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Brazil
Industrial Policies and Manufactured Exports

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GLOSSARY OF ACRONYMS

BEFIEX	-	Comissão Para Concessão de Benefícios Fiscais a Programas Especiais de Exportação (Special Program of Fiscal Incentives for Exporters)
BNDE	-	Banco Nacional do Desenvolvimento Econômico (The National Bank of Economic Development)
CACEX	-	Carteira de Comércio Exterior (Foreign Trade Department, Bank of Brazil)
CDI	-	Conselho de Desenvolvimento Industrial (Industrial Development Council)
EMBRAMEC	-	Empresa Brasileira de Indústria Mecânica
FINAM	-	Fundo de Investimentos da Amazônia (Amazon Investment Fund)
FINAME	-	Agência Especial de Financiamiento Industrial (Special Agency for Industrial Financing)
FINEX	-	Fundo de Financiamiento à Exportação (Export Financing Fund)
FINOR	-	Fundo de Investimentos do Nordeste (Northeast Investment Fund)
FUNCEX	-	Fundação Centro de Estudos do Comércio Exterior (Center of International Trade Studies)
IBGE	-	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
ICM	-	Imposto Sobre Circulação de Mercadorias (State Value added tax)
IPI	-	Imposto de Produtos Industrializados (Federal Industrial Product Tax)
ISIC	-	International Standard Industrial Classification
NBM	-	Nomenclatura Brasileira de Mercaderias (Brazilian External Trade Classification)
SUDAM	-	Superintendência do Desenvolvimento da Amazonia (The Superintendency for the Development of the Amazon Region)
SUDENE	-	Superintendência do Desenvolvimento do Nordeste (The Superintendency for the Development of the Northeast)

BRAZIL

INDUSTRIAL POLICIES AND MANUFACTURED EXPORTS

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This report is based on the findings of a mission which visited Brazil during July/August 1981. The mission comprised Messrs. M. Peñalver (mission chief) C. Dahlman, R. Incer and M. Reyes (all of the Bank), Mr. E. Bolte (UNIDO/WB Coop. Prog.) and Mr. W. Tyler (consultant).

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INTRODUCTION

This report summarizes the findings of a World Bank mission that visited Brazil in July/August 1981. The main purpose of the mission was to review Brazil's trade policy with respect to manufacturing industry and its impact on industrial efficiency and manufactured export growth. In addition, a brief review of the main features of the manufacturing sector during the decade of the 1970s, including its structure and performance, was also prepared as background information for the review of trade policies in 1980 and 1981. The mission also reviewed the Brazilian experience with policies to promote and regulate the development and acquisition of industrial technology and their impact on output and exports.

The report is organized in three separate parts. The first part, comprising Chapters 1 to 4, provides background on Brazilian industrial development during the 1970s and some major features of the earlier process of industrialization. These chapters are mainly descriptive and are based on available statistical material and earlier reviews of the industrialization process. This part of the report also includes a quantification of the sources of industrial demand growth for the decade of the 1970s, separating the contributions of import substitution, domestic demand expansion and export expansion. The calculation, using the Brazilian input-output table, updates previous available studies covering the period up to 1971.

Part II constitutes the main body of the report and includes a review of trade policies during the last decade, concentrating on a quantification of the relative incentives for production oriented towards the domestic market and for exports. Export incentive rates are calculated at the level of each industrial subsector for the period 1979-1981. Industrial protection is measured on the basis of direct price comparisons and related to sub-sectoral profit rates. The estimates of protection and export incentives for each industrial subsector are converted to net terms applying a shadow exchange rate,and are compared to obtain a measure of the net pro- or anti-export bias implicit in the overall set of trade policies.

The third part of the report (Chapters 9 to 11) reviews Brazilian technology policy, including development of human resources, basic R & D, industrial technology and technology transfer. Their impacts on the production and export of several categories of industrial goods, and the experience of three subsectors of the capital goods industries are presented. The three case studies exemplify the main types of technological transfer, based on domestic R & D, direct investment by multinational companies, and imports of technology by domestic firms.

The policy analysis and recommendations in the report focus on the main policy variables influencing the export competitiveness and profitability of industrial products, namely the exchange rate, the level of protection and the level of export incentives. The report does not attempt to elaborate all possible policy implications and recommendations but to present, in an organized fashion, the main information and analytical tools to be considered in the preparation and evaluation of policy alternatives. In addition to the main policy recommendations mentioned in the report, more detailed policy papers could be prepared, on the basis of the main findings presented in this report and of further analytical work of a more limited subsectoral or regional scope.

SUMMARY AND CONCLUSIONS

PART I. MANUFACTURING PRODUCTION AND EXPORT PERFORMANCE

Structure and Performance of the Manufacturing Sector

i. Brazilian industrialization started in the last decade of the nineteenth century, mainly in the São Paulo area. At the beginning of the decade of the 1920s, Brazil had a well established industrial sector and had achieved considerable import substitution, with an overall import ratio of 36 percent. Further growth during the 1930s led to a drop in the import ratio to 20 percent by 1939. By that time, most consumer goods subsectors, including garments and footwear, food and beverages, textiles, leather, furniture and wood products, had import ratios below 10 percent.

ii. In the two decades following World War II, Brazil experienced a very substantial process of import-substituting industrialization. From 1945 to 1962 industry grew at an average rate of 8 percent p.a. fueled by large inflows of direct foreign investment (particularly from 1956 to 1961) and by public sector investment in manufacturing. During this period, industrial growth took place under a foreign exchange constraint that was delayed, but not eliminated, by the inflow of foreign investment, and by increasing foreign borrowing which resulted in the external debt increasing from less than 50 percent of annual exports in the years 1947-1948 to more than double annual exports by 1962-1966. During this period, total commodity exports increased by only 1.3 percent p.a., and manufactured exports (excluding food) were less than 5 percent of total exports by 1964. The inward-oriented development of the 1950s and early 1960s resulted in the apparent paradox of a very heavy dependence of the Brazilian economy on the small foreign sector, through the high level of external indebtedness and heavy debt service obligations.

iii. The economic policies applied between 1964 and 1967 were directed to correct the internal and external disequilibria that had developed during the previous years, and laid the foundations for the rapid growth of the 1967-1973 period. A stabilization program with fiscal and monetary restraint was adopted, while a policy of frequent mini-devaluations aimed at maintaining a stable real exchange rate was also established. Export incentives were introduced and a certain amount of import liberalization took place. The stabilization program resulted in reduced growth rates of GDP (3.9 percent p.a.) and of industry (3.6 percent p.a.) during these years.

iv. From 1967 to 1973, manufactured output grew at an unprecedented rate of 12.9 percent p.a., manufactured exports grew at an average of 36 percent p.a. and the import ratio for manufacturing increased from an all-time low of 6 percent in 1964 to 7 percent in 1967 and 10.3 percent in 1971. The main factors behind this very rapid growth include the expansionary fiscal and monetary policies followed after 1967, the existence of a high degree of unutilized capacity in the manufacturing sector, and a favorable international scenario.

v. In the years following the oil crisis, and until 1980, the Brazilian economy continued to experience rapid growth, although at reduced rates. Between 1974 and 1980, Brazilian manufactured output grew at an annual rate of 6.8 percent, with GNP growing at an average of 7.1 percent p.a. The economic policies followed after 1974 implied a departure from those followed from 1964 to 1973 and included a return to an active import-substitution strategy, particularly in capital goods and intermediates, while maintaining the structure of export incentives virtually unchanged. The new import-substitution drive was accompanied and supported by an ambitious program of public sector investments largely designed before the consequences of the oil price increases were felt.

vi. By 1979, manufacturing accounted for 28 percent of Brazilian GDP, and traditional industries (food, beverages, tobacco, textiles, garments, footwear, furniture and printing) accounted for only 34.5 percent of manufacturing value added, down from nearly 50 percent in 1962. Public sector firms accounted for 22.5 percent of the total equity of manufacturing firms, and foreign firms had an equal share. However, in 1971 the share of government firms was only 18.5 percent, whereas that of foreign firms was 34.4 percent. Thus, the decrease in the share of foreign ownership was accompanied by increases in both public sector and domestic private sector ownership.

vii. Employment in the manufacturing sector increased from 8.6 percent of the economically active population in 1960, to 15 percent in 1976. Total employment in manufacturing rose from 1.7 million in 1960 to 3.6 million in 1975. Employment growth was much faster in the 1967-1973 period (9 percent p.a.) than in the 1973-1980 period (4 percent p.a.). Available data on output growth and employment elasticities show that the higher employment generation during the earlier period was the result not only of more rapid industrial growth, but also of the more labor-intensive character of such growth, mainly as a result of the different product mix.

viii. Industrial activity is highly concentrated in the southeast region, and this concentration has increased during the last four decades. However, geographical concentration may have peaked in 1960 and declined afterwards. The first government measures to achieve higher geographical distribution of economic activities took place in the early 1960s. The share of the southeast in total manufacturing value added decreased from 79 percent in 1960 to 76 percent in 1975. The ground lost by the southeast was reflected by increases in the south and center-west regions. At the same time, the north increased slightly its share in manufacturing, but the share of the northeast continued to decrease.

ix. Since the establishment of SUDENE (Superintendency for the Development of the Northeast) and SUDAM (a similar agency for the north region), fiscal and financial incentives have been the main instruments used to stimulate the industrialization of these two regions. Fiscal incentives include exemptions from federal income tax, federal and state sales taxes, and tariff exonerations for capital goods and equipment without similars in the country. By investing in corporations installed in the northeast or north regions, Brazilian firms may offset up to 50 percent of their income tax liabilities and individuals up to 45 percent of their taxable income. In addition to the fiscal incentives, the north and northeast regions also receive special financial incentives (subsidized credit).

x. Industrial growth in the north and northeast regions after 1960 has been considerable. However, when compared to the other regions, their performance is disappointing. The share of the northeast in the manufacturing value added fell from 16.8 percent in 1960 to 6.6 percent in 1975, and the share of the north region increased from 1.1 percent to 1.2 percent. Thus, in spite of the special incentives, the north has barely kept in step with the overall industrial growth for the country, whereas the northeast has fallen well behind.

Manufactured Exports and Sources of Demand Growth

xi. Manufactured exports (including semi-manufactures) have increased enormously during the last fifteen years, from US$284 million in 1965 to US$11.4 billion in 1980. During the same period, their share in the country's total exports increased from 18 percent to nearly 57 percent. While growing very fast in absolute and relative terms, Brazilian manufactured exports are still a small part of the country's manufactured output, about 8-9 percent in 1979. In addition, Brazil is one of the countries with the lowest percentage of exports in GDP, 7 percent in 1979.

xii. Brazil's export share in total world trade increased slightly during the last decade, from nearly 1 percent in 1970 to 1.1 percent in 1980, and its share in the world trade in manufactured products performed much better, increasing three-fold between 1965 and 1978 (from 0.22 percent to 0.64 percent). When compared with other developing countries, Brazil's share of manufactured exports (excluding food) increased from 3.4 percent in 1965 to 6.7 percent in 1978 (after reaching 7 percent in 1975).

xiii. A major feature of Brazil's manufactured export performance has been a process of diversification away from agriculture-based products. In 1970, over 80 percent of the manufactured exports (using the ISIC classification) were agriculture-based products whereas this share was less than 50 percent in 1979. The five products with the largest absolute increase in the 1970-1979 period - oils and fats, other food products, motor vehicles, iron and steel, and grain products - were also the five most important exports in 1979. The non-agriculture-based exports contain a wide variety of items directed toward highly diversified export markets. The bulk of consumer-oriented products are exported to the industrial countries, while exports of capital goods are concentrated on developing countries. Growth of manufactured exports to the developing and centrally planned economies was considerably higher than to the industrialized market economies during the 1970s.

xiv. In spite of very high growth rates and a sizable volume of exports in a number of products, manufactured exports are still a small share of manufactured output (8 to 9 percent depending on which classification is used). If the food industry is excluded, the share goes down to 5.2 percent. However, the incremental contribution of exports is higher, at about 12.5 percent of the increase in output between 1975 and 1979. Industries with high export ratios include processed food, footwear, transport equipment, some categories in the non-electrical machinery industry, textiles, clothing and pulp and paper.

xv. Manufactured exports increased by 30 percent in current US$ terms in 1980 and by 25 percent during the first half of 1981. However, when food and petroleum products are excluded (the latter are mainly the difference between the output mix of Brazilian refineries and the pattern of domestic demand), the situation changes completely for the first half of 1981, when the growth rate of the more narrow group of manufactured exports fell to 15 percent. This may have been a reflection of the loss of competitiveness of Brazilian exports, as a result of the appreciation of the cruzeiro during 1980 and early 1981, coupled with the reduction or elimination of fiscal and financial incentives in late 1979. Faster devaluation of the cruzeiro and increases in fiscal and financial incentives since mid-1981 had a positive impact on exports during the second half of the year.

xvi. The relatively small share of exports in the output of most manufacturing firms is mainly due to the historical character of the industrialization process, oriented to supply the large and fast growing domestic market. In addition to this historical reason, the overall policy framework, particularly the administrative and control apparatus, continue to have a negative impact on trade in industrial goods. A large part of the administrative limitations to imports and exports have their origin in the exchange control regulations, which are in turn due to the balance of payments difficulties faced by Brazil.

xvii. The three sources of industrial demand growth (import substitution, domestic demand expansion, and export expansion) have played changing roles during the last two decades. Import substitution was very important until 1964, when the import ratio stood at an all-time low of 6 percent, but became negative through 1974, when the import ratio increased to nearly 12 percent. Afterwards, a renewed import-substitution drive resulted in a decrease of the import ratio to less than 7 percent in 1979. Export expansion had a positive contribution during the whole period, as indicated by the constant increase in the share of exports in industrial output from 2 percent in 1964 to 5.7 percent in 1970 and about 9 percent in 1979.

xviii. A quantification of the direct and indirect impacts of each of the three sources of growth indicates that, during the period 1970-1974, there was negative import substitution of about 8.4 percent of total output growth, whereas export expansion accounted for 12 percent of total growth and growing domestic demand accounted for more than 96 percent of total growth. During the most recent period of 1974-1979, import substitution became positive, accounting for 4.3 percent of growth, whereas export expansion accounted for 9.3 percent and domestic demand growth for 86.5 percent. An industry-by-industry analysis shows considerable variations, but the basic pattern remains the same. In the first subperiod, consumer products had the largest contribution from export expansion (18 percent). During the 1974-1979 period, the role of export expansion was very similar in the three subsectors (capital, intermediate, and consumer goods). Import substitution was highest in capital goods (nearly 9 percent) and also important for intermediates (6 percent), but was zero for consumer goods.

PART II. TRADE POLICY, PROTECTION AND COMPETITIVENES OF BRAZILIAN INDUSTRY

xix. Industrial and trade policies since early 1979 have been characterized by intermittent attempts to liberalize the economy through simultaneous real devaluation of the cruzeiro, and reduction of import protection and export subsidies. However, this long-term policy has been reversed several times in the face of short-term problems and exogenous shocks. A gradualist approach adopted in January 1979, included an accelerated crawling peg to achieve a real devaluation of 25 percent over four years, gradual reductions in tariff and non-tariff barriers to imports and export subsidies, but was abandoned in late 1979 as a result of the impact of the oil price increases and of higher-than-expected inflation. In December of the same year, a policy package tried to achieve the same results through a "maxi-devaluation" of 30 percent, one-step elimination of fiscal incentives and the imposition of an export tax on major commodities.

xx. The new approach taken in December 1979 was practically abandoned in early 1980 by the announcement that devaluation during the year would be limited to 40 percent irrespective of annual inflation. The accompanying limit on "monetary correction" and the resulting negative interest rates produced an upsurge in the velocity of circulation of money. This, together with the growing fears of another maxi-devaluation, combined to generate an unprecedented increase in the rate of inflation, which exceeded 100 percent for 1980, as well as another large deficit in the trade account, reaching US$2.8 billion. With an overall growth of GDP of 8 percent in real terms, and a similar growth of industry, the economy was clearly overheated. Imports increased by close to 28 percent in current US$ terms, and the current account deficit was US$12.2 billion.

xxi. Since the beginning of 1981 the government introduced a much tighter control over monetary and credit expansion as well as public sector expenditures. At the same time, a more flexible policy of frequent mini-devaluations reflecting domestic inflation, and other measures to eliminate more structural sources of disequilibria were adopted (they included gradual removal of price controls, and some reductions in subsidized credit). Also, there was an increase in the surcharge import tax, in import controls and in export credit, and the fiscal subsidy to exports was reintroduced.

xxii. All main economic indicators showed a considerable cooling-off of the economy in 1981. Industrial production fell by more than 5 percent during the year, and unemployment increased in all major metropolitan areas. At the same time, inflation showed some signs of abating, and imports fell by nearly four percent in current US$ terms. The decrease in production was particularly localized in the industrial sector and more specifically in a number of industrial subsectors including transport equipment (the most affected industry), capital goods and consumer durables. Production of wage goods was the least affected. Continuing export growth, combined with the reduction of imports, resulted in a balance-of-trade surplus of US$1.2 billion for 1981.

Export Incentives

xxiii. The system of incentives to manufactured exports was established during the years of economic liberalization of 1964-1967, and reinforced in later years (mainly 1968 to 1972) to compensate for the loss of competitiveness from the revaluation of the cruzeiro in real terms. The tax reform of 1965 replaced the previous cascading sales tax by two value-added taxes, thus allowing for an effective exemption of indirect taxes on exports. The tax and duty draw-back system was established in 1966 and went into operation in 1969. Three different procedures are used, including restitution of duties paid, exemption of duties and taxes on imports to exporters who have paid duties and taxes on previously imported items, and suspension of such duties and taxes on the basis of an agreement to use the imports for export production.

xxiv. Other main fiscal incentives to exports include BEFIEX, a system of enterprise-specific export incentive packages based on long-term export commitments (generally 10 years), and the export tax credit (crédito prêmio). BEFIEX was established in 1972 and has been used by a small number of large exporters, mainly in the automotive sector. The crédito prêmio, introduced in 1969, was abolished as a general incentive in December 1979 (except for some firms under BEFIEX agreements), and was reintroduced in April 1981. Before the 1979 devaluation the rate of crédito prêmio was related to the IPI and ICM tax rate for each product, whereas since April 1981 it has a uniform rate of 15 percent of the FOB value of exports. The subsidy rate will be reduced to 9 percent at the end of 1982 and it is scheduled to be completely eliminated by the end of March 1983. Also, profits made on export sales are not subject to corporate profit tax.

xxv. The quantification of export incentives for the most recent years indicates that, prior to its elimination in December 1979, the crédito prêmio was the largest single incentive, amounting to US$1.1 billion in 1979. In the same year, duty draw-backs amounted to US$350 million, benefits under BEFIEX were US$273 million, income tax reductions US$203 million and other incentives were US$43 million. In 1980, the elimination of crédito prêmio for all firms except automotive firms under BEFIEX programs reduced its total amount to US$240 million, and US$460 million were granted under the draw-back system. BEFIEX benefits were US$383 million, income tax reductions US$313 million and other fiscal incentives US$55 million.

xxvi. Total fiscal incentives in 1980 had a nominal amount of US$1.5 billion, and manufactured exports reached a total of US$11.4 bilion. Thus, the nominal incentive rate was about 12.7 percent. However, the real value of those incentives to exporters was lower than its nominal value because of delays in the payments of crédito prêmio, the incidence of corporate income tax on such payments, and the redundancy in many of the tariff levels rebated under the BEFIEX and draw-back systems. An estimation of the real value of such fiscal export incentives shows a decrease in the average rate of adjusted fiscal incentives to 9.3 percent. Similar calculations at a more disaggregated level show a very large range of variation in the incentive rate across subsectors, particularly in 1980 when the main beneficiaries of the incentive system were the firms under BEFIEX.

xxvii. Several export-financing mechanisms are also in operation. The Fund for Export Financing (FINEX), a government fund managed by the Central Bank and operated by CACEX, provides pre- and post-shipment financing for firms producing capital goods or other export products with long production periods (18 months or more). In addition, the Resolution 674 program provides pre-shipment financing on highly subsidized terms to firms producing a wide range of products for export. CACEX issues certificates of entitlements to participating firms for a percentage of their export volumes (ranging from 12 to 40 percent of exports). These certificates are then used to obtain the financing from commercial banks, which discount the documents at the Central Bank. The credit volumes approved under Resolution 674 were US$1.9 billion in 1979, US$1.8 billion in 1980, and US$2 billion in the first half of 1981.

xxviii. A quantification of the subsidy element in export financing under Resolution 674 indicated an average subsidy rate of 11.5 percent of manufactured exports in 1980 and of 12.7 percent in 1981. (The latter is probably an underestimation as it was based on the assumption that little or no additional financing would be approved in the second half of the year.) The range of financial incentive rates among industries indicated considerable variations, but less than in the case of fiscal incentives.

Protection

xxix. The medium and long-term prospects of Brazilian industry depend on its overall efficiency and its ability to compete domestically and abroad. The existence of high tariff and non-tariff barriers to imports reduces or even eliminates the pressure of foreign competition. Under many circumstances, this may result in a pattern of industrial growth which includes inefficiencies and/or monopolistic profits, misallocation of resources and, in the medium and long run, less than optimal growth. This is particularly the case in small countries where the reduced size of the market does not allow for plants of minimum efficient size, or where there is no room for effective domestic competition to develop. It is also relevant in large countries for subsectors where the need to achieve economies of scale prevents domestic competition, or where the country's resource endowments are not well suited for such production.

xxx. A study of effective protection in Brazil for 1966 and 1967, relying mainly on nominal tariff levels but also using some direct price comparisons, found an average nominal rate of protection, in 1967, of 48 percent, and an effective rate of 66 percent. Consumer goods had the highest rates (70 percent nominal and 101 effective), with intermediate goods having protection levels very close to the average and capital goods having nominal and effective protection rates below the average. This structure of protection rates is common to many studies of protection in developing countries, particularly when the studies are based on tariff levels, and results from a tariff structure which includes higher tariffs for consumer goods than for intermediate and capital goods, and widespread tariff exemptions for the latter two categories. This situation is typical of countries with advanced import substitution in the consumer goods industries and little or no production of capital goods. While this may have been partly the situation in Brazil in the mid-1960s, it is not the case today. Also, it is conceivable that redundancy had developed already in

the tariff structure, exaggerating the cascading structure of protection. Subsequent studies of effective protection, prepared during the 1970s and based also on import tariffs, continued to show a similar structure of protection, and somewhat reduced levels.

xxxi. However, a new estimation of nominal and effective protection to industry, based on direct price comparisons as of late 1980 and early 1981, shows that the traditional cascading structure of protection no longer appears. The difference between domestic and world prices is similar for consumer and capital goods, and the average price difference for intermediate goods is much lower. Furthermore, after adjustments for production subsidies are made, the structure of nominal protection rates is the opposite of the traditional pattern. Capital goods receive the highest nominal protection level (38 percent), intermediate products have an average nominal protection rate close to the average for manufacturing (23 percent), and consumer goods have the lowest rate at 13 percent. The estimates of effective protection confirm the structure found at the nominal protection level, with effective protection rates of 60 percent for capital goods, 42 percent for intermediate goods, and 36 percent for consumer goods.

xxxii. The 1980-81 averages of effective protection may appear modest, especially when compared to the earlier, yet very different, studies for Brazil. One cannot conclude, however, that the welfare costs to the Brazilian economy are therefore modest. What matters is not so much the average rates across subsectors but rather the dispersion in the subsectoral rates. Since this dispersion is considerable, it can be concluded that the allocative costs of the Brazilian protection systems are also considerable.

xxxiii. All the estimates above were obtained by using the official exchange rate prevailing in Brazil at the time the price comparison was made. However the exchange rate itself was affected and partly determined by trade policy distortions such as the export incentives reviewed above and import protection. Therefore, a more relevant indication of the competitiveness of the industrial sector would be provided by the net effective protection rates, calculated by using the exchange rate that would prevail in the absence of distortions (the shadow exchange rate). Given the levels of export incentives and import protection, the shadow exchange rate for 1980 was estimated at 16.7 percent above the actual exchange rate (implying an overvaluation of 16.7 percent in the official exchange rate. When the shadow exchange rate is used, average net effective protection for manufacturing drops to 23 percent, ranging from 37 percent for capital goods to 16 percent for consumer goods.

xxxiv. At the subsectoral level, there is considerable variation in the net effective rates of protection, with 7 industries receiving negative net protection (transport equipment, non-metallic minerals, paper, rubber, leather, beverages and tobacco) and several industries receiving high protection (pharmaceutical products 85 percent, electrical equipment 82 percent, perfumes 64 percent, chemicals 60 percent, machinery 52 percent). The above estimates provide support to the view that, during the late 1960s and the 1970s, the very fast growth of Brazilian industry resulted in considerable gains in the degree of competitiveness of many subsectors. The reversed structure of protection with respect to the one found in 1967

is also consistent with this view, as the capital goods industries having lower degrees of competitiveness are the more recently established, have relatively smaller markets and are subject to lower presures from domestic competition. However, the existence of very high rates of protection in industries such as perfumes and pharmaceuticals points to some of the problems derived from the present trade policy system which effectively prevents all foreign competition.

xxxv. To ascertain to what extent higher net effective protection estimates are related to higher costs and therefore lower efficiency at the plant level, it is also necessary to look at the profit rates of the corresponding subsectors. Profit rates for 1979 show considerable variance among subsectors. Practically all traditional consumer industries showed high profit rates in 1979, despite low or negative protection, a further indication of their efficiency levels. Among intermediate products, the wood industry also showed negative protection and high profit rate, whereas metallurgy showed low protection and low profit rate. In the capital goods industries, the highest protection is received by electrical equipment, which also showed a high profit rate, whereas the non-electrical machinery industry showed a low profit rate, partly as a result of several large firms experiencing low levels of capacity utilization. A surprising result emerges in the pharmaceutical industry, where the highest rate of protection was accompanied by the lowest profit rate in the sector.

Industrial Policy Impact

xxxvi. The estimates of nominal protection reviewed above indicate the extent by which domestic prices for domestically sold products exceed world prices, whereas the estimates of export incentives measure the amount by which the prices received by the producers of exported goods exceed the world prices of such goods. When these two indicators are compared for a specific industry or product, it is possible to estimate the relative incentive to sell in the domestic or the export markets. The results of this comparison for Brazil indicate an average anti-export bias for the manufacturing sector as a whole of 2 percent in 1980, with 11 out of the 21 industrial subsectors showing a pro-export bias. The highest relative bias in favor of exports appears in the transport equipment industry. High pro-export biases are shown also in the paper, rubber, non-metallic minerals and processed-food industries. Large anti-export biases occur in the pharmaceutical products, chemicals, perfumes, printing and publishing, machinery, and furniture industries. In 1981, export incentives increased substantially with the reintroduction of the crédito prêmio and the increase in subsidized export financing. As a result, the anti-export biases probably decreased for all subsectors. One of the main conclusions of this comparison is that the impact of current trade policies in terms of relative incentives to sell domestically or abroad varies enormously among industries.

xxxvii. The pro- or anti-export bias is a measure of the relative incentive to sell in the domestic or foreign market, but it is not necessarily correlated with the absolute level of incentive received by the industry. In the Brazilian case, with production going overwhelmingly to the domestic market, the best measure of the absolute incentive is the rate of net effective protection which also presents large variations among industries.

xxxviii. An overall consideration of the impact of the trade policies reviewed above indicates that the average levels of protection and export incentives for manufacturing are moderate, if overvaluation of the exchange rate is taken into account. In addition, the review of the performance of Brazilian manufacturing during the last decade shows high growth of output and an impressive growth of manufactured exports. However, there are several aspects of the current policy environment that are cause for concern, as they may have negative effects on growth and resource allocation within and outside the industrial sector.

xxxix. The first area of concern refers to the interrelations between protection levels, export incentives and exchange rate. The high levels of incentives required to compensate the overvaluation represent a considerable fiscal cost. In addition, since import protection does not take place through tariffs but mostly through non-tariff restrictions, the system of protection and incentives does not generate the resources to cover its own costs. Also, the high level of nominal export incentives generate protectionist reactions in the importing countries.

xl. A second area of concern refers to the wide dispersion of protection and export incentive rates among industries. While some of these differences reflect consciously adopted policy priorities to develop specific industries, there are many instances that do not appear to be properly explained in these terms. The variation in the net rates are often the unintended result of an accumulation of policy mechanisms, whose overall impact at the subsectoral level is not generally well known to the policy makers, and is often not consistent with a growth pattern that takes full advantage of the country's comparative advantages. In some instances, specific incentives have been shown to produce undesirable side effects, as was the case with the previous structure of the crédito prêmio, which discriminated against labor-intensive subsectors.

xli. Finally, the very high level of potential protection resulting from the reliance on high tariff rates and, particularly, on non-tariff barriers, allows the subsistence of pockets of inefficiency. The subsistence of such inefficient industries, increasingly apparent when a more disaggregated analysis is carried out, has a considerable cost in terms of growth and allocative efficiency. A related problem arising from the administrative complexity of the protection and incentive system is the discrimination against smaller firms that do not have the resources to be fully informed of the complexities of the system, to process the applications for incentives and to find their way through the bureaucratic mechanisms.

xlii. Brazil's industrial strategy for the next decade and, particularly, for the next four to five years revolves around the performance of its external sector. The balance-of-trade deficits of 1979 and 1980, added to the high debt-service payments, resulted in a current account deficit of more than US$12 billion in 1980. While the stabilization measures taken in 1981 have already produced a trade surplus, imports during 1981 should be considered abnormally low, and should be expected to grow considerably when economic activity starts to recover. With manufactured exports accounting already for about 60 percent of total exports, a high growth rate of the former is a pre-requisite of sustainable growth in the next few years. The required growth of manufactured exports would face increasing difficulties

and could probably not be achieved under the policy framework that prevailed during most of the 1970s. The heavy reliance on direct export subsidies might cause increasing retaliatory actions from importing countries while imposing a heavy fiscal cost at home, providing widely diverging effective incentive rates to individual industries and discriminating against smaller firms. At the same time, the maintenance of an overvalued exchange rate (partly as a result of the trade distortions) would require the maintenance of the complex structure of tariff and non-tariff barriers to imports which, although largely redundant, allow for the continuation of some inefficient industries and often reduce the access of Brazilian firms to specific inputs or equipment at international prices or quality levels.

xliii. To encourage the rapid growth of output and exports in line with Brazil's comparative advantages and resource endowments, the focus of trade policy during the next years should be an exchange rate policy that would achieve a gradual devaluation of the cruzeiro in real terms. This should be accompanied by a realignment of export incentives and protection measures, in order to reduce their dispersion among sectors, and to reduce their average levels as the real devaluation is achieved. While the reduction in the average protection levels should at least equal the real rate of devaluation, the average export incentive levels should be allowed to increase in net terms in order to reduce or eliminate anti-export biases. The above measures should be accompanied by a review of the mechanisms and procedures under which the export incentives and protection are granted in order to simplify the system and to make it more automatic and less discriminatory across industries and across firms. This policy review should also include a review of several industrial subsectors that have been the target of special programs since the mid-1970s, to ascertain the impact of the programs, the competitiveness achieved by these industries and their prospects in the medium and long term.

PART III. TECHNOLOGICAL DEVELOPMENT AND MANUFACTURED EXPORTS

xliv. Among Latin American countries, Brazil has given the most explicit attention to the role of technology in economic development and to the stimulation of technological development through government policy. Before 1968, most of the effort on the creation of a technological infrastructure focussed on institution building and human resource development. Beginning in 1968, scientific and technological development became a specific policy objective, articulated mainly by the National System of Scientific and Technological Development (SNDCT) and the National Fund for Scientific and Technological Development (FNDT). The latter soon became the principal instrument for the implementation of S & T policy. While it is difficult to estimate the total amounts spent on S & T, because there is no accurate source of information for non-federal spending, it appears that approximately 1 percent of GNP was spent in 1976. Perhaps as much of half of the total funds were utilized to buy equipment for R & D centers and for the training of researchers and professors.

xlv. Regulation of technology started in 1962 with the obligation to register payments for such transfers with the Central Bank. After 1971, the National Institute of Property Rights (INPI) took over from the Central

Bank the control of agreements on transfer of technology. While INPI established many detailed regulations covering all aspects of technology transfer agreements, it appears that in practice it has been difficult to adequately implement them, because of differences between the contracting parties and the regulators. This suggests that government policy may be most helpful in providing information on alternatives, encouraging thorough evaluation and selection procedures, and assisting in the bargaining process.

xlvi. The main instrument used in Brazil to encourage the development of technological capabilities has been the provision of subsidized financing by FUNTEC, a special fund created within BNDE, and FINEP, a specialized financing institution. During the first 10 years of operations (1964-1974), FUNTEC activities concentrated in funding post-graduate training for scientists and engineers. After 1974, FUNTEC gave priority to programs to strengthen the technological activities of local firms. FINEP was established in 1967 to help finance the first steps in any new ventures (mainly feasibility and project studies). In 1971 FINEP was made the executing agency for FNDCT, and in 1973 its scope was expanded through two new programs to support local consulting firms and the technological development of national enterprises. In 1975 FINEP became the secretariat of a coordinating commission for the purchase of local capital goods by state enterprises. FINEP's first activity account for nearly two thirds of its operations, but the program to support technological development of national enterprises has also been growing rapidly.

xlvii. Government policies to promote the demand for domestic technology have mainly taken the form of incentives to use domestically produced machinery and equipment. An important instrument to stimulate purchases of local capital goods has been subsidized financing provided primarily by FINAME, a subsidiary of BNDE. Protection to capital goods has also been provided through the Law of National Similars and the mechanisms developed for its application. These include a negotiation between CACEX, the investor wanting to import part of its equipment requirements, and representatives of the relevant domestic capital goods producers, to agree on the share of equipment to be imported and procured locally for the specific investment project.

xlviii. Brazilian technology policy has affected the supply and demand of local technology as well as as the purchase of foreign technology. The main thrust on the supply side has been on the development of the country's physical and human R & D infrastructure, the development of technological capabilities in local firms, and the regulation of contracts for the acquisition of foreign technology. The three main sources of supply of technological development, used in different degrees by individual industries, have been direct investment by subsidiaries of foreign multinational firms, local development of industrial technology based on local R & D infrastructure, often provided by the government, and acquisition of foreign technology by local firms. In the Brazilian experience, there are examples of the three types of development indicating considerable success, but for which a more complete cost-benefit analysis is not available. Three of these examples are those of the automotive industry strongly based on

multinational firms; the aircraft industry, which is a very successful example of local technological development; and the heavy capital goods industries, where some foreign firms coexist with large domestic firms largely dependent on acquisition of foreign technology.

PART I

MANUFACTURING PRODUCTION AND EXPORT PERFORMANCE

CHAPTER 1

ORIGINS AND RECENT PERFORMANCE OF THE MANUFACTURING SECTOR

The Origins of Brazilian Industrialization

1.01 Several recent studies of Brazil's economic history have pointed to the last decade of the nineteenth century as the starting point in Brazilian industrialization. 1/ Most of the industrial growth in the final years of the last century and early years of the twentieth century took place in the São Paulo area, and was spurred by the coffee boom which provided the sources of capital accumulation, a growing market in the form of growing incomes of the workers directly and indirectly related to the coffee economy, and a supply of skills and entrepreneurial spirit among the flow of immigrants into the area. As is common in this pattern of industrialization, basic manufactured consumer goods, particularly textiles, were the main beneficiaries of the process. However, developments in the mechanical industries can also be traced to this period, mainly in the form of repair shops for agriculture-related machinery. As an indication of the growth of the textile industry in this period, textile industry employment grew from 2,100 workers in 1895 to 26,400 in 1905 and 53,000 in 1907. The early burst of industrialization was also encouraged by the substantial depreciation of the exchange rate that took place during the 1890s and by some degree of tariff protection established primarily for revenue-earning purposes.

1.02 It appears that, at the beginning of the decade of the 1920s, Brazil had a fairly well established industrial sector and considerable import substitution had taken place. By 1919-1920, the ratio of manufactured imports to total supply of manufactured goods was down to 36 percent, and the ratio was below 10 percent for industries such as garments and footwear, furniture, and wood products. While similar data are not available for the pre-World War I period, the moderate growth rates of manufactured output during the 1911-1918 period indicate that such low import ratios may have existed as early as 1911. Manufacturing output grew more slowly between 1919 and 1932, averaging about 1.5 percent p.a., but some new industries such as chemicals and metallurgy registered substantial gains at the expense of the traditional industries such as textiles. The poor performance of the manufacturing sector during this period has been attributed to the unstable application of the main economic policy instruments, whose over-riding concern was the operation of the coffee price support program. The importance of the exchange rate policy during this period appears to have been considerable, as indicated by the growth of manufactured output that accompanied the currency depreciation period of 1921-1923.

1/ For instance, Villela, A. and Suzigan, W. "Política de Governo e Crescimento da Economia Brasileira, 1889-1945," IPEA/INPES Monografia No. 10, 1973. Also, Baer, W. and Villela, A. "Industrial Growth and Industrialization: Revisions in the Stages of Brazil's Economic Development", in The Journal of Developing Areas, Vol. 7, 1973. The discussion in this section follows the summary of the above studies presented in Tyler, W., Manufactured Export Expansion and Industrialization in Brazil, J.C.B. Mohr (Paul Siebeck), 1976.

1.03 A new period of rapid industrial growth started in 1933. From 1932 to 1939, manufacturing output grew at an average annual rate of 11.8 percent, and the cement, metallurgy, paper and textile industries grew particularly fast. By 1939, the ratio of imports to total supply of manufactures had dropped to 20 percent, and the subsectors where the ratio was below 10 percent had expanded to include also textiles, leather, food and beverages. Industrial growth continued during World War II, although at reduced rates, averaging 5.4 percent p.a., as a result of the lack of access to raw materials and, particularly, of capital goods. In the two years after the end of the war, the foreign trade liberalization and the overvalued exchange rate resulted in a large flow of imports, particularly of capital goods. Thus, when import controls were reestablished in 1947, the industrial sector had been able to renovate a large part of its obsolete equipment. The 1940s saw also the first instances of government participation in industrial production, with the establishment of the Companhia Siderúrgica Nacional in 1941 (as part of a long-term plan to establish an integrated steel sector) and several other firms justified on grounds of national sovereignty and/or strategic considerations as a result of World War II.

Industrial Development After 1945

1.04 In the two decades following the War, Brazil experienced a very substantial process of import-substituting industrialization. From 1945 to 1962 industry grew at an average rate of 8.0 percent p.a. Industrial output grew nearly four times, and the share of industry in GDP increased from 20 percent to about 26 percent. Also, the ratio of manufactured imports to total supply of manufactured products dropped from 14 percent in 1949 to only 6 percent in 1964. Since import substitution in the traditional goods industries had already advanced very far by the early 1940s (with all import ratios below 10 percent), the main changes took place in the intermediate goods industries and, particularly, in the durable consumer goods and capital goods industries which grew at very fast rates. Thus, between 1955 and 1964, the average growth rate for transport equipment was 25.1 percent p.a., for electrical machinery 20.7 percent p.a., chemical and pharmaceuticals 14.4 percent p.a., and metal products 10.4 percent p.a., whereas textiles grew 3.5 percent p.a., garments and footwear 1.4 percent p.a., and leather products 2.1 percent p.a. 2/ At the end of this period the structure of manufactured output had changed considerably, with the share of traditional industries (food, beverages, tobacco, textiles, garments, footwear, furniture and printing) dropping from 66 percent of manufacturing value added in 1949 to 46 percent in 1964.

1.05 The very fast industrial growth experienced from the late 1940s to the early 1960s was fueled by large inflows of direct foreign investment (particularly from 1956 to 1961) as well as public sector investment in manufacturing (mainly in the steel sector). Foreign investment was attracted by a large, rapidly growing and well protected domestic market, as well as by an attractive package of investment incentives offered by the government. Thus, in the late 1950s, a number of large multinational firms established opera-

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2/ The figures are from Baer, W., A Industrialização e o Desenvolvimento Econômico do Brasil, Fundação Getúlio Vargas, 1975.

tions in Brazil in the automotive sector and in a number of metallurgy, chemicals, and other industries. While many of these plants were of relatively efficient size, they were fully oriented to supply the domestic market, both in terms of their size and product composition, with practically no scope for exports, and the situation in the public investment projects was very similar. No data are available on the percentages of foreign and public sector ownership for the earlier period but in 1971, a survey indicated that foreign firms accounted for 34.4 percent of the equity of industrial enterprises, public sector firms controlled 18.5 percent, and domestic private firms had the remaining 47.1 percent (para. 2.08 below).

1.06 The period of industrial growth experienced by Brazil after World War II took place under a foreign exchange constraint that was delayed, but not eliminated, by the inflow of foreign investment described above, and by increasing foreign borrowing. Total commodity exports grew by only 1.3 percent p.a. in current US$ between 1947 and 1963, although there were substantial year-to-year variations, with very high export values during the coffee boom of 1951-53. Also, by 1962, manufactured exports (excluding food) were only US$84 million, less than 7 percent of total exports, whereas coffee accounted for 53 percent of total exports. Imports remained similarly constrained, growing by a very low 1.5 percent p.a. in current US$ during the same period. In spite of the declining share of imports in GDP, the inflow of foreign investment was not enough to close the current account deficit, and the external debt increased from an average of about US$590 million (less than 50 percent of annual exports) during 1947-48 to US$3.5 billion, more than double the average annual exports, during the 1962-66 period. Thus, the inward-oriented development of the 1950s and early 1960s resulted in the apparent paradox of a very heavy dependence of the economy on the small foreign sector (through the high level of external indebtedness and heavy debt service obligations). At the same time, a large domestic disequilibrium had developed through excess aggregate demand, and inflation increased from 26 percent p.a. in 1960 to 87.3 percent in 1964.

The Stabilization Program of 1964-1967

1.07 The economic policies applied between 1964 and 1967 were directed to correct the internal and external disequilibria that had developed during the previous years, and laid the foundations for the very rapid growth of the 1967-1973 period. Public sector expenditures were reduced through the elimination of subsidies, taxes were increased and tax collection improved, control over monetary and credit expansion was increased, monetary correction was established and the policy of mini-devaluations was introduced. While the above stabilization program was being carried out, other measures geared to reduce the inward orientation of the economy were also adopted. In addition to the more flexible exchange rate policy, exports were encouraged through the elimination of taxes, licensing procedures and other restrictions, as well as through the introduction of export incentives (both fiscal and financial). At the same time, a certain amount of import liberalization took place.

1.08 The stabilization period of 1964-67 resulted in low rates of growth of GDP (an average of 3.9 percent p.a.) and of industry (3.6 percent p.a.), while inflation also fell from 87 percent in 1964 to 27 percent in 1967. Imports and exports experienced some increases during these years, but after

1967 their growth became much faster. In fact, after 1967 industrial and overall economic growth accelerated substantially, as did manufactured exports. At the same time, the import ratio in a majority of industrial subsectors started to increase for the first time in the history of Brazilian industrialization. From 1967 to 1973, manufactured output grew at an unprecedented average rate of 12.9 percent p.a., manufactured exports grew at an average of 36 percent p.a. (for 1966-72), and the average import ratio for the manufacturing sector increased from an all-time low of 6 percent in 1964 to 7 percent in 1967 and 10.3 percent in 1971. As a result, the share of industry in GDP, which had remained constant at 26 percent between 1960 and 1967, jumped to 30 percent in 1972.

Brazilian Manufacturing in the 1970s

1.09 While the first few years of the 1970s belong to the 1964-1973 period of stabilization and opening up of the economy to international trade, the period after 1974 was characterized by a partial return to the inward-oriented industrialization policies which covered the two decades following World War II (paras. 1.4 to 1.6 above). There is a strong parallel in the type of industrial development followed, the policies adopted, the implications of the process and the problems created (particularly the external sector deficits arising from heavy debt service obligations). At the same time, the Brazilian industrial sector, and the economy as a whole, were very different in 1974 from 1945 and, therefore, there are also many dissimilarities in the two periods. The rest of this chapter briefly reviews the performance of the Brazilian manufacturing sector in the 1970s, while the next chapter explores other aspects of the manufacturing sector during these years.

Overall Performance

1.10 The performance of the Brazilian economy from 1968 to 1973 was impressive, with GDP rising at an average annual rate of about 11.5 percent and the industrial sector and the manufacturing industries growing at a rate of 13.2 percent and 13.9 percent, respectively (Table 1). The existence of a high degree of idle capacity in the manufacturing sector, the expansionary policies followed by the government, and a favorable international environment, contributed to the boom. The available data (Statistical Appendix, Table 2.5) shows that the index of capacity utilization for manufacturing industry increased from 83.0 percent in 1968 to 90.0 percent in 1973, with all industrial subsectors (except tobacco) experiencing substantial increases. In addition, favorable balance-of-payments conditions allowed continued importation of industrial raw materials and capital goods, causing an increase in the import ratio. Also, policy-makers took advantage of the existing domestic conditions by following an expansionist fiscal and monetary policy, which began to increase aggregate demand from 1967 onwards.

1.11 Another important factor in explaining the Brazilian boom of 1968-1973 is the international scenario of the period, which included a significant expansion of international trade by the developed countries and a high level of capital movements. Total exports increased from US$1.9 billion in 1968 to US$6.2 billion in 1973, while manufactured exports grew from US$0.4 billion to US$2.0 billion (Statistical Appendix, Table 3.2), reaching average annual growth rates of about 27 percent and 38 percent,

Table 1: GDP and Industrial Growth, 1966-1980
(Average annual percentage rates)

	1966/67	1968/73	1974/80
GDP	4.4	11.5	7.1
Industrial Sector	6.4	13.2	7.7
Manufacturing Industry 1/	7.0	13.9	6.8

Source: Statistical Appendix Tables 1.1 and 1.5

1/ Figures based on National Accounts. According to IBGE data, these rates are 6.8 percent and 13.3 percent for 1966/67 and 1968/73, respectively.

respectively. As a result, the share of manufactured exports in total exports rose from 20.3 percent in 1968 to 32.4 percent in 1973. In the same period, the share of total exports in GDP rose from 5.2 percent to 7.6 percent.

