach to a protective equivalent for cotton cloth. The protective equivalent of the current duty correlated positively with the ratios of imports from Britain to total imports, with the ratios of imports from Britain to domestic production of cotton goods, and with the ratios of imports from Britain to domestic production of countable cotton cloth. This was true with or without removal of time trends.

Second, it was concluded that the study of the effects of tariffs on commodities like cotton cloth would require careful intra-industry analysis. This is true because the tariff rates are carefully differentiated by grade, type and value of cloth, and because exact data on imports and production of each grade would be required. There is no doubt that tariffs are effective protection for the producers of many grades of cloth, but the approach used here conceals all of the differential effects.

As to textile machinery, it was discovered that imports from the United Kingdom seemed to be independent of changes in the protective equivalent. Rank and product-moment correlations with Germany's shares of United States imports had low-valued negative coefficients before the removal of trend effects, and low-valued positive coefficients after their removal. The conclusion must be that these coefficients are meaningless. Rank correlation of the protective equivalent with imports from Germany as percents of domestic production has a coefficient of -.45, after removal of time trends. Since there is no significance test for this, simple and multiple correlation of the product-moment type was applied--with somewhat different results. Without correction for time, the coefficient of -.80 is significant at the one percent level. Correction for time reduces it to -.03, however, which is not significant. The hypothesis was advanced that the results obtained from simple correlation without the removal of time trends are the more significant. The German textile machinery case, however, had yielded a coefficient significant at the ten percent level with time removed. Common sense, nevertheless, would point to the acceptance of the simple correlation results, without removal of time trends. Multiple correlation tests attempting to isolate the effects of the tariff from the effects of the other costs failed to verify this hypothesis, but succeeded in revealing the effects of the tariff. For both Germany and the United Kingdom, the tariff had a significant relation to imports as percents of domestic production, whether or not time trends were removed. The relations of costs to imports were less clear, but were more nearly significant if time trends were removed. The relation of the tariff to Britain's share of United States imports was significant, though it had not been for Germany. There seems to be no good reason why it should be significant.

Further study of the world market for textile machines leads to the conclusion that there are many dynamic factors which cannot be quantified for statistical analysis. It seems, in the light of all of the special factors present, quite remarkable that the tariff was as effective as it appears to have been through 1938. One would guess that its importance in the future would be much less than in the past.

As to the balance of payments problems of the United Kingdom and the dollar value of the Pound, common sense supports the hypothesis that United States import duties are relevant. The duties on the two examples of this chapter and their protective equivalents cannot give us direct evidence of this. In the first place, the results of the correlation tests are ambiguous. In the second place, the list of imports from the United Kingdom is too varied to be adequately represented by these commodities. The duties on these examples are high--varying from 22.5 percent _ad valorem_ to 31 percent _ad valorem_ in one case, and from 15 percent _ad valorem_ to 40 percent _ad valorem_ in the other case. Duties at such heights must have some effects. Changes in relative prices in the British and United States economies also certainly affect the British balance of payments and the value of the Pound. Relative price levels were certainly significant in the depreciations of the Pound in 1931-32, and in 1949. Since the imports from Britain are industrial products, however, demands for them are relatively inelastic, and it is therefore difficult to find statistical evidence of price effects.

CHAPTER IX

INDIA - CASTOR BEANS AND JUTE PRODUCTS
and
ARGENTINA - CATTLE HIDES AND FLAXSEED

This chapter will briefly present four agricultural commodities, each of which offered some peculiar problems. These commodities illustrate some of the limitations on our type of analysis. Each of the commodity markets has peculiar features which make it difficult to measure the effects of tariffs. Therefore the analysis of each commodity will be briefer than in the preceding chapters. The principal tasks of this chapter will be to point out the types of difficulties encountered, and to suggest alternative methods of approaching the problem.

For each commodity, the difficulties encountered in its analysis will first be stated briefly. This will be followed by an analysis of the commodity, patterned after the analyses of Chapters III through VIII, but less thorough. Then an attempt will be made to assess the possibility of using alternative approaches.

Castor Beans

The first to be considered is the castor bean, formerly imported from India, but from 1933 until 1948 imported principally from Brazil. It was not possible to find a price index which could be used to measure production costs in Brazil, so the formal part of the analysis is confined to the imports from India.

Castor beans, when crushed, yield castor oil equal to about forty-five percent of their weight. The remainder, called pomace, is used as a fertilizer.[1] Since pomace is apparently of minor commercial value, the bean is sought only for its oil. The oil has several peculiar properties making it unique among industrial oils. The medicinal use of the oil is unimportant. Its high viscosity and specific gravity and some of its chemical properties make it useful in high speed, lightweight motors, in brake fluids, shock absorbers and emulsion breakers. It is also useful in leather tanning and textile finishing. A relatively new use for it became important during the war. When dehydrated, it becomes a drying agent, and has been substituted for tung oil and other imported oils for this purpose.[2] Thus the oil from the imported castor bean enjoys an inelastic demand due to its unique properties. It is substitutable for tung and other oils in some uses, but historically the substitution has been brought about by wartime shortages, rather than by price differentials.

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1 United States Tariff Commission, Summaries of Tariff Information, Washington, G.P.O., 1948, v. 1, part 4, p. 56.

2 Ibid., v. 1, part 4, p. 56.

Second, castor beans are produced under conditions which might make their volumes insensitive to small price changes. The beans grow on trees which, in the tropics, grow wild in wastelands, along roads, etc. In India, they are cultivated along the edges of fields, roads and dikes, and harvested as supplementary or incidental crops. In Brazil, the source of most imports since 1933, they have grown wild on uncleared or waste plots of land. Farmers and others have gathered them for supplemental incomes. Recently, encouraged by the growing American market, some farmers have begun to cultivate them in Brazil.[3]

The castor bean is therefore more a product of forest gathering, like cascara bark or herbs, than an agricultural product. While the availability of higher market prices would be expected to increase gathering efforts, and low prices to discourage them, other non-price factors will greatly affect the yields. General employment and income conditions among the rural population will probably be more effective than the prices of the beans in drawing people to the work of gathering them, or in causing them to abandon the practice. Also, as more land is cleared, or as plots are enlarged for mechanical cultivation one could expect the number of trees to decline. The development of marketing and shipping channels for the bean must greatly

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[3] The information on castor bean production methods is from Ibid., v. 7, part 5, p. 78.

influence the amount of beans gathered. Since the bean is not a regular commercial crop for many farmers, the initiative must be taken by marketing specialists, or perhaps by the buyers. The late development of large-scale exports from Brazil may have been influenced by these considerations.

In the third place, India's economic growth resulted in the virtual cessation of castor bean exports to the United States from 1935 to 1950. Her total production has declined, for reasons not known to the writer.[4] The remaining production of beans is processed in India in a newly developed pressing industry. Some of the oil satisfies a growing industrial demand in India, and some is exported.[5]

The United States imported virtually no castor oil until World War II. This was undoubtedly due to the tariff differential between beans and oil. Beans are taxed at one-fourth cent per pound. Since they yield forty-five percent oil, this amounts to .56 cents per pound of oil content. The duty on oil was three cents per pound until 1948 and is now one and one-half cents per pound. The three cent rate was 57.5 percent <u>ad valorem</u> based on 1937 values,

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4 United States Tariff Commission, <u>Op. Cit.</u>, v. 7, part 5, p. 78.

5 European Cooperation Administration, <u>The Sterling Area</u>, London, Her Majesty's Stationery Office, 1951, p. 318.

and 19.2 percent ad valorem based on 1946 values.[6] The rate on beans was 10.1 percent ad valorem in 1937, and 5.6 percent in 1946. On the basis of a 45 percent oil yield, this was 22.4 percent on the oil content in 1937 and 12.4 percent in 1946. This differential was apparently sufficient to protect the American oil pressers.

In any case, United States buyers turned from Indian sources to Brazil, still importing no oil. The expansion of bean gathering in Brazil then seems to have been brought about by the demands of United States' (and possibly other countries') oil pressers. Therefore, the American import duty on oil has indirectly fostered production of beans in Brazil, and forced the new Indian pressing industry to sell in other markets.

The statistical study of castor bean imports from India is presented in Table XIV, pages 316 to 318. The "oil seeds" wholesale price index for India, shown in column 1, is composed of several important Indian products, of which cotton seed, linseed, peanuts and possibly others were more important than castor beans. Therefore it is not simply an index of castor bean prices. The United States index covers many products. It may not be relevant to castor bean or castor oil costs, because of differences in the production

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[6] United States Tariff Commission, Op. Cit., v. 1, part 4, p. 55.

TABLE XIV, INDIA - CASTOR BEANS

Year	1 Index of wholesale prices in Calcutta (July, 1914 = 100) oil seeds.[1]	2 Rate of exchange. Indian Rupee equals ———cents, U.S.[2]	3 Index number of wholesale prices in Calcutta (July, 1914 = 100) oil seeds in U.S. dollars.	4 Wholesale price index, U.S., oils and fats, inedible, (1947-49 = 100)[6]	5 Protective equivalent of 1926 duty on Castor beans.	6 Duty in each year on Castor beans (223100) tar. par. 762.[4]
1926	134	36.327	134.0	69.2	.500	.5¢ lb.
1927	143	36.312	142.9	64.0	.577	.5
1928	142	36.466	142.5	66.0	.557	.5
1929	155	36.202	154.5	61.6	.648	.5
1930	127	36.067	126.1	49.2	.662	.5
1931	82	33.690	76.0	33.9	.579	.5
1932	76	26.347	55.1	27.7	.514	.5
1933	74	31.816	64.8	27.3	.613	.5
1934	92	37.879	95.9	28.1	.881	.5
1935	107	36.964	108.9	42.7	.659	.5
1936	101	37.523	104.3	43.8	.615	.25
1937	115	37.326	118.2	53.2	.574	.25
1938	106	36.592	106.8	34.2	.806	.25
1939	106	33.279	97.1	33.5	.748	.25
1940	106	30.155	88.0	30.7	.740	.25
1941	103	30.137	85.4	53.7	.411	.25
1942	143	30.122	118.6	72.7	.421	.25
1943	270	30.122	223.9	70.5	.820	.25
1944	288	30.122	238.8	70.6	.873	.25
1945	280	30.122	232.2	70.6	.849	.25
1946	338	30.155	280.6	82.5	.878	.25
1947	452	30.164	375.3	127.6	.759	.25
1948	528	30.169	438.5	115.9	.977	.25
1949	599	27.706	456.8	56.6	2.084	.25
1950	679	20.870	390.1	68.7	1.466	.25

7	7a	8	9	10	11	12
Protective equivalent of current duty on Castor beans.	Index of protective equivalent of current duty on Castor beans (1926 = 100)	Imports of Castor beans from India as percent of total U.S. imports of Castor beans - Quantity.[4]	U.S. imports of oil seeds from India as percent of total U.S. imports of oil seeds - Value.[4]	U.S. imports of oil seeds from India as percent of U.S. cash income from farm crops - oil bearing crops - Value.[5]	Ad valorem equivalent of duty on Castor beans.	
.500	100	89.5			14.9%	
.577	115	88.9			14.3	
.557	111	95.9			14.4	
.648	130	90.4			14.1	
.662	132	83.5			16.2	
.579	116	83.4	59.7	5.0	22.0	
.514	103	78.6	92.9	4.9	26.0	
.613	123	54.8	127.9	10.7	29.9	
.881	176	33.2	253.3	11.5	26.7	
.659	132	16.5	42.2	2.2	22.6	
.307	61	4.2	68.6	3.5	11.3	
.287	57	0	12.3	1.0	10.1	
.403	81	0	6.6	.3	13.9	
.374	75	0	2.1	.1	14.1	
.370	74	30.1	67.6	1.7	10.5	
.205	41	.02	4.9	.1	12.8	
.211	42	.8	16.6	.1	8.8	
.410	82	.1	1.1	.007	7.3	
.437	87	0	.6	.005	7.6	
.425	85	0	80.0	.5	7.7	
.439	88	0	1.1	.008	5.6	
.380	76	0	.3	.001	n.a.	
.488	98	0	.1	.001	n.a.	
1.042	208	0	0	0	n.a.	
.733	147	21.4	42.5	.5	n.a.	

1 Great Britain, Secretary of State for India, Statistical Abstract for British India, London, Her Majesty's Stationery Office, 1942, p. 425 (1922-1939); India, Central Statistical Organization, Cabinet Secretariat, Statistical Abstract, India, 1950, New Series No. 2, Delhi, Manager of Publications, 1952, (1940-1950)

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32 (1922-1930); Ibid., January, 1940, p. 74 (1931-1938); Ibid., January, 1948, p. 125 (1939-1947); Ibid., December, 1953, p. 1409 (1948-1950).

