



THE STRUCTURE OF PROTECTION IN BRAZIL

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In this chapter we analyse the structure of import tariffs and other protective measures in Brazil. We do this for the system both before and after the tariff reform of March 1967. Our "before" picture refers precisely to June 1966; that structure (but not that level) of protection can be taken as typical of the entire 1957-1966 period, and very roughly (e.g., the rank ordering of the sectors by level of protection) typical of the 1947-1957 period as well. The "after" refers precisely to April 1967.

I. Brazil's Economic Growth and the Pattern of International Trade²

Brazil is a large country, rich in natural resources and not overpopulated. In area it is larger than the continental United States. Its population is over 80 million. Arable land is abundant; much good land lies fallow and much more is used in ways which result in very low productivity per acre.

Most commonly-used metallic ores are plentiful and economically exploitable; Brazil is especially well-endowed with iron and manganese ores. The exceptions are copper and tin; recently-discovered copper deposits may change this. Some petroleum has been found, but at present about two-thirds of consumption must be imported. Only a little coal is present, and it is of poor quality, i.e., not economically suited for coking for the steel industry. Potential hydroelectric resources are

plentiful.

Per-capita income is about \$300, with a significant difference between the two major centers of population. The Northeast, with about 30 percent of the people, has very little industry, a backward social and economic structure, and a per-capita income of about \$100. The Center-South, with most of the rest of the population, enjoys an income of almost \$400 per capita. The Center-South has virtually all of Brazilian industry, and its agriculture is much more efficient (both per worker and per acre) than that of the Northeast. The industry centered around São Paulo, Belo Horizonte, and Rio de Janeiro is as significant, modern, and diversified as any in the less-developed world.

Industry and agriculture each account for between one-fourth and one-third of GNP. Agriculture has been growing at 4.5 percent annually since the Second World War. Industry grew at almost 10 percent annually from 1948 through 1962; since then various problems have resulted in near-stagnation. Imports plus exports fell from about 30 percent of GNP in the immediate postwar years to less than 20 percent in 1962-64.

Coffee is, of course, very important in Brazil. It accounts for about half of export receipts, which is equivalent to over 3 percent of GNP. Brazil supplies over 40 percent of world coffee consumption. Other important exports are raw cotton, cocoa, sugar, lumber (mostly pine), tobacco, iron ore, manganese ore, rice, and corn. The most important imports are crude oil, wheat, aluminum, copper, tin ore, various chemicals, and various capital goods. The structure of trade before the recent stagnation is shown in Table 1.

Import substitution has been a crucial aspect of Brazilian industrialization, both as to impetus, and as to structure and "logic." While there

were (and still are) more imbalances in Brazilian growth than even a Hirschman could admire, the "big push" characteristics of the industrialization are striking. The import substitution was both wide and deep: virtually all final goods are now produced in Brazil, and most processed inputs and components are too. With the exceptions of some chemicals and some capital goods, virtually every industrial product in Brazil is almost 100 percent domestically made. Industrial growth was so rapid and diversified that the absolute value of imports of processed goods was held roughly constant in the face of rapid growth in income. The postwar Brazilian data do not show the pattern of rising imports of semi-processed products and components which is typical of countries in the early stages of industrialization.

The two tables which follow show some details of this process. Table 2 shows sectoral breakdowns of industrial growth since 1939, illustrating the diverse and broad nature of that growth. Table 3 shows the evolution of import substitution of industrial products.³ We can see from Table 3 that the chronological sequence of Brazil's industrialization was typical. Imports of consumer non-durables had already been almost completely substituted before the postwar period. Consumer durables came next, mostly during the war and through the 1950's. Intermediate producer goods was next, and still shows some significant imports, while capital goods is the last major category to be produced domestically. (Imports of capital goods in 1964 were abnormally depressed. Investment was abnormally low, and imports of capital goods declined more than proportionally. The normal level of capital goods imports in the mid-1960's is roughly 30 percent of total supply.) The overall import coefficient of less than

10 percent of total supply (of industrial products) is remarkable for a country of Brazil's income level.

II. The System of Protection

Significant changes in commercial policy have been frequent in post World War II Brazil. At the end of the war Brazil had large foreign exchange reserves. The same exchange rate of Cr\$ 18.50 per dollar that had been in force throughout the war remained unchanged until 1953, while prices rose 285 percent from 1945 to 1953.⁴ Even in 1945 this rate had overvalued the cruzeiro -- in terms of dollars it was approximately the same as in 1937, while prices in Brazil had risen about 80 percent more than in the U.S.⁵ When a little over one year of unrestricted imports wiped out Brazil's foreign exchange reserves, controls on imports were chosen as the principal means of balancing the balance of payments.

Import Policy

From 1947 to 1953, a licensing system was used to control both the level and the structure of Brazil's imports. Foreign exchange was allocated according to a five-category system of priorities:⁶

1. "Super-essential": agricultural equipment, fuels, oils, lubricants, metals not domestically available, and needs of government agencies.
2. "Essential": other raw materials, machinery, spare parts, producer goods in general, some pharmaceuticals.
3. Transfers of capital and earnings of foreign capital.
4. Other goods.

5. Travel, etc.

Of the total amount of foreign exchange allocated to imports of goods (i.e., priority categories 1, 2, and 4), around 17 to 19 percent went to the "super-essential" category and about 65 to 70 percent to the "essential."⁷ Very little was left for finished consumer goods.

The imposition of the licensing system in 1947 was principally a response to a foreign exchange crisis. Around 1949, however, policy started to move toward more deliberate protectionism, with the gradual revival of the prohibition of imports of products for which domestic substitutes existed. This was under the authority of the "Law of Similars," which had been on the books in one form or another since 1911. The Dutra government (1945-50) was economically too orthodox to use this and other means of inducing structural change very aggressively. Deliberate industrialization did not take place until the more pragmatic Vargas (1951-54) and then the enthusiastic Kubitschek (1956-60) governments first tolerated and then embraced the "growthmanship" (desenvolvimentismo) philosophy.

In October 1953 Brazil's import policies were significantly changed.⁸ Control by licensing was replaced by a five-category exchange auction system. The monetary authority (SUMOC) allocated available foreign exchange among each category, and the effective import rates were set in weekly or bi-weekly auctions. Minimum premia were also set for each auction.

Some commodities were not subject to the auction system. These included imports for governmental agencies, wheat, newsprint and other paper for printing, and petroleum products. These products were imported at the average export rate for all products, plus specific taxes in some cases. Petroleum products were subject also to licensing. These goods accounted for about one-third of the total value of imports. All other imports of

goods were classified among the five categories, as follows:

1. Inputs to agriculture, certain pharmaceuticals and inputs to the pharmaceutical industry, and some other "essential" commodities.
2. "Essential" raw materials (i.e., those for favored industries).
3. Other raw materials and "essential" spare parts and equipment. (again, those for favored industries).
4. Other spare parts and equipment, and fresh fruits.
5. All other commodities (i.e., most finished consumer goods).

According to Kafka, the first three categories generally absorbed at least 80 percent of the total foreign exchange available for auctions, and the fifth category absorbed a maximum of three percent.⁹ Disaggregated import data for 1954-57 show finished consumer goods to be about 14 percent of all auction imports, with the rest divided equally between capital and intermediate producer goods. This suggests that the fifth category was not rationed quite so strictly as Kafka suggests. The distribution of commodities among classes was not changed significantly during the period the system was in effect, which was October 1953 to August 1957, although new domestic availability of some goods did result in imports of those goods no longer being considered "essential," and thus shifted to the next-higher category.

The average cost of actual imports under the auction system is shown in Table 4. The structure of protection did not change much during the period. Indeed, the gross structure of the price effects were probably quite similar during the entire period 1947-57, covering the licensing as well as the auction system.

In August 1957 the system controlling imports was reformed once again by introducing a comprehensive set of ad valorem tariffs and reducing the

number of categories to two. A few goods (fertilizers, newsprint, wheat, petroleum, and petroleum products) again formed a kind of separate category, for which a lower exchange rate, generally equal to the average rate for all exports, was used. This system remained in effect with only gradual changes up to March 1967, when the tariff schedule was revised downward and the multiple rates eliminated. In addition to the categories, multiple rates, and the ad valorem tariffs, certain restrictions and exemptions were used to reduce or to facilitate certain imports. Across-the-board surcharges, advance deposits, and similar devices were also used from time to time, principally during 1961-65, to raise revenue and to change the effective exchange rate for imports.¹⁰

During 1957-67, most important raw materials and other producer goods were placed in the "general" category. The exchange rate in this category was set in auctions until March 1961, when the auctions were discontinued and a free market allowed to function. Most other goods, considered "inessential," were placed in the "special" category. These goods were mostly consumer goods, and most producer goods which were domestically available. The exchange rate in the special category was controlled by auctions, in which the rate generally varied between two and three times the general category rate. Total value of "special" category imports was very small.

To oversimplify quite a bit, to import goods in the general category one had to pay tariffs generally up to about 80 percent, while for goods in the special category one had to buy exchange at a premium of 100 to 200 percent, and also to pay tariffs ranging up to 150 percent. Special category imports also required a license, discussed below.

