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NOTA

O presente trabalho constitui-se as versões preliminares dos Capítulos 6 e 7 do relatório da pesquisa Políticas Comerciais e Incentivos Industriais no Brasil, 1979-81, em elaboração conjunta com Wilson Suzigan. Versões preliminares de Capítulos 3, 4, e 5 já foram apresentadas nos Textos para Discussão Interna, nºs 18, 29 e 26.

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CONTEÚDO

POLÍTICAS COMERCIAIS E INCENTIVOS INDUSTRIAIS NO BRASIL, 1970-81

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Chapter 6

IMPLICIT TARIFFS AND IMPLICIT NOMINAL PROTECTION

I. INTRODUCTION

The complexity of the incentive system in Brazil rules out any straightforward method of analyzing its effects through an examination of the tariff policies or any other single policy instrument. The effects of the entire constellation of economic policies on relative prices must be taken into consideration. For that reason a point of departure in any analysis of the incentive system requires direct comparisons between actual domestic and international prices. Only in that way can one begin to assess effects of incentive or disincentive instruments. These policy instruments have the effect of allowing domestic and international prices to differ. The extent to which they do in fact differ reflects the incentives or disincentives provided to an industry or sector. Accordingly, for tradable goods the law of one price is taken as given and serves as an analytical point of departure. Differences from international prices, barring transportation costs, are seen as reflecting policy distortions.[1]

For analysing protection afforded in the domestic market, the direct price comparisons permit the calculation of an implicit

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[1] As will be discussed below, market imperfections may also be reflected in the observed divergences.

tariff on an individual product basis. The implicit tariff is defined as follows:

$$t_{IMPj} = \frac{P_{Dj}}{P_{Mj}} - 1 \qquad (6.1)$$

where

$$P_{Mj} = (P_{Wj} + C_{Fj})\, r \qquad (6.2)$$

and where

P_{Dj} = the domestic FOB factory(producer) price, excluding the IPI and ICM taxes for product j

P_{Mj} = the CIF import price of product j expressed in domestic currency for product j

P_{Wj} = the "world" price for tradable product j expressed FOB at reference point of origin in foreign currency

C_{Fj} = cost of freight and insurance from reference point of origin to Brazilian port of entry, expressed in foreign currency

r = prevailing official exchange rate, defined as cruzeiros per foreign currency unit.

The implicit tariff reflects the proportional amount by which the domestic producer price exceeds the international price through the exercise of domestic economic policies. In such instances production for the domestic market is provided positive protection through the incentive system. In the case

where $t_{IMP}<0$, disregarding for the moment transportation costs, the sector is being discriminated against by export taxes, controls or other disincentives. It should be noted that in either case, i.e., $t_{IMP}>0$ or $t_{IMP}<0$, adjustments should be made to account for any direct production subsidies. The latter have the effect of reducing P_D, and consequently such production subsidies, either of a fiscal or credit nature, must be netted out.

In making the direct price comparisons we have examined individual products on as a detailed basis as possible. There are many standardized tradable products for which there exist established international markets. For such products making the price comparisons, albeit onerous, is relatively straightforward. The greatest problems arise when the products are not standardized, such as is most readily apparent with finished consumer goods and capital goods. In these industries product differentiation and quality differences are of considerable importance. Even in these cases, however, price comparisons can frequently be made by selecting the more simplified and standardized products within a given industry. Moreover, in the case of industries where multinational firm production is important, products can be chosen which are the same whether produced in Brazil or abroad.

Since the price comparisons are made on a product by product basis, aggregation over products is necessary in order

to generalize from the results and to render them more readily comprehensible. Such aggregation presents formidable problems. Our procedure has been to select products subject to the criteria of comparatibility, data availability and sectoral representativeness. Efforts have been made to obtain some product coverage for every tradable goods sector for a large number of sectors. A simple average of the implicit tariffs for the products in each sector was then calculated. It is these means that are used as the basis for computing nominal protection for domestic market production in the subsequent analysis.

Our rather simplistic aggregation procedure presents several difficulties. First, the sector classification is in many instances arbitrary and disparate, including widely heterogeneous products. Second, even though efforts have been made to ensure that the products selected presented some degree of representativeness for the sector in question, it is not clear that a selectivity bias does not exist for some sectors. Similarly, the more standardized products in a given sector themselves may not be representative of the sector as a whole. Some of these problems could admittedly be attenuated with larger product samples. Finally, and very importantly, there is a question of the meaning of the tariff averages for the sectors if there is observed substantial variance around the sectoral product means. As will be discussed below, this is a significant problem with some sectors, especially those aggregated in such a way to include a disparate range of

heterogeneous products. Despite these difficulties our aggregation procedure has been employed simply because there existed no viable superior alternative. In many cases, it is felt that the problems imposed in the aggregation are minor, if at all relevant. In a few others, however, serious difficulties do exist and appropriate qualifications must be made in interpreting the results.

The aggregation of the individual product implicit tariff calculations is made according to the IBGE industrial classification. Specifically, the classification system employed is that of the IBGE input-output accounts. The most disaggregated level,i.e., the 5 digit level, in the input-output accounts contains 160 product groups, of which 132 encompass nominally tradable goods. Of these,some 111 are manufactured product groups. The more aggregated 4 digit level consists of 87 sectors, including 72 tradable goods sectors. Again the great majority - 67 sectors - are manufacturing sectors. For purposes of presenting the data in a more readily compehensible form, we have frequently employed the familiar IBGE 2 digit level of aggregation, encompassing 21 manufacturing industries.

The use of the IBGE input- output format in classification and aggregation presents the advantages of (1) enabling comparisons and analysis with other Brazilian data series organized in a comparable format and (2) permitting the

calculation of effective rates of protection using the Brazilian input-output tables. On the other hand, the uniqueness of the classification system for Brazil renders more difficult the comparison of the Brazilian incentive system with those of other countries. Moreover, some of the sectors, reflecting the production structure of the Brazilian economy, appear rather arbitrary and even somewhat artificial. For example, in the 5 digit classification there are a total of 3 different sectors producing coffee and coffee products at different stages of production.[2]

II. DATA SOURCES

Three distinct data gathering strategies were simultaneously pursued, involving different data sources in order to undertake the direct price comparisons. In general the objective was to obtain the most up-to-date price information available. The period of data collection roughly ran from June 1980 to April 1981. The next few pages will describe the data collection

[2] They are undried coffee beans, dried coffee beans and roasted, ground and instant coffee. The distinction between the first two product groups seems especially arbitrary since drying usually takes place on the farm.

efforts from the three principal data sources.[3]

A. CPA Information

In order to bring about a change in tariff rates or other commercial practices, a firm can petition the Council for Tariff Policy (Conselho de Política Aduaneira, or CPA). In support of its application the soliciting firm must provide extensive documentation, including information on domestic and international prices for the products in question. Basically, three types of CPA processes are of interest - those requesting tariff rate increases, tariff rate reductions or reference prices. The majority of the processes request additional protection. Based upon an examination of the requests and some independent verification of price information, the CPA can then grant tariff

[3] A fourth data gathering strategy was originally planned. It consisted of extracting NBM 8 digit domestic price information from the IPI tapes and comparing it with CIF import price information, as collected by CACEX. This effort, to have been undertaken in cooperation with FUNCEX, was necessarily abandoned owing to problems of data access and excessive data processing costs. In addition, such analysis would have presented problems of having to rely on unit values, i.e., value per unit of weight, instead of actual prices. Even at the highly disaggregated 8 digit leve there still exists substantial product heterogeneity for some product lines. In any case, previous research including, most importantly, that of Kravis and Lipsey(1971), has indicated some of the pitfalls of using unit values. It should also be pointed out that employing Brazilian import data to generate the import unit values would restrict the price comparisons to product groupings for which there are actually imports. As will be subsequently demonstrated, imports in many sectors are nearly nonexistent.

schedule changes.

The information generated in the CPA evaluation process permits some direct price comparisons. The CPA was kind enough to grant access to its files and reports("pareceres")[4]; in addition valuable current information was provided by the SEPLAN representative on the CPA. On the basis of such data covering the period 1978-81 some 350 direct price comparisons were made.[5]

While it can be argued that, to the extent that there are more tariff increase requests than those for tariff reductions, there is a bias resulting in an overstatement of the implicit tariffs. A firm must be able to demonstrate that it "needs" a higher tariff, and this implies a possible tendency on the part of firms to exaggerate the domestic-international price differences. This line of reasoning, however, has its limits. If the need for protection is shown to be excessive, the CPA is liable to reject the request on grounds of economic efficiency.

The 350 usable direct price comparisons from the CPA processes unfortunately are not evenly, or randomly, distributed over sectors. Some sectors are heavily protected with redundant tariffs and widespread quantitative restrictions on imports. Such protection and the virtual prohibition of imports results in little in the way of requests to change the system.

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[4] To our knowledge, no other study, outside the CPA, has been conducted making use of such materials.

[5] Some information was also included for the year 1977.

Firms receiving such protection are indeed happy to leave things the way they are, and potential importers correctly perceive any request for import liberalization for these products to be futile. Consequently, there are no CPA processes, and resultant price comparisons, in such industries as textiles, apparel, shoes, furniture, and beverages. While our CPA derived price comparisons do in fact cover a total of 41 five digit level sectors, there is considerable concentration in such sectors as Other Chemical Products(62 product price comparisons) Miscellaneous Manufacturing (37 price comparisons) and Petrochemicals(31 price comparisons).[6]

B. FIPE Interviewing Survey

One approach to obtaining price information on an internationally comparable basis for individual products is to ask those who presumably are most knowledgeable about such matters - the managers of the producing firms themselves. This approach was tried in the form of a large scale interviewing survey conducted in the state of São Paulo by the FIPE, in colaboration with the World Bank. Although the focus of the survey was the analysis of locational factors for the firms, general quantitative information about the firms' operations was

[6] Of the 62 price comparisons in the Other Chemical Products sector (IBGE classification nº 20013) 44 resulted from processes seeking to increase protection, i.e.,tariff increases or reference prices, while the remaining 17 were derived from requests to decrease tariffs.

included. Moreover, questions were incorporated into the questionaire dealing with domestic and international prices for both the firm's outputs and inputs[7]. Along with other requests for quantitative information, these questions were included into a "leave behind" annex to the questionaire administrated during the on-the-spot interview at the firm. The field interviews were conducted during the period August-December 1980. As a result, the price information obtained from the survey covers that approximate period.

The results obtained from this large scale effort, at least as far as our research interests were concerned, were disappointing. To be expected, the response rate in returning the leave behind annexes was low, despite concerted efforts on the part of the FIPE personnel administering the survey. A total of 588 industrial firms were interviwed throughout the state of São Paulo, representing a wide range of industrial activities. Of these some 104 constituted new plant operations for which little in the way of quantitative information on the firms' operations, including price information, was available at the time of the interview. Of the remainder only 143 returned the questionaire annexes - a response rate of only 30 percent.

[7] The questions were framed in such a way that the firm could list "international" prices as either CIF import prices in Brazil or FOB export prices at some other point of origin. Adjustments were subsequently made. The firm was also provided the option of presenting a percentage difference between international and domestic prices.

Examining the 143 returned annexes, it was observed that 36 firms presented neither any of the requested domestic or international prices. Since these firms obviously possessed knowledge of their own domestic prices, the failure to provide at least this information must be construed as (1) a lack of interest in bothering to complete the form or (2) a feeling on the part of the responding firm that the price information was confidential or sensitive. Another 77 firms were willing to provide domestic price information, in greatly waying degrees of accuracy and completeness, but did not provide any international price data for either any of their products or inputs. It was only the remaining 30 firms - out of an initial 588 - that provide some of both domestic and international prices. Even these questionaires were frequently not complete.

Given the fact that some 77 of the responding firms were unable to provide any comparable international price information for either their products or inputs, a question of interpretation arises. In examining the questionaires, frequently there were encountered pencilled in remarks such as "imports not permitted", "question irrelevant", "product not imported", etc. One can not escape the fact that in many instances the firms simply did not know what the prevailing international prices were. There are elements of both rational market behavior and market knowledge imperfections in such ignorance. The lack of knowledge about international prices in some instances can be

interpreted as an indication of high levels of protection afforded in the domestic market. Import competition is simply not a factor, so there is no need for the firm to be apprised of what the comparable imported good would cost, either with or without tariffs. What matters to such firms are domestic market conditions.