3 U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1941, p. 356 (1929, 1932, 1936-1940); Ibid., 1944-1945, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1953, p. 275 (1950).

4 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. For 1947-1950, duty from _______, Schedule A, August 1, 1950, corrected to May 1, 1952. Quantities for 1947-1950 from _______, U. S. General Import of Merchandise, Report No. FT110, annual summaries, 1947-1950. The difference between "imports for consumption" and "general imports" is ignored.

5 Imports, Ibid., U. S. farm value from _______, Statistical Abstract of the United States, 1944-1945, p. 649, 1950, p. 583, 1952, p. 589.

6 U. S. Department of Labor, Bureau of Labor Statistics, mimeographed, unpublished extension of 1947-1949 based index backward to 1926.

methods and sources of raw materials. Still it was thought to be better than an index of farm prices including oil-bearing products, because no castor beans have been grown in the United States except on an experimental basis.

Inspection of Table XIV will quickly show the futility of attempting to measure statistically the effects of the United States tariff and changing relative prices. The dominating fact is the replacement of Indian castor beans by those from Brazil. This was caused by India's development of oil pressing, the tariff differential between beans and oil, and the development of bean marketing in Brazil, as explained above. The tariff is partially responsible--i.e., if the differential had not existed, a part of the United States pressing industry would probably have been eliminated by Indian oil. India's lower production of beans and greater domestic use of the oil would have left some room for American pressing of Brazilian beans. Whether a pressing industry would have developed more rapidly in Brazil if the tariff discrimination against oil had been removed is a matter of conjecture. It is likely that it would have, however, for there is in fact a growing pressing industry in Brazil. United States imports (duty free for government use) during the war were substantial, and the major source was Brazil.[7]

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7 Ibid., v. 1, part 4, p. 56.

Some correlation tests were applied to the data of Table XIV. Rank correlation of the protective equivalent with imports from India as percents of total United States imports yields a meaningless coefficient of -.09, with time trends removed. This is to be expected, for the decline in India's share of imports after about 1931 is not directly related to the tariff on beans. Actually some relation can be found by correlation of the data through 1934. Multiple correlation of column 7a with column 8 resulted in a coefficient of -.69, which is significant at the five percent level. This result should not be relied upon, however. There is a serious question as to the date with which to terminate the correlation. Termination at 1931 or at 1935 would have resulted in a different coefficient--possibly one not significant.

Rank correlation of the _ad valorem_ equivalent of the duty (column 11) with India's share of United States castor bean imports (column 8) yielded a coefficient of -.52, with time trends removed. There seems to be no logical reason why column 11 should correlate more sensibly with column 8 than does column 7a. Neither result can have much meaning. The rank correlations between columns 7a and 9 (+.06) and between columns 7a and 10 (+.08) are clearly meaningless, as might be expected. No attempt was made to separate the tariff from other costs, since other factors clearly dominate imports.

The most significant question about the tariff and castor bean imports cannot be answered with the data presented here. That question: has the tariff been instrumental in preventing the import of castor oil from either India or Brazil, and has it therefore fostered the gathering of beans and retarded the development of the pressing industry in Brazil?

All of the examples of this study were constructed after the pattern described in Chapter II. The purpose of this was to discover whether a large number of cases would yield meaningful results with this method. This chapter contains some examples for which useful results cannot be obtained from the simple, standardized approach employed in this study. This chapter should attempt to outline alternative approaches to the measurement of the effects of the tariff.

There are only a few sets of information necessary for an analysis of the effects of tariffs on castor bean and castor oil imports. One can safely assume that the competition between castor oil and other domestically produced oils is negligible. The properties of castor oil are sufficiently different to make it a separate product. It has partially replaced tung oil. There are now some imports of tung oil from Argentina--its competition with castor oil as a paint drier may be important. One can also assume that domestic production of castor beans would not be practical, unless the tariff on beans were considerably higher than that paid during the war. The plant is an annual bush in temperate zones, and a wild perennial tree in the tropics,[8] so the differences in production costs will always be great. This means that the relevant competition is that between foreign and domestic oil pressing. The relevant duty is the difference between the duty on oil and the duty on beans, expressed as a rate per pound of oil content. Through 1935, this differential was equal to 1.89 cents per pound of oil. Through December 31, 1947, it was 2.44 cents. Since January 1, 1948, it has been only .94 cents per pound of oil. To be accurate, this difference should be adjusted by subtracting the shipping cost differential (if any) expressed as so much per pound of oil, and by adding the value at the pressing mill of the by-product pomace per pound of oil extracted. The result would be the net monetary burden, per pound of oil, imposed on oil as against beans.

If castor oil were to continue to be imported only sporadically or not at all, this would be <u>primae facia</u> evidence that the protective tariff (or tariff differential) were prohibitive. This should be checked by looking for institutional barriers to the expansion of the pressing industry in Brazil. Actually, since 1948, imports of castor

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8 <u>Ibid</u>., v. 7, part 5, p. 78.

oil have increased considerably. Table 9 - 1 indicates the growing imports of the oil, and the return of India as a supplier--principally of oil. Occasionally India has exported some beans to the United States, since 1950.

Table 9 - 1

Imports of castor oil and beans since January 1, 1948

Year	Imports of oil from Brazil (Million pounds)	Imports of oil from India (Million pounds)	Total imports of oil (Million pounds)	Oil Equivalent of total imports of beans (Million pounds)	Oil as % of total imports of beans and oil
1948	2.2	0	2.4	136.1	1.7
49	10.5	0	10.6	130.5	7.5
50	45.4	0.5	46.6	118.0	28.4
51	69.7	14.0	89.2	67.1	57.0
52	47.2	40.4	111.8	63.4	63.5
53	52.9	46.6	127.1	51.2	71.4
54	27.3	18.5	56.4	49.2	53.4

Source: United States Department of Commerce, Bureau of the Census, Report No. FT 110, U. S. Imports of Merchandise for Consumption, calendar year volumes, 1948-1954.

Since oil is clearly becoming a greater portion of the total imports of oil and beans, the tariff differential of .94 cents per pound of oil must be allowing the expansion of oil pressing in the supplying countries. This in itself is convincing evidence that the former tariff differentials of 1.89 cents and 2.44 cents were effective barriers. This might be modified by the possibility that the governments of Brazil, India and the other oil shipping countries (principally Belgium) have subsidized the pressing industry. This has not been checked for this study--as this portion of the analysis is simply suggesting a method, not seeking the answer. It is not likely that the presence of subsidies would destroy the conclusion that the former tariff differentials were prohibitive, however. One should ask why, if a subsidy were possible, it was not worthwhile to make it generous enough to overcome the 2.44 cent differential. The answer is that 2.44 cents was equal to fifteen percent of the value per pound of the oil in 1946, and forty-seven percent of its value in 1937![9] The pressers' margins were likely not great enough to make it worthwhile to subsidize them to the extent of fifteen or forty-seven percent of the value of the finished product.

Effects of changes in the protective equivalent of the tariff differential between castor beans and castor oil might be estimated for the future. Because of the recent growth of foreign pressing capacity, it is doubtful that the short period 1948-1954 would yield useful results. Any future period would be affected by the fact that existing capacity (foreign or domestic) might continue to operate with low margins or losses; i.e., supplies of oil pressing services might be inelastic. This would not preclude

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9 _Ad valorem_ equivalents of the duty on oil, from which these estimates were made, are from _Ibid._, v. 1, part 4, p. 55.

measurement of the effects of changes in the protective equivalent, however. Supplies of agricultural products are inelastic in the same sense, yet it is possible to measure the effects of the protective equivalent of the tariff. The supply of any import to one country is more elastic than is the total supply; for alternative markets exist.

Specifically, a protective equivalent of the tariff differential between castor oil and castor beans can be constructed in a way that will be described. This protective equivalent can then be correlated with the ratios of castor oil imports to the sums of the imports of castor oil and castor beans.

The differential, .94 cents per pound at present, would serve as the base of the calculations. Indexes of the costs of pressing the oil in the domestic and in the foreign industries should be selected. These should not simply consist of the pressers' margins, nor of their reported costs. Ideally, they should be indexes including the costs of the types of labor, machinery and supplies used by the pressers. They should also include a deduction for the value at the press of the pomace by-product, and an allowance for any greater shipping cost per pound of oil content, of beans over oil. If the index of such costs for the foreign producers is then adjusted for exchange rate variations, then the foreign and the domestic indexes will make good cost relatives to be applied to the tariff differential.

Jute

The second commodity to be analyzed in this chapter is semi-manufactured or manufactured jute. Raw jute is imported free of duty, for processing by a branch of the textile industry into twine, rope and carpet backing. The jute yarn or twist, which is an intermediate stage in the manufacture of either twines and ropes or fabrics, is subject to a rather high duty (2½ to 11 cents per pound), and little of it is imported. Unfinished burlap, on the other hand, was taxed at one cent per pound until July 9, 1948, and is now taxed at one-half cent per pound. Burlap which has been bleached, dyed, printed or rendered non-inflammable was, until 1948, taxed at one cent per pound plus ten percent *ad valorem*. This differential was enough to confine nearly all imports to the unfinished grade. Since the one cent rate varied from about seven to about sixteen percent *ad valorem*, the additional ten percent rate on the finished grades was a considerable burden. Since 1948, the rate on finished burlap has been one-half cent per pound plus five percent *ad valorem*.

More than ninety percent of the total world exports of jute originate in India and Pakistan. Most of the raw jute is grown in East Pakistan. It was once nearly all processed and marketed in India, in the Calcutta area. Since the partition of India and Pakistan, the latter has begun to develop its own processing plants, and has exported some raw jute to Britain and the United States. For this study, imports from India and Pakistan were lumped together as imports from India, in the years after partition.

Jute is an important product and export of both India and Pakistan. Jute manufactures accounted for twenty-eight percent of India's exports in 1949-50, and raw jute accounted for thirty-three percent of Pakistan's exports in the same period.[10] The United States consumes about twenty-five percent of the world's jute manufactures.[11] From eighty-five to ninety-nine percent of United States imports of manufactured or raw jute has come from the India-Pakistan sub-continent.

This product is therefore one that should be an excellent example for the study of the effects of United States tariffs. It is important enough in the trade between India and the United States. It is also easily identified in trade statistics and in domestic production statistics. Quite good price series to be used as measures of costs are available. Raw jute prices in India form a series that measures the costs of the principal ingredient of burlap

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10 Economic Cooperation Administration, _Op_. _Cit_., p. 631.

11 _Ibid_., p. 627.

and jute twist. Ideally, labor and materials should be included, but such an index could not be found. For the United States, an index of prices of "other textiles" was available. This should reflect costs in textiles other than cotton, wool, silk, rayon and clothing manufacture. The two indexes measure costs in different ways, but neither should be grossly misleading.

There must be some reason why jute is included in this group of commodities for which the protective equivalent did not work. The first reason is that the tariff has been effective enough in discriminating between various jute manufactures so that one type, unbleached and uncolored burlap, dominates import figures. Second, since India has been practically the only source of jute, a comparison of imports from India with total imports is not very revealing. Third, the tariff on unfinished burlap remained constant at one cent per pound from 1922 to July 9, 1948. Changes in the protective equivalent occurred only because of different movements of the two price indexes which were used to indicate costs. Changes in the price relatives might have had some effect on the ratios of imports from India to domestic production of burlap products, except that the two quantities are not really competitive. Domestic production is of twine and rope from raw jute imported duty-free (not included in our data on imports) and of bags and other materials made from imported burlap. There is no domestic production of raw jute nor of burlap. For the three reasons listed here, then, it is impossible to measure the effects of the United States tariff with the simple method employed in this study.

Table XV, pages 330 to 332, shows the computations made for the India jute example. The price indexes have been described. The protective equivalent in column 5 shows that changes in the price relatives were not great, except for a decline in Indian prices relative to American prices in the early 1930's, and a rise between 1946 and the exchange depreciation of 1949. The duties in column 6 show the constant rate of one cent per pound until 1948, modified by the imports free for government use which occurred during the war. Column 7 is therefore like column 5, except for four war years and the years 1948, 1949, and 1950.