The various exemptions and restrictions form a complex set of

modifications to the tariffs. Enforcement is very flexible, varying through time as well as among products, and a precise description is somewhat difficult; we will try to summarize here the major characteristics. The exemptions are principally of two types. One type is of the following form: Upon proof of purchase of a given quantity of domestic production, a proportional quantity may be imported at a very low tariff rate. The proportion is set so as to protect the full capacity of a domestic industry which does not produce enough to satisfy the entire domestic demand. This type of exemption usually also functions as a quantitative restriction; if the domestic product is not purchased, it is difficult to import, even paying the higher tariff. The major function of the higher tariff is that it establishes a ceiling on the price of the domestic substitute, which generally must be sold at or below the import price plus the higher tariff if the protection is to be furnished. Thus for these products the consumer pays a weighted average of the import price plus the lower tariff, and the domestic price. This type of control was important for coal, lead, aluminum, and asbestos.

The second type of exemption is for important inputs (mostly capital equipment) for high-priority industries. This exemption depends not only on the type of good, but also on the identity of the user. The nature of the exemption also varies, at times being limited to exemption from the tariff, and at times including a lower exchange rate, or even dispensation from the obligation to buy exchange in the case of foreign-financed imports. This exemption was widely used, and for capital goods the ratio of tariff collections to value of imports seldom exceeded 10 percent, even though the average official tariff, weighted by imports, was about 50 percent.¹¹

Note that the rate of actual collections is not an accurate measure of

the protection, or lack of it, because many consumers were not eligible for these exemptions and were buying the domestic products.

The restrictions are just as complicated as the exemptions. We have already mentioned one type of restriction: that which functioned jointly with the exemptions on coal, lead, aluminum, and asbestos. Other types are the Law of Similar, and monopoly or government price setting combined with quantitative restrictions.

The Law of Similar has been an important instrument for quantitative restrictions on imports since the mid 1950's. The basic idea is that some or all importers are prohibited from importing a product which is recognized by the government as being available domestically. The practice was formally instituted as far back as 1911; the scope of application among importers, the criteria for government recognition of domestic availability, and the strictness of enforcement have varied considerably since. The Law was enforced as follows: To register a product as a similar, the manufacturer applied to the Conselho de Política Aduaneira (CPA). This body is composed of representatives of manufacturers, importers, and the government. If the CPA was satisfied that the domestic supplier(s) could furnish the product in sufficient quantity and quality (in 1967 price and time for delivery were added as elements of the criteria), the product was registered as a similar. Goods for which there is a registered similar cannot be imported by most public corporations, mixed (partly owned by the government) companies, public authorities, or by any importer who received any special treatment such as exemption from required advance deposits, government financing for investment, etc. Also, a good in the special category required a license which could be obtained only with great difficulty by any importer if a domestic similar existed.

(The special category was abolished in March 1967.) Private importers could import general category goods even if a national similar existed, but in that case would not be granted any exemptions, government loans or other special treatment to which they might be entitled in the absence of the Law of Similar.

Public corporations and authorities, and private importers who received special favorable treatment, had to have a license to import. A license was also necessary for anyone to import goods in the special category. This license was granted by the foreign trade department (CACEX) of the Bank of Brazil. CACEX tended to be more protectionist than the CPA, and sometimes refused to grant licenses even if there was no "similar" registered with the CPA. In cases where goods were not standardized (especially capital goods), the CPA's register tended to omit many goods for which domestic similars had recently come into existence. CACEX used an informal procedure and was more restrictive on licensing; a private importer who did not receive a license from CACEX could, however, forego any special privilege and import without a license if the good was in the general category. (Most goods for which registered similars exist were placed in the special category.) In October 1967, CACEX was given complete authority as to enforcing the Law of Similar, and will use its informal and broader concepts of determining if a similar exists.

Exceptions to all these general rules were and are made, sometimes towards liberalizing and sometimes towards tightening the provisions.

There are several products for which the government grants an import monopoly, or sets quantitative restrictions and price controls. The most important instances are salt, soda ash, steel, and rubber. These arrangements are usually made to protect extremely high-cost domestic

production (salt, soda ash because salt is an important input, and rubber), but in the case of steel have resulted in domestic prices not too much higher (at times, not at all higher) than in exporting countries.

Export Policy

The 1945-53 period was characterized by maintenance of a more and more overvalued currency, as mentioned above. (This is shown in Table 5, below.) Both the quantum and the value of exports declined steadily from 1946 until the Korean War. Starting in 1949, exporters of certain products which were being priced out of the market were allowed to sell foreign exchange directly to importers of non-essential goods. This effective devaluation was at first severely limited as to scope among export products, but became more important just before and just after the Korean War boom.

In 1953, different rates were established for the export of different types of products. Bonuses were also used from time to time, and the system was quite complicated and quite variable. The average rate rose about as fast as the domestic price level, but for individual products the real rate and the administrative set-up changed frequently. This period lasted through 1959. Both the quantum and the value of exports were more or less stagnant during this period.

During 1959 the rate for more and more products was freed; by the end of the year proceeds from all exports except coffee, cocoa, mineral oil and castor oil beans could be sold on the free market.

The continuous rise in domestic prices and only occasional readjustments in the export rate caused wide variations and uncertainty as to the real export exchange rate. The average (of absolute values) monthly

variation in the real rate was over 3.8 percent. Periods of three to six months in which the real rate dropped 10 or 15 percent were not uncommon. Moreover, during the 1953-1959 period the real rate for individual products fluctuated even more, and was more uncertain, than the average real rate. We cannot quantify the effect this had on discouraging exports. It may not have been too serious with regard to primary commodities, which made up (with coffee) about 90 percent of the total value of exports. Judging from conversations we have had, it may have been a significant discouragement to a number of industrial firms.

The details of the administrative regime were also far from optimal from an export-promotion view. Throughout the entire postwar period licenses were necessary, and the various bonuses, freedom to sell part of foreign exchange receipts from exports of certain products on the free market, and other schemes used to compensate for the overvalued cruzeiro complicated matters considerably. Licenses were refused in various instances, the most important being when the government wanted to keep domestic food prices down, and therefore prohibited the export of certain food products. Licenses to export manufactured products were rarely refused (and rarely requested!), although the exporter was required to prove that at least 70 percent of the value of the product could be attributed to domestic inputs.

Drawbacks (i.e., some sort of scheme to exempt exporters from paying import tariffs) were not generally available until 1967. It now appears that this privilege will be available, although it is too early to be sure just how difficult it will be to take advantage of.

The stagnation in non-coffee exports during the entire period, and the fall in the value of manufactured exports, mark Brazil as one of the

poorest performers among the less-developed countries on export promotion. The combination of an undervalued exchange rate (see Table 5 and discussion below), uncertainty as to the future value of the real rate, and occasional quantitative restrictions on exports of food products have certainly had their effect.¹²

The average import and export exchange rates are shown in Table 5. The export rate does not include coffee -- coffee policy will not be analysed in this paper. We do not show an import rate for 1947 through 1953; we do not have an estimate of the price effect of the licensing system then in force. The rates include bonuses, taxes, tariffs, exchange premia, port charges, and adjustments for advance deposits.

III. Nominal and Effective Rates of Protection, 1966 and 1967

Introductory Remarks

Before presenting our detailed results for 1966 and 1967, some words of caution are in order. We have done our best to take into account the restrictions and exemptions mentioned earlier -- details are in the following paragraphs and in the Appendix. Problems of redundancy remain -- these are discussed below. The valuation of the cruzeiro must also be taken into account -- this is done in Section V. Even with all the care we have taken, the numerical results presented throughout this chapter should be taken as showing only the general structure and approximate level of protection. For example, in this section we discuss what should be called "potential" protection -- the maximum actually available. When we say that the potential protection of a sector is, say, 47 percent, this means

that 47 percent is our best estimate, but that a variation of, say, ± 10 percent of our estimate is not unlikely -- the true figure might well be 42 percent, or 52 percent, or something in between. This lack of precision is due not only to possible errors or omissions in measurement, such as transport costs, non-monetary costs of obtaining exemptions, use of an input-output table for 1959, and others, but also to conceptual problems such as how to average the many individual product tariffs within a sector. We believe that our results give a picture of the structure and level of protection which is accurate enough for a general evaluation such as the one we present in the final section of this chapter. We do not claim greater precision than this.

Throughout this chapter, numerical estimates of "tariffs" include exchange auction premia, port charges, adjustments for advance deposits, restrictions, exemptions, and (subtracted) taxes levied on domestic production but not on imports. Details of all these adjustments are explained in the Appendix.

We believe that our estimates are reasonably close to the maximum protection which the actual system, as legally constituted and as actually administered, allows. The problem of redundancy remains -- domestic prices may not be as high as permitted by the system. In the present case, this problem might be serious where tariffs are high and products not standardized -- consumer goods. Since there is generally very little trade in consumer goods, we have even more reason to suspect redundancy.