1.12 The growth of individual industries during the 1968-1973 period reflects the different impacts of the Brazilian "economic boom." Between 1968 and 1973 the output of consumer goods increased at an average annual rate of 11.9 percent, capital goods increased at 18.1 percent and the intermediate goods at 13.5 percent (Table 2). Durable consumer goods experienced the fastest growth with an average annual rate of 23.6 percent. The traditional consumer goods industries (food, beverages, tobacco, textiles, garments and footware) grew at an average of about 9 percent p.a., below the average growth rates for the sector as a whole but well above the historical rates of the previous two decades, as a result of growing domestic and export demand.

Table 2: Growth Rates for Industrial Categories
(Average annual percentage rates)

Industries	1966/67	1968/73	1974/80
Consumer Goods	4.8	11.9	5.0
a. Durables	13.4	23.6	7.7
Transport	13.1	24.0	3.3
Electric and Home Applicances	13.9	22.6	15.5
b. Non-Durables	3.6	9.4	4.5
Capital Goods	4.5	18.1	7.1
Intermediate Goods	10.8	13.5	8.3
TOTAL	6.8	13.9	6.8

Source: Statistical Appendix, Table 1.6

1.13 In the period following the oil crisis, the Brazilian economy did not reattain the growth rates of 1968-1973, but still experienced rapid economic growth. The GDP growth rate dropped from 13.9 percent in 1973 to 9.8 percent in 1974. In the following year this figure fell to 5.7 percent. Between 1974 and 1980, Brazilian GNP rose at an average annual rate of 7.1 percent, and the industrial sector and the manufacturing industry grew at annual rates of 7.7 percent and 6.8 percent, respectively (Table 1).

1.14 The decrease in the rate of growth of industrial output is reflected in the sectoral composition of the Net National Product (Statistical Appendix, Table 1.2). The industrial sector's share of NNP fell from 39.4 percent in 1974 to 36.9 percent in 1980, and the share of manufacturing dropped from 30.6 percent to 27.4 percent. The generalized slowdown of Brazilian industry was accompanied by a reduction in the degree of capacity utilization in manufacturing, which dropped from 88 percent in 1974 to 84 percent in 1980, and was only 78 percent in the first quarter of 1981 (Statistical Appendix, Table 2.5).

1.15 The deceleration of the manufacturing sector in the second half of the 1970s affected with different intensities the performance of individual industries. The growth rate of the durable consumer goods industry dropped from 23.6 percent p.a. (1968-1973) to 7.7 percent in the 1974-1980 period (Table 2), and the growth rate of the transport equipment industry fell from 24.0 percent to 3.3 percent. At the same time, the average annual growth rate of the capital goods industry dropped from 18.1 percent to 7.1 percent, mainly because of the decrease in public investment since 1977. The average annual growth rate of the intermediate goods industries also fell, from 13.5 percent to 8.3 percent. The slowdown in the manufacturing sector was also reflected in the indices of capacity utilization. In the machinery industry, the index fell from 92.3 percent in 1973 to 77.8 percent in 1979, and in the electrical communication equipment, it fell from 88.3 percent in 1973 to 79.3 percent in 1979. In general, this underutilization of capacity was the result of investments made during the years 1968-1973, based on expectations of lasting prosperity. Many investment projects started during the years of the boom reached maturity in the middle of an economic crisis, with tight domestic credit, an external economic recession, and a substantial drop in demand.

1.16 The economic policies followed in Brazil after 1974 implied a departure from those followed from 1964 to 1973, and were in many ways a return to those followed in the 1950s and early 1960s. After a moderate opening of the economy to foreign markets from 1964 to 1973, the oil price increases of 1973 and the resulting deterioration of the Brazilian terms of trade led to a defensive return to an import-substitution strategy, although this time mixed with the awareness of the need to continue expanding and diversifying manufactured (and other) exports. However, the new element in the industrial policy followed after 1974 was the return to import-substituting industrialization. The promotion of manufactured exports was a continuation of the policies established in the previous years (most of the instruments were established between 1967 and 1971) made more necessary by the sudden tightening of the country's foreign exchange constraint. After

several decades in which the manufacturing import and export ratios moved in the same direction (down from 1945, or even 1933, to 1963 and up from 1964 to 1973), they started to change in opposite directions after 1974. The ratio of manufactured imports to total domestic supply of manufactures, which had increased from 6 percent in 1966 to 10.3 percent in 1971 and 11.9 percent in 1974, fell again to 6.8 percent in 1979 (Table 19), whereas the ratio of manufactured exports to manufactured output, which had already increased from 2 percent in 1964 to 7 percent in 1974, continued to increase and reached 9 percent in 1979 (Table 20).

1.17 The emphasis on import substitution, particularly of capital goods, after 1974 was a combination of the expected high demand for such goods, to be partly generated by the ambitious public sector investment program, together with the suddenly tightened foreign exchange constraint faced by Brazil. The Second National Development Plan (1975-79) explicitly called for large investments in pulp and paper, petrochemicals, fertilizers, steel and non-ferrous metals, with the objective of reaching or approaching self-sufficiency by the end of 1979. However, the substantial curtailment in demand, particularly from the reduction of the public investment program, resulted in many industrial projects facing serious problems of idle capacity as soon as they were completed. Thus, the failure to recognize the medium-term impact of the 1973-74 external shocks on the demand growth of the Brazilian economy was responsible for the problems that started to develop in a number of capital goods producing industries as early as 1977, in spite of the increased barriers imposed to imports.

1.18 The emphasis on manufactured exports had its origins in the policy changes in the years 1967 to 1970 but was consolidated to a large extent by the BEFIEX agreements in the early 1970s, under which a number of firms (particularly in the automotive sector) undertook long-term export commitments (for 10-year periods) in exchange for a package of incentives which included duty-free imports of machinery and inputs, income and value-added tax exemptions and other fiscal subsidies (see Chapter 6 of this report for a detailed review of BEFIEX and other export incentives). The first wave of BEFIEX agreements started in 1971 and had been mostly completed by 1973, although new agreements continued to be negotiated. Thus, a very important source of the manufactured export expansion in the 1974-1980 period was based on policy decisions taken during earlier years. The BEFIEX agreements were also the main impulse for the renovation of the Brazilian automotive industry, which in the late 1960s and early 1970s was operating with inefficient plant sizes and obsolete equipment (see Chapter 11 below).

CHAPTER 2

STRUCTURE OF MANUFACTURING

Output and Value Added

2.01 In 1979, manufacturing accounted for 28.0 percent of Brazilian GDP, up from 26 percent in 1960, and the overall industrial sector accounted for 38 percent of GDP. These are very high figures for developing and industrialized countries' standards alike, reflecting a very advanced stage of industrialization of the economy. Brazil's share of manufacturing in GDP is only exceeded by 5 and equaled by 2 of the 76 developing countries for which data are presented in the 1981 World Development Report (WDR). Even more noticeable, only 4 of the 18 industrialized countries exceed Brazil's share of manufacturing in GDP. 3/

2.02 The structure of Brazilian manufacturing has experienced a substantial change during the last two decades. In 1962, industries other than traditional industries 4/ accounted for 50.8 percent of the value of manufacturing output, while in 1980 their share was 65.5 percent of the total. This change is explained almost completely by variations in the shares of only four industries: metallurgy, and chemical products, which increased; and textiles and food industries, which fell. Table 3 shows the main changes in the composition of manufacturing output in the past two decades.

2.03 In 1962, metallurgy and chemical products accounted for 20.5 percent of the total value of manufacturing output, while textiles and food products accounted for 34.3 percent. In 1980, the situation was just about the opposite, with the former industries producing 33.8 percent and the latter producing 21.1 percent of the total value of manufacturing output. All other industries experienced only marginal changes, except for machinery, whose share increased steadily from 2.9 percent in 1962 to 7.8 percent in 1976, and then decreased to 6.4 percent in 1980. Among traditional industries, only textile and food products have a significant participation in the total value of manufacturing output. Capital goods industries 5/ produced 17.3 percent of the value of the manufacturing output in 1962 and 19.4 percent in 1980.

3/ All figures in this paragraph are from the 1981 WDR. The developing countries with higher shares of manufacturing are Uruguay (31%), Portugal (37%), Argentina (37%) and Yugoslavia (31%), whereas Egypt and Singapore also have 28%. The industrialized countries with higher shares are Austria, Japan and the Netherlands (all 29%), and West Germany (38%).

4/ Traditional industries include food, beverages and tobacco, textiles, garments, footwear, furniture and printing.

5/ They include machinery, electrical and communications equipment, and transport equipment.

Table 3: Distribution of Value of Production by Industry
(Percent)

	1962	1973	1980
Traditional Industries	49.2	41.9	34.5
Wood	2.0	2.7	n.a
Furniture	1.7	1.8	n.a.
Leather	1.2	0.8	n.a.
Textiles	14.3	9.1	6.6
Apparel	3.3	3.5	4.0
Food	20.0	18.0	14.5
Beverages	2.2	1.6	1.1
Tobacco	1.3	0.8	0.7
Publishing and Printing	1.9	2.1	n.a.
Diverse	1.3	1.5	n.a
Other Industries	50.8	58.1	65.5
Non-Metallic Minerals	4.3	3.4	4.0
Metallurgy	10.7	12.2	16.7
Machinery	2.9	7.2	6.4
Electrical and Communications Equipment	4.8	4.9	5.4
Transport Equipment	9.6	8.9	7.6
Paper	2.7	2.8	2.8
Rubber	1.9	1.5	1.5
Chemical Products	9.8	12.1	17.1
Pharmaceutical Products	2.0	2.0	1.2
Perfumery	1.0	1.2	0.9
Plastic Products	1.2	1.9	1.9
TOTAL	100.0	100.0	100.0

Source: Statistical Appendix, Table 2.1.

Investment and Ownership

2.04 Total investment in manufacturing increased nearly four times between 1970 and 1979, growing at an average annual rate of about 15.5 percent in real terms (Statistical Appendix, Table 2.12). Acceleration of the growth rate of investment began at the end of the 1960s, partly as a response to the rising degree of capacity utilization generated by increasing aggregate demand. Also, new investment was partly the result of the increased role of public sector investment and of the substantial incentives given to investment in the period through 1975. Domestic production of capital goods was also stimulated by higher rates of depreciation granted to investors using locally produced equipment and through expanding activities

of the Special Agency for Industrial Financing (FINAME), a subsidiary of the National Bank for Economic Development (BNDE), established in 1965 to finance the purchase of Brazilian-produced capital goods.

2.05 The total amounts of investment in some manufacturing subsectors are shown in Table 4. In 1975, investment in metallurgy, machinery and paper more than doubled the amount of investment realized in 1973. Other industries, such as electrical and communication equipment and transport equipment, showed significant increments in the absolute amount of investment from 1974 onwards. For manufacturing as a whole, total recorded investment in current US dollars increased constantly from 1973 to 1978, when it reached an amount of US$4.1 billion, falling again to US$3.9 billion in 1979.

Table 4: Investment in Selected Industrial Sectors
(US$ million)

	1973	1974	1975	1977	1979
Metallurgy	479.6	925.5	1,065.8	948.3	1,160.5
Machinery	64.1	106.6	173.0	189.5	122.7
Electrical and Communication Equipment	140.9	151.4	156.2	166.8	174.5
Transport Equipment	349.8	417.1	489.3	460.2	567.1
Paper	37.5	55.2	113.5	348.6	141.7
Chemicals	280.6	361.6	367.1	797.2	723.4
Total Manufacturing	1,175.0	2,607.1	3,087.7	3,866.7	3,861.8

Source: Statistical Appendix, Table 2.12.

2.06 The distribution of investment by industry group has been highly concentrated in a reduced number of industries. The share of total investment of metallurgy, transport equipment and chemical products added up to 47.3 percent in 1969, 62.2 percent in 1975 and 63.5 percent in 1979. The significant increase experienced by metallurgy (Table 5) from 9.8 percent in 1969 to 30.1 percent in 1979 reflects the impact of the import-substitution program implemented by the government after the 1973 oil crisis.

Table 5: Relative Share of Main Industry Groups
in Total Investment in Manufacturing
(Percentages)

	1969	1973	1975	1979
Metallurgy	9.8	27.1	34.5	30.1
Transport Equipment	24.2	19.7	15.8	14.7
Chemicals	13.3	15.8	11.9	18.7
Total	47.3	62.6	62.2	63.5

Source: Statistical Appendix, Table 2.13.

2.07 The pattern of industrial investment has been influenced by the investment incentives granted, mainly by the Conselho do Desenvolvimento Industrial (CDI). Through 1973, CDI granted these incentives almost indiscriminately for projects of all sizes and subsectors. In 1974, for the first time, it established criteria for approvals and a minimum size of project; in 1975 and 1976, it designated priority subsectors. The subsector composition of CDI approvals since 1977 (Table 6) shows the higher priority attached to new projects in the chemical industries and the nonmetal intermediate products.

Table 6: Subsector Composition of CDI Investment Approvals
(Percentage of investment amount)

	1977	1978	1979	1980
Capital Goods	18.3	10.3	8.0	7.6
Metallurgy and Intermediate Metal Products	27.3	47.1	41.8	2.9
Chemicals, Petrochemicals & Pharmaceuticals	27.6	15.3	21.9	34.1
Non-metal Intermediate Products, Cement, Paper and Cellulose	16.0	18.0	21.5	42.6
Automotriz and Component	5.1	7.7	3.9	6.1
Consumer Goods	5.7	3.6	2.9	6.9
Total	100.0	100.0	100.0	100.0

Source: Statistical Appendix, Table 2.14.

2.08 Data on the structure of ownership of industrial firms can be obtained from the annual survey of the largest firms conducted by the magazine VISÃO. 6/ The overall figures (Table 7) show that the share of equity in government firms increased from 18.5 percent in 1971 to 22.5 percent in 1979. The share of domestic private firms also increased from 47.1 percent in 1971 to 55.0 percent in 1979, while the share of foreign firms decreased from 34.4 percent to 22.5 percent. These changes in the structure of ownership are the result, among other factors, of the significant expansion and diversification of the activities of public enterprises. Since the First National Development Plan (1971), the government has been making significant direct investments in manufacturing industries, in particular to support import substitution in heavy capital goods and basic industrial inputs (ferrous and non-ferrous metals, fertilizers, petrochemicals and pulp and paper).

6/ VISÃO: "Quem e Quem na Economia Brasileira", several issues. The 1979 VISÃO survey included the financial statements of 6,945 manufacturing firms with equity above US$1 million each.

2.09 Government firms are important in metallurgy (mainly in steel, with 62.3 percent of the total) and in chemicals (because of the significant government share in petro-chemicals, petroleum refinery and distribution). Government firms controlled 38.6 percent of the metallurgy industry in 1971 and 38.5 percent in 1979. A growing pattern is shown in chemical products, where government firms controlled 52.2 percent of the industry's equity in 1971 and 64 percent in 1979. Government firms have been recently entering a broader number of industries (Table 7). In 1979, they were relatively important in transport equipment (5.6 percent of the total), paper (6.4 percent) and in printing and publishing (9.1 percent).

2.10 While foreign firms have a share in the assets of nearly all manufacturing activities, most of them have shown a decrease over the last 10 years. The industries in which foreign enterprises have the greatest concentration were the same in 1971, 1974 and 1979, but in all cases foreign participation has been declining. This is the case of the machinery industry (foreign ownership dropped from 68.4 percent in 1971 to 36.5 percent in 1979), electrical and communication equipment (from 64.9 percent in 1971 to 37.5 percent in 1979) and plastic products (48.7 percent in 1971 and only 25.9 percent in 1979). Other industries in which foreign enterprises have a high share are tobacco, pharmaceutical products, and transport equipment. The share of the domestic private firms increased in most of the manufacturing industries in the 1971-1979 period. The most significant examples are metallurgy (from 37.3 percent in 1971 to 50.5 percent in 1979), machinery (from 31.6 percent to 61.3 percent), electrical and communications equipment (from 35.1 percent to 62.5 percent) and plastic products (from 51.3 percent to 74.1 percent).

2.11 The increase in the share of domestic firms is the result of specific measures adopted by the government in order to limit the increase of foreign participation in the economy. Brazilian companies are given preference in purchases by state companies, which represent an important market for many manufacturing industries, especially for the capital goods industry. Also, EMBRAMEC (one of BNDE's subsidiaries) takes shares in Brazilian companies producing capital goods and provides part of the risk capital for formation of mixed Brazilian and foreign companies to undertake joint ventures. EMBRAMEC's role is to ensure predominance of Brazilian capital. Another basic measure in this respect is that foreign companies can no longer (since the middle of the 1970's) acquire Brazilian companies which are considered by the government as leaders in priority fields.

Employment and Productivity

2.12 The share of industrial sector employment in the economically active population (EAP) increased from 12.9 percent in 1960 to 23.2 percent in 1976. During this period, manufacturing industry was the main source of employment within the industrial sector; its share in the EAP increased from 8.6 percent to 15.0 percent (Table 8). Based on Census data, total employment in the manufacturing sector increased from 1.7 million in 1960 to 2.6 million in 1970 and to 3.8 million in 1975, implying an average annual growth rate of 4.3 percent between 1960 and 1970, and 7.9 percent between 1970 and 1975. However, the fastest growth took place between 1967 and 1973 (para. 2.14 below) and is not adequately reflected in the census data. Manufacturing has provided growing shares of incremental employment, accounting for 16.3 percent of the EAP increase between 1950-1960, 18.9 percent between 1960-1970 and 26.4 percent from 1970 to 1976.

Table 7: Patterns of Ownership in Selected Years

(Percentage Share of Equity)

Industry	1971			1974			1979		
	Govt. Firms	Foreign Firms	Domestic private Firms	Govt. Firms	Foreign Firms	Domestic private Firms	Govt. Firms	Foreign Firms	Domestic private Firms
Non-metallic minerals	-	33.3	66.7	2.0	35.0	64.0	1.1	29.1	69.7
Metallurgy	38.6	24.1	37.3	34.0	12.0	54.0	38.5	11.0	50.5
Machinery	-	68.4	31.6	1.0	46.0	53.0	2.2	36.5	61.3
Electrical and Comm. equip	-	64.9	35.1	-	61.0	39.0	-	37.5	62.5
Transport equipment	-	57.3	42.7	4.0	63.0	33.0	5.6	57.2	37.2
Wood	-	17.3	82.7	-	9.0 1/	91.0	-	6.7	93.3
Furniture	-	3.6	96.4	-	-	100.0	-	4.2	95.8
Paper	-	28.3	71.7	-	-	-	6.4	11.6	82.0
Rubber	-	67.0	33.0	6.0	61.0	33.0	-	54.2	55.8
Leather	-	16.6	83.4	-	11.0	89.0	-	17.6	82.4
Chemicals	52.2	30.0	17.8	55.0	23.0 2/	22.0	64.0	18.8	17.2
Pharmaceutical products	-	60.5	39.5	-	-	-	2.6	66.5	30.9
Perfumery	-	51.1	48.9	-	-	-	-	30.3	69.7
Plastics	-	48.7	51.3	-	-	-	-	25.9	74.1
Textiles	-	28.5	71.5	-	13.0 3/	87.0	0.7	14.7	84.6
Clothing and Footwear	-	32.9	67.1	-	-	-	-	2.2	97.8
Food	-	14.6	85.4	1.0	31.0	68.0	0.9	13.8	85.3
Beverages	-	9.8	90.2	-	14.0	86.0	0.1	6.7	93.2
Tobacco	-	97.7	2.3	-	99.0	1.0	-	96.4	3.6
Printing and Publishing	-	1.3	98.7	-	2.0	98.0	9.1	2.2	88.7
Miscellaneous	-	39.5	60.5	-	47.0	53.0	-	40.1	59.9
Total Manufacturing	18.5	34.4	47.1	20.0	29.0	51.0	22.5	22.5	55.0

Sources: 1971 figures: From W. Tyler,"Manufactured Exports Expansion and Industrialization in Brazil"-1976
1974 figures: Bacha, Edmar L., "Issues and Evidence of Recent Brazilian Economic Growth"-in World Development, 1977, Vol. 5, No. 1/2.
1979 figures: Visão-August 29, 1980.

(1) Including Funiture and Paper.
(2) Including Pharmaceutical, Perfumery and Plastics.
(3) Including Clothing and Footwear.

Table 8: Sectoral Distribution of Economically Active Population (Percentage)

	1960	1970	1976
Primary Sector	54.0	45.8	36.2
Secondary Sector	12.9	18.6	23.2
- Manufacturing Industry	8.6	11.4	15.0
- Construction and Other Industry	4.3	7.2	8.2
Services	33.1	35.6	40.6
TOTAL	100.0	100.0	100.0

Source: Statistical Appendix, Table 2.6.

2.13 During the last two decades the traditional industries have shown a clear decrease in their share in total manufacturing employment (Table 9) from 50.7 percent in 1965 to 48.0 percent in 1970 and to 42.9 percent in 1980. The main reason is the drop in the share of employment in textiles (from 17.3 percent in 1965 to 8.6 percent in 1980) and food industries (from 13.9 percent to 11.4 percent). On the other hand, the share of non-traditional industries in total manufacturing employment increased from 46.7 percent to 53.3 percent in 1980. The main reason is the increase in the share of machinery from 4.0 percent to 10.5 percent.

Table 9: Structure of Industrial Employment (Percentages)

	1965	1970	1974	1980
Traditional Industries	50.7	48.0	43.7	42.9
Wood	4.1	4.1	4.8	4.8 1/
Furniture	2.5	3.0	3.2	3.4 1/
Leather	1.2	1.1	0.8	1.0 1/
Textiles	17.3	14.2	10.4	8.6
Apparel	5.1	5.8	7.0	8.3
Food	13.9	13.0	12.1	11.4
Beverages	2.4	2.3	1.5	1.4
Tobacco	1.0	0.7	0.6	0.6
Publishing and Printing	3.2	3.8	3.3	3.4 1/
Other Industries	46.7	49.3	52.9	53.3
Non-Metallic Minerals	6.8	7.4	6.7	7.0
Metallurgy	13.0	11.9	11.9	12.7
Machinery	4.0	5.1	9.9	10.5
Electrical and Communications Equipment	4.1	5.1	5.8	5.5
Transport Equipment	7.4	7.4	6.0	6.1
Paper	2.7	2.7	2.7	2.6
Rubber	1.3	1.4	1.5	1.3
Chemicals	4.4	5.0	4.1	3.4
Pharmaceutical Products	1.9	1.7	1.4	1.1
Perfumery	0.1	0.1	0.7	0.7
Plastic Products	1.0	1.5	2.2	2.4
Total Manufacturing	100.0	100.0	100.0	100.0

Source: Statistical Appendix, Table 2.9.

1/ Data for 1976.

2.14 Employment growth in manufacturing was fastest from 1967 to 1973, at an average rate of 9.0 percent p.a., dropping to 4.0 percent in the period 1973-1980 (Table 10). During these two periods, the annual growth rates of manufacturing value added were 13.3 percent and 6.8 percent, implying employment elasticities of 0.68 for the earlier period and 0.59 for the latter. This result indicates that industrial employment generation during 1967-1973 was much higher than after 1973, not only because of the more rapid growth of value added, but also because of the more labour-intensive character of such growth. The employment elasticities of individual industries (Table 10) suggest that the lower average elasticity for the 1973-1980 period was mainly the result of a shift in the product mix towards less labor-intensive industries. The elasticities of individual industries

Table 10: Employment Elasticities of Manufacturing

	1967-1973			1973-1980		
	Growth Rate of Output (%)	Growth Rate of Employment (%)	Employment Elasticity	Growth Rate of Output (%)	Growth Rate of Employment (%)	Employment Elasticity
Dynamic Industries	16.7	9.9	0.59	8.4	4.5	0.53
Non-metallic Minerals	13.1	7.7	0.59	8.8	4.9	0.56
Metallurgy	11.7	8.7	0.74	9.3	6.1	0.66
Machinery	20.2	21.3	1.04	0.0	6.3	0.70
Electrical and Communications Equipment	17.7	8.8	0.50	7.5	4.1	0.55
Transport Equipment	21.8	8.5	0.39	6.2	2.7	0.44
Paper	13.0	8.1	0.62	2.7	3.4	1.26
Chemical Products	16.5	5.7	0.35	7.6	0.8	0.11
Plastic Products	18.6 1/	18.4	0.99	10.2	4.8	0.47
Traditional Industries	9.4	8.1	0.86	4.6	3.6	0.78
Textiles	9.0	4.2	0.47	3.1	-0.4	-
Apparel	7.9	12.8	1.62	4.6	6.8	1.48
Food	9.1	9.4	1.03	5.1	2.6	0.51
Beverages	9.9	3.3	0.33	7.5	0.8	0.11
Tobacco	5.6	0.5	0.09	6.3	3.9	0.62
TOTAL	13.3	9.0	0.68	6.8	4.0	0.59

Source: Statistical Appendix, Tables 1.7 and 2.7.

1/ Growth rate for 1970-1973 period.

Table 11: Labor Absorption Coefficients in the Manufacturing Industry, 1970

Industries	Direct	Total
Traditional	22.2	28.7
Wood	43.1	50.1
Furniture	40.9	52.7
Leather	29.3	37.6
Textiles	29.6	36.9
Apparel	36.6	52.7
Food	12.7	17.2
Beverages	20.0	26.0
Tobacco	11.1	13.7
Publishing and Printing	24.5	28.4
Dynamic A	15.0	20.5
Non-Metallic Minerals	38.6	44.0
Metallurgy	15.6	22.8
Paper	19.8	27.5
Rubber	14.1	19.3
Chemicals	6.4	10.0
Pharmaceutical Products	8.2	10.8
Perfumery	8.7	15.0
Plastic Products	18.9	24.4
Dynamic B	17.4	26.9
Machinery	22.7	30.9
Electrical and Communications Equipments	17.5	24.6
Transport Equipments	13.6	25.5
TOTAL	18.6	25.6

Source: da Mata, Milton. "Crescimiento Industrial e Absorção de mão-de-obra," in Indústria: Política, Instituições e Desenvolvimento; Suzigan, W. editor - IPEA, 1968.

decreased over time in some cases and increased in others. At the same time, the decrease in each of the two industry sub-groups (about 9 percent for traditional and 10 percent for other industries) was well below the decrease of the employment elasticity of manufacturing as a whole (about 13 percent). This also suggests that the main source of the decrease in the overall employment elasticity was the change in the output mix.

2.15 The available studies of labor absorption in manufacturing, and of employment multipliers, use the most recent input-output table available for Brazil, that of 1970, whose technical coefficients are likely to have experienced substantial changes over the last decade. The employment coefficients implicit in the 1970 input-output table (Table 11) show the ranking of direct industrial employment coefficients from a high of 43.1 percent in the wood industry to a low of 6.4 percent in chemicals. However, the difference between traditional and other industries is reduced when the total (direct and indirect) industrial employment effects are considered. Backward linkages were not very important for the traditional industries (the average coefficient only increases from 22.2 percent to 28 percent when they are included) but they are particularly important in some of the more modern industries such as transport equipment (the coefficient increases from 13.6 percent to 25.5 percent), machinery (from 22.7 percent to 30.9 percent), electrical equipment (17.5 percent to 24.6 percent), and paper (19.8 percent to 27.5 percent). However, backward linkages into agricultural employment were not included in the calculations. As a result, the total employment effects of the agro-industrial subsectors are somewhat underestimated.

2.16 Real wages in manufacturing grew at an average of 3.21 percent p.a. in the period of 1968-1980, whereas output per employee grew at a lower rate of 2.8 percent p.a. (Table 12). However, most of the difference is accounted for by the faster growth of real wages in the 1968-73 period and particularly from 1970 to 1973. The difference between the growth rates of real wages and of output per employee in the 1968-1973 may be overstated because of the choice of base year. If the period 1967-1973 is considered the growth rate of output per employee increases to 3.9 percent. However, data limitations did not allow the calculation of the growth rate of real wages for this period. After 1973, real wages and output per employee have grown at very similar rates. The structure of industrial wages shows relatively high dispersion among industries, with the industry paying the highest average wages (pharmaceutical products) exceeding the industry with lowest wages (garments) by a ratio of 3 to 1 (Statistical Appendix, Tables 2.10 and 2.11). The wage structure among industries remained practically unchanged between 1960 and 1970.

Table 12: Annual Growth Rates of Manufacturing Wages and Output 1968-1980

	1968-73	1973-80	1968-80
Real Wage per Employee 1/	3.6	3.0	3.2
Output per Employee	2.7	2.8	2.8

1/ Total wage bill divided by number of employees and deflated using the CPI index for Rio de Janeiro (base year: 1977)

Source: Statistical Appendix, Tables 1.7, 2.10 and 2.11. Mission calculations.

Industrial Location and Regional Development

2.17 Brazilian industrialization took place mainly in the southeast region, centered in the state of São Paulo. This region also includes the states of Minas Gerais, Espírito Santo and Rio de Janeiro. The concentration of the manufacturing industry in the southeast region has increased during the last four decades. The share of the southeast in total industrial employment increased from 66.6 percent in 1940 to 70.4 percent in 1976 and its share in total value added from 73.4 percent to 77.1 percent. However, the concentration process appears to have reached its peak in 1960 and declined afterwards. During the 1960s, the first government measures were taken in order to achieve wider geographical distribution of economic activities. The "Superintendência do Desenvolvimiento do Nordeste" (SUDENE) was created in December 1959, and the "Superintendência do Desenvolvimiento da Amazônia" (SUDAM) was created in October 1966. Between 1960 and 1975, a slight geographical deconcentration of manufacturing activity appears to have occurred. The relative importance of the southeast region in the manufacturing industry decreased, but still remained by far the main industrial center of the country, as its share in total employment fell from 71.4 percent in 1960 to 67.7 percent in 1975, and that of value added from 79.1 percent to 76.3 percent.

2.18 The ground lost by the southeast was reflected by increases in the south and center-west regions. At the same time, the north region increased slightly its share in manufacturing, but the share of the northeast continued to decrease (Statistical Appendix, Table 2.18). The south, including the states of Paraná, Santa Catarina and Rio Grande do Sul, has the second largest share in manufacturing. In 1976, it accounted for 20.7 percent of the number of manufacturing establishments, 18.7 percent of employment, and 14.6 percent of value added. The northeast is still the third region in terms of its contribution to manufacturing, in spite of the fact that its relative share continued to drop in the 1960-1975 period. In 1975, it accounted for 10.1 percent of industrial employment and 6.6 percent of value added.

2.19 Within the regions there is also a high concentration of manufacturing output in some states. Table 2.19 in the Statistical Appendix shows the share of the main states in the respective region's industry. In the north, the states of Amazonas and Pará had a share of 52.7 percent and 35.2 percent, respectively in the total value of industrial production in 1976. In the northeast, the states with the highest share were Ceará (13.1 percent), Pernambuco (32.6 percent) and Bahia (30.7 percent). In the southeast, the highest concentration was in the state of São Paulo, with 72.6 percent of the region's value of production in 1976; Rio de Janeiro followed with a share of 15.8 percent. In the south, Rio Grande do Sul produced 48.8 percent of the value of production and in the center-west region, the state of Goiás had a share in the region manufacturing production of 60.4 percent.

2.20 With the exception of wood, the southeast had by far the highest share in all manufacturing industries in 1974. Its share was particularly important in non-metallic minerals (74.3 percent), metallurgy (88.3 percent), machinery (85.4 percent), electrical and communications equipment (88.3 percent), transport equipment (94.4 percent), pharmaceutical products (87.5 percent), and plastic products (80.6 percent) (Statistical Appendix, Table 2.20). The south produced 60.4 percent of the total production of wood and also had a relative important share in the traditional industries: furniture

(21.4 percent), leather (45.0 percent), food (22.9 percent), beverages (19.5 percent) and tobacco (31.8 percent). The northeast region had its largest shares in the production of textiles (14.8 percent), food (11.0 percent), beverages (11.1 percent), and tobacco (7.3 percent), as well as non-metallic minerals and chemicals.

Incentives for Regional Industrialization

2.21 Until the end of the 1950's Brazil did not have a systematic policy aimed at a geographical deconcentration of industrial activities. After the establishment of SUDENE and SUDAM, fiscal and financial incentives have been the main instruments used to stimulate industrialization in the northeast and in the north. SUDENE and SUDAM administer the fiscal incentives (with CDI approval), while the main financial incentives are administered through the BNDE system. The fiscal incentives include exemptions from federal income taxes, federal and state sales taxes (IPI and ICM) and tariff exonerations for capital goods and equipment without similars in the country. In addition, the Northeast Investment Fund (FINOR) and the Amazon Investment Fund (FINAM) were established in December 1974. By investing in shares of incorporated enterprises installed in the northeast or north regions (or in FINOR and FINAM), Brazilian corporations may offset up to 50 percent of their income tax liabilities and individuals up to 45 percent of their taxable income. In addition to the fiscal incentives, the north and northeast regions also receive special financial incentives (subsidized credit).

2.22 The amount and regional distribution of fixed investments approved by CDI are shown in the Statistical Appendix, Table 2.21. According to this data, a reallocation of resources among regions has taken place between 1971 and 1979. The share of projects approved by CDI in the southeast fell from 76.5 percent of the total amount of investment approved to 57.7 percent between 1971 and 1979, while the shares of other regions (except the north and the northeast) have increased significantly. The share of the south increased from 8.0 percent to 25.5 percent and the center-west region increased from 0.1 percent to 4.6 percent. In 1980, as a result of the policy changes introduced in December 1979, the share of the northeast increased substantially, reaching 25 percent of the value of these investment projects, compared to only 12.4 percent in 1979. A similar change occurred with the geographical distribution of the financial operations approved by the BNDE system (Statistical Appendix, Table 2.22). The share of the southeast region fell from 67.2 percent in 1970 to 50.3 percent in 1980 and the shares of the other four regions rose. However, the most significant increases were in the northeast (from 13.1 percent to 17.6 percent) and the south (from 17.3 percent to 27.4 percent). The north and the center-west regions increased their shares from 0.7 percent to 1.9 percent and from 1.6 percent to 2.8 percent, respectively.

Performance of the Northeast and the North Regions

2.23 From 1960 onwards, the northeast and north regions achieved considerable industrial growth. Between 1960 to 1975, the number of establishments increased from 20,505 to 31,552 in the northeast and from 1,795 to 4,825 in the North (Statistical Appendix, Table 2.17). The number of additional jobs generated in the same period was 179,000 in the Northeast and 51,000 in the

North, an increase of 86 percent and 268 percent, respectively. However, if the performance of both regions is compared to the other regions of the country, the results are rather disappointing. The share of the northeast region in manufacturing value added fell from 16.8 percent in 1960 to 6.6 percent in 1975 (Statistical Appendix, Table 2.18), and the north region increased its share from 1.1 percent to only 1.2 percent. The regional development of these two regions has been slower than the overall industrial development of the country, in spite of the special incentives programs. Data for the Northeast region (Statistical Appendix, Table 2.23) show that in 1960, the traditional industries accounted for 70.1 percent of the value added, while in 1974 they provided only 50.3 percent. The significant increase in the share of the other industries is explained mainly by the high growth rates experienced by metallurgy (23.3 percent), machinery (35.8 percent) and electrical and communications equipment (37.6 percent).

CHAPTER 3

MANUFACTURED EXPORT PERFORMANCE

Introduction

3.01 This chapter reviews Brazil's past and recent manufactured export performance and future prospects. Brazil requires rapidly increasing exports to offset the foreign exchange drain imposed by its substantial oil import dependency and heavy foreign debt burden. Also, high export growth would allow the currently high levels of idle production capacity and unemployed labor to be brought back into operation while relieving the foreign exchange constraint.

3.02 Brazil has little control over most of its export prices (with the exception of a small number of agriculture-based exports, like coffee, cacao and soybean products, where Brazil may influence prices to some extent). 7/ Thus, export volume is the most important criterion for measuring export performance and the development of the long-term real capacity to import. A volume index of Brazil's past export performance exists only for the major categories of industrial and non-industrial exports, while more detailed time series are in current cruzeiro or US dollar terms. In addition, quantities (metric tons) of export products are published, but they are of little use for measuring the export performance of other than unprocessed raw materials. This chapter presents an analysis of export values based on three separate and not necessarily consistent sources. 8/

7/ On the other hand, imports are mainly dependent on the level of economic activity, as virtually all "non-essential" imports have been eliminated. Practically only oil and needed machinery and production inputs are currently imported, in reduced volumes during the current recession.

8/ The report uses the following sources for export data:

(i) The World Bank/UN Data Bank time series of manufactured exports at the ISIC five-digit level, 1962-1979.

(ii) Two time series of exports prepared by CACEX, the first according to the Nomenclatura Brasileira de Mercadorias (at eight-digit level and for the 99 major product categories); the second according to 97 principal products, which distinguishes between "basic products", "semi-manufactures" and "manufactures". The definition of manufactures by CACEX differs considerably from the ISIC system.

(iii) The export statistics of the Ministry of Finance, which are based on the data supplied by exporting firms for tax purposes. The Ministry employs a different categorization than CACEX.

3.03 The total value of Brazilian exports has experienced substantial growth since 1965. The average annual growth rate from 1965 to 1980 was 18.4 percent in current US$ terms, but a large part of this increase reflects inflation, particularly in the later years. Manufactured and semi-manufactured exports grew during this period at the much higher rate of 27.9 percent per year, reaching a total amount of US$11.4 billion in 1980 (Statistical Appendix, Table 3.2) 9/ The growth trends in constant US$ and the quantity indices are in Table 13. While total export growth was affected by strong year-to-year fluctuations, manufactured exports grew at more stable rates during the 1970s. The share of manufactured products in total exports rose from about 18% in 1965 to about 57% in 1980 (Statistical Appendix, Table 3.2). This growing share contributed to reduce the instability of export proceeds, which tend to fluctuate due to volatile primary product prices and export volumes.

Table 13: Growth Rates of Exports
(% per year)

	1965-1970	1970-1975	1975-1980	1965-1980
Total Exports				
Constant US$ 1/	8.4	14.9	8.6	10.6
Volume Index	N.A.	7.4	6.2	N.A.
Weight (tons)	N.A.	18.4	3.5	N.A.
Manufactured Exports 2/				
Constant US$ 1/	15.4	26.7	16.6	19.5
Volume Index	N.A.	15.1	16.7	N.A.
Weight (tons)	N.A.	8.7	20.1	N.A.

1/ Current US$ values deflated by the US wholesale price index as published in the IMF, International Financial Statistics.

2/ CACEX definition (including semi-manufactures).

Source: Statistical Appendix, Tables 3.2 and 3.3. Mission calculations.

3.04 Brazil did well on the world export market during the period 1965-1980. The country's share in world trade increased from slightly less than 1 percent during the 1960s to 1.1 percent during the 1970s (Table 14).

9/ Using the CACEX classification. When the ISIC classification is used, (Statistical Appendix, Table 3.4), the average annual rate for all manufactured products is 18.4 percent for the period 1965-1979. If all food products are excluded from the ISIC data, the rate is 28.1 percent.

Brazil's share in developing countries' exports fell after 1973 and 1979 because of the impact of oil price increases on the exports of oil-exporting developing countries. However, this share increased again from 1975 to 1978 and should increase again after 1980, if oil prices remain more stable. Brazil's manufactured exports performed much better than total exports in the world market. The country's market share increased three-fold from 0.22 percent of world trade in 1965 to 0.64 percent in 1978, and there are indications of a further increase by 1980. When compared to other developing countries, Brazil strengthened its position considerably, doubling its share in manufactured exports between 1965 and 1975. Brazilian manufactured exports increased from about 8 percent of total manufactured exports of Latin American and Caribbean countries in 1962 to more than 40 percent of the total in 1978 (IBRD, World Development Report, 1981).

Table 14. Brazil's Share in World Trade 1/
(Percentages)

	1965	1970	1975	1978	1980
Brazil's Share in Total World Trade	0.97	0.98	1.10	1.08	1.10
Share in Exports from Developing Countries	4.40	4.92	4.14	4.21	3.62
Share in World Exports of Manufactures 2/	0.22	0.27	0.55	0.64	n.a.
Share in Manufactured Exports from Developing Countries	3.44	3.70	7.00	6.65	n.a.

1/ Excluding trade of centrally planned economies.

2/ Manufactured products, excluding foods and fuels.

Source: UN Yearbook of International Trade Statistics.
UN Monthly Bulletins of Statistics.

Structure of Manufactured Exports

3.05 Manufactured export growth during the 1970s was accompanied by major changes in the composition of exports, including a reduction in the importance of agriculture-based products. In 1970, over 80 percent of manufactured exports (as defined in the ISIC classification) were processed agricultural products, with an extremely low degree of manufactured value added. Among the 10 most important manufactured exports at the four-digit level, only three--iron and steel products, textiles and office machinery--were non-agriculture-based, with a small total share of 8.6 percent of manufactured exports. During the 1970s, these three categories

experienced growth rates above average, while most of the agro-based manufactured exports increased at less than average rates. In addition, the 70 non-agro-based products of the four-digit ISIC Code summarized in Table 15 under "others" increased during the 1970s at the highest rate of all product categories. Also, the high concentration in a small number of product categories, which existed in 1970, was sharply diminished by the end of the decade. The two most important products at the four-digit level accounted for 52 percent of the total in 1970, and 25% in 1979, and the 10 most important export categories fell from 88 percent to 64 percent of the total (Table 15). While agriculture-based products continue to be a very important part of Brazil's manufactured exports, other manufactures became much more important by the end of the 1970s. Motor vehicles and footwear entered the list of the ten most important manufactured exports during the decade, replacing meat and wood products.

Table 15: Main Manufactured Exports in 1970

(US$ million)

ISIC Code	Sub-sector	1970 Value	1970 (%)	1979 Value	1979 (%)	Annual Growth 1970/1979 (%)
3116	Grain Products	566	29.3	1,164	9.5	12.3
3121	Food Products, n.e.c.	435	22.6	1,250	10.3	15.8
3118	Sugar	134	6.9	413	3.4	9.8
3115	Oils and Fats	134	6.9	1,745	14.3	34.7
3111	Processed Meat	129	6.7	308	2.5	5.0
3311	Wood Products	105	5.4	257	2.1	7.4
3710	Iron and Steel Products	98	5.1	778	6.4	29.0
3211	Textiles	39	2.0	555	4.6	31.4
3119	Cacao Products	29	1.6	479	3.9	40.2
3825	Office Machinery	28	1.5	156	1.3	23.5
	Others	232	12.0	5,083	41.7	40.9
	Total Manufactures	1,929	100.0	12,188	100.0	23.3
	(Total Exports)	(2,739)		(15,244)		(21.1)

Source: World Bank/UN Data Bank.

3.06 The five products with the largest absolute export increase during 1970-79 (oils and fats, other food products, motor vehicles, iron and steel, and grain products) were also the five most important manufactured exports in 1979 (Table 16). Also, the figures show that most of the major non-agriculture-based manufactures established their current importance during

the past decade. Growth was more evenly distributed among different products during the second half of the decade than during the first, but there was considerable instability of these trends for a number of major products. This was mainly due to large variations in output and world prices of agricultural-based products such as sugar. However, the growth of total manufactured exports was extremely stable due to the excellent performance of non-agricultural-based exports.

Table 16: Main Manufactured Exports in 1970 and 1979

(US$ million)

ISIC Code	Sub-sector	1970 Value	1970 (%)	1979 Value	1979 (%)	Annual Growth 1970/1979 (%)
3115	Oils and Fats	134	6.9	1,745	14.3	34.7
3121	Food Products, n.e.c.	435	22.6	1,250	10.3	15.8
3116	Grain Products	566	29.3	1,164	9.5	12.3
3843	Motor Vehicles	11	0.6	781	6.4	62.3
3710	Iron and Steel Products	98	5.1	778	6.4	29.0
3211	Textiles	30	2.0	555	4.6	31.4
3199	Cacao Products	29	1.6	479	3.9	40.2
3118	Sugar	134	6.9	413	3.4	9.8
3240	Footwear	8	0.4	367	3.0	42.8
3113	Processed Fruits	17	0.9	320	2.6	36.4
	Others	458	23.7	4,336	35.6	28.3
	Total Manufactures	1,929	100.0	12,188	100.0	23.3
	(Total Exports)	(2,739)		(15,244)		

Source: World Bank/UN Data Bank.

3.07 Developments during the first half of 1981 indicate a weakening of non-agricultural manufactured exports. Total manufactured exports increased in current US dollar terms by 30% in 1980, and at an annual rate of 25% during the first six months of 1981 (Statistical Appendix, Table 3.7). The growth rates in constant US dollars were 16% and 12% respectively. However, when food and petroleum products [10]/ are excluded, the picture

10/ Petroleum products are a "residual" export originating from the differences between the output mix of the PETROBRÁS refineries and the pattern of domestic demand for such products.

changes considerably. The growth rates in current US$ of the more narrow group of manufactured exports was also 30% in 1980 but fell to less than 15% in the first half of 1981. This was probably a reflection of the loss of competitiveness of Brazilian exports as a result of the real appreciation of the cruzeiro that took place during 1980 and early 1981, coupled with the reduction or elimination of financial and fiscal incentives to export in late 1979. During the second quarter of 1981, the mini-devaluations of the cruzeiro were accelerated again and export incentives increased. These changes, together with the subtantial reduction of domestic demand, improved the performance of manufactured exports during the second half of 1981.