Rank correlation of column 7 with India's (quantity) share in total imports yields a coefficient of -.18, with time trends removed. This is not of great enough value to be significant. It could not be expected to be significant, for India's shares of imports depend upon the grade of burlap imported, not upon Indian prices relative to other prices. Small amounts of a superior grade of burlap in widths of 72 inches or more are imported from the United Kingdom and other countries. This is used for linoleum backing, and is not supplied by India. Therefore nothing can be learned about the effects of the duties on burlap

TABLE XV , INDIA - JUTE

	1	2	3	4	5	6
Year	Index numbers of wholesale prices in Calcutta (July, 1914 = 100) Jute, raw.[1]	Rate of exchange - Indian Rupee equals ——— cents, U.S.[2]	Index numbers of wholesale prices in Calcutta (July, 1914 = 100) Jute, raw, in U.S. dollars.	Wholesale price index, U.S. other textile products (other than cotton clothing, silk and rayon, wool) (1926 = 100)[3]	Protective equivalent of 1923 duty on burlaps and other woven fabrics of Jute n.s.p.f. not bleached, colored, printed or rendered non infl.	Duty in each year on burlaps and other woven fabrics, n.s.p.f., not bleached, colored, printed, or rendered non-infl.[4]
1923	90	31.110	90.0	77.4	1.00	1¢ lb.
1924	102	31.784	104.2	87.1	1.03	1
1925	154	36.264	179.5	104.1	1.48	1
1926	120	36.327	140.1	100.0	1.20	1
1927	93	36.312	108.6	95.4	.98	1
1928	100	36.466	117.2	86.9	1.16	1
1929	95	36.202	110.5	93.1	1.02	1
1930	63	36.067	73.0	84.2	.75	1
1931	49	33.690	53.1	75.1	.61	1
1932	45	26.347	38.1	67.9	.48	1
1933	41	31.816	41.9	72.5	.50	1
1934	39	37.879	47.5	73.1	.56	1
1935	50	36.964	59.4	68.5	.75	1
1936	50	37.523	60.3	67.0	.77	1
1937	56	37.326	67.2	68.4	.84	1
1938	49	36.592	57.6	65.5	.76	1
1939	80	33.279	85.6	69.2	1.06	1
1940	79	30.155	76.6	74.5	.88	1
1941	77	30.137	74.6	90.7	.71	1
1942	77	30.122	74.6	97.9	.66	1
1943	123	30.122	119.1	98.8	1.04	.64¢
1944	122	30.122	118.1	100.6	1.01	.07
1945	117	30.122	113.3	101.1	.96	.04
1946	155	30.155	150.2	122.8	1.05	.21
1947	251	30.164	243.4	174.3	1.20	1
1948	296	30.169	287.0	182.9	1.35	.75
1949	290	27.706	258.3	179.5	1.24	.5
1950	301	20.870	201.9	182.5	.95	.5

7	7a	8	9	10	11	12
Protective equivalent of current duty on burlaps, etc.	Index of protective equivalent of current duty on burlaps, etc. (1923= 100).	U.S. imports of Jute from India as percent of total U.S. imports of Jute - Quantity.[4]	U.S. Imports of Jute from India as percent of total U.S. imports of Jute - Value.[4]	U.S. imports of Jute from India as percent of U.S. production of Jute - Value.[5]		
1.00	100	86.8%	83.8%	242%		
1.03	103	86.1	82.8			
1.48	148	88.0	85.7	296		
1.20	120	88.1	86.4			
.98	98	86.4	84.8	278		
1.16	116	85.2	78.9			
1.02	102	85.5	82.9	315		
.75	75	93.9	91.3			
.61	61	90.6	86.6	216		
.48	48	91.2	87.3			
.50	50	84.5	79.5	171		
.56	56	84.8	82.8			
.75	75	81.3	78.0	173		
.77	77	86.8	82.6			
.84	84	86.8	82.3	152		
.76	76	90.7	86.7			
1.06	106	88.8	84.7	155		
.88	88	94.2	91.5			
.71	71	95.2	92.6			
.66	66	95.0	96.6			
.07	7	97.7	99.2			
.007	1	98.8	98.7			
.004	0	98.7	98.1			
.02	2	96.5	95.6			
1.20	120	96.0	98.0	239		
.10	10	96.0	95.4			
.62	62	95.6	95.3			
.48	48	87.1	80.4			

1 Great Britain, Secretary of State for India, Statistical Abstract for British India, London, Her Majesty's Stationery Office, 1942, p. 425 (1922-1939); India, Central Statistical Organization, Cabinet Secretariat, Statistical Abstract, India, 1950, New Series No. 2, Delhi, Manager of Publications, 1952 (1940-1950).

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1931, p. 32 (1922-1930); Ibid., January, 1940, p. 74 (1931-1938); Ibid., January, 1948, p. 125 (1939-1947); Ibid., December, 1943, p. 1409 (1948-1950).

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1929, p. 325 (1922-1928); Ibid., 1933, p. 281 (1929-1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-45, p. 418 (1941-1943); Ibid. 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid., 1953, p. 275 (1950).

4 ______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. For 1947-1950, duty taken from ______, Schedule A, August 1, 1950, corrected to May 1, 1952. In 1943, 1944, 1945 and 1946, certain quantities were admitted free, Executive Order 9177 international courtesy, and for the United States government. In these years, a fictitious duty is computed by dividing the total duty that would have been collected at 1¢ per lb. on the dutiable quantity by the total quantity imported. In 1922, imports were free until September, so the rate of duty is estimated in the same way for that year. In 1948, the duty was lowered to ½¢ per lb. in July. No data is available on the quantities imported before and after July 1; so the fictitious rate of .75¢ is used for the whole year's imports.

5 Imports, Ibid., U.S. production, ______, Statistical Abstract of the United States, 1933.

except what is obvious from the nature of the imports, i.e., that the differentials in the duty prevent imports of finished burlaps, twists and burlap bags.

Correlation of the protective equivalent with imports from India as percents of domestic production does not yield a sensible result. The reasons for this were mentioned above. Domestic production uses two kinds of raw materials; raw jute and unfinished burlap. Considerable quantities of the imported burlaps are sold directly to the using industries, for binding springs in furniture and autos, for baling cotton and other products, for making brattice cloths in mines, etc., and are therefore not further processed by firms identified with the domestic jute textile industry. For this reason, imports are larger than domestic production.

Imports and domestic production are not competitive, however, but complementary. They might be competitive in the absence of the high duties on the jute twist, sliver, etc. used in twine and on the bleached, dyed, printed or further manufactured burlap. It is here that the tariff is effective. Its effects cannot, however, be quantified with our method of analysis.

The next task is to discover how the effects of the tariff might be measured or estimated. One might boldly guess that the domestic industry depends entirely upon the tariff differentials for its existence. Textile manufacture in general, and jute processing in particular are highly developed arts in India. With inexpensive labor and fairly modern but inexpensive machines purchased in a "used" condition from the Dollar area or new from the Sterling area, India's industry could probably expand readily to process all of the jute sold to the United States. This assumption would make the sum of United States imports and the value added by the domestic industry equal to the new value of the imports.

If the finished jute products were cheaper when all were imported (a likely hypothesis) total consumption might expand--causing imports to be larger than the sum of present imports and value added by domestic production. For some uses, the demand is probably inelastic. In other uses, however, such as bagging--cotton and paper are rivals. In some cases burlap would not do. In others , it is a question of price differentials. Paper is generally a cheaper substitute--progress in improving its tensile strength has displaced much burlap in recent years. Cotton is more expensive--it is a matter of weighing its advantages against its greater cost. Cheaper burlap bags would probably capture or recapture some portions of these markets. If jute ropes and twines were cheaper when manufactured in India, they might capture larger portions of their markets.

One is not necessarily limited to the above assumption that the domestic industry is entirely supported by the tariff differentials. It should be possible to select tariff differentials which might be strategic in controlling the amounts of imports of certain grades of jute products. Unfinished burlap was taxed at one cent per pound; this was reduced to one-half cent per pound on July 9, 1948. The reason for this duty is hard to see--no burlap is manufactured domestically. Finished burlaps and jute bags are also taxed at the same specific rate--called a "compensating duty." There is an additional *ad valorem* duty on them, however. It was ten percent on finished burlap and unfinished bags, and fifteen percent on finished bags. In 1948 it was reduced to five percent on finished burlap and unfinished bags, and seven and one-half percent on finished bags. The duties on jute yarns, twists, sliver etc., and on bagging for cotton bales were not reduced in 1948. The duties on yarns, twists, etc. are successful in preventing imports of any but small amounts of these jute products. The duty on jute bagging for use on bales of raw cotton is not effective. The cotton cloth bagging for cotton bales is directly subsidized by the federal government. Yet only from three to five percent of the cotton bales are bagged with cotton; the rest are bagged with jute.[12] The seven and one-half percent additional duty on jute bags which are bleached, printed,

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[12] United States Tariff Commission, *Op. Cit.*, v. 10, p. 93.

stenciled, etc., is apparently effective in confining bag imports to the unfinished grades. This may be due to factors other than the tariff. It is easy to imagine that stenciling or labelling might be done more conveniently in small lots domestically, allowing importers or jute processors to deal in unmarked bags in large lots.

From this group of differentiated tariff rates one can select the five percent ad valorem portion of the duty on finished burlap and unfinished bags as one to which a test may be applied. The basic one-half cent per pound rate on these two items must be ignored. It may serve the purpose of benefiting paper, cotton and other domestic materials which may be substitutes for burlap. The number of possibilities for substitution is so great, and the duty on burlap has existed for so long, that it would be impossible, however, to quantify this substitution relationship. The other duties are either almost wholly successful or almost wholly unsuccessful, leaving no possibility of relating changes in imports to changes in the protective equivalents of the duties.

Reduction of the ad valorem portion of the duty on finished burlap and unfinished bags from ten percent to five percent permits a study of the changes in imports which seem to result. Depreciation of the Indian Rupee and changes in Indian and Pakistani prices relative to American prices are the other variables which would enter a protective equivalent. We could use the price index of "other textiles" for United States costs. We should like an index, not of raw jute prices, but of general textile manufacturing costs for India (and perhaps for Pakistan). We could then operate on the tariff differential, which was ten percent to July 9, 1948, then five percent, with cost relatives constructed from these two price series and exchange rates. We should then have a "protective equivalent of the tariff differential on finished burlap and unfinished bags."

This should be correlated with an appropriate ratio of imports to domestic production. The correct ratio would be that of imports of finished burlap and unfinished bags from India and Pakistan to the output of the same commodities from the domestic industry. Several difficulties would be encountered. Securing such an index of domestic output would require getting a detailed record from the industry. An alternative would be to compare imports of finished burlap and unfinished bags with imports of unfinished burlap (the raw material). The fault with this is that much imported burlap is used in its unfinished state. Any shift of demand between finished and unfinished burlap would reduce the relevance of the comparison. Since Pakistan is trying to develop its own jute manufacturing industry, it will be supplying larger portions of the manufactured jute. Two alternatives are available. One could lump together imports from India and Pakistan, thus ignoring the shifts between them. This would require a price index which combined textile prices in both countries, and an exchange rate which would be a composite of the Indian and Pakistani Rupee. The other alternative would be to analyse separately the imports from each country. Conclusions could not be drawn without looking at both, however, for the United States duty could not be responsible for shifts of jute manufacture between India and Pakistan.

There appears to be little evidence that the reduced differential duty on finished burlap and unfinished bags has permitted much growth of imports of these two items. Table 9-2 shows these data for the years 1946 through 1954. The duty was reduced on July 9, 1948, partition occurred in August, 1947, and the Indian Rupee was depreciated in September, 1949. The Pakistani Rupee retained its dollar value.

Table 9 - 2

Total imports and combined imports from India and Pakistan of Unfinished Burlap, Finished Burlap and Unfinished Jute Bags

	2		3		4		5	
Year	Imports of burlap, bleached, printed, etc. (Million pounds)		Imports of jute bags, not bleached, etc. (Million pounds)		Imports of burlap not bleached, etc. (Million pounds)		Sums of (2) & (3) as percents of column (4)	
	Tot.	India and Pakistan	Tot.	India and Pakistan	Tot.	India and Pakistan	Tot.	India and Pakistan
1946	0.7	0.3	18.7	18.3	549.6	533.6	3.5	3.5
1947	9.8	0.1	30.7	30.5	531.7	519.6	7.6	5.9
1948	1.0	1.0	21.6	21.5	505.9	485.6	4.5	4.6
1949	0.1	0.1	18.4	18.3	446.6	426.6	4.1	4.3
1950	0.4	0.4	28.1	27.2	418.4	362.5	6.8	7.6
1951	0.1	0.09	19.4	18.9	333.8	275.8	5.8	6.9
1952	0.07	0.05	25.0	24.8	482.8	397.6	5.2	6.3
1953	0.1	0.08	23.4	23.3	435.4	340.2	5.4	6.9
1954	0.2	0.08	10.3	10.3	416.0	347.0	2.6	3.0

Sources: United States Department of Commerce, Bureau of the Census, Report No. FT 110, United States Imports of Merchandise for Consumption, calendar year volumes; 1947-1954, and ________, Foreign Commerce and Navigation of the United States, 1946.