In a continuous, rapid inflation, with only occasional adjustments in the exchange rate, the precise meaning of redundancy is not clear. If a tariff is such that the domestic price equals the world price just before a devaluation -- and therefore there is redundancy at all other parts of

the inflation-devaluation cycle -- is there zero redundancy? Should we measure redundancy as some sort of average, perhaps at the mid-point between devaluations? This would imply that "zero redundancy" would permit imports half of the time. Added to the problem of definition are the problems of measurement. The commodities are not standardized; prices vary among parts of Brazil and among exporting countries.

The question of redundancy is a real one, and an interesting one, even if definition is ambiguous and measurement difficult. We have not been able to make valid price comparisons for enough consumer goods to satisfy ourselves sufficiently to present numerical estimates for the relevant sectors. We do, however, have enough information to draw some general conclusions.

As we showed in Table 5, real import rates fell sharply in 1966 and 1967. Imports of consumer goods have risen sharply: in 1967 automobiles were being imported at the rate of roughly 1000 per month; imports in 1961-65 averaged 340 per year. The dollar value of imports of manufactured consumer non-durables grew 23 percent in 1966 and 44 percent in 1967, and appears to be growing rapidly in early 1968.¹³ Clark concludes that "about a third of the large import increase in 1966 was attributable to import liberalization, the remainder being due to the sharp recovery of gross investment."¹⁴ These rising imports, together with some crude price comparisons at the retail level made in February 1968, lead us to believe that there was very little, if any, redundancy before the devaluation at the end of 1967 -- the time of minimum redundancy in recent years. In fact, many consumer goods were being imported at that time.

Redundancy is in general more of a problem in calculating effective protection; "tariffs" on inputs should certainly be non-redundant. In

the present case, we believe this problem to be unimportant. We have used direct price comparisons for many of the most important standardized inputs, and we doubt that there is much redundancy left in the generally low tariffs on producer goods. This same kind of problem does exist, however, as an aggregation problem: many producer goods are in the same sectors as consumer goods, and for some sectors the average tariff for the sector overstates the tariff on those products of the sector used as inputs to manufacturing.

Numerical Results

Having discussed so many qualifications, we present in Table 6 our estimates of nominal (product) and effective (value added) protection, with the tariffs and other aspects of the system as of June 1966 and April 1967. These should be thought of as "potential" protection. The effective rates apply to gross value added -- we have no data on depreciation. Results are presented for both the "Balassa" method (non-tradable inputs treated as tradable with zero tariff¹⁵) and the "Corden" method (value-added part of non-tradable inputs treated as value added by the using sector, and tradable part treated as tradable inputs with the relevant tariffs).

In Table 7 we show the rank ordering of sectors, by various measures of protection. The correlation of nominal and effective protection is extremely high; the Spearman rank-order correlation coefficient is .945 (significant at the .005 level) for 1966. The ranking was virtually unaffected by the tariff reform of March 1967.

The inter-industrial structure of protection, as shown in Table 6, has several interesting aspects. Considering nominal (product) tariffs first, we find the average protection available to the manufacturing sector to be

99 percent in 1966, cut roughly in half to 48 percent in 1967. Producer goods enjoy less protection than consumer goods, although there are some exceptions such as food products and pharmaceuticals. Unfortunately, the Brazilian industrial classification (on the level of the only input-output table available) does not distinguish clearly between components, semi-finished goods, finished producer goods, and finished consumer goods. We have calculated average nominal protection for sub-sectors, and re-aggregated these to type of good by use. The results are shown in Table 8. Here the cascading is clear: of the uses shown, protection before the 1967 reform was lowest on capital goods. Next came intermediate goods (this class is closer to primary products than "parts and components"), then construction materials, then parts and components, and finally finished consumer goods. Intermediate goods dropped slightly below capital goods in 1967, but the general structure is similar. As can be seen in Table 6, unprocessed raw materials receive the lowest protection. (Remember that there is probably some redundancy, especially for consumer goods in 1966.)

The ranking of the sectors by effective protection is almost identical to the ranking by nominal (product) protection, but the range and levels of effective protection are greater. The cascading of the nominal tariffs causes effective protection to be lower than nominal protection for some producer goods -- those that have very low tariffs but buy inputs which have higher tariffs -- and higher than nominal protection for consumer goods. Thus, the range of effective protection is from 8 to 173 percent in 1967, and was from 25 to 447 percent in 1966.¹⁶ As shown in Table 9, the dispersion of effective protection, as measured by the ratio of the standard deviation to the mean, is considerably greater than the dispersion of nominal protection.

The tariff reform of 1967 reduced the range and levels of available protection to a considerable degree. Dispersion was not significantly affected. The average for all secondary production was reduced from 151 to 73 percent. A rough breakdown of the ranges is shown in Table 10. The range and variation of protection, while reduced, remains very high. Brazil is still granting seven sectors more than 100 percent effective protection.

Aggregation to twenty-four sectors hides a lot of variation. The Brazilian approach to tariff setting starts from an attempt to determine the desired tariff for each of the thousands of individual items in the tariff code. This results in a lot of intra-sectoral variation. Moreover, many sectors include some items which are not yet produced domestically and receive little protection, and others which are produced domestically and receive high protection. This occurs in producer goods sectors such as chemicals and metallurgy, and in the machinery and equipment sectors which include both consumer and producer goods. Thus the impression one receives of the range and variation in protection from Tables 6 and 14 is an underestimate.

IV. Effective Protection Calculated Using the Standard Input-Output Table

In Table 11 we present the results of applying Brazilian tariffs to a "standard" input-output table. In columns 2, 3, 7, and 8 of the table depreciation is treated as a tradable input, with the tariff relevant to capital goods, and value added is net of depreciation. In columns 4, 5, 9, and 10 depreciation is treated as part of value added.

V. Overvaluation and Effective Protection

All of the analysis so far presented is based on protection relative to Brazil's "basic" import exchange rate. That is, it shows what protection is, relative to what it would be if all commodities could be imported at that "basic" rate. This rate, however, is completely arbitrary, and so are the tariffs. What does count is the combination of the rate and the tariff: the rate could be raised or lowered, tariffs could be lowered or raised to compensate, and the cruzeiro cost of \$1.00 worth of imports would not change.

To put the point in a different way, consider removal of all tariffs. This is the situation to which we are comparing the actual one in the analysis in Sections III and IV above. Imports would rise, exports would be unchanged, and the current account balance of payments deficit would increase. Something else would presumably have to happen: devaluation, loss of reserves, or increased capital inflow.

It is therefore interesting to analyse the structure of protection relative to the (devalued) exchange rate which would compensate for the removal of all tariffs in the effect on the balance of payments. That is, to compare a situation with tariffs and one without tariffs, it is more interesting to change the exchange rate so as to hold the balance of payments constant, rather than to hold the (arbitrary) exchange rate constant and thus imply changes in the balance of payments.

We are going to assume that actual policy as regards coffee remains unchanged. We will call our new rate the "pseudo-free-trade" rate, indicating that it is the rate which would compensate for the removal of all tariffs, export taxes, and subsidies except those on coffee. To estimate this rate we must estimate the response of exports and imports

to changes in price. The usual way to do this is through estimates of the price elasticities of supply and demand for imports and exports. This is a complex problem, both conceptually and empirically. The "elasticity of demand for imports," for example, may well depend on the magnitude, direction, and duration of the price change. It will certainly depend on how the structure and level of domestic industrial production and income react. If no other policy changes are made, reducing the price of imports would probably have decreased import substitution (i.e., shifted the demand for imports to the right) and also decreased domestic income and demand for industrial inputs (i.e., shifted the demand for imports to the left). Is it more appropriate for our purposes to assume that no compensating policy changes would have been made, or to note Brazil's drive for development and assume that lowering the price of imports would have been done only in conjunction with compensating industrial subsidies?

We could discuss these problems for several pages. The point is that we cannot attain precision in estimating the pseudo-free-trade rate. We know it lies somewhere between the actual export rate and the actual import rate including tariffs; all we can do is use our best judgement of responses to price and other changes, and achieve estimates of the structure of protection relative to the pseudo-free-trade rate, which are much closer than those presented in Table 6.

We will assume that the elasticity of supply of imports is infinite. We have two estimates of the elasticity of demand for imports: these are approximately -0.4 and -0.6.¹⁷ Both these estimates are "partial" in the sense that they do not include effects of price changes on import substitution or domestic income. We believe this to be more appropriate than a "total" estimate, and will use -0.5 in our calculations. The

reader is warned that a ceterus paribus assumption as to policy, rather than as to domestic income and production, would imply a higher price elasticity, a higher pseudo-free-trade rate, and a lower level of protection relative to that rate than the results we will get.

We are, if anything, even more uncertain regarding exports. None of Brazil's non-coffee exports account for more than 10 percent of either total Brazil non-coffee exports or total world exports of the commodity involved.¹⁸

For these exports, the elasticity of demand is thus on the order of 20 times the total world demand elasticity. If the latter is, say, about one-third, the Brazilian elasticity would be about 7. In the event of an actual devaluation, minor exports would probably expand much more, because of the large number of products which are an even smaller percentage of world trade. We will estimate the demand elasticity as at least 7; actually anything up to infinity implies very similar results, as we will show below.

We have estimates of the domestic elasticity of supply of a few export products, as around 0.8 to 1.3.¹⁹ The elasticity of them all taken together would probably be less. The share of exports in total production of these commodities varies widely; an average would be 0.5 or less. A reasonable estimate of the supply elasticity for exports would be, then, around 1 or 2.