By the same measure, export activity is not of interest if the domestic market , presumably heavily protected, presents greater profit opportunities than international markets. A problem arises through not keeping abreast of international prices in that, when export does become profitable, the firm may be ignorant of such prospects. The development of redundancy in import restrictions may mean that exports do become profitable at some point. Yet the firm may look to the formal protection and import situation for its products rather than at international prices. If so, export opportunities may be lost as a result of such market knowledge imperfections. Our judgment is that there are elements of this type of market imperfections existent. It can also be noted that, comparing the interviewed firms furnishing and not furnishing international price information,those firms providing the requested international price data exhibited a tendency to be larger, export involved, and multinational in operation.

In addition to the low response rate for the price questions from the FIPE survey, there was a problem involving the quality of the information collected from the 30 responding

firms. The manner in which the questionaires were completed by the firms varied greatly, as one would expect. Some firms obviously took the task quite seriously, while others appeared quite lackadaisical and careless in completing the form. Some of the furnished price information was obviously incorrect. Internal checks of consistency were incorporated into the FIPE questionaire, and external checks for prices were possible through information generated from other sources. In the cases of apparently incorrect and unreconcilable price information a follow-up call to the firm was made to obtain clarification and correction, or the erroneous information was simply jettisioned. After the data cleaning process was completed[8], we were left with 112 usable price comparisons from a fairly wide range of some 29 five digit level manufacturing sectors.[9] Unlike the price comparisons made from the CPA information, the FIPE survey based price comparisons were not so heavily concentrated. The greatest of the latter's price comparisons were in Other Food Products(13), Pumps and Motors(10), and Polyethelene, PVC and Other Resins(10).

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[8] Some efforts were made to utilize the domestic price information available from the 77 completed questionaire annexes supplying such data. Yet, the definition of the products, even at the highly disaggregated NBM 8 digit level, presented problems in identifying exactly equivalent internationally produced counterparts. For this reason, along with problems of data quality, these efforts were abandoned.

[9] Since the FIPE survey information also generated individual firm cost data, some individual product estimates of effective protection were possible at the firm level. In general these estimates were consistent with those made using the more aggregated input-output accounts.

C. Miscellaneous Direct Price Comparisons

A third major source for our direct price comparison information is miscellaneous in nature. Domestic and international price information was gathered from nearly wherever it was available in the hopes that product comparability could be ascertained. The various sources included published materials, newspaper accounts and price lists. In addition numerous interviews with firms were undertaken to complement the data otherwise gathered in our research. A total of 214 direct product price comparisons were made in this fashion, raising the total number from all sources of information to 676. In some respects, the miscellaneous source category is the most important of the three data collection strategies. It was used to both fill gaps and complement the price comparisons generated from the CPA information and the FIPE survey. Accordingly, the sectoral coverage is the greatest from these price comparisons. Furthermore, since the data were gathered and compared by ourselves, we are a bit more confident of their quality that for the price comparisons made from price data generated by others. For example, it was possible in these estimates to control for representativeness of the products composing a sector.

Turning first to the sources for domestic price information, a single major source was the Interministerial Price Council (Conselho Interministerial de Preços, or CIP). In 1980 CIP price controls were comprehensive, extending to most of the industrial

sector with the major exception of the capital goods producing industries. While the original intention of CIP was to prevent monopolistic market power abuses, by 1980 some 2,000 products were subject to CIP control, although many of the covered industries, such as textiles and apparel, were clearly not characterized by oligopolistic market structures. The CIP was kind enough to make many of its price lists and information available. The problem then become one of finding the international prices of comparable products.

Two major difficulties are apparent with the use of the CIP price information. First, there is the problem of representativeness of the 1980 period itself. All of the CIP prices we employed were from either late 1980 or early 1981. During 1980 CIP was used as a anti-inflation devise. The CIP became more stringent in awarding price increases to firms, and the processing of requests was dragged out for longer periods rendering the granted increases less effective in real terms. The result was that profits for the controlled firms were squeezed and relative prices were distorted. The price controls have in fact constituted an unwitting disincentive to the industrial sector. Controlled prices were consciously held down, and, since we have employed this price information, there is a bias in understating the implicit tariffs. It was not possible to eliminate this bias, doing so would require some sort of estimate as to what the domestic price of a certain product would be in the absence of price controls[10].

[10] Conceivably one might approach such estimates by comparing firm (sectoral) profit rates prior to and after the imposition of price controls.

A second difficulty inherent with the use of the CIP price materials concerns the timing of the increases. Since price adjustments are normally made only every six months, the real price of the product in question falls over the price period. As such, there is a problem as to which dates to select for a given product. Instead of using a mid-point, we have elected to use the date of the price increase for making the price comparisons. The resultant upward bias in our computed implicit tariffs, is thus offsetting in character to the downward bias concommitant with the existence of stringent price controls.

In addition to the CIP price information, other materials were also employed to obtain domestic price data. Newspapers publish information on various key agricultural products on a daily basis, and there exist numerous specialized publications, both by government agencies and private concerns, that furnish detailed price data[11]. Efforts were made at the time of data collection to obtain the most recent price information available. Thus the data points generally fall within the period October 1980-March 1981. In general the location selected was the Center-South, particularly São Paulo.

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[11] A few of the domestic price sources consulted were: Informações do Mercado Agrícola, Preços Recebidos pelos Agricultores, Preços Pagos pelos Agricultores, Informaçoes Econômicas do Estado de São Paulo, Boletim de Custos and A Construçao.

The international price information originated from a wide variety of sources[12]. Various international institutions collect and publish price information for internationally traded goods. These materials were used extensively. The World Bank in particular was highly cooperative in making available much information available in its files. Some U.S. and European domestic prices, with appropriate adjustments, were employed for products where those countries were exporters. Use was made of both government and private sector publications, the latter frequently being of a specialized industry nature. Whenever possible price lists were employed.

On the basis of the price information available, products were selected. As indicated above, efforts were made to include products considered to be representative of the different sectors. For example, in the cement industry common portland cement is by far the single most important product. Accordingly, this product was included in the analysis.

The form in which international price data are available varies greatly. Frequently, they are quoted in export FOB values.

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[12] A list of the sources used for international prices includes World Bank, Commodity and Price Trends, UN, Monthly Statistical Bulletin; FAO, Monthly Bulletin of Statistics; U.S. Department of Labor, Produce Prices and Price Indexes; The Journal of Commerce; 1981 Building Construction Cost Data; The Commercial Bulletin; CRU Metal Monitor; Daily News Record; The Almanac of the Canning, Freezing and Preserving Industries; Leather and Shoes; Cotton Outlook; Engineering News Record; Asbestos; Preise and Preisindizes für die Ein und Ausfuhr; and Chemical Marketing Reporter.

In such cases freight and insurance costs have to be added to arrive at a hypothetical import CIF prices for a Brazilian port of entry. This adjustment has been made by adding the average freight and insurance costs to the FOB price values[13]. Typically, these shipping costs average an additional 10-15 percent of the FOB export price.

The price comparison timing problem, mentioned above in reference to CIP price adjustments for industrial products, is accentuated with agricultural products. In addition to annual fluctuations due to general supply and climatic conditions, agricultural prices are subject to substantial seasonal fluctuations. As indicated, our agricultural product price comparisons generally covered the period October 1980-April 1981. This period has included the end of harvest point for some products and an inter-harvest point for others. The seasonal fluctuations problem for domestic prices is complicated still further by the fact that international prices for agricultural products are volatile as well. For price comparison purposes these difficulties are reduced if a large number of randomly selected products is included[14]. Our sample of agricultural products, while including most of the major products, is

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[13] Brazilian import statistics are recorded and published in both FOB and CIF values. Average freight and insurance costs by product category can be computed as the proportional differences.

[14] This difficulty could also be attenuated by calculating average implicit tariffs for each product examined over time, e.g.,monthly periods. This,however, did not prove feasible. Only one point in time for each product was observed. However,it can be noted that our agricultural price comparisons results are roughly consistent with those in an extended time period analysis reported for key agricultural products in a recent study by Homem de Melo(1980).

relatively large. Given the relatively low variances around the means for the implicit tariffs, we feel that our estimates are reasonably robust.

Another problem inherent with agricultural sector product price comparisons stems from the distinction between domestic producer and wholesale prices. The prices should be expressed as producer prices. Yet, such data were not always available, necessitating some adjustments with wholesale price quotations. In general we have been very conservative in these adjustments; if there exists a bias it has been to overstate the domestic producer prices, thus overstating the implicit tariffs for the agricultural sector. It should be noted that agricultural commercialization and distribution costs in Brazil are very high relative to those of other countries. Expressed in another way, the inefficiency of the agricultural commercialization system serves to discriminate against agricultural producers in Brazil.

The price comparisons for some products and sectors only proved possible through conducting interviews with producing firms. Some 14 firms were interviewed, representing a wide variety of sectors, in addition to those firms included in the FIPE survey. In general these firms proved very cooperative, and the quality of the price information obtained from them was considered high.

A final qualification is in order. The question must be asked as to how representative the 1980-81 period is for making direct price comparisons and undertaking an overall examination of the incentive system. In general the period of analysis was one of an acceleration of the rate of inflation. Such inflationary acceleration is normally thought to be accompanied by a dispersion in relative prices[15]. The activities of the CIP during 1980 seem to attest to this distortion of relative prices. Furthermore, the 1980-81 period has witnessed an enornous proliferation of subsidized credit, most notably for agriculture, and, as will be discussed below, it is difficult, owing to data limitations, to empirically incorporate the effects of such production subsidies into a nominal protection measure. Thus, one can say that indeed the 1980-81 period is not a happy period for measuring incentives. But then again, one might well ask just what period is truly representative, and of what. The system exists, and it is the present system, prevailing at the time of this writing which we are trying to assess . Only in that fashion can one obtain a better understanding of possible allocation effects that the incentive system may have.

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[15] For some empirical evidence regarding the Brazilian experience see Moura da Silva (1981). Moura da Silva also argues that an inflationary spurt also has an initial effect of increasing agricultural prices relative to prices for industrial sector products.

III. PRICE OBSERVATIONS AND IMPLICIT TARIFF ESTIMATES

Combining the various information sources for the direct price comparisons, the results of the implicit tariff estimates undertaken at the 5 digit level are reported in Appendix Table A 6.1. Aggregation into the IBGE 4 digit level has been done by taking a simple average of those products in each sector. The means along with their standard deviations are reported in each case. For comparison purposes the December 1980 nominal tariff rates, as computed from the tariff schedule, i.e., the TAB, are listed in Column 1 of Appendix Table A6.1. A more aggregated two digit listing for the industrial sector, along with the relevant averages, is presented in Table 6.1.

Looking first at the value added weighted implicit tariff averages presented in Table 6.1, it is observed that the overall averages for Primary Agriculture(i.e., Forestry, Agriculture and Livestock) and Manufaturing are surprisingly low - -23.0 and 11.9 percent respectively. Within manufacturing a cascading protective structure, readily apparent with the nominal legal tariffs, is no longer evident with the implicit tariff averages. While the implicit tariff average for consumer goods is higher than that for capital goods or intermediate products, the protection implied through the price system for capital goods exceeds that for intermediate products. In addition, at the two digit level substantial inter-industry differences are abundant in the industry averages.

Table 6.1

NOMINAL PROTECTION MEASURES

FOR INDUSTRY AT THE 2 DIGIT LEVEL, 1980- 81

Industry	Nominal Legal Tariff December 1980 (%)	Average Implicit Tariff (%)	Average Implicit Nominal Protection (%)
Mining	27.0	-15.9	- 3.6
Non-Metallic Minerals	109.4	-22.5	-17.7
Metallurgy	77.4	3.0	10.8
Machinery	56.3	24.0	58.7
Electrical Equipment	95.4	45.2	81.7
Transportation Equipment	101.9	-16.7	- 3.7
Lumber & Wood	125.3	- 8.9	- 4.3
Furniture	148.2	20.0	26.1
Paper	120.2	-19.9	-16.1
Rubber	107.3	-23.3	-15.4
Leather	156.6	10.0	15.6
Chemicals	48.2	40.7	55.1
Pharmaceutical Products	27.9	79.0	97.4
Perfumary	160.5	28.5	35.1
Plastics	203.8	14.3	28.9
Textiles	167.3	20.6	25.2
Apparel	181.2	24.2	30.6
Food Products	107.8	-21.3	- 3.4
Beverages	179.0	- 9.9	- 5.3
Tobacco	184.6	- 3.6	1.3
Printing & Publishing	85.5	18.1	24.1
Miscellaneous	87.0	73.9	91.8
AVERAGES[1]			
Primary Agriculture[2]	55.4	-23.0	- 7.2
Manufacturing	107.0	11.9	29.4
Capital Goods	85.2	13.6	45.5
Intermediate Products	103.3	5.6	25.2
Consumer Goods	132.5	13.9	14.6

Notes: 1. Value added weights of 1979 are used for aggregating from the four digit to two digit level and for computing the more aggregated means.