Analysis of the effects of United States duties and relative prices on imports of jute from India must be, then, an intra-industry analysis of jute manufacturing. The approach must be similar to those suggested for cotton cloth and for castor beans. Only a limited amount can be learned about tariffs and jute, for several reasons.

First, the development of new manufacturing capacity in India and Pakistan depends upon many factors not directly related to the tariff differential on finished or further manufactured jute fabrics. Capital needs, the competition of other industries for available capital and attempts of both India and Pakistan to achieve greater self-sufficiency will all affect the rate of growth of jute processing in these two countries. Demands by other countries for finished jute fabrics and for raw and semi-finished jute will affect the amounts available to the American market.

Second, only a part of the imports of jute are subject to statistical analysis of the effects of the tariff differential. Jute twist, yarn, etc. and finished jute bags are virtually excluded. It may be inferred that the tariff is effective in excluding these products. Yet one cannot be certain of this, nor can one measure the effects. Closer examination of costs in the industry might confirm or deny the prohibitive effects of these duties. Meanwhile, their existence limits the statistical analysis to a portion of the jute industry.

Third, the increases in the imports of finished burlap and unfinished bags are so small as to raise doubts concerning the real effects of the lowered duty and the depreciated Indian Rupee. It may be that time is required to increase jute textile finishing capacity, or it may be that the tariff differential of five percent _ad valorem_ is still too great.

Fourth, the post-partition complications in India-Pakistan trade disturb the pattern of exports to the United States. Very little unfinished burlap, and no finished burlap or jute bags have yet been imported from Pakistan. If Pakistan is successful in shifting more manufacturing to its territory, this may have effects on the trade with the United States which are independent of United States tariffs.

Cattle Hides

One of the largest imports from Argentina is that of cattle hides. Cattle hides are defined by the United States Department of Commerce as bovine hides weighing more than twenty-five pounds wet or more than twelve pounds dried or dry-salted. Lighter hides are called calf-skins or kip skins. Argentina is second only to the United States in the production of cattle hides. It is the principal source of United States imports of cattle hides (supplying roughly one-half of imports), but supplies very few calf and kip skins. Argentina is like the United States in that it has a highly developed meat-packing industry. This industry is the principal source of cattle hides. Hides are definitely by-products of beef. The three variables which determine the supply of hides are a) the slaughter of cattle for beef (the upper limit of the supply of hides); b) the quality of the hides; and c) the relation between the prices of hides and the costs of handling and shipping them (determining how many will be discarded). Argentina has the world's second largest slaughter, its cattle are grazed in a way that produces hides without blemishes, and its highly organized slaughtering favors easy marketing of the hides.

The United States is the world's largest producer and consumer of cattle hides. It consumes about one-fifth of the world's production, but it is not self-sufficient in hides. About one-fifth of its consumption is imported.[13] Small amounts are, however, exported. Exports are due to special requirements for different types and grades of hides, and to seasonal differences between the northern and southern hemispheres.

It would appear at first sight that cattle hides from Argentina would make an excellent case for the measurement of the effects of the United States duty. Cattle hides were on the free list until the Tariff Act of 1930. They were then dutiable at ten percent *ad valorem* until November,

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13 *Ibid.*, v. 15, part 6, p. 2.

1941, the effective date of the agreement with Argentina, which set the duty at five percent. Since Argentina is the principal supplier, and since the United States is one of the largest markets, one would guess that the Argentine-United States trade in hides would be an excellent laboratory. Argentine data for years prior to 1932 were not available. However, earlier data on United States total imports and imports from Argentina are available. One can therefore hope to observe the effects of removing cattle hides from the free list. This will be done later, when the results of the quantitative study of this example are examined.

Closer examination of the market for cattle hides raises doubts, however, as to whether it is possible to measure the effects of tariffs at all. Let us recall the above description of the supply of cattle hides. The slaughter of animals for beef sets the upper limit to the supply. This is true for the domestic supply in any one country, as well as for the world. The demand for cattle hides arises principally from the shoe industry, which uses eighty-five percent of them. The rest of the hides are used for industrial belting, upholstery, luggage, harness and saddlery.[14] While all of these demands may shift upward and downward with the business cycle in the same

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[14] Ibid., v. 10, part 6, p. 2.

years as the demand for beef would be shifting upward or downward, there is no direct connection between the demand for beef and the demand for hides. The supply of hides, on the other hand, is the tail to the beef slaughtering kite. The only departures would be caused by variations in the quality of hides and the hides which might be discarded because their market price is not sufficient to cover the costs of handling and marketing them. As meat packing becomes a more concentrated industry, the proportion of hides discarded for this reason would be expected to be small. For a large consumer of cattle hides like the United States, it turns out that the difference between the demand for hides and their domestic supply coming from the meat packing industry is made up of imports.

In spite of the fact that cyclical variations in incomes could be expected to shift demands for beef and demands for leather in the same directions in the same years, the domestic supply of hides is not apt to follow the demand for leather very closely. Our discussions of the imports of cattle from Mexico and Canada provided the reasons for this. The supply of beef cattle for slaughter is subject to a "herd cycle"; it also varies with the severity of the winters and the costs of feeding the animals. Therefore the gap between the demand for hides by the leather industry and the domestic supply of hides is apt to vary widely from year to year. This gap is the demand for imports. Tariffs and the relations between foreign prices and domestic prices are apt to be minor influences on imports in comparison to the changes in this gap.

With this serious qualification in mind, let us look at the computation and use of the protective equivalent of the duty on cattle hides from Argentina. It is presented in Tables XVI and XVIa, pages 346 through 351. The computations were duplicated because of some doubts concerning the choice of the best price indexes. Table XVI uses an index of the prices of hides for Argentina, and an index of hides and skins for the United States. Hides other than cattle hides are produced in large quantities in both countries. Cattle hides are about forty-five percent of the total weights in the United States index of "hides and skins" prices. The weight of cattle hides in the Argentine index is not known, but may be somewhat larger than in the United States index. The hesitation to rely upon these indexes arose from the large relative weights of cattle hides in their construction. Table XVIa was therefore computed, using "agricultural products" prices for Argentina and "farm products" prices for the United States. As we shall see, it makes little difference.

Turning to Table XVI, we can see that depreciation of the Argentine Peso between 1932 and 1948 reduced the protective effect of a given duty by about one-half. A small part of this can be attributed to a slight increase in

TABLE XVI, ARGENTINA - CATTLE HIDES

	1	2	3	4	5	6
Year	Wholesale price index, Buenos Aires, Hides, (1926 = 100).[1]	Rate of exchange - Argentine Peso equals ---------- cents, U.S.[2]	Wholesale price index. Buenos Aires Hides (1926 = 100), in U.S. dollars.	Wholesale price index, U.S. hides and skins (1926 = 100).[3]	Protective equivalent of 1932 duty on cattle hides (020100-0202000) tar. par. 1530a.	Duty levied in each year on cattle hides (020100-0202000), tar. par. 1530a.[4]
1932	53.1	58.443	53.1	42.1	10.00	10%
1933	63.9	72.801	79.6	67.1	9.41	10
1934	71.6	33.579	41.1	68.6	4.75	10
1935	80.5	32.659	45.0	80.8	4.42	10
1936	91.0	33.137	51.6	94.6	4.32	10
1937	118.6	32.959	66.9	113.5	4.67	10
1938	81.9	32.597	46.0	73.6	4.96	10
1939	89.2	30.850	47.1	84.6	4.41	10
1940	92.3	23.704	37.4	91.9	3.23	10
1941	105.8	23.704	42.9	108.4	3.14	9
1942	117.1	23.732	47.6	117.6	3.21	5
1943	114.6	25.125	49.3	114.7	3.41	5
1944	117.0	25.125	50.3	109.9	3.63	5
1945	119.6	25.125	51.4	117.0	3.48	5
1946	175.7	25.125	75.5	147.4	4.06	5
1947	233.3	29.773	118.9	209.8	4.49	5
1948	234.6	29.773	119.5	209.8	4.52	5

7	7a	8	9	10	11	12
Protective equivalent of current duty on hides.	Index of protective equivalent of current duty on hides (1932 = 100).	U.S. imports of cattle hides from Argentina as percent of total U.S. imports of cattle hides - Quantity.[4]	U.S. imports of cattle hides from Argentina as percent of total U.S. imports of cattle hides - Value.[4]	U.S. imports of cattle hides from Argentina as percent of U.S. production of cattle hides - Quantity.[5]		
10.00	100	63.6	66.1	6.7		
9.41	94	50.4	55.5	11.4		
4.75	48	44.3	54.6	4.1		
4.42	44	46.8	52.6	8.0		
4.32	43	51.4	15.7	8.9		
4.67	47	48.3	53.1	7.5		
4.96	50	40.3	47.1	3.5		
4.41	44	57.6	61.8	9.7		
3.23	32	54.5	61.2	13.9		
2.82	28	54.3	60.4	20.0		
1.60	16	49.2	52.7	11.4		
1.70	17	51.9	53.4	9.7		
1.81	18	64.8	63.9	8.1		
1.74	17	62.1	61.0	2.2		
2.03	20	45.4	48.6	2.1		
2.25	23	44.1	46.4	2.4		
2.26	23	44.6	52.8	4.8		

1 Banco Central de la Republica Argentina, Oficiona de Investigaciones Economicas, Suoplemento Estadistico de la Renista Economica, No. 1, 1937, Buenos Aires, 1937, p. 5 (1932-1936); Ibid., No. 29, December, 1939, p. 5 (1937-1938); Ibid., No. 89, December 1944, p. 5 (1939-1940); Ibid., No. 110, September, 1946, p.5 (1941-1945); Ibid., No. 133, August, 1948, p. 5 (1946-1948).

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1940, p. 74 (1932-1938); January, 1948, p. 125 (1939-1947); December, 1953, p. 1409 (1948). Beginning in 1940, the "special" for export rate is used, rather than the official rate. In 1947 and 1948, the "basic" rate is used, since no "special" or "free" rate is quoted.

3 U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1933, p. 281 (1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-45, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1948).

4 ________, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. 1947 and 1948 data from ________, Report No. FT110, U.S. General Imports of Merchandise, annual summaries, 1947 and 1948. The difference between "imports for consumption" (used in previous years) and "general imports" (1947 and 1948) is ignored. Duty for 1941 estimated by rating portion of total year's imports entered prior to November 15 at 10¢ lb., and portion entered November 15 or later at 5¢ lb.

5 U. S. imports, Ibid., U.S. production, ________, Statistical Abstract of the United States, 1941, p. 885 (1932-1940); Ibid., 1950, p. 803 (1941-1949). U.S. production of hides is reported in number of hides, while import figures were obtained in pounds. Though it would have been possible to re-assemble import data in number of hides, an alternative (shorter) method was employed. For 1947, 1950, it was found that imported hides weighed approximately 36 lbs. each. Imports from Argentina were then divided by 36. Since the "imports as percent of U.S. production" is to be used for correlation, it makes no difference that this estimate may be in error. The only possibility of an error affecting the final results is the possibility that the composition of hides (wet salted vs. dry) changed significantly -- thus altering the mean weight of imported hides. In 1947-1950 21% of imported hides were dry, weighing 17 lbs. each, and 79% were wet salted, weighing 40.7 lbs. each. It is not known what portion of domestic hides were sold in each state. It does not matter, so long as the proportions of imported wet and dry hides did not change enough to alter the rankings of the various years.