3.08 The substantial growth of manufactured exports in 1980, and of some categories in 1981, is mainly due to a small number of agricultural-based product categories. Oils and fats (largely of soybeans) continued their high growth of the 1970s. 11/ Meat exports, which had started to rise again in 1979 after several years of stagnation, nearly doubled their volume in 1980 and 1981. Sugar exports tripled to US$1.4 billion in 1980, but declined slightly in early 1981. Fast growing non-agriculture-based items were motor vehicles, machinery, petroleum products, paper pulp and footwear. Most of these items had already achieved high growth during the 1970s and belonged to the group of major manufactured exports in 1979. However, the above average growth of these major exports categories during 1980 and 1981 does not indicate that the process of manufactured export diversification, which took place during the 1970s, is being reversed.

3.09 Brazil's manufactured exports contain a wide variety of items directed toward highly diversified export markets. Major products categorized under transport equipment include engines for motor vehicles, CKD car kits, trucks, freighters and tankers up to very large sizes, and airplanes. (See also Chapter 11 of this report for a more detailed review of these items.) The machinery and equipment items include turbines, generators, gates and valves for hydropower stations which are among the largest built in the world. Paper-making machines and equipment for steel-rolling mills are other export products requiring advanced production technology. The continued diversification of manufactured exports is now concentrated largely in the machinery and equipment product group, resulting in a deepening of the industrial sector and the application of more advanced technology as compared to the industrial processing of agricultural raw materials.

3.10 A major factor in Brazil's strong manufactured export performance since 1965 was the diversification of markets. In contrast to other industrializing countries, Brazil has been a strong exporter to markets in both industrial and developing countries. Neighboring markets in Latin America and the USA and more distant markets in Europe, Africa and the Middle East have

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11/ Section III (Oils and Fats) of the NBM classification differs from item 3115 (Oils and Fats) of the ISIC Code. Exports in 1979 of Section III products were US$593.4 million compared to ISIC Code 3115 exports of US$1,744.9 million, which also includes soybean flour and cake.

received attention in accordance with their potential. During the 1970s, growth of manufactured exports to the developing and centrally planned economies was considerably higher than to the industrialized market economies, with the exception of Japan (Statistical Appendix, Table 3.14). Currently, only little over one half of manufactured exports are to the industrialized market economies, compared to nearly three quarters in 1970. Exports were particularly strong to the high potential markets of the oil-producing developing countries in Africa and the Middle East, as well as to the neighboring semi-industrialized countries, Argentina, Chile and Venezuela.

3.11 The bulk of consumer-oriented products are exported to the industrial countries, while exports of capital goods are concentrated in developing countries (Statistical Appendix, Table 3.13). In 1979, 68% of food, 61% of textile and 98% of footwear exports went to the industrial market economies. On the other hand, 64% of machinery and equipment exports were directed toward developing countries, of which about one third went to countries outside of the Western Hemisphere. The product-specific direction of manufactured exports indicates the ability of Brazilian export manufacturers to adjust well to market opportunities.

Export Orientation of Industry

3.12 In spite of recent high growth and sizable volume in a number of products, exports are still a small part of Brazilian industrial output, which is basically oriented toward the large domestic market. The share of manufactured exports in production was only 8.3 percent in 1979 (Table 17). [12/] Excluding the important food industry, the export share of manufactured production would have been only 5.2 percent. The export orientation of Brazilian industry has somewhat increased in recent years, although not to an extent that exports would have reached more than a marginal importance for most industries. In incremental terms, however, the role of exports has been larger: during the period 1975-1979, 12.5 percent of the industrial production increase was exported. Exports of additional non-food manufactured output were 9.1 percent.

3.13 At the subsector level, exports are important only in the food industry, accounting for about one quarter of production. [13/] All other industries export 10 percent or less of their output (Table 17). At a higher degree of disaggregation more sub-sectors with important export activities can be identified. Footwear has a high export component; several sub-sectors

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12/ The figures in this section refer to the ISIC categories. If the IBGE input-output table categories are used (as in Chapter 4 below), the average export ratio increases from 8.3 to 9.1 percent. The main differences between the two categories occur in the food and chemical industries.

13/ Based on the sharp rise of leather goods exports during 1975-79, this industry may also have exported close to a quarter of production in 1979.

in the non-electrical machinery and the transport equipment industries also export substantial quantities. Generally, industries with important export components had high export growth rates during the second half of the 1970s. In the non-electrical machinery and transport equipment industries, and to a lesser extent in textiles, clothing, footwear, leather goods and paper and pulp production, exports contributed considerably to production growth in recent years. Between 11 percent and 25 percent of recent production growth of these industries were sold in foreign markets. For all other non-food manufactures, exports continue as "spill-overs" of excess production which cannot be sold profitably in the domestic market.

Table 17: Export Ratios in Manufacturing 1965-1979

(percentages of total production)

	1965	1970	1975	1979
Beverages, tobacco	0.1	0.4	0.5	0.5
Textiles	1.9	1.8	5.0	7.1
Clothing, footwear	0.2	1.4	5.9	8.3
Leather goods	5.9	9.2	15.1	n.a.
Wood, furniture	21.2	10.4	4.2	n.a.
Paper, pulp	2.3	1.0	2.6	7.5
Chemicals, rubber, plastics	1.2	1.4	1.6	2.7
Non-metallic minerals	0.4	1.0	1.1	1.9
Metals, metal products	4.2	3.6	2.1	4.4
Mechanical machinery	5.1	4.4	4.8	9.0
Electrical machinery	0.9	1.4	3.4	4.4
Transport equipment	0.8	0.7	4.3	10.0
Other	0.9	1.3	5.6	n.a.
Subtotal	2.5	2.4	3.1	5.2
Food	46.5	28.2	20.8	24.4
Total	11.3	7.6	6.0	8.3

Source: Statistical Appendix, Tables 3.9 and 3.10.

3.14 Although disaggregated output data for 1980 and 1981 are incomplete, the statistics on manufactured exports suggest that the trends of the period 1975-1979 continued. Both average and incremental export shares of manufactured output should have risen further in 1980 and 1981, since export growth exceeded output growth. At sub-sectoral level, industries with high

and rising export shares during the 1970s also had high export growth during 1980/81. Transport equipment, machinery, footwear, pulp and several agro-based products may have achieved incremental export ratios of production of between 25 and 50 percent.

3.15 About 3,000 manufacturing enterprises in Brazil export part of their production, 14/ most of them only in small volumes. During the period January-March 1981, over 45 percent of total Brazilian exports came from only 50 enterprises, and the concentration was higher in the case of industrial exports. In 1979, 27 manufacturers alone were responsible for about 37 percent of the country's non-food manufactured exports (Statistical Appendix, Table 3.15). During 1981, Petrobras intended to export US$1 billion worth of products (about 5 percent of estimated total manufactured exports), which is three times the value of the company's exports in 1979. Volkswagen may double its exports in 1982, compared to 1979, to over US$400 million. In the machinery, textile and footwear industries, only a very small number of large enterprises is participating in the current process of manufactured export growth. 15/

3.16 The high concentration of manufactured exports in a small number of firms does not indicate that these firms are principally producing for export markets. The majority of the large exporting manufacturers are affiliates of transnational enterprises (Statistical Appendix, Table 3.15) which consider the Brazilian domestic market as their main target. Exports by these firms, even if they involve large volumes, are either to increase capacity utilization (often marginally) or to meet export targets agreed with the Government within the framework of special export incentive schemes (namely BEFIEX). In both cases, exports rarely reach more than a moderate share of total production of an enterprise, although some firms have been recently exceeding the targets by a wide margin, and the export shares have started to be significant in a few firms. The situation is similar in a second important group of exporting enterprises, which is dominated by the Government. This is the case of Petrobras whose large export volume is a very small share of its total output. Only a number of large food-processing enterprises (which are generally nationally owned) are basically export-oriented, particularly in the sugar and soybean products industries.

Internal Constraints to Manufactured Exports Growth

3.17 The small percentage of exports in Brazil's industrial output is mainly the result of the historical process of industrial development, oriented to supply its large and growing domestic market, and of the

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14/ The corporate tax statistics of 1979 list 2,928 exporting firms, of which 2,648 were in the industrial sector.

15/ E.g., the bulk of the planned increase of footwear exports from US$385 million in 1980 to US$500 million in 1981 and possibly, US$1 billion in 1982, would be achieved by 10-20 enterprises. This compares to 5,000 footwear producing enterprises in Brazil, of which only 90 are exporting (only 60 firms currently export more than US$10,000 per year).

country's long-term industrial policy. 16/ The role of exports in this strategy has been to earn foreign exchange for essential imports of goods (fuel, machinery and inputs not available in Brazil) and services. Foreign sales on a large scale were required only for agro-based manufactures. For most of this century, at least until the mid-1960s, non-agro-based manufactures were expected to develop based on the large and growing domestic market, whereas investments by transnational corporations were to provide the link to foreign technology. Brazil's rapid industrial growth, and the standards of efficiency achieved by the country's manufacturing sector (see Chapter 7 below) would indicate that the past industrial strategy was largely successful, although it may also be argued that a different strategy, including a higher export orientation, would have provided a greater capacity to absorb the external shocks originated by the oil price increases after 1973 and 1979.

3.18 The availability of competitive production inputs and machinery is still a constraint to higher exports in a number of industries, in spite of the large and diversified Brazilian economy. Imports of equipment and industrial inputs have often not been allowed, or they have been subject to prohibitive tariffs if there was competitive domestic production, whereas imports of non-competitive inputs and equipment were practically duty-free because of tariff-reducing industrial incentive schemes. Thus, the less efficient subsectors of Brazilian industry have often imposed a burden on more efficient subsectors. The textile industry, e.g., has not had sufficient access to modern equipment and inputs (synthetic fiber) at world prices. As a result, its competitiveness in international markets is reduced.

3.19 Complex import protection and incentive systems require a sizable Government administration and control apparatus, which is generally not conducive to maximum volumes of exports. The general attitude of the administration (particularly of CACEX) toward exporting enterprises seems often to have been one of suspicion, instead of assistance and promotion. The volume of export documentation required is enormous, and CACEX operates a detailed export control system. This requires for both the exporting enterprises and CACEX large and costly bureaucracies, which may be an important reason for the concentration of exports in a comparatively limited number of large enterprises with experienced export administrations. CACEX, on the other hand, has a legal obligation to control foreign trade activities to prevent the transfer of profits by over- and under-invoicing of imports and exports. 17/ Thus, it is difficult to strike a balance between the need for

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16/ A review of the policy instruments and a quantification of their importance and impact on manufactured exports is included in Chapters 5 to 8 of this Report.

17/ In addition to differing corporate taxation systems, the protection and incentive systems make over and under-invoicing profitable for importers and exporters.

controlling illegal transfers and minimizing the administrative cost of exporting. Both CACEX and the industrialists' associations see a need for facilitating exports, but they continue to disagree on the requirements for control. A possible approach to the simplification of procedures could be to shift away from complete controls toward selective control of export documentation. Control based on samples would help to speed up the processing of export documentation but would still be a rather small step toward eliminating administrative constraints on exports. As long as highly diversified protection and incentive systems continue to exist, complex trade controls will be necessary.

External Export Constraints

3.20 Brazilian manufactured exports have faced few external constraints. In a number of agro-based products (soluble coffee, soya products, cacao products, orange juice) Brazil's market share is already large, and centralized export marketing is conducted in order to maximize export revenues. Also, export taxes of varying levels have occasionally been imposed on agro-based manufactured exports: In December 1979, in the wake of the maxidevaluation, a temporary export tax of 30 percent of stipulated minimum unit FOB values was imposed on meat, canned fish, most oils and fats, orange juice, alcohol, semi-finished leather, sawnwood and carded cotton. Export taxation may serve to exploit Brazil's market power in these products, although an across-the-board 30% taxation cannot accurately reflect the widely varying market conditions for the different products. The tax was established only to compensate the effect of the maxi-devaluation of December 1979 and was later eliminated as inflation and "pre-fixed" devaluation gradually eroded the impact of the maxi-devaluation, and exporters (particularly soybean farmers) withheld their product from the market.

3.21 In the case of several non-agricultural exports, Brazil is facing increasing resistance from importing industrial countries which object to some of the export incentive schemes. After the reintroduction of the export subsidy (crédito premio) in April 1981, the threat of countervailing duties by the U.S. led to the imposition of an export tax at roughly the level of the export incentive on textiles, garments, leather goods and garments, footwear, and plastics and rubber products. 18/ In late June 1981, export taxes were also applied on exports to the U.S. of cotton yarn, several iron

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18/ For a description of existing export incentives and their present levels see Chapter 6 below. While the crédito prêmio was reintroduced at 15%, the export tax was 15.6% for textiles, garments, leather goods, rubber and plastics; 15.9% for men's and boys' leather garments; and 15.0% for leather footwear.

and steel products, and castor oil products. Exports of possibly up to US$700 million were affected in 1981 (or about two thirds of this amount when taking into account that the measures were implemented only in May), of which more than half would be footwear.

3.22 The quota restrictions on exports of textiles and garments to the industrial countries, established within the Multi-Fibre Arrangement (MFA), seem to present rather indirect constraints to export growth. Brazil did not fully utilize its quota allocations under the MFA, but in the negotiations on a prolongation of the MFA the country requested substantially larger quotas than in the past. The knowledge of the existence of small quotas may have prevented manufacturers from establishing sizable export production capacities. Also, for textile and garment products minimum sales volumes in one country are sometimes necessary to bear the high cost of export marketing. In summary, external constraints to Brazilian exports are small but rising, including the threats of import barriers in some Latin American countries. In the case of developed countries, footwear and textile exports may be particularly affected, but largely through indirect discouragement of potential exporters rather than by directly reducing export profitability.

Prospects for Manufactured Exports

3.23 Brazil's economic crisis, centered mainly in the very large external sector deficits in the current account, gives urgency to the reconsideration of the country's long-term industrial and trade strategy. Given the export potential of a large number of Brazilian manufactures and the still very low export ratios, the government's annual export growth target of 20 percent in current US dollars can be met and should be exceeded during the next five years. 19/ However, unless substantial changes in the industrial and trade strategy are adopted, the required export growth may be increasingly costly. Firstly, the overall tendency toward higher protection in important Brazilian export markets will affect the prospects of major products, particularly the consumer goods which already now face some constraints. Products which have currently strong market demand, like military equipment, may not be able to compensate fully for rising difficulties in the markets of more traditional products. Secondly, as more enterprises with domestic market orientation would have to establish export production capacity in order to meet rising export targets, the incentives offered may have to be considerably increased. Unless the responsibility for guaranteeing the export competitiveness of Brazilian products is transferred to the exchange rate, the compensatory tax and credit incentives required will put a heavy strain on the public sector budget, and may invite countervailing measures by importing countries under the prevailing GATT regulations.

19/ Total exports in 1981 were US$23.3 billion (an increase of 15.7 percent over 1980).

CHAPTER 4

SOURCES OF INDUSTRIAL GROWTH: IMPORT SUBSTITUTION AND EXPORT EXPANSION

Introduction

4.01 The previous chapters have reviewed the main trends in the Brazilian industrialization process, the main features of the manufacturing sector in the 1970s and at the outset of the 1980 decade, and the performance and prospects of manufactured exports since their appearance as an important feature of the Brazilian economy in the early 1970s. As indicated in Chapter I, the large, growing, and well protected domestic market was the main destination of the successive waves of industrial investment, around the turn of the century, after 1932, and particularly after World War II. Extensive import substitution in the traditional consumer industries, with import ratios below 10 percent, appears to have taken place as early as 1911, and by 1939 the import ratio for the manufacturing sector as a whole was only 20 percent. During the long period of industrial growth following World War II, the import ratio kept falling continuously to 14 percent in 1949 and 6 percent in 1964 (Table 18). At the same time, the ratio of manufactured exports to manufactured output remained at very low levels, between 2 and 2.5 percent between 1949 and 1967 (Table 19).

4.02 This chapter attempts to quantify the three components of industrial demand growth--import substitution, domestic demand expansion and export expansion--and to explore their relationships to the trade and incentive policies followed in the different subperiods. Looking solely at the import and export ratios, it appears that import substitution and expansion of domestic demand were the main sources of industrial growth, with varying relative importance until 1967. Afterwards, increasing manufactured exports became important in the 1968-1973 period, while the import ratio increased for the first time after 1964, thus pointing to a process of negative import substitution. After 1974, a new period began, in which both import substitution and export expansion appear to have been significant. The analysis below measures the impact of these factors at the individual industry level, and at the aggregate level, including the direct and indirect effects through backward linkages in production.

Previous Studies and Theoretical Framework

4.03 Previous studies of the sources of industrial demand growth in Brazil have been undertaken with manufacturing output data at the 2-digit level covering some 21 manufacturing industries. 20/ While presenting comparable estimates for later periods, thus up-dating the previous work, this chapter also presents estimates of the sources of industrial demand growth on a more disaggregated basis. This greater disaggregation has

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20/ See Samuel A. Morley and Gordon W. Smith, "On the Measurement of Import Substitution," American Economic Review, Vol. 60, No. 4 (September 1970), pp. 728-735, and William G. Tyler, op. cit., 1976.

been made possible by the availability of industrial value added estimates by the IBGE and the publication of the complete 1970 input-output accounts, incorporating 72 tradable goods sectors in the IBGE 4-digit version.

Table 18: Manufactured Import Ratios in Total Supply

(percentages)

	1949	1964	1967	1970	1974	1979
Non-metallic minerals	1.8	1.8	1.8	2.7	4.1	2.4
Metallurgy	23.6	7.5	11.6	10.0	14.7	4.6
Machinery	65.7	30.9	29.6	28.4	32.1	19.5
Electrical equipment	47.0	7.8	11.3	18.8	20.2	14.1
Transportation equipment	51.7	4.8	8.9	7.8	8.8	3.6
Lumber & wood	1.5	0.1	0.2	0.4	0.7	1.0
Furniture	0.0	0.1	0.0	0.1	0.2	0.1
Paper	9.6	5.8	6.8	8.6	11.5	4.9
Rubber	3.0	0.3	0.7	2.9	8.3	4.4
Leather	3.4	0.3	0.3	0.5	3.2	2.6
Chemicals	38.3	11.1	13.6	15.6	22.2	11.8
Pharmaceutical products	19.3	3.3	3.6	6.0	8.3	8.1
Perfumery	2.8	3.4	2.2	2.2	4.1	1.2
Plastics	29.6	3.6	7.1	0.5	1.7	0.3
Textiles	4.0	0.1	0.2	0.6	2.3	0.6
Apparel and footwear	0.1	0.0	0.1	0.8	0.5	0.3
Food products	2.9	0.9	1.3	0.9	4.4	5.1
Beverages	2.4	0.8	1.2	4.5	6.9	1.3
Tobacco	0.0	0.0	0.0	0.0	0.9	0.1
Printing & publishing	2.2	4.4	4.2	2.3	2.0	2.0
Miscellaneous	30.7	13.4	17.9	21.7	28.8	21.1
Total	13.9	6.1	7.1	8.0	11.9	6.8

4.04 The conceptual framework and estimating method used in the previous studies, and in this chapter, are based on an identity relationship that allocates the growth of output between two points in time to the three sources of demand, import substitution, export expansion and domestic demand

growth. 21/ An extension of the basic identity was used in the previous studies and in this chapter to account for the effects of indirect production, stemming from the production of intermediate inputs. This has been done by using the coefficients of the 1970 input-output matrix.

4.05 The previous studies demonstrated that during the postwar period up to the early 1960's import substitution was an important source of demand growth. The study by Tyler estimated that between 1949 and 1964, 24 percent of the increase in industrial output could be attributed to import substitution. Import substitution was particularly important in the machinery, transportation equipment, electrical equipment, chemicals, and metallurgy sectors. In general, these were the sectors that grew the fastest during the 1949-64 period. In the mid-1960's, however, there began a gradual and cautious redirection of economic policies away from the forced import-substituting industrialization that characterized the 1949-64 period. A partial liberalization in the system of import restrictions took place, along with the implementation of a number of measures designed to provide incentives for export. Reflecting these policy changes, the period 1964-71 actually witnessed negative import substitution for many industries and the emergence of exports as a significant, yet still small source of industrial demand growth.

4.06 The new analysis covers the period 1970-79. Data published in the input-output accounts for 1970 serve as a benchmark. In order to reflect the economic policy changes accompanying the first petroleum price shock and subsequent events in the mid-seventies, the overall 1970-79 period is divided into two subperiods. The first covers the years 1970-74, and constitutes an extension of the 1964-71 period, while the second covers the years 1974-79. As will be shown below, the nature of industrial growth during these two subperiods was markedly different. The industrial output data for 1974 and 1979 originate from IBGE preliminary estimates of value added according to the input-output classification. Adjustments have been made on the basis of the 1970 input-output accounts information, observed output growth and price changes to obtain estimates of output. The trade data have been reclassified by hand from the published NBM classification format into the IBGE input-output classification according to the IBGE conversion tables. 22/ All variables are expressed in current prices.

21/ Import substitution (in absolute terms) is defined here as the difference between the volume of imports that would have existed at the end of the period, if the import ratio had remained constant, and the actual volume of imports. The percentage measures used in this chapter refer to absolute import substitution as a percentage of the increase of output. A description of the estimating methodology is outlined in Annex 1.

22/ The reclassification was prepared by FUNCEX. Because of the different definitions of manufacturing in the NBM and IBGE classifications on the one hand, and the ISIC classification on the other, the figures and ratios used in this chapter, while consistent over time, do not coincide with the figures in Chapter 3 above. The most important differences appear in the food and chemical categories.

4.07 As part of the estimating procedures, indirect export production and indirect import-competing production must be computed with the use of an input-output transactions table. These redefined export and import vectors were computed with the 1970 IBGE input-output table. Unquestionably, there are problems inherent with using these figures, as the process of industrial development that took place after 1970 may have considerably changed the input-output coefficients. However, as there are no alternative sources, we have used the only available figures. Since 1970 the structural interdependence of the Brazilian economy has grown markedly, and, as a result, the estimates of industrial growth accounted for by import substitution and export expansion presented in this chapter are likely to be underestimates.

Sources of Industrial Growth in the 1970s

4.08 An indication of the possibilities for import substitution or export-led demand growth can be obtained by examining the ratios of imports to total available domestic supply and exports to output, respectively. If imports are small relative to total domestic consumption, the scope for further import substitution can be regarded as limited. Similarly, if exports are initially small relative to an industry's output, even very rapid export growth will have only a small impact on the industry's output growth in the short term. By 1970 the overall prospects for continued import substitution were fairly limited (Table 18), as the average ratio of imports to total available domestic supply was 8 percent. By way of comparison, the comparable figures for 1949 and 1964 were 14 percent, and 6 percent, respectively. By 1970 in only four out of 21 two-digit industries did imports account for more than 10 percent of total available domestic supply. These industries were machinery, electrical equipment, chemicals, and miscellaneous manufacturing. Continuing a trend begun in the mid-1960's, between 1970 and 1974 the ratio of manufacturing imports to total available domestic supply of manufactured products increased. This reflected the policy measures liberalizing import restrictions and, as a result, imports in practically all two-digit industries increased relative to domestic output. On the export side, Table 19 shows that exports as a proportion of manufacturing output, continue to be small in spite of rapid export growth. By 1979, manufactured exports accounted for 9 percent of manufacturing output, up from 6 percent in 1970. In only two industries at the two-digit level of aggregation did 1979 exports represent more than 20 percent of output.

Table 19: Manufactured Export Ratios in Total Output

(percentages)

	1949	1964	1967	1970	1974	1979
Non-metallic minerals	0.2	0.2	0.7	0.8	1.2	1.8
Metallurgy	1.6	1.5	3.6	3.2	1.5	3.7
Machinery	1.5	3.2	5.2	3.6	5.2	14.2
Electrical equipment	0.2	0.3	0.7	1.4	7.7	4.4
Transport equipment	0.1	0.7	0.7	0.7	4.4	9.9
Lumber & wood	2.0	2.2	3.1	4.2	11.8	8.9
Furniture	-	0.1	0.2	0.3	1.3	0.8
Paper	-	0.7	0.3	0.9	3.7	7.7
Rubber	0.1	2.4	0.3	0.9	1.4	3.4
Leather	2.2	2.0	6.2	13.5	17.8	21.3
Chemicals	16.5	4.1	3.3	5.7	8.0	11.4
Pharmaceutical products	2.5	0.6	0.8	0.8	1.7	2.5
Perfumery	-	2.0	2.8	0.2	0.5	1.1
Plastics	-	0.3	0.3	0.1	0.2	0.8
Textiles	2.5	0.7	1.0	7.4	10.9	6.5
Apparel and footwear	-	0.1	0.2	1.0	9.1	7.4
Food	2.1	4.3	5.7	13.3	21.1	16.9
Beverages	0.1	0.2	0.2	0.3	2.9	1.8
Tobacco	-	0.3	0.5	11.5	18.5	22.1
Printing & publishing	-	0.1	-	0.3	0.8	0.6
Miscellaneous	1.0	0.4	0.9	2.2	7.3	7.7
Total	2.3	2.0	2.6	5.7	6.9	9.1

Source: Statistical Appendix, Table 4.2 for 1970, 1974 and 1979; and Tyler (1976) for 1949, 1964 and 1967.

4.09 The results of the sources of demand growth estimations are presented at the two-digit level in Table 4.3 of the Statistical Appendix and the more aggregate results are shown in Table 20. 23/ For the 1970-74 period, negative import subtitution was prevalent. These results reflect the prevailing liberalization of economic policies and are consistent with those made previously for the 1964-67 and 1967-71 periods. In all but two industries at the two-digit level, negative import substitution took place. At the same time, export expansion, while still accounting for only 12% of total output growth for manufacturing as a whole, was beginning to become significant relative to previous experience. For some industries, such as

23/ The estimates for the more disaggregated 4-digit level industries are presented in Table 4.4 of the Statistical Appendix. The Table 4.3 estimates are value added weighted averages of the 4-digit level estimates.

food products, textiles, leather, and tobacco, export growth constituted an important element in the growth of output. The years 1974-75 marked the beginning of a new era of Brazilian trade policies, possessing more in common with the policies prior to the mid-sixties than those of the 1964-74 period. The cautious liberalization of imports was halted abruptly with the introduction of new import restrictions, including substantial tariffs and a host of increasingly restrictive nontariff barriers. This latest round of import-substitution measures was introduced primarily for balance-of-payments considerations rather than to protect domestic industry.

Table 20: Sources of Manufacturing Demand Growth, 1970-79

(percentage)

	1970-74			1974-79			1970-79		
	IS	EE	DE	IS	EE	DE	IS	EE	DE
Capital Goods	-6.6	8.9	97.6	16.1	10.1	75.8	8.8	10.1	81.1
Intermediate Goods	-11.6	8.1	103.4	14.6	10.1	75.3	6.1	9.0	85.0
Consumer Goods	-5.9	18.4	87.6	2.5	8.1	89.3	0.0	9.1	91.4
Total Manufact.	-8.4	12.0	96.4	10.1	9.4	80.5	4.3	9.3	86.5

Source: Statistical Appendix, Tables 4.3 and 4.4.

4.10 For the 1974-79 period, import substitution emerges once again as a positive contributing source. For manufacturing as a whole, import substitution between 1974 and 1979 accounted for 10 percent of output growth (Table 20). In comparison with the 1949-64 period, also characterized by policies emphasizing import substitution, it should be noted that by 1974 there was far less scope for continued import substitution than was the case in 1949. Between 1974 and 1979, import substitution was able to provide more than 20 percent of demand growth in only two 2-digit industries--metallurgy and machinery. While it is clear that the levels of protection afforded by the tariff and non-tariff barriers increased substantially after 1974, the gains coming from import substitution were limited in their magnitude because of redundancy in the import barriers and of the already very low import ratios in most industries.

4.11 During 1974-79, the contribution of export expansion to demand growth for manufacturing as a whole was somewhat less than during the 1970-74 period, having fallen from 12% to 9.4%. The decrease took place in spite of the higher export base, which could have generated more substantial gains in export-derived demand growth. The overall decrease is due to the performance

of the consumer goods industries, as the contribution of export expansion by capital and intermediate goods to total demand growth increased. Much of the decline in consumer goods was related to the slower export growth of textiles, apparel, and food products. At the same time, however, export expansion continued to be an important source of growth for some industries, such as leather and tobacco products, and began to be significant for such industries as metallurgy, machinery and transportation equipment.

4.12 In all subperiods, domestic market expansion, calculated as a residual, accounted for a very large share of demand growth, indicating the importance of the domestic market in a large country such as Brazil. Moreover, the domestic market plays a key role in any policy transition from inward-oriented industrial growth to more outward-looking growth, or vice versa. The turnaround in economic policies in the mid-seventies and the subsequent changes in the nature of Brazil's industrial growth are further indicated in Table 21. Out of 66 six-digit manufacturing industries, 53 registered negative import subtitution during the import-liberalizing, fast growth, 1970-1974 period. In contrast, only 3 of the 66 industries displayed negative import substitution during the 1974-79 period. Similarly, export expansion exceeded import substitution as a source of demand growth for 60 industries in 1970-74, as compared to only 31 industries for 1974-79.

Table 21: Relative Importance of Import Substitution and Export Expansion

	Number of Sectors	
	1970-74	1974-79
Positive Import Substitution	13	63
Negative Import Subtitution	53	3
Import Substitution's Contribution greater than that for Export Expansion	6	35
Export Expansion's Contribution greater than that for Import Substitution	60	31
Total Number of Sectors 1/	66	66

1/ Includes 66 manufacturing industries at the IBGE 4-digit level. Coffee bean products have been excluded.

Source: Statistical Appendix, Table 4.4.

4.13 Thus, the analysis shows that the shift in economic policies observed during the mid-1970's had an important impact on the nature of industrial growth. As a result of the external sector crisis generated by the oil price increases of 1973 and 1979, policies once again began to emphasize import substitution. This renewed emphasis, however, came at a time when the prospects for further import substitution in all but a few industries were quite limited, and it had become increasingly imperative to expand exports. By 1979, only 11 out of 66 manufacturing industries at the 4-digit level displayed ratios of imports to total available domestic supply greater than 20 percent. Pushing import-substitution policies across the board at this point would not be able to bring about the desired economic growth and, moreover, the growth that might result would only take place at high cost.

PART II

TRADE POLICY, PROTECTION AND COMPETITIVENESS OF BRAZILIAN INDUSTRY

CHAPTER 5

INDUSTRIAL POLICY OVERVIEW

Introduction

5.01 As indicated above (Chapter 1), the process of industrialization in Brazil was based, until the mid-1960s, on an import substitution strategy supported by the large size of the domestic market and by the overall industrial policy framework. By that time, the combined result of the foreign exchange policy, high import tariffs and non-tariff barriers, and lack of assistance to manufactured exports had created substantial anti-export bias and very low import and export ratios in manufacturing, but it is not clear to what extent the protective policy had resulted in inefficiencies in the industrial sector. A study of protection in Brazil in the late 1960s, 24/ based mostly on legal tariff levels, found that in 1966 the average nominal protection of manufacturing was 99 percent, and average effective protection was 118 or 115 percent (depending on whether the Corden or Balassa formulas were used). However, these figures did not take into account the possibility of redundancy in the tariffs, and did not include any adjustment for the overvaluation of the official exchange rate. The same study repeated the calculations for 1967, when a tariff reduction had eliminated a considerable amount of redundancy, and their results were adjusted using a shadow exchange rate, obtaining much lower effective protection rates (see Chapter 7 below).

5.02 The economic liberalization measures started after 1964 went a long way toward changing the policy and institutional framework, as they included reforms in fiscal and monetary policy, protection, export promotion, exchange rate policy, and others. The conventional analysis of the two subperiods 1964-67 and 1967-73, corresponding to the stabilization-recession and fast growth stages, has often implied that the shift in trade policy took place after 1967, once the stabilization program had been completed. This view has been related to the fact that the policy of "mini-devaluations" was started in 1968, and that the export subsidies were also established the same year. However, although export subsidies and rebates were 45 percent of the FOB value of exports in 1971, 25/ "genuine" export subsidies were only 17 percent once tax rebates and duty drawbacks are excluded. At the same time,

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24/ Bergsman, J. and Malan, P. "The Structure of Protection in Brazil" in Balassa, B. and Associates, The Structure of Protection in Developing Countries, The Johns Hopkins Press, 1971.

25/ Balassa, B. "Incentive Policies in Brazil" in World Development, Vol. 7, Pergamon Press Ltd., 1979. The figures are from Savasini, J.A. Export Promotion: The Case of Brazil, Praeger, 1978.

the 1971 real exchange rate (trade-weighted with respect to Brazil major trading partners) was 13 percent above the level in 1965. This indicates that the mini-devaluation policy started in 1968 was insufficient to compensate the revaluation of the cruzeiro in 1966 and 1967, and that the role of the export subsidies established in 1968 was mainly to compensate this appreciation.

5.03 The time pattern of the import-liberalization measures shows even more clearly that the main progress was achieved in the earlier years, and that after 1967 there was some retrogression. In 1965 and 1966 there was substantial import liberalization, mainly through changes in the exchange premium system, and in March 1967 a general reduction of tariffs and the abolition of some non-tariff barriers took place. However, import tariffs were revised upwards again in 1968. The average nominal tariff for manufacturing went down from 99 percent in 1966 to 48 percent in 1967, increasing again to 66 percent in 1969. By 1973, nominal tariffs were estimated to have dropped again to 57 percent. It is important to notice, however, that the above figures can only be taken as a tentative indication of the trend in the level of protection, as tariffs have not been an important element of protection policy in Brazil for many years (in 1972, average tariff collection was 9 percent of imports). Thus, all protection estimates prepared in the late 1960s and early 1970s and based on nominal tariff rates have to be taken with great caution.

5.04 The relationship between policy changes after 1964, and the period of very high output and export growth between 1968 and 1973 has been explored by several authors, and several alternative explanations have been offered. 26/ A cyclical explanation as well as an argument based on the favorable international environment have been put forward, but whatever the relative importance of the different factors, it appears that the policy changes were an important element in the improved economic performance. On the export side, the major new element was the introduction of an export incentive system, as the exchange rate experienced a revaluation after 1965 and remained at this higher level until 1973. Thus, a moderate reduction in protection, a system of export incentives and, more importantly, a simplification and streamlining of administrative procedures, together with a publicly stated policy of a stable real exchange rate, managed to slightly open up a very inward-oriented industrial sector.

Policy Reactions to the Oil Crisis

5.05 The quadrupling of oil prices in 1973 resulted in an 18% deterioration of Brazil's term of trade. Given the rigidity of Brazilian imports, the alternatives open to the policy makers implied very hard choices in terms of economic growth, remuneration to the factors of production, and resource allocation. Fiscal and monetary policy followed a fluctuating pattern, with restrictive measures during 1974 and early 1975, an expansionary period until mid-1976, and a more restrictive policy again in 1977 and 1978. The exchange rate policy continued to be based on mini-devaluations, and the real exchange rate depreciated between 1973 and 1975, but returned to the 1973 level in

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26/ Balassa op. cit. reviews the major arguments before making his own.

1976-1977, with another depreciation in 1978 (Statistical Appendix, Tables 5.1 and 5.2). (The real devaluation of the cruzeiro was larger and more consistent when the impact of commodity prices is excluded from the comparison).

5.06 Trade policy after 1973 continued focussing on the expansion of exports, particularly manufactured products, but this was accompanied by an increase in import barriers, including higher tariffs, advance deposit requirements, and quantitative restrictions and by the promotion of import-substituting investments. The major components of Brazil's import bill were (in addition to oil), capital goods and intermediate products. Thus, the Second National Development Plan (1975-1979) contemplated large investments in pulp and paper, petrochemicals, fertilizers, steel and non-ferrous metals, with the objective of reaching or approaching self-sufficiency by 1979. At the same time, capital goods industries were to be promoted by a combination of import restrictions, fiscal incentives and preferential credit. Finally, measures to limit oil imports included gasoline price increases, the requirement that alcohol (mostly from sugarcane) be mixed with gasoline, a program for increasing the production of alcohol three-fold by 1980, and increased oil exploration.

5.07 The export promotion program remained basically unchanged from that of the previous period, although the importance of financial incentives to manufactured exports, particularly working capital financing at subsidized rates, experienced a substantial increase (see Chapter 6 below). Also, one of the incentives established in the previous period (BEFIEX) was used by a growing number of firms.

5.08 The measures adopted to limit imports and to promote exports did not suffice, however, to re-establish equilibrium in the balance of trade. As a result, in order to avoid substantial reductions in the growth rate and/or in the real remuneration to the factors of production, foreign borrowing was used to finance the current account deficit, and the foreign debt increased from US$12.6 billion in 1973 to US$41 billion in 1978. The trade account, which had been in balance in 1973, closed with a deficit of US$4.7 billion in 1974, US$3.5 billion in 1975, US$2.2 billion in 1976, and had a small surplus (US$97 million) in 1977, reverting to a deficit of US$1 billion in 1978. The temporary recovery in the trade account was the result of continued export growth and vigorous import restrictions, and of an improvement in the terms of trade between 1974 and 1977, mainly because of the coffee boom.

5.09 The policies followed in the years after the first oil price increase were successful in maintaining a fairly high rate of economic growth but they did so at the cost of external disequilibria, growing foreign indebtedness, and increasing inflation. The increase in the General Price Index (GPI) was 15 percent in 1973 but it nearly doubled to about 30 percent in 1974 and 1975, exceeded 40 percent in 1976 and 1977 and was again close to this figure in 1978. Major factors in bringing about this increase were expansionary fiscal and monetary policies in 1976, the continuing public sector deficits caused by growing subsidies to different subsectors, and the very ambitious public investment program in infrastructure and industry (steel, fertilizers).

Policy Changes After 1979

5.10 Industrial and trade policies in early 1979 included an attempt to liberalize the economy through simultaneous reductions in the overvaluation of the cruzeiro, the level of import protection, and of export subsidies. However, this proclaimed long-term policy was soon reversed in the face of short-term problems. The result has been a "stop-and-go" approach to economic policy, which until the beginning of 1981 had not achieved the main objectives set in early 1979. The main thrust of the policy program adopted in January 1979 was a gradual compensated devaluation, in which an accelerated crawling peg of the exchange rate was to achieve an accumulated real devaluation of the cruzeiro of 25 percent over a period of four years. At the same time, tariff and non-tariff barriers to imports were to be reduced, and export subsidies would be phased out, also over a four-year period. Thus, the program constituted a break with the policies followed during the 1973-1978 period and a partial return to the liberalization policies of the late 1960s, although without including a full-fledged stabilization program. Some reductions in fiscal expenditures were also contemplated, although the overambitious public investment program designed in the early 1970s had been already cut down since 1977.

5.11 The gradualist program of 1979 did not survive the impact of the new oil price increases during the year, and of higher-than-expected inflation. It appears that the institutional set-up, including split monetary authority and multiplicity of public sector institutions, did not allow for an efficient management of monetary and fiscal policy. Also, during 1979, inflation increased to about 54 percent and the real exchange rate remained practically unchanged after a real devaluation in January and until the December maxi-devaluation. At the same time, the trade deficit increased nearly three-fold, reaching US$2.7 billion. Thus, in December of the same year a new policy course was taken with a devaluation of the cruzeiro of 30 percent, the removal of a prior deposit scheme on imports, a one-step elimination of the fiscal subsidy to exports that had been targeted for gradual reduction, and the imposition of export taxes on major export commodities.

5.12 The policy measures adopted in December 1979 represented a radical departure from the exchange rate policy followed during the previous eleven years and had a strong negative impact on many industrial firms (public and private) which had increased their foreign indebtedness in the previous years. In an attempt to ease the financially hard-pressed enterprises and to influence inflationary expectations, the government announced, in early 1980, that devaluation during the year would be limited to 40 percent, irrespective of annual inflation.

5.13 During 1980, the lack of restrictive fiscal and monetary policies called for to make the devaluation effective, and the upsurge in the velocity of circulation of money brought about by the ceiling on "monetary correction" and resulting negative interest rates, combined to generate an unprecedented increase in the rate of inflation, which exceeded 100 percent for 1980. At the same time, the growing fears of another maxi-devaluation contributed to generate a large deficit in the trade account, which reached US$2.8 billion

in spite of good export performance (exports increased by 32.2 percent in current US$ terms). With an overall growth of GDP of 8 percent in real terms and a similar growth of industry, the economy was clearly overheated. Imports increased by close to 28 percent (in current US$ terms), and the current account deficit was US$12.2 billion. As a result of the high inflation, the real exchange rate in December 1980 stood at a level similar to that before the maxi-devaluation of 1979, when compared to the US dollar, and had experienced a real revaluation of 4.4 percent with respect to the weighted average of the currencies of Brazil's major trading partners. Thus, during 1980, inflation and the exchange rate policy fully eliminated the effect of the maxi-devaluation of December 1979, and the economy started 1981 with more serious disequilibria in its domestic price system and its external sector.

The Stabilization Program of 1981

5.14 Since the beginning of 1981, the Government enacted a number of measures aimed at stabilization. The two cornerstones of the program were a much tighter control over monetary and credit expansion, as well as public sector expenditures, and a more flexible exchange policy of frequent mini-devaluations reflecting the full extent of the domestic inflation. Moreover, a number of other measures were taken (some already in 1980) to eliminate more structural sources of disequilibria, including gradual removal of price controls, transfer of some items from the "monetary" to the fiscal budget (with a view to full consolidation by 1982), increasing control over public sector firms and reductions in the volume of subsidized credit to some sectors. In addition, other measures have been taken to slow import growth (a surcharge tax of 25 percent and increased import controls) and to stimulate manufactured exports (reintroducton of the fiscal subsidy eliminated in December 1979 and increased availability of pre-shipment financing for exports).

5.15 After a number of U-turns in policy orientation during the last three years, the stage was set in 1981 for a more complete version of the 1979 policy approach. There are at least three separate sets of reasons why this second attempt could be more successful than the first. One refers to the exogenous shocks, such as the oil price increases, which contributed to the decision to change course during 1979 and, which, under current world demand conditions, are not expected to recur in 1981-1982. The two other main reasons for an increased chance of success are domestic and include the higher degree of control over public sector expenditures and credit expansion of which the government is capable under the current system, and the more general recognition (albeit still reluctant) that a successful stabilization strategy requires a real cost in terms of a temporary but substantial reduction in the growth of output.

Stabilization in the Domestic Market

5.16 All main economic indicators showed a considerable slowdown of the economy in 1981. Industrial production fell by 5.4 percent in real terms, imports fell by 3.8 percent in current US$ terms during the year, and

unemployment increased noticeably in all major metropolitan areas. 27/ At the same time, inflation started to show signs of abating, with increases in the General Price Index (a composite of the wholesale price, the consumer price, and construction price indices)falling from a monthly average of 7.5 percent during the first quarter to 5.4 percent during the second. The monthly average increased slightly during the third quarter, to 5.6 percent, and fell to 4.5 percent during the last quarter. As a result, the annual rate of inflation for the twelve month period ending in December 1981 had been reduced to 95.2 percent, from a peak of 121.2 percent at the end of March 1981.

5.17 The 1981 economic recession was particularly localized in the industrial sector 28/ and more specifically in a number of industrial subsectors. Output during 1981 fell substantially in the consumer durables subsector (27.2 percent) 29/, capital goods industries (18.7 percent) and intermediates (10.5 percent). However, non-durable consumer goods fell only 2.3 percent. While the fall in demand for consumer durables is related to the demand management policies adopted by the government after late 1980 (increase in interest rates and monetary correction, limits to credit expansion and stiffening in installment credit conditions), the serious recession in the capital goods industries is also related to the reduction in the government investment programs, which, after suffering some reductions in the 1978-80 period, have now experienced further cuts.

5.18 Although disaggregated data are scarce and of uncertain accuracy, it appears that the more traditional subsectors of manufacturing were still relatively unaffected by the recession. Thus, food production increased 2.8 percent, clothing and footwear 1.3 percent, soaps and perfumes 0.6 percent and pharmaceuticals 4.1 percent during the first three quarters of 1981. This may reflect the fact that under the current wage-indexation schemes, wages of up to three times the minimum wage level have semi-annual adjustments above the rate of monetary correction (which during 1981 fully reflected domestic inflation). As a result, production of wage goods remained less affected and, given the regional distribution of industrial activity, the impact of the industrial slow-down concentrated in the "heavy industry" areas such as São Paulo and Rio de Janeiro. It appears that for the whole of 1981, industrial output experienced a fall of 5.4 percent, albeit with considerable variations among specific industrial subsectors, and that Brazilian GDP fell by 1.9 percent.

27/ From 6.6 percent in December 1980 to 8.3 percent in September 1981 in Rio de Janeiro and from 4.6 percent to 7.3 percent in Sao Paulo.

28/ Agriculture performed well in 1981, with a growth rate of 6.8 percent.

29/ The automobile industry was probably the hardest hit by the 1981 recession. IBGE estimates that motor vehicle production fell by 31.3 percent in 1981.

Stabilization in the External Sector

5.19 The overall stabilization program summarized above had also a significant impact on the external sector, as the slowdown in economic activity reduced the demand for imports while the fall in domestic demand encouraged producers to seek increased external sales. Even more important, the abandonment of the policy of "pre-fixation" of monetary correction and devaluation, and its replacement by a policy of adopting monetary correction and devaluation rates equal to the rate of increase in the consumer price index, stopped the gradual loss of competitiveness of Brazilian exports. However, given the very large revaluation of the cruzeiro in real terms experienced during 1980, the new policy of faster mini-devaluations mentioned above would have been slow and insufficient to achieve the rapid improvement in the trade balance that was called for in 1981. Thus, the Government took also a number of direct measures to increase the profitability of exports.