2. Includes Forestry and Fishing, Agriculture, and Livestock and Poultry.

Source: Appendix Table A6.1.

Those industries with the lowest implicit tariffs are Rubber (-23.3 percent), Non-Metallic Mineral Products(-22.5 percent), Food Products(-21.3 percent), and Paper(-19.9 percent). Seen as receiving the most domestic market protection through the price system are Pharmeceutical Products(79.0 percent),Miscellaneous Manufacturing Products(73.9 percent), Electrical Equipment(45.2 percent), and Chemicals(40.7 percent).

It is clear that such averages as those presented in Table 6.1 disguise a number of relevant considerations, including that of considerable product heterogeneity. Greater detail is provided through an examination of the more disaggregated Appendix Table A6.1. Within the agricultural sector(Sector 0201) the discrimination that agricultural activities receive through prices and the commercial policy system is readily apparent and widespread. Nearly all products display domestic producer prices below international (i.e., import CIF) price levels. The important exception is wheat, for which domestic protection is generously supplied through a price support system; the implicit tariff for wheat, calculated for February 1981, was 118 percent.[16] Excluding the exceptional case of wheat from the

[16] While producer prices are set at high levels to stimulate domestic production, the government simultaneously maintains low, heavily subsidized prices for domestic wheat consumers through the administration of a government wheat monopoly.The rationale of this policy of subsidying domestic wheat consumption is ostensibly to combat inflation and benefit low income groups. The consumer prices are set beneath the world price level, serving to swell consumption and imports. The difference between the purchase and sales price of wheat is made up through fiscal means. This wheat subsidy in recent years has substantially contributed to money supply emissions by the government.

average implicit tariff for Agriculture reduces the variance around the mean considerably.[17]

The heterogeneity of the products included even at the disaggregated 5 digit level serves to frequently present high standard deviations for the implicit tariff means reported. While much in this regard is evident from Appendix Table A6.1, some specific remarks concerning some of the sectoral means and variances are in order. With respect to the metallurgy industry, it can be noted that for Flat Iron and Steel Sheet (Sector 11021) and Rolled Iron and Steel Sheets(Sector 11022) the implicit tariff means are -9.9 and -22.2 percent, respectively, with substantial standard deviations. Yet, for both sectors the principle products have implicit tariffs near the means, and it is less significant, outlying,products that inflate the standard deviations.

In the Petroleum Refining Sector(Sector 2003), the products are also quite diverse. Listed under Gasoline and Diesel Oils are two basic products subject to very different government pricing policies. In February 1981 the implicit tariff for gasoline was calculated at 175 percent, with domestic prices maintained at high levels by the government to inhibit consumption. For diesel fuel the comparable implicit tariff was estimated at 11 percent. In both these cases, along with those of other petroleum derivatives, the prices are set by government fiat and, given the nature of

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[17] Without wheat the sector mean falls to -19.4 percent and the standard deviation drops to 28.9 percent.

petroleum production and distribution in Brazil, have little to do with production incentives. With the exception of gasoline and nafta, which is priced low to provide incentives to the petrochemical industry, the government policy with respect to petroleum derivations is to price them in accordance with international price movements.

As is evident from Appendix Table A6.1, the standard deviations around the implicit tariff means are particularly large for the capital goods industries. Undoubtedly product mix considerations and the enormous product heterogeneity inherent in these industries goes a long way in explaining the large variances around the means. Yet, there is another, compelling explanation. In addition to tariffs and other explicit import restrictions, the government has undertaken still other measures to promote the cpaital goods industries. Various credit and fiscal incentive measures are provided, sometimes of substantial quantitative importance. In general these measures are discretionarily awarded by diverse government agencies on a product by product and firm by firm basis.[18] Thus it is quite reasonable to expect there to be considerable domestic price variance in these industries, even at times for the same products.

The distinction between nominally tradable and nontradable goods is fundamentally transportation costs. While some goods such as raw sugar cane and fresh bread are clearly nontradables, the distinction for many products is by no means dichotomous. Some

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[18] For a description of these measures and an attempt to quantify their impact, see Tyler (1980).

such products are included in our sample. Natural protection for the domestic market is provided through transportation costs. Since in our estimates the international prices are taken to be CIF import prices, the implicit tariffs can not be uniformly be regarded as reflective of international competitiveness. A product, or sector, may exhibit a low implicit tariff but some of this may merely reflect high transportation costs. The non-metallic mineral product manufacturing and beverage industries are especially characterized by such high transportation cost circumstances.

Comparing the nominal legal tariffs with the implicit tariff estimates it is clear that widespread tariff redundancy exists. As can be seen in Appendix Table A6.1, in all but 6 of the 72 nominally tradable goods sectors listed at the four digit level the nominal legal tariff exceeded the implicit tariff. In most instances the differences were quite large. With industrialization and economic growth the relative prices of many manufacturing products have fallen resulting in extensive "water" in the tariff system. With such redundancy apparent it is to be expected that, barring tariff reduction incentive schemes, imports are effectively inhibited. When the existence of the extensive nontariff barriers is introduced into the discussion, the effective restriction of imports becomes even more dramatic.

The effect of the high, and redundant, tariff levels, along with the extensive and intricate system of nontariff barriers, has

been to reduce imports in many industries to practically nothing. Viewed in another way this is tantamount to saying that import substitution in these industries is complete, and has been so for some time[19]. Brazil's imports have been compressed to consist almost entirely of petroleum, some basic good grains, industrial intermediate goods, and some, generally more sophisticated, capital goods. These products are generally admitted under special tariff arrangements. This compression of imports by the prevailing system of commercial policies is evidenced in Table 6.2 at the two digit level and Appendix Table A6.2 at the more disaggregated IBGE 4 digit level. In examining the ratios of imports to total available domestic supply in 1979, only four industries (Machinery, Electrical and Communications Equipment, Chemicals, and Miscellaneous Manufacturing) indicated imports accounting for 10 percent or more than total available domestic supply. The imports for many industries, particularly those producing durable consumer goods, are seen to be minuscule relative to domestic production.

On the export side, it has been noted that the transportation costs incorporated into the implicit tariff estimates may give an exaggerated notion of export competitiveness, disregarding other policies. To be sure, the dramatic increases in exports, especially of manufacturing products, since the mid-1960's reflect decreasing

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19 The average ratio of imports to available domestic supply (i.e., domestic production plus imports) for all manufacturing had declined from .36 in 1919-20, to .20 by 1939, and to .06 by 1964. In 1964 these ratios for individual 2 digit industries exceeded .10 for only the machinery, chemicals, and miscellaneous manufacturing industries. For a discussion see Tyler (1976), pp. 67-77.

Table 6.2

RELATIONSHIP BETWEEN TRADE AND OUTPUT

FOR MANUFACTURING, 2 DIGIT LEVEL, 1970 AND 1979

Industry	Ratio of Imports to Total Available Domestic Supply (M/(X + M))		Ratio of Exports to Output (E/X)	
	1970	1979	1970	1979
Non-Metallic Minerals	.027	.024	.008	.018
Metallurgy	.100	.046	.032	.183
Machinery	.284	.195	.036	.142
Electrical Equipment	.188	.141	.014	.044
Transportation Equipment	.078	.036	.007	.099
Lumber & Wood	.004	.010	.142	.089
Furniture	.001	.001	.003	.008
Paper	.086	.049	.009	.077
Rubber	.029	.044	.009	.034
Leather	.005	.026	.135	.213
Chemicals	.156	.118	.057	.114
Pharmeceutical Products	.060	.081	.008	.025
Perfumary	.022	.012	.002	.011
Plastics	.005	.003	.001	.008
Textiles	.006	.006	.074	.065
Apparel	.008	.003	.010	.074
Food Products	.009	.051	.133	.169
Beverages	.045	.013	.003	.018
Tobacco	.000	.001	.115	.221
Printing & Publishing	.023	.020	.003	.006
Miscellaneous	.217	.211	.022	.077
Total	.080	.068	.057	.111

Source: Appendix Table A6.2.

levels of policy discrimination against export activities and increased export competitiveness. At the same time, however, it is evident from Table 6.1 and Appendix Table A6.1 that many sectors still do in fact suffer economic policy discrimination. Domestic prices for many products are systematically kept beneath international price levels through the use of price controls, export taxes, and export restrictions. Agricultural products, for example, are subject to payment of the ICM tax for exports, a practice which was elimated in the late 1960's for manufactured exports. Specific de facto export taxes also prevail for a number individual products such as coffee and minerals. In addition, an involved system of export restrictions and licensing exists for many products. The bureaucratic justification for such discrimination against export activity is almost always the stated desire to satisfy the domestic market at lower than international prices for reasons of equity, inflation repression, and industrial promotion. The result is that the exportable surplus mentality, observed in Brazil during the 1950's[20], still exists for many basic products. Within the manufacturing sector by 1979, despite the observed rapid export growth, there were few industries where exports accounted for more than 10 percent of output. (Table 6.2)

The conclusion from the analysis is inescapable. At least, and especially, on the import side, commercial policies in Brazil have transformed many nominally tradable goods into another type of analytically distinct goods. These goods can be regarded as pesudo-nontradables. Commercial policies of the type pursued in Brazil

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[20] See Leff (1967).

have effectively severed the link between international and domestic prices. The traditional partial equilibrium analytical framework, where international prices, in conjunction with trade policy instruments, are taken to determine domestic prices for tradable goods, is of little usefulness in analysing domestic price formation in Brazil[21]. These goods, or at least many of them, are no longer in effect tradable goods but rather pseudo-nontradables, whose prices, like other non-tradables, are determined by domestic demand and supply conditions instead of international prices and trade tax equivalents.

IV. ADJUSTMENTS FOR CREDIT AND FISCAL PRODUCTION SUBSIDIES: IMPLICIT NOMINAL PROTECTION ESTIMATES

The estimated implicit tariffs can not be considered measures of nominal protection for domestic market sales. To do so would understate the nominal protection afforded in the domestic market. Domestic production subsidies, brought about through credit or fiscal mechanisms, constitute production incentives since they serve to increase profitability at a given domestic price. It is therefore necessary to include such subsidies in our estimates of nominal implicit protection.

First, to handle production subsidies conceptually in our estimates some assumptions must be made regarding average, or unit, profitability. At a given domestic FOB factory price P_{Dj} total

[21] Analytically, the divorcing of domestic prices and international prices for many nominally tradable goods also undermines the usefulness of many of the two sector open economy models, along Mundell lines, involving the distinction between tradable and nontradable goods. With Brazilian style trade policies some goods can flip-flop back and forth between the two sectors.

profits for the price-taking firm are written as

$$(6.3) \quad \pi = P_{Dj} - C(Q) + S_{Dj}$$

Assuming S_{Dj} - the domestic subsidy amount - to be proportional to output Q, we can write

$$(6.4) \quad S_{Dj} = s_{Dj} \cdot P_{Dj} \cdot Q_j$$

where s_{Dj} can be regarded as the total domestic subsidy rate for product j. Accordingly, unit profits can be expressed as

$$(6.5) \quad \pi/Q = P_{Dj} \ (1+s_{Dj}) - \frac{C(Q)}{Q}$$

While this specification separates production subsidies from the more customary supply-side considerations, it allows us to view the domestic price and subsidy rate in an analogous fashion with respect to profitability. To maintain unit profitability · domestic prices and the subsidy rate can be substituted in accordance with Equation (6.5).

This relationship allows us to extend the basic implicit tariff framework by incorporating direct production subsidies into a more generalized measure of nominal implicit protection (p_{IMPj}). It is expressed as

$$(6.6) \quad p_{IMPj} = \frac{P_{Dj}(1+s_{Dj})}{P_{Mj}} - 1$$

This concept provides a measure of the impact that economic policies, at a given official exchange rate, have on imparting nominal protection to product j relative to the import CIF price. It is this measure that we have employed in our analysis.

The actual measurement of the domestic market subsidy rate (s_D) for different sectors at a disaggregated level is exacting and requires a number of unfortunately rather arbitrary assumptions in view of the data availability limitations. The basic fiscal and credit subsidy schemes have been described above in Chapter 5, and Tables 5.1 and 5.3 privide some general indications of their aggregated magnitude. Our task here is to disaggregate both the fiscal and credit subsidies to the 4 digit level.