TABLE XVIa, ARGENTINA - CATTLE HIDES

	1	2	3	4	5	6
Year	Wholesale prices in Buenos Aires, index agricultural products (1926 = 100).[1]	Rate of exchange - Argentine Peso equals ----------cents, U.S.[2]	Wholesale prices in Buenos Aires, index, agricultural products (1926 = 100) in United States dollars.[3]	Wholesale price index, U.S. farm products (1926 = 100).[3]	Protective equivalent of 1932 duty on Cattle Hides (0201000-0202000) tar. par. 1530a.	Duty levied in each year on Cattle Hides (0201000-0202000), tar. par. 1530a.
1932	59.0	58.443	59.0	48.2	10.00	10%
1933	56.9	72.801	70.9	51.4	11.27	10
1934	70.7	33.579	40.6	65.3	5.08	10
1935	72.2	32.659	40.3	78.8	4.18	10
1936	86.5	33.137	49.0	80.9	4.95	10
1937	105.1	32.959	59.3	86.4	5.61	10
1938	90.6	32.597	50.5	68.5	6.02	10
1939	83.6	30.850	44.1	65.3	5.52	10
1940	79.5	23.704	32.2	67.7	3.89	10
1941	75.7	23.704	30.7	82.4	3.04	9
1942	80.3	24.732	34.0	105.9	2.62	5
1943	86.8	25.125	37.3	122.6	2.49	5
1944	87.1	25.125	37.4	123.3	2.48	5
1945	106.5	25.125	45.8	128.2	2.92	5
1946	182.3	25.125	78.4	148.9	4.30	5
1947	169.1	29.773	86.1	181.3	3.88	5
1948	188.2	29.773	95.9	188.3	4.16	5

7	7a	8	9	10	11	12
Protective equivalent of current duty on hides.	Index of protective equivalent of current duty on Cattle hides (020100-020200) tar. par. 1530a (1932 = 100).	U.S. imports of Cattle hides from Argentina as percent of total U.S. imports of Cattle hides - Quantity.[4]	U.S. imports of Cattle hides from Argentina as percent of total U.S. imports of Cattle hides - Value.[4]	U.S. imports of Cattle hides from Argentina as percent of U.S. production of Cattle hides - Quantity.[5]		
10.0	100	63.6	66.1	6.7		
11.3	113	50.4	55.5	11.4		
5.1	51	44.3	54.6	4.1		
4.2	42	46.8	52.6	8.0		
5.0	50	51.4	56.7	8.9		
5.6	56	48.3	53.1	7.5		
6.0	60	40.3	47.1	3.5		
5.5	55	57.6	61.8	9.7		
3.9	39	54.5	61.2	13.9		
2.7	27	54.3	60.4	20.0		
1.3	13	49.2	52.7	11.4		
1.2	12	51.9	53.4	9.7		
1.2	12	64.8	63.9	8.1		
1.5	15	62.1	61.0	2.2		
2.2	22	45.4	48.6	2.1		
1.9	19	44.1	46.4	2.4		
2.1	21	44.6	52.8	4.8		

1 Banco Central de la Republica Argentina, Oficiana de Investigaciones Economicas, Supplemento Estadistico de la Renista Economica, No. 1, 1937, Buenos Aires, 1937, p. 5 (1932-1936); Ibid., No. 29, December, 1939, p. 5 (1937-1938); Ibid., No. 89, December 1944, p. 5 (1939-1940); Ibid., No. 110, September 1946, p. 5 (1941-1945); Ibid., No. 133, August, 1948, p. 5 (1946-1948).

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1940, p. 74 (1932-1938); January, 1948, p. 125 (1939-1947); December, 1953, p. 1409 (1948). Beginning in 1940, the "special for export" rate is used, rather than the official rate. In 1947 and 1948, the "basic" rate is used since no "special" or "free" rate is quoted. Actually, entirely different rates may have been used, due to the manipulations of multiple rates by the exchange authorities.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1933, p. 281 (1932); Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-1945, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1948).

4 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within those volumes. 1947 and 1948 data from _______, Report No. FT110, United States General Imports of Merchandise, annual summaries, 1947 and 1948. The difference between "imports for consumption" (used in previous years) and "general imports" (1947 and 1948) is ignored.

5 United States imports, Ibid., United States production, _______, Statistical Abstract of the United States, 1936, p. 885 (1932-1940); Ibid., see Table XVI for method of arriving at column 10.

United States prices relative to Argentine prices. However, the Peso was valued at only 29.773 cents in 1948; hardly more than one-half of its value in 1932. This accounts for the major portion of the reduction of the protective equivalent of the 1932 duty from 10 cents to 4.5 cents by 1947 and 1948.

The tariff reduction of November 15, 1941, cut the duty itself in half. The protective equivalent of the current duty on cattle hides therefore was in 1948, less than one-fourth of its value in 1932. Columns 7 and 7a show this, and the additional fact that it was even lower in the early 1940's, before the Peso appreciated with respect to the Dollar.

The question of which value for the Peso to use after 1938 was solved easily by simply assuming that the "special for export" rate was the right one in the years (1939 through 1946) in which it was quoted. Through 1938, only one rate was quoted. In 1947 and 1948, only a "basic" rate was quoted. The extent to which rates other than the one used in Tables XVI and XVIa were applied to the export of hides is not known.

Scanning columns 8, 9 and 10 of Table XVI, and comparing them to columns 7 and 7a reveal that there is little relation between Argentina's share of the American cattle hide market and the protective equivalent of the duty on hides from Argentina. One can say that from forty-five to fifty-five percent of the cattle hide imports (by weight) come from Argentina, with variation above or below this in a few years. Argentina contributes a higher portion of imports by value than by weight. This is because her hides are of consistently higher quality and of the types that bring higher prices.

Column 10 shows, on the other hand, that Argentine hides make up widely varying portions of American hide consumption. If the analysis in the preceding pages is correct, this is to be expected. It is also to be expected that the influence of the protective equivalent on this variation is slight. Rank correlation confirms this expectation. The coefficient, with time trends removed, is -.21. A check against this is obtained by correlating the corresponding variables from Table XVIa. The coefficient is -.14. It makes little difference, then, whether prices of hides or prices of all agricultural products are used. The coefficients are of the expected negative sign, but their low values reflect the weakness of the effects of prices on imports.

Similar results are obtained by correlating column 7a with column 8. The coefficient of rank correlation is -.22, with time trends removed. Table XVI data yields a coefficient of -.19. These are of the same order of magnitude as those relating imports to domestic production. They reflect the weakness of the effects of relative prices on

Argentina's share of United States imports. The explanation of the weakness must be somewhat different than the explanation of the weakness of the price and tariff effects on Argentina's shares of United States consumption, however. The tariff rate is the same for the products of all countries except Cuba and the Philippines, which provide only minute quantities of hides. It is therefore only the changes in relative Argentine-United States prices which would affect Argentina's share of imports. Rank correlation of column 5 with column 8 of Table XVI results in a coefficient of -.31. The effect of relative prices is in the expected direction, but weak. This is apt to be true because the supply of Argentine hides is subject to the same peculiarities as is the supply of American hides, and because demands from other countries for Argentine hides are apt to fluctuate as widely as does the American demand. Therefore, when the United States demand for imports is strong, the hides are obtained from wherever they are available. A strong American demand therefore may or may not increase the share coming from Argentina; depending upon the supplies available there and elsewhere, and upon other countries' demands. One factor affecting United States imports from Argentina since the war, for instance, is the stronger reliance of the United Kingdom on Argentine sources. This results in a slightly reduced share of United

States imports for Argentina, and probably is unrelated to Argentine prices relative to American prices.

The multiple correlation test separating the effects of the tariff from the effects of other costs yielded little consolation, either. The partial coefficient relating the tariff to imports from Argentina as percents of domestic production, with costs constant, is +.20. That relating costs to imports, with the tariff constant, is -.27. The latter is not significant at the ten percent level. The former is clearly "perverse."

There is one other possible way of interpreting the data of Table XVI. Since variations in domestic cattle production are so important in determining imports of hides, one could use domestic production of cattle as the third variable in rank correlation, rather than time. The rationale would be the following: variations in cattle slaughter in the United States affect total imports of hides and imports of hides from Argentina independent of the level of the tariff or relative prices; so removal of the effects of domestic cattle slaughter would leave a clearer relation between the tariff and imports from Argentina. Rank correlation of column 7a with column 10 of Table XVI, with the effects of the domestic slaughter removed, yields a coefficient of -.32. This is not remarkably better than the coefficient (-.21) obtained with the use of time trend as a correction. There seems to be little true relation between the protective equivalent and imports. At least all of our tests show weak results.

The question of how to measure the effects of the tariff in such a market is still not answered. It is likely that we shall have to be satisfied with an indefinite answer. It may even turn out that the tariff has only the effect of raising prices slightly for domestic producers, depressing them slightly for foreign producers, and leaving import quantities unaffected.

It is possible to observe the change in imports which followed the removal of cattle hides from the free list. Imports from Argentina as percents of domestic production of cattle hides are shown in table 9 - 3.

Table 9 - 3

Total imports of cattle hides and imports from Argentina as percents of domestic production of cattle hides, 1925-1941

Year	Total Imports of Cattle Hides as Percents of Domestic Prod.	Imports of Cattle Hides from Argentina as Percents of Domestic Prod.
1925	20.7	11.0
1926	19.5	10.1
1927	30.2	16.1
1928	38.0	18.1
1929	38.4	19.2
1930	29.2	13.5
1931	15.9	8.4
1932	10.6	6.7
1933	22.6	11.4
1934	9.3	4.1
1935	17.2	8.0
1936	17.4	8.9
1937	15.4	7.5
1938	8.7	3.5
1939	16.9	9.7
1940	25.4	13.9
1941	36.8	20.0

Sources: United States Department of Commerce, Bureau of the Census, _Foreign Commerce and Navigation of the United States_, and ________, _Statistical Abstract of the United States_.

Total imports of cattle hides, and imports from Argentina, declined sharply relative to domestic production after the imposition of the duty. One cannot tell how much of this was due to the income changes of the depression years, however. In fact, there was considerable increase of imports again after 1938. Reference to Table XVI shows, however, that imports declined again, despite the reduction of the duty, and did not recover by 1948. One cannot say how much of the decline of imports is traceable to the duty. Some would follow if the tariff increased the price of domestic hides enough so that fewer were discarded. The maximum price increase traceable to the tariff would have been ten percent, however. Some increase in the proportion of hides sent to market would occur anyway, due to improved transportation facilities and greater concentration in the meat packing industry.

Two other relations can be observed in table 9-3. First, there is considerable year-to-year change in the proportion of imports to domestic production. This is to be expected, from the supply conditions described above. Second, Argentina's share of imports remains very close to fifty percent through all of these year-to-year shifts in total imports. This was also observed in Table XVI. Its meaning must be that the market for cattle hides is truly a world market, so that all sellers share in the increases and decreases of sales in the American market. This must be true in spite of the fact, mentioned above, that world supplies must be subject to the same kinds of fluctuations that we observe in the American market.

We end by being defeated in our attempts to find any clear relation between the tariff and imports of cattle hides from Argentina. Our measures are probably correct in showing a consistent but weak effect of the protective equivalent of the duty. We are unable to overcome the effects of the almost random variations of the cattle slaughter in the United States. As nearly as we can tell, we have assessed the true significance of the duty and of relative price changes. We are not able to construct a statistical device that will be convincing, however.

Flaxseed

Flaxseed was once an important item of trade with Argentina. In 1937, imports of flaxseed from Argentina were equal to 97.7 percent of total United States imports of flaxseed. They were equal to 387 percent of domestic production by quantity. Though the tariff was 65 cents per bushel (equal to 51.8 percent _ad valorem_), the value of imports from Argentina was 258 percent of the value of United States farm production. The story presented here is one of the decline of these imports to zero. The tariff seems not to have had much to do with this decline. In fact, Table XVII, pages 360 to 362, shows that the tariff was reduced to 32.5 cents per bushel in 1942. Due to the rise in the price of flaxseed, the _ad valorem_ equivalent of the duty was as low as 8.9 percent by 1946. Due to the decrease in the value of the Peso, the protective equivalent of the current duty was as low as 8.1 cents per bushel in 1943 and 1944 (using 65 cents in 1932 as a base), and was only 13.5 cents in 1948.