If we define the actual rate as the average rate (including subsidies) for non-coffee exports, then subsidies and export taxes are zero. With assumptions of infinite elasticities of demand for exports and supply of imports, the percentage devaluation needed to compensate for a removal of tariffs is given by:²⁰

$$\frac{r' - r}{r} = \frac{t \left(\frac{M}{X} \right) \left(\frac{e_M}{e_X} \right)}{\left(\frac{M}{X} \right) \left(\frac{e_M}{e_X} \right) - (1+t)} \quad (1)$$

where: r' = "pseudo-free-trade" exchange rate

r = actual export rate (both in cruzeiros per dollar)

t = tariffs

M = value of imports

X = value of exports

e_M = elasticity of demand for imports

e_X = elasticity of supply of exports

If we drop the assumption of infinite elasticity of demand for exports, we get a formula which looks just like (1) except that the definition of e_X is now:

$$e_X' = \frac{e_{SX}(e_{DX}+1)}{e_{DX}-e_{SX}} \quad (2)$$

where e_{SX} , e_{DX} = elasticities of supply of exports and demand for imports.

Since we are not considering exports of coffee, $M=2X$. (The ratio actually varied between 1.3 and 2.9 during 1954-67. For the period as a whole, the total value of imports was about one percent more than the total value of exports, and the share of coffee in total exports was about 48 percent. Using the value 2 implies that our pseudo-free-trade rate would have left the balance of payments unchanged over the period as a whole, but not in each year.) Before we select the set of assumptions to calculate the pseudo-free-trade rate for each year, we will explore the effect of variation in the assumptions for the single year 1967. This is shown in Table 12.

It seems to us that the first three sets of assumptions, or perhaps just the first and third, cover the reasonable range. These give results quite close to each other. For the reader who believes that a "total" elasticity of demand for imports should have been used, we arbitrarily set that parameter at -2 for estimates 4 and 5. This does make quite a difference. We also show estimates for the actual value of $\frac{M}{X}$ in 1967, a year when the ratio of total imports to total exports was abnormally low. Estimate number 3 seems quite reasonable, and offers the added advantage of easy arithmetic. We will therefore use the third set of parameter estimates for each year during 1954-67.

It is worth noting that the data are consistent with the assumptions of unitary supply and infinite demand elasticities for non-coffee exports. The former assumption could be contradicted by a regression of the quantum on the (real) domestic price. Such a regression gives an estimated elasticity of 0.98. The latter assumption could be contradicted by a regression of the quantum on the foreign price. Such a regression does not show a significant relationship; this is consistent with an unshifting, infinitely elastic demand curve. The absence of a relation between the quantum and the world price can also be seen in a regression of the quantum on the (real) exchange rate. This regression gives the same elasticity (1.03) with respect to the exchange rate as the first equation's estimate with respect to the exchange rate times the foreign price.²² We do not pretend that these results give reliable estimates of either of the elasticities. They do show that the quantity and the price of non-coffee exports did behave almost exactly as they would have if our set of assumptions had been true.

In Table 13 we show the resultant estimates of the pseudo-free-trade rate, as well as protection and export taxes relative to that rate. In the same table we show index numbers of the real value of that rate, and the real cruzeiro value of one dollar of exports or imports. These last data are not only interesting in themselves, but the real value of the pseudo-free-trade rate allows us to see if the estimate seems reasonable. The depreciation of the real rate until the early 1960's, and its subsequent appreciation, does seem reasonable; the Brazilian economy was growing very rapidly through 1962 (the year when the rate attained its maximum) and did not grow thereafter. One would expect the real free-trade rate to rise in response to rapid growth in industry and in per capita income such as Brazil experienced up to 1962. The amount of growth in the rate is perhaps a bit high, although the amount of the subsequent decline does not seem unreasonable.

In the period 1954-64, tariffs averaged 86 percent, and export taxes 31 percent. After 1964 both tariffs and export taxes declined, reaching the relatively low levels of 20 and 13 percent, respectively, after the devaluation and tariff reform of March 1967.²³

We have also calculated the structure of protection relative to the pseudo-free-trade rate, before and after the reform, of March 1967. These results are shown in Table 14. Because of the lack of precision in our estimate of the pseudo-free-trade exchange rate, the numbers in Table 14 are less precise than those in Table 6. However, those in Table 14 are estimates of a concept which is more useful analytically. Comparison of the two sets of estimates shows that "trying to protect everything results in protecting nothing" -- compared to a free trade situation with devaluation, protection is considerably less than compared to the "basic"

import exchange rate. Before the 1967 tariff reform, average available nominal protection was 47 percent for all sectors, and 58 percent for industry. Effective protection averaged 72 percent for all sectors, and 98 percent to industry. After the reform, average nominal protection was 20 percent, with the average for industry 30 percent; effective protection for all primary and secondary sectors averaged 31 percent, and for industry 52 percent. A rough breakdown of levels is shown in Table 15, which should be compared to Table 10.

Looking at present nominal tariffs in greater detail, we see that no sector receives as much as 100 percent protection, on the average. Indeed, since the highest nominal tariff relative to the "basic" exchange rate is 100 percent, the highest relative to the pseudo-free-trade rate is 75 percent. Only six sectors have nominal tariffs of 50 percent or more.

VI. Evaluation

Biascs²⁴

The average bias to import substitution in industry, compared to importing, was about 52 percent as of 1967. It was greatest for consumer goods (roughly fifty to one hundred percent), less for intermediate goods (roughly 10 to 60 percent) and least for capital goods (ranging from negative values up to perhaps 40 percent). There was a great deal of variation, both among sectors and within given sectors. In earlier years this bias was considerably greater.

The bias to production for domestic consumption, compared to export, was even greater. On the average, non-coffee export products

bore a tax of roughly 13 percent in 1967. During 1954-64 this tax averaged 31 percent. To get a rough idea of the effect of this on value added in agriculture, we assume that commercial policy was neutral as to inputs. Since value added is about 84 percent of value of product at free trade prices, the implied tax on value added for export was roughly 37 percent during 1954-64, and is still roughly 15 percent (i.e., value added for export was 37 percent, and is now 15 percent less than value added for domestic production). This is for exports of primary products.

For exports of manufactures, the bias is even greater. Even assuming full drawbacks, the margin available for value added for one of the twenty-one manufacturing sectors when producing for export would have been negative. The bias (on an "effective" basis)²⁵ was over 50 percent for all but three manufacturing sectors and over 100 percent for all but nine of the twenty-one. This bias also was even larger in earlier years, as the spread between import and export exchange rates was greater. One does not have to go further to understand why Brazil has so few regular exports of manufactures.

Alternative Policies for the Past

Even with the benefit of hindsight, it is not easy to judge Brazil's commercial policy, relative to various possible alternatives. We will limit ourselves to a few aspects of past policy which we think are difficult to defend on any reasonable grounds.

The extremely high protection afforded to many processes seems difficult to justify. That any ceiling is arbitrary does not imply that no ceiling is appropriate. No matter how much one believes in infant industry arguments, learning effects, external economies, etc., one wonders

whether Brazil will benefit from protecting industries requiring over, for example, 100 percent effective protection.

The cascading of tariffs is a related point. Manufacturers seeking protection are quick to point out the tariffs on their inputs, and to call for even higher tariffs on their product to compensate for increased input cost. Theory shows that setting all nominal tariffs equal results in effective protection at the same level as the nominal tariffs. Thus, if all inputs have an average tariff of, say, 40 percent, a tariff of 40 percent on the product will result in 40 percent protection to the process. A higher tariff on the product will cause the process to be protected by more than the tariff on the product. This is what has happened in nineteen of the twenty-four sectors.

The bias against exports of primary agricultural commodities can be looked at as a trade-off: exports and GNP growth are sacrificed, but a more equitable income distribution is gained by keeping down prices of food and clothing.²⁶ It is more difficult to justify the enormous bias against exports of industrial products, which has certainly been prohibitive in almost all cases. It is true that most countries, advanced and underdeveloped, discriminate against imports of manufactured goods -- just as Brazil does. But even in the absence of discrimination abroad, one doubts that many Brazilian manufacturers would try to export in the face of the enormous difference in profitability caused by their own country's commercial policy.

The theory of international trade includes a determination of "costs of protection" -- net losses in consumers' and producers' surplus caused by the price distortions induced by protection.²⁷ These costs are likely to be only a small part of the total cost of protection, and also of course

do not include many of the possible offsetting benefits. Leibenstein has concluded that all costs from misallocation of resources are usually small compared to costs from all other kinds of inefficiency.²⁸ This appears to be true of Brazilian commercial policy: protection has probably cost Brazil far more in permitting inefficiency in processes which could have reasonable comparative costs, than in sheltering industries which are inherently inefficient in Brazil. We believe this total cost to be rather high -- probably significant as a percent of annual industrial output -- but we cannot estimate it with any precision. Balanced against this cost are the rapid and sustained growth and modernization made possible by the industrialization. The extent to which that industrialization could have been achieved without incurring the high costs of protection is too complex a question to be resolved here.²⁹

Protection is a useful and a powerful instrument for creating domestic industry. It is not such a useful instrument for developing an industry which will become competitive in a reasonable time. Tariffs help to induce domestic investment and to make it more profitable, but they reduce the motivation for efficiency. Efficiency, even in the long run, has been of secondary importance as a goal of Brazilian industrialization policies. The tariff system shows this, not only in the level and variation of protection, but also in the manner in which individual tariff rates are determined. The principal question as it is presently done is: "What are the costs, and what tariff is needed to permit reasonably profitable operation at those costs?" Whether the industry should exist at all in Brazil, or a timetable and program for future reductions in costs and in protection, are too seldom considered.