Turning first to the fiscal incentives, it can be noted that these incentives take various forms. The major type of fiscal incentive granted by the government is the reduction or exemption of import duties for government approved projects. Since these benefits do not formally constitute production subsidies, they have been excluded from our adjustments.[22] The fiscal credit for steel producers, based upon 95 percent of the IPI, was estimated from the 1979 fiscal credit total and output data at 2.5 percent of steel product outputs. For the capital goods industries two fiscal credit programs were relevant for domestic market sales. As described in Chapter 5, a discretionary system of fiscal credits related to the IPI exists for approval capital goods under D.L. 1335. For the products included this constitutes a direct

[22] Since duty free imports at an overvalued exchange rate imply a subsidy, it can be noted that there is in fact a subsidy element involved to the extent that the degree of the prevailing exchange rate overvaluation exceeds that of the tariff reduction. There is no straightforward way, however, that such a consideration can be incorporated into our estimates.

production subsidy. While these subsidies can conceivably range up to 20.7 percent, as measured on a value of product basis, in practice the benefits are not awarded on a widespread basis. Comparing the total fiscal credits granted in 1979 under the program with output data, we have estimated an average subsidy rate of 2 percent on a value of product basis. A more widely used fiscal incentive for domestic capital goods sales is an accelerated depreciation provision in the income tax laws. A previous study has made a rough estimate of the magnitude of this incentive, and it is this estimate that we have employed.[23] In general, there have been few revisions in the relevant fiscal incentive schemes during the period 1978-81. It therefore seems reasonable to use incentive estimates made with 1978-79 data to approximate the fiscal incentives for the 1980-81 period.

In comparison with the fiscal incentives, the credit subsidies are more involved, more extensive, and even more difficult to estimate on a 4 digit level. These subsidies result from the ability of producing firms, or farms, to obtain loans at interest rates beneath what would constitute free market rates. A realized credit subsidy rate (s_{CR}) can be estimates as:

$$(6.7) \quad s_{CRj} = \frac{S_{CRj}}{X_j} = \frac{Q_{CRj}}{X_j} \cdot \left(\frac{i-i'}{1+i}\right)$$

[23] See Tyler(1980). With the present tax rates, and under assumptions concerning general profitability, it has been estimated that this incentive amounts to 5 percent on a value of product basis.

where

S_{CRj} = total amount of credit subsidy for firm or product j

Q_{CRj} = loan amount

X_j = output of firm or product j

i = market interest rate

i' = subsidized interest rate.

The last expression on the right hand side of equation (6.7) can be regarded as the credit subsidy rate.

The credit subsidies in the agricultural and livestock sectors of the economy are presently of considerable magnitude. For years it has been a government policy to intentionally provide the rural sector with subsidized credits, but with the acceleration in the inflation, in part itself due to the extension of agricultural credits, the amount of the subsidies grew rapidly in the late 1970's.[24] We have estimated the 1980 agricultural and livestock sector realized credit subsidy rates to be equal to 21.1 percent of output.[25]

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[24] For good discussions see Sayad (1978) and Resende (1980,1981).

[25] The credit subsidy rate, as opposed to the realized credit subsidy rate, was estimated at 39.1 percent.Our estimates have been based on assumed market rate of interest for 1980 of 115.2 percent-5 percent above the increase in the general price index,a realized nominal interest rate for agricultural and livestock loans of 31.0 percent,loan balance amounts in the banking system,and production and income estimates.These data,along with alternative credit subsidy estimates,are presented and discussed in the on-going research of Gervásio Castro de Resende and Milton da Mata entitled "Crédito Agrícola no Brasil".Their subsidy estimates,while comparable, are slightly higher than ours.

Our difficulty with using such an estimate stems from the fact that it is, by its nature, an average. The actual provision of agricultural credit through the banking system, most notably the Banco do Brasil, is extremely lopsided. Favored crops, including most of the major export crops, account for disproportionately large amounts of credit, while other products, such as the basic foodstuffs of mandioc,beans,and potatoes, receive little. Moreover, as tc be expected with such a subsidized credit bonanza and its implied credit rationing, the recipients of such governmental largess tend to be large firms. Ferreira (1981) has estimated that in 1975 in the Northeast only 4 percent of the credit went to farms of 50 hectares or less.

The average industrial sector realized credit subsidy rate was estimated in an analogous manner to that for agriculture and livestock. Central Bank accounting and reports list loan balances, according to major sectors of the economy, for the consolidated banking system. From such information loan activity is approximated for the industrial sector as a whole.The average credit subsidy rate, given presumed free market interest rates, monetary correction factors, and observed nominal interest rates,was estimated as 25.7 percent. Adjusting for loan activity as a proportion of output, the average realized credit subsidy rate for industry was calculated to be equal to 10.3 percent. No inclusion was made for investment credits through the investment banking, as opposed to commercial banking, system. As such, our estimates may be conservative, although it can be argued that it is current production credits rather than investment credits which are at issue.

The individual 4 digit level industry realized rates were estimated in a qualitative, but necessary, fashion.[26] Five categories of credit preference through the commercial banking system were assumed in relation to the average. They are very low,low, average, high,and very high. Expressed as multiples of the average realized credit subsidy rate, the multiples were assigned values of 0.5,0.75,1.0,1.25, and 1.5, respectively. Thus the realized credit subsidy rates were taken to range from a very low of 5.1 percent to a very high of 15.4 percent. In consultation with bankers and businessmen, the individual sectors were then each assigned a preference category and consequently a realized credit subsidy rate.

Another type of important credit incentive has to do with suppliers' credits for domestically produced capital goods. FINAME has in recent years liberally provided such credit, financing at subsidized interest rates approximately two-thirds of domestic capital goods sales. The effect of these credits is to make domestically produced capital goods more competitive. For 1978 the net price effect of these incentives was estimated at 8.8 percent on a value of product basis (Tyler,1980). Although these incentives increased in 1979 and 1980, we have elected to use the more conservative 8.8 percent figure. Consequently our estimates may be somewhat downward biased for the capital goods industries.

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[26] Lending activity data are simply not collected on a highly disaggregated basis.

The domestic market fiscal and credit production subsidies, including elements permissable under GATT practices, have been combined additively into an overall domestic subsidy rate,i.e., $s_{Dj} = s_{FISj} + s_{CRj}$. Subsequently, the implicit nominal protection rates were computed in conjunction with the estimated implicit tariffs. The results are presented in the last column in Tables 6.1 and Appendix Table A6.1. The implicit nominal rate of protection for manufacturing as a whole is seen to be 29.4 percent.

In some cases the domestic production subsidies provide for substantial increases in implicit protection relative to the implicit tariffs. A particularly noteworthy feature, observed in Table 6.1, is the reversal of the cascading protection structure evident from the legal tariffs and, to a lesser extent, from the implicit tariffs. The greatest implicit nominal protection exists for the capital goods industries, followed by the intermediate goods industries and finally consumer goods. It is precisely such a structure that one would expect given the governments' stress in recent years on import substitution in the capital and intermediate producing goods industries.

While the rates of implicit nominal protection provide a view of the country's protective system for the domestic market, a still more comprehensive view can be obtained by incorporating the effects of protection on a given sector's inputs. For such an analysis an effective protection framework is necessary, and it is to this question that we now turn.

Appendix Table A6.1

IMPLICIT TARIFF CALCULATIONS FOR 4 AND 5 DIGIT LEVEL INDUSTRIES, 1980 - 81

IBGE 4 and 5 Digit Codes	Industry	Nominal Legal Tariff 1980 (%)	Implicit Tariff Calculations: Number of Products in Sample (n)	Implicit Tariff Calculations: Average Implicit Tariff (%)	Implicit Tariff Calculations: Standard Deviation (%)	Implicit Nominal Protection (%)
0101	Forestry and Fishing	80.7	7	-41.2	28.8	-38.2
01011	Logs	86.7	1	-22.5	--	
01012	Firewood & Charcoal	32.5	1	-32.7	---	
01013	Fish & Shellfish	128.0	2	-34.6	6.1	
01014	Other Forestry & Fishing	80.2	3	-54.6	44.0	
0201	Agriculture	58.5	29	-17.1	37.1	- 0.4
02011	Coffee Beans	0.0	1	-35.4	--	
02012	Sugar Cane	55.0	--	n.t.[1]	--	
02013	Seed Cotton	0.0	1	-13.0	--	
02014	Husked Rice	45.0	1	-10.1	--	
02015	Wheat	45.0	1	117.9	--	
02016	Beans	55.0	2	01.3	8.8	
02017	Tobacco	155.0	2	-36.7	19.3	
02018	Vegetables & Fruits	97.9	11	-18.4	37.3	
02019	Other Agricultural Products	73.0	10	-28.2	18.0	
0301	Livestock and Poultry	27.9	6	-24.3	10.7	- 8.3
03011	Live Poultry & Eggs	110.0	2	-21.8	15.5	
03012	Cattle & Swine	15.8	2	-27.7	01.3	
03013	Unprocessed Milk	0.0	1	-11.2	--	
03014	Other Livestock & Poultry	85.5	1	-35.6	--	
0501	Mining	28.7	15	-16.7	35.4	- 3.9
05011	Metallic Mineral Mining	6.0	5	-32.5	52.8	
05012	Non-Metallic Mineral Mining	53.7	10	-15.5	34.8	
0502	Combustible Mineral Extraction	11.4	2	-13.7	19.2	- 0.4
05021	Petroleum & Natural Gas	13.3	1	0.0	--	
05022	Coal & Other Mineral Fuels	2.2	1	-27.3	--	
1001	Cement	48.1	2	-34.1	21.0	-25.7
010011	Cement	48.1	2	-34.1	21.0	
1002	Glass Products	123.4	6	19.5	85.2	25.6
10021	Sheet Glass	71.8	4	-18.4	39.2	
10022	Glass Containers	145.0	2	95.1	120.3	
10023	Other Glass Products	143.8	n.a.[2]	n.a.[2]	--	
1003	Other Non-Metallic Mineral Products	120.8	11	-27.5	63.2	-23.8
10031	Other Non-Metallic Mineral Products	120.8	11	-27.5	63.2	
1101	Pig-iron, Iron Alloys & Primary Steel	49.2	5	-13.7	37.2	- 0.5
11011	Pig-iron	70.0	1	-32.9	--	
11012	Steel Ingots & Iron Alloys	37.6	4	- 8.9	41.2	
1102	Iron & Steel Sheets	37.4	16	- 8.5	32.3	5.5
11021	Flat Iron & Steel Sheets	38.4	5	- 9.9	36.9	
11022	Rolled Iron & Steel Sheets	37.5	6	-22.2	35.2	
11023	Scrap Metal	16.6	5	9.5	17.7	
1103	Iron & Steel Castings	95.9	3	31.3	65.3	- 3.6
11031	Iron & Steel Castings	95.9	3	31.3	65.3	
1104	Non-Ferrous Metals	44.1	11	-16.5	64.0	
11041	Copper	44.5	5	-19.2	96.9	
11042	Other Non-Ferrous Metals	44.0	6	-14.3	25.4	

Appendix Table A6.1(continued)