TABLE XVII, ARGENTINA - FLAXSEED

Year	1 Wholesale prices in Buenos Aires, index, agricultural products (1926 = 100).[1]	2 Rate of exchange - Argentine peso equals ———————cents, U.S.[2]	3 Wholesale price index, agricultural products in U.S. dollars.	4 Wholesale price index, U.S. farm products (1926 = 100).[3]	5 Protective equivalent of 1932 duty on Flaxseed (223000) tar. par. 762.	6 Duty levied in each year on Flaxseed (223000), tar. par. 762.[4]
1932	59.0	58.443	59.0	48.2	65.0 ¢ bu.	65.0¢ bu.
1933	56.9	72.801	70.9	51.4	73.2	65.0
1934	70.7	33.579	40.6	65.3	33.0	65.0
1935	72.2	32.659	40.3	78.8	27.2	65.0
1936	86.5	33.137	49.0	80.9	32.2	65.0
1937	105.1	32.959	59.3	86.4	36.4	65.0
1938	90.6	32.597	50.5	68.5	39.1	65.0
1939	83.6	30.850	44.1	65.3	35.9	65.0
1940	79.5	23.704	32.2	67.7	25.3	65.0
1941	75.7	23.704	30.7	82.4	19.8	65.0
1942	80.3	24.732	34.0	105.9	17.0	32.5
1943	86.8	25.125	37.3	122.6	16.2	32.5
1944	87.1	25.125	37.4	123.3	16.1	32.5
1945	106.5	25.125	45.8	128.2	19.0	32.5
1946	182.3	25.125	78.4	148.9	28.0	32.5
1947	169.1	29.773	86.1	181.3	25.2	32.5
1948	188.2	29.773	95.9	188.3	27.0	32.5

7	7a	8	9	10	11	12
Protective equivalent of current duty on Flaxseed (2233000) tar. par. 762.	Index of protective equivalent of current duty on flaxseed (2233000) tar. par. 762, (1932 = 100).	U.S. Imports of Flaxseed from Argentina as percent of total U.S. imports of Flaxseed, Value.[4]	U.S. Imports of Flaxseed from Argentina as percent of total U.S. imports of Flaxseed, Quantity.[4]	U.S. Imports of Flaxseed from Argentina (value) as percent of farm value of U.S. production of Flaxseed.[5]	U.S. Imports of Flaxseed from Argentina (quantity) as percent of U.S. production of Flaxseed.[5]	Ad valorem equivalent of U.S. duty on Flaxseed (2233000).[4]
65.0	100	92.0%	93.4%	47.3%	64.3%	99.0%
73.2	113	80.0	81.6	96.0	163.5	66.9
33.0	51	54.9	60.6	85.1	151.7	61.3
27.2	42	89.8	92.0	68.0	114.4	73.1
32.2	50	81.0	85.7	141.3	247.0	56.6
36.4	56	96.9	97.7	258.5	387.3	51.8
39.1	60	93.4	93.4	145.2	178.5	50.3
35.9	55	95.2	95.3	61.1	77.9	56.5
25.3	39	83.1	83.4	26.8	31.9	54.4
19.8	30	55.4	56.6	15.2	37.2	72.2
8.5	13	64.2	73.6	11.9	24.7	25.0
8.1	12	33.4*	43.3*	5.5*	9.2*	13.3
8.1	12	3.9*	6.7*	1.9*	3.3*	11.2
9.5	15	15.4*	22.6*	1.5*	2.5*	10.9
14.0	22	10.2*	14.5*	.9*	2.2*	8.9
12.6	19	0	0	0	0	n.a.
13.5	21	0	0	0	0	n.a.

1 Banco Central de la Republica Argentina, Oficiana de Investigaciones Economicas, Supplemento Estadistico de la Renista Economica, No. 1, 1937, Buenos Aires, 1937, p. 5 (1932-1936) Ibid., No. 29, December 1939, p. 5 (1937-1938); Ibid., No. 89, December, 1944, p. 5 (1939-1940); Ibid., No. 110, September, 1946, p. 5 (1941-1945); Ibid., No. 133, August, 1948, P. 5 (1946-1948).

2 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, January, 1940, p. 74 (1932-1938); Ibid., January, 1948, p. 125 (1939-1947); Ibid., December, 1943, p. 1409 (1948). Beginning in 1940, the "special for export" rate is used, rather than the official rate. In 1947 and 1948, the "basic" rate is used, since no "special" or "free" rate is quoted.

3 United States Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1933, p. 281 (1932), Ibid., 1936, p. 300 (1933-1935); Ibid., 1941, p. 356 (1936-1940); Ibid., 1944-1945, p. 418 (1941-1943); Ibid., 1947, p. 288 (1944-1946); Ibid., 1950, p. 280 (1947-1949); Ibid; 1953, p. 275 (1950).

4 _______, Foreign Commerce and Navigation of the United States, annual volumes. See Table No. I for specific sources within the volumes. Duty for 1947-1950 from _______, Schedule A, August 1, 1950, corrected to May 1, 1952. Rate reduced January 1, 1942, T.D. 5054, November 1, 1941, Trade Agreement with Argentina. Rate increased June 30, 1949, T.D. 52235. Imports from1947-1950 from _______, Report No. FT 110, U.S. General Imports of Merchandise, annual summaries, 1947-1948.

5 Imports, Ibid., U.S. production, _______, Statistical Abstract of the United States, 1950, p. 611.

* Includes free imports, Executive order 9177, public law 497 and United States government.

It is clear then that we cannot learn much from Table XVII about the effects of the tariff on flaxseed. There were other factors which dominated the flaxseed trade. We have two tasks: to learn what were the causes of the decline in imports, and to discover whether it is possible to learn anything about the tariff on flaxseed.

It is not hard to discover what has caused the decline of flaxseed imports. Nor is it hard to discover the effects of a tariff--but the tariff is that on linseed oil, not on flaxseed.

The tariff on flaxseed was designed to protect the domestic growers. In 1929, it was raised, by presidential proclamation, from 40 cents per bushel to 56 cents per bushel.[15] The Tariff Act of 1930 raised it to 65 cents per bushel. The decline of the price of flaxseed caused this to be equal to as much as 99 percent *ad valorem* in 1932. In spite of the high duty, imports averaged about 140 percent of domestic production in the 1930's. A part of the reason for the failure of the duty to increase domestic production was the drouth in the growing areas; principally North and South Dakota, Minnesota and Montana. This was apparently not all of the difficulty, however. War conditions demanded more flaxseed--for military needs, and for export to the Allied Nations. The required amounts

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15 *Ibid.*, v. 7, part 5, p. 79.

were obtained by government encouragement through the soil conservation program. From 1943 to 1946, however, production declined again. A price supported at $6 per bushel caused production to increase again in 1947. The $6 support price can be contrasted with the average price of $1.52 per bushel for the years 1930-1939.[16]

One may wonder why Argentina, the world's principal grower of flaxseed, does not enter this market again. There are clear reasons why it does not. In the first place, the United States government would protect its support price by limiting imports if they tried to enter in large quantities. In fact, on June 30, 1949, the rate on flaxseed was raised to fifty cents per bushel. This was in accordance with the trade agreement with Argentina, whereby the President of the United States could declare that the "existing abnormal situation in respect to flaxseed" no longer existed. Apparently the United States has not had to protect further its support price, for Argentina has virtually prohibited the export of flaxseed. This has been done to develop the seed crushing industry. Argentina is now the world's leading exporter of linseed oil.[17]

The tariff on flaxseed has not been successful in excluding imports of flaxseed; in fact, imports have varied

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16 Ibid., v. 7, part 5, p. 82.

17 Ibid., v. 1, part 4, p. 61.

directly, rather than inversely, with the ad valorem equivalent computed in Table XVII. Flaxseed imports have been reduced to nearly zero by United States and Argentine direct government intervention. The tariff, now fifty cents per bushel, may be useful to the United States government in achieving this effect, but it has by no means been adequate. The great effort necessary to become self-sufficient in flaxseed is a commentary on the economic efficiency of such an objective.

For a long time the tariff differential between flaxseed and linseed oil has been successful in retaining the pressing industry in this country. Linseed oil imports were taxed at 3.3 cents per pound from 1922 until 1929. They were taxed at 3.7 cents from 1929 to 1930. Since 1930, they have been taxed at 4.5 cents per pound.[18] The duty on flaxseed is expressed as so much per bushel of 56 pounds. The oil yield is from 30 to 40 percent by weight.[19] Taking the average yield to be 35 percent, each bushel would yield 19.6 pounds of oil. Thus a tariff of 40 cents per bushel is equal to 2.04 cents per pound of oil content. This is much below the 3.3 cents per pound duty on oil which was in effect prior to June, 1930. Also, the by-products of the pressing industry, cake and meal, were largely exported with

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18 Ibid., v. 1, part 4, p. 59.

19 Ibid., v. 7, part 5, p. 82.

a draw-back on the duty. This further increased the differential against the import of oil. When the duty was raised to 56 cents per bushel in 1929, it was still equal to only 2.85 cents per pound of oil less the draw-back on exported cake and meal. The 65 cent duty was equal to 3.3 cents per pound of oil content less the draw-back, but the duty on oil was then raised to 4.5 cents per pound. The 32.5 cent duty on flaxseed was equal to 1.65 cents per pound of oil.

From 1922 through 1930, decreasing amounts of linseed oil were imported. None was imported from Argentina between 1924 and 1940. Total imports of oil were negligible from 1931 until 1942. Large amounts were imported free by the United States government during the war. Imports declined to negligible quantities by 1950, and none was imported from Argentina in 1949 and 1950. It is therefore clear that while a tariff varying from 9 percent to 99 percent _ad valorem_ was never successful in eliminating seed imports, a tariff of 3.3 cents, 3.7 cents and 4.5 cents per pound was an effective barrier to the import of linseed oil. The 3.3 cent duty varied from 32 to 47 percent _ad valorem_. The 3.7 cent duty was from 38 to 50 percent, and the 4.5 cent duty has varied from 19 to 124 percent.[20]

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[20] Duties on and imports of linseed oil are from United States Department of Commerce, Bureau of the Census, _Foreign Commerce and Navigation of the United States_, annual volumes, 1922-1946.

In the flaxseed case our usual method failed to show effects of the tariff. This is a correct result, for the flaxseed tariff had, by itself, little effect on imports. Clearly it did create a differential between the pre-duty price of imported seed and the market price of domestic seed. This was not enough to prevent imports being nearly 400 percent of domestic production in one year, however. Drouth in the principal growing area was only a part of the reason for this failure. From 1922 through 1931, when the ad valorem equivalent of the duty varied from 20 percent to 67 percent, and while there was no drouth, imports of seed varied from fifty-three percent to 149 percent of the domestic crop.

Our analysis of the flaxseed case did turn up an effect of the tariff on linseed oil, however. Here, without providing data susceptible to statistical manipulation, the imports of oil compared to the imports of seed do show conclusively that the level of the linseed oil duty was high enough to guarantee the existence of the domestic pressing industry. Just as the severity of the measures necessary to exclude flaxseed was a commentary on the economic efficiency of those measures, the heighth of the oil duty is a commentary on the validity of supporting a domestic pressing industry. The economic nationalism of the United States' flaxseed and linseed oil measures is matched by that of Argentina's control of flaxseed exports in the interest of developing a pressing industry. The total result is the complete cessation of trade between the principal producer of this vegetable oil product and the largest consumer of vegetable oils. Linseed oil is an important ingredient of paint, varnish, linoleum, oilcloth, and printing ink. These products are made more costly by these measures. They in turn are protected by tariffs.

Summary

The four commodities studied in this chapter are all important products of India, Pakistan, Argentina and Brazil. In two cases, tariffs were instrumental in radically altering the pattern of trade. The differential between castor beans and castor oil shifted our import trade from India as a source to Brazil. Later reduction of the differential has aided the development of a pressing industry in Brazil and brought India back into the picture. Extreme measures in favor of domestic flaxseed and linseed oil extraction have virtually stopped trade in these two commodities.

The effects of tariffs were less dramatic in the other two cases. Discrimination against various stages of jute manufacture has preserved a small domestic industry. Slight relaxation of the discrimination has allowed Indian industry to gain a small portion of the further processing. It is too early to tell whether the remaining discrimination will be enough to protect the domestic processing of burlap and jute bags. Manufacture of the yarns used in twine, rope and carpet making is preserved for the domestic industry by high duties which have not been relaxed. In the fourth case, that of cattle hides, the tariff has had little effect. It has probably increased slightly the profits of meat packing firms, and it has probably diminished the portion of cattle hides discarded by small slaughterers and farmers. Its effect on the pattern of trade has been observable, but small.

Of the four cases, only in the cattle hide case did the protective equivalent prove to be an efficient measure of the tariff's effects. The small effects shown by the protective equivalent are probably roughly correct. In the other cases, methods employed throughout this study failed to result directly in useful measures of the tariff's effects. However, each of these three examples led us to a point where it became clear that additional information and other types of analysis would yield answers. In none of these three cases were we unable to assess the effects of duties related to the product we were examining. In two cases, castor beans and jute products, it appeared possible to extend the use of the protective equivalent to tariff differentials and alternative forms of the product. In the flaxseed-linseed oil case, such a statistical device seemed not to be feasible. However, examination of the relevant data left few doubts concerning the effectiveness of the United States duties in altering the pattern of trade in this vegetable oil product.