If Brazilian industry is to become truly modern and efficient, it must

be given both opportunity and motivation to reduce costs. Profits seem not to have been sufficient motivation, at least in a highly inflationary environment. Indiscriminate tariff cutting alone is not the answer. Better physical infrastructure, better education, more industrial experience, growing per capita income and larger markets can permit cost reductions. Lower tariffs can increase the motivation. The emphasis should be on future competitiveness and reductions in current inefficiencies -- not on indefinitely continued support for high-cost production.

Policies for the Future

The preceding discussion has already lead into consideration of what changes might be desirable in the future. We obviously favor reducing cascading and extremely high protection. The tariff reform of March 1967 has made significant progress, especially on the latter. If the Law of Similars is really enforced with the requirement that domestic price not exceed world price plus tariff, and the real basic rate is kept constant, there should be virtually no products receiving more than about 75 percent protection relative to the pseudo-free-trade situation.

Further reductions in cascading would probably be a good idea, and would bring effective rates of protection closer to nominal rates. This could be accomplished by moving toward a more unified system of nominal rates: One could imagine a revenue tariff, applied to all imports without exception, of perhaps 10 or 15 percent. All industrial products could receive higher protection -- say 30 or 40 percent -- and there could be a special higher rate to protect industries where the government determines higher protection to be advisable.³⁰ Such a system would not necessarily be very different from the present one. Revenue from tariffs would

increase, prices of important raw materials would rise a bit, and effective protection to most of industry would be around 40 to 75 percent. Reduction of the higher effective protection presently available to finished consumer goods, many of which do not appear to have any unavoidable competitive disadvantage, would imply significant changes.

The bias against exports of manufactures, even with full drawback privileges, is still very large. Regular exports of manufactures in significant amounts may be only a long-run possibility for Brazil, but we consider it important to promote such exports. Brazil's import coefficient cannot be reduced indefinitely, and thus export growth will be a long-run constraint on GNP growth. Brazil's current exports could be significantly expanded, but it is unlikely that they could be continuously expanded at a rate which Brazilians would regard as satisfactory for growth of GNP. So significant exports of manufactures appear to be necessary for future Brazilian growth, and these will never appear unless a start is made in their promotion.

Removing the bias against exports of manufactures could also be one of a number of changes to make Brazilian industry more cost-conscious, less inward-looking, and more modern and efficient in general. Brazil's large, protected market has been at once the strength and the weakness of industrialization. The wide-spread absence of contact with competitors in domestic or export markets can only be to the disadvantage of the Brazilian consumer, even in the long run. Increasing the profitability of exports of manufactures seems to us a useful step towards lower costs and better quality in the domestic market.

Table 1
 STRUCTURE OF BRAZIL'S FOREIGN TRADE
 (percent by value)

Item	1946-48	1960-62
<u>Exports</u>		
Coffee	38%	53%
Cocoa	4	5
Cotton	15	7
Tobacco	2	2
Iron ore	-	5
Hemp	-	2
Sugar	1	4
Manganese ore	-	2
Lumber	3	3
Miscellaneous primary products	31	14
Miscellaneous manufactures	6	3
	<u>100%</u>	<u>100%</u>
Total as percent of GDP	13%*	7%
<u>Imports</u>		
	<u>1948-50**</u>	
Finished Goods:		
Consumer durables	8%	2%
Consumer non-durables	7	7
Capital goods	38	29
Intermediate Products:		
Metallic	8	7
Non-metallic	} 20 {	21
Construction materials		3
Other:		
Crude oil	-	8
Other fuels and lubricants	13	10
Wheat	6	13
	<u>100%</u>	<u>100%</u>
Total as percent of GDP	10%	8%

* 1947-48 only.

Sources: Exports: SEEF, Ministry of Finance.

Imports: **Suitable data are not available for years prior to 1948. Data for 1948-50 from ECLA, "The Growth and Decline of Import Substitution in Brazil," Economic Bulletin for Latin America, March 1964; for 1960-62 from IBGE, Números Índices Anuais dos Preços e das Quantidades no Comércio Exterior e de Cabotagem, Rio de Janeiro, 1965.

EVOLUTION OF THE STRUCTURE OF BRAZILIAN INDUSTRY, 1939-1964

Sector	Value Added, in Millions of 1953 U.S. Dollars			Percentage Distribution			Average Annual Growth Rates					
	1939	1949	1959	1964	1939	1949	1959	1964	39-49	49-59	59-64	39-64
Food, Beverages, and Tobacco	345	612	1118	1859	30%	27%	21%	22%	5.9%	6.2%	10.6%	7.0%
Textiles, Clothing and Footwear	307	537	815	1164	27	23	16	14	5.7	4.3	7.4	5.5
Wood, Paper, and Products	79	200	456	519	6	8	8	6	9.8	8.6	2.6	7.8
Leather, and Rubber Products	26	75	181	239	3	3	3	3	11.2	9.2	5.8	9.3
Chemicals	124	230	723	1386	11	10	14	17	5.6	12.2	13.8	10.2
Non-metallic Mineral Products	61	165	356	355	5	7	7	4	10.5	8.0	nil	7.3
Metals and Metal Products	150	349	1437	2547	13	16	27	31	8.8	15.2	12.0	12.0
Others	54	129	247	288	5	6	4	3	9.1	6.8	3.0	6.9
Total Manufacturing	1146	2297	5333	8357	100	100	100	100	7.2	8.5	9.4	8.3

Source: Industrial Censuses for 1939, 1949, and 1959; Industrias de Transformação Dados Gerais - 1963/64, published by IBGE, April 1966 for 1964. Adjustments for comparability made by the authors.

Table 3
STRUCTURE OF IMPORTS AND DOMESTIC PRODUCTION OF
INDUSTRIAL PRODUCTS, BY USE

Year	Consumer Goods		Producer Goods		All Industrial Goods
	Durables	Non-durables	Intermediate	Capital	
	A. <u>Imports</u> (billion cruzeiros of 1955)				
1949	8.9	5.4	18.2	15.8	48.3
1955	2.1	4.5	22.6	13.7	42.9
1959	2.9	2.8	21.2	29.2	56.1
1964	1.5	3.9	18.6	8.7	32.7
	B. <u>Domestic Production</u> (billion cruzeiros of 1955)				
1949	4.9	140.0	52.1	9.0	206.0
1955	19.0	200.9	104.0	18.0	341.9
1959	43.1	258.0	159.6	59.5	520.2
1964	93.8	319.5	261.2	79.7	754.2
	C. <u>Imports as Percentages of Total Supply</u>				
1949	60.1%	3.7%	25.9%	59.0%	19.0%
1955	10.0	2.2	17.9	43.2	11.1
1959	6.3	1.1	11.7	34.5	9.7
1964	1.6	1.2	6.6	9.8	4.2

Source: Imports from IBGE, Numeros Indices..., op.cit. Gross value of industrial production from Industrial Census, Registro Industrial and Indices of Physical Production from Conjuntura Econômica. Imports of 1949 projected backward using data in ECLA, "The Growth and Decline...", op.cit.

Table 4
IMPORT EXCHANGE RATES AND PROTECTION, 1954 AND 1956

Category	Average Rate		Protection	
	1954	1956	1954	1956
	(cruzeiros per dollar)		(percent)	
"Custo de câmbio"	30	44	-21	-38
1	42	74	10	4
2	45	81	18	14
3	58	103	52	45
4	68	116	80	62
5	111	222	190	210

Source: Average rates from EPEA, Diagnóstico Preliminar, Setor de Comércio Internacional, Ministry of Planning, March 1967 (mimeo).

"Protection" is the percent by which the rate exceeds the "pseudo-free-trade" rate, estimated later in this chapter.

The "Custo de câmbio" is the average export rate, usually used for wheat, newsprint, petroleum and products, etc.