IMPLICIT TARIFF CALCULATIONS FOR 4 AND 5 DIGIT LEVEL INDUSTRIES,

1980 - 81

IBCE 4 and 5 Digit Codes	Industry	Nominal Legal Tariff 1980 (%)	Implicit Tariff Calculations: Number of Products in Sample (n)	Implicit Tariff Calculations: Average Implicit Tariff (%)	Implicit Tariff Calculations: Standard Deviation (%)	Implicit Nominal Protection (%)
1105	Miscellaneous Metal Products	105.7	20	10.3	34.2	27.2
11051	Iron & Steel Wire	38.5	1	13.4	--	
11052	Iron & Steel Forgings	107.5	2	-16.4	16.1	
11053	Tin-plated Cans	55.0	1	-25.3	--	
11054	Other Metal Products	119.7	16	15.7	35.5	
1201	Pumps and Engines	58.8	17	17.1	65.7	50.6
12011	Pumps and Engines	58.8	17	17.1	65.7	
1202	Machine Parts	58.1	30	85.1	83.8	138.0
12021	Bearings	60.0	n.a.	n.a.	--	
12022	Power Transmission Equipt.	55.9	n.a.	n.a.	--	
12023	Other Machine Parts,inc. Tools	58.1	30	85.1	83.8	
1203	Industrial Equipt. & Machinery	51.8	22	29.5	73.2	66.5
12031	Industrial Equipt. & Machinery	51.8	22	29.5	73.2	
1204	Agricultural Equipt. & Machinery	42.0	10	-18.3	8.6	5.1
12041	Agricultural Equipt. & Machinery	42.0	10	-18.3	8.6	
1205	Office & Domestic Use Equipt & Mach.	130.4	10	-10.8	23.9	3.5
12051	Office Equipt. & Machinery	58.9	4	-18.3	7.3	
12052	Household Appliances	159.4	6	- 5.8	30.3	
1206	Tractors	41.5	6	-47.8	23.0	-32.9
12061	Tractors	41.5	6	-47.8	23.0	
1301	Electric Energy Equipment	72.2	2	- 3.0	11.0	24.7
13011	Electric Energy Equipment	72.2	2	- 3.0	11.0	
1302	Electric Wire & Cables	68.8	5	12.9	4.0	45.2
13021	Electric Wire & Cables	68.8	5	12.9	4.0	
1303	Electric Equipment	88.5	17	49.1	48.7	91.7
13031	Electric Motors & Generators	62.6	1	-11.3	--	
13032	Electric Material	96.3	16	52.9	47.6	
1304	Electrical Machinery & Appliances	61.1	16	34.7	84.7	73.2
13041	Electrical Machinery & Appliances	61.1	16	34.7	84.7	
1305	Electronic Equipment	55.4	11	96.4	69.5	152.6
13051	Electronic Equipment	55.4	11	96.4	69.5	
1306	Communications Equipment	144.1	4	63.2	115.0	95.0
13061	Television,Radio& Record Playing Euipt.	176.9	2	-22.0	44.1	
13062	Other Communications Euipt.	88.4	2	148.4	93.3	
1401	Automobiles	126.3	5	-23.2	9.1	-15.3
14041	Automobiles	126.3	5	-23.2	9.1	
1402	Trucks and Buses	83.6	3	-46.2	3.6	-39.3
14021	Trucks and Buses	83.6	3	-46.2	3.6	
1403	Motors & Vehicle Parts	112.5	3	-15.5	1.9	- 9.1
14031	Motors & Vehicle Parts	112.5	3	-15.5	1.9	
1404	Shipbuilding	27.0	3	19.6	12.7	53.8
14041	Ships & Boats	27.0	3	19.6	12.7	
1405	Railway Equipt.& Other Vehicles	63.5	4	- 6.4	32.3	20.4
14051	Railway Rolling Stock	39.3	3	-21.7	12.6	
14052	Other Vehicles	84.0	1	39.6	--	
1501	Wood	125.3	4	- 8.9	40.1	-4.3
15011	Lumber, Plywodd & Vaneer	117.7	1	33.6	--	
15012	Wooden Boxes & Crates	170.0	n.a.	n.a.	--	
15013	Other Wood Products	151.7	3	-23.1	34.8	

Appendix Table A6.1(continued)

IMPLICIT TARIFF CALCULATIONS FOR 4 AND 5 DIGIT LEVEL INDUSTRIES,

1980 - 81

IBGE 4 and 5 Digit Codes	Industry	Nominal Legal Tariff 1980 (%)	Implicit Tariff Calculations			Implicit Nominal Protection (%)
			Number of Products in Sample (n)	Average Implicit Tariff (%)	Standard Deviation (%)	
1601	Furniture	148.2	2	20.0	21.2	26.1
16011	Furniture	148.2	2	20.0	21.2	
1701	Wood Pulp	34.5	1	-37.7	--	-29.7
17011	Wood Pulp	34.5	1	-37.7	--	
1702	Paper	85.2	8	- 9.0	41.7	0.4
17021	Paper	85.2	8	- 9.0	41.7	
1703	Paper and Paperboard Products	166.8	1	-32.4	--	-25.4
17031	Paper & Paperboard Boxes,etc.	175.0		n.a.	--	
17032	Other Paper & Paperboard Products	125.1	1	-32.4	--	
1801	Rubber	107.3	3	-23.3	7.2	-15.4
18011	Tires & Inner Tubes	85.0	2	-20.9	8.2	
18012	Other Rubber Products	158.8	1	-28.2	--	
1901	Leather & Leather Products	156.6	1	10.0	--	15.6
19011	Leather & Leather Products	156.6	1	10.0	--	
2001	Chemical Elements & Compounds	33.3	66	55.1	62.9	75.0
20011	Caustic Soda	33.0	1	-33.2	--	
20012	Soda Ash	30.0	1	36.3	--	
20013	Inorganic & Organic Chemicals	33.7	64	56.7	62.8	
2002	Alcohol	160.0	3	- 9.3	12.3	4.7
20021	Alcohol	160.0	3	- 9.3	12.3	
2003	Petroleum Refining	20.8	37	26.1	60.5	45.5
20031	Gasoline & Diesel Oil	0.0	2	93.2	116.2	
20032	Fuel and Lubricating Oils	40.0	1	0.0	--	
20033	Naphta	20.0	1	-34.2	--	
20034	Liquid Petroleum Gas	0.0	1	- 1.7	--	
20035	Other Petroleum Refining Products	58.4	1	11.9	--	
20036	Petrochemicals	31.9	31	24.9	59.1	
2004	Coke & Coal Derivations	18.0	5	-47.3	54.7	-39.2
20041	Coke & Coal Derivations	18.0	5	-47.3	54.7	
2005	Chemical Resins & Fibers	88.7	48	64.8	73.1	90.2
20051	Polyethylene,PVC & Other Resins	71.2	35	66.7	84.6	
20052	Synthetic Yarns & Fibers	103.0	12	63.6	20.3	
20053	Synthetic Rubber	59.1	1	11.7	--	
2006	Vegetable Oils &Oilseed Products	47.8	2	-46.5	8.0	-42.4
20061	Crude Vegetable Oils	66.8	1	-40.8	--	
20062	Other Oilseed Products	18.6	1	-52.1	--	
2007	Pigments and Paints	89.4	4	42.1	90.9	56.7
20071	Pigments and Paints	89.4	4	42.1	90.9	
2008	Miscellaneous Chemical Products	52.2	20	71.1	104.0	93.0
20081	Fertilizers	7.9	4	17.8	26.9	
20082	Other Chemical Preparations	77.9	16	84.4	112.3	
2101	Pharmaceutical Products	27.9	20	79.0	89.0	97.4
21011	Basic Pharmaceutical Products	29.5	17	65.6	90.0	
21012	Dosed Pharmaceutical Products	27.8	3	155.1	19.1	
2201	Perfumary & Soaps	160.5	8	28.5	17.3	35.1
22011	Perfumary & Soaps	160.5	8	28.5	17.3	

Appendix Table A6.1(continued)

IMPLICIT TARIFF CALCULATIONS FOR 4 AND 5 DIGIT LEVEL INDUSTRIES, 1980 - 81

IBGE 4 and 5 Digit Codes	Industry	Nominal Legal Tariff 1980 (%)	Implicit Tariff Calculations: Number of Products in Sample (n)	Implicit Tariff Calculations: Average Implicit Tariff (%)	Implicit Tariff Calculations: Standard Deviation (%)	Implicit Nominal Protection (%)
2301	Plastics	203.8	4	14.3	43.4	28.9
23011	Plastics Sheets	205.0	n.a.	n.a.	--	
23012	Plastic Wrappings	205.0	n.a.	n.a.	--	
23013	Other Plastic Products	202.4	4	14.3	43.4	
2401	Basic Textile Processing Products	71.4	1	- 5.0	--	- 0.2
24011	Unginned Cotton & Other Nat.Fibers	72.5	1	- 5.0	--	
24012	Cottonseed & Other Textile Residues	66.2		n.a.	--	
2402	Synthetic Fiber Textile Products	197.8	10	15.3	16.1	21.2
24021	Synthetic Fiber Textile Products	197,8	10	15.3	16.1	
2403	Natural Fiber Textile Products	166.7	19	21.7	14.6	27.9
24031	Cotton & Other Nat.Fiber Yarns	105.9	10	22.5	17.9	
24032	Natural Fiber Fabrics & Products	194.9	9	20.8	10.8	
2404	Other Textile Products	173.0	3	26.0	11.6	32.4
24041	Coth Bags	205.0		n.a.		
24042	Knitwear & Hosiery	196.1	1	12.9	--	
24043	Special Fabrics	169.4	1	30.0	--	
24044	Finished Yarn & Fabric Products	0.0	1	35.0	--	
2501	Apparel	185.3	7	23.1	13.2	29.4
25011	Apparel	185.3	7	23.1	13.2	
2502	Footwear	170.0	2	27.5	3.5	34.0
25021	Footwear	170.0	2	27.5	3.5	
2601	Coffee Bean Products	60.0		-38.6[3]	4.5	-29.1
26011	Coffee Bean Products	60.0		-38.6	4.5	
2602	Processed Coffee Products	72.5	1	-41.7	--	-32.7
26021	Processed Coffee Products	72.5	1	-41.7	--	
2603	Processed Rice	50.0	1	-23.8	--	-19.9
26031	Processed Rice	50.0	1	-23.8	--	
2604	Wheat Flour	100.0	2	-28.3	2.3	-24.6
26041	Wheat Flour	100.0	2	-28.3	2.3	
2605	Other Vegetable Products	127.7	6	23.3	34.4	-29.6
26051	Cereals & Starches,exc.Wheat	107.6	2	21.4	11.6	
26052	Other Processed Vegetable Products	151.8	4	24.3	43.8	
2606	Meat Products	64.0	6	6.2	59.4	11.6
26061	Fresh or Frozen Meat	46.1	2	-25.4	6.4	
26062	Prepared & Preserved Meat	115.8	3	55.1	27.1	
26063	Raw & Salted Hides	41.9	1	-77.2	--	
2607	Poultry Products	100.2	2	-10.5	10.7	- 5.9
26071	Poultry Products	100.3	2	-10.5	10.7	
2608	Prepared Fish Products	137.8	1	- 2.4	--	2.6
26081	Prepared Fish Products	137.8	1	- 2.4	--	
2609	Dairy Products	119.0	7	64.2	66.9	72.6
26091	Processed Milk	99.6	2	62.6	3.8	
26092	Other Dairy Products	165.5	5	92.7	52.5	
2610	Crude Sugar Products	75.2	2	3.1	1.8	-47.2
26101	Crude Sugar Products	75.2	2	3.1	1.8	
2611	Refined Sugar	110.0	1	-71.1	--	-69.6
26111	Refined Sugar	110.0	1	-71.1	--	

Appendix Table A6.1(continued)

IMPLICIT TARIFF CALCULATIONS FOR 4 AND 5 DIGIT LEVEL INDUSTRIES,

1980 - 81

IBGE 4 and 5 Digit Codes	Industry	Nominal Legal Tariff 1980 (%)	Implicit Tariff Calculations: Number of Products in Sample (n)	Implicit Tariff Calculations: Average Implicit Tariff (%)	Implicit Tariff Calculations: Standard Deviation (%)	Implicit Nominal Protection (%)
2612	Bakery & Pastry Products	169.3	3	-45.8	28.6	-43.0
26121	Bread & Rolls	164.4		n.t.		
26122	Noodles, Biscuits, etc.	176.4	3	-45.8	28.6	
2613	Edible Oils & Fats	75.2	2	3.1	1.8	8.4
26131	Edible Oils & Fats	75.2	2	3.1	1.8	
2614	Other Food Products	115.4	15	-23.4	18.4	-19.5
26141	Animal Feeds	53.2	2	-33.5	7.3	
26142	Other Food Products	164.8	13	-21.8	19.3	
2701	Beverages	179.0	2	- 9.9	3.7	- 5.3
27011	Beverages	179.0	2	- 9.9	3.7	
2801	Tobacco Products	184.6	1	- 3.6	--	1.3
28011	Tobacco Products	184.6	1	- 3.6	--	
2901	Publishing and Printing	85.5	2	18.1	60.5	24.1
29011	Newspapers & Books	112.8	2	18.1	60.5	
29012	Printing & Graphics	0.0				
3001	Miscellaneous Manufactured Products	87.0	42	73.9	105.6	91.8
	Total		676			

Notes: 1. non tradable products

2. not available

3. For the purposes of the effective protection estimates the implicit tariff for coffee bean products (Sector 2601) was taken to be a simple mean between coffee beans (02011) and processed coffee products(26021).

Sources: The nominal tariff averages were generated from materials kindly furnished by Honório Kume from his on-going research at FUNCEX, entitled "Quantificação da Proteção Efetiva Após do Pacote de Dezembro de 1979 e Simulações da Política Tarifária". The implicit tariffs rates of implicit nominal protection were estimated as described in the text.

William Tyler
July 1981

Chapter 7

EFFECTIVE PROTECTION ESTIMATES AND THE STRUCTURE OF DOMESTIC MARKET PROTECTION

I. METHODOLOGY AND ESTIMATING PROCEDURES

To measure effective protection for domestic market sales we have employed the conventional partial equilibrium estimating procedures.[1] In the following chapter analogous procedures will be developed and employed to estimate effective export promotion rates. Measuring the protection of domestic value added relative to value added in world prices, the effective rate of protection for domestic market sales can be written as

$$(7.1) \qquad g_j = \frac{t_j - \Sigma_i a_{ij} t_i}{1 - \Sigma_i a_{ij}}$$

where

g_j = the effective rate of domestic market protection for product j

t_j = the nominal rate of protection for product j

a_{ij} = the technical coefficient for input i used in the product of product j, as measured in world prices

t_i = the nominal rate of protection for input i.