CHAPTER X

CONCLUSIONS

The seventeen commodity examples involving eight countries have provided an opportunity to explore thoroughly the possibilities of discovering and measuring the effects of United States tariffs under a variety of circumstances. In all cases, examples were drawn from classes of supplementary imports in such a way that imports from the example country amount to a significant portion of total United States imports of that economic class.[1] In all cases, the country selected contributed at least ten percent of United States imports of the class from which the individual commodity was selected. In most cases, fifty percent or more of the commodity class is imported from the country selected. The single commodity was selected partly because of its importance within the commodity-class trade with the country, and partly on the basis of convenience. Convenience usually meant measurability. A commodity which is classified[2] simply for tariff schedule purposes is preferable,

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1 Economic class refers to the Department of Commerce classification according to economic class, e.g., crude foodstuffs, crude materials, manufactured foodstuffs, etc.

2 Here "classification" refers to Department of Commerce commodity class, e.g., 00 = "animals and animal products, edible," with numbered sub-classes down to individual commodities.

for imports are recorded simply, and a single rate of duty may be found to apply to a large volume of imports. The two commodities selected for the Mexico study illustrate this combination of relevance and convenience. "Cattle" is the largest homogeneous item in the important commodity class "animals and animal products, edible," which is a major part of the economic class "crude foodstuffs." "Tomatoes, natural state," though not large imports, provide a significant homogeneous group within "vegetable products, edible," which are also important in "crude foodstuffs."

Each commodity was analyzed separately with the techniques described in Chapters I and II, and then the effects of trade in these and other commodities upon the country in question were estimated, where this seemed possible. The informal part of the analysis is complete for each case, and little can be said in general about it, except to condense and summarize the results. This will be done later. Meanwhile, the formal part of the analysis--the attempt statistically to measure the effects of tariffs and the effects of costs--is not complete until the results have been assembled and evaluated as a whole. Correlation tests were employed with data grouped, insofar as possible, so that negative correlation coefficients would have economic meaning. The correlation tests may be divided into two groups. The first group tested the relation between an index which assembled all the measurable elements of the costs of imports relative to the costs of their domestic rival products and one or more measures of the volume of the imports. The second group of tests attempted first to separate the cost burden of the tariff from other costs, and to relate the tariff alone to the relevant measures of imports. Then these tests attempted to relate the non-tariff elements of relative costs to the same measures of imports.

The results of the first group of tests are summarized in Table 10 - 1. Rank correlation was employed throughout, as it is a simple test which does not assume a normally distributed parent universe, and it does not fit the data to linear trends. Multiple correlation with the rank method is not statistically accurate, however. Since it is nevertheless important to attempt to remove the time trends which may result from the unmeasured factors affecting imports, it was attempted. The second, third, fifth and sixth columns of Table 10 - 1 record the rank correlation coefficients with and without the removal of the time trend effects. This provides some protection against the possibility of misleading results due to the inaccuracy of this multiple correlation technique. If the partial coefficient differs radically from the simple coefficient, this difference should be accepted as meaningful only if examination of the underlying data suggests that it should be so accepted. Another weakness of the rank correlation

Table 10 - 1

Summary of the Results of Correlation Tests of the Protective Equivalent of the Current Duty, With:

	(A) Imports as percents of domestic production:			
	(1) rank correlation		(2) product-moment correlation	
	(a) simple	(b) time removed	(a) coefficient	(b) level of significance
Australia, wool	-.54	-.38	-.73	1%
Mexico, Cattle	-.56	-.39	-.65	1%
" ,tomatoes,by quantity,1928-46	-.43	-.44	-.66*	1%
" , " ,by value, 1928-42	-.30	-.26		
" , " , " " , 1938-46	-.61	-.34		
Canada, softwood boards	-.47	-.49		
" , cattle	-.55	-.48	-.83	1%
" , aluminum, by quantity	-.25	-.47		
" , " , by value	-.35	-.72		
" , nickel				
Switzerland, coal-tar colors	+.10	+.03		
" , watches	+.03			
Germany,coal-tar colors,by quantity			-.40	10%
" , " " " , " value	-.14	-.15		
" , textile machinery	-.39	-.32	-.61	10%
United Kingdom, cotton cloth	+.62	+.56		
" " , textile machinery	-.83	-.45	-.03	n.s.
" " , " "			-.80*	1%
India, castor beans, by quantity, 1926-50				
" , castor beans, by quantity, 1926-34				
" , castor beans,by value,1931-50	+.09	+.06		
" , " " ," quantity, "	+.12	+.08		
" , jute, by quantity				
Argentina, cattle hides	-.07	-.21		

* - time trends not removed

(B) Imports as percents of total imports:

(1) rank correlation		(2) product-moment correlation	
(a) simple	(b) time removed	(a) coefficient	(b) level of significance
-.01	-.10		
-.12	-.08		
-.61	-.52		
-.33	-.15		
-.31	-.11		
+.14	+.24		
+.07	+.06		
		-.25	n.s.
		-.47	5%
-.37	-.60		
+.37	+.29		
-.07	+.08	-.32	n.s.
	-.09		
		-.69	5%
-.36	-.18		
-.10	-.22		

method--the lack of a statistical test of significance--is partly corrected for by use of product-moment correlation in a few cases.

Examination of the second and third columns of Table 10 - 1 reveals a preponderance of negative-valued coefficients, though there is a scattering of positive values, and there are several coefficients of such low absolute value as to be of little significance. These coefficients relate the composite measure of costs, called "the protective equivalent of the current duty," to imports as percents of domestic production. They are checks on the sensitivity of imports to any or all changes in foreign costs relative to domestic costs.

All of the imports coming from Australia, Mexico and Canada are fairly sensitive to changes in costs, except nickel. Domestic nickel is unimportant, so imports from Canada are compared with total imports. A low-valued relation with costs is to be expected, since more than ninety percent of imports generally come from Canada. Four checks by product-moment or linear regression result in coefficients significant at the one percent level. In two of these cases, tomatoes, by value, for 1938-1946, and aluminum, by value, there is considerable difference between the simple coefficients and those with the time correction. Since there is no clearly valid reason why time should have had such strong effects on these two commodities, we can admit the possibility of error in the rank partial method, and take the simple rank coefficients as adequate measures of the sensitivity of imports to costs. For this group, tomatoes (1938-1946), aluminum and nickel show a clear relation between costs and the principal country's share of total imports, while wool and tomatoes (1928-1942) fail to do so.

Of the industrial products from Switzerland, Germany and the United Kingdom, only coal-tar colors from Germany and textile machinery imports as percents of domestic production have a clear relation to costs. Coal-tar dye imports from Germany, as percents of total imports by value, are significant at the five percent level. This was a check on the possibility that the values of Germany dyes were depressed in an effort to maintain quantity sales despite tariff discrimination. Germany's quantity shares did not have a significant coefficient--hence this rough check does not refute the hypothesis.

The last four commodities considered, all grouped in Chapter IX, did not provide adequate statistical measures of the effects of tariffs and other costs. It was clearly not worthwhile to apply correlation tests to imports of Argentine flaxseed. Imports of Argentine cattle hides show only very weak relations with the protective equivalent. Indian jute imports, as percents of total jute imports, show slightly a more significant relation with the protective equivalent. The years 1926-1934 contain a significant relation between the protective equivalent and imports of Indian castor beans as percents of total imports. This is a short period, however, and by 1934 or 1935, changes in Indian production and Indian manufacture of castor oil were taking place which could not have been caused principally by United States duties.

The general conclusion to be drawn from this preliminary statistical test is that there is some promise of success for this general approach to the problem of measurement. The next test presses the question one step further--i.e., to the isolation of the tariff from other cost effects. This step should provide the answers to two questions: a) is the linear regression technique capable of discovering relationships which may exist, and b) what are the statistical values of the relations? The first question must receive a positive answer before the second question can be answered. Unfortunately, the multiple correlation coefficient will not provide separate answers to these two questions.

We must employ two kinds of strategy in order to reach even reasonably firm conclusions. First, a fairly large number of cases must be observed at once, to avoid the danger of basing conclusions on chance results. Linked with this are the use of statistical significance tests and general analyses of the markets with which the cases are dealing. The second strategy was outlined in Chapters I and II. It consists of proper selection and treatment of the variables so that the statistical relations may be expected to have economic meaning. The only difficulty remaining is the validity of the linear treatment of the trends in the data. This cannot be avoided, so long as second-order partial coefficients are required. The multiplicity of the examples, and a willingness to check correlation results for "reasonableness" against the economic characteristics of each market provide us our principal protections against error.

Table 10 - 2 summarizes the multiple regression attempts at isolation of tariff and other cost effects. Looking first at the columns under (A), using imports as percents of domestic production, we find the tariff having effects significant at the five percent level or better in seven of twelve cases. Closer examination reveals that these results are to be expected, considering the nature of the markets with which we were dealing--except that they are unexpectedly good in two cases. It may seem surprising that the tariff effects are not significant for the Australian wool case. The total measure of costs, shown in Table 10-1, had a significant negative correlation with wool imports. However, analysis of the case, and the data in Table I, Chapter III, showed that the tariff changes had been small and infrequent compared to changes in relative costs. This

test is intended statistically to verify or to refute a hypothesis that can be formed by examination of such a case. In the wool case, the hypothesis was that, though the tariff was successful in exploiting the Australian wool grower to the benefit of the American wool grower, the most significant effects upon Australia's shares of our market came from changes in the other costs. Other costs, with tariff effects constant, correlated significantly at the ten percent level.

Both costs and the tariff correlated significantly at the one percent level for Mexican cattle. It seems surprising that only the tariff was significant for Canadian cattle. Examination of the case, however, discloses that limitations on Canada's herds occur for reasons associated with alternative land uses, so that exports do not take full advantage of market opportunities. Not all of these alternative land uses were reflected in the prices used to measure cattle costs. Costs still correlated negatively with Canadian cattle--the level of significance is simply below ten percent, and much less than that for the tariff.

Mexican tomatoes, for years excluding most of the war and post-war, correlate negatively with both the tariff and costs--but not significantly. Non-price factors affecting yields can account for this lack of ability to measure. There need be no doubt whether the tariff restricts imports in favor of domestic production; for the tariff amounted to

Table 10 - 2

Summary of the Results of Correlation Tests of the ad valorem equivalent of the Duty, and of Relative Costs, With:

	(A) Imports as percents of domestic production: (1) the a.v. duty, with costs and time constant		(A) (2) costs, with the a.v. duty and time constant		(B) Imports as percents of total imports: (1) the a.v. duty, with costs and time constant		(B) (2) costs, with the a.v. duty and time constant	
	(a) coeff.	(b) level of significance	(a) coeff.	(b) level of significance	(a) coeff.	(b) level of significance	(a) coeff.	(b) level of significance
Australia, wool	-.23	n.s.	-.34	10%	+.35		-.48	5%
Mexico, cattle	-.52	1%	-.55	1%				
" ,tomatoes,by quantity,1928-42	-.36	n.s.	-.06	n.s.				
Canada, softwood boards	-.68	1%	-.24	n.s.				
Canada, cattle	-.68	1%	-.25	n.s.				
" , aluminum, by quantity	-.44	5%	-.47	5%				
" , nickel					+.67		+.02	
Switzerland, coal-tar colors	+.66		-.45	10%	+.67		+.74	
" , watches	-.77	1%	-.15	n.s.				
Germany,coal-tar colors,by quantity					-.14*	n.s.	-.37*	10%
" , " " " ," value					-.37*	10%	-.14*	n.s.
" ,textile machinery	-.82	5%	-.64	10%	-.30	n.s.	-.40	10%
United Kingdom, cotton cloth	+.26**		-.05**	n.s.				
" " ,textile machinery	-.96**	1%	-.10**	n.s.	-.58**	1%	+.14	
Argentina, cattle hides	+.20	n.s.	-.27	n.s.				

* - duties are ratios of duties on German products to duties on Swiss products.
** - time trends not removed.

nearly one hundred percent _ad valorem_ in some years. The removal of linear time trends does not correct properly for such non-price factors as weather, blight, etc., however, so we must be satisfied with a hypothesis that is not rejected by statistical analysis, though it is not confirmed.