Table 5
AVERAGE EXCHANGE RATES: BRAZIL 1946-67

Year	Nominal rates for:			Real rates for:	
	Non-coffee exports including bonuses (cruzeiros per dollar)	Imports:		Non-coffee exports including bonuses (index)	Imports including tariff
		Basic rate	Including tariffs		
1946	18.40	18.60	18.60	117	
1947	18.40			111	
1948	18.40			103	
1949	18.40			98	
1950	18.40			95	
1951	18.40			79	
1952	18.40			70	
1953	22.50			74	
1954	27.00	41.80	62.30	71	164
1955	41.30	63.80	91.90	92	204
1956	44.90	73.80	173.	81	314
1957	53.00	65.60	173.	84	275
1958	65.40	149.	173.	91	240
1959	114.	202.	291.	111	283
1960	160.	223.	321.	118	238
1961	245.	268.	611.	129	322
1962	370.	390.	1040.	130	366
1963	553.	575.	1670.	110	333
1964	1210.	1284.	3000.	133	330
1965	1874.	1899.	3930.	134	281
1966	2200.	2220.	3750.	112	190
1967*	2700.	2730.	3730.	109	150

Notes: Average export rate does not include adjustments for proceeds from hard-to-export goods being sold on the free market prior to 1953. Source: EPEA, Diagnóstico Preliminar, Setor de Comércio Internacional, Ministry of Planning, March 1967 (mimeo).

Basic import rate from ibid. Tariffs are the Clark-Weisskoff estimates of tariffs plus premia (op.cit., Table B-4a and 1b), multiplied by a constant factor to equate the Clark-Weisskoff estimate for 1967 with our estimate for 1967, as presented in Table 6 below. See the appendix, paragraph 3, for details.

The "real rates" are indices of the nominal rates, deflated by the wholesale price index excluding coffee (Conjuntura Econômica, index No. 45).

* Data for 1967 are for April-December only.

THE STRUCTURE OF PROTECTION IN BRAZIL: 1966 AND 1967

Sector	June 1966		April 1967	
	Nominal Protection	Effective Protection (a) (b)	Nominal Protection	Effective Protection (a) (b)
Primary vegetable products	36%	36%	10%	8%
Primary animal products	137	169	17	17
Dairying	27	28	14	13
Non-metallic mineral products	79	103	40	39
Smelting	54	68	34	36
Machinery	48	48	34	32
Electrical equipment	114	382	57	97
Transport equipment	108	233	57	75
Food products	45	50	23	25
Furniture	132	401	68	124
Paper and products	93	157	48	59
Rubber products	101	167	78	116
Leather products	108	156	66	85
Chemicals	53	67	34	42
Pharmaceuticals	48	50	37	35
Perfumes, soaps, etc.	192	*	94	3670
Plastics	122	315	48	58
Textiles	181	939	81	162
Clothing	226	457	103	142
Food products	82	110	27	40
Beverages	205	1529	83	173
Tobacco	193	373	78	124
Printing and publishing	122	198	59	67
Miscellaneous	104	181	58	72
Average, all sectors	85(84)	(198) 181(118)	37(36)	(85) 76(48)
Average, manufacturing	99(98)	(282) 254(151)	48(47)	(132) 117(73)

Notes: * Estimate of value added at world prices is negative.

"Nominal Protection" is tariffs plus exchange premia, port charges, etc., less taxes on domestic production, with adjustments made for restrictions and exemptions. See the Appendix for details.

"Effective Protection (a)" is calculated treating non-tradable inputs as tradable inputs, with a zero tariff.

"Effective Protection (b)" is calculated breaking up non-tradable inputs into value added and tradable goods, and then incorporating each part into those inputs of the sector in question.

Averages in parentheses exclude the perfumes sector.

Table 7
SECTORS RANKED BY LEVEL OF PROTECTION
(in ascending order of protection)

Sector	Effective Protection(a)		Nominal Protection	
	1966	1967	1966	1967
Primary vegetable products	2	1	2	1
Mining	1	2	1	2
Primary animal products	13	3	19	3
Wood products	4*	4	3	4
Machinery	3	5	4*	6*
Metallurgy	7	6	7	6*
Non-metallic mineral products	8	7*	8	10
Chemicals	6	7*	6	6*
Pharmaceuticals	4*	9	4*	9
Food products	9	10	9	5
Paper products	11	11	10	11*
Printing and publishing	15	12	16*	16
Plastics	17	13	16*	11*
Miscellaneous	14	14	12	15
Leather products	10	15	13*	17
Transport equipment	16	16	13*	13*
Rubber products	12	17	11	19*
Tobacco	18	18	22	19*
Electrical equipment	19	19	15	13*
Clothing	21	20	24	24
Furniture	20	21	18	18
Textiles	22	22	20	21
Beverages	23	23	23	22
Perfumes, soaps, etc.	24	24	21	23

Note: * Protection the same for two or more sectors.

Table 8

NOMINAL PROTECTION BY USE OF PRODUCT: BRAZIL

<u>A. Disaggregation</u>			
<u>Sector</u>	<u>Use of Product</u>	<u>June 1966</u>	<u>April 1967</u>
Non-metallic mineral products:	construction materials	76%	43%
	consumer durables	91	25
Machinery:	parts and components	46	35
	capital goods	35	28
	consumer durables	86	47
Electrical equipment:	parts and components	75	48
	capital goods	70	62
	consumer durables	216	94
Transport equipment:	parts and components	103	71
	capital goods	74	48
	consumer durables	202	89
Paper and products:	intermediate goods	69	41
	consumer non-durables	161	66
Rubber products:	intermediate goods	80	60
	consumer durables	106	81
Chemicals:	intermediate goods	47	34
	of which: fertilizers	22	7
	consumer non-durables	58	33
Textiles:	threads and yarns	168	61
	fabrics	226	103
<u>B. Re-Aggregation</u>			
<u>Use of Product</u>			
Capital goods		56%	41%
Construction materials		76	43
Intermediate goods		70	38
Parts and components		88	60
Consumer durables		132	68
Consumer non-durables		114	47

Note: Part B includes all of the 21 manufacturing sectors.

Table 9
INTERSECTORAL DISPERSION IN PROTECTION

Measure	Standard Deviation	Ratio of Standard Deviation to Mean
Nominal protection: before reform	52	.61
after reform	24	.65
Effective protection: before reform	734(106)	4.06(0.90)
after reform	318(48)	4.17(1.00)
Protection relative to pseudo-free-trade situation, after reform: nominal	20	1.00
effective	279(41)	5.10(1.32)

Notes: The means are weighted averages, as explained in the Appendix. The standard deviations are also weighted, using the same weights, and computed as follows:

$$\text{variance} = \frac{\sum W_i t_i^2}{\sum W_i} - \bar{t}^2$$

where W_i = weights

t_i = tariffs

\bar{t} = weighted average of tariffs

The numbers in parentheses are the results if the perfumes sector is omitted.

Table 10
 NUMBER OF SECTORS IN GIVEN RANGES
 OF EFFECTIVE PROTECTION

Range	Number of Sectors	
	1966	1967
Less than 50%	5	11
Less than 100%	9	17
Less than 200%	18	23
200% and above	6	1
	—	—
Total	24	24

Note: Using the (b) measure of effective protection.

THE STRUCTURE OF PROTECTION IN BRAZIL: 1966 AND 1967

(based on "standard" input-output table)

Sector	June 1966		April 1967	
	Nominal Protection	Effective Protection to Net Value Added (a) (b)	Nominal Protection	Effective Protection to Net Value Added (a) (b)
01 Agriculture	50	51 47	18	13 11
02 Fishing	44	27 23	21	-1 -2
03 Solid fuels	60	70 60	38	44 38
04 Gas	35	-40 -37	10	-78 -70
05 Iron ore mining	0	-23 -24	0	-15 -16
06 Non-ferrous metal ore mining	12	-35 -34	4	-36 -34
07 Petroleum and natural gas	26	-24 -24	23	-5 -4
08 Construction material	49	48 37	21	7 4
09 Other minerals	28	17 14	23	17 14
10 Meat products	135	832 631	20	26 21
11 Prepared food products	220	760 587	83	264 202
12 Sugar	0	-130 -117	0	-55 -51
13 Confectionary products	177	429 371	73	169 145
14 Dairy products	77	234 195	45	188 157
15 Cereal products	183	422 364	63	134 114
16 Other food products	40	-118 -95	16	-53 -43
17 Beverages	145	291 230	58	106 81
18 Fats and oils	101	295 236	49	153 121
19 Tobacco	232	556 498	93	220 195
21 Thread and yarn	172	485 371	68	186 143
22 Textiles	221	442 367	103	221 182
23 Hosiery	226	424 376	103	203 178
24 Clothing	226	329 288	103	143 124
25 Sacks, bags, and linen goods	219	354 305	98	147 126
26 Shoes	226	393 358	103	161 146
28 Lumber	21	-30 -27	11	-6 -7
29 Wood products and furniture	121	247 203	64	127 105
31 Wood pulp	26	-52 -34	18	-8 2
32 Paper and products	115	269 206	54	115 87
33 Printing and publishing	122	167 144	59	79 68
				15 13
				5 4
				44 37
				-50 -45
				0 -1
				-16 -15
				23 23
				12 12
				21 21
				27 19
				232 180
				-32 -20
				171 135
				164 139
				125 107
				-41 -33
				95 70
				142 112
				202 170
				166 128
				199 169
				182 160
				138 118
				140 120
				156 140
				-1 -2
				122 100
				3 0
				106 82
				75 65

Table 11 (continued)