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[1] See Balassa and Associates(1971) and Corden(1971) for the most exemplary treatment. It is clearly recognized that the conventional effective protection estimating procedures imply well known simplifying assumptions and present ample conceptual difficulties. Yet, in the absence of any viable alternative, we have opted to use the procedures described, problems and all.

It is this formulation that has been used in a wide variety of empirical studies.

Since the a_{ij}'s in Equation (7.1) are expressed as ratios calculated from international price values, an adjustment must be made if the technical coefficient information available was computed from domestic prices and values. Accordingly, the estimating formula can be expressed as

$$(7.2) \qquad g_j = \frac{t_j - \sum_i a_{ij} \left(\frac{1+t_j}{1+t_i} \right) t_i}{1 - \sum_i a_{ij} \left(\frac{1+t_j}{1+t_i} \right)}$$

where the a_{ij}'s represent the technical coefficients as measured from domestic price and value information.

The rate of effective protection depends upon two main elements: (a) the nominal protection afforded the final product and (b) the input structure and the protection afforded those inputs. Accordingly, the measure of effective protection can be easily decomposed into two components reflecting these different effects. First, there exists a subsidy equivalent to domestic producers as effected through the protection afforded to the final product in question. Secondly, there also exists a tax equivalent imposed on the same domestic producers through the increase of input prices

associated with commercial policies. Both components are expressed in proportional value added terms and can be written simply as:

$$(7.3) \qquad g_j = \frac{t_j}{1 - \sum_i a_{ij}} - \frac{\sum_i a_{ij} t_i}{1 - \sum_i a_{ij}}$$

where the first term on the right hand side, $t_j/(1-\sum_i a_{ij})$, represents the subsidy equivalent component, while the second term depicts the tax component working through higher input prices. If the latter component exceeds the subsidy component, the effective rate of protection is negative, indicating a discrimination against the activity producing the final product j.

While we have called these two components of domestic market effective protection the subsidy and tax effect components, respectively, there is no presumption that they always possess those particular effects. In the case where the domestic prices for inputs, through the exercise of economic policies, are effectively set at levels beneath international prices, the tax effect component in the second term of Equation (7.3)'s right hand side effectively becomes a subsidy effect component. It takes on a negative sign and thus serves to increase the effective protection afforded to the final product. Such effects are not at all uncommon; conscious government policy may, and frequently does, seek to keep down the prices of industrial inputs through subsidies or price controls. Similarly, the subsidy effect component itself may also take on quite different features. Again

through the exercise of commercial policies, the final product can be explicity discriminated against, i.e., $t_j < 0$.

So far we have discussed nominal protection in tariff equivalent terms. In the absence of direct production subsidies, implicit tariffs can be utilized to estimate rates of effective protection. A problem arises, however, when we incorporate adjustments for production subsidies and develop what we have termed the implicit nominal protection rates. Such protection exists for the final product, but it is not representative of the tax effect component of the effective protection rate. Firms buy inputs at the observed domestic market prices. It is irrelevant for these firms whether or not the input producing industries receive production subsidies or not. What matters are the domestic prices for the inputs in question, even though those prices would clearly be higher in the absence of production subsidies for the input producing industries. A distinction is apparent between the costs to firms and the costs to society as a whole. But, since it is the costs of producing facing firms that are at issue in analyzing resource pulls, it is necessary to make adjustments in the estimates. Therefore, the implicit tariffs, and not the implicit nominal rates of protection, should be used to estimate the tax effect component of effective protection. Accordingly, our estimating equation is expressed as

$$(7.4) \qquad g_j = \frac{P_{IMPj} - \sum_i a_{ij} \left(\frac{1+t_{IMPj}}{1+t_{IMPi}}\right) t_{IMPi}}{1 - \sum_i a_{ij} \left(\frac{1+t_{IMPj}}{1+t_{IMPi}}\right)} .$$

The technical coefficients used in our estimates of effective protection were derived from the 1970 IBGE input-output accounts (IBGE,1979). The difficulties in using these tables are readily apparent. During the period 1970-1981 industrial output has nearly tripled, and accompanying changes in industrial structure are strongly evidenced. Moreover, during the period there were significant changes in relative prices, particularly of energy inputs. Despite these problems, it is necessary to use the 1970 input-output accounts for any detailed study involving input structure in Brazil, such as for example the estimation of effective protection. There is simply no disaggregated and viable alternative with Brazilian data. While IBGE is planning to up-date the coefficients with the results of the 1975 economic census, this information was not available for our analysis, nor is it expected until 1982. One can note that with the firm cost structure data gathered in the FIPE survey, the estimation of effective protection for a number of assorted individual products was undertaken. These results, while not reported here, were in general consistent with our aggregated 4 digit level estimates made with the input-output accounts.

Of the 87 sectors in the 4 digit A' matrix 72 are ostensibly traded goods producing sectors. A greater level of disaggregation did not prove possible.[2] The Corden method was employed to deal with problem of nontraded inputs.These sectors accordingly are incorporated into

[2] The IBGE 87x87 A' matrix is estimated as the product of two rectangular matrices. Conceivably, through changing the order of multiplication, an A' matrix of 160x160 could be generated. This, however, proved impossible for us because of the nature of one of the rectangular matrices and the difficulty in making the appropriate adjustments. More recently, this has been accomplished by Frederico de Carvalho. See his "Matrizes de Coeficientes Técnicos-Brasil 1970:Uma Nota", FUNCEX, unpublished paper, May 1981. A logical extension of the present reasearch would be a further disaggregation, as well as estimations with up-dated technical coefficients.

value added.[3]

II. EFFECTIVE PROTECTION ESTIMATES

The basic estimates of effective protection for domestic market sales are presented in Appendix Table A7.1 for 72 tradable goods sectors. More aggregated figures, at the 2 digit level along with still larger aggregates, are provided in Table 7.1. The ranking of the sectors in Appendix Table A7.1 according to effective protection rates provides an idea of the relative ordering of those sectors to the extent that they have been benefitted or discriminated against by economic incentive policies with respect to their domestic market sales. The Primary Agriculture sector, consisting of Forestry and Fishing, Agriculture, and Livestock and Poultry, is seen to be discriminated against in the domestic market with a rate of effective protection of -8.2 percent. Agriculture itself, on the average, appears to be somewhat less discriminated against but still displays a negative rate of effective protection for domestic market sales. Within agriculture it is clear that considerable disparities exist in effective protection rates across products, or even farms, owing to the way in which the substantial financial subsidies are awarded.

For the manufacturing sector as a whole the average rate of effective protection for domestic market rates was computed to be 45.0 percent (Table 7.1).While this average figure appears modest in

3 Had the Balassa method of dealing with nontraded inputs been employed, our estimates of effective protection would have been slightly higher. We feel, however, that the Corden method is more appropriate.

Table 7.1

EFFECTIVE PROTECTION ESTIMATES FOR DOMESTIC MARKET SALES,

2 DIGIT LEVEL, 1980-81

Industry	Effective Protection Estimate (%)	Effective Protection Decomposition		Net Effective Protection Estimate (%)
		Subsidy Effect (%)	Tax Effect (%)	
Mining	- 4.2	- 3.9	0.3	-19.4
Non-Metallic Minerals	-19.6	-21.4	- 1.8	-32.3
Metallurgy	34.2	20.1	-14.1	12.9
Machinery	93.3	95.3	2.1	62.7
Electrical Equipment	129.3	144.4	15.0	93.0
Transportation Equipment	- 6.5	- 8.2	- 1.6	12.7
Lumber & Wood Products	17.7	- 8.3	-26.0	- 0.9
Furniture	52.7	50.8	- 1.9	28.5
Paper	-18.5	-24.4	- 6.0	-31.3
Rubber	-21.4	-20.3	1.1	-33.8
Leather	13.9	19.3	5.4	- 4.2
Chemicals	86.4	87.8	1.4	56.9
Pharmeceutical Products	116.3	122.2	5.9	82.1
Perfumary	91.6	80.3	-11.3	61.3
Plastics	28.3	38.7	10.4	8.0
Textiles	36.7	44.2	7.5	15.1
Apparel	46.7	63.8	17.1	23.5
Food Products	26.1	8.4	-17.7	6.2
Beverages	- 1.1	- 7.8	- 6.8	-16.8
Tobacco	5.7	1.7	- 4.0	-11.0
Printing & Publishing	31.9	32.6	0.6	11.1
Miscellaneous	171.7	172.5	0.8	128.7
AVERAGES[1]				
Primary Agriculture[2]	- 8.2	- 7.7	0.4	-22.8
Manufacturing	45.0	41.3	- 3.7	24.7
Capital Goods	63.3	67.5	4.2	51.0
Intermediate Goods	46.0	40.5	- 5.5	22.9
Consumer Goods	34.2	28.5	- 5.7	13.0

Notes: 1. Value added weights of 1979 are used for aggregating from the four digit to two digit level and for computing the more aggregated means.

2. Includes Forestry and Fishing, Agriculture, and Livestock and Poultry

Source: Appendix Table A7.1.

relation to the potential effective protection possible in the absence of tariff redundancy, it masks considerable disparities in the rates for individual sectors,or sector aggregates..As was also evidenced with our measure of implicit nominal protection, the reverse cascade effect is apparent in effective protection. Capital goods in general receive the highest rates of effective protection for domestic market sales. Protection for that sector would appear higher still if Transportation Equipment, including automobile production, were excluded from the capital goods average.

As indicated, the effective protection averages themselves are a bit misleading because of the considerable variation in the estimated rates across sectors. At the 4 digit level, incorporating 72 tradable goods sectors, it is seen that some sectors are benefitted through very high rates of effective protection. Among those sectors receiving the highest rates of domestic market effective protection are Dairy Products, Machine Parts, Electronic Equipment, Miscellaneous Manufacturing, Electric Equipment,and Alcohol. A total of 16 out of the 72 estimated sectors displayed effective rates of protection greater than 100 percent.(Table 7.2) In addition to the Primary Agricultural sectors, sectors heavily discriminated against in the domestic market through the exercise of economic policies include Trucks and Buses, Vegetable Oils and Oilseed Products, Coke and Coal Derivations, and Wood Pulp. Some 27 sectors possessed negative rates of effective protection for domestic market sales. In any case, the disparities in the rates between sectors are very high. The existence of such great disparities in the protection system is entirely consistent with the empirical evidence derived from other semi-industrialized economies.

Table 7.2

FREQUENCY DISTRIBUTION OF PROTECTIVE MEASURES

Range of Protection (%)	Nominal Legal Tariff 1980		Implicit Nominal Protection		Effective Rate of Protection		Net Effective Rate of Protection	
	Number of Sectors	(%)	Number of Sectors	(%)	Number of Sectors	(%)	Number of Sectors	(%)
< 0	0	0	30	42	27	39	33	47
0-25	3	4	15	21	9	13	12	17
25-50	13	18	11	15	9	13	8	11
50-75	15	21	7	10	8	11	6	9
75-100	10	14	7	10	3	4	4	6
>100	31	43	2	3	14	20	7	10
Total	72	100	72	100	70[1]	100	70	100

Note: 1. Those 2 sectors for which negative value added at world prices was calculated were omitted from the computations. These two sectors accordingly displayed very high effective protection and would presumably fall into the category with effective protection net effective protection rates greater than 100 percent.

Source: Appendix Tables A6.1 and A7.1.

It is apparent from Table 7.1 and Appendix Table A7.1 that in most cases the great part of the effective protection is derived from the subsidy effect element in the effective protection computation. The tax effect element is generally rather small, indicating that in general Brazilian industry,and agriculture, are not disproportionately adversely affected from having to acquire inputs at greater than world prices. There are, of course, some exceptions to this generalization. Such sectors such as Synthetic Fiber Textile Products, Apparel, Communications Equipment, and Plastics are among those with tax effects amounting to greater than 10 percent on a value added basis. The use of production subsidies for input producing industries had kept domestic prices down and in doing so has benefitted the user industries.

For many industries, including the manufacturing average, the tax effect is negative. In other words, many industries are benefitted by being able to purchase inputs at prices beneath world prices. The effect of this of course ceteris paribus is to increase effective protection. In fact, this characteristic of a negative tax effect element has been a major component of Brazilian industrial policy. Input prices are kept down so as to serve as an incentive to user industries. Direct production subsidies have been used to offset, and in some instances overcome, the disincentive inherent to the input producing industries. Those industries especially benefitting from policies maintaining less than world prices for their inputs include, among others, alcohol, the basic metal producing industries, lumber and wood, paper, basic textile processing, and the food product industries.