5.20 Between December 1979 and December 1980, the cruzeiro experienced a revaluation of 17.3 percent in real terms with respect to the US dollar. In spite of the abandonment of the policy of pre-fixation in late 1980, the appreciation of the cruzeiro continued until February 1981, by which time the price-adjusted cruzeiro/dollar rate was equal to that of November 1979, immediately before the maxi-devaluation. Thus, in a period of fourteen months, the failure to control aggregate demand and the exchange policy adopted managed to eat up fully the effects of the maxi-devaluation. Since then, the trend has been reversed, and through more frequent devaluations of the nominal exchange rate, some progress has been achieved. By the end of June 1981, the price-adjusted cruzeiro/dollar rate indicated a real devaluation of 4.9 percent from its February 1981 level but was still more than 15 percent above the level immediately following the maxi-devaluation. Adding to the loss of competitiveness in the cruzeiro/dollar rate is the substantial appreciation of the US dollar with respect to the Japanese and European currencies of Brazil's main trading partners. Although a price-adjusted exchange rate of the cruzeiro with respect to the weighted average of the currencies of its main trading partners is only available through February 1981, the nominal exchange rates indicate that the revaluation of the cruzeiro continued through June. The trade-weighted exchange rate shows a nominal devaluation of 18 percent between February and June, a period during which Brazilian wholesale prices increased by 27 percent. Assuming an average annual inflation of up to 12 percent in Brazil's main trading partners, the corresponding price increase for the four-month period would be 3.9 percent and the trade-weighted revaluation of the cruzeiro in real terms would be 3.5 percent (compared to the 4.9 percent devaluation with respect to the US dollar). Between June and December 1981, the mini-devaluations accelerated, proceeding at an annual rate of 98.5 percent, well above the corresponding 80.6 percent annual growth rate of the General Price Index. Thus, for the whole of 1981, the price-adjusted cruzeiro/dollar rate experienced a real devaluation of about 10 percent.

5.21 In spite of the difficulties indicated above, the approach currently followed by the Brazilian government, of frequent mini-devaluations over and above the differential inflation, seems preferable to a sudden maxi-devaluation. The experience of December 1979 shows that a maxi-devaluation is more likely to generate self-fulfilling expectations of further inflation and devaluations. At the same time, a maxi-devaluation imposes a sudden cost increase on firms and individuals having large foreign debt balances and may result in strong pressures to invalidate the effects of the devaluation. Frequent mini-devaluations have been a common feature of Brazilian economic policy during the last fifteen years, and the Government's ability to control monetary and credit expansions, although higher than at the time of the 1979 devaluation, might not be able to resist the pressures that would be generated after a new maxi-devaluation. For all these reasons, continuation of the current policy, but with an increase in the frequency and the size of the mini-devaluations, appears to be the best course. Such a policy implies the maintenance of some inflationary pressure generated by the external sector, but, given the latter's relatively small size, it is clear that the strongest pressures will continue to come from the domestic sector.

Export Incentives and Import Restrictions

5.22 The loss of competitiveness of Brazilian exports during 1980 due to the exchange rate policy was compounded by the elimination of fiscal subsidies in December 1979 and by some changes in the methodology for calculating the amount of subsidized pre-shipment financing for manufactured exports. The latter fell from a total of US$1.9 billion in 1979 to US$1.8 billion in 1980, even though manufactured exports increased from US$8.6 billion to US$11.4 billion during the same period. The effects of the loss of competitiveness of Brazilian industrial exports started to be felt during the first quarter of 1981, when exports of semi-manufactured and manufactured products reached a total of US$2.8 billion, 30/ with an increase of only 17.4 percent in current US dollar terms over the same period in 1980.

30/ Excluding sugar and instant coffee. The latter actually dropped from US$68.7 million to US$54.4 million.

5.23 To reverse this trend, the Government reintroduced, in April 1981, a modified version of the fiscal subsidy to exports eliminated in December 1979 (the "crédito prêmio"). In its new version, the subsidy has a flat 15 percent rate on all eligible products [31]/ to be reduced to 9 percent from January to March 1983, when it is to be finally eliminated in compliance with agreements reached with the GATT. Shortly after the re-establishment of the crédito prêmio, the US announced that it would impose countervailing duties on some Brazilian exports (shoes, cotton textiles and leather products), and a compensating export tax was then imposed by Brazil on such exports going to the US market (para 3.23 above). The reintroduction of the crédito prêmio had as one of its main effects to compensate for the appreciation of the cruzeiro with respect to European currencies as a result of the strengthening of the US dollar.

5.24 A substantial change in the provision of subsidized financing to industry and exports also took place in 1981. During 1980, pre-fixation of monetary correction implied highly negative real interest rates for most types of credit, and the special credit lines for manufactured exports provided only a relatively small reduction in such negative rates. Starting in 1981, however, the situation was again reversed. Monetary correction equal to the rate of growth in the National Consumer Price Index (INPC) started to be applied, pushing overall interest rates for industry into positive values in real terms. At the same time, some changes were made in the export financing legislation (Res. 674 of January 1981), increasing the amount of credit for which firms are eligible and fixing the interest rate at 40 percent. (A more detailed analysis and quantification of export incentives is included in Chapter 6 below.)

5.25 Beginning in early 1980, the Government began stiffening import restrictions, partly through the establishment of the financial operations tax on most imports (excluding oil). The tax rate was originally 15 percent and was later increased to 25 percent. As a result, the system is, in effect, one of multiple exchange rates, with three basic rates for general imports, oil imports and most commodity exports, and manufactured exports. With the gradual adjustment of the nominal exchange rate and the planned reductions in fiscal incentives, the financial operations tax, which is actually a tariff surcharge, should also be eliminated. Finally, it appears that, in a further effort to reduce imports, a number of administrative

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31/ Except in the case of some exports under the BEFIEX program which maintained their contractual rates even after the general elimination of the subsidy in 1979 and have remained untouched again. Prior to December 1979, the "crédito prêmio" rates were related to IPI and ICM rates for the specific product (see Chapter 7 below).

barriers are now being used, from outright rejections of import licenses to processing delays, additional bureaucratic requirements and other. The overall impact of the system of tariff and non-tariff import restrictions on the efficiency and competitiveness of the industrial sector is analyzed in Chapter 7 below.

5.26 The impact of the battery of policy measures summarized above, added to the impact of the recession on the external sector, already appeared in the trade data for 1981. Total industrial exports reached US$14.0 billion during the year, an increase of 23 percent in current US$ over 1980, a performance clearly superior to that of the first quarter of the year. At the same time, total Brazilian exports reached US$23.3 billion during 1981, an increase of only 15.7 percent over 1980. Imports in 1981 amounted to US$22.1 billion, a 4 percent decrease over the corresponding period in 1980 (US$23 billion). As a result, the trade account of the balance of payments has shown monthly surpluses since May 1981, and the accumulated trade surplus during the year reached a total of US$1.2 billion.

CHAPTER 6

FISCAL AND FINANCIAL INCENTIVES TO EXPORTS

Introduction

6.01 Since the mid-1960s, Brazilian economic policy has tried to increase the export orientation of the industrial sector, in order to relax the foreign exchange constraint faced by the country and to reduce the dependence on exports of a small number of commodities. These efforts have been relatively successful, as indicated by the impressive growth of manufactured exports reviewed in Chapter 3 above. From 1965 to 1980, exports of industrial products (including semi-manufactures) grew about 40 times, reaching US$11.4 billion in 1980 (Statistical Appendix, Table 3.2). However, several factors have made this change a difficult one, requiring vigorous export incentives to achieve a still moderate percentage of exports in the total manufactured output. These factors include the historical process of industrial development in Brazil (see Chapter 1 above), which was based on import-substituting industrialization, the very large and rapidly growing domestic market during the 1960s and 1970s, and the large percentage of foreign investment in several key industries, which resulted in plants whose market was defined as part of the marketing strategy of the parent multinational company.

6.02 The system of incentives to manufactured exports was established during the years of economic liberalization of 1964-1967 and reinforced in later years (mainly 1968 to 1972) to compensate the loss of competitiveness resulting from the revaluation of the cruzeiro in real terms. Since then, a formidable administrative system has evolved to handle this battery of incentives, mostly under the direction of CACEX, the large Foreign Trade Unit of Banco do Brasil. During the past fifteen years, the administration of the incentive system has been used in a fairly discretionary way to compensate for variations in the real exchange rate and to support specific subsectors at different points in time. Specific incentives have been established, altered and/or eliminated to suit specific subsectoral programs and priorities. This chapter presents a review of the current system of fiscal and financial incentives to manufactured exports, and an attempt to quantify its importance in recent years at the sub-sectoral level. This quantification is compared with previous work done by several Brazilian authors, mainly in the mid 1970s, and the effectiveness of the current system and its implications for further development of industrial output and exports are examined.

Fiscal Incentives to Exports

6.03 The first fiscal measure that eliminated an important source of anti-export bias was the tax reform of 1965, which replaced the previous cascading sales tax by two value-added taxes, IPI and ICM, thus allowing

for an effective exemption of indirect taxes on exports. Subsequently, several other fiscal incentives were gradually introduced. These incentives can be classified in two main groups, depending on whether they consist of indirect tax exemptions (including import duties) to eliminate an anti-export bias, or whether they are genuine subsidies to compensate for other unspecified disincentives to exports (e.g. the overvaluation of the exchange rate). The first group includes mainly the duty draw-back system and some of the elements of the BEFIEX and CIEX programs (although these two constitute special categories), whereas the subsidies include the export tax credit (crédito prêmio), the reduction in corporate income tax and the additional exemptions to import duties and other taxes.

6.04 The duty draw-back system was established in 1966 and put in operation in 1969. Three different procedures are applied:

(i) Restitution of duties and taxes paid by exporters on imported production inputs. 32/ This post facto system of reimbursing taxes and duties (which is the usual form of duty draw-back in other countries) is hardly used in Brazil, and no statistical information is available.

(ii) Exemption of duties and taxes on imports to exporters whose earlier exports contained imported inputs for which duties and taxes have been paid. Basically, this system permits exporting enterprises to re-establish stocks of imported production inputs. Each import activity under this system requires clearance from CACEX.

(iii) Suspension of duties and taxes, in advance, on imports for export production, on the basis of an agreement to use the imports to produce exports which have a higher value than the imports. This is the most frequently used duty draw-back mechanism.

6.05 The BEFIEX program (Benefícios Fiscais a Programas Especiais de Exportação) is a system of enterprise-specific export incentive packages provided in return for a commitment to reach agreed export targets over a period of generally 10 years. In operation since 1972, each agreement is based on detailed documentation on the exporting enterprise and negotiations with the BEFIEX administration. The typical incentive package offered contains a 70-90 percent duty and tax reduction on imports of machinery and equipment and a reduction of 50 percent on raw material and intermediate products' imports, with complete exemptions of import duties and taxes granted in special cases. Major advantages of the BEFIEX incentive system are the permission to use the imports for both export and domestic market production; the waiver of the "law of similars", thus providing access to equipment at world market prices and quality; and, in some cases, a long-term

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32/ The taxes rebated or exempted are the IPI, ICM, TPM (Taxa de Melhoramento de Portos), and AFRMM (Tax for the Renovation of the Merchant Marine).

guarantee against changes in the incentive system, which proved valuable after 1979 when the crédito prêmio was abolished, but maintained for the automotive enterprises with a BEFIEX agreement. The BEFIEX agreements included other commitments by the enterprises in addition to the obligations to adhere to long-term export targets. For example, enterprises in the automotive industry, which have been the main beneficiaries of the BEFIEX system, were obliged to reach an agreed domestic value-added content of exports in addition to targets of nationalization values of total production. (See also Chapter 11 below, on the impact of BEFIEX on the automotive industry.) Thus, BEFIEX operates as a program of industrialization rather than only as an export incentive system. A similar CIEX system is operated in parallel to BEFIEX and applies to small enterprises lacking the ability to undertake long-term export commitments. Reduction of import duties and taxes is granted only on machinery and equipment (by up to 90 percent), the agreement is generally made for only up to 5 years, and the export targets in relation to import volume are lower than in the BEFIEX system.

6.06 The most important subsidy to exports has been the export tax credit (crédito prêmio) introduced in 1968, abolished as a general incentive during the devaluation of December 1979, and re-introduced in April 1981. Before the 1979 devaluation, the crédito prêmio was related to payments of IPI and ICM taxation, and its rates were generally identical to the tax rates for different products. The new crédito prêmio was set at a uniform rate of 15 percent of FOB value for all products for 1981, to be reduced to 9 percent for 1982 and 3 percent until June 30, 1983, when it was to be eliminated. This timetable was modified later, maintaining the 15 percent rate until December 1982. The crédito prêmio is now scheduled to be eliminated on April 1, 1983. Under the prevailing system, the crédito prêmio can be used immediately for payment of all tax obligations. A reduction of corporate profit taxes for exporters has also been effective since 1971. In principle, profits made on export sales are not subject to the 35 percent (30 percent until 1979) corporate profit tax, but the number of exceptions is large. According to the legislation, this export incentive scheme is to be abolished at the end of 1985.

Quantification of Fiscal Incentives

6.07 Since the establishment of the Brazilian system of export incentives in the late 1960s, there have been several studies that have attempted its quantification. The most complete work to date remains that carried out by FUNCEX for 1975, 33/ but it is important to examine again the importance of the incentive system with more recent data. Also, the FUNCEX study was unable to quantify the importance of BEFIEX-related incentives for lack of data, whereas this chapter makes use of additional information made available in recent years. Finally, the quantification of incentives in this chapter

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33/ Pastore, A.C., Savasini, J.A. and Rosa, J.A., FUNCEX, Quantificação dos Incentivos às Exportações, 1978.

distinguishes more clearly between "subsidies" and other incentives and takes into account the product-specific rates and particular technical features of each scheme.

6.08 The availability of statistical data on specific fiscal incentive schemes was substantially improved during 1980 by the Secretaria de Receita Federal of the Ministry of Finance, which established a computerized data system on corporate taxation. After some adjustments and estimates, the system offers a complete picture of all incentive schemes by industrial sub-sector. As the system only provides data for 1979 and 1980, it cannot be readily used for complementing the earlier studies, which used time series of incentives and exports starting in the early 1960s. Nevertheless, it should be useful for checking the assumptions made on the size of different schemes. Of the 24 tax and import duty incentive schemes registered separately by the Secretaria, four are specifically designed to promote exports. In addition, the Secretaria provides data on the volumes of export cash incentives (crédito prêmio) and corporate tax incentives for exports.

6.09 Basic data on exports and two of the fiscal incentives (crédito prêmio and income tax reduction) for 1978 and 1979, at the two-digit level of the NBM classification, are available from the corporate income tax registration system (Table 22 and Statistical Appendix, Tables 6.1 and 6.2). The 1978 data cover all 420,000 registered enterprises, of which 65,000 are industrial. The 1979 data are based on a sample of the largest 20,000 firms, 7,500 of which are industrial. The sample should therefore cover all exporting industrial enterprises (para 3.17 above). The corporate tax data indicate that a large share of industrial exports (about one-quarter) does not receive the two subsidies, whereas a number of non-industrial exports benefit from incentives which are directed to industrial exports. 34/ The industrial exports not receiving incentives are concentrated in the food, tobacco and chemical industries.

6.10 In 1979, the last year under the old incentive system, industry received tax credit certificates for about Cr. 33.1 billion or US$1.1 billion (Table 22). The average tax credit rate was about 13 percent of the export value; the average tax credit rate on exports receiving the incentive was 17 percent. At the subsectoral level (Statistical Appendix, Table 6.2), the machinery and equipment industries received the lion's share of the crédito prêmio; one-third of the total went to the transport equipment industry, where the average rate (on exports receiving the incentives) was 24.6 percent. The crédito prêmio was abolished as part of the maxi-devaluation package of 1979 for all exports, excluding some of the firms under the BEFIEX system (where the crédito prêmio had been provided on a contractual basis). It was reintroduced in April 1981 at a uniform level for all qualifying products. This is expected to eliminate the subsectoral concentration and to

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34/ To a certain extent this may also reflect the fact that the Secretaria da Receita Federal collects data on a firm basis, whereas the incentives are given on a product basis.

provide for simplified administrative procedures. Under the current system, the amount of crédito prêmio disbursed differs considerably from the real value of this incentive to the exporters. Firstly, the crédito prêmio can only be deposited in a bank one month after receipt, 35/ without application of monetary correction. At current market interest rates, the loss of value to the exporter would be around 10 percent of the crédito prêmio. Secondly, a more important reduction in the real value of the crédito prêmio results from its being subject to corporate profit taxation. Thus, the "incentive effect" of the crédito prêmio as well as its actual fiscal cost to the federal budget amounts to only around 65 percent of its nominal value.

Table 22: Credito Premio and Income Tax Reduction on Exports 1978-1979

(Cr. billion)

	No. of Firms (thousand)	Sales Receiving Incentives		Sales Not Receiving Incentives		Crédito Premio	Export Profit Tax Reduction
		Export	Domestic	Export	Domestic		
1978							
Industry	64.6	98.4	14.4	39.8	1,914.3	20.7	8.7
Other	357.8	27.5	2.9	40.1	220.9	1.5	1.8
Total	422.5	125.9	17.3	79.9	2,135.2	22.1	10.5
1979							
Industry	7.5	177.2	18.1	56.0	2,675.8	33.1	18.3
Other	13.1	53.8	2.1	55.6	243.9	2.3	6.0
Total	20.6	231.0	20.2	111.6	2,919.7	35.4	24.3

Source: Statistical Appendix, Tables 6.1 and 6.2.

6.11 The above data also provide an indication of the relative importance of the crédito prêmio for the profitability of exports in 1978 and 1979. 36/ In the latter year, export-related profits for industry as a whole were only slightly above one-half of the crédito prêmio received. In the machinery and equipment subsectors, where export profits were below

35/ The document is issued by CACEX after shipment.

36/ Profit data are also from the Secretaria da Receita Federal and originate from corporate tax declarations.

average, the crédito prêmio was particularly important. In the transport equipment industry, the amount of tax credit received in 1979 was more than four times the amount of export profits. 37/ Overall, the tax exemption of export profits provides only a modest amount of incentive. In 1979, US$200 million were provided as support to exporters, compared to US$1.1 billion in the form of crédito prêmio. About 30 percent and 11 percent, respectively, of the total tax exemptions were in the food and textile industries, which had high profitability from export activity.

6.12 Reduction or exemption of import duties and taxes are the most widely used instruments of industrial development in Brazil. The Secretaria da Receita Federal lists 24 incentive schemes providing access to imports at reduced tax rates. As a result, actual import duties and taxes paid by industry in 1980 were only one-third of their scheduled amount (Table 23). Exemptions and reductions were again highly concentrated in the metallurgical and machinery-producing industries, which received about 60 percent of the total exemptions. The bulk of the import duties and tax exemptions for industry were not related to exports; about 70 percent of the total were intended to support industrial production for the domestic market, and only 30 percent were used to reduce discrimination against exports.

6.13 The most important scheme providing export-related import duty reductions and exemptions is BEFIEX. While BEFIEX benefits go beyond import duty reductions (para. 6.05 above), the large volumes of imports that have taken place under the system, its concentration on a small (although growing) number of firms in the capital goods industries (particularly the automotive sector), and the coverage of machinery imports as well as raw materials and intermediate inputs, to be used for both exports and domestic sales, have contributed to make BEFIEX the key export incentive scheme for its beneficiaries. In particular, exports of transportation equipment depend largely on BEFIEX incentives, although they are also major beneficiaries of other export incentive schemes. About 20 percent of industrial exports during 1978-1980 were performed within BEFIEX, US$1.8 billion in 1980 alone (Table 24). Until 1979, only 59 enterprises maintained BEFIEX agreements, the number rising to 100 during 1980. By July 1981, 115 enterprises had signed long-term export commitments in order to obtain the BEFIEX incentive package. Another 130 smaller firms were at that time participating in the CIEX system. The total export commitments during the contract period of the BEFIEX and CIEX agreements were US$25 billion at the end of 1980, rising to

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37/ To the extent that export profitability is an indication of comparative advantage, the data above may indicate that export incentives were concentrated in industries with the least comparative advantage. Since these industries have maintained their high crédito prêmio rates due to the BEFIEX agreements, this support of the least export competitive industries is currently still in effect. However, a more comprehensive consideration should also take into account the different levels of protection as shown in Chapter 7. The complete discussion is presented in Chapter 8 below.

US$33 billion in July 1981. US$2.2 billion of the latter amount were export commitments within the short-term CIEX agreements.

Table 23: Industrial Sector Imports and Tariff Exemptions, 1980

(Cr. billion)

	Imports under BEFIEX	Imports under Drawback	Other Export Related Imports	Total Export Related Imports	Total Industrial Sector Imports
Imports	27.2	44.4	4.7	76.3	979.7
Tariff exemptions	21.7	26.0	3.1	50.8	157.7
Exemption rate (as % of imports)	79.8%	58.6%	65.6%	66.6%	16.1%

Source: Statistical Appendix, Tables 6.3 and 6.4.

Table 24: BEFIEX Program, 1977-1980

(US$ billion)

	No. of Firms	BEFIEX Exports 1/	Manufactured Exports 2/	BEFIEX Exports Share (%)
1977	n.a.	0.58	3.84	15.1
1978	n.a.	0.97	5.08	19.1
1979	59	1.24	6.68	18.6
1980	100	1.77	9.04	19.6

1/ Including CIEX in 1977-79.
2/ Including semi-manufactured.

6.14 Of the cumulative export commitments of US$25.2 billion under BEFIEX agreements, one half corresponded to the transport equipment industry (Table 25). The net foreign exchange earnings of the program are indicated to be US$10.6 billion or 42 percent of the export value. In 1980, however,

BEFIEX exports of US$1.77 billion required imports of US$546 million, with a ratio of net foreign exchange earnings of 69 percent. The net foreign exchange earnings of US$1.22 billion received export tax credits of about US$240 million and import duty exemptions of US$380 million. Thus, the importance of the exports under BEFIEX contracts is matched by a very high level of incentives.

Table 25: BEFIEX Sectoral Programs, 1980

(US$ billion)

Sector	Export Commitment		Net Foreign Exchange Earnings	
	Amount	Share (%)	Amount	Share (%)
Food	0.39	1.5	0.32	3.0
Chemicals	0.40	1.6	0.16	1.5
Wood products	0.20	0.8	0.17	1.6
Paper and pulp	1.26	5.0	0.86	8.1
Textiles, garments	1.66	6.6	1.33	12.5
Footwear	0.17	0.7	0.14	1.3
Metals	5.93	23.5	2.33	22.0
Machinery	2.59	10.3	1.34	12.6
Transport Equipment	12.39	49.2	3.85	36.2
Other	0.19	0.8	0.13	1.2
Total	25.18	100.0	10.62	100.0

Source: BEFIEX, Annual Report 1980.

6.15 The two main procedures of import duty draw-back currently in operation (suspension and exemption) accounted for US$460 million in 1980 for the industrial sector as a whole. The main beneficiary industries are again the metal working subsectors, particularly the transport equipment industry (Statistical Appendix, Table 6.4). The picture was practically unchanged during the period of January-May 1981 (Statistical Appendix, Table 6.5), when metallurgy, machinery and transport equipment obtained two-thirds of the duty draw-backs. Finally, an additional system of import duty reductions (Regime 04) provided duty exemptions of US$55 million in 1980 with a relatively even subsectoral distribution (Statistical Appendix, Table 6.4).

Aggregate Impact of Fiscal Incentives to Exports

6.16 The quantification of individual fiscal incentives in the previous section can be used to construct an aggregate measure of the impact of all fiscal incentives on each industrial subsector for 1979 and 1980 (Statistical Appendix, Tables 6.6 and 6.7). At the aggregate level, the total value of fiscal export incentives dropped from US$2 billion in 1979 to US$1.5 billion in 1980, due to the elimination of non-BEFIEX export tax credits (Table 26).

At the same time, manufactured exports increased from US$8.7 billion to US$11.4 billion [38]/. Fiscal export incentives are highly concentrated on a small number of industrial subsectors, an important feature which became even more accentuated after the revision of incentives in 1979. The transport equipment industry obtained more than one third of the total incentive volume in 1979 and more than 50 percent in 1980. The maintenance of the crédito premio for exporters of transport equipment with BEFIEX contracts was the main reason for this rising subsectoral concentration of fiscal incentives. Fiscal incentive rates vary considerably among subsectors from a high of 34 percent for transport equipment to a low of less than 1 percent for beverages, tobacco and printing.

6.17 The figures in Table 26 indicate the legal or nominal value of each incentive as reflected in the amount of the tax credit certificates issued, or in the difference between the calculated import tariffs and the tariffs actually paid. However, the value of the incentives to the exporters often differs from the above nominal values. As indicated in para. 6.10 above, in the case of the crédito prêmio the impact of delays in cashing the certificates and the incidence of corporate income tax reduce its value to about 65 percent of its nominal amount. Similarly, the nominal amounts of tariff reductions under the BEFIEX and draw-back schemes would only coincide with its value to the exporters under very special circumstances [39]/. Estimation of the real value of the tariff reductions to the exporters presents several problems. Chapter 7 below shows that Brazilian import tariffs include considerable redundacy, i.e., that the price of the competing domestic products is well below the level of international prices plus the legal tariffs. Thus, a possible alternative value for the BEFIEX and draw-back schemes could be obtained by using the implicit tariff levels (based on direct price comparisons) shown in Chapter 7, instead of the nominal tariff values as in Table 26. However, this would result in a substantial underestimation of the incentives, which are used in a selective way to obtain access to specific inputs where price and quality differences are most important (and are not captured in the implicit tariff figures shown in Chapter 7).

38/ The export figures are also from the Ministry of Finance. They fall in between the figures shown by CACEX using the NBM classification and those obtained by using the ISIC classification (Chapter 3 above).

39/ The conditions under which the two values would be equal are (i) zero elasticity of substitution among factors, and (ii) absence of domestically produced competing inputs or zero redundancy in the tariffs of competing domestic inputs.

Table 26: Nominal Fiscal Incentives to Exports, 1979-1980

(US$ million)

	1979	1980
Export Tax Credit	1,111.0	240.0
Income Tax Reduction	203.2	312.8
BEFIEX	273.0	382.6
Draw-back	350.0	460.2
Other	42.8	54.9
Total Fiscal Incentives	1,980.0	1,450.5
Manufactured Exports	8,654.0	11,383.6
Average Incentive Rate	23.0	12.7

Source: Statistical Appendix, Tables 6.6 and 6.7.

6.18 To approximate the real value of import duty exemptions, a new estimation was made using the composition of imports under BEFIEX and draw-back in 1980, the average (for each import category) nominal tariff levels (Statistical Appendix, Tables 6.8 and 6.9), and the implicit tariffs shown in Chapter 7. The results, summarized in Table 27 together with the adjusted value of the crédito prêmio, indicate adjusted values for the BEFIEX and draw-back schemes of about two thirds of their nominal value. The adjusted fiscal incentive rate fell to 15.7 percent of export value in 1979 and to 9.3 percent in 1980 (Table 27). The overall fiscal incentive package in 1979 consisted of 53 percent cash incentive, 32 percent import duty exemption, and 15 percent corporate income tax exemption. After December 1979, this composition changed substantially, to 15 percent cash incentive, 55 percent import duty exemption and 30 percent income tax exemption. With the reintroduction of the crédito prêmio in April 1981, the current structure is again very similar to the one existing in 1979.

Table 27: Adjusted Fiscal Incentives to Exports, 1979-1980

(US$ million)

	1979	1980
Export Tax Credit	722.2	156.0
Income Tax Reduction	203.2	312.8
BEFIEX	165.7	232.2
Draw-back	240.1	315.7
Other	27.7	37.5
Total Fiscal Incentives	1,358.9	1,054.2
Manufactured Exports	8,654.0	11,383.6
Average (Adjusted) Incentive Rate	15.7	9.3

Source: Statistical Appendix, Table 6.10. Mission calculations.

Financial Incentives to Exports

6.19 Two programs for the financing of manufactured exports are operated under a two-tier mechanism by the Central Bank of Brazil. The Fund for Export Financing (FINEX) is a government fund managed by the Central Bank but autonomously operated by CACEX. Under this program, CACEX finances manufactured exports in the preshipment and postshipment stages. The preshipment financing supplies working capital to firms producing capital goods for export and requiring a production period of eighteen months or longer. This financing extends also to industrial projects (turn-key projects and turn-key packages) executed abroad by Brazilian engineering firms. Postshipment financing includes both buyer's credit and supplier's credit. The buyer's credit is extended by CACEX through opening lines of credit to foreign banks operating abroad (inclusive of the foreign branches of Banco do Brasil) which in turn, finance their local customers for the purchases of Brazilian goods. Suppliers' credit is extended by discounting the documents received by the exporters from sales on credit abroad. Post-shipment financing is also available for the export of cars and other consumer durables. The maturity and terms of FINEX loans (denominated in US$) compete with other government-sponsored programs available elsewhere. The interest rate is 7.5 percent and the maturities run from three to eight years. As of December 31, 1980, FINEX loans outstanding amounted to Cr$96.3 billion (Table 28).

Table 28: Industrial Export Financing, 1975-1980

(Balances at the end of the year, Cr$ million)

	1975	1976	1977	1978	1979	1980
CACEX Credit:						
FINEX	3,840	7,820	12,730	20,370	40,425	96,295
PROEX	-	835	1,280	1,890	2,435	5,020
Sales of Manufacture Exports	210	2,445	6,500	6,610	11,155	8,995
Other CACEX Operations	1,360	1,920	3,045	3,825	6,595	12,745
Total CACEX	5,345	13,020	23,555	32,695	60,605	123,050
Central Bank Credit:						
Production			17,305	26,270	38,400	63,945
Commercialization					1,885	2,785
Investment Banks			1,275	1,635	3,610	7,815
Total Banco Central	5,940	10,995	18,580	27,905	42,010	74,245
Total Export Credit	11,285	24,095	42,135	60,600	102,615	197,295
FINEX Operations						
FINEX Production				4,480	5,710	11,610
FINEX Sales				15,360	31,870	77,720
Others				380	345	120
Engineering Projects				150	2,500	6,845
Total	3,840	7,820	12,730	20,370	40,425	96,295

Source: Banco Central do Brazil: Relatório Anual, 1980 and Bulletin of June 1981.
Banco do Brazil: Relatório Anual, 1977 and Bulletin No. 4 of 1980.

6.20 In order to encourage a larger participation of private financial institutions in the export credit programs, CACEX also administers a FINEX program to cover the difference between the rate that the private institutions charge on their export financing and the cost of the foreign and local resources used for these operations. The rates and maturities offered by private financial institutions should be equal to those offered by CACEX. CACEX also finances promotional activities by Brazilian exporting firms, such as exports shipped in consignment, participation in international fairs, shipping of sample products, market research and equity investments in trading companies incorporated in foreign countries and dedicated to the sales of Brazilian products, etc. There is very little information

available on CACEX's export credit classified by products (particularly for preshipment). Estimations from CACEX officials indicate that FINEX preshipment financing is heavily concentrated in ship building (50 percent), and railroad equipment (20 percent). For postshipment financing, the distribution of FINEX export credit (mainly capital and consumer durable goods) is presented in Table 29.

Table 29: Distribution of FINEX Postshipment Export Credit

(percentages)

Cars and Road Building Equipment	36
Agriculture Machinery	3
Paper Industry Machinery	2
Metallurgy Industry	2
Mechanical Industry	1
Textile Industry Equipment	5
Energy and Communication Equipment	5
Construction Equipment	13
Rubber Industry Machinery	1
Food Industry	1
Other Consumer Durables	3
Unidentified	28

Source: CACEX, unpublished data.

6.21 In addition to FINEX, the other main credit program directed to manufactured export financing is Resolution 674, named after the Central Bank regulation that sets its terms and conditions. The program is aimed at supplying working capital to the firms producing manufactured exports, but the operating procedures of this scheme, as well as the terms and conditions of the loans granted under the program, place it closer to a cash subsidy financed through the monetary budget than to an export credit. The 674 program is executed through commercial, investment and state development banks, using the discount window of the Central Bank. CACEX participates by issuing certificates of export to the manufacturing firms, based on the value of the exports of each firm during the previous year or on its export commitments subscribed with the Ministry of Finance for the current year. These certificates entitle the manufacturers and trading companies to receive an amount of financing for their working capital needs determined as a percentage of the value of their exports fixed each year by the Monetary Council. (The percentages currently range from 12 to 40 percent.) The certificates are issued in U.S. dollars, but the loans are extended in cruzeiros at the exchange rate prevailing on the date of the loan transaction. The interest rate charged on these loans is 40 percent paid semi-annually on the amount outstanding, and their maturity is one year. Neither loan amounts nor maturity are related to the financing needs of the exporters or to the length of production period required by their activities. The percentages established by the Monetary Council reflect

rather government priorities and the desire to promote certain exports, or to compensate others for unfavorable events effecting their production at home or their commercialization abroad. The credit volumes under Resolution 674, from 1975 to 1981, are summarized in Table 30.

Table 30: Preshipment Financing under Resolution 674

(US$ million)

	1977	1978	1979	1980	June 1981	1981
Certificates Issued	1,425	1,635	1,885	1,795	1,970	3,048
Certificates Cancelled	20	1,410	1,635	1,825	1,350	1,826
Balances (End of the Year)	1,405	1,630	1,880	1,855	1,970	1,934
(In Cr$ Million)	18,580	27,905	42,010	74,245	134,190	246,000

Source: Banco Central do Brasil, unpublished data.

6.22 The volume of export financing under Resolution 674, as a proportion of manufactured exports eligible for such financing, remained stable between 1975 and 1978, at about 20 percent, falling to about 10 percent in 1979 and 1980, and increasing again to 24 percent in the first half of 1981 (Statistical Appendix, Table 6.11). The recent increase reflects the efforts of the Brazilian authorities to compensate exporters of manufactured products for the appreciation of the cruzeiro experienced in 1980 and the first months of 1981. FINEX financing (amounts outstanding at the end of the period) showed a decreasing trend between 1976 (68 percent of capital and durable consumer goods exports) and 1980 (40 percent). Export financing for industry continues to be a small portion of total short-term credit to industry, although it increased from 7 percent in 1975 to 14 percent in 1980 (Table 31). While this share is larger than the share of manufactured exports in total gross industrial output, it is too small to have a significant impact on the overall financial costs of the industrial sector.

Table 31: Export Financing and Short-term Industrial Credit, 1975-1980
(Cr$ Million)

	1975	1976	1977	1978	1979	1980
1. Export Financing	10	25	40	60	100	195
2. Short-term Industrial Credit	140	210	310	515	900	1,425
Ratio 2 to 1	7	12	13	12	11	14

Quantification of Financial Incentives to Exports

6.23 This section attempts to quantify the financial incentives to exports as a percentage of export values at the subsectoral level. Inasmuch as the final objective is to obtain a combined measure of fiscal and financial incentives, the quantification should be consistent with that of the fiscal incentives. This presents some methodological problems, because of the fact that while exports take place over the full year (and fiscal incentives are received in parallel with exports), financing under Resolution 674 is granted once a year for each firm. The problems raised by this characteristic of the incentive relate to the need to refer both exports and financing to a common point (e.g., January 1) by using appropriate exchange rates and price indices. 40/

6.24 The estimation of the subsidy rates for the different export categories included in Resolution 674 is presented in Statistical Appendix, Tables 6.12 and 6.13. The average incentive rates were 11.5 percent in 1980 and 12.7 percent in the first half of 1981. (The estimation for the first half of 1981 was based on the assumption that, given the volume of certificates issued between January and June, and the percentage of each category of exports that they can reach, practically no additional certificates would be issued during the second half of the year. The subsequent issuance of more certificates would increase the incentive rates.) The products most favored by the credit subsidy are fibers, fabrics, apparel, footwear and leather products, with subsidy rates close to or above 20 percent of the export value. Machinery exports are next, with rates ranging from 15-20 percent. 41/ Processed agricultural products fall between 10 and 15 percent, with some major items such as soybean products and orange juice receiving credit subsidies of less than 10 percent of their export values.

6.25 Some caution must be introduced in these estimations. They tend to overestimate the subsidy rates for those products whose export values are falling relative to the previous year's levels. The amount of subsidy during the calendar year varies from product to product according to the months of issuance of the certificates and of the contracting of the loans. The

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40/ Since the seasonal trends of exports and of certificates under Resolution 674 are different, different weights have been used to estimate the annual average exchange rates and the annual price index to make the required conversions. The selection of the relevant interest rate for comparison purposes (in order to estimate the subsidy component of the export credit) also presented some difficulties. Besides the lack of data, the free segment of the credit market is so narrow that the "market"-determined rate is not necessarily the relevant comparison. In the calculations, a positive real rate of 10% was used as a proxy for the market rate.

41/ Machinery exports, as well as exports of transport equipment, are the main recipients of the FINEX financing which is not included in the calculation. However, post-shipment financing by FINEX is similar to that offered by many other countries.

estimates assume that the holders of the certificates obtain the financing immediately, which is not always the case. Finally, given the impossibility of matching the export categories as presented by Resolution 674 with the export data available, when several categories have been combined the percentage selected to determine the amount of financing to which they were entitled was that of the merchandise that had the highest weight in the value of the group. Taking into account these qualifications, it is reasonable to expect that the actual credit subsidies fall in absolute and percentage terms into the estimated magnitudes presented in Table 6.12 of the Statistical Appendix.

CHAPTER 7

PROTECTION AND COMPETITIVENESS OF BRAZILIAN INDUSTRY

Introduction

7.01 The medium- and long-term prospects of the Brazilian industrial sector depend on its overall efficiency and its ability to compete domestically and abroad. As shown in Part I of this report, industrial growth in Brazil was mostly inward-oriented, at least until the late 1960s, and, even with the successful export expansion experienced during the 1970s, the share of industrial output now being exported continues to be small. This is not, by itself, an indication of the degree of competitiveness of the sector, as the large and growing domestic market has provided considerable incentive for industrialization. However, when combined with the existence of a complex system of tariff and non-tariff barriers to imports, it might indicate the existence of high protection levels. Similarly, the considerable success in the expansion of manufactured exports since the late 1960s could be taken as an indication of improved competitiveness or, in the presence of the protective system mentioned above, could be only the result of a very high level of administered incentives. Chapter 6 above has provided some measurement of those incentives, but a full evaluation of the efficiency, competitiveness and growth prospects of Brazilian industry requires a simultaneous look at the levels of protection actually realized in the sector and the impact of the exchange rate policy. This chapter will review the most recent information available on industrial protection in Brazil and will compare it with previous studies conducted in the early 1970s. In the next chapter, the main elements defining the country's trade policy (protection, export incentives and exchange rate) will be put together and used to outline part of a possible strategy of industrial growth for the 1980s.

7.02 The existence of high tariff and non-tariff barriers to imports reduces or even eliminates the pressure of foreign competition. Under many circumstances, this would result in a pattern of industrial growth which includes inefficiencies and/or monopolistic profits, misallocation of resources and, in the medium and long run, less than optimal growth. This is particularly likely to be the case in small countries, where the reduced size of the market does not allow for plants of minimum efficient size, or where there is not room for effective domestic competition to develop. It is also relevant, even in large countries, for subsectors where the need to achieve economies of scale prevents domestic competition, or where the country's resource endowments are not well suited for such production. Conversely, there are cases where temporary inefficiencies of scale, low capacity utilization or monopolistic profits represent costs associated with a learning curve in the industrialization process (the infant industry

argument) 42/. While the relevant questions to be asked are those relative to efficiency and competitiveness, the analytical procedures used in empirical studies are often unable to distinguish between technical inefficiency and monopolistic situations or, more importantly, between foreign and domestic competition. Thus, protection studies based on tariff levels (nominal or actually collected) implicitly assume that the domestic price is equal to the world price plus the tariff 43/. While the assumption may be valid for very small countries, or for specific industrial subsectors, it is highly unlikely to be satisfactory as a general assumption for a country like Brazil, particularly for subsectors with small minimum efficient size (MES) plants and a long tradition of import-substituting industrialization. In such circumstances, tariff redundancy is likely to develop. The extensive use of non-tariff barriers also makes the tariff-based studies largely irrelevant for Brazil.

7.03 A more direct measure of competitiveness (although not necessarily efficiency) can be obtained by making direct price comparisons between domestic and foreign prices. Direct price comparisons capture the final result of all policy measures as well as market forces (e.g. domestic competition) as reflected in one of the elements of competitiveness: the price. However, there are also other dimensions to competitiveness that can be grouped together in the concept of quality. The main implicit assumption in the protection studies based on direct price comparisons is that the products compared are identical, instead of only imperfectly substitutable as is often the case in the real world. Also, direct price comparisons can provide a good measure of world competitiveness, but unless accompanied by a study of profit rates they cannot provide a measure of efficiency across industries. Price comparisons may show that the prices of Brazilian electrical equipment are above world prices, while their inputs have similar domestic and world prices, but this does not indicate whether the difference is mainly due to inefficiencies or to higher than average profit rates. Overall, however, studies of effective protection based on direct price comparisons can provide the most robust estimates of competitiveness in Brazil.

Effective Protection in the 1960s and Early 1970s

7.04 One of the more complete early studies of effective protection in Brazil is the one carried out by Bergsman and Malan for 1966 and 1967. While the study was based on nominal tariff levels, the authors carefully reviewed the possible reasons for redundancy in the tariffs and concluded that there might have been considerable redundancy in their estimates for

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42/ It is important to distinguish between technical inefficiencies, such as less than efficient size or low capacity utilization, and monopolistic situations with technical efficiency at the plant level, where the economic inefficiency is related to the output composition and allocation of resources among sectors.

43/ In addition, such studies do not take into account the impact of non-tariff barriers.

1966 but much less in the estimates for 1967. Bergsman and Malan also carried out some direct price comparisons in order to obtain independent estimates for 1967. The results of their study have often been used to emphasize the high levels of protection in Brazilian industry in the mid-1960s, by pointing only to the 1966 estimate of average nominal protection for manufacturing (99 percent) and to the average effective protection for the same year (118 or 155 percent depending on whether the Corden or Balassa formulas were used in the estimation).

7.05 However, the above study provides a somewhat different picture when looked at in more detail. In the first place, after part of the tariff redundancy in 1966 was eliminated, the estimates for 1967 are considerably lower; the average nominal rate for manufacturing drops from 99 to 48 percent, and the effective rate from 118 to 66 percent (Table 32). Moreover, these protection estimates were calculated at the overvalued official exchange rate, and part of the apparent protection was only compensation for that overvalued exchange rate. Bergsman and Malan also present estimations of the overvaluation (27 percent in 1966 and 14 percent in 1967) and net estimates of protection after adjusting for the overvaluation. For 1967, their estimate of net nominal protection in manufacturing was 30 percent, and net effective protection was estimated at 45 percent (Table 32). 44/

7.06 All sets of protection rates calculated by Bergsman and Malan presented a similar structure, with protection rates on consumer goods well above the average for manufacturing (except for processed food, because of the impact of sugar), protection on intermediate goods very close to the average, and capital goods showing the lowest rates. It is also important to note that in the cases where they were able to estimate protection rates for the transport equipment industry separately (using free trade input-output coefficients) all calculations showed negative effective protection with rates ranging from -17 percent (gross effective protection in 1967) to -42 percent (net effective protection in 1966). This structure of protection is common to many studies of protection in developing countries, particularly when the studies are based on nominal tariff levels. The results arise from a tariff structure which includes higher tariffs for consumer goods than for intermediate and capital goods and widespread tariff exemptions for the latter two categories. This situation is typical of countries with a well advanced degree of import substitution in the consumer goods industries and little or no production of capital goods. While this is not the Brazilian case today, it may have been partly the situation in the mid 1960s. However, it is also conceivable that the reliance on a tariff structure already outdated exaggerated the cascading structure of protection found by Bergsman and Malan, and that a direct price comparison study would have resulted in a flatter structure.

44/ All figures in Table 32 correspond to estimates using domestic input-output coefficients (from a 1959 input-output table). Bergsman and Malan also provide estimates using free trade coefficients. These estimates are generally lower than the ones presented in Table 32.

Table 32: Nominal and Effective Protection, 1966-1967
(Percent)

	Protection Estimates		Net Protection Estimates	
	Nominal	Effective	Nominal	Effective
1966				
Processed Food	82	87	44	48
Beverages and Tobacco	201	406	138	299
Non-durable Consumer Goods	140	173	89	115
Durable Consumer Goods	108	151	64	98
Intermediate Goods	92	110	52	66
Machinery	87	100	48	58
Manufacturing	99	118	57	72
1967				
Processed Food	27	40	11	23
Beverages	81	155	58	123
Non-durable Consumer Goods	70	101	44	76
Durable Consumer Goods	57	75	37	53
Intermediate Goods	49	67	28	46
Machinery	47	60	26	40
Manufacturing	48	66	30	45

Source: Bergsman and Malan, op. cit., Tables 6.8 and 6.13.

7.07 Subsequent studies of effective protection to industry in Brazil, prepared during the 1970s, and also based on the tariff structure, continued to show a similar pattern of protection although at somewhat reduced levels. Tyler (1976) presents estimates for 1973, with an average rate of 47 percent for manufacturing [45/] and rates of 67 percent for consumer goods, 36 percent for intermediates and 40 percent for capital goods. Tyler indicated that the estimates for 1973 were likely to include substantial redundancy, and concluded that, in 1973, protection in Brazil was not as high as appeared from the estimated results, was not particularly high in relation to other developing countries, and had declined considerably since 1966.

45/ Not adjusted by the overvaluation of the exchange rate. If the 1967 adjustment (para. 7.05) were used, the average net effective protection would be reduced to 26 percent.