Sector	June 1966				April 1967				
	Nominal Protection	Effective Protection to Net Value Added		Effective Protection to Gross Value Added	Nominal Protection	Effective Protection to Net Value Added		Effective Protection to Gross Value Added	
		(a)	(b)			(a)	(b)		
5 Leather	100	110	88	106	63	171	138	186	130
5 Leather goods (except shoes)	204	376	334	361	86	136	119	131	114
7 Rubber products	101	169	140	151	78	172	142	157	131
8 Plastics	86	77	63	76	68	120	102	111	94
9 Synthetics	122	258	211	217	48	88	71	79	65
0 Other chemicals	35	27	13	34	19	7	-2	15	6
1 Chemicals	83	145	123	137	55	100	85	95	81
14 Petroleum products	114	358	285	273	111	371	291	277	227
45 Non-metallic mineral products	72	106	86	100	36	47	36	46	37
46 Glass and products	115	176	154	162	62	85	71	80	67
48 Pig iron and ferromanganese*	56	335	167	277	18	90	41	80	41
49 Steel ingots*	56	152	114	132	18	13	47	20	15
50 Rolled steel products*	45	-7	-10	7	32	94	74	84	68
51 Other steel products	36	-1	-5	8	24	0	-3	6	3
54 Non-ferrous metals	57	189	113	157	52	198	121	159	104
55 Metal castings	56	73	61	72	20	12	9	15	12
56 Metal products	91	173	144	161	52	90	75	86	71
57 Agricultural machinery	38	17	12	21	26	15	11	18	14
58 Non-electrical machinery	73	100	82	96	47	69	57	66	56
59 Electrical machinery	100	147	129	140	55	74	65	72	62
60 Shipbuilding	24	-36	-33	-27	14	-22	-21	-16	-14
61 Railroad vehicles	47	35	29	38	30	23	18	25	21
62 Automobiles	151	333	277	304	78	158	128	145	119
64 Bicycles and motorcycles	195	440	376	400	103	217	185	199	169
65 Airplanes	21	-6	-8	0	11	-7	-8	-3	-3
66 Precision instruments	34	21	16	24	24	19	13	20	16
67 Miscellaneous	200	350	303	338	90	143	123	139	115

Note: * Tariffs on pig iron and steel ingots are not very relevant, since most production takes place in integrated firms and transactions take place only occasionally. The effective tariff on the entire steel-making process was about zero in 1966 and negative in 1967. Prices of rolled products in those years were held down by government rulings.

Table 12
EFFECT OF DIFFERENT PARAMETER ESTIMATES
ON PERCENTAGE DEVALUATION

Estimate Number	Parameter Estimates				Percentage Devaluation $(\frac{r'-r}{r})$
	e_{DX}	e_{SX}	e_M	$\frac{M}{X}$	
1	-7	2	-.5	2.0	14%
2	-7	1	-.5	2.0	19
3	$-\infty$	1	-.5	2.0	16
4	-7	2	-2.	2.0	27
5	$-\infty$	1	-2.	2.0	29
6	-7	2	-.5	1.7	12
7	$-\infty$	1	-.5	1.7	14

Table 13
 TARIFFS, EXPORT TAXES, AND THE PSEUDO-FREE-TRADE
 EXCHANGE RATE

Year	Pseudo-Free-Trade Rate (cruzeiros per dollar)	Export Tariffs (percent of pseudo-free-trade rate)	Export Taxes	Indices of Real Values		
				Export Rate	Pseudo-Free-Trade Rate	Import Rate
1946				117		
1947				111		
1948				103		
1949				98		
1950				95		
1951				79		
1952				70		
1953				74		
1954	38	64	29	71	100	164
1955	57	61	28	92	126	204
1956	71	144	37	81	129	314
1957	81	114	35	84	129	275
1958	95	82	31	91	132	240
1959	160	82	29	111	156	283
1960	210	53	24	118	155	238
1961	350	75	30	129	185	322
1962	550	89	33	130	193	366
1963	830	101	33	110	166	333
1964	1700	76	29	133	187	330
1965	2500	57	25	134	179	281
1966	2800	34	22	112	142	190
1967*	3100	20	13	109	125	150

Notes: Coffee exports are not included.

"Tariffs" are calculated as the import rate including tariffs, etc. (Table 5) divided by the pseudo-free-trade rate, less unity.

"Export taxes" are calculated as unity, less the export rate (Table 5) divided by the pseudo-free-trade rate.

"Indices of real values" were obtained by deflating the nominal rates by the index of wholesale prices excluding coffee (Conjuntura Econômica index No. 45).

* Data for 1967 are for April-December only.

Table 15
 NUMBER OF SECTORS IN GIVEN RANGES OF
 EFFECTIVE PROTECTION
 (relative to pseudo-free-trade situation)

Range	Number of Sectors	
	<u>1966</u>	<u>1967</u>
Less than 50%	8	13
Less than 100%	15	20
Less than 200%	19	23
200% and above	<u>5</u>	<u>1</u>
Total	24	24

Appendix: Methodology and Sources

1. Tariff rates were taken from Abilio Corrêa, Lahire Nobre and J.C. Magalhães: Tarifa das Alfândegas, Rio de Janeiro (in looseleaf form which is kept up to date).
2. The premium for goods in the special category as of June 1966 was taken to be 100 percent. This rate was approximately constant at this level throughout 1966. (Data from Central Bank.)
3. In calculating the average product tariff for each of our 24 sectors, tariffs on individual items were weighted by the sum of imports and domestic production of those items in the year 1958. (Data on imports from Estatística do Comércio Exterior do Brasil, 1958, S.E.E.F., Ministério da Fazenda, Rio de Janeiro; on domestic production from Produção Industrial Brasileira, 1958, IBGE, Rio de Janeiro.) In forming the weights, domestic production values were deflated by 1966 tariffs, to make them more comparable to import values. ⁴¹Our weights are a very inclusive concept of potential imports. For our purposes, we did not want to use a concept of actual imports. Actual imports of course tend to be those products which are least protected, and thus such a concept would underestimate the protection afforded to domestic production. On the other hand, our concept also includes exports among potential imports. (See paragraph 6 below for our treatment of tariffs on exports.) Exports were included because we wanted the total effect of commercial policy on the domestic price structure. The reader should note, therefore, that averages such as the import rates in Tables 5 and 13 include export products.

The reader may be interested in the numerical differences implied by these different concepts. We show this below:

import concept (i.e., weights)	average protection, 1967
actual imports, 1962 (Clark-Weisskoff)	21%
imports plus domestic production, 1958 (Bergsman-Malan)	37%
imports plus domestic production less exports, 1958 (B-M)	41%

To calculate the nominal rates for imports, including tariffs, in Table 5, we needed a time series of average tariffs. We had analysed tariffs only for 1966 and 67. We did not have the resources to do this for each of the preceding years, and hence adopted a way to approximate the result. We took the Clark-Weisskoff time series, which was weighted by 1962 imports. (We added an adjustment for advance deposits and surcharges during 1961-65, taken from EPEA, Diagnostico..., op.cit.) We then had a time series of protection weighted by actual imports; we wanted one weighted by total supply. To approximate the latter we increased the Clark-Weisskoff estimates for each year by 76 percent, the amount by which our estimates for 1967 exceeded the Clark-Weisskoff estimates for 1967. We then added the resultant series to the basic import rate for each year, to get the total cost of potential imports with tariffs weighted by total supply. The average for 1966 shown in Table 5 is therefore not our average as calculated directly in Table 6. It is less than our average. We preferred to use the projection based on the Clark-Weisskoff time

series because of the redundancy problem: Our estimates for 1966 include much more redundancy than those for 1967, while the Clark-Weisskoff estimates have a small and roughly constant amount of redundancy.

4. The structure of inputs for these 24 sectors was given by an input-output table for 1959, compiled and kindly made available to us by Willy van Rijckeghem. The table has since been published as IPEA, Relações Interindustriais no Brasil, Cadernos IPEA No. 2, Ministério do Planejamento, Rio de Janeiro, December 1967. The data in the van Rijckeghem table were modified for our purposes, as follows:
 - a. All flows were put at producer prices by deducting trade and transport margins, both from inputs and from outputs. Excise taxes were also deducted from inputs. (Output values were already net of excise taxes.)
 - b. The value of the coefficients at world prices was estimated by multiplying the observed value by the ratio of 1966 protection on the product and on the input:

$$(a_{ij, \text{ world}}) = (a_{ij, \text{ observed}}) \frac{(1+t_j)}{1+t_i}$$

We do not put much faith in this assumption, but could find no better way to make the adjustment. The results seem sensible in all cases except sectors 22 and, perhaps, 27. In sector 22 value added, calculated as a residual after the adjustment, appeared negative; in sector 27 it appeared very small. This implies that the inputs used by the industry cost more (at free-trade prices) than the output is worth (also at free-trade prices).

This is inefficiency indeed! We believe it possible that there exist in Brazil some processes for which this is true. We do not believe that the average of as many different processes and plants which one of our sectors represents is so inefficient. Sector 22, where the "value added at world prices" appeared to be negative, represents perfumes, soaps, candles, etc. We have no reason to believe that this entire sector, on the average, is so inefficient.