Canadian softwood boards show the effects of changes in United States tariffs rather strongly. Other costs, though correlating negatively, do not appear as significant. In this case it is not so much the imperfections of the market as it is the fact that the Canadian market is tied so closely to the United States market. With up to one-half of her output exported, and principally to the United States, prices of lumber and timber follow those set by the larger market. Thus the use of these prices to measure relative costs results in quite inaccurate indications of the effects of changing Canadian resource costs.

Aluminum imports show sensitivity to both tariff and cost changes which is surprising, considering the nature of the product and the bi-national monopoly which existed in the years studied. Rational market behavior on the part of the monopoly would, however, tend to divide the American market between its domestic product and its imported product according to changing relative costs of the two sources.

Nickel shows no sensible relation either to costs or to tariffs. This was suspected when the first correlation tests failed, and when the nature of the market was examined.

Coal-tar colors from Switzerland responded in the expected way to relative costs, but not to the tariff. It is hard to interpret the Swiss case. The German case might be equally difficult, for the industry in both countries was subject to cartel arrangements which made prices and sales insensitive to cost factors. The German case did reveal the effects of tariff discrimination against German products, however. Imports from Germany as percents of total imports, measured by value, were sensitive to the tariff, but not to other costs. Measured by quantity, they were sensitive to costs, but not to the tariff. This supports the hypothesis that the German industry or government depressed the values of these products to maintain Germany's quantitative share in the American market.

Swiss watches are quite sensitive to changes in the tariff, but not to costs. Costs were measured very crudely, with the use of metals and metal products prices. This may not only invalidate the cost measure, but weaken the tariff measure, for the isolation of tariff effects depends upon stripping out an accurate cost measure. However, the correlation coefficient for the tariff checks with more general examination of the case, as shown in Table IX. The first correlation test, using the protective equivalent, failed to show the sensitivity of watch imports

to total cost effects. This may have been due, however, to the submerging of the tariff in the largely irrelevant costs.

Textile machinery showed surprising sensitivity to the tariff. In the United Kingdom case, this was obtained by the omission of the correction for time trend.

Cotton cloth failed to show any sensitivity either to the tariff or other costs. This is due to the failure to acquire proper data for prices and imports of the grades of cloth involved.

Cattle hides show perverse effects of tariffs and effects for other costs that are not significant. This is explained by the subordinate role of hides in the cattle market. It is doubtful whether the tariff has any effect other than to raise slightly the domestic prices. Other commodities studied--castor beans, jute and flaxseed--did not yield meaningful results, for special reasons investigated in the preceding chapter.

Thus a fair proportion of the cases studied resulted in measures of tariff effects which were significant. A smaller proportion resulted in significant measures of the effects of other costs. While these "proportions" may not be convincing in a statistical sense, they may be regarded as indicative that measurability is possible. Of the five cases in which the effect of the tariff was not significant at the ten percent level, four involved markets in which weather, cartellized prices, lack of adequate data and extraneous market supply influences caused price reactions to be distorted or of small values. Only in the Australian wool cases did circumstances promise a significantly measurable tariff effect, which did not materialize. The partial coefficient was negative (-.23) but not significant at the ten percent level. Costs, however, proved to have a significant effect. It seems to be true that the United States tariff succeeded in exploiting Australian growers. If this resulted in significant effects on their wool prices, these may have depressed the index of domestically produced raw materials. Therefore, what was really a tariff effect may have shown up as an effect of changes in relative costs. If the Australian Pound was depressed by the effects of United States tariff, then these results were re-inforced. The conditions under which the effects of the tariff may be measurable were violated to the extent that the cost index was affected by short-run changes in the American market. That the total effects of costs and tariffs on the imports of wool were important was indicated by the coefficient -.73; significant at the one percent level.

In short, where markets react rationally to price-cost changes, or where elasticities of supply can be expected to be reasonably large, this method seems capable of measuring the effects of changes in United States duties. One should accept this conclusion with humility. While the theory of measurement of costs with composite indexes of competitive prices for products produced by an "industry" is sound, the degree to which these costs may be approached by using actual commodity-group indexes is problematical. The accuracy with which costs effects are isolated by the linear regression method with this data may be seriously questioned. It is perhaps good fortune rather than prescience which results in "good" measures where common sense would lead one to expect good measures.

A further question should be asked of the results. Is it possible to measure with linear regression, the elasticity of the supply of an import? The problem is one of joint causation in markets; changes in quantities purchased may result as well from changes in demand, as from changes in supply. Where it is not possible positively to identify the supply function, as a function distinct from demand, linear regression will not yield reliable results. Simultaneous solution of demand <u>and</u> supply functions would be necessary.

In this case, it can be argued that the supply function is distinct from a demand function pertaining to the same market in each case. The variables actually used in linear regressions are as follows:

(1) the dependent variable Y, equal to imports from the example country $\div$ domestic production, or Y', equal to imports from the example country $\div$ total imports;

(2) the independent variable X', equal to the tariff $\div$ the unit value of the import;

(3) the independent variable W, equal to changes in foreign (dollar) costs since a base year $\div$ changes in domestic costs since the same base year; and

(4) the independent variable Z, equal to an arbitrarily chosen linear time trend, used to remove any residual effect on imports not attributable to the tariff or to the costs in W.

The supply function is as follows:

Y (or Y') $= f\ (X', W, Z)$, or

$Y = \alpha X + \beta W + \gamma Z$, with α, β and γ being the simple regression coefficients. W, being a cost variable, would not appear in a demand function. A demand function for the same market would be the following:

$Y = f\ (X', Z, I)$; I being a measure of income, such as a series of gross national products for the years of the sample.[3] The functional relation would be

$Y = \zeta X + \eta Z + \theta I$. Thus each function--demand or supply--is positively identifiable, since each contains a

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[3] Since most of the samples begin before 1929, national income would be actually used, in the absence of gross national product data for the early years.

term not found in the other. The demand function has not been determined for the samples. It is the supply function which has been determined. The coefficients are reliable, however, since linear regression may be used rather than the more laborious simultaneous equation method as long as the function to be determined is one of exact identification.[4]

Some further comments on the methods employed in the preceding chapters may be based on an analysis of the logic of multiple correlation analysis by T. Koopmans, paraphrased by J. Tinbergen.

> "Unconditional conclusions can only be negative: the rejection of some theory. For positive conclusions additional information is needed. This information is subject to the principles of:
>
> "(a) statistical censorship: the additional information must not be contradictory to observation;
>
> "(b) scientific efficiency: it must not be a consequence of assumptions already made or of data already used;
>
> "(c) the solid base: it must be as plausible as possible;
>
> "(d) the sufficient base: it must be sufficient to draw the conclusions."[5]

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[4] See J. Tinbergen, Econometrics, New York, Blakiston, 1951, pp. 194-203.

[5] Ibid., p. 197; T. Koopmans, "The Logic of Econometric Business Cycle Analysis," Journal of Political Economy, April, 1941, p. 157.

Positive conclusions have not been accepted without some justifications based upon further information contained in the cases. In general, it can be said that the information, used to supplement statistical tests in each case, satisfied the above requirements. It was information based upon various observations of the markets studied, and thus satisfied (a) above. It was independent of the assumptions made in constructing the variables and their functional relations (b). It was plausible; being based either on independent observation, or upon economic reasoning concerning the markets (c). If it was used to base a positive conclusion on a significant coefficient, it provided sufficient basis for such positive conclusion (d).

Further hypotheses cited by Tinbergen are satisfied by the methods used above. These are that the influences <u>not</u> included in the functional relation are:

(i) accidental or small,

(ii) included in the trend term or

(iii) present only in individual years which are excluded from the analysis.[6]

Assumptions (i) and (ii) had to be made in order to rely upon the functional relations expressed. (iii) was satisfied by omitting war years in all cases in which the war disrupted trade in a clearly significant way.

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[6] <u>Ibid</u>., p. 197.

The last group of comments concerning the results of this study simply relate these results to other attempts which have been made to measure the sensitivities of imports to price or cost influences.

The study by Adler, Schlesinger and Van Westerborg also uses multiple regression. Their calculations, however, were designed to discover the elasticity of American demand for imports. Their variables were:

M = index of quantity of imports

Y = index of United States real gross national product

P = index of import prices for one economic class or sub-class, and one region, divided by an index of prices of the same economic class of imports from other regions.[7]

Y', P' and P'' were used alternatively. Y' was an unadjusted index of industrial production for the United States. P' and P'' were indexes of import prices adjusted by duty payments in two different ways. Their functional equation, stated in a way analagous to the ones in this study, would be as follows:

$M = \lambda + \beta Y + \gamma P$ (or Y' + P' or P'').

The results were expressed as "gross correlation coefficients," net (partial) coefficients, a measure of

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[7] John H. Adler, Eugene R. Schlesinger and Evelyn Van Westerborg, The Pattern of United States Import Trade since 1923, New York, Federal Reserve Bank of New York, 1952, p. 69.

multicollinearity, and income (or industrial production) and price elasticities (or competitive price factors).[8] The imports are of economic classes from regions, rather than of commodities from countries. The income and price elasticities of demand are not exact, as the authors point out.[9] Shifts in supply functions have not been accounted for, so that they may be "historical" trends rather than true demand functions. Corresponding shifts in demand functions would destroy the reliability of the coefficients in our own study, since they are theoretically conceived as parts of supply functions. The linear time trends were used to remove these demand shifts; but they can do so only imperfectly.

The Adler-Schlesinger-Van Westerborg study found relatively high values for price elasticities of demand for some products from some areas; e.g., crude and semi-manufactured materials from E.R.P. countries, crude food-stuffs from E.R.P. countries, Europe and Latin America, and finished manufactures from E.R.P. countries. Combined with the significant reactions of the supplies of some individual commodities in these groups, which were found in our study, these elasticities of demand would indicate important effects of United States tariffs. The Adler-Schlesinger-

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8 Ibid., pp. 71-78.

9 Ibid., p. 41.

Van Westerborg method (or ours) could be adapted to the study of the demands for individual commodities, thus greatly increasing our knowledge of the effects of tariffs in these markets.

The estimates of the elasticities of the demands for and the supplies of imports which have been made in the past have used commodity groups. These estimates have generally been low enough to discourage us from expecting much from decreases in tariff rates. Orcutt points out two types of limitations to these estimates. The first is the use of historic data, which includes shifts of both demand and supply functions, to arrive at elasticities.[10] Our study has, first, tried to eliminate the effects of shifts, and secondly, recognizing the imperfections of this, has deliberately refrained from presenting values for elasticities of supply *per se*. The correlation coefficients, in Tables 10 - 1 and 10 - 2 are to be taken for what they are--the results of combinations of time series. Orcutt's second objection is that composites of imports and exports give false(low) values of elasticities, because inelastic commodities show large price changes, thus distorting the composite measures.[11] Our study, of course

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[10] Guy H. Orcutt, "Measurement of Price Elasticities in International Trade," *The Review of Economics and Statistics*, May, 1950, p. 117.

[11] *Ibid*., p. 125.

avoids this difficulty.

Mr. A. J. Brown evaluates a number of attempts at measurement of elasticities of the demands for and the supplies of internationally traded goods. He cites measurements of elasticities of substitution between a product from one country and the same product from another country by Mr. Kubinski; 280 commodity examples in all. Of these, 256 showed negative correlations; 133 of which were significant at the five percent level.[12] Clear evidence of time lags in price effects was found by Mr. Kubinski--a factor discovered in some of our industrial examples. Mr. Brown concludes, in part:

> "1. Wherever measurements have been made for goods of the same narrow classes entering a single market, results have been obtained which, while they vary greatly, are, on the average, quite high--certainly well above unity [elasticity of substitution]. The number of measurements of this kind is such as to give a reasonable basis for generalization."[13]

We feel confident at this point in relying upon the favorable results of our tests in a large proportion of the cases attempted. The general conclusion must be that it is possible in many cases to measure the effects of tariff changes more closely than they have been estimated before.

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12 A. J. Brown, "The Fundamental Elasticities in International Trade," T. Wilson and P. W. S. Andrews, eds., Oxford Studies in the Price Mechanism, Oxford, Clarendon, 1951, pp. 91-93.

13 Ibid., p. 99.

The method employed in this study, mobilizing as it does all of the relevant data, will at least separate for the researcher those cases in which measurement is worthwhile from those in which it is not. Even in the cases where measurement is not worthwhile by standard means, much can be learned, as we discovered in Chapter IX.

The final conclusion must be that the great amount of labor involved has been justified by advancing us one small step further in the understanding of the effects of tariffs on the imports of the United States.

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