7.08 A more recent unpublished study 46/ also relied on import tariffs to estimate effective protection in 1973 and 1975, but instead of using nominal tariff rates (the rates established in the tariff law), utilized actual or realized tariffs obtained as the ratio of tariff collections for a specific product or product category to the imports of such product or category. The average effective protection rates for manufacturing were estimated at 25 percent for 1973 and 29 percent for 1976. As the authors used an estimation of the overvaluation of the exchange rate of 25 percent, the net effective protection was calculated to be zero in 1973 and about 3 percent in 1975. Of the 58 industrial subsector levels studied, net effective protection was negative for 32 subsectors in 1973 and for 27 subsectors in 1975. These very low estimates appear to result from biases implicit in the methodology used. With a widespread use of non-tariff restrictions, import duty reductions or exonerations under different incentive schemes, and a very small percentage of imports in the total supply of manufactured products, actual tariff collections can be expected to substantially underestimate nominal and effective protection. Also, the exchange rate overvaluation was probably overestimated; using the Bergsman and Malan 1967 figure, the average rates of net effective protection would have been a still very low 10 percent for 1973 and 13 percent for 1975.

Nominal and Effective Protection to Industry in 1980

7.09 A new estimation of nominal and effective protection to industry, based on direct price comparisons as of late 1980 and early 1981, has been recently prepared 47/. The study used the IBGE input-output classification, with 67 manufacturing sectors at the 4-digit level, and 21 manufacturing industries at the 2-digit level. This is the first study to use the complete version of the 1970 IBGE input-output matrix. Even using this recently published matrix, however, the considerable structural change that has occurred in Brazil during the last ten years imposes some caution in the use of the input-output technical coefficients. The study, based on prices collected from June 1980 to April 1981, used several sources and covered a total of 676 products.

7.10 The direct price comparisons at the product level, when aggregated at the subsector and industry level, provide average implicit tariffs that can be compared with the nominal tariffs rates (Table 33). The overall averages of implicit tariffs are very low, at -23 percent for agriculture and 11.9 percent for manufacturing, compared to 55 and 107 percent average legal tariffs, respectively. Also, the typical structure featuring highest

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46/ Paulo Neuhaus and Helenamaria Lobato, "Proteçao Efetiva a Industria no Brasil, 1973-1975" (Versao Preliminar), FUNCEX 1978 (mimeo).

47/ William Tyler, Política Comercial e Industrial no Brasil: Uma Análise sob a Otica de Proteção Efetiva para Vendas no Mercado Doméstico", IPEA/INPES, Textos para Discussão Interna, No 35 julho 1981 (mimeo). The study is part of a larger study on commercial policy and industrial incentives by W. Tyler and Wilson Suzigan, in preparation.

Table 33: Nominal Protection at the 2-Digit Level, 1980-1981

Industry	Nominal Legal Tariff December 1980 (%)	Implicit Tariff (%)	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	48.3
Electrical Equipment	95.4	45.2	71.4
Transportation Equipment	101.9	-16.7	-5.8
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	-8.2
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]	53.8	-23.0	-7.2
Manufacturing	99.4	11.9	22.8
Capital Goods	83.3	13.6	37.8
Intermediate Products	76.5	5.6	25.2
Consumer Goods	132.5	13.9	13.1

[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: Statistical Appendix Table 7.1

protection for consumer goods and lowest for capital goods, found in all previous studies as well as in the current nominal tariff rates, no longer appears; consumer and capital goods have very similar implicit tariffs and intermediate goods have a much lower average. The redundancy shown in the legal tariffs when compared to the average implicit tariffs is an indication of the small relevance of import tariffs as a measure of competitiveness in Brazil. They are, however, an effective means of reducing or eliminating foreign competition.

7.11 The average implicit tariffs obtained from the price comparisons have to be adjusted for production subsidies to obtain the level of implicit nominal protection (Table 33). Such subsidies effectively increase the price received by the producer without appearing in the selling price used in the comparisons; therefore, the implicit tariffs become underestimations of the levels of nominal protection. After these adjustments, 48/ the structure of nominal protection shows a complete reversal of the traditional structure. Capital goods are shown receiving the highest nominal protection level, at 37.8 percent, intermediate products have an average nominal protection close to the average for manufacturing, and consumer goods have the lowest levels of nominal protection, at 13.1 percent.

7.12 When calculating effective protection based on direct price comparisons, the relevant prices for the products for which the calculation is being done are those obtained after adjusting for production subsidies as mentioned above, i.e., the prices that represent the implicit nominal protection levels. However, the relevant prices for the inputs used in the production of such goods are those effectively paid by the producers and do not take into account the production subsidies on the inputs (i.e., the relevant input prices are those related to the implicit tariff levels). Using these sets of prices, and the technical coefficients of the IBGE 1970 input-output matrix, the estimated effective protection rates for the 72 traded goods sectors out of the 87 sectors in the matrix are shown in the Statistical Appendix (Table 7.2). The results, aggregated at the 2-digit level, as well as the averages for consumer, intermediate, and capital goods, and for manufacturing as a whole, are summarized in Table 34.

48/ The adjustments included in the IPEA study were 2.5 percent on steel products and 2 percent on capital goods products based on IPI tax credits; 5 percent subsidy on capital goods based on the accelerated depreciation provisions; a 21 percent credit subsidy on agriculture (probably overestimated); a range of 5 to 15 percent credit subsidy on industry, with an average of 10 percent (probably correct for 1980 but no longer valid for 1981); and an 8.8 percent subsidy on capital goods based on the subsidized FINAME credit. The subsidies resulting from the accelerated depreciation provision and the FINAME loans are not production subsidies as they do not increase the price received by the seller above the apparent market price, but reduce the price paid by the buyer below such price. Therefore, they should not have been included in the calculation, and they overstate protection on capital goods. A new set of calculations including these changes was prepared by the mission and used in this report. As a result, the protection estimates in this report are slightly lower than the original IPEA estimates.

Table 34: Effective Protection Estimates at the 2-Digit Level, 1980-1981

Industry	Effective Protection (%)	Net Effective Protection (%)
Mining	-4.3	-18.0
Non-Metallic Minerals	-19.6	-31.1
Metallurgy	34.2	15.0
Machinery	77.0	51.7
Electrical Equipment	111.9	81.6
Transportation Equipment	-9.6	-22.5
Lumber & Wood Products	17.7	0.9
Furniture	52.7	30.8
Paper	-18.5	-30.2
Rubber	-21.4	-32.6
Leather	13.9	- 2.4
Chemicals	86.4	59.7
Pharmaceutical Products	116.3	85.3
Perfumery	91.6	64.2
Plastics	28.3	9.9
Textiles	36.7	17.1
Apparel	46.7	25.7
Food Products	26.1	8.1
Beverages	-1.1	-15.3
Tobacco	5.7	- 9.4
Printing & Publishing	31.9	13.0
Miscellaneous	171.7	132.8
AVERAGES[1]		
Primary Agriculture[2]	-8.2	-21.3
Manufacturing	43.6	23.1
Capital Goods	59.6	36.8
Intermediate Goods	42.0	21.7
Consumer Goods	35.7	16.3

[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: Statistical Appendix Table 7.2.

7.13 The estimates of effective protection confirm the structure already found at the nominal protection level, with the highest rates in the capital goods sectors and the lowest among consumer goods sectors. The average effective protection rate for manufacturing, 43.6 percent, is above the 29 percent estimated using realized tariff rates, as was to be expected, and below the 66 percent estimated using legal tariff rates in 1967. The higher rates found in 1967 probably resulted from a combination of higher effective protection at the time, as well as of a certain amount of redundancy in the legal tariff rates.

7.14 The most striking difference between the protection estimates in 1980 and in 1967 is the reverse ranking order in which consumer, intermediate and capital goods appear. This probably results also from a combination of changes in the structure of protection during the 1970s, and of higher redundancy in the estimates of consumer goods protection, with respect to capital goods protection, in 1967. Looking only at the rates for capital goods, the differences are actually small. In 1967, the rate for machinery was 60 percent, whereas the comparable capital goods estimate for 1980 was 59.6 percent. The latter includes also some consumer durables (e.g. automobiles), which in 1967 had an estimated protection rate of 75 percent, whereas the more narrowly defined machinery subsector shows a 77 percent rate in 1980. Thus, it appears that protection to the capital goods subsector has remained basically unchanged at a relatively high level 49/. An important exception is the transport equipment industry, where negative effective protection was found both in 1967 and 1980. Protection of intermediate goods shows a decrease from 67 percent in 1967 to 42 percent in 1980. As the increase in intermediate goods production was very large during the 1970s, a considerable part of the estimated drop in protection may reflect increased efficiency due to economies of scale and learning processes, while at least part of the decrease was probably due to some prior redundancy in legal tariffs.

7.15 The main differences in the protection estimates for 1967 and 1980 are those related to consumer goods. The 1967 estimates indicate effective protection rates of 101 percent for non-durable consumer goods, 75 percent for durables, 40 percent for processed food, and 155 percent for beverages and tobacco; whereas the 1980 estimates show an average of only 36 percent for all consumer goods, with rates of 26 percent for food products, 37 percent for textiles, 47 percent for clothing, and very low rates for beverages and tobacco. While it is likely that a substantial increase in the efficiency of consumer goods industries took place between 1967 and 1980, it appears that this is the subsector where the highest redundancy existed (and continues to exist) in the legal tariff rates. As indicated earlier in this report (Chapter 1), import substitution in a number of consumer goods industries was well advanced as early as 1911, with import ratios for garments, footwear, furniture and wood products below 10 percent. By 1967, the import ratios for such consumer goods were already below 1 percent, and output and domestic demand increased very fast in the following years. With a very large domestic market, fast growing domestic demand, increasing exports, and generally small minimum efficient size plants, the lack of foreign competition resulting from high tariff and non-tariff barriers was apparently compensated by a considerable degree of domestic competition.

49/ At least when no adjustment for overvaluation of the exchange rate is made.

7.16 All the estimates above have been obtained by using the official exchange rate prevailing in Brazil at the time the price comparison was made. However, the exchange rate itself was affected and partly determined by policy distortions such as the export incentives reviewed in Chapter 6, the import protection described above, and others. Therefore, a more relevant indication of the competitiveness of the industrial sector would be provided by the net effective protection rates, calculated by using the exchange rate that would prevail in the absence of distortions. Several alternative rates could be used for that purpose, including the equilibrium rate that would hypothetically clear the market for foreign exchange in the absence of distortions, or a narrower version of a shadow exchange rate that takes into account the impact of taxes, subsidies and other policy measures on the exchange rate but does not require the assumption of equilibrium of the balance of payments or the trade account. This latter shadow exchange rate was calculated using the export incentives and protection levels described above. Using the methodology described in Annex 2, the estimated shadow exchange rate for 1980 is shown to be 16.7 percent above the actual exchange rate 50/. The net effective protection estimates (Table 34) have been obtained using this shadow exchange rate.

7.17 When the impact of exchange rate overvaluation is taken into account, the average net effective protection rate for manufacturing drops to 23 percent, ranging from 37 percent for capital goods to 16 percent for consumer goods. At the two-digit level, 6 of the 21 manufacturing subsectors have net protection rates exceeding 50 percent, and 7 subsectors have negative net protection. The subsectors receiving highest protection are (in addition to Miscellaneous) Pharmaceutical Products (85 percent), Electrical Equipment (82 percent), Perfumery (64 percent), and Chemicals (60 percent). The machinery industry also receives a relatively high protection rate of 52 percent, and, as was found in 1967, the transportation industry experiences negative effective protection. All the results above correspond to 1980, at the shadow exchange rate calculated for that year. In 1981, the elimination of price controls may have increased the protection rates. On the other hand, increased export incentives would result in a higher overvaluation as reflected in the estimation of the shadow exchange rate, thus reducing the net effective protection.

7.18 The above estimates provide strong support to the view that, during the late 1960s and the 1970s, the very fast growth of Brazilian industry, from the basis of an already large and well established market, resulted in considerable gains in the degree of competitiveness of many subsectors. This was spurred by substantial domestic competition (as foreign competition was effectively barred in most cases) and increases in efficiency as a result of larger production runs. The reversed structure of protection in 1980 with respect to 1967 is also consistent with this view, as the capital goods

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50/ The stricter concept of equilibrium exchange rate would imply a considerably higher overvaluation.

industries, which are shown to have lower degrees of competitiveness, 51/ are also the more recently established, have relatively smaller markets, are still in the early stages of their learning curves and are subject to lower pressures from domestic competition. However, the increasing appreciation of the exchange rate during 1980 and early 1981 (Chapter 5 above), together with the desire to further compress imports, led to the introduction of tougher non-tariff barriers to imports during 1981.

Efficiency and Competitiveness of Industry

7.19 The net effective protection estimates provide a good indication of the degree of competitiveness of Brazilian industries, as reflected in the prices of their products. However, the excess of domestic over world prices, when present, is not necessarily an indication of the degree of technical efficiency of the industry. Higher domestic prices may also reflect monopolistic power in the domestic market. In order to ascertain to what extent higher net effective protection estimates are related to higher costs and therefore lower efficiency, it is also necessary to look at the profit rates of the corresponding subsectors. To the extent that net effective protection estimates appear to be positively correlated with profit rates, the issue may not be one of technical efficiency in industrial production, but rather of composition of output, allocation of resources among sectors, and income distribution between different groups. Profit rates for industrial subsectors have recently become available as part of the computerized data system of the Secretaria da Receita Federal and are used below to review the relationship between profitability and protection.

7.20 The profit rates for 1979, at the 2-digit subsector level, show considerable variance. While the three types of rates calculated (return on equity, return on assets and profit on sales) are highly correlated, the differences among subsectors are very high. When the structure of profit rates (Table 35) is compared to the structure of net effective protection estimates, several interesting conclusions emerge. Firstly, practically all traditional consumer goods industries, which receive very low or negative protection, show high profit rates, a further indication of their efficiency. This applies to textiles, clothing, footwear, food, beverages and tobacco, plastics and leather industries. Among intermediate goods industries, the lowest protection (negative in net terms) is received by the wood and lumber industry which also shows a high profit rate. A very different situation appears in metallurgy, where a low level of net protection results in very low profit rates. This is an indication that the industry, largely in the hands of the public sector, has been operating with strict

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51/ In the Brazilian context it is more accurate to refer to industries having lower degrees of competitiveness than to industries receiving higher protection. In fact all industrial subsectors receive very high degrees of protection, as imports are often effectively impeded through non-tariff barriers but, as shown above, the protection granted is actually used to a limited extent.

price controls in order to benefit the capital and durable consumer goods using its output. The paper industry, in spite of strong negative protection has been able to maintain low but acceptable profit rates, and a similar situation occurs in the transport equipment industry, non-metallic minerals and rubber.

Table 35: Industrial Profit Rates, 1979

(Cr$ billion)

	Total Assets (Average)	Total Equity (Average)	Total Revenue	Net Profit	Profit on Equity (%)	Profit on Assets (%)	Profit on Sales (%)
Non-metallic Minerals	123.1	72.2	86.1	10.5	14.6	8.5	12.2
Metallurgy	515.1	209.2	347.9	3.5	0.7	0.7	1.0
Machinery	181.8	76.2	169.7	6.1	8.0	3.3	3.6
Electrical Equipment	155.1	69.6	173.0	16.2	23.2	10.4	9.3
Transport Equipment	255.1	99.5	276.7	11.0	11.0	4.3	4.0
Wood Products	44.1	27.2	36.5	4.7	17.1	10.5	12.7
Furniture	16.7	7.5	23.8	1.6	21.0	9.4	6.6
Paper	103.4	53.1	73.9	5.2	9.9	5.1	7.1
Leather and Products	11.8	5.9	17.0	1.5	25.1	12.6	8.7
Chemicals	564.1	266.2	445.1	32.3	12.1	5.7	7.2
Pharmaceuticals	46.4	19.4	54.1	0.1	0.3	0.1	0.1
Perfumes, Soap	16.5	7.2	27.4	1.2	16.2	7.1	4.3
Plastics	40.9	21.0	50.5	5.3	25.4	13.1	10.6
Textiles	166.5	85.1	163.0	16.6	19.5	9.9	10.2
Clothing, Footwear	42.9	20.1	58.2	5.9	29.4	13.8	10.1
Processed Food	343.2	152.6	467.1	27.3	17.9	8.0	5.8
Beverages	58.9	28.3	44.0	5.0	17.5	8.4	11.3
Tobacco	24.4	12.7	25.0	3.0	23.5	12.3	12.0
Printing and Publishing	31.2	14.4	42.4	2.6	18.2	8.4	6.2
Miscellaneous	42.4	20.0	49.4	4.3	21.6	10.2	8.8

Source: Secretaria de Receita Federal, Ministry of Finance (unpublished data), Mission calculations.

7.21 The capital goods industries (machinery and electrical equipment) receive high effective protection, highest in the case of electrical equipment. While non-electrical machinery achieves low profit rates (probably the average is biased downwards by several large firms suffering from substantial idle capacity), the electrical equipment industry shows very high profit rates, particularly on equity. This suggests that protection could be considerably reduced without creating output and employment losses. The chemicals and perfume industries also achieve relatively high profit rates with the help of considerable protection, whereas a somewhat surprising result emerges in the pharmaceutical industry, where the highest rate of protection at the 2-digit level (excluding miscellaneous) is accompanied by

the lowest profit rate in the sector. The importance of multinational companies in the subsector points out to the possibility that transfer pricing may be partly responsible for this result.

7.22 The simultaneous use of data on protection and profit rates at a more disaggregated level should provide considerable assistance in the preparation of the country's industrial policy, in order to avoid the consolidation of inefficient industries and to support those subsectors that require assistance, taking into account their efficiency levels and their present and potential contributions to the country's economic growth. The increased availability of data on such industrial indicators should be quickly put to use to guide industrial and trade policies.

CHAPTER 8

INDUSTRIAL POLICY IMPACT AND FUTURE INDUSTRIAL STRATEGY

Introduction

8.01 The preceeding two chapters have explored the competitiveness of Brazilian industry by looking at the extent to which domestic prices for domestically sold products exceed world prices (Chapter 7) and by measuring the amount by which the prices (including subsidies) received by the producers of exported goods exceed the world prices of such goods (Chapter 6). When these two indicators of competitiveness are compared for a specific industry or product, it is possible to obtain some information as to the relative incentive to sell in the domestic or the export markets. Furthermore, when the exchange rate policy is taken into account, the three types of policy measures, import protection, export incentives and exchange rate, can provide an indication of the relative incentive (or disincentive) to produce a specific category of goods (manufactured with respect to non-manufactured, consumer vs. intermediate etc.). For the manufacturing sector as a whole, a given level of support can be provided through infinite combinations of protection, export incentives and exchange rate, but different combinations will be likely to provide differential support among industries as well as between markets (domestic or export). Finally, various policy combinations will also have different effects on other aspects of industrial structure and performance such as employment generation, import dependence, etc. and on the performance of the economy as a whole (through the impact on inflation, public sector budget, etc.).

8.02 The purpose of this chapter is to review briefly the three main areas mentioned above. First, a comparison of domestic vs. foreign market incentives at the industry level is attempted. This is followed by a review of the overall level of incentives to the manufacturing sector and to specific industries (by introducing the impact of the exchange rate), and, finally, an attempt is made to identify and, when possible, quantify the impact of the specific policy combination adopted in Brazil in recent years on the structure and performance of the industrial sector and on the country's economic performance. The last part of the chapter outlines the main features of Brazil's industrial and overall economic strategy for the 1980s, as implied by recent Government measures and pronouncements, and explores some of the additional policy measures required.

Incentives to Exports and Domestic Sales

8.03 The fiscal and financial incentives to exports, reviewed and quantified in Chapter 6, have been estimated to average 20.8 percent of the export value of manufactured products in 1980, whereas the implicit nominal protection applying to domestic sales of manufactured products was estimated to average 22.8 percent. Thus, when all export incentives are taken into account, the price (in cruzeiros) received by an average exporter was 2.0 below the price of a domestic sale of the same good (Table 36). In 1981, the reintroduction of crédito prêmio and the increase in the volume of subsidized credit for exports (Chapter 6) further increased export incentives, whereas

nominal protection probably also increased as a result of the elimination of price controls. A pro-export bias or, using a more common expression, a negative anti-export bias appeared in 11 out of the 21 industrial subsectors, although a more mixed picture is likely to emerge if the comparison is done for the 70 industries at the 4-digit level.

Table 36: Nominal Incentives to Exports and Domestic Sales, 1980
(Percentage of exports and domestic sales)

	Adjusted Fiscal Incentives	Financial Incentives	Total Export Incentives	Implicit Nominal Protection	Anti-Export Bias
Non-Metallic Minerals	4.0	10.1	14.1	-17.7	-31.8
Metallurgy	6.8	10.1	16.9	10.8	-6.1
Machinery	11.2	18.0	29.2	48.3	19.1
Electrical Equipment	17.5	18.0	35.5	71.4	35.9
Transport Equipment	22.7	11.4	34.1	-5.8	-39.9
Wood Products	7.8	11.4	19.2	-4.3	-23.5
Furniture	3.2	11.4	14.6	26.1	11.5
Paper	7.5	7.8	15.3	-16.1	-31.4
Rubber	7.7	9.8	17.5	-15.4	-32.9
Leather Products	5.9	17.4	23.3	15.6	-7.7
Chemicals	3.5	10.1	13.6	55.1	41.5
Pharmaceuticals	8.5	10.1	18.6	97.4	78.8
Perfumes, Soap	3.5	10.1	13.6	35.1	21.5
Plastics	10.5	10.1	20.6	28.9	8.3
Textiles	8.1	21.5	29.6	25.2	-4.4
Clothing, Footwear	8.2	22.1	30.3	30.6	0.3
Processed Food	3.7	10.1	13.8	-8.2	-22.0
Beverages	3.3	10.1	13.4	-5.3	-18.7
Tobacco	0.2	10.1	10.3	1.3	-9.0
Printing	0.1	10.1	10.2	24.1	13.9
Miscellaneous	4.0	10.1	14.1	91.8	77.7
Manufacturing	9.3	11.5	20.8	22.8	2.0

Source: Table 33, Statistical Appendix, Tables 6.10 and 6.12. Mission calculations.

8.04 The highest relative bias in favor of exports appeared in the transport equipment subsector, where export prices including incentives are estimated to exceed domestic prices by nearly 40 percent. Other subsectors where this pro-export bias was also very high were paper (31 percent), rubber (33 percent), non-metallic minerals (32 percent), wood products (24 percent) and processed food (22 percent). A reverse situation appeared in 10 industrial subsectors, where the domestic price continued to exceed the export price including fiscal and financial incentives. This was the

situation for miscellaneous industries, where the anti-export bias was estimated at 78 percent for 1980, pharmaceutical products (79 percent), chemicals (42 percent), electrical equipment (36 percent), perfumes and soap (22 percent), printing and publishing (14 percent), machinery (19 percent), furniture (12 percent) and plastics (8 percent).

8.05 The pro- or anti-export bias is a measure of the relative incentive to sell in the export or domestic markets, but it is not necessarily correlated with absolute level of incentive received by the industry. Thus, in the Brazilian case, a high level of absolute export incentives coexists with high and low pro-export biases. The transport and electrical equipment industries received, in 1980, the highest levels of export incentives, but, while the transport equipment subsector had domestic prices below international prices, the electrical equipment industry presented domestic prices well above international levels. As a result, the transport equipment industry had the highest pro-export bias of all 2-digit subsectors, whereas electrical equipment had a large anti-export bias. The export performance of these two industrial subsectors during the 1970s provides evidence of the importance of the pro- or anti-export bias in the overall policy environment. With similar absolute levels of incentives to export, the share of exports in the output of the transport industry grew from 0.7 percent in 1970 to 10 percent in 1979, whereas in the case of electrical equipment, the export share increased from 1.4 percent in 1970 to only 4.4 percent in 1979 (Table 18).

8.06 The Brazilian industrial subsectors showing the largest anti-export biases were also the ones with the highest levels of nominal implicit tariffs. This reflects partly the fact that export incentives showed less dispersion than implicit tariffs. With nominal protection rates of 92 and 97 percent, the miscellaneous and pharmaceutical industries presented the highest anti-export biases, followed by chemicals, which also had a high protection rate of about 55 percent. All industries having positive anti-export bias show very low export ratios in 1979 (Tables 18 and 20), with the exception of chemical products. However, the increase in the export share of chemical products, from 5.7 percent in 1970 to 11.4 percent in 1979 may have been the result of the very large increase in exports of vegetable oils, most of which are classified under chemicals in the IBGE classification.

Net Incentives to Exports and Production

8.07 The comparison between nominal incentives to exports and domestic sales presented in the previous section was done at the exchange rate prevailing at the time of the comparison. The existence of the policy distortions (the incentives to exports and domestic sales) affects also the level of the exchange rate and thus results in changes in the net effect of the nominal incentives. Similar to the calculation of the net effective protection rates (Chapter 7 above), the net export incentive rates and the net nominal protection rates present a more accurate measure of the amount by which the prices received by Brazilian producers for export and domestic sales exceed or fall short of world prices. In this case, the relevant world prices are converted to cruzeiros at the exchange rate that would have prevailed if the policy distortions did not exist (i.e. the shadow exchange rate referred to in the previous chapter). While the average net anti-export

bias remains practically unchanged in absolute terms, and the changes at the industry level are also very small, the absolute levels of net nominal export incentives and net nominal protection change considerably (Table 37).

Table 37: Net Nominal Incentives to Exports and Domestic Sales, 1980

	Net Export Incentives (%)	Net Nominal Protection (%)	Net Anti-Export Bias (%)
Non-Metallic Minerals	-2.2	-29.5	-27.3
Metallurgy	0.2	-5.1	-5.3
Machinery	10.7	27.1	16.4
Electrical Equipment	16.1	46.9	30.8
Transport Equipment	14.9	-19.3	-34.2
Wood Products	2.1	-18.0	-20.1
Furniture	-1.8	8.1	9.9
Paper	-1.2	-28.1	-26.9
Rubber	0.7	-27.5	-28.2
Leather Products	5.6	-0.9	-6.5
Chemicals	-2.6	32.9	35.5
Pharmaceuticals	1.6	63.2	67.6
Perfumes, Soap	-2.6	15.8	18.4
Plastics	3.3	10.4	7.1
Textiles	11.1	7.3	-3.8
Clothing, Footwear	11.6	11.9	0.3
Processed Food	-2.4	-21.3	-18.9
Beverages	-2.8	-18.9	-16.1
Tobacco	-5.5	-13.2	-7.7
Printing and Publishing	-5.6	6.3	11.9
Miscellaneous	-2.2	64.4	66.6
Manufacturing	3.5	5.2	1.7

Source: Tables 33 and 36, Mission calculations.

8.08 After adjusting for the overvaluation of the exchange rate, the average net export incentive to manufactured exports is very low, at 3.5 percent, and the average net nominal protection is also low, at 5.2 percent. At the subsectoral level, 11 of the 21 subsectors received positive net export incentives, and in four of these eleven subsectors, the net incentive rate was below three percent. Similarly, only eleven industries received positive net nominal protection. The net nominal protection rates showed considerable variation among sectors, ranging from 63 percent for pharmaceuticals to -30 percent for non-metallic minerals. Net export incentive

rates also vary substantially from 16 percent for electrical equipment to -6 percent for printing and publishing. Only six industries, machinery, electrical equipment, pharmaceuticals, plastics, textiles and clothing and footwear, showed positive net protection and net export incentives, whereas 5 industries received negative net protection and export incentives. Although policy priorities such as support of infant industries, temporary assistance to specific subsectors, and others, may justify a certain degree of diversity in the pattern of incentives, the large variations observed are likely to reflect the result of many, often uncoordinated, policy measures, and to result in a suboptimal allocation of resources among subsectors.

Effective Incentives to Exports

8.09 The review and quantification of export incentives in Chapter 6 and in the present chapter has taken place at the nominal level, i.e., by looking at the difference between the price received by the exporter (including incentives) and the world price. But, as when measuring protection, the effective incentive received depends not only on the price of the product but also on the prices paid for the inputs used in the production process. In the case of export products, the incentives received through reductions in the price of imported inputs under the BEFIEX and draw-back schemes have already been taken into account, but the differences (positive or negative) in the domestic prices of the domestically produced inputs with respect to their world prices have not been considered. When they are taken into account, in a procedure similar to that used in estimating effective protection, a quantification of the effective incentive rate for manufactured exports is obtained.

8.10 There have been two attempts of estimating effective export incentives in Brazil, one using data for 1975 [52/] and a more recent one using data for 1980-1981 [53/]. The 1975 study uses the FUNCEX estimations of nominal incentives referred to in Chapter 6, which do not include the effect of the BEFIEX, and the protection of inputs is estimated through the use of nominal tariffs, which, as indicated in Chapter 7, are likely to include substantial redundancies. As these two limitations introduce a downward bias in the estimation (the first underestimates nominal incentives on the exported output and the second overestimates protection on inputs), the FUNCEX results can be considered a lower bound estimate of effective incentives to manufactured exports in 1975. The results for the 57 industries at the 3-digit level show positive effective incentive rates for all industries except one (tobacco). However, the FUNCEX study does not take into account the overvaluation of the exchange rate. If a 20 percent overvaluation is assumed, a total of 12 industries show negative rates.

52/ Pastore, A., Savasini, J.A., Rosa, J.A. and Kume, H., "Promoção Efetiva as Exportações" no Brasil, FUNCEX, 1978.

53/ Tyler, W., "Nominal Export Incentives and Effective Export Promotion Estimates for Brazil, 1980-1981", IPEA/INPES, Textos para Discussão Interna No. 37, July 1981 (mimeo). This study also presents estimates of anti-export biases computed from effective rates of domestic market protection and export subsidization for 72 tradable goods sectors. The overall results in this exercise were quite consistent with those presented in the present report (Table 37).

8.11 The estimation for 1980-1981 uses the same direct price comparisons used in the estimation of effective protection to estimate the protection on inputs. Although the quantification of nominal incentives is somewhat different from the one used in Chapter 6 54/, the overall picture of incentives, both in terms of absolute amount and distribution among subsectors, is consistent with the FUNCEX results for 1975 and the estimates for 1980 presented in Chapter 6.

8.12 The net effective incentives to exports provided by the overall policy framework can also be gauged in another way. As the protection on domestic inputs does not distinguish between production for domestic or foreign markets, and the incentives provided through special access to imported inputs have already been taken into account in the quantification of nominal export incentives, the comparison of net effective protection, net nominal protection and net export incentives (Table 38) will provide an indication of the net effective incentive to export. Thus, for a given industry such as machinery, a net effective protection rate (on domestic sales) of 52 percent was provided with net nominal protection of 27 percent. Since exports receive a lower nominal incentive (11 percent), it is clear that they also receive lower net effective protection. In the case of clothing and footwear where nominal protection and export incentives are very similar, the low net effective protection results in a very similar net effective incentive to export.

The Impact of Brazilian Trade Policy

8.13 All recent estimations of the aggregate impact of Brazil's trade policy indicate that the average levels of protection for domestic sales and of incentives to exports for the manufacturing sector as a whole are moderate, if the effect of all policy variables, including the overvaluation of the exchange rate, are taken into account. In addition, the performance of Brazilian manufacturing during the last decade shows increasing competitiveness and efficiency with respect to international standards, relatively high growth of output and an impressive growth of manufactured exports, which now account for more than 40 percent of manufactured exports from Latin American and the Caribbean. However, there are several aspects of the current policy environment that are cause for concern, as they have negative effects on growth and resource allocation both within and outside the industrial sector. Even more importantly, the challenges facing the Brazilian economy during the next few years would not be adequately met within the present policy framework and require some major adjustments.

54/ Tyler's estimations also exclude BEFIEX and draw-back incentives. The quantification of financial incentives is based on the legal rates, as the actual amounts of financing were not available at the time.

Table 38: EXPORT INCENTIVES, PROTECTION AND EXPORT RATIOS
(percent)

	Net Export Incentive (1980)	Net Nominal Protection (1980)	Net Effective Protection (1980)	Export Ratios 1970	Export Ratios 1979
Non-metallic Minerals	-2.2	-29.5	-31.1	0.8	1.8
Metallurgy	0.2	-5.1	15.0	3.2	3.7
Machinery	10.7	27.1	51.7	3.6	14.2
Electrical Equipment	16.1	46.9	81.6	1.4	4.4
Transport Equipment	14.9	-19.3	-22.5	0.7	9.9
Wood Products	2.1	-18.0	0.9	4.2	8.9
Furniture	-1.8	8.1	30.8	0.3	0.8
Paper	-1.2	-28.1	-30.2	0.9	7.7
Rubber	0.7	-27.5	-32.6	0.9	3.4
Leather Products	5.6	-0.9	-2.4	13.5	21.3
Chemicals	-2.6	32.9	59.7	5.7	11.4
Pharmaceuticals	1.6	69.2	85.3	0.8	2.5
Perfumes, Soap	-2.6	15.8	64.2	0.2	1.1
Plastics	3.3	10.4	9.9	0.1	0.8
Textiles	11.1	7.3	17.1	7.4	6.5
Clothing, Footwear	11.6	11.9	25.7	1.0	7.4
Processed Food	-2.4	-21.3	8.1	3.3	16.9
Beverages	-2.8	-18.9	-15.3	0.3	1.8
Tobacco	-5.5	-13.2	-9.4	11.5	22.1
Printing and Publishing	-5.6	6.3	13.0	0.3	0.6
Miscellaneous	-2.2	64.4	132.8	2.2	7.7
Manufacturing	3.5	5.2	23.1	5.7	9.1

Source: Tables 37, 34 and 20.

8.14 The first area of concern refers to the interrelations between protection levels, export incentives and exchange rate. While the average levels of protection and export incentives are lower than they appear at first sight, because of the overvaluation of the exchange rate to which they themselves contribute, such result is not arrived at without a considerable real cost. The high levels of nominal incentives required to compensate exchange rate overvaluation represent a considerable fiscal cost, which has to be financed in some way, either domestically or abroad. When public sector deficits are the result, financing is not avoided but simply disguised as the inflation tax which results from higher aggregate expenditure. Thus, the budgetary and inflationary pressures resulting from the fiscal and financial incentives generate costs, which are borne by other sectors of the economy, and distortions in the allocation of resources. In addition, since protection of domestic production does not take place through tariff barriers but mostly through non-tariff restrictions, the system of protection and incentives does not generate the resources required to cover its own costs.

On the contrary, substantial additional resources are used to operate the complex administrative system. If, on the other hand, lower levels of export incentive and protection were combined with a less overvalued exchange rate, the structure of relative prices would be less distorted, the administrative costs, fiscal deficit and resulting inflationary pressures would be reduced, and the average levels of actual protection and incentive to export might remain largely unchanged while eliminating the current wide dispersion of rates among industries.

8.15 Some of the large differences in protection and export incentive rates appearing at the 2-digit level of aggregation may reflect policy priorities to develop specific industries, which may be justified on the basis of infant industry arguments. Thus, the higher levels of protection for capital goods industries and lower levels for consumer goods industries appear consistent with that objective, which is supported by the success of a number of more traditional industries in achieving international levels of competitiveness. However, there are many instances of protection and/or export incentive levels that could not be properly explained in the above terms. As seen earlier in this chapter, the electrical equipment industry receives a very high level of protection, well above the average for manufacturing and also above other capital goods industries. Even with positive net export incentives, although below the protection for domestic sales, the sector's export performance has been poor. A similar situation of high protection for domestic sales may be found in the pharmaceuticals and perfumes industries and in many components of the chemical industry. The situation in the machinery industry is more complex, as the relatively high levels of protection reflect an effort to develop the sector, and the also high export incentives have resulted in an impressive export performance. Similarly, the generous export incentives to the transport equipment industry have resulted in large and rapidly growing exports while maintaining low domestic prices, although the cost-effectiveness of the export incentives may still be open to question. 55/

8.16 The enormous dispersion of protection and export incentive rates among industries, ranging from 133 percent to -31 percent in the case of net effective protection, goes well beyond what would be desirable on the basis of a limited number of well established priorities for industrial and export development, and is bound to generate misallocation of resources, to maintain pockets of inefficiency within the industrial sector and, in the medium and long run, to constrain industrial growth. In the past, specific policy measures were adopted on grounds other than clearly defined industrial priorities. For instance, the crédito prêmio was established and continued to operate for nearly ten years with rates related to the sales tax rates (for IPI and ICM) for the specific products. The tax rates did not reflect any pattern of industrial priorities and the resulting incentive rates had little relation with subsectoral policy intentions. In fact, the FUNCEX

55/ The competitiveness, performance, and prospects of the machinery and transport equipment industries are examined in more detail in the third part of this report.

study on export incentives (para. 6.07) found that the structure of export incentives discriminated against labor-intensive subsectors. While the new structure of crédito prêmio established in April 1981 is based on a flat rate for all industrial subsectors (except for some firms covered by BEFIEX agreements), there are still many elements in the incentive/protection structure that do not reflect specific industrial priorities. Finally, the present structure of incentives and protection contains many discretionary elements, which are administratively determined. While this provides an element of flexibility to the system, which is actively used by government institutions to react to short-term exogeneous shocks, it also provides the opportunity for additional distortions, increases the cost of operating the system to the government and the enterprises, and discriminates against smaller firms that do not have the resources to maintain special units to follow changes in the incentives, process applications for incentives and fight their way through the bureaucratic meachinery.

Trade Policy and Industrial Strategy

8.17 Brazil's industrial strategy for the next decade, and particularly for the next four to five years, revolves around the performance of its external sector, where considerable improvements in the current account are needed in the short- and medium-term in order to maintain growth while reducing the deficits relative to GDP and exports. As indicated in Chapter 5, the policy measures implemented by the government since late 1980 have already gone a long way to reverse the trend in the trade account, and a trade surplus was achieved in 1981. However, the volume of imports during 1981 should be considered abnormally low for several reasons, including primarily the low level of economic activity during the year, the use of relatively high inventories accumulated during 1980 in expectation of a maxi-devaluation, and the strong efforts made by Brazilian firms to operate with reduced levels of inventories in the face of high interest rates. With a higher level of economic activity expected in 1982, low inventories of imported inputs, and overall inventories already below long-term trends, imports in 1982 might increase again faster, and continuing growth after 1982 will require growing import volumes.

8.18 With manufactured exports accounting already for about 60 percent of total exports, a high growth rate of such exports is a pre-requisite of sustainable growth in the next few years. While Brazil's export performance during the last fifteen years has been impressive, considerable room for further expansion still exists. In particular, the average export ratio for the manufacturing sector continues to be below 10 percent and in many industries is considerably lower. The absolute volume of manufactured exports, about US$12 billion in 1980, and the overall size of the Brazilian economy, while gigantic for Latin American standards, are not such that they face serious external constraints because of the share in world exports of manufactures (see Chapter 3). In fact, the size of the Brazilian main economic magnitudes may be misleading until it is compared with some medium-sized, middle-income countries or with medium-sized industrialized countries. For instance, Brazil's GDP in 1979 was only about 13 percent

above that of Spain, a not particularly open country with a smaller share of industry in GDP than Brazil. However, the World Bank's 1981 World Development Report indicates that Spain's manufactured exports were more than double Brazil's in 1978. The comparison with another medium-size but more industrialized country such as Italy is even more striking. While Italy's GDP was 58 percent above that of Brazil, the value of Italy's manufactured exports was more than ten times that of Brazil. Out of more than 100 countries listed in the 1981 World Development Report, including less developed, middle-income, and industrialized countries, only 43 (China, India, Uganda and Turkey) have total export ratios with respect to GDP below the 7 percent of Brazil in 1979.

8.19 The very fast expansion of manufactured exports and general opening up of the economy cannot be sustained under the policy framework that prevailed during most of the 1970s and, particularly, after 1973. As indicated above, the main role of the export incentive system has been little more than to neutralize the average disincentive provided by an overvalued exchange rate and the level of domestic protection, while at the subsectoral level large differences in aggregate incentive rates and negative rates for many subsectors have emerged. To encourage rapid growth of output and exports in line with Brazil's comparative advantages and resource endowments, the focus of trade policy during the next two to four years should be a more flexible exchange rate policy, following the pattern adopted in early 1979 (see Chapter 5) that would achieve a gradual devaluation of the cruzeiro in real terms. This should be accompanied by a realignment of export incentives and protection measures, in order to reduce their dispersion among sectors, and to reduce their average nominal levels as the real devaluation is achieved. While the reduction in the average protection levels should at least equal the real rate of devaluation, the average net export incentive level should be allowed to increase, in order to reduce or eliminate anti-export biases. The above measures should be accompanied by a review of the mechanisms and procedures under which the export incentives are granted, to simplify the system and make it more automatic and less discriminatory to smaller firms, to reduce levels of inefficiency in well protected firms and to limit special incentives to a small number of clearly defined industries with explicit priorities. This should also involve a review of several industrial subsectors that have been the target of special programs since the mid-1970s, particularly in the intermediate and capital goods industries, to ascertain the impact of the programs, the competitiveness achieved by these industries and their prospects in the medium- and long-term 56/.

8.20 In the short-term, the current policies of domestic stabilization with control of the monetary and credit expansion, and of stabilization in the external sector based on an acceleration of the mini-devaluations (Chapter 5) are already showing results in the moderation of the rate of inflation and improvements in the trade account and should be continued at least through 1982. In the medium-term, to guarantee a self-sustained and rapid growth of industrial exports, the mini-devaluations should continue

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56/ The third part of this report reviews some of the issues affecting a few capital and consumer durable subsectors.

at a rate slightly above the general price index, to regain gradually the parity level of December 1979 with respect to US dollar, and a competitive level with other currencies. As indicated in para 8.19 above, this gradual devaluation should be partly compensated by phasing out the tax credit certificate as already planned (the fiscal subsidy is scheduled to be totally eliminated by mid-1983). At the same time, an improved system of access to imported inputs (and capital goods) for export production should be established in order to eliminate specific anti-export biases in many subsectors. This could be partly accomplished through an expanded drawback system that would include firms producing intermediate inputs for exporting firms.

8.21 Another necessary element of this strategy, which is made more difficult by the country's balance-of-payments situation, is a more general simplification and reduction of administrative and other barriers to imports. Over the next two years, this might prove to be risky and politically difficult, as inflationary expectations or the fear of another maxi-devaluation might create a rush on imports and, possibly, become a self-fulfilling prophesy. For these reasons, an opening up to imports, above the increase that renewed growth will inevitably generate, might be difficult to achieve until a sustained export growth results in an improved performance of the balance of trade, and more stable oil prices, reduced world interest rates and reduced dependence on imported oil, ease the foreign exchange constraint. However, the current surcharge on imports (financial operations tax), which has been recently used to compensate for the increasing over-valuation of the cruzeiro in 1980 and early 1981, should be gradually reduced and eliminated over a similar period to the tax credit certificate. The first stage of this partly compensated devaluation should take place through 1982 and 1983, whereas a more substantial elimination of non-tariff barriers, and a realignment of import tariffs would take a longer period of time. The relatively secondary importance given here to the elimination of protective measures is not only due totheir impact on the balance of payments, but also to the estimated low negative impact on the general level of competitiveness of Brazilian industry (Chapter 7 above).

8.22 The maintenance of a policy of mini-devaluations over and above the differential rate of inflation is bound to introduce some inflationary pressures in the economy. However, such pressures are the result of the process of elimination of a distortion in the price system, in the same way in which the elimination of price controls also introduces inflationary pressures. At the same time, the simultaneous reduction in the financial operations tax on imports, and in the level of fiscal and financial incentives to exports would have an offsetting effect. Furthermore, the relatively small size of the external sector means that external pressures are much smaller than those generated by excess domestic demand, and monetary and credit expansions. Thus, control of aggregate demand (including elimination of the public sector deficit) should be maintained to further reduce inflationary pressures.

8.23 Continuation of the above policy approach has a real cost in the short-run, in terms of slow growth and low levels of industrial output in 1981 and 1982. However, these costs cannot be avoided and are a prerequisite for rapid and stable growth afterwards. After a very weak performance in 1981, industrial output could already experience a moderate growth in 1982 with a small recovery of domestic demand and a more dynamic expansion of manufactured exports. However, certain sectors such as consumer durables, capital goods, and some intermediates may continue to experience production rates well below the 1980 levels and/or low capacity utilization rates.

PART III

TECHNOLOGICAL DEVELOPMENT AND MANUFACTURED EXPORTS

CHAPTER 9

TECHNOLOGY POLICY

9.01 Among Latin American countries Brazil has given the most explicit attention to the role of technology in economic development and to the stimulation of technological development through government policy. In addition to the government measures explicitly aimed at technological development, such development is affected by a whole range of other policies regarding industry, trade, fiscal policy, credit policy, etc. The purpose of this chapter is to provide a summary review of the main aspects of Brazilian technology policy, particularly as regards the industrial sector. This will serve as background for the next two chapters, which analyze Brazilian exports of products requiring relatively more sophisticated technology. The main policies affecting technological development in the case of Brazil are grouped under four headings: policies directed to (i) development of technological infrastructure; (ii) regulation of technology imports; (iii) development of technological capability at the firm level, and; (iv) generation of demand for local technology.

Development of Technological Infrastructure

9.02 Before 1968 most of the effort in this area focused on institution building and human resource development. The period between 1920 and 1950 was characterized by the creation of various R & D institutions in engineering and the sciences, including the National Institute of Technology (INT) in 1921, the Aerospace Research Center (CTA) in 1954, and various state-level technological research institutes in Sao Paulo, Bahia, Rio Grande do Sul, and Pernambuco. (For a chronogram of the main events in Brazilian science and technology policy see Statistical Appendix Table 9.1). In 1951 two important institutions, the National Research Council (CNPq) and the Campaign for the Improvement of the Higher Educational Staff (Capes) were created. Their primary objective was to stimulate and finance the development of high-level human resources in order to strengthen S & T capability, particularly in the universities and in research and development institutions. In 1964 a special fund (FUNTEC) was created within BNDE to finance the development of specialized technical personnel for research and related activities in the universities. In 1964 the BNDE established another fund which was to play an important role in the creation of local technological capacity. It was the Fund for the Acquisition of Machinery and Industrial Equipment, which was later called the Special Agency for Industrial Finance (FINAME), and eventually transformed into a separate public enterprise as a subsidiary of the BNDE. Another important institution created during this period was the Fund for Financing Studies and Projects (FINEP). It started out in 1965 as a fund in the Ministry of Planning and Coordination to finance feasibility studies and project development for investments in sectors and activities which were considered of

priority for the economic and social development of the country. In the administrative reforms which took place in 1967 the Government turned FINEP into a public enterprise.