5. Port charges and across-the-board surcharges were added to the tariffs. These were 12 percent ad valorem plus one percent of the tariff for both years. We used 13 percent. Excise taxes levied on domestic production, but not on imports, were deducted from the product tariff. Thus our estimates measure the net effect of tariffs, etc., on imports and excise taxes on domestic production. The level of these domestic excise taxes for 1966 was estimated from data in the EPEA Diagnostic of Public Finance. We used a rough average for the states of São Paulo, Rio de Janeiro, Guanabara and Minas Gerais, including a rough guess at the extent of cascading. (The tax in 1966 was levied on total value of sales at each sale.) This estimate was 7 percent. For 1967 we again used a rough average for the same states, which was 10 percent.
6. Estimates of actual price ratios were used instead of tariffs in three cases.
 - a. All products (except coffee) which are regularly exported were treated as if they had a zero tariff. For coffee the actual ratio of price to the producer divided by world price was used. This gave a tariff for coffee of -60 percent for 1966 and -47 percent for 1967. The adjustment to zero was made for a large number of

products, mostly in the three primary sectors, wood products, food products, and tobacco.

- b. Capital goods were divided between imports or domestic production. The tariffs on imported capital goods were calculated as the ratio of actual tariff collections to actual value of imports (data from the Ministry of Finance). For domestically produced capital goods, which are mostly simpler types than those imported and are somewhat protected by the Law of Similars, we assumed no exemptions were available and used the tariffs as published. These adjustments applied to the metallurgy and the three machinery sectors.

We are left with a major problem in accounting for the effect of variations in tariff exemptions on imported capital goods as the exemptions vary by sector of destination. We do not have the quantitative data needed to take this into account in our calculations. Thus we have been unable to quantify the effects of what we believe to have been a very important feature of commercial policy's effect on resource allocation: the different costs of capital equipment to different using industries.

- c. For particular standardized products where either restrictions or exemptions were important, an estimate of the ratio of domestic exfactory prices to CIF prices was made. This was done for the following products: soda ash, caustic soda, eight different petroleum products, natural rubber, various kinds of automotive tires and tubes, aluminum, lead, tin, copper and zinc ingots, coal, various steel products, and cement. Most of these prices are set administratively, either by government agencies, government-controlled corporations, or in close consultation with the

government. Prices are adjusted (to the inflation) irregularly, and often not in conjunction with devaluations. We used our best judgement, forming averages of internal prices for several months if data were available and if this seemed to give a more reasonable estimate of the implicit tariff. In a few cases (notably cement and tin) we were not able to get reasonable price comparisons, and therefore used our best estimate of the price effect of the official tariff plus any restrictions or exemptions. Adjustment for quality was necessary only in the case of coal, where we used an estimate of blast furnace productivity as the index of quality.

7. For those domestic similars which were not covered by the adjustments listed above, we did the following: for 1966, we used the 100 percent special category premium plus the (high) tariffs on these products. For 1967, when the special category had been abolished, we accepted the provision of the Brazilian regulations that no protection would be given if the domestic price exceeds the CIF price plus the tariff, and thus simply used the tariff. In our judgement, this may have overestimated the actual price increases allowed by protection to most similars in 1966, and underestimated it for many similars in 1967.
8. Value added in the Brazilian input-output table includes depreciation.
9. In averaging the 24-sector results, we used the sum of imports plus gross value of domestic production to average nominal (product) tariffs, and value added to average effective tariffs. Comparable data for the three primary sectors were not available, and we made rough estimates from the national income accounts and indices of physical production.

Footnotes

1. The authors are with the University of California, Berkeley, and the Instituto de Pesquisa Econômico-Social Aplicada, Rio de Janeiro. In addition to their colleagues on this project, they wish to acknowledge the helpful suggestions of Earl Rolph and Tibor Scitovsky. They also wish to express appreciation for help from Gabriel Ferreira, Jack Heller, Joaquim Ferreira Mangia, Otto Ferreira Neves, José Sampaio Portela Nunes, and José Maria Vilar de Queiroz. Credit for assistance with the tremendous amount of calculations goes to Regis Bonelli, Marcos de Carvalho, and Dag Ehrenpreis. Bergsman's work was supported financially by the Agency for International Development and the OECD Development Center, as well as the International Bank for Reconstruction and Development. None of these persons or organizations bear any responsibility for the contents of this chapter.
2. A good general source is Werner Baer, Industrialization and Economic Development in Brazil, Richard D. Irwin, 1965.
3. A valuable source on import substitution in Brazil is ECLA, "The Growth and Decline of Import Substitution in Brazil," Economic Bulletin for Latin America, March 1964.
4. Conjuntura Econômica, index No. 2.
5. See Donald L. Huddle, "Balanço de Pagamentos e Controle de Câmbio no Brasil," Revista Brasileira de Economia, March 1964, p. 8.
6. See Huddle, op.cit., and continuation in the Revista Brasileira de Economia, June 1964; IMF, Annual Report on Exchange Restrictions, various years beginning in 1950.
7. Estimated from data in ECLA, "The Growth and Decline...", op.cit.

8. See IMF, Annual Report on Exchange Restrictions, 1954 through 1958; Alexander Kafka, "The Brazilian Exchange Auction System," Review of Economics and Statistics, August 1956.
9. Ibid., page 310.
10. For a quantitative description and analysis of tariff changes over time, see Samuel A. Morley: "Import Demand and Import Substitution in Brazil," to appear in Howard S. Ellis (ed.): Essays on the Economy of Brazil, University of California Press. Also, Paul Clark and Richard Weisskoff: "Import Demands and Import Policies in Brazil," February 1967 (mimeo), and Paul Clark: "Brazilian Import Liberalization," September 1967 (mimeo).
11. Data on tariff collections and value of imports from the Ministry of Finance; average tariff calculated by the authors.
12. See Nathaniel H. Leff, "Export Stagnation and Autarkic Development in Brazil, 1947-1962," Quarterly Journal of Economics, May 1967.
13. SEEF, Ministry of Finance, Mensário Estatístico and unpublished worksheets.
14. Clark, op.cit., page i.
15. The distinction between the assumption of zero effective tariff or nominal tariff is unimportant, as our two non-tradable inputs are both over 95 percent value added.
16. Using the (b) measure of effective protection, and excluding the perfumes sector. (See the Appendix, paragraph 4.) We will use this measure whenever we mention averages of effective protection.
17. See Clark and Weisskoff, op.cit., Clark, op.cit., and Morley, op.cit.
18. For those products which have the highest percentages, the figures

are as follows:

product	share in	
	world exports	Brazil non-coffee exports
cacau	10%	5%
bananas	6	1
cotton	5	11
sugar	3	8

19.. See Antonio Delfim Netto et.al., Agricultura e Desenvolvimento no Brasil, Estudos Anpes No. 5, 1967.

$$20. \frac{\Delta X}{X} = e_X \frac{(r' - r)}{r}$$

$$\frac{\Delta M}{M} = e_M \frac{(r' - (1+t)r)}{(1+t)r}$$

Setting $\Delta X = \Delta M$ gives the result in the text.

21. This follows from:

$$\frac{\Delta Q}{Q} = e_{SX} \frac{\Delta(pr)}{pr} = e_{DX} \frac{\Delta p}{p} \quad (3)$$

where Q = quantum of exports

p = foreign price of exports

From (3) we can derive the change in exports at foreign prices as:

$$\frac{\Delta X}{X} = e_X^i \frac{(r' - r)}{r}$$

where e_X^i is as defined by (2).

22. The results are as follows:

$$\log Q = .44 + .98 \log(rp)$$

(1.30) (.28)

$$R^2 = .39$$

$$\log Q = .14 + 1.03 \log r$$

(.78) (.17)

$$R^2 = .67$$

where Q = quantum of non-coffee exports (Conjuntura Econômica, index No. 70).

r = average export exchange rate for products other than coffee,
 deflated by the domestic wholesale price index, (See Table 5.)
 p = average dollar price of non-coffee exports (Conjuntura Econômica,
 index No. 84).

Data cover 1946-1966. Both elasticities are significantly different from zero at the .005 level. The regression of Q on p gives an R^2 of .11, which implies that the elasticity is not significantly different from zero at the .05 level.

23. The breakdown of the margin between the import and export rates into import tariffs and export taxes reflects our assumptions about elasticities, etc., and says nothing whatsoever about government policy in regard to the breakdown of taxation between imports and exports.
24. All biases will be measured relative to the pseudo-free-trade situation.
25. This bias was calculated as follows:

$$\text{bias} = \frac{(\text{value added for domestic production}) - 1}{(\text{value added for export})}$$

For 1967 we assumed full drawbacks. (This probably underestimates the bias):

$$\text{bias}_i = \frac{t_i - \sum a_{ji} t_j}{1 - \sum a_{ij}}$$

Note that in 1967 the basic import rate was only 1 percent above the export rate.

26. We are indebted to Gordon Smith for this point.
27. See, e.g., Charles Kindleberger, International Economics, Fourth edition, Richard D. Irwin, 1968, pp. 105-106.

28. Harvey Leibenstein, "Allocative Efficiency vs. X-efficiency,"
American Economic Review, June 1966.
29. This will be developed further in Bergsman's forthcoming study,
Brazil's Industrialization and Trade Policies.
30. Clark and Weisskoff (op.cit., p. 16) make a suggestion along these
lines.