In general, these are industries that are intensive users of primary or agricultural products.

III. CORRELATIONS AMONG DIFFERENT PROTECTION MEASURES

Previous studies of protection in Brazil and other countries have found significant positive correlations among the various measures of protection.[4] Table 7.3 presents the results of Spearman rank correlations among the different protection measures that we have developed and estimated for Brazil. While the import-weighted nominal tariffs, the realized tariffs, and the nominal legal tariffs are demonstrated to all be positively related, it is clear that the tariff schedules, or tariff information, do not provide an accurate picture of the protection actually present through the operation of market forces and other, non-tariff, policy measures.[5] The nominal legal tariffs, for instance, possess no correlation with the implicit tariffs, implicit nominal protection, or rates of effective protection for the domestic market. For its part, effective protection is seen to be significantly positively correlated to implicit nominal protection, the implicit tariffs, and both the subsidy and tax effect components of effective protection.[6]

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[4] See Guisinger and Schydlowsky (1971), Bergsman and Malan (1971), Tyler (1976), Little, Scitovsky and Scott (1970) and Balassa and Associates (1971).

[5] The exception to this is the realized tariff rates. As indicated in Table 7.3, significant positive correlations were evidenced between realized tariffs, on the one hand, and effective protection, implicit tariffs, and implicit nominal protection, on the other.

[6] Regressing the effective protection rates over sectors on the rates of implicit nominal protection, the following equation was estimated

$$g_j = 20.0 + 1.4 t_j$$
$$(11.61)$$

$$R^2 = .66.$$

Table 7.3

SPEARMAN RANK ORDER CORRELATION COEFFICIENTS BETWEEN DIFFERENT DOMESTIC MARKET PROTECTION MEASURES, 72 TRADABLE GOODS SECTORS (n=72)

	Import Weighted Nominal Tariff, 1979	Realized Tariff Rate, 1979	Nominal Legal Tariff, 1980	Potential Effective Tariff Protection Rate,1980	Implicit Tariff Rate, 1980-81	Implicit Nominal Protection Rate, 1980-81	Effective Protection Rate, 1980-81	Subsidy Effect Component of Effective Protection 1980-81	Tax Effect Component of Effective Protection 1980-81
Import-Weighted Nominal Tariff, 1979	-								
Realized Tariff Rate, 1979	.43**	-							
Nominal Legal Tariff,1980	.59**	.21**	-						
Potential Effective Tariff Protection Rate,1980	.65**	.35**	.88**	-					
Implicit Tariff Rate, 1980-81	.15	.28**	.10	.12	-				
Implicit Nominal Protection Rate, 1980-81	.08	.28**	.00	.00	.97**	-			
Effective Protection Rate, 1980-81	.01	.20**	-.01	-.01	.86**	.88**	-		
Subsidy Effect Component of Effective Protection , 1980-81	.05	.21**	.02	-.03	.90**	.93**	.92**	-	
Tax Effect Component of Effective Protection, 1980-81	.01	.13	.03	.01	.43**	.47**	.36**	.49**	-

Note : ** indicates significance at the 5 percent level.

IV. NET EFFECTIVE PROTECTION

The effective protection estimates presented above were made at existing exchange rates. Yet the existence of the protection system implies an exchange rate different from that which would prevail under a free trade regime. Domestic market protection allows the governmental authorities to maintain an overvalued exchange rate. The point of reference for trade policy analysis should be one of the country's true social opportunity costs. That point of reference should involve a free trade regime, an equilibrium exchange rate, and macroeconomic policies undertaken to pursue internal stability. This means that our effective protection estimates should be adjusted for exchange rate overvaluation associated with the prevailing set of trade policies. The result of this adjustment, insofar as domestic market protection is concerned, can be referred to as net effective protection.

Incorporating the effects of exchange rate overvaluation (or conceivably, undervaluation), the net effective rate of protection(g'_j) for domestic market sales can be written as

$$(7.5) \qquad g'_j = \frac{R}{R^*}(1+g_j) - 1$$

where R and R* are the prevailing official and shadow exchange rates, respectively. In the case exchange rate overvaluation, i.e., R*>R, the net effective rate of domestic market protection (g'_j) for a given industry j will be less than the effective rate of protection (g_j).

The problem, of course, is determining what an equilibrium, or shadow, exchange rate would be. There is a literature on the subject,

and some estimating procedures do exist.[7] By and large, these procedures consitute measures of the trade flow impact of existing trade policy distortions. Problems arise with the consideration of capital account movements in the balance of payments, the formulation of domestic monetary policies, nontradable goods, and protection in trading partners. Elasticity considerations are important as well, and any shadow exchange rate estimates prove quite sensitive to measures of domestic trade policy distortions.

In our analysis we have used the shadow exchange rate estimate of a recent study by Roberto Incer.[8] Employing the Bacha-Taylor estimating formulation, Incer estimated a shadow exchange rate premium of 18.8 percent over the prevailing official rate for 1981. It is this figure that we have employed.

Our estimates of net effective protection for domestic market sales are presented in Column 4 of Table 7.1 and Appendix Table 7.1. Adjusting for exchange rate overvaluation, it is clear that the discrimination borne by Primary Agriculture is substantial; a weighted average rate of net effective protection for the domestic market was calculated as -22.8 percent for that sector. For the manufacturing sector as a whole the average was 24.7 percent. As is of course the case with our effective protection estimates for domestic market sales,the net effective protection estimates show considerable variance between sectors. It can be noted in Table 7.2 that 33 out of 72 sectors displayed negative

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[7] See Bacha and Taylor(1971), Balassa (1974) and UNIDO(1972).

[8] Roberto Incer, "Brazil: Shadow Exchange Rate Estimation for 1980-85", unpublished paper, May 1981.

rates of net effective protection. Presumably these are the sectors that would benefit the most from any dismantling of the protection system.

V. THE STRUCTURE AND IMPACT OF DOMESTIC MARKET PROTECTION

The industry ranking of effective protection possesses important implications for the allocation of economic resources. The theory of effective protection suggests that resources will be pulled into those econmic activities receiving high effective protection and out of those receiving low effective protection. In a two good general equilibrium model this result is clear. A problem, however, arises in the general equilibrium context when there are many products. The ranking of the industries, while describing the protection received through economic policies, may not entirely predict resource flows resulting from protection or its elimination.[9] Demand considerations and the effects of changes in factor prices can only be incorporated in a general equilibrium framework. These objectives notwithstanding, it can nevertheless be argued that in general terms the ranking of effective protection should provide an approximate indication of the overall direction of resource pulls. This appears to be most unequivical at the extremes of the range of effective domestic market protection.

We have attempted to examine some of the domestic market protection, along with its structure, through carrying out some simple bivariate statistical tests. Pearson and Spearman correlations were undertaken between the protection measures, on one hand, and variables reflecting

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[9] For general equilibrium treatments of the theory of effective protection see Bhagwati and Srinivasan (1973), Ramaswami and Srinivasan (1971), and Taylor and Black (1974). See also Giannetti(1978).

economic performance and structure, on the other, for our cross-section of 72 tradable goods sectors. The results of these tests are reported in Table 7.4. For comparison purposes, correlations with the tariff rates are presented alongside of those with implicit nominal protection and effective protection. Because of the ordinal nature of the problem and the accompanying difficulties in interpreting the cardinality relationship between the variables concerned, we feel that the Spearman correlation coefficients are more meaningful and representative of the relationships we seek to explore. The Pearson coefficients are nevertheless presented for comparison purposes.

There is some evidence, although flawed, to suggest that protection and profitability are positively related, as hypothesized from the theory of effective protection. Both our measures of implicit nominal protection and effective protection are significantly positively correlated with the ratio of gross profits per unit of output.(Table 7.4) For this correlation result to be meaningful, however, it is necessary to assume that the profitability pattern existent in 1970 over industries was the same in 1980-81. Since our measure of profitability captures all the returns to capital, and is therefore a measure of capital intensity as well, the profitability pattern, at least as we have measured it, is likely to be fairly stable over time.[10]

Reflecting any possible increase in profitability resulting from domestic market protection, one would expect, as hypothesized by the

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[10] Alternatively, for our results to hold, it could be assumed that the structure of protection has not changed since 1970. This assumption, however, is unrealistic.

Table 7.4

CORRELATIONS BETWEEN DOMESTIC MARKET PROTECTION MEASURES AND ECONOMIC STRUCTURE AND PERFORMANCE VARIABLES, 72 TRADABLE GOODS SECTORS

	Nominal Legal Tariff Rate		Implicit Nominal Protection Rate		Effective Protection Rate	
	Pearson	Spearman	Pearson	Spearman	Pearson	Spearman
Exports to Output Ratio, i.e., E/X, 1979	-.14	-.03	-.12	-.06	-.08	.01
Imports to Total Available Domestic Supply Ratio, i.e., M/Z, 1979	-.39**[3]	-.49**	.32**	.40**	.20**	.25**
Value Added Growth Rate:						
1970-74	-.02	.01	.16*[4]	.24**	.03	.16*
1974-79	.15*	.07	-.13	.01	.01	.08
1970-79	.07	.06	-.04	.18*	.02	.19**
Value Added to Labor Ratio, i.e., V/L^1	-.35**	-.38**	.09	.09	.07	.09
Average Wages	-.34**	-.39**	.26**	.32**	.11	.18*
Direct Labor Inputs per Output Ratio, i.e., L/X^1	-.09	.32**	-.10	.14	-.13	.06
Direct and Indirect Labor Inputs per Output Ratio, i.e., L^*/X^1	.03	.29**	-.38**	-.38**	-.04	-.15*
Profits per Output Ratio, i.e., $\pi/X^{1,2}$	-.09	-.10	.22**	.36**	.06	.22**
Wages Cost per Value Added Ratio, i.e., W/V^1	.10	.12	.20**	.16	.03	.05

Notes:
1. Variables were calculated from information in the 1970 IBGE input-output accounts.
2. Profits were calculated as a gross residual, including all returns to capital.
3. ** indicates signficance at the 5 percent level.
4. * indicates significance at the 10 percent level.

theory of effective protection, to find a positive association between effective protection and output growth over industries. This association is suggested in Table 7.4. Significant positive Spearman coefficients were evidenced between both implicit nominal and effective protection and value added growth for the 1970-79 period.[11] For the 1970-74 subperiod this association was also evident. It is, however, disconcerting that there is no apparent relationship between protection and growth during the 1974-79 subperiod. This is precisely the period for which one would expect to find the strongest association.

The association between domestic market protection and import substitution are noteworthy. A strong negative relationship between legal tariff rates and the ratio of imports to total available domestic supply is evidenced in Table 7.4. The latter variable measured for 1979, depicts the degree of import substitution that has occurred and the possibilities for future import substitution. For those sectors which have inherently completed all possible import substitution, i.e.,possessing an M/Z approaching 0, very high legal tariffs can be observed. The tariff system, while presently anachronistic, was in fact used in the past as a primary instrument to promote import substitution and industrial development. Presumably at some point the presently observed tariff redundancy did not exist. The appearence of widespread redundancy, as evidenced by comparing our implicit tariff estimates with the legal tariff rates, has been a characteristic of Brazilian industrial growth in the past twenty-five years. Accompanied with the closing of the future prospects for further

[11] Appendix Table A7.2 presents the computed annual value added growth rates for the 72 tradable goods sectors used in our analysis.

import substitution, the development of tariff redundancy can be viewed as evidence to a certain degree of success in import substitution. Sectors which have received heavy protection in the past have grown and become more efficient. Those sectors which have undergone the import substitution process have seen their relative prices fall.

Table 7.4 also demonstrates that those sectors possessing the greatest possibilities for further import substitution, i.e., high M/Z's are those sectors receiving the most protection, both in nominal and effective terms. All the relevant Pearson and Spearman correlation coefficients are positive and significant. The domestic market protection system does appear to be heavily geared to import substitution. The protection system is not random and does in fact possess a logic.[12] At the same time, however, the magnitude of some of the effective protection estimates inidcates that the welfare costs of this strategy can be substantial.