9.03 Beginning in 1968, scientific and technological development became a specific policy objective. The 1968-1969 development plan, called Programa Estrategico do Desenvolvimento (PED), defined an explicit policy for S & T for the first time at the federal level. Although there were some important differences in the priorities of the PED and those of subsequent plans, the program of action and institutional structure then established for planning have been maintained. 57/ The PED proposed the creation of a National System of Scientific and Technological Development (SNDCT), of S & T Basic Plans that would spell out the actions foreseen in the National Development plans, and of a National Fund for Scientific and Technological Development (FNDCT) to finance the SNDCT.

9.04 The FNDCT, set up in 1969, became the principal instrument for the implementation of S & T policy. Since 1971, it has been administered by FINEP, which was reorganized to operate essentially as a bank to promote scientific and technological development. The SNDCT was formally set up in 1972 to coordinate all government action in the field of S & T. Initially CNPq was given an advisory function on science and technology, while the Ministry of Planning (SEPLAN) was given an advisory role in the economic and financial aspects. In 1974 CNPq was restructured and integrated into SEPLAN. With those changes, CNPq, which until then had confined its action mostly to the development of human resources, became the central organism of the SNDCT, was given executive powers and was made responsible for overall S & T planning.

9.05 Since the creation of the SNDCT, three Basic Plans have been issued, covering the periods 1973-1976, 1975-1979, and 1980-1985. The first Plan promoted an increase in the volume of resources for S & T by strengthening the FNDCT and other financial mechanisms. The 1975-1979 Plan aimed at broadening the supply of S & T, and to reinforce the technological capabilities of national firms. The current Plan differs from the previous two in that rather than

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57/ In the PED, priority was put on developing technologies more appropriate to the factor endowments of Brazil in order to assure greater labor absorption and to create a mass market to guarantee self-sustained growth. In the subsequent plans, the emphasis was put on increasing the international competitiveness of Brazilian industry and in strengthening national enterprises. See D.A. Guimarães and E. Ford, "Ciência e Tecnologia nos Planos de Desenvolvimento: 1956/1973." Pesquisas e Planejamento Econômico, Vol. 5, N. 2, Dezembro 1975, pp. 85-432; and R. Bielschowsky, "Notas sobre a Questão da Autonomia Tecnologica na Indústria Brasileira," in W. Suzigan, ed., Indústria: Política, Instituções e Desenvolvimento (IPEA: Série Monografica, No. 28), Rio de Janeiro: IPEA/INPES, 1978, pp. 99-136.

presenting government actions in the form of programs, projects, and priority activities, it established a set of policy directions that are supposed to orient the actions of the public and private sector. Furthermore, it does not present any figures on planned expenditures.

9.06 The level of FNDCT resources increased in real terms until 1975, then fell in 1976 and 1977 (Statistical Appendix Table 9.2). A peak was reached in 1978, but funding fell dramatically in 1979 when government expenditures were cut throughout the whole economy. Over the ten-year period considered, funding totalled slightly more than US$1 billion. The types of programs and the distribution of funds show that the FNDCT has aimed primarily at developing the research infrastructure of Brazil, particularly human resources, although some funds have also been channeled to special technologies and technological development in industry. The largest amount of resources went to "Scientific Development and Human Resources for Research", which accounted for 53 percent of the number of operations and absorbed 50 percent of total resources. These funds were used primarily to support basic research at the universities and graduate training in Brazil and abroad. The second largest area was "Development of New Technology", which absorbed 16 percent of the funds and included nuclear energy, space, ocean, and non-conventional energy. Industrial Technology absorbed 14 percent of the funds and included the ADTEN program administered by FINEP that will be discussed below. The next most important area was "Technology Applied to Regional and Social Development", which absorbed 7 percent of the funds, mostly used to create physical infrastructure and human resources for R & D centers in Bahia, Minas Gerais, Rio Grande du Sul, and São Paulo. "Infrastructure Technology", "Support Activities", and "Agricultural Development" all received 5 percent or less of the total.

9.07 It is difficult to estimate the total amounts spent on S & T in Brazil because there is no accurate source of information for non-federal spending. It is clear, however, that there was a significant increase from the early sixties which continued well into the seventies. Statistical Appendix Table 9.3 shows the dramatic increase in funding between 1964 and 1979 by the three main sources at the Federal level -- CNPq grants and scholarships, FUNTEC/BNDE, and FINEP/FNDCT. The total from these sources for the second half of the period was more than three times that for the first half. Total federal spending is estimated to have increased from US$68 million in 1968 to US$540 million in 1976, (about 2.4 percent of the federal budget, or about 0.5 percent of GNP). During the same period, S & T spending by autonomous state enterprises, independent research institutes, and private industry also increased in response to greater government incentives and to the greater availability of human resources. It has been estimated that, taking into account these additional resources, approximately one percent of the GNP was spent

on S & T in Brazil in 1976.[58]/ Perhaps as much as half of the total funds were utilized to buy new equipment for R & D centers and universities and for the training of researchers and professors. Also, it is possible that levels after 1978 have been somewhat lower given the large cutbacks in government expenditures which have taken place.

9.08 In the industrial sector, the most important development was the creation of the Secretaria de Tecnologia Industrial (STI) of the Ministry of Industry and Commerce (MIC) in 1972. It was the first sectoral science and technology unit to be established within a ministry. The STI took over various S & T institutions already existing in MIC, and its current activities include (a) R & D programs through its own institutes; (b) funding for technological development in public and private enterprises, and for the development of specific technologies,[59]/; (c) technological information services to firms; (d) regulation of industrial patents and technology transfer through INPI (National Institute of Industrial Property Rights); and (e) acting as the executive secretariat of the National Council for Metrology, Normalization and Quality Control (CONMETRO).

Regulation of Technology Imports

9.09 The strategy towards imports of foreign technology is a key element of technology policy in developing countries. This includes not only specific policies on the importation of disembodied technology (such as licenses and technical services) but also those relating to the inflow of foreign investment and to the control of imports of technology embodied in capital goods. Brazilian policy towards foreign investment has been one of the most open among developing countries. Brazil has relied on foreign investment both as a source of technology and a source of capital to carry out large investment programs as part of its national development plans. Although a more comprehensive review should also analyze direct foreign investment, foreign licensing, and local technological effort,

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58/ Estimate made by IDB in conjunction with a technology loan to Brazil.

59/ The STI was the promoter of the national alcohol program, which is supposed to supply 10.7 billion liters of alcohol by 1985 to substitute for 45 percent of the projected gasoline consumption for that year. This is the most ambitious program developed to date by the STI. The program involves not only the technological problems of blending and using various mixtures of gasoline and alcohol but also research into: adaptations to allow gasoline and diesel engines to run on pure alcohol, different raw material sources of alcohol, increases in crop yields, and development of new processing plants to produce alcohol.

this section focuses primarily on the control of disembodied technology imports.[60/]

9.10 Regulation of the transfer of technology started in 1962 with Law 4131 (the main law governing foreign investments in Brazil), which required that foreign payments for technology transfer be registered with the Central Bank. Payments for the transfer of technology for the 1965-1970 period were heavily concentrated in transportation, metallurgy, and electricity and communications. Vehicles alone accounted for nearly one third of the total and involved the largest payments per contract. The most common type of contract was technical assistance followed by engineering services, trademark licenses, licenses for fabrication, and project preparation. National firms appeared to be more dependent on engineering services and project preparation, whereas subsidiaries and/or associates of the technology suppliers were more dependent on technical assistance, and foreign firms unrelated to the technology supplier were more dependent on patents and trademarks. Subsidiaries and/or associates appeared to be using technology payments as a way of profit remittances. Their average payments per contract were 4.8 times higher than those by unrelated firms and 8.7 times those by national firms (see Annex 3 for more details).

9.11 After 1971, INPI took over, from the Central Bank, the control of agreements on transfer of technology. Initially INPI sought to: (i) evaluate whether the technology should be imported; (ii) reduce the cost of the imported technology by strengthening the bargaining position of the local licensee; (iii) eliminate clauses restricting the local absorption and dissemination of the imported technology, or limitations in the export of the products manufactured with the technology; and (iv) favor the importation of technology rather than capital or goods. In 1975 INPI issued a policy statement establishing the norms and concepts for the regulation and approval of transfer of technology agreements. This ordinance divides technology transfer

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60/ Annex 3, however, presents some information on the role of foreign technology and the extent of local technological efforts in Brazilian industry. The information is based on the results of a study of the largest 500 firms in 1970 and a study of technology payments through 1970, both carried out by IPEA.

agreements into five categories. 61/ Each type of agreement must be registered with INPI in accordance with different regulations as to terms and payments authorized, period of validity, required Brazilian participation, and various special provisions depending on the type of contract. To a large extent, this ordinance was a reaffirmation and expansion of regulations contained in previous legislation. The main additions consisted in making the transfer conditional upon absorption of technology by the recipient companies. This was done by demanding full disclosure of technical knowledge by the proprietors of the technology, and by the requirement that the recipient companies present plans for the absorption of the technology and for the local personnel training.

9.12 The impact of INPI's attempts to control the imports of technology, and to develop the technological capability of the importing firms, have not been evaluated but may have been quite large. Payments for technology imports have averaged more than 10 percent of the value of imports of capital goods (Statistical Appendix, Table 9.4). Although the percentage decreased from 1969 to 1974 (due partly to the very rapid increase of capital goods imports during that period), it has been increasing again since 1975 (when imports of capital goods have remained more or less constant), reaching almost 20 percent in 1979. This appears to indicate that there has been some substitution between imports of capital goods imports of technology.

9.13 However, there are indications that despite some progress in the control and regulation of the inflow of technology since INPI's creation, there is still a way to go in terms of having a fully developed and well operating system in this area.62/ For example, a series of interviews with high executives of firms, industrial development banks, and some key producers associations carried out in the late 1970s as part of an IPEA study on the private sector indicated that most felt that INPI was too bureaucratic, that it did not follow a clearly defined industrial policy, and that it still had

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61/ These are: (1) patent license agreements (title to industrial property, including knowhow and technical assistance); (2) trademark license agreements (right to use trademarks that involve title to industrial property); (3) industrial technology license agreements (transfer of knowhow to manufacture consumer goods and/or inputs in general, not protected by industrial property legislation), (4) technological and industrial cooperation agreements (transfer of knowhow for manufacturing industrial plants, machinery, and equipment), and (5) technical service agreements (planning, programming, and performing studies and projects, and specialized services).

62/ See for example some of the studies developed collaboratively by the Fundação Carlos Alberto Vanzolini (FCAV) São Paulo and the Center for Policy Alternatives (CPA) of MIT under a research contract funded by the São Paulo State Council of Technology (CET).

an insufficient number of personnel for its large regulatory task. 63/ Some also complained that INPI was more worried about reducing the outflow of foreign exchange than with technological development. Others complained that in some cases it was difficult to purchase necessary foreign technology because of excessive regulation by INPI. These conflicting interpretations illustrate the difficulty of striking a proper balance between controlling the inflow of foreign technology and effectively utilizing foreign knowledge and technology. It also suggests that government policy may be most helpful in providing information on alternatives, encouraging thorough evaluation and selection procedures on the part of national firms, and assisting in the bargaining process. Besides encouraging greater diffusion of information, this would imply strengthening the technological capability of local firms and providing the right incentives for its development.

Development of Technological Capabilities at the Firm Level

9.14 The main instrument used in Brazil to encourage the development of technological capability has been the provision of subsidized financing by FUNTEC and FINEP.64/ FUNTEC was created as a result of the BNDE's experience with the large investment programs of the second decade of the fifties and beginning of the sixties, which identified a strong technological dependence with respect to product, process, and project engineering. To help ameliorate this technological dependence, FUNTEC was to support the development of human capital in scientific and technological disciplines, to stimulate and support research and innovation by local industry, and to adapt imported technology to local conditions. During its first 10 years (1964-1974), FUNTEC's activities were mainly directed to activities were mainly directed to developing local research infrastructure by funding postgraduate training for scientists and engineers 65/ (Statistical Appendix, Table 9.5). After 1974, FUNTEC gave priority to programs to strengthen the technological activities of local firms, mainly through the Subprogram on the Demand and Utilization of Technology. Its

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63/ Annibal V. Villela, and Werner Baer, O Setor Privado Nacional: Problemas e Políticas para seu Fortalecimento (IPEA, Coleção Relatórios de Pesquisa No. 46), Rio de Janeiro, IPEA/INPES, 1980.

64/ Much of the information on FUNTEC and FINEP is taken from Jose Pelucio Ferreira, "Desenvolvimento Científico e Tecnológico, A Experiencia Brasileira" (mimeo), Organization of American States, Department of Scientific Affairs, October, 1980.

65/ Between 1964 and 1974, FUNTEC funded 48 percent of the 2,129 Brazilians receiving masters degrees in engineering, exact and natural sciences, agricultural sciences, and social sciences (economics); and 46 percent of the 341 receiving doctorates in the first three of these fields.

objectives were to create attractive conditions for Brazilian firms to become interested in technological innovation, to stimulate R & D projects, and to support diffusion of technological innovation acquired or developed in industrial undertakings. FUNTEC established also a Subprogram for Generation and Supply of Technology aimed at attracting research institutions, including the universities, to participate more directly in the technological effort of Brazilian firms. It focused on development of human resources, basic and applied research and development, capacitation in specialized technological services, and specialized technical information .

9.15 The change in emphasis of FUNTEC activities, from human resource development and supply of technology programs centered on universities and research institutes before 1974, to programs on demand for technology based in industry after that year, is shown in Statistical Appendix Tables 9.5 and 9.6 66/. The value of FUNTEC operations has been falling in real terms since 1973. While this has occurred as FINEP and the programs financed through the FNDCT have expanded and undertaken many of the same type of activities carried out by FUNTEC, it is difficult to ascertain to what extent the fall in FUNTEC financing reflects the more difficult economic condition as opposed to a policy of consolidating all financing of S & T activity under FINEP.

9.16 FINEP was established in 1967 to help finance the first step in any new ventures (feasibility and project studies), but its functions were considerably enlarged later on. In 1971 FINEP was made the executing agency for the FNDCT, and in 1973 its scope as a financing institution was enlarged with the introduction of two new programs. Also, in 1975 it became the secretariat for the Coordinating Commission of the Nuclei of Industrial Articulation (CCNAI), a mechanism for promoting the purchase of local capital goods by state enterprises.

9.17 FINEP's own financing activities consist of three different programs of subsidized financing. A program to support users of consulting services (AUSC) gives financial assistance to public or private firms for all types of project studies, as long as they are controlled by Brazilian residents. These studies include prefeasibility, engineering, project management, specific studies within programs of regional or national integration, and studies to expand the administrative and technical capabilities of firms seeking project

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66/ Statistical Appendix Table 9.6 presents the distribution of FUNTEC resources allocated to the Demand and Utilization of Technology Program for the period 1974-1978. It shows that the funding has been almost exclusively oriented towards programs in the transformation industry and that projects in two sectors, mechanical (42 percent) and electrical, electronics and communication (38 percent) absorbed 80 percent of total disbursement.

financing. The program to support local consulting (ACN) was started in 1973 and was a natural outgrowth of FINEP's original mandate to strengthen local project capability. Its objective is to provide finance to local consulting firms to acquire human and material resources in order to substitute for the services of foreign consulting firms. Finally, the program to support technological development of national enterprises (ADTEN) was started in 1973, when it became apparent that FINEP should also finance technological activity at the private enterprise level. It gives priority to firms operating in areas considered fundamental for the National Development Plans, and only applies to firms where Brazilians have majority control. The main activities financed through this program are R & D for new products and processes, research to adapt imported technologies, purchase and absorption of imported technological packages, strengthening of local teams dedicated to the development or adaption of technology, establishment of quality control centers, and establishment of R & D centers. Through this program, FINEP also participates in the establishment of firms dedicated to the development andcommercialization of products or processes with a high technological content, and in all stages of the productive process necessary for the materialization of innovations or adaptations of pre-existing technologies.

9.18 The largest number and volume of FINEP operations have belonged to AUSC, the oldest program (Statistical Appendix, Table 9.8). They represent 63 percent of the total number of operations and 65 percent of the value. The ACN program, by its very nature, has been relatively small since its beginning in 1973, accounting for 9 percent of the cumulative number of operations undertaken by 1979 and only 6 percent of the value. In contrast, the ADTEN program, also started in 1973, grew very rapidly, accounting for 28 percent of the total number of operations, and 30 percent of the total value through 1979. There was a large increase in the number and value of FINEP operations from 1973 onwards. However, there were signs of a fall by 1979, which have probably continued in 1980 and in 1981 as the government has cut back expenditures in all areas.

9.19 Since 1971, FINEP has also administered the FNDCT resources (para 9.04 above). Such funds account for little more than one third of the combined number of contracts and more than 60 percent of the total amount financed (about US$1.2 billion through 1979) 67/. During 1977-1979, FINEP's activities have been concentrated in the industrial, electric energy, and transport sectors (Statistical Appendix, Table 9.10). The main sector has been industry, which accounted for more than half of the total number of projects and for almost half the value of operations. There has been great annual

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67/ Statistical Appendix, Table 9.9. The figures here distinguish between what is administered by FINEP directly as its own (including the ADTEN program) and what FINEP administers for the FNDCT as the executing agency of that fund.

variation in the relative importance of the different types of operations (Statistical Appendix, Table 9.11). While the share of general studies has decreased, the shares going to project execution (mostly product, process, and detail engineering), R & D centers, and product R & D have increased significantly. Thus, it appears that there was an increased emphasis on specific products and projects. Finally, FINEP has participation in the equity of several firms (Statistical Appendix, Table 9.12). Equity participation was limited to small firms in high technology areas, mainly electronics. FINEP's share ranged from 6 to 57 percent of the firm's equity.

9.20 The amount of subsidy implicit in FINEP loans varies widely among programs and sectors and has experienced considerable changes over time. In 1979, FINEP reduced the subsidies implicit in loans by increasing the interest rates and the amount of prefixed monetary correction which were to be effective from 1980 onwards. The current terms and conditions of FINEP financing are summarized in Statistical Appendix Table 9.13 and reflect the new priorities given to agriculture, energy, and social development. The priority sectors get larger subsidies through their lower levels of prefixed monetary correction. The ADTEN program receives the most favorable conditions in terms of grace and amortization periods. Small and medium enterprises benefit from nominal interest rates which are half those set for large enterprises. The overall interest rate structure is designed to set the lowest rates for projects which a priori may be expected to have the greatest externalities and spillovers, the highest for those which seem to be most firm specific.

9.21 It is difficult to evaluate the impact of FINEP operations on the technological development of the industrial sector. It is clear that it has played an important role in developing local engineering and project preparation capability. Also, judging from the size of the ADTEN program, it must also have had some impact on technological efforts at the firm level, although the results of such efforts cannot be ascertained without more detailed information on the specific projects financed. FINEP indicates a high rate of commercial success of investments supported through the ADTEN program.

Policies Affecting Demand for Domestic Technology

9.22 Government policies to promote the demand for domestic technology in Brazil, after 1973, have mainly taken the form of incentives to use domestically produced machinery and equipment. These policies include investment incentives, local purchase incentives (including subsidized credit), and trade policy. The pattern of industrial investment was influenced by incentives providing tariff and tax exonerations, granted primarily by the CDI. Local production of capital goods was stimulated as these incentives reduced the cost of investment and favored the purchase of domestically produced goods by eliminating IPI and ICM taxes and granting accelerated depreciation. Locally supplied equipment in CDI

approved projects increased from 25.9 percent in 1974 to 44.2 percent in 1978 68/.

9.23 Purchase of domestic capital goods was stimulated by a series of other measures. Decree Law 1355 of 1974 provided that the purchase of domestically produced capital goods could be accompanied by the exemption of the IPI tax, and provided for a direct fiscal subsidy through reimbursement of IPI taxes paid on the intermediate inputs used in producing the local capital goods. The magnitude of the subsidy varied by product, because the IPI rates themselves varied, as did the degree of vertical integration in their production. A study based on 16 capital goods industries estimated that the fiscal subsidy averaged about 20 percent. These incentives were not applied to all capital goods, but to a large number of what were considered "sophisticated" capital goods whose production was still relatively new in Brazil. In addition, the Government sought to use purchases by state-owned enterprises to stimulate the domestic capital goods industry. State firms are able to import capital goods, only after it is verified that no similar local products exists. FINEP has also established a Technical and Financial Cooperation Agreement with state enterprises, through which it provides ADTEN funds for the initial project and first production of capital goods in local firms selected by the state enterprises, and a Financial Cooperation Agreement with FINAME to provide resources to domestic capital goods producers.

9.24 An important instrument to stimulate purchases of local capital goods has been subsidized financing provided primarily through FINAME 69/. FINAME has three financial programs providing resources for small and medium enterprises, capital goods in general, and heavy capital goods made to order. A previous Bank mission estimated that, in 1977, the credit subsidies provided through the latter program made possible a 29.4 percent reduction in the price to the

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68/ In addition, in 1978 the CDI fixed minimum nationalization requirements to be met by capital goods suppliers in order to be registered as national products and qualify for special financing. These indices, which were set at a minimum of 65 percent and averaged 82 percent in the mid-seventies, were increased to 85 percent in 1978-1979 and to 90 percent in 1980-81.

69/ Other financial institutions which give subsidized finance for the capital goods industry include the Banco do Brasil, which finances purchases of agricultural machinery and equipment, as well as Embramec (another subsidiary of BNDE), which takes equity in capital goods firms producing what are considered priority product lines and tries to create technical groups within the firm in order to help them develop technologically.

purchaser, relative to the ex-factory price. 70/ Although the subsidy element is believed to have fallen in subsequent years, 71/ the massive proportions of the program were a key stimulus to the development of the local capital goods industry. FINAME's commitments increased rapidly as a percentage of all BNDE commitments (especially after 1974), accounting for more than half of the total in 1980 (Statistical Appendix, Table 9.13). After its creation in 1974, the program for heavy capital goods increased rapidly as a share of FINAME commitments. The program reached its peak in 1978, accounting for almost 90 percent of total FINAME commitments and amounting to more than US$5.5 billion. The capital goods industries which benefited most from FINAME loans during this period were the producers of equipment for steel, petrochemicals, railroads, and power generation and transmission.

9.25 The effects of trade policy on the Brazilian industrial sector have been analyzed in considerable detail in Part II of this report (Chapters 5 to 8). One of the main findings of this review was that there has been a complete inversion of the traditional cascading structure of protection found in 1967, with capital goods currently receiving higher rates of protection than intermediate or consumer goods. Although this occurred as protection to capital goods remained largely unchanged while decreasing slightly for intermediate goods and significantly for consumer goods, the current structure of protection provides an indication of the preference given to the capital goods industry in order to stimulate its development.

9.26 Protection to domestic capital goods is also provided through the Law of Similars and the mechanisms developed for its application. After a project is approved for investment incentives, its import content is further examined by CACEX. According to the Law of National Similars, a project cannot receive import related investment incentives unless there is no comparable domestic counterpart for the goods which are to be imported. Since this examination was usually a lengthy procedure, a negotiating mechanism called Participation Agreement was developed to expedite matters. The agreement is the result of tripartite discussions between CACEX, the investor, and representatives of the relevant domestic capital goods producers' associations, concerning the share of domestic capital goods in the investment project. Once such a share is decided, the investor is permitted to import all the products agreed upon without further examinations, even though the project may last several years. As shown in Table 39, the share of domestic capital goods in such

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70/ World Bank Report No. 2488-BR, Brazil: Protection and Competitiveness of the Capital Goods Producing Industries, July 21, 1980.

71/ The same report calculated that the subsidy in 1978 was only 8.8 percent.

agreements increased from only 53 percent in 1973 to 89 percent in 1981.

Table 39: CACEX Participation Agrements, 1973-1980

(US$ million)

Year	Number of Agreement and Revisions	Total Capital Goods Amount Negotiated	Percentage to be Purchased Domestically
1973	145	689	52.7
1974	220	2,149	58.4
1975	264	2,714	62.4
1976	202	2,728	68.1
1977	192	2,938	76.6
1978	169	2,562	74.5
1979	180	1,763	82.4
1980	164	4,146	85.2
1981	199	7,932	88.7

Source: CACEX

9.27 Government policy has also favored the development of the locally owned capital goods industry, as opposed to the domestic capital goods industry in general. As seen in Chapter 3, there was an inversion of the pattern of ownership in the machinery and electrical and communications industry between 1971 and 1979, with the share of foreign firms falling from about two thirds of total equity in those sectors to one third. Nevertheless, Brazilian industry is still heavily dependent on foreign technology and foreign firms in the relatively more technologically sophisticated industries as will be seen in Chapter 10.

The Impact of Technology Policy

9.28 Brazilian technology policy has addressed the supply and the demand of local technology as well as the purchase of foreign technology. The main thrust on the supply side has been on the development of the country's physical and human R & D infrastructure, primarily through the activities of CNPq and funding from FNDCT. The supply efforts also included attempts to stimulate the development of technological capability in local firms, particularly by subsidized financing granted through FUNTEC and FINEP, and the purchase of foreign

technology has been controlled through the regulation of technology contracts by INPI. On the demand side, the state has played an important role directly as a user of technology in autonomous state enterprises, and indirectly through a buy-local policy. The buy-local policy has been used vigorously to promote the development of the local capital goods industry. The main instruments used to implement this policy have been subsidized financing for the purchase of domestic capital goods and a structure of protection which has been slanted in favor of capital goods.

9.29 Unfortunately, there is not enough information to evaluate directly the impact of these policies on Brazilian technological and general industrial development. For example, while it is clear that there has been an important build-up in the basic R & D infrastructure, there is no recent information on the relationship between the R & D institutes and the industrial sector. While there is some information on the R & D activity undertaken or financed by the state, there is very little information on R & D activity by the private sector. Also lacking are detailed analyses of the programs financed by FUNTEC and FINEP, and of INPI's efforts to regulate imports of technology. Furthermore, while there has been a tremendous build-up of the local capital goods industry it is not yet clear to what extent such a build-up has been accompanied by local technological development.

9.30 In the face of this lack of direct information, Chapter 10 examines the technological development of Brazilian industry as reflected by the country's exports of goods incorporating (embodied) technology and of technological services. Chapter 11 focus on three of the main exporting sectors identified in Chapter 10 and traces the role of government policy in their development. The three subsectors developed on the basis of three different sources of technology, including subsidiaries of foreign firms in the case of the transport sector, the government R & D infrastructure in the aeronautical industry, and private firms working primarily with imported technology in the made-to-order capital goods producing industry. Thus, they provide an insight on the operation, constraints, and implications of the main alternative sources of technological development available to developing countries.

CHAPTER 10

CAPITAL GOODS AND TECHNOLOGY EXPORTS

10.01 Other things being equal, the export of products requiring more complex technology may be taken as an index of a country's technological development. Even when a country's industrial exports receive export subsidies, an increasing share of exports requiring relatively more sophisticated technology would indicate not only that the country is employing more complex technologies, but that presumably the products are becoming increasingly competitive internationally in both price and quality. It may of course be that the increasing share of such exports results from greater subsidies or greater excess capacity in that type of product. That has to be examined explicitly on a case-by-case basis, but it is necessary to start by looking in some detail at the export figures. The purpose of this chapter is to explore the technological development of Brazilian industry as reflected by the country's exports. The first section of this chapter gives an overview of the changes in the structure of Brazilian exports by focusing on increasingly narrower slices of industrial products requiring relatively more sophisticated technology. The second reviews the information available on exports of disembodied technology. Finally, the third examines who are the most important exporters of products requiring relatively sophisticated technology and identifies the cases to be reviewed in more detail in Chapter 11.

Changes in the Structure of Brazilian Exports

10.02 The broadest definition of manufactured products is obtained in the ISIC classification. Using this classification, the share of manufactured products in total exports shows considerable fluctuation between 1965 and 1980, with an increase of roughly 10 percentage points or about 15 percent over the period, particularly during the last five years. A narrower definition of industrialized products is used in the official Brazilian trade statistics by product type. It excludes a number of semi-processed basic products such as brown sugar, frozen meats and fish, and processed mineral ores. With this definition the share of total exports in the early years of the 1965-1980 period is less than one quarter of the share using the manufactured products definition. However, the share rises rapidly, so that by 1979 it accounts for more than half of total exports.

10.03 The concept of "manufactured" products in the official Brazilian trade statistics excludes "semi-manufactured" products from industrialized products. The products excluded are crystalized sugar, natural wax, cut woods, vegetable oils, cacao paste, processed hides, tin, paper, pulp, iron and steel in ingots and in simple products, and a few others. At the beginning of the period "manufactured" products by this definition accounted for roughly half the share of industrialized products and only 8 percent of total exports, whereas, in 1979 they account for nearly 45 percent of total exports. The Brazilian

definition of manufactured exports is not a very adequate indicator of products requiring "relatively sophisticated" technology, as it includes products based on very traditional technologies such as refined sugar, processed coffee, frozen orange and other juices, shoes, cotton thread, textiles and apparel; at the same time, it excludes some basic industrial products which require relatively sophisticated technology such as paper, pulp, and steel. Thus, it is necessary to develop an alternative definition of "relatively sophisticated" manufactured products to measure the shift in the technological base of the exports. Because of the difficulty in classifying them, food products will be excluded arbitrarily, even though many processed food products involve relatively sophisticated technology. In addition, beverages, tobacco, textiles, clothing, leather goods, footwear, and wood products are also excluded. Brazil's relatively sophisticated exports, as defined in this chapter, are composed mainly of three groups: capital goods 72/ and steel, chemicals and petrochemicals, and pulp and paper, in that order of importance. These three sectors are among the ones which have received highest attention in Brazil's industrial development plans.

Table 40: Structure of Brazilian Manufactured Exports
(percentage of total exports)

	1965	1970	1975	1979
Manufactured Exports (ISIC)	71.5	70.4	66.2	80.0
Industrial Exports (NBM)	17.8	24.3	39.6	56.0
Manufactured Exports (NBM)	8.1	15.2	29.8	43.6
"Sophisticated" Exports (ISIC)	6.7	10.9	19.1	31.1
Capital Goods and Automobiles	1.8 1/	3.4	9.0	14.7
Total Exports (US$ billion)	1.6	2.7	8.7	15.2

1/ 1966 share.

Source: CACEX, World Bank/UN Data Bank.

Exports of Capital Goods

10.04 Exports of capital goods have increased from 1.8 percent of total exports in 1966 to 14.7 percent of total exports in 1979, -- slightly over

72/ Loosely defined, because the largest product in transport equipment is passenger automobiles, which, strictly speaking, is not a capital good, and because various products in the category of metal products, which is not included, are usually counted as capital goods.

eight times their 1966 share. Transportation equipment is the largest subsector and the one that grew the fastest in the past decade. Table 3.13 in the Statistical Appendix presents export figures for the capital goods sector at the four-digit ISIC level for the period 1962-1979. Within the transportation subsector the most important category is motor vehicles, followed distantly by ships and aircraft, and the fastest growing product among capital goods exports is aircraft. The second fastest growing category in the transportation subsector, however, was railroad equipment, which is still very small in aggregate value.

10.05 The second most important subsector is non-electrical machinery. Within the subsector the most important category is machinery not elsewhere classified (which covers a wide spectrum from mass produced to made to order machinery), followed by special industrial machinery (all industrial machinery except machine tools and agricultural machinery), and office machinery, respectively. 73/ The fastest growing categories in that sector, however, were engines and turbines, and agricultural machinery, but together they only accounted for 15 percent of the total output of non-electrical machinery. The least export-oriented subsector is electrical machinery. Slightly more than half of the exports from that subsector are radios, television sets, and communication equipment. Most of the rest, however, is industrial machinery and other electrical machinery (mass produced and made to order) not elsewhere classified.

Exports of Disembodied Technology

10.06 In addition to the large increase in exports of goods requiring relatively sophisticated technology, there have been growing instances, particularly in recent years, of Brazilian exports of disembodied technology in the form of construction and engineering services, turn-key plants, industrial processes, and others. The information in this section is based mainly on the results of a pilot study which is part of a joint research project being carried out by the World Bank and the Inter-American Development Bank. 74/. The study identified 176 cases of exports of disembodied technology (including construction and engineering services) and turnkey plants. These consisted of 88 cases of export of industrial technology, 59 of construction, and 29 of non-industrial consulting service exports.

10.07 Construction contracts were the most significant in terms of value. 75/ They were concentrated in hydroelectric projects, highways, and

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73/ Office machinery includes electronic calculators and computers as well as typewriters.

74/ See Francisco Sercovitch (consultant), "Brazil as a Technology Exporter: with Sectoral Studies on the Steel and Alcohol Industries", Inter-American Development Bank (mimeo), April, 1981.

75/ Export values were only available for 39 contracts -- 10 in industry, 8 in construction, and 21 in consulting. The value of these contracts was US$3.2 billion, of which 96 percent was in construction contracts, including a US$1.2 billion contract to build and equip a 330 mile railway in Iraq.

communications, although the largest contract was one in railways. Those exports were based largely on the experience accumulated by Brazilian construction companies in huge domestic projects such as Brasilia, the large hydropower dams, and the trans-amazonic highway. In these projects Brazilians appeared mainly to export their ability to put together, schedule and control on a large scale the wide variety of inputs needed. Such projects also reflected their ability to organize and use the available local labor force, which may consist of thousands of unskilled workers at a single site for a temporary job, sometimes in a difficult environment.

10.08 The manufacturing contracts were concentrated in the alcohol, steel, food and beverages, and machinery and components industries. They consisted mostly of turn-key plant contracts and technical assistance. The steel technology exports reflected accumulated experience with charcoal-based steel production (which still accounts for 36 percent of Brazilian steel production), and the large production of capital goods for the steel industry (which was stimulated by Brazil's large steel expansion plans). Brazil's alcohol-related exports are closely related to its tradition in sugar processing and to the heavy emphasis on biomass-related energy since the oil crisis. Most of these and the other Brazilian exports of disembodied technology in the manufacturing sector were closely related to local capital goods production, once again reflecting the importance of the local capital goods sector.

Main Exporters using Relatively Sophisticated Technology

10.09 Before turning to an examination of technological development in a few selected capital goods subsectors, it is useful to complement the general overview on exports requiring "relatively sophisticated" technologies with a look at the main exporting firms. Table 10.1 in the Statistical Appendix presents a list of all Brazilian firms which exported more than three million dollars worth of these products in 1979. 76/ The 201 firms listed accounted for 78 percent of the total value of "relatively sophisticated" exports (as defined above), or almost 25 percent of total exports in 1979. As can be seen from the names of the firms listed, they include a large number of multinational corporations.

10.10 In Table 41 the firms have been classified in ten different categories. The biggest group, with 40 of the 201 firms, is the transportation sector. These firms account for more than US$1.5 billion worth of exports, 42 percent of the exports in the sample. Within transportation, 12 firms producing automobiles, trucks, and engines are the most important. Except for the two trading companies, all these firms are multinational vehicle manufacturers. Another important subgroup within the sector consists of two exporters of auto radios, both multinationals. A third category consists of 13 exporters of parts and components, including

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76/ This list is taken from the list of main exporting companies compiled by Cacex. All companies exporting primary agricultural and mineral products have been excluded, as well as firms exporting traditional manufactures such as shoes and textiles.

two trading companies. Only two of these companies are Brazilian (Metal Leve, an important producer of pistons, and Marco Polo, a producer of bus bodies). A fourth subgroup is made up of three well-known multinational tire producers. A fifth subgroup consists of four ship producers, three of which are Brazilian firms (Caneco, Emaq, and Estaleiro So). Following is a group including a Brazilian producer of turbo-prop airplanes (Embraer) and a Brazilian airline company which exports airplane parts purchased domestically (Varig). Another important Brazilian exporter is producer of armored personnel carriers and rubber wheeled tanks (Engesa). Finally, there are four exporters of trains and parts, including a multinational which exports locomotives (General Electric) and two Brazilian producers of railroad cars (Cobrasma and Mafersa).

10.11 Metal products (iron, steel, or basic metal products) constitute the second largest cluster. Firms in this area number 45 and account for 18 percent of the total exports in the sample. There are eleven firms exporting pig iron, nineteen exporters of iron or steel slabs, bars or plates, and ten exporters of tubes and pipes. In addition, three firms export iron and steel structures, and two export cutlery. In contrast to the firms in the first area, most of these firms are Brazilian, with very heavy participation by the large state-owned steel producers (CSN, Cosipa, Usiminas, Acesita).

10.12 Pulp and paper exports, with fifteen firms, account for almost ten percent of the value of exports. The distribution between local and foreign firms is more even. The fourth area consists of 25 firms in industrial machinery, which account for 5.6 percent of exports. Multinationals predominate, but also included are Brazilian producers of refrigeration equipment, machine tools, motors, mills and distilleries, and other mechanical machinery.

10.13 Exporters of petrochemicals, chemicals, and pharmaceuticals (26 firms) account for nearly 14 percent of exports in the sample. The state-owned oil company (Petrobras) is the largest single exporter of the whole sample, accounting for almost nine percent of the total, but its exports are somewhat special. It imports crude oil and exports the excess gasoline which results from the substitution of alcohol from Brazil's gasohol program. The 25 other producers in this group consist of both local and foreign firms, although there is a strong predominance of multinationals in pharmaceuticals, fertilizers, and fungicides.

10.14 Seven firms exporting electronic parts and components represent 4 percent of the exports. Almost two thirds of these exports are information processing units exported by IBM, and most of the rest consists of microelectronic structures and calculators exported by other multinationals. The only Brazilian firm is an exporter of calculators (Dismac). The 16 exporters of consumer and other durables represent three percent of the total. The exports consist of typewriters, sewing machines, cash registers, bicycles, rifles and shotguns, and domestic appliances such as refrigerators, washing machines, and floor-waxing machines. Except for one exporter of sewing machines (Vigorelli), the bicycle exporter (Caloi), and some of the exporters of guns, the firms are multinationals.

Table 41: Firms Exporting More than US$3 million in 1979 1/

Number of Firms	Sector/Main Product 2/	Value of Exports in U.S. millions	Percentage Distribution of Value
41	Transportation	1553.6	41.7
12	Automobiles and trucks (including engines)	936.4	25.1
2	Auto radios	139.3	3.7
13	Vehicle Parts and Components	126.0	3.3
3	Tires	53.0	1.4
4	Ships	145.6	3.9
2	Airplanes	71.8	1.9
1	Military Vehicles	47.2	1.2
4	Trains and Parts	34.3	0.9
45	Iron, Steel and Basic Metal Products	668.5	17.9
11	Pig Iron	163.5	4.4
19	Steel	330.7	8.9
10	Tubes and Pipes	144.0	3.9
3	Iron and Steel Structures	16.1	0.4
2	Cutlery	14.2	0.4
15	Pulp and Paper	319.7	8.6
5	Pulp	190.1	5.1
6	Paper and Cardboard	82.1	2.2
2	Paperboard	39.2	1.1
2	Books and Magazines	8.3	0.2
25	Industrial Machinery and Equipment	208.1	5.6
2	Earthmovers	58.1	1.6
2	Machinery for Paper and Plastics Industries	22.1	0.6
3	Refrigeration and Air Conditioning	18.8	0.5
2	Mechanically Powered Compression Rollers	18.5	0.5
2	Machine Tools	17.7	0.5
2	Sifting and Separating Equipment	16.8	0.5
2	Motors	13.8	0.4
3	Tools	12.8	0.3
2	Mills	9.1	0.2
5	Others	20.4	0.5
1	Gasoline	323.8	8.9
25	Chemicals and Pharmaceuticals	174.2	4.7
7	Electronics Parts and Equipment	152.8	4.1
1	Information Processing Units	92.4	2.5
3	Microelectronic Structures	48.6	1.3
2	Calculators	8.0	0.2
1	Other	3.8	0.1
16	Consumer and Other Durables	111.1	3.0
4	Typewriters	32.6	0.9
3	Sewing Machines	29.3	0.8
4	Domestic Appliances	27.6	0.7
3	Rifles and Shotguns for Hunting	10.5	0.3
1	Bicycles	7.4	0.2
1	Cash Registers	3.7	0.1
13	Electrical Parts and Equipment	94.0	2.5
3	Electrical Parts		24.8
3	Television	24.5	0.7
2	Telephones	23.4	0.6
1	Motors	7.5	0.2
4	Others	13.8	0.4
6	Agricultural Parts and Equipment	55.9	1.5
5	Tractors and Parts	49.3	1.3
1	Combines	6.6	0.2
7	Others	67.2	1.8
3	Optical Instruments	50.0	1.3
3	Glass	13.4	.4
1	Ammunition for Sports and Hunting	3.8	.1
201	Total	3728.9	100%

1/ Excludes firms producing different mineral products and alloys because it was not possible to distinguish these activities from mining activities.

2/ Classification is based on the main product exported by the firm.

Source: Table 10.1.

10.15 Exporters of electrical parts and equipment (13 firms) account for 2.5 percent of the exports. All of them are multinationals. Six agricultural machinery producers export tractors, tractor parts, and combines, which represent 1.5 percent of the exports. All except an exporter of disc plows (Baldan) are again multinationals. Finally, the last group is made up of an assortment of seven firms representing 1.8 percent of the exports. Three export optical instruments, three export glass or glass products, and one exports ammunition for sport and hunting. Two of the glass exporters are multinationals. The rest of the firms appear to be Brazilian.

10.16 It is clear that one of the most striking features of Brazilian exports of products requiring relatively sophisticated technology, in addition to the high degree of firm and sector concentration, is the overwhelming preponderance of multinational firms. They account for most of the exports in all the groups except those based on natural resources, such as iron and steel, and pulp and paper, where Brazilian firms are predominant. While it appears that there is a relatively large share of Brazilian firms among those who exported less than three million dollars in 1979, this would not change the general picture much, as firms exporting less than three million dollars accounted for only 22 percent of the total exports. The large share of multinational firms among the exporters in the sample may be explained by two factors. First, multinational firms already have more sophisticated technology, so it is not surprising to find so many of them among the exporters of products requiring relatively more sophisticated technology. Also, they have much easier access to the international market than local firms because of their already well established international marketing networks.

10.17 More interesting than the large share of multinationals in the sample is the existence of a considerable number of important Brazilian exporters. Their ability to export at relatively large scales suggests that they have reached some international level of efficiency, perhaps after an initial period of protection during which they developed their technological capability and scale of operations. In addition, it appears that many multinational firms which were originally attracted to invest in Brazil because of the large domestic market eventually started using Brazil as a platform to export to other developing countries (and in some cases developed countries) once they established sufficiently large-scale plants. To analyze in more detail some of the issues related to the development of export capacity by multinational and Brazilian firms in relatively high technology areas, their present situation and prospects, Chapter 11 reviews the experience of three such industrial subsectors.

CHAPTER 11

EXPORT DEVELOPMENT IN THREE CAPITAL GOODS SUBSECTORS

Introduction

11.01 As indicated in Chapter 9, three of the main sources of technological development available to developing countries are the transference of technology together with direct investment by multinational firms, technology transfer through special agreements on imports of technology by domestic firms, and technological development based on domestic R & D infrastructure. In the latter case, the role of the public sector can be large, not only in the R & D infrastructure stage, but also in the industrial technology applications. The Brazilian experience during the last two decades shows examples of the three types of technological development, including instances where the result has been the establishment of large industrial subsectors and, in some cases, considerable success in world markets. This chapter reviews three industrial subsectors, all of them within the capital goods industry, that examplify the three types of technological development referred to above.

The Automobile Subsector

11.02 To a large extent the rapid development of the Brazilian auto industry over the past 20 years is a success story of infant industry development. Through its backward linkages it played a key role in the development of Brazilian industry. In addition, it is the largest exporter of manufactured products in Brazil. This section summarizes the growth of the industry, focussing primarily on the development of exports. 77/ Brazilian automobile production started in the mid-fifties. Until then, Brazil had relied upon imports of completely knocked down kits (CKD). 78/ However, due to the unavailability of imports during World War II, there was a large demand for locally produced spare parts. Although spare parts production capacity was increased, it could not satisfy the demand, and there

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77/ Most of the historical material in this section is drawn from Eduardo Augusto de Almeida Guimarães, and Maria Fernanda Gadelha, "O Setor Automobilístico No Brasil" (Finep-CEP: Relatório de Pesquisa No. 2) 1980, and E.A. de Almeida Guimarães, "Dinâmica de Crescimento da Indústria de Automóveis no Brasil: 1957/78, Pequisa e Planejamento Econômico, Rio de Janeiro, Vol. 10, No. 3 (Dec. 1980) pp. 775-812.

78/ The main assembly plants were Ford (1919), GM (1924), International Harvester (1926), Vemag (1945 -- a local firm assemblying mostly German vehicles), FNM (1949 -- a state firm assembling Italian trucks), Willys (1952), VW (1953), and Mercedes Benz (1953). German vehicles had the largest market share.

was a jump in imports in the post-war years. This caused a drain on Brazil's foreign exchange reserves, which eventually led to stricter import restrictions.

11.03 In the mid-fifties the government determined to establish a local vehicle industry as a key to Brazil's industrial development. Special incentives and conditions were provided to attract international automobile firms to set up production in Brazil, including: (i) duty free import of capital goods and essential components; (ii) a gradual "nationalization" requirement to reach a local content of 95 percent by 1960; (iii) prohibition of imported vehicles; and (iv) fiscal, financial and foreign exchange advantages to the firms who participated in the program. The program worked very quickly and successfully in meeting its goals. By 1960, eleven firms were producing vehicles, [79]/ and, by 1962, the nationalization content had reached virtually 100 percent. The growth of the industry can be divided into two cycles -- a period of rapid expansion (1957-1962) followed by period of relatively slow growth (1963-1967), and a new period of rapid expansion (1968-1974) followed by another period of slow growth (Statistical Appendix, Table 11.1).

11.04 The first cycle corresponded to the initial development of the industry with rapid growth due to unsatisfied demand from strong import controls. As this demand was satisfied, the growth of production slowed down in the second half of the cycle, because income growth was slow during the mid sixties. During that period, the economy was passing through a phase of stagnation, and the stock of vehicles was still too new to lead to any significant demand for stock replenishment. During the second half of this cycle, VW increased its share in the automobile market from 47 percent in 1962/63 to 54 percent in 1965, 62 percent in 1966, 68 percent in 1967, and a peak of 78 percent in 1968 (Statistical Appendix, Table 11.2) This was based largely on its gains in the small car market, where its share increased from 82 percent in 1964/65 to 96 percent in 1967. It appears that VW's success was, in part, the product of lower production costs, which resulted from greater scales of production as its small car models had the longest production runs in the industry. [80]/ Although no direct evidence on the exact magnitude of these cost reductions could be obtained, a rough proxy is the evolution of the manufacturer's suggested basic retail price deflated by the general consumer price index. Table 11.10 in the Statistical Appendix shows that, based on an index where the 1961 price was 100, the relative price of VW's small model fell to 73 in 1967 and 57 by 1973.

79/ Simca, FNM/Fiat, Willys, Vemag, VW, Toyota (jeeps), Scania, Mercedes Benz, International Harvester, Ford, and GM (the last five only produced trucks). These included all eight who had previously been assembling vehicles in Brazil.

80/ In a Congressional examination into car prices for the period 1963-1967, it was revealed that whereas VW made money on all of its models during the 1963-1967 period, its main competitors (Willys, Vemag, and Simca) suffered losses on most of their models.

11.05 The second cycle of expansion of automobile production corresponded to the "miracle growth" years of Brazilian industrialization. Total vehicle production quadrupled from 225 thousand in 1967 to 905 thousand in 1974. This expansion was closely linked to the expansion of consumer credit for the acquisition of durable consumer goods, one of the key ingredients of the expansionist fiscal and monetary policy followed after 1967. This new cycle was characterized by a reorganization of the structure of the industry. The three big U.S. producers, GM, Ford and Chrysler entered the market to produce automobiles. 81/ In addition, the only two Brazilian firms, FNM and Vemag, were taken over by multinationals. FNM, the state-owned car and truck manufacturer, was absorbed by its licensor, Alfa Romeo. Vemag was taken over by VW, which discontinued Vemag production in 1967. The period was also characterized by large investments to expand capacity aimed at product diversification. In the first three years, it was aimed primarily at capturing the growing higher-income market with medium and large cars. Only two of the 58 models introduced in the period 1968/1972 were small automobiles. In addition, small autos were responsible for only 7.5 percent of the 86 percent increase in automobile production between 1968 and 1970. The period 1970-1974, however, led to significant change, as the rapid growth in incomes brought new customers into the market for new small cars. During this period, small cars were responsible for 78 percent of the 125 percent increase in automobile production (again mainly VW). GM and Chrysler, which until then had limited their production to medium and large cars, were induced to begin production of small cars in 1973, even before the impacts of the energy crisis were felt.

11.06 The energy crisis of 1973 slowed down the rapid expansion of the automobile production after 1974, both directly as a result of higher gasoline prices and gasoline rationing, and indirectly as a result of a slower rate of economic growth and a gradual contraction in credit for car purchases. Table 42 shows that most of the growth in automobile production since 1974 has been in non-passenger vehicles. Although the more rapid expansion of the production of commercial vehicles was partly the result of government policy, the slower growth of passenger vehicles production also suggests that the cycle of rapid expansion started in the late sixties would have reached its limit even without the energy crisis, and that car sales would have had to adjust more closely to the overall growth of national income and a widening of the distribution of income.

81/ GM has actually produced a passenger-type vehicle since 1959 but in very limited quantities. In 1967 it made investments for the production of a medium-large car, which it launched in 1968. Ford started production of a large passenger car in 1967. In that year it also took over control of Willys by buying Kaiser Stock, and used Willys jeep engines in some of its later models such as the Brazilian Maverick. Chrysler bought International Harvester's Brazilian truck plant in 1966. Also, it took over control of the Brazilian operations of Simca in 1967, stopped Simca production, and launched its own model in 1969.

11.07 One of the most significant characteristics of the automobile industry in the past decade is the rapid increase in the percentage of production exported, which rose from 2.7 percent in 1972 to 13.8 percent in 1980 (Table 42). This increase was mainly the result of government incentives granted through the BEFIEX program. While total vehicle production in 1980 was nearly two times that in 1972, exports had grown nearly twelve times (Statistical Appendix, Table 11.4). For all types of vehicles except buses, the increase in exports was relatively greater than the corresponding increase in production. The most dramatic relative increase was for multiple use pick-ups (21 times) and utility vehicles (18 times).

11.08 About one half of the value of the exports have been vehicles, and one half parts and components (Table 11.3 in the Statistical Appendix). Vehicles, either completely knocked down (CKD) kits or completely built up (CBU), have gone almost exclusively to other developing countries, while parts and components have tended to go to developed countries. The export of vehicles to other developing countries is partly related to similar low octane fuel found in most of these countries. Also, to the extent that the vehicles may have been adapted to rough Brazilian road conditions, they may also be better adapted to conditions in other developing countries. The types of vehicles which experienced the greatest relative increases in exports were precisely those (multiple use pick-ups and utility vehicles) which are best adapted to rough use. 82/ Safety and antipollution regulations in most of the industrialized countries have been a barrier to entry into these markets. The only company which appears to have significant exports to a developed country market is Mercedes Benz, who exports CKD trucks to its U.S. assembly plant.

11.09 The firms exporting mainly vehicles include VW, Saab-Scania, Mercedes Benz, and FNM, although the exports of the first three also include a significant share of components. Ford, Chrysler, and Fiat export mainly parts and components (Statistical Appendix, Table 11.5). VW has been by far the most important exporter and the one which exports to the most number of countries (more than fifty). Among its exports are: CKD kits (for assembly in the Philippines, Uruguay, Peru, and Venezuela, which build their cars exclusively from Brazilian parts), engines (including the Dasher engine installed in Germany in the car which is exported to the U.S.), transmissions, and many replacement parts. In addition, VW will soon be producing diesel engines for export. 83/ GM exports CKD and CBU vehicles mostly to Latin America, and land moving equipment and diesel motors. It is also said to be planning a US$500 million investment in Brazil to produce

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82/ The only Brazilian manufacturer of vehicles other than sports cars (of which there are two) is Gurgel, a producer of specialized four-wheel drive vehicles based on VW chasis, which exported 18 percent of its production in 1980 (Statistical Appendix Table 11.7).

83/ George H. Westacott, "The Brazilian Auto Industry," State University of New York, unpublished, undated mimeo.

Table 42: BRAZIL -- Production and Export of Automobiles (1972-1980)

	Production	Percentage Exported	Assembled Vehicles as % of Total Vehicle Exports	Passenger Automobiles Production	Percentage Exported	Assembled Autos as % of Total Autos Exported
1972	616,210	2.2	17.4	407,457	1.6	7.7
1973	759,321	3.2	19.8	475,311	2.6	12.4
1974	898,871	7.2	30.0	529,424	4.7	35.2
1975	930,971	7.8	35.2	524,980	6.9	39.7
1976	975,511	8.2	26.0	524,879	5.3	23.9
1977	921,106	7.6	38.0	466,457	9.6	30.4
1978	1,066,969	9.0	47.5	536,745	11.3	46.7
1979	1,120,576	9.4	44.9	545,789	8.6	33.9
1980	1,137,486 1/	13.8	51.4	580,143	10.4	31.7

1/ Includes the production of 254,0.6 alcohol powered vehicles.

Source: ANFAVEA.

multifuel engines for their new "world car" to be exported to West Germany and Britain. Ford exports cars, trucks, tractors, and auto radios (from Philco, it electronics subsidiary) as well as small four-cylinder engines (for Pintos, Capris, etc.), which are assembled in Canada, Germany, and other countries.

11.10 An important question is to what extent the increasing amount and diversification of exports reveal increasing technological development and greater production efficiency, and to what extent they are the result of special subsidies. As suggested earlier, the dramatic increase in exports can be largely attributed to the BEFIEX program. This program, started in 1972, was primarily aimed at inducing multinational companies to produce at economic scales as part of an international investment strategy, with specialization of production of different components across countries. The program involved ten-year contracts between the firm and the government, with export commitments in exchange for duty-free importation of capital goods, parts, and components for a total annual value up to a third of the value of its annual exports (see Chapter 6 above). Other legislation also introduced in 1972 for theautomobile industry established that the fiscal incentives for the imports of parts and components were conditional on exports of components, CBU units, and CKD kits of at least US$40 million annually for each firm during the next ten years, and that the value added in the country had to be at least three times the FOB value of the imports. The exemption from import duties and from the industrialized products tax would only be given to firms whose production had at least 85 percent national content for automobiles, 82 percent for utilitarian vehicles, 95 percent for jeeps, 82 percent for buses, and 78 percent for trucks, depending on their size. (Firms that did not enter such export agreements had to have nationalization indices of 95 percent and did not benefit from the exemptions from import and industrialized products taxes).' In addition,the exporting firms were given a credito premio equal to 26 percent of the FOB value of the exports.

11.11 Given the magnitude of the export subsidies and other incentives, it is not surprising that exports of motor vehicles increased so dramatically. The automobile industry has been the main beneficiary of the BEFIEX program. Nine of the thirty projects approved by BEFIEX through 1977 were for the export of vehicles and parts, and those nine projects had the largest export commitments of all projects approved (with the exception of the Jari pulp and paper project, which was the fourth largest). The nine projects accounted for 74 percent of the total export value committed until 1977. 84/ The BEFIEX approved investments for the 1973-1977 period were much larger than the investments approved by the CDI during the 1965-1973 period. Thus, contrary to the experience of the slow growth period of 1963-1967 when only VW undertook any new investments, the slow growth period after 1974 has been characterized by a significant amount of new investments oriented toward the export market thanks to the BEFIEX program.

84/ The BEFIEX program was subsequently diversified, and an effort was made to include smaller national firms. However, even at the end of 1980, automobiles, parts, accessories, and other transportation equipment still accounted for 49.2 percent of the total export commitments and for 57.9 percent of the total investment under the BEFIEX program.

11.12 The strong effect of the incentives and subsidies offered through BEFIEX on the exports of vehicles does not necessarily mean that there has not been significant technological development and increasing efficiency in the industry. Although it was not possible to obtain direct cost data for the firms, there is strong indirect evidence that the Brazilian auto industry has become increasingly efficient as it expanded. First, direct price comparisons carried out during 1980-81 (Chapter 7 above) indicate that the prices of Brazilian vehicles are lower than those of similar foreign vehicles. The average implicit tariffs which result from the price comparisons indicate that internal automobile prices are an average 23.2 percent lower than comparable international prices (Statistical Appendix, Table 11.12). The internal price of trucks and buses is even lower, with an average implicit tariff of -46.2 percent. The magnitude of these price differences is surprising and contrasts with the findings of studies done in the late sixties which showed that the price of Brazilian vehicles was significantly higher than US prices. The differences may be explained in part by the fact that the local vehicles may not be strictly comparable to similar foreign vehicles, particularly in terms of quality and special features such as pollution control and safety mechanisms. Thus, the real, quality-adjusted price differences may not be as large as suggested. 85/ The average prices for main components such as motors and vehicle parts, and tires are also lower than comparable international prices. To some extent, the lower vehicle prices may be traced to prices for iron and steel inputs, which are also lower than the international prices (Statistical Appendix, Table 11.12).

11.13 More importantly, the relative fall in the cost of Brazilian cars which was cited earlier in the case of VW, is more generalized. Chart 1 shows the evolution of a weighted index of relative car prices for the period 1975-1978, as well as the evolution of the relative prices for various types of automobiles manufactured by the three main producers. The average weighted index shows that the relative price of a Brazilian car has been halved in the period 1961 to 1978. In the earlier period, the fall in the average relative price closely parallels the movement in VW's price for small cars, given VW's dominant share in the market. In the more recent period, when there is a larger variety of models, there is more variation. However, two points stand out. First, all trends tend to show a flattening out after 1974 when the industry had a slower growth rate, which again suggests that there may be a link with economies of scale. Second, all the series show a strong downward movement. This probably reflects not only individual scale economies and learning curve effects for each model as production increases, but also increasing technological development and cost efficiency among the

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85/ That Brazilian vehicles may not be of the same quality or as sophisticated as other vehicles, however, does not necessarily detract from their foreign sales appeal. In fact, they may be preferred if they are simpler and cheaper, because that may make them the most appropriate choice for buyers in other developing countries.

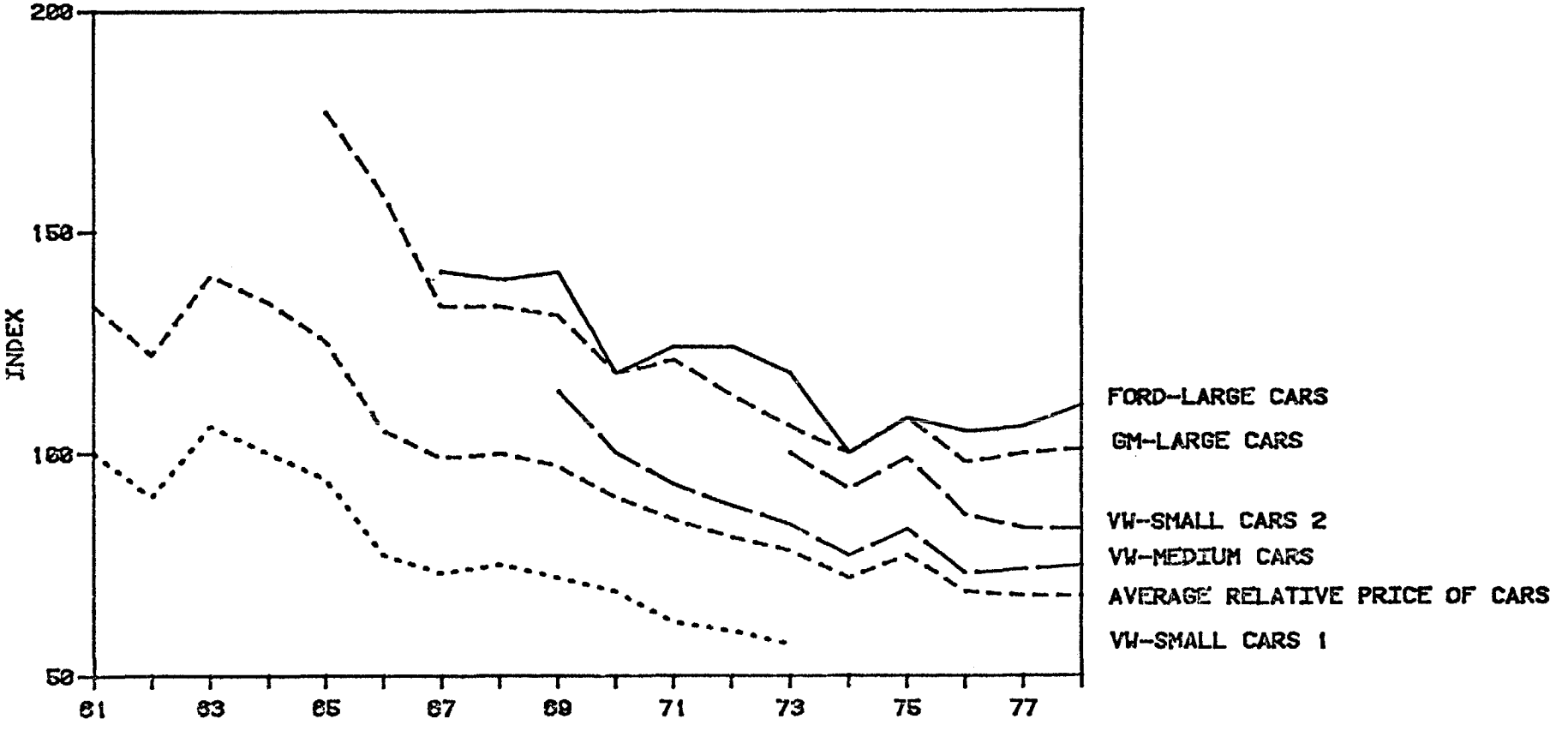
local suppliers of parts and components for the industry in general. 86/ To be able to increase the level of nationalization of parts as required by law, VW and other automobile producers had to develop their local suppliers, including provision of finance, training and technical assistance. In 1957, VW had 150 suppliers, increasing to 1,300 in 1965, 3,000 in 1970, and 4,330 in 1974 (only 900 of which were foreign). Many of the suppliers produce not only vehicle parts, but also machines, machine tools, castings, forgings, etc., which are also used in other industries. The auto industry has helped to stimulate Brazilian technological development in industry through the backward linkages to such suppliers of parts and components and probably even further back to basic industries such as steel, glass, rubber, and plastics.

11.14 While the Brazilian automobile industry is an interesting example of technological development based on foreign companies, there are a number of issues which need to be examined to assess this strategy. The automobile industry is one of the country's largest earners of foreign exchange, but, given the number of incentives and special subsidies received, it is not clear what are the domestic resource costs of those exports. The overall level of incentives (see Chapters 6 and 8 above), including the 26 percent export subsidy, now seems unduly high. It may have been justified ten years ago, when local production costs were higher than international costs, and indeed some strong subsidies may have been necessary as part of a strategy to induce the firms to make investments at more economic scales of production. Given what now appears to be the cost competitiveness of the locally produced vehicles, the magnitude of the subsidy raises the question of why the firms do not export an even larger share of production. 87/ Both the possible high domestic resource cost of the auto exports and the reasons for the limits in the export shares should be examined carefully in the context of the renegotiation or further extension of the BEFIEX contracts.

86/ Prices of transportation products as a whole have fallen 29 percent relative to the average prices for manufactured products between 1970 and 1980 (Statistical Appendix, Table 11.11).

87/ The share of exports increased from a little over 2 percent in 1972 to almost 14 percent in 1980, but, given their apparent cost competitiveness plus the strong export bias introduced by the 26 percent export subsidy, it is not clear why they do not export a larger share of their production, or produce more for the export market, particularly as they seem to have had excess capacity even before the dramatic fall in domestic demand which occurred in 1981.

CHART 1. EVOLUTION OF BRAZILIAN CAR PRICES, VARIOUS MODELS



SOURCE: STATISTICAL APPENDIX, TABLE 11.10.

11.15 As an import-substitution strategy, the development of the automobile industry appears to have been successful in producing vehicles locally at prices equal to or less than international prices. However, it is not clear whether this has more than compensated for the high cost of local vehicles imposed during the initial period of import substitution. It is likely that forcing producers to achieve more than 95 percent local content in only three to four years imposed unnecessarily high costs as compared to a more gradual increase in the nationalization requirement. Also, it appears that the costs of achieving the last ten percent of nationalization were very high because of the forced production of some components at very inefficient scales. On the positive side, however, the development of the automobile industry has had great externalities in terms of stimulating the development of the parts, components, and input-supplying industries. While these externalities are very difficult to quantify, they have involved not only the technical assistance and technology directly transferred to some of the suppliers, but also labor training and greater emphasis on quality control. The latter is likely to have led to greater cost consciousness and production control, which may have spilled over in some of these firms to other areas of production and led to an improvement in their overall efficiency.

The Aircraft Industry

11.16 Although the production of airplanes in Brazil dates back to 1910, when the first monoplane was built in Brazil, the development of the Brazilian airplane industry is essentially the development of Embraer. 88/ The creation of Embraer in 1969 was the culmination of a process which had started almost thirty years earlier. The first step was the creation of a Ministry of Aeronautics in 1940, which was to become a great incentivator for research on aviation. The second step was the creation of the Instituto Tecnico de Aeronautica (ITA) in 1946 for training aerospace engineers. By 1980, ITA had trained more than 2100 engineers at the college level and more than 300 at the graduate level. The third was the creation of the Centro Tecnico Aero-Espacial (CTA) in 1954, an aerospace research center mainly

88/ There have been other important local airplane producers. The Companhia Aeronáutica Paulista, founded in 1942 by Francisco Pignatan, produced 700 monoplanes. The Companhia Nacional Construtora Aeronáutica Neiva manufactured more than 500 planes of its own design between 1959 and 1975, including a trainer which was exported to Chile. Aerotec, founded in 1962, produced another monoplane trainer for the air force.

staffed with the engineers trained by ITA. 89/ The final step was the transfer of the team which had designed the Bandeirante from CTA, the research institution, to industry by creating a mixed state-private enterprise -- Embraer -- for the industrial production of the Bandeirante.

11.17 This process required large financial resources and was only possible through public sector intervention. Thus, as the private sector was skeptical about the feasibility of Embraer and reluctant to make the large investments necessary, the government provided a mechanism for the capitalization of the enterprise by establishing that one percent of the corporate income tax owned by companies in Brazil could be applied for the purchase of stock in Embraer. 90/ In 1980 Embraer produced eleven different airplane models, and as of January 1, 1980 had an accumulated production of 2,071 airplanes (Statistical Appendix, Table 11.13). Embraer's production includes military and commercial aircraft. The military category includes the Xavante, a single-engine jet trainer and ground attack plane, whose manufacture was started in 1971 through a license from Macchi Spa of Varesse, Italy. 91/ More than 150 of these planes built by Embraer were operating in the Brazilian Air Force (FAB) in 1980, six were exported to Togo, and four to Paraguay.

11.18 Embraer's commercial aircraft category is centered around the Bandeirante and the Xingu, twin-engine turbo-props of local design, which were originally made for the FAB. In addition, Embraer produces two other commercial airplanes. One is the Ipanema, a Brazilian design which was made for agricultural uses. It can carry up to 680 liters of chemicals and is used for seeding, fertilizing, and spraying. It accounts for 18.7 percent of Embraer's cumulative production. The second type is a four to ten-seaters for general aviation, which Embraer produces as a result of a cooperation

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89/ The CTA now consists of four institutes: ITA; the Institute of Research and Development (IPD), which is in charge of R & D for aeronautical products in the areas of airplanes, electronics materials and mechanics; the Institute of Space Activities (IAE), which is in charge of R & D in activities related to space; and the Institute of Development and Industrial Coordination (IFI), which is in charge of coordinating and supporting activities to consolidate and develop the aerospace industry in Brazil. Among other areas, the CTA has been very active in the energy-substitution program, particularly the certification of alcohol engines and the search for a diesel fuel substitute.

90/ As a result, Embraer is more than 90 percent privately owned by almost 200,000 private firms.

91/ The plane is also produced under license in South Africa (as the Impala) and in Australia.

agreement with Piper. This type of plane accounts for 57 percent of Embraer's output. 92/

11.19 The Bandeirante is basically an intermediate product developed for third-world conditions which found a perfect market niche in developed countries due to the rise of fuel prices. The Bandeirante (which means pioneer in Portuguese) was developed at the Institute of Research and Development of CTA at the request of the FAB. In the early sixties, the FAB was worried that the old stock of DC3s, which formed the backbone of air travel to hundreds of small airports in the interior of the country, were wearing out, and that there was no product that could replace them in the advanced segment of the market. The technological frontier was moving increasingly toward larger jets, which could not operate on the short and often unpaved runways characteristic of airports in the interior of Brazil, whereas in the small general aviation segment the planes were too small. As a result, FAB commissioned the CTA to design a plane smaller and faster than a DC3 but larger than the small four-seaters which were then available in the general aviation class. Since the idea was to produce the plane locally, it was also decided that the new plane should be a turbo-prop rather than a jet, because the latter was too ambitious a goal.

92/ The cooperation agreement is an illuminating example of how much a local company with strong government support can negotiate for better terms on technology transfer when there is a large domestic market to interest the foreign suppliers. Embraer decided to enter the four to eight-seater market in 1973 after making a detailed analysis of demand. The Brazilian market was second only to the U.S. market for American made aircraft of that type. Between 1964 and 1974, Brazil had imported 2,485 such planes, mostly from Beechcraft (10 percent of the total), Cessna (59 percent), and Piper (24 percent). Embraer had three alternatives: it could develop its own models, it could manufacture foreign products under license, or it could negotiate an industrial cooperation agreement. It chose the latter in order to achieve rapid market penetration without excessive technological dependence. To obtain such a cooperation agreement, it made clear to the U.S. companies that with the help of the government it was effectively closing off the Brazilian market to all foreign companies except for the one which entered into the agreement. Three essential features of the agreement were that: (1) there would not be any royalty payments, (2) Embraer would have the right to make modifications which it deemed appropriate to the imported models, and (3) there would be a progressive nationalization of the components of the aircraft, which was expected to reach 70-75 percent for all models. Although Cessna had the largest market share, it was Piper which agreed to the conditions (perhaps because it was most anxious to get a larger share of the market). For more information on the Piper-Embraer agreement see Jack Baranson, North South Technology Transfer: Financing and Institution Building, Mt. Airy, Maryland: Lomond Publications, 1981.

11.20 The original Bandeirante designed at CTA was an eight-passenger model which had its first successful flight in 1968. 93/ In 1972 two commercial Brazilian airlines, after studying the various models available internationally, ordered a 16-passenger version of the Bandeirante for use on local routes, which had become uneconomical to operate because of lack of proper equipment. The success of this commercial model, which started operating in 1973 within Brazil, greatly encouraged Embraer. 94/ It created a special group to try to launch the Bandeirante in the international market. The first foreign sales took place in 1975 with the export of 5 Bandeirantes and 10 Ipanemas to Uruguay for a total of five million dollars, including airplanes, technical assistance, and spare parts. Two more foreign sales were made in 1976 -- three Bandeirantes to the Chilean army, and three Xavantes to the Air Army of Togo.

11.21 The critical turning point in Embraer's foreign sales was in 1977. That year it participated in the Le Bourget Air Show in France, and in the twelve months which followed the show Embraer gained recognition as an important new competitor in the international market. In 1977, foreign sales totaled 12.1 million dollars and included the first sales to developed countries -- France, the U.K., and Australia, and the official certification of the aircraft by France and England. In 1978, the first Bandeirante was sold to the U.S., and later in the same year it received official certification by the FAA, opening up the coveted U.S. market. By the end of 1979, 31 planes had been sold to the U.S.

11.22 The success of the Bandeirante in the developed country markets such as the U.S. is that as a small turbo-prop it found a perfect niche in short commuter runs where it is much cheaper to operate than jets. The success of the Bandeirante in the developing country markets is that it is a very rugged aircraft that can take off and land in short and even unpaved fields and requires very low maintenance -- the conditions for which it was designed for the Brazilian market. The outlook in both markets looks promising, but the competition is getting much stiffer, particularly in the developed country commuter market. Encouraged by Embraer's success with a thrifty turbo-prop, various large manufacturers are working on their own turbo-prop models. Embraer itself has designed a new 30-35 passenger model called the Brasilia which is aimed at that market. 95/ A mock-up of the

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93/ The first two prototypes built at Embraer in 1969 and 1970 were also eight-passenger models. However, the FAB asked for a bigger airplane, and in 1970 Embraer turned its efforts to stretching the Bandeirante. The first stretched version was flown in 1972 and could carry 12 passengers. The FAB ordered 80 such planes (later changed to 60) and 20 of a military cargo and parachute troop transport version with a still longer fuselage and more powerful turbines.

94/ In 1976, when five new local carriers entered to serve the internal market, they all chose the newest version of the Bandeirante, which by that time was an 18-passenger model. In 1980, the regional carriers of Brazil were operating 43 Bandeirantes, which had already flown 330,000 hours and carried more than 1,350,000 passengers.

95/ Many of the improvements in the new model have been made in response to requests and suggestions from the buyers, particularly the American buyers.

Brasilia was presented in 1980, and, in July 1981, there had already been 111 orders for this new model, even though the first was not expected to fly until 1983. Due to increased competition from other companies, some of which have announced that their model will be flying before 1982, Embraer is also trying to speed up the production of its new plane.

11.23 A high percentage of the value of the airplanes produced by Embraer is of Brazilian origin. In part this results from the high labor share in the value of an airplane, which varies between 30 and 50 percent of its total cost. In 1978 the nationalization index for some of the planes produced by Embraer was as follows: Ipanema, 80%; Bandeirante, 75%; Xingu, 70%; Xavante, 40%; single engine planes in Embraer/Piper agreement, 45%; twin engine planes in Embraer/Piper agreement, 40%. 96/ It is probably higher now for most models, as the local network of suppliers has been built up as part of the policy of increasing the participation of local firms in the manufacture of airplanes. Embraer has a Division of Nationalization within its technical department, whose objective is to increase Brazilian participation. This has been very important in transferring technology to other local firms. 97/ In 1980 Embraer had more than 300 suppliers. Thus Embraer has played an important role in developing the local airplane parts industry, which is now an important exporter in its own right. Moreover, the reputation Brazil has achieved in foreign markets as a producer of airplanes is helping to open new doors for the export of the Brazilian airplane parts industry.

11.24 The case of Embraer is an example of a successful local research response to specific and clearly articulated needs. It was possible only because there had been a long-term and carefully phased technological development effort, which was motivated not by market forces but by the desire to have local control over what was considered a strategic area. The identification and articulation of the product was also special as it could only be made by a monopsonist who could guarantee the market. That some of the airplanes originally designed for the internal military market appear to have become commercial successes was rather fortuituous. However, they have served to stimulate the newly created technological capability to seek a commercial outlet, and there appear to have been significant spillovers into Brazilian industry both from the research center and from Embraer. It is

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96/ Embraer, "A Indústria Aeronáutica do Brasil Ja Tem Reconhecimento Internacional," Planejamento e Desenvolvimento, Ano 6, No. 68, Janeiro 1979.

97/ One of these is Metal Leve, the producer of pistons identified in the list of major Brazilian exporters. Metal Leve was actually created before the development of the local automobile industry as a supplier of parts for imported cars. It developed very rapidly with the installation of local automobile producers in Brazil. Furthermore, with the establishment of local airplane industry, it moved into the airplane piston market, and the greatest part of its exports are in fact airplane pistons. It claims to be the largest producer of aircraft pistons in the world.

not clear, however, whether the production of airplanes and the economic benefits of the externalities more than cover the economic costs involved. Furthermore, it is not clear whether Embraer will be able to compete successfully in the commercial market with its new models. Nevertheless, the example is very important in showing that there can be successful research responses to local needs, if there is a sufficient local technological base, and the needs can be clearly articulated.

Heavy Capital Goods

11.25 This section focuses primarily on capital goods which are made to order, as they generally require more sophisticated technology than serially produced goods. 98/ Capital goods production as a whole fell slightly in relation to industrial production during the period 1974-1980, but the relatively slow growth of the subsector was caused by the low growth of serially produced capital goods. Capital goods made to order actually increased as a share of industrial production from 4.1 percent in 1974 to 5.0 percent in 1980. They doubled their share in total capital goods, so that by 1979/80 they accounted for roughly a quarter of all such goods produced (Statistical Appendix, Table 11.15).

11.26 At the same time, the share of exports of made-to-order capital goods in total capital goods tripled from 5.3 percent in 1974 to 15.8 percent in 1980, while capital goods increased their share of industrialized product exports only from 20 to 30 percent. The dynamism of exports of made-to-order capital goods is also seen in the quintupling of the export ratio from 3 percent in 1974 to 15.9 percent in 1980. At the same time, the export ratio for all capital goods tripled from 7.7 percent to 22.4 percent. Table 11.16 in the Statistical Appendix gives a breakdown of the share of Brazil's heavy capital goods exports by type of product. In terms of overall value, the main exports are ships, furnaces, mechanical machines, and railroad equipment.

11.27 The Brazilian shipbuilding industry started after World War II, but its main development took place during the 1970s as a result of two naval construction plans aimed at reducing Brazil's dependence on foreign carriers and building up a national fleet. 99/ Current production capacity is about two million deadweight tons per year (DWT) with the inauguration of a new

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98/ For additional information on the development of the Brazilian capital goods sector, see the World Bank Report No. 2488-BR "Brazil: Protection and Competitiveness of the Capital Goods Producing Industries" (July 21, 1980).

99/ Between 1970 and 1979, the Brazilian-owned fleet increased its share in total trade-related freight revenues from 37.6 percent to 50.8 percent, and the share of that carried on Brazilian-made ships has increased from 15.1 percent to 22.8 percent.

500,000 ton facility in 1981. However, production in 1980 was only 88 percent of that in 1978, and, based on projects in the pipeline, was expected to fall to 30 percent by 1983. The industry consists of eight main producers, three of which are foreign. Two of the foreign producers can make supertankers up to 450,000 and 500,000 DWT. 100/ The local producers make ships and tankers ranging from small vessels for intercoastal trade to 50,000 DWT ships, and several of these producers appear among the biggest Brazilian exporters. Several local producers do their own basic and detailed engineering. There are also smaller producers of fishing vessels and patrol boats. Although exports started in 1964 with the sale of two 13,000 DWT ships to Mexico, there was not much export activity again until the seventies, and most of it has actually taken place only in the last five years (Statistical Appendix, Table 11.17). Total exports to date have been slightly under one million DWT, but with orders to be delivered by 1983 the total will reach almost two and a half million DWT.

11.28 The railroad equipment industry in Brazil is also well developed and includes all types of products, from railroad cars to locomotives and unit trains such as subways. Table 11.18 in the Statistical Appendix summarizes railroad industry exports from 1971 to 1980. As the total value of exports increased, the share of wagons, which used to be the principal item, fell to less than 10 percent, while locomotives (mostly made by General Electric) increased to about 50 percent of the total, and components (which only started being exported in 1977) quickly jumped to 40 percent of the total. Exports in 1980 increased 120 percent over 1979 exports, with most of the increase in locomotives and components. To a large extent the increase resulted from very low domestic demand during that year, the worst since 1968. In 1980, no cargo wagons were ordered, purchase orders for passenger cars were stopped and revised downward, and the orders for locomotives were postponed. 101/

11.29 Other heavy capital goods exports included pulp and paper machinery, alcohol distilleries, and steel plants and equipment. The exports of pulp and paper machinery were mostly by VOITH, a large German multinational which set up operations in Brazil in 1964. Its two main lines of production in Brazil are turbines for hydro-power plants and pulp and paper machines. About two thirds of its sales come from the pulp and paper division. Because of the large domestic market, the firm decided to concentrate a large part of its worldwide pulp and paper machinery manufacturing capacity in Brazil and to supply part of its international market from its Brazilian plant. It has exported machinery from Brazil to Sweden, the U.S., Mexico, Argentina, Chile, Kenya, and others. However, despite the

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100/ The largest produced to date are 277,000 DWT tankers for Petrobras by Ishibras. Verolme, the other large multinational producer, was expected to inaugurate its new 500,000 DWT berth in late 1981. It should be noted, however, that when Ishibras was visited at the time of the mission, it was operating at less than 50 capacity.

101/ Cobrasma, one of the main producers of wagons which recently inaugurated a very large plant for mass producing cargo wagons, was operating at 10 percent capacity in mid-1981.

large size of the Brazilian operations which include some local design engineering, 102/ it appears that the decision-making process for exports still takes place at the home office in Germany.

11.30 Exports of alcohol distilleries are made mostly by Dedini and, to a lesser extent, Zannini, two Brazilian firms. 103/ Dedini consists of a group of firms with turnover of about US$260 million in 1979, producing equipment for the sugar, alcohol, cement, paper and steel industries, as well as steel bars, parts and forgings. The company started in the 1920s as a small mechanical and woodworking shop which repaired and manufactured equipment used by sugar mills and alcohol distilleries. It diversified into other fields as it grew and currently provides about 60 percent of the Brazilian alcohol equipment market, having built more than 400 plants. It has exported seven turn-key distilleries to four countries in Latin America. Zannini is a smaller company which consists of two branches, Zannini Foster Wheeler, a joint venture which provides advisory services in various process industries, and Zannini Equipamentos Pesados, which builds complete sugar and alcohol plants based on its own designs. The latter recently signed a cooperation agreement with Foster Wheeler (USA) to manufacture and install six alcohol distilleries in the USA.

11.31 Exports of equipment for the steel industry have been of two types. One is the export of turn-key mini-steel plants based on charcoal, a technology in which Brazil has long experience. The plants have been made by a consortium between Coferaz (a Brazilian steel producer) and Tenenge (a large Brazilian engineering firm) and included a 120,000-ton-per-year plant to Paraguay (Acepar), and a 100,000-ton-per-year plant to Uruguay (Valentines). Other exports of pieces and units of steel equipment included a slabbing mill exported by Coferaz to Uruguay (Laisa). More recently, however, a contract to supply a 400,000-ton-per-year rolling mill to Ohio River Steel (USA) has been won by Aços Villares, a large Brazilian group which produces a wide range of capital goods as well as steel.

11.32 The relatively fast growth in the production and exports of made-to-order capital goods is partly due to the emphasis and special incentives which they received as part of the government import-substitution drive in capital goods from 1974 on. Table 11.19 in the Statistical Appendix shows that almost two billion dollars worth of investment took place since 1975, which almost doubled the capacity of this subsector. However, while the heavy capital goods industry made this large capacity expansion on the schedule proposed in the Second National Development Plan, the large government investments in basic industries, which were to be the main market for the industry, were cut back and delayed as a result of the more

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102/ Out of a labor force of 3,500, over 560 are engineers and technicians in the design area.

103/ The information on this and the next paragraph is primarily from Francisco Sercovitch, "Brazil as a Technology Exporter," Inter-American Development Bank, April 1981 (mimeo).

constrained public investment program followed after 1974. The result has been a progressively increasing level of excess capacity in the industry.

11.33 In 1980, the sectors' production capacity was estimated at a level of six billion dollars. However, the apparent domestic demand (production + imports - exports) was only US$4.5 billion, of which US$1.6 billion was supplied by imports. Thus, sales to the local market were only $2.8 billion, or 47 percent of capacity (Statistical Appendix, Table 11.20). In addition, due to the long production period for made-to-order capital goods, the cuts in the government investment programs which had begun two to three years earlier only began to be noticed in 1980, the first year in which production actually fell. Although production fell only 10 percent in 1980, it may fall further in 1981 and in the following years as the orders presently in the pipeline are completed, because there are very few new orders to take their place. The only two areas where there are still new orders are oil perforation and energy-substitution projects. As a result, the sector has focused increasingly on the export market in an attempt to maintain production levels in the face of falling internal demand.

11.34 It appears that an important factor limiting exports by the capital goods industry was the lack of sufficient technological mastery by local firms to make some of the more ambitious exports on their own. In the heavy capital goods industries this is reflected in insufficient basic engineering capability for the various equipment projects. In the past, given the government controls on the establishment of foreign firms, they often entered into consortia with local firms to bid on specific projects. If the consortium won, the foreign company provided the basic engineering and transferred only some of the basic fabrication technology to the local partners. Local firms were often unable or uninterested in acquiring the basic design capability because of the extracosts involved, and because of what appeared to be many opportunities to continue to win projects through consortia arrangements in other bids, often involving other types of equipment and different foreign partners. If the large government programs had continued and the local firms had acquired enough experience in manufacturing the large capital goods involved, they might have developed technological capability to do their own project engineering. Then they would have been able to compete in the international market based on their production experience with the local market. However, as a result of the cutbacks in the government investment programs, they have not been able to fully develop the capability and are still largely dependent on foreign technology. Most firms can only sell in the foreign markets if they enter into consortia with foreign capital goods producers having the appropriate design capability. With this objective, ABDID signed an agreement with the Japan Machinery Exporters Association in December 1980 to make common exports to third countries. However, it is not clear to what extent this will actually lead to joint projects, given the depressed level of world capital goods demand and Japan's own excess capacity.

11.35 In conclusion, much of the benefits in terms of developing local technological capacity in heavy capital goods production are yet to be realized. Furthermore, with the large cuts in the public sector investment program it is unlikely that the Brazilian firms will be able to make use of

much of the experience and human capital which they have been accumulating. In some of the large firms, the possibility of starting layoffs in design and engineering departments if the situation does not improve has already been discussed. This illustrates some of the possible costs of ambitious capital goods programs oriented primarily for the internal market.

ESTIMATION OF THE SOURCES OF DEMAND GROWTH [1]

In a seminal paper Hollis Chenery presented a proportional measure of import substitution from which an identity measure of the sources of demand growth for an industry can be derived.[2] This identity is written as:

$$(1.1) \quad \Delta X_i = \frac{X_i^1}{Z_i^1} \cdot \Delta D_i + \frac{X_i^1}{Z_i^1} \cdot \Delta E_i + \left(\frac{X_i^2}{Z_i^2} - \frac{X_i^1}{Z_i^1}\right) Z_i^2$$

where

X_i = total output in industry i

M_i = imports of the products produced by industry i

Z_i = $X_i + M_i$ = total available supply

D_i = domestic intermediate and final demand

E_i = exports of industry i.

The superscripts indicate the two different points in time defining the period, e.g., 1970 and 1974. Dividing (1.1) through by ΔX_i, the sources of demand growth can be estimated. The second and third terms on the right hand side of (1.1) represent growth attributed to export expansion and import substitution, respectively. The first term depicts that growth attributable to domestic demand expansion. Since ΔD_i is not directly observable, domestic demand growth's contribution is computed as a residual.

In order to account for the effects of intermediate production in an economy with industrial interdependence, Morley and Smith devised an alternative measure of import substitution defined as

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1/ For a more detailed discussion of the estimating methodology see William G. Tyler, Manufactured Export Expansion and Industrialization in Brazil (Tubingen: J.C.B. Mohr 1976). Parts of this section have reproduce from that source.

2/ Hollis B. Chenery, "Patterns of Industrial Growth," American Economic Review, Vol. 50, No. 3 (September 1960), pp. 624-654.

$$(1.2) \qquad IS_i^* = \left(\frac{X_i^2}{Z_i^{2*}} - \frac{X_i^1}{Z_i^{1*}}\right) Z_i^{2*}$$

where, in matrix notation,

$$(1.2a) \qquad Z^* = X + M^*$$

$$(1.2b) \qquad M^* = (I - A)^{-1} M = \text{a vector of redefined imports}$$

A = a matrix of technical coefficient a_{ij}.

The vector of redefined imports M* can be interpreted as the necessary domestic production that would be required to completely substitute for imports if final demands were to remain constant.

Exports can be treated in an analogous fashion. It is also desirable to include the indirect domestic production arising from the production of a given vector of exports. Accordingly, a vector of redefined exports can be computed and expressed in matrix notation as

$$(1.3) \qquad E^* = (I - A)^{-1} E.$$

Rewriting Equation (1.1) to incorporate the redefined measures of export expansion and import substitution we have

$$(1.4) \qquad \Delta X_i = \frac{X_i^1}{Z_i^1} \cdot \Delta D_i + \frac{X_i^1}{Z_i^1} \cdot \Delta E_i^* + \left(\frac{X_i^2}{Z_i^{2*}} - \frac{X_i^1}{Z_i^{1*}}\right) Z_i^{2*}$$

It is this measure that has been employed in our estimates. Redefined exports and imports for the years 1970, 1974, and 1979 were computed using the IBGE input-output table of 1970.

ESTIMATION OF THE SHADOW EXCHANGE RATE

Introduction

1. Trade policy measures such as import tariffs and export subsidies and taxes, which affect directly the prices of tradable goods, alter the amounts of imports and exports and, therefore, the exchange rate that results in a given balance of the trade account. If we assume, for simplicity, that the starting point is one of equilibrium in the trade account, and a 10 percent tariff is introduced, imports will be reduced, a trade surplus will appear, and the exchange rate that will establish the equilibrium will imply a revaluation of the currency. Therefore, in the new equilibrium, the domestic price of imports will exceed the previous price by less than the amount of the new tariff. A similar adjustment would occur if an export subsidy was introduced, and at the new equilibrium the domestic currency price received by the exporter would also exceed the previous price by less than the amount of the subsidy.

2. The above would also hold true for any given surplus or deficit in the trade account, indicating that the net impact of trade policies is lower than their nominal amount, for any given trade account balance, as a result of their impact on the exchange rate. In any real situation, the observed exchange rate and trade balance are those existing in the presence of the actual set of trade policies. The exchange rate that would have resulted in the same trade balance without the trade policies (the "starting" exchange rate in the previous paragraph) cannot be observed directly but can be estimated if sufficient information is available on the elasticities of the traded goods. This estimated exchange rate is normally referred to as the "shadow exchange rate" 1/. The shadow exchange rate has many applications in economic analysis, but is particularly important in the evaluation of the impact of trade policies as it allows an estimation of their net impact on the domestic prices of goods.

3. The process involved in the estimation of the net impact of trade policies is an iterative one. After the nominal values of all trade policies have been estimated for each product or group of products, these values, together with additional data on the

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1/ The shadow exchange rate deals only with relative prices and attempts to reflect the real costs of imports and exports to the economy. Changes in relative prices, by themselves, do not restore equilibrium in the balance of payments. The traditional elasticity analysis of foreign exchange adjustment carries some implicit assumptions on monetary and fiscal policies as well as on changes in the marginal propensity to save, for exchange rate adjustments to achieve external equilibrium. The role of achieving such an equilibrium rests on other demand management policies, not on exchange rate adjustments.

composition of imports and exports, and the domestic and world elasticities of supply and demand for imports and exports, are used in the estimation of the shadow exchange rate. Finally, the shadow exchange rate is used to adjust the nominal values of the trade policies and obtain their net values.

4. The estimation of the shadow exchange rate for Brazil prepared by the mission is an update of previous work done by the Bank in 1977 2/. The present estimation refers to 1980 and uses the actual import and export data for that year. In addition, the quantification of the main trade policy distortions (fiscal and credit subsidies to exports and import protection) is the one carried out by the mission and presented in Chapters 6 and 7 of this report. The elasticity coefficients of imports and exports have been taken from an earlier 1981 estimation 3/.