The theory of protection predicts that a country will seek to protect its scarce factors of production. In the Brazilian case one accordingly would expect to find that the structure of protection favors physical and human capital intensive industries. This expectation is in fact supported by the empirical evidence. As indicated above, our measured profit rate variable can also be

[12] By the same taken, it is clear from Table 7.4 that the legal tariff system presently possesses no coherent logic or structure.

regarded as a measure of physical capital intensity. As seen in Table 7.4, it is significantly positively correlated with both nominal and effective protection. While our data base does not possess a reliable measure of physical capital, the variable value added to labor (V/L) is frequently used as a proxy of the capital-labor ratio.[13] The correlations between V/L and both nominal and effective protection, while positive, are not statistically significant. Stronger evidence is apparent with our proxy measure of human capital intensity. For the latter, in keeping with notions of human capital and reasonably efficient labor markets, we have used average wages. This variable is seen to be significantly positively related to both nominal and effective protection.Accordingly,one can conclude that the Brazilian system of domestic market protection favors human capital. Analysing the factor intensity structure of protection can also be approached from the opposite direction through an examination of the relationship between labor intensity and protection. Table 7.4 shows a negative and significant relationship between the ratio of total,direct and indirect, labor requirements per unit of output and both nominal and effective protection. It thus appears that labor and especially unskilled labor, is disprotected by the domestic market protection system. The distributional implications of the domestic market protection structure are apparent in both economic and political terms.

[13] This widespread empirical shortcut dates from Lary (1968).

Appendix Table A7.1

EFFECTIVE PROTECTION ESTIMATES FOR DOMESTIC MARKET
SALES, 4 DIGIT LEVEL, 1980-81

IBGE Code	Industry	Effective Protection Estimate (%)	Effective Protection Decomposition		Net Effective Protection (%)
			Subsidy Effect (%)	Tax Effect (%)	
0101	Forestry and Fishing	-38.9	-39.3	- 0.5	-48.5
0201	Agriculture	- 1.1	0.4	1.5	-16.8
0301	Livestock and Poultry	- 8.0	-10.1	- 2.1	-22.6
0501	Mining	- 4.6	- 4.3	0.3	-19.7
0502	Combustible Mineral Extraction	- 0.7	- 0.4	0.3	-16.4
1001	Cement	-29.2	-32.1	- 2.9	-40.4
1002	Glass Products	27.1	32.9	5.7	7.0
1003	Other Non-Metallic Mineral Products	-26.0	-28.9	- 2.9	-37.7
1101	Pig-Iron, Iron Alloys & Primary Steel	33.0	- 1.2	-34.2	11.9
1102	Iron & Steel Sheets	21.9	11.0	-10.9	2.6
1103	Iron & Steel Castings	105.9	93.8	-12.1	73.3
1104	Non-Ferrous Metals	- 0.5	- 5.0	- 4.5	-16.3
1105	Miscellaneous Metal Products	50.6	48.1	- 2.5	26.7
1201	Pumps and Engines	73.1	81.2	8.0	45.7
1202	Machine Parts	259.7	263.1	3.4	202.8
1203	Industrial Equipment & Machinery	91.6	94.3	2.7	61.3
1204	Agricultural Equipment & Machinery	6.6	7.2	0.7	-10.3
1205	Office & Domestic Use Equipment & Machinery	- 2.7	4.8	7.5	-18.1
1206	Tractors	-40.0	-47.6	- 7.7	-49.5
1301	Electric Energy Equipment	32.2	33.6	1.4	11.3
1302	Electric Wire & Cables	62.7	61.2	- 1.5	36.9
1303	Electric Equipment	157.0	161.9	4.9	116.3
1304	Electrical Machinery & Appliances	119.8	125.5	5.7	85.0
1305	Electronic Equipment	229.3	241.6	-12.3	177.2
1306	Communications Equipment	147.6	183.8	-36.1	108.4
1401	Automobiles	-23.5	-26.6	- 3.1	-35.6
1402	Trucks and Buses	-58.7	-65.4	- 6.7	-65.2
1403	Motors & Vehicle Parts	-11.0	-13.0	- 2.0	-25.1
1404	Shipbuilding	71.3	78.1	6.9	44.2
1405	Railway Equipment & Other Vehicles	28.6	28.5	- 0.2	8.3
1501	Wood	17.7	- 8.3	-26.0	- 0.9
1601	Furniture	52.7	50.8	- 1.9	28.5
1701	Wood Pulp	-34.2	-43.4	- 9.3	-44.6
1702	Paper	10.6	0.6	-10.0	- 6.9
1703	Paper & Paperboard Products	-34.4	-36.7	- 2.3	-44.7
1801	Rubber	-21.4	-20.3	1.1	-33.8
1901	Leather & Leather Products	13.9	19.3	5.4	- 4.2
2001	Chemical Elements & Compounds	128.0	130.8	2.9	91.9
2002	Alcohol	148.7	19.3	-129.3	109.3
2003	Petroleum Refinig	64.4	63.4	- 1.0	38.4
2004	Coke & Coal Derivatives	-43.0	-47.0	- 4.0	-52.0
2005	Chemical Resins & Fibers	137.1	147.4	10.3	99.6
2006	Vegetable Oils & Oilseed Products	-50.5	-56.2	- 5.7	-58.4
2007	Pigments & Paints	83.5	91.9	8.4	54.5
2008	Miscellaneous Chemical Products	139.2	145.7	6.4	101.4
2101	Pharmeceutical Products	116.3	122.2	5.9	82.1
2201	Perfumary & Soaps	91.6	80.3	-11.3	61.3
2301	Plastics	28.3	38.7	10.4	8.0
2401	Basic Textile Processing Products	21.2	- 0.5	-21.7	2.1
2402	Synthetic Fiber Textile Products	16.3	33.4	17.1	- 2.1
2403	Natural Fiber Textile Products	52.0	57.6	5.5	28.0
2404	Other Textile Products	38.2	49.3	11.1	16.3
2501	Apparel	41.7	62.6	20.8	19.3
2502	Footwear	60.3	67.2	6.9	35.0
2601	Coffee Bean Products	-38.4	-52.7	-14.2	-48.2

Appendix Table A7.1

EFFECTIVE PROTECTION ESTIMATES FOR DOMESTIC MARKET

SALES, 4 DIGIT LEVEL, 1980.81

IBGE Code	Industry	Effective Protection Estimate	Effective Protection Decomposition		Net Effective Protection
			Subsidy Effect	Tax Effect	
		(%)	(%)	(%)	(%)
2602	Processed Coffee Products	v.h.[1]	--	--	--
2603	Processed Rice	-22.4	-34.3	-11.9	-34.7
2604	Wheat Flour	-42.4	-35.7	6.7	-51.5
2605	Other Vegetable Products	100.4	73.7	-26.7	68.6
2606	Meat Products	37.7	21.8	-15.8	15.9
2607	Poultry Products	22.9	-15.7	-38.6	3.4
2608	Prepared Fish Products	104.4	11.1	-93.3	72.1
2609	Dairy Products	278.7	251.8	-26.9	218.7
2610	Crude Sugar Products	-62.7	-68.5	- 5.8	-68.6
2611	Refined Sugar	-82.0	-110.3	-28.2	-84.9
2612	Bakery & Pastry Products	-53.8	-70.9	-17.1	-61.1
2613	Edible Oils & Fats	v.h.[1]	--	--	--
2614	Other Food Products	-21.4	-28.3	- 7.9	-33.8
2701	Beverages	- 1.1	- 7.8	- 6.8	-16.8
2801	Tobacco Products	5.7	1.7	- 4.0	-11.0
2901	Publishing and Printing	31.9	32.6	0.6	11.1
3001	Miscellaneous Manufactured Products	171.7	172.5	0.8	128.7

Note: 1. Value added in world prices was calculated as negative, indicating very high estimates for effective protection.

Source: Computed from implicit nominal protection estimates. For a description of the methodology employed see text.

Appendix Table A7.2

VALUE ADDED ANNUAL GROWTH RATES, 4 DIGIT LEVEL, 1970-79

IGBE Code	Industry	Value Added Annual Growth Rates[1] (%)		
		1970-74	1974-79	1970-79
0101	Forestry and Fishing	6.8[2]	3.7	5.1
0201	Agriculture	6.8[2]	3.7	5.1
0301	Livestock and Poultry	6.8[2]	3.7	5.1
0501	Mining	20.0	5.5	11.7
0502	Combustible Mineral Extraction	2.2	3.2	2.8
1001	Cement	12.9	9.3	10.9
1002	Glass Products	11.5	12.5	12.0
1003	Other Non-Metallic Mineral Products	26.9	6.6	15.2
1101	Pig-Iron, Iron Alloys & Primary Steel	10.9	10.2	10.5
1102	Iron & Steel Sheets	16.6	12.3	14.2
1103	Iron & Steel Castings	26.8	4.5	13.9
1104	Non-Ferrous Metals	13.5	9.4	11.2
1105	Miscellaneous Metal Products	24.0	7.3	14.4
1201	Pumps and Engines	30.5	19.4	24.2
1202	Machine Parts	5.4	-12.0	- 4.7
1203	Industrial Equipment & Machinery	24.0	0.9	10.6
1204	Agricultural Equipment & Machinery	45.1	1.0	18.7
1205	Office & Domestic Use Equipment & Machinery	22.4	6.7	13.4
1206	Tractors	19.6	4.3	10.9
1301	Electric Energy Equipment	12.1	5.2	8.2
1302	Electric Wire & Cables	24.7	3.3	12.3
1303	Electric Equipment	15.8	7.3	11.0
1304	Electrical Machinery & Appliances	20.2	11.2	15.1
1305	Electronic Equipment	24.9	- 0.2	10.3
1306	Communications Equipment	24.2	10.5	16.4
1401	Automobiles	29.9	2.9	14.1
1402	Trucks and Buses	10.9	2.9	6.4
1403	Motors & Vehicle Parts	59.0	8.6	28.6
1404	Shipbuilding	- 4.9	13.8	5.1
1405	Railway Equipment & Other Vehicles	17.1	- 0.7	6.8
1501	Wood	19.5	6.6	12.1
1601	Furniture	19.6	6.6	12.2
1701	Wood Pulp	35.4	7.0	18.8
1702	Paper	14.6	5.6	9.5
1703	Paper and Paperboard Products	15.2	6.0	10.0
1801	Rubber	18.5	5.3	11.0
1901	Leather & Leather Products	18.3	6.6	11.6
2001	Chemical Elements & Compounds	17.9	8.0	12.3
2002	Alcohol	0.3	43.0	22.2
2003	Petroleum Refining	12.8	4.3	8.0
2004	Coke & Coal Derivations	8.9	10.3	9.6
2005	Chemical Resins & Fibers	27.7	8.0	16.3
2006	Vegetable Oils & Oilseed Products	11.5	11.2	11.3
2007	Pigments and Paints	27.4	7.4	15.9
2008	Miscellaneous Chemical Products	27.2	7.8	16.0
2101	Pharmaceutical Products	19.2	4.7	10.9
2201	Perfumary & Soaps	12.3	10.1	11.1
2301	Plastics	23.3	13.8	17.9

Appendix Table A7.2

VALUE ADDED ANNUAL GROWTH RATES, 4 DIGIT LEVEL, 1970-79

IBGE Code	Industry	Value Added Annual Growth Rates[1] (%) 1970-74	1974-79	1970-79
2401	Basic Textiles Processing Products	- 1.5	0	- 0.7
2402	Synthetic Fiber Textile Products	7.5	8.0	7.8
2403	Natural Fiber Textile Products	10.1	1.0	5.0
2404	Other Textile Products	12.1	2.4	6.6
2501	Apparel	18.3	6.1	11.4
2502	Footwear	7.3	2.7	4.7
2601	Coffee Bean Products	9.9	6.1	7.7
2602	Processed Coffe Products	18.1	7.8	12.3
2603	Processed Rice	9.9	6.0	7.7
2604	Wheat Flour	6.8	7.5	7.2
2605	Other Vegetable Products	20.7	12.3	16.0
2606	Meat Products	2.8	1.2	1.9
2607	Boultry Products	32.6	12.9	21.3
2608	Prepared Fish Products	5.2	3.1	4.0
2609	Dairy Products	8.9	1.0	4.4
2610	Crude Sugar Products	6.4	4.5	5.4
2611	Refined Sugar	9.4	4.4	6.6
2612	Bakery & Pastry Products	13.5	6.6	9.6
2613	Edible Oils & Fats	9.5	10.4	10.0
2614	Other Food Products	11.6	5.8	8.3
2701	Beverages	12.8	7.7	9.9
2801	Tobacco Products	7.1	6.5	6.8
2901	Publishing and Printing	19.5	6.6	12.2
3001	Miscellaneous Manufactured Products	19.5	6.6	12.2

Notes: 1. The growth rates were computed on an annually compounded basis.

2. For sectors 0101, 02Q1, and 0301 only aggregated estimates were available from the national income accounts. Our analysis proceeds on the assumption that growth for the 3 primary agricultural sectors was equal.

Source: Computed from IBGE estimates.

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