Methodology

5. The formulation chosen is similar to the free trade exchange rate proposed by Squire and van der Tak 4/, appropriately modified to accommodate several categories of merchandise imports and exports. In the case of some countries it is necessary to allow for a less than perfectly elastic foreign demand for exports in calculating a shadow exchange rate 5/. Brazil, a large country with a substantial share of the world market in a number of important commodities is such a case. Thus, we may express the ratio of the shadow exchange rate to the official exchange rate by the following equation:

$$\frac{R^1}{R} = \frac{\sum_i e_i^f X_i (1 + S_i) + \sum_i e_i^m M_i (1 + T_i)}{\sum_i e_i^f X_i + \sum_i e_i^m M_i}$$

where

R = official exchange rate
R^1 = shadow exchange rate
e_i^f = price elasticity of foreign exchange for product i

2/ Earwaker, F. and Knight, P., "Brazil Shadow Exchange Rate", World Bank Memorandum, December 28, 1977. The summary description of the methodology is taken from there.

3/ Incer, R., "Brazil. Shadow Exchange Rate Estimation for 1980-1985" World Bank Memorandum, May 19, 1981.

4/ Squire, L. and van der Tak, M., Economic Analysis of Projects, John Hopkins University Press, 1975, p. 95.

5/ The derivation of the formula adopted may be found in Bacha, E. and Taylor, L. "Foreign Exchange Shadow Prices: A Critical Review of Current Theories" Quarterly Journal of Economics 85:2 (May 1971). This formula has also been used in Balassa, B. "Estimating the Shadow Price of Foreign Exchange in Project Appraisal" Oxford Economic Papers 26 (July 1974).

$$= \frac{e_i^{sx} \ (e_i^{dx} - 1)}{e_i^{sx} + e_i^{dx}}$$

e_i^{sx} = price elasticity of export supply for product i

e_i^{dx} = effective price elasticity of export demand facing product i (in absolute terms). This is equal to the inverse of the country's share of world exports times the aggregate world price elasticity of demand

e_i^{m} = price elasticity of demand for imports of i

X_i = exports of product i

M_i = imports of product i

S_i = export incentive for product i (as a ratio of export price)

T_i = protection rate on product i

Shadow Exchange Rate for Brazil, 1980

6. The main factors used in the estimation of the shadow exchange for 1980 are summarized in the table below. For comparison purposes, the corresponding factors used in the 1977 estimation are also indicated 6/.

	1	2	3	4	5	6	7	8	9	10	11	12
Year	X	M	e_i^f	e_i^m	(1+S)	(1+T)	$(e_i^f e_i^m)$	(1+S)(1+T)	3/7	4/7	5/8	6/8
1980	100	124	1.98	0.48	1.176	1.12	0.95	1.32	2.08	0.51	0.89	0.85
1977	100	107	1.83	0.67	1.23	1.49	1.23	1.84	1.49	0.54	0.68	0.81

7. Substituting the above values in the formula, the estimated shadow exchange rate for 1980 is 16.7 percent above the official exchange rate ($R^1/R = 1.167$) 7/. This means that a devaluation of 16.7 percent, together with the elimination of import protection and export subsidies would have resulted in a similar trade balance in 1980. The result also indicates that if a product was sold domestically at a price 16.7 percent above the world price (at the official exchange rate), the net impact of protection was zero. This

6/ Additional detail on the elasticity and market share factors, and on the volume and composition of trade, is available on request.

7/ The corresponding result for 1977 was $R^1/R = 1.323$.

is because in the absence of trade policies, the exchange rate resulting in a similar trade balance (the shadow exchange rate) would indicate a domestic price equal to the world price. Similarly, export incentives of 16.7 percent would indicate zero net export incentive. Protection and export incentive rates above 16.7 percent would then result in positive net protection or export incentives, and the contrary would be true for rates below the shadow exchange rate. This would apply also to the relevant effective rates of protection and of export incentives.

TECHNOLOGICAL DEVELOPMENT AND TECHNOLOGY TRANSFERS in 1970 SURVEY RESULTS

1. Introduction

A quick overview can be obtained from the results of various surveys which were undertaken at the end of the sixties and the beginning of the seventies. One covered the sources of technology for the initial installation of the 500 largest companies in Brazil in 1970 and the technological activities of these firms in 1967/1969. A second covered the technological activities of a sample of research institutes. A third analyzed the importation of foreign technology up to 1970. [1/] Each of these will be summarized below.

2. Sources of Technology for Initial Installation

Four hundred ninety four of the 500 firms surveyed responded to the questionnaire. Sixty two percent (282 firms) had utilized foreign technology for their original installation. The percentage was almost twice as high for foreign firms compared to local ones. The time of installation was divided into five periods (Table 1). For both foreign and local firms there was a fall in the percentage of firms which obtained technology from abroad between the pre-1930 period and the 1931-1945 period. This may have been related to difficulty in obtaining foreign technology during the War, because after 1945 the percentage of firms which obtained technology from abroad was higher than during the first period, and increased steadily ever since. This pattern appears to reflect an increasing dependence on foreign technology as the development of Brazilian industry demanded more complex technologies which were not locally available.

1/ All three were carried out by the Institute of Economic and Social Planning (IPEA) a research institute connected with the Secretariat of Planning. The results of the first two are presented in Francisco Almeida Bruto, Eduardo Augusto de Almedia Guimarães, and Maria Helena Poppe de Figuereido, Potential de Pesquisa Tecnologica no Brasil, Brasilia: IPLAN/IPEA, 1971. The results of the third survey, which was also done by the same team, are presented in A Transferência de Tecnologia no Brasil, Brasília, IPLAN/IPEA, 1973.

Sources of Technology for Initial Installation
(percentage)

Installation Date	National Firms		Foreign Firms		All Firms	
	Local	Foreign	Local	Foreign	Local	Foreign
Before 1930	53.1	46.9	16.2	83.8	41.5	58.5
1930-1945	63.7	36.3	21.2	78.8	52.4	47.6
1946-1955	45.8	54.2	13.3	86.7	31.7	68.3
1956-1965	37.1	62.9	10.4	89.6	21.7	78.3
After 1965	31.8	68.2	-	100.0	28.0	72.0
Total	51.4	48.6	14.5	85.5	37.9	62.1

Source: Bruto et al., op. cit., Table 5.2, p.77.

Sectors varied in their degree of dependence on foreign technology. 2/ In most cases, the sectors most dependent on foreign technology were also those in which the percentage of foreign firms was greatest. This was particularly noticeable in the transportation, pharmaceuticals, mechanical and electrical and communications sectors. In these sectors, the percentage of foreign firms was more than half. Only 86 percent of the foreign firms, however, obtained their technology from abroad, indicating that some had used locally available technology. The sectors least dependent on foreign technology had relatively less foreign firms and those foreign firms had a higher propensity to use locally available technology. This suggests that the relative technological self-sufficiency of these sectors was related not only to the share of foreign firms but to greater local technological capability and/or simpler technologies. Sixty-two percent of the firms which imported technology did not adapt it. Of the 38 percent which did adapt the technology, 21 percent was adapted in Brazil, 12 percent was adapted abroad and 6 percent involved a combination of foreign and local adaptation.

The sectors which did the least adaptations were food products, textile, pulp and paper, chemicals, metallurgy, and

2/ Three quarters or more of the firms depended on foreign technology in the following sectors: non-metallic minerals, transportation, pharmaceutical and medical, chemical and mechanical. Half or less of the firms depended on foreign technology in: other non-durable consumer goods, food products, textiles, and pulp and paper. In the remaining sectors -- plastic products, other intermediate products, metallurgy, and electrical communications -- the percentage of firms depending on foreign technology ranged between 67 and 59 percent respectively.

electrical and communications. The first three were also among the least dependent on foreign technology, which implies that perhaps the technologies in these three sectors are relatively simpler. The same may not be true in the last two sectors, however, because they showed a significant number of cases requiring local adaptation. The sectors in which firms did the most adaptations locally were other non-durable consumer goods, plastic products, and pharmaceutical and medical products, implying that (holding local technological capability fixed) a knowledge of local conditions may have been particularly important. The sectors in which most adaptations were made abroad were other intermediate products and non-metallic minerals. Since the share of foreign firms was not particularly high in these two sectors (which discards the simple explanation of reliance on the central R & D facilities of the home office) the explanation may be that the adaptation required special laboratory and design work from abroad. The mechanical and other intermediate products sectors had the greatest relative number of cases in which the adaptations required a combined local and foreign effort. Together with plastic products and other non-durable consumer goods they were the sectors showing the highest relative number of firms undertaking adaptations.

3. Research Activities by the Firms

Sixty four percent (292) of the firms carried out some form of local research during the period 1967/1969. Over the whole sample of firms this percentage increased steadily with the size of the firm (measured in terms of employment) from 42 percent among firms with less than 100 persons to 78 percent for those with more than 2,000 employees, but this was not always true for each individual sector. There was also great variation among the sectors. 3/

A greater percentage of foreign firms tended to do research (71 percent versus 61 percent for national firms) but this again was not true for all sectors, the exception being non-metallic minerals, metallurgy, electrical and communications equipment, plastics, and other producers of intermediate goods. Furthermore, the average number of research projects per foreign firm was greater (9.3 versus 5.7 for national firms). National firms tended to undertake a slightly larger share of complex projects among their research as compared to foreign firms, but may have been because the foreign firms did the more complex projects abroad.

A different issue relates to the number of firms which had some sort of contract for the importation of technology at the time of the survey (1967/1969). Overall, 42 percent of the firms had a contract. As may have been expected this percentage was greater for foreign firms (53 percent) as compared to local firms (36 percent).

3/ Those in which a greater than average share of firms did research were, in order of decreasing shares: mechanical, transportation, electrical and communications, metallurgical, other producers of intermediate goods, pharmaceuticals and medical products, plastics, and non-metallic minerals.

Overall, the percentage was greater (49 percent) for those firms which carried out research. However, this relationship was different between foreign and local firms. In the former, the majority of the firms which undertook research had technology transfer agreements (58 percent). Among the local firms, however, only 42 percent of the firms which undertook research had technology transfer agreements. Thus, the importation of technology and local research activity may be more complementary among foreign firms than among national firms.

The behaviour of foreign and national firms among the 162 firms which did not undertake local research was also different. Eighty four percent of the multinational firms turned to other sources for technological services. In three quarters of these cases the source was their home company. Few used local R & D centers and universities. Only 52 percent of the national firms turned to other sources of technological services. Those who did, however, used the laboratories and departments of other firms and local R & D institutes and universities.

4. Technological Activities of a Sample of Research Institutes

The survey attempted to embrace all institutions carrying out research in industrial technology. The institutions were identified using the directories of CNPq, CAPES and information collected from consultants. Questionnaires were distributed to 132 institutions. Sixty indicated that they carried out technological activities, but only forty six did work on industrial technology. The survey was based on the answers of those 46 research institutes.

The main findings were the following:

1. Sixty three percent of the institutes were federal, 20 percent were linked to state governments, and only 17 percent were private. Half of the total were linked to universities.

2. At the time of the study, the institutes employed 5,025 persons with a secondary or higher education. Half of these were dedicated to technological as opposed to scientific or other activities. There was a high degree of concentration. Seven institutes accounted for more than three quarters of the total number of technological activities carried out during 1967/1969.

3. Routine activities accounted for 53 percent of the total number of activities while research activities accounted for the remaining 47 percent. Routine activities consisted 91 percent of tests and 9 percent of engineering. Research activities were: 70 percent adaptations, 16 percent major adaptations, and only 9 percent creation of new processes or products.

4. Only 24 percent of the institutes actively sought relationships with industry, 56 percent limited their contact with industry to dissemination of their research results or to responding to specific industry requests and 20 percent had no relationship with industry at all.

5. Only 32 percent of the institutes' industrial technology activities were done at the request of outside parties, the remaining 68 percent being undertaken by own initiative. Furthermore, most of the activities done for third parties consisted of routine activities such as tests and engineering (70 percent) while most of the activities done by own initiative were research (54 percent).

5. Transfer of Technology (1965-1970)

The study on the foreign technology contracts analyzed payments for transfer of technology for the 1965-1970 period. [4/] The main findings can be summarized as follows:

1. Three out of a total of 21 sectors accumulated almost two thirds of the total payments. These were transportation (39.9 percent), metallurgy (11.1), and electrical and communications materials (9.2). At a more disaggregated level the largest share was made by vehicles producers (32.0), producers of parts of the automotive industry (6.8), steel and steel products (7.3) and pharmaceutical and medical products (5.2).

2. The largest average payments per contract were also made by the automobile industry (20 times the overall average) followed by rubber (5 times), food products and non-ferrous metallurgy (2 times). Also above the average were transformers, electrical and electronic cosmetic appliances,

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[4/] The study was based on transfer of technology contracts registered with the Central Bank. Since 1962 Brazilian law requires that all contracts involving payments to foreign parties should be so registered. The study analyzed only the contracts related to industry and excluded those related to the manufacture of petroleum derivatives because of the large number of contracts signed by the state owned company would distort the results. The contracts analyzed accounted for 1,516 of the 2,429 registered at the Central Bank of the end of 1970. Whenever a contract had more than one type of transfer of technology each was counted separately. This gave rise to the classification of 1983 contracts from the 1,516 registries. However, only 1,380 (70 percent) involved payments during the 1965-1970 period.

glass, cement and cement products. The remaining 33 subsectors had average payments per contract below the overall average. The sectors with lower than average payments included some sectors with complex technologies such as steel, electrical materials, and chemicals. It may thus be concluded that there is no simple correlation between the complexity of the sector and the cost of imported technology.

3. The most common type of contract was technical assistance (46.7 percent) followed by engineering services (21.1), trademark licenses (13.8), license for fabrication or use of patent (12.6), and project elaboration (5.8). 5/ The average payment per technical assistance contract was more than twice the average for any other type. As a result more than two thirds of the total payments were for technical assistance contracts. The prevalence of technical assistance contracts might be explained by the existence of legislation which prohibits the payment of royalties for trademarks, and patents between subsidiaries and their parent companies. The legislation may have led foreign firms to make those payments under the category of technical assistance. Although payments for technical assistance represent the largest share of payments for technology for all firms regardless of type of ownership, they represented the largest share of payments for subsidiaries and/or associates of the technology suppliers (89.2 percent) as compared to foreign firms which were unrelated to the technology supplier (52.7) and national firms (41.5).

4. There were significant differences in the type of ownership of the firms which made the different types of contracts. National firms accounted for the largest share of total payments for engineering services (71.8 percent) and project elaboration (80.7). Subsidiaries and/or associates made the largest share of payments for technical assistance (67.4). Unrelated foreign firms made the largest share of payments for licenses for fabrication or use of patents (44.8) and trademarks (47.9).

5/ Technical assistance was distinguished from technical services in that the former was defined as permanent assistance or advice, remunerated as a percentage of output or per unit of output while the latter was defined as a temporary service provided for a fixed sum. Technical services were distinguished from project elaboration in that the latter were defined as studies which led to plant design, and final specifications for the construction of industrial plants or the manufacture of industrial products.

5. Nationally owned firms signed 61 percent of the total number of contracts as compared to 26 percent by unrelated companies and 13 percent by subsidiaries and/or associates. However, the latter were responsible for 52 percent of the total payments. Their average payments per contract were 4.8 times those by unrelated foreign firms and 8.7 times those by national firms. Furthermore, their average payment per contract was higher for every type of contract except engineering services where the highest average payment was made by national firms 6/. Although these differences may result from differences in the sectoral composition of the contracts, they also suggest that foreign firms may have been using payments for technology contracts as a way of profit remittance.

6/ Paragraph 2 indicated that the correlation between technological complexity of a sector and technological payments is not very clear. Also, the average payment by subsidiaries and/or associates is higher than that for unrelated foreign firms.

STATISTICAL APPENDIX

I. Origins and Performance of the Manufacturing Sector

II. Structure of Manufacturing

III. Manufactured Export Performance

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.1 GDP ANNUAL GROWTH RATES

(Prices of 1970)

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Gross Domestic Product	5.2	1.5	2.9	2.7	3.8	4.9	11.2	9.9	8.8	13.3	11.7	13.9	9.8	5.7	9.0	4.7	6.0	6.4	8.0
Agriculture	5.5	1.0	1.3	13.8	-14.6	9.2	4.5	3.8	1.0	11.4	4.1	3.5	8.5	3.4	4.2	9.6	-1.7	3.2	6.8
Industry	7.8	0.2	5.2	-4.7	9.8	3.0	13.3	12.1	10.4	14.3	13.4	15.8	9.9	6.2	10.7	3.9	8.1	6.9	8.0
Commerce	5.8	0.1	1.1	1.7	7.4	4.2	12.5	9.3	10.3	14.1	12.7	14.8	9.3	3.5	8.7	3.5	5.9	6.3	7.2
Transport and Communications	8.4	7.8	1.6	1.8	6.6	7.8	8.9	11.6	10.5	7.4	11.9	17.1	12.7	11.8	7.4	4.1	6.8	10.1	12.7

Sources: Lemgruber A. C.: "As recessões de crescimento no Brasil" in Conjuntura Econômica, April 1981.
Fundação Getúlio Vargas, Conjuntura Econômica, February 1981.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.2 SECTORAL DISTRIBUTION OF NET NATIONAL PRODUCT

(Percentages)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975 1/	1976 1/	1977 1/	1978 1/	1979 1/	1980
Net National Product (f.c.)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	15.9	13.3	12.8	11.7	11.1	10.2	10.7	10.4	11.0	11.2	10.5	10.7	12.4	11.1	10.9	10.3
Industry	32.5	33.5	32.5	34.7	35.7	36.3	36.2	37.3	38.1	39.4	39.4	38.8	37.3	36.0	36.1	36.9
- Manufacturing	24.8	25.5	24.3	26.3	26.8	27.4	27.7	28.6	29.5	30.6	30.2	29.6	28.5	28.3	27.4	-
- Mineral Extractive	0.8	0.7	0.7	0.7	0.7	0.9	0.8	0.8	0.7	1.3	1.3	1.1	1.0	0.9	0.9	-
- Construction Materials	5.3	5.3	5.6	5.9	6.3	5.9	5.6	5.7	5.7	6.0	5.6	5.5	5.6	5.8	2.1	-
- Industrial Public Utility Services	1.6	2.0	1.9	1.8	1.9	2.1	2.1	2.2	2.2	2.0	2.3	2.2	2.2	3.0	5.7	
Services	51.6	53.2	54.7	53.6	53.2	53.5	53.1	52.3	50.9	50.1	50.1	50.9	50.3	52.9	53.0	52.8

1/ Preliminary Data

Sources: IBGE, Anuário Estatístico do Brasil - 1980 (Basic data Fundacao Getúlio Vargas, Instituto Brasileiro de Economia).
Fundação Getúlio Vargas, Conjuntura Econômica, February 1981.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.3 SECTORAL DISTRIBUTION OF NET DOMESTIC PRODUCT
(at factor cost, 1970 prices)

Years	NDP f.c. Total	S E C T O R S		
		Agriculture	Secondary	Tertiary
1965	100.0	14.5	33.1	52.4
1966	100.0	11.9	35.0	53.1
1967	100.0	12.4	34.4	53.2
1968	100.0	11.7	35.0	53.3
1969	100.0	11.0	35.8	53.2
1970	100.0	10.2	36.3	53.5
1971	100.0	10.1	36.6	53.3
1972	100.0	9.4	37.1	53.5
1973	100.0	8.5	37.8	53.7
1974	100.0	8.4	37.8	53.8
1975	100.0	8.2	38.0	53.8
1976	100.0	7.9	38.6	53.5
1977	100.0	8.3	38.3	53.4
1978	100.0	7.7	39.0	53.3
1979	100.0	7.4	39.2	53.4
1980	100.0	7.3	39.2	53.5

Source: Fundação Getúlio Vargas, Conjuntura Econômica, February 1981.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.4 SECTORAL DISTRIBUTION OF GDP

(Percentages)

Years	GDP Total	S E C T O R S		
		Agriculture	Industry	Services
1960	100.0	23.2	25.8	51.0
1964	100.0	22.6	26.0	51.4
1967	100.0	20.3	26.2	53.5
1968	100.0	18.8	27.9	53.3
1969	100.0	18.3	28.4	53.3
1970	100.0	17.6	28.8	53.6
1971	100.0	17.6	28.9	53.5
1972	100.0	16.7	29.7	53.6
1973	100.0	15.5	30.6	53.9
1974	100.0	15.3	30.4	54.3
1975	100.0	15.2	30.5	54.3
1976	100.0	15.0	32.0	53.0
1977	100.0	12.2	36.7	51.1
1978	100.0	11.2	37.1	51.7
1979	100.0			
1980	100.0			

Source: Indice do Brasil 1980/81, Indice - O Banco de dados, Rio de Janeiro, 1981. Basic data from Fundacão Getúlio Vargas and IPEA-SEPLAN

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.5 GROWTH RATES OF INDUSTRIAL OUTPUT: MAIN CATEGORIES

(Prices of 1970)

Industrial Categories	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979(1)	1980(1)
Mineral Extractive	13.9	2.2	15.6	11.9	17.0	3.7	10.9	12.3	42.0	6.5	1.0	-4.7	6.2	9.9	12.6
Manufacturing	11.7	2.2	14.2	11.2	11.9	15.2	14.6	16.1	8.4	4.5	10.5	2.3	7.8	7.0	7.6
Construction Materials	2.4	6.2	10.2	16.6	3.1	12.5	8.6	15.1	12.1	13.3	12.8	9.1	9.7	4.8	7.8
Industrial Public Utility Services	9.1	5.6	12.2	9.9	11.0	12.3	11.3	15.0	12.4	10.2	10.1	12.9	12.0	12.6	10.5
Total Industry	9.8	3.0	13.3	12.1	10.4	14.3	13.4	15.8	9.9	6.2	10.7	3.9	8.1	6.9	8.0

Source: Fundação Getúlio Vargas, Conjuntura Econômica - December 1980, February 1981.

Note: Data for industrial categories are estimations of IBGE.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.6 GROWTH RATES OF MANUFACTURING: MAIN SECTORS

(1970 = 100)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average annual rates of growth - 1966/67	1968/73	1974/80	1966/80
Consumer goods	65.6	69.6	72.1	81.1	91.6	100.0	112.4	127.2	141.8	149.0	152.1	166.4	169.0	182.6	191.9	200.4	4.8	11.9	5.0	7.7
Durable	43.2	50.6	55.5	70.5	94.3	100.0	134.4	166.0	197.4	224.4	235.1	249.4	244.9	286.5	308.1	331.9	13.4	23.6	7.7	14.6
Transport	41.3	48.0	52.8	64.5	94.7	100.0	138.8	168.4	191.9	211.8	208.9	209.3	184.7	217.4	228.2	240.7	13.1	24.0	3.3	12.5
Electric and home appliances	47.5	56.3	61.6	83.9	93.9	100.0	124.5	160.5	209.7	252.6	293.7	339.3	379.8	442.0	487.5	575.4	13.9	22.6	15.5	18.1
Non-durable	70.4	73.6	75.6	83.4	91.1	100.0	107.7	119.0	129.9	133.0	134.5	148.7	152.9	162.8	170.5	177.1	3.6	9.4	4.5	6.4
Capital	62.4	72.1	68.2	85.3	88.1	100.0	112.7	136.3	184.8	213.8	224.6	263.5	255.1	270.6	285.9	299.1	4.5	18.1	7.1	11.0
Intermediate	55.4	67.2	68.0	82.1	90.0	100.0	109.7	126.2	145.0	156.7	165.4	190.6	202.3	216.1	235.9	253.0	10.8	13.5	8.3	10.7
TOTAL	61.4	69.0	70.1	82.0	90.6	100.0	111.4	127.9	148.1	159.6	165.7	187.1	191.4	205.4	219.8	234.6	6.8	13.3	6.8	9.4

Sources: Bonelli, R. and Werneck, D. - "Desempenho industrial: auge e desaceleração nos anos 70, in "Indústria: política, instituições e desenvolvimento", IPEA, Wilson Suzigan, editor. Data for 1978 - 1980 was obtained using annual growth rates of physical production published by IBGE in "Desempenho da Indústria de transformação" - various issues.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 1.7 INDEX OF MANUFACTURING OUTPUT
(1970 = 100)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Annual Average Rates of Growth 1966/67	1968/73	1974/80	1966/80
Non-Metallic Minerals	61.7	66.4	66.0	83.3	90.6	100.0	104.4	118.6	138.1	158.5	172.7	193.5	209.5	222.2	233.7	249.1	3.4	13.1	8.8	9.8
Metallurgy	55.3	71.4	71.1	88.3	94.4	100.0	112.1	129.6	137.8	144.9	158.2	179.6	192.5	207.7	229.5	257.2	13.4	11.7	9.3	10.8
Machinery	53.7	64.7	62.9	77.5	85.8	100.0	123.0	149.6	189.7	211.8	243.8	279.9	261.7	280.8	301.1	347.2	8.2	20.2	9.0	13.5
Electrical and Communications Equipment	54.1	61.6	68.6	87.8	95.7	100.0	116.4	141.4	181.9	200.6	201.6	238.7	242.0	266.6	287.5	302.2	12.6	17.7	7.5	12.2
Transport Equipment	55.0	63.0	59.4	74.7	90.9	100.0	124.3	152.3	194.3	231.0	232.3	249.1	242.6	275.4	290.0	295.8	3.9	21.8	6.2	11.9
Wood	100.0	114.7	111.1	129.8	151.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Furniture	100.0	113.6	99.8	105.9	106.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Paper	63.9	68.5	77.8	84.1	95.1	100.0	107.0	105.5	161.2	121.2	115.3	139.3	142.8	158.5	177.3	194.3	10.0	13.0	2.7	7.7
Rubber	50.7	65.2	67.9	81.5	85.6	100.0	112.9	138.9	156.1	184.5	193.2	214.8	210.3	224.5	239.2	259.5	15.7	14.9	7.5	11.5
Leather	84.5	79.7	85.1	95.8	96.2	100.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chemicals	51.7	62.7	63.0	74.2	84.1	100.0	109.0	127.2	157.2	165.7	169.9	200.1	213.1	213.2	252.0	261.8	10.4	16.5	7.6	11.4
Pharmaceutical Products	-	-	-	-	-	-	-	-	-	-	100.0	119.1	102.7	114.9	121.9	137.9	-	-	5.5[a]	-
Perfumery	57.3	62.9	71.8	80.3	92.5	100.0	119.8	130.7	139.3	155.4	161.1	192.0	209.9	228.9	257.8	281.8	11.9	11.7	10.6	11.2
Plastic Products	-	-	-	-	-	100.0	110.1	130.1	167.0	205.7	216.2	254.7	253.1	279.3	292.3	328.6	-	18.6[b]	10.2	-
Textiles	85.0	84.0	77.0	95.9	100.1	100.0	116.6	120.9	129.3	124.7	127.6	135.5	136.2	141.5	150.3	160.6	-5.0	9.0	3.1	4.4
Apparel	70.1	71.2	71.7	81.4	84.8	100.0	94.3	99.0	113.0	115.3	123.7	133.9	127.1	139.5	145.2	154.3	1.1	7.9	4.6	5.4
Food	66.4	67.7	75.9	81.6	92.5	100.0	100.4	118.1	127.9	134.9	134.8	150.0	158.4	164.4	168.8	180.8	6.9	9.1	5.1	6.9
Beverages	74.0	82.9	77.9	83.7	91.2	100.0	111.3	116.8	137.5	149.0	157.1	178.4	202.6	212.4	221.5	227.5	2.6	9.9	7.5	7.8
Tobacco	84.4	79.1	84.9	90.2	94.1	100.0	104.9	111.1	118.2	133.3	143.9	157.0	165.3	175.8	182.9	181.3	0.3	5.6	6.3	7.9
TOTAL	61.4	69.0	70.1	82.0	90.6	100.0	111.4	127.9	148.1	159.6	165.7	187.1	191.4	205.4	219.8	234.6	6.8	13.3	6.8	9.4

a/ Annual average rate of growth period 75/80
b/ Annual average rate of growth period 70/73

Sources: Bonelli, R. and Wernack, D.: Desempenho industrial: auge a desaceleracão nos anos 70; in "Industrial política, instituciones a desenvolvimento," W. Suzigan, editor.
Data for 1978-80 was obtained using annual growth rates of physical production published by IBGE in "Desempenho da Industria de Transformacão" - various issues.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.1 MANUFACTURING OUTPUT 1965-1980 AT CONSTANT PRICES 1/
(1970 prices - Cr$ millions)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Non-Metallic Minerals	2,995	3,223	3,204	4,043	4,398	4,854	5,068	5,757	6,703	7,694	8,383	9,392	10,145	10,786	11,344	12,091
Metallurgy	8,035	10,374	10,330	12,829	13,715	14,529	16,287	18,830	20,021	21,053	22,985	26,094	27,968	30,177	33,344	37,369
Machinery	3,565	4,295	4,176	5,145	5,696	6,639	8,166	9,932	12,594	14,061	16,186	18,583	17,374	18,642	19,990	23,051
Electrical and Communications Equipment	2,966	3,378	3,761	4,814	5,247	5,483	6,382	7,753	9,973	10,999	11,054	13,088	13,269	14,618	15,764	16,570
Transport Equipment	5,253	6,017	5,673	7,135	8,682	9,551	11,872	14,546	18,558	22,063	22,177	23,792	23,171	26,303	27,698	28,252
Wood	-	-	-	-	-	2,662	-	-	-	-	-	-	-	-	-	-
Furniture	-	-	-	-	-	2,079	-	-	-	-	-	-	-	-	-	-
Paper	1,819	1,950	2,200	2,393	2,707	2,846	3,045	3,003	4,588	3,449	3,281	3,964	4,064	4,519	5,046	5,530
Rubber	1,003	1,290	1,343	1,612	1,693	1,978	2,233	2,747	3,088	3,649	3,821	4,249	4,164	4,441	4,731	5,133
Leather	-	-	-	-	-	768	-	-	-	-	-	-	-	-	-	-
Chemicals	6,562	7,958	7,996	9,417	10,674	12,692	13,834	16,144	19,952	21,031	21,564	25,397	27,047	29,344	31,984	33,228
Pharmaceutical Products	-	-	-	-	-	2,498	-	-	-	-	4,076	4,850	4,153	4,679	4,963	5,615
Perfumery	925	1,016	1,160	1,297	1,494	1,615	1,935	2,111	2,250	2,510	2,602	3,101	3,390	3,697	4,163	4,551
Plastic Products	-	-	-	-	-	1,925	2,119	2,504	3,215	3,960	4,162	4,903	4,872	5,377	5,627	6,326
Textiles	9,200	9,092	8,334	10,380	10,835	10,824	12,621	13,086	13,995	13,498	13,811	14,666	14,742	15,316	16,268	17,383
Apparel	2,758	2,801	2,821	3,202	3,336	3,934	3,710	3,895	4,445	4,536	4,866	5,268	5,000	5,488	5,712	6,070
Food	15,633	15,939	17,869	19,211	21,777	23,543	23,637	27,804	30,111	31,760	31,736	35,315	37,292	38,705	39,741	42,566
Beverages	1,624	1,820	1,710	1,837	2,002	2,195	2,443	2,564	3,018	3,271	3,448	3,916	4,447	4,662	4,862	4,994
Tobacco	942	883	947	1,007	1,050	1,116	1,171	1,240	1,319	1,488	1,606	1,752	1,845	1,962	2,041	2,023
Miscellaneous 2/	8,261	10,360	10,154	11,221	12,257	4,785	15,276	17,108	18,730	20,938	17,309	19,671	20,069	21,423	22,941	24,925
TOTAL	71,541	80,396	81,678	95,543	105,563	116,516	129,799	149,024	172,560	185,960	193,067	218,001	223,012	240,139	256,219	275,677

Sources: IBGE - Anuário Estatístico do Brasil, 1980 and Table 1.7.

1/ To get the value of manufacturing output at 1970 prices, the index of real production (1970 = 100) shown in Table 1.7 was applied to the value of the 1970 manufacturing output published by IBGE in the Anuário Estatístico do Brasil, 1980.

2/ Publishing and Printing is included in Miscellaneous.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.2 MANUFACTURING OUTPUT AT CURRENT PRICES
(Cr$ millions)

Industries	1962	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1976	1977	1978	1979	1980
Non-metallic Minerals	150.0	812.9	1,234.9	1,648.0	2,477.9	3,087.1	3,831.2	5,292.9	7,017.6	10,895.2	18,150.8	46,211.5	67,762.2	98,458.4	151,133.7	334,912.2
Metallurgy	400.3	2,082.8	3,154.7	3,791.9	5,846.2	7,649.8	60,281.3	13,877.2	23,404.8	38,800.7	74,611.9	153,302.8	243,080.1	367,051.0	623,619.6	1,387,553.6
Machinery	109.6	621.8	1,109.4	1,491.8	2,438.4	2,972.8	3,994.7	6,673.9	11,243.9	25,013.6	38,772.3	91,069.0	122,186.6	166,784.7	258,349.5	535,558.4
Electrical and Communications Equipment	181.9	872.7	1,640.9	2,054.6	3,149.0	4,010.8	4,634.7	6.291.6	8,836.0	15,698.5	26,693.5	59.516.0	83,624.0	127,024.9	210.099.2	448.141.6
Transport Equipment	360.8	1,826.0	2,988.7	3,343.9	4,823.5	6,878.9	8,097.9	11,904.4	18,178.6	28,380.8	46,827.4	100,496.0	139,335.9	212,626.5	335,737.3	629,171.7
Wood	78.8	312.1	607.7	693.7	1,194.6	1,889.5	1,889.6	2,292.6	3,785.1	8,506.5	13,053.7	23,589.5	-	-	-	-
Furniture	64.3	253.2	453.8	575.4	833.0	1,108.3	1,362.2	1,684.0	2,783.5	5,447.1	7,814.6	18,339.5	-	-	-	-
Paper	103.1	529.1	788.0	1,211.2	1,461.4	1,792.4	2,339.5	3,280.0	4,818.0	8,794.0	17,493.0	28,140.2	42,454.8	62,238.8	110,660.5	228,956.5
Rubber	70.6	429.6	619.4	721.3	1,156.8	1,305.7	1,739.4	2,221.0	3,111.4	4,713.7	8,090.4	17,568.4	26,686.4	40,936.9	61,077.8	127,103.0
Leather	43.5	158.2	268.8	335.3	448.0	492.6	720.5	955.0	1,653.4	2,657.8	2,617.2	6,763.1	-	-	-	-
Chemicals	368.8	2,409.2	3,978.7	4,475.5	6,567.8	7,861.9	10,324.4	14,713.9	22,131.6	38,567.8	77,247.9	185,633.7	257,555.7	362,896.0	557,045.3	1,426.034.0
Pharmaceutical Products	76.2	509.2	867.6	1,048.9	1,532.5	1,884.1	2,355.2	3,208.9	4,303.6	6,316.6	7,698.0	17,621.1	22,929.5	33,545.8	51,627.0	101,034.0
Perfumery	38.3	255.9	485.9	607.3	809.6	1,054.8	1,406.0	1,792.7	2,339.8	3,693.3	5,839.2	11,521.6	17,185.5	24,094.1	39,851.6	74,124.0
Plastic Products	46.2	236.2	326.6	545.3	784.7	1,044.1	1,411.1	1,956.3	2,850.3	6,108.0	10,472.6	23,045.1	30,958.3	45,539.6	72,499.0	154,350.4
Textiles	536.0	2,118.3	3,330.2	3,826.0	6,144.3	6,899.9	8,334.7	11,810.8	17,125.9	29,017.1	41,038.7	88,503.4	119,334.4	162,772.1	257,668.3	549,348.7
Apparel	124.3	578.6	962.9	1,190.9	1,638.6	2,080.1	2,657.5	3,686.4	4,943.6	11,010.6	17,211.2	45,832.0	64,339.5	95,801.5	157,306.1	336.949.7
Food	750.8	3,823.6	5,787.0	7,791.6	1,021.1	12,833.9	16,230.4	24,157.8	35,660.7	37,293.8	83,058.3	176,532.5	269,065.5	389,068.7	629,124.0	1,204,772.6
Beverages	81.6	395.3	622.8	818.2	1,128.5	1,433.5	1,779.3	2,485.5	3,516.2	5,148.0	6,902.6	14,775.9	22,488.9	35,644.9	52,932.7	92,420.5
Tobacco	48.8	241.1	291.5	452.6	620.2	822.8	1,081.3	1,390.4	1,838.6	2,605.9	3,838.2	8,689.1	13,198.7	17,950.3	34,374.8	55,205.9
Publishing and Printing	71.7	365.1	631.4	885.2	1,244.8	1,608.1	1,976.8	2,717.5	3,833.6	6,587.4	10,218.0	22,134.8	-	-	-	-
Miscellaneous	49.4	225.4	494.5	531.9	727.1	913.6	1,135.0	1,670.5	2,549.2	4,888.4	9,014.0	16,736.2	-	-	-	-
Supporting Activities and Industrial Services	-	-	-	-	-	-	-	-	-	-	11,441.5	11,441.5	-	-	-	-
TOTAL	3,755.2	19,056.5	30,633.0	38,042.6	55,237.2	69,624.8	87,582.9	124,063.5	185,925.5	318,144.9	526,663.5	1,167,663.0	1,694,940.7	2,464,443.7	3,960,361.1	8,320,718.6

Source: Anuário Estadístico do Brasil, IBGE, several issues.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.3 MANUFACTURING VALUE ADDED AT CURRENT PRICES

(Cr$ millions) 1/

Industries	1962	1966	1967	1968	1969	1972	1973	1974	1976	1977	1978	1979	1980
Non-metallic Minerals	85.8	777.0	1,071.3	1,628.7	2,092.4	4,470.8	6,808.3	11,105.2	28,061.2	42,292	63,498.9	107,192.7	282,151.2
Metallurgy	212.2	1,742.3	2,012.0	3,173.2	4,108.0	10,402.9	16,262.2	30,044.9	55,618.6	79,280	114,272.9	197,737.4	448,702.3
Machinery	54.4	707.4	974.9	1,480.1	2,155.2	6,306.0	11,871.3	19,119.1	48,141.0	65,902	90,809.2	149,569.2	374,247.6
Electrical and Communications Equipment	94.6	933.5	1,174.1	1,761.9	2,249.7	4,685.8	7,809.3	12,008.7	27,492.9	37,172	57,875.0	100,598.1	218,402.5
Transport Equipment	174.5	1,464.8	1,614.0	2,176.1	3,105.8	7,160.5	10,314.3	14,872.1	34,011.5	49,864	76,178.0	121,783.8	257,659.6
Wood	43.3	380.8	414.5	676.8	939.1	1,951.3	4,381.6	6,617.6	12,113.1	n.a.	n.a.	n.a.	n.a.
Furniture	33.8	261.1	324.7	448.7	568.2	1,434.9	2,684.2	3,815.7	9,154.4	n.a.	n.a.	n.a.	n.a.
Paper	49.2	378.6	620.7	742.6	952.7	2,276.0	4,055.2	7,734.0	11,937.9	16,140	25,720.7	45,322.0	97,302.4
Rubber	33.7	324.4	339.0	593.6	748.0	1,676.7	2,447.4	3,762.2	7,222.4	10,255	14,831.3	23,417.1	60,702.9
Leather	17.0	130.7	162.2	214.2	226.0	699.3	953.7	1,013.5	2,672.2	n.a.	n.a.	n.a.	n.a.
Chemicals	145.5	1,930.7	2,087.0	2,995.1	3,718.9	8,439.7	14,320.8	23,388.2	59,342.1	86,560	123,716.2	284,541.8	681,344.0
Pharmaceutical Products	51.2	648.4	801.9	1,166.7	1,399.5	3,018.7	4,447.5	5,106.2	11,727.3	15,079	20,467.5	46,813.0	122,246.1
Perfumery	15.6	256.3	312.0	432.1	583.2	1,131.1	1,758.7	2,605.5	4,959.1	7,284	10,571.9	25,328.0	63,920.9
Plastic Products	27.1	174.9	328.4	463.0	641.7	1,550.1	3,181.9	5,358.2	11,329.6	15,247	21,150.7	36,581.4	107,843.4
Textiles	235.8	1,713.8	1,892.1	2,992.4	3,625.4	7,957.3	12,647.9	15,261.0	32,149.9	38,789	58,149.5	88,313.6	190,417.4
Apparel	57.5	501.8	600.2	820.3	1,017.3	2,240.7	4,887.8	7,370.0	20,420.4	23,424	35,775.8	53,410.5	114,513.8
Food	226.3	2,289.6	2,782.4	3,429.3	4,643.1	10,335.4	15,802.7	22,228.2	51,330.2	76,760	124,694.6	240,578.3	478,412.1
Beverages	45.0	390.7	490.8	704.9	959.3	2,043.7	2,867.7	3,726.9	7,925.0	13,035	19,721.6	33,222.4	74,620.1
Tobacco	31.9	174.2	282.6	389.7	526.2	1,100.8	1,600.8	2,273.4	4,930.7	9,231	11,866.4	21,784.4	35,710.6
Publishing and Printing	42.7	418.9	586.5	814.5	1,069.8	2,648.5	4,401.4	6,632.3	14,944.2	n.a.	n.a.	n.a.	n.a.
Miscellaneous	30.3	330.0	355.9	481.4	614.7	1,597.8	2,738.3	5,179.9	9,969.6	n.a.	n.a.	n.a.	n.a.
Supporting Activity and Industrial Services	-	-	-	-	-	-	-	-	6,794.3	-	-	-	-
TOTAL	1,707.4	15,932.1	19,227.4	27,545.2	35,944.6	83,148.2	136,243.1	209,223.2	472,240.7	662,720	1,005,218.5	1,881,053.1	4,250,129.4

Sources: 1962-1976 data: IBGE, Anuário Estatístico do Brasil, various issues.
1976-1980 data: Estimations of IBGE - draft.

1/ IBGE estimations correspond to annual variations in real terms. In order to complete the series from 1976 on, the real values were transformed in nominal values using the annual variations of industrial prices computed by the Fundação Getúlio Vargas and published in Conjuntura Economica.

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Table 2.4 INDICES OF INDUSTRIAL PRICES

(1970 = 100) 1/

Industry	1962 2/	1965 2/	1968 2/	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Non-metallic Minerals	-	-	-	n.a.	n.a.	n.a.	100.0	138.5	191.0	270.1	375.7	534.2	854.2	2,110.7
Metallurgy	6.1	32.8	71.2	100.0	113.6	128.0	150.0	208.3	267.4	365.5	475.9	645.3	1,009.9	2,044.0
Machinery	6.1	32.8	71.2	100.0	114.0	132.4	147.4	178.1	228.9	321.4	465.7	612.9	942.0	2,042.2
Electrical and Communications Equipment	6.1	32.8	71.2	100.0	109.4	122.2	140.1	170.9	210.3	302.8	402.7	573.4	925.5	1,912.1
Transport Equipments	6.1	32.8	71.2	100.0	115.4	129.9	142.7	170.1	226.5	292.9	443.7	595.0	903.2	1,873.2
Wood	6.1	32.8	71.2	100.0	131.1	195.1	279.6	344.7	328.1	530.2	672.8	1,116.2	2,270.4	5,846.3
Furniture	6.1	32.8	71.2	100.0	113.4	135.3	159.6	210.0	266.4	392.4	530.5	727.8	1,192.1	2,640.5
Paper	6.1	32.8	71.2	100.0	124.2	141.1	168.5	267.7	313.7	424.4	563.6	804.8	1,258.7	2,465.8
Rubber	6.1	32.8	71.2	100.0	116.4	136.9	150.0	179.5	254.9	356.4	516.4	699.2	1,036.2	2,448.5
Leather	6.1	32.8	71.2	100.0	125.7	179.2	263.2	269.4	286.1	462.3	606.1	1,137.6	1,979.4	2,848.4
Chemicals	6.1	32.8	71.2	100.0	116.8	140.3	158.8	247.0	336.1	481.3	661.8	864.9	1,841.4	4,248.1
Plastic Products	6.1	32.8	71.2	100.0	105.5	111.9	122.0	166.0	222.0	295.0	401.5	508.3	840.7	1,366.1
Textiles, Apparel and Footwear	6.1	32.8	71.2	100.0	118.6	133.0	161.0	181.4	198.3	297.6	357.4	505.7	725.2	1,464.2
Food	6.1	32.8	71.2	100.0	124.6	141.5	158.5	208.5	280.0	364.0	512.9	809.9	1,522.6	2,827.5
Beverages	6.1	32.8	71.2	100.0	118.5	140.3	162.1	204.0	275.8	385.0	562.5	802.1	1,299.4	2,841.8
Tobacco	6.1	32.8	71.2	100.0	118.4	147.2	181.6	212.0	273.6	378.1	671.0	812.0	1,431.5	2,367.7
Publishing and Printing	6.1	32.8	71.2	100.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Miscellaneous	6.1	32.8	71.2	100.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Supporting Activities and Industrial Services	6.1	32.8	71.2	100.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Manufacturing Industries	6.1	32.8	71.2	100.0	117.5	136.2	156.3	202.2	261.6	369.3	503.8	713.9	1,252.9	2,631.1

Source: Fundacação Getúlio Vargas - Conjuntura Econômica - several issues.

1/ The data used to construct these indices has 1969 as base; the necessary transformations have been done to transform those on 1970 base indices.

2/ Because the lack of disaggregated data, the industrial wholesale price has been used for all the manufacturing industries.

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Table 2.5 INDUSTRIAL CAPACITY UTILIZATION, 1968-1981

Industry	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Non-metallic Minerals	86.0	90.5	90.3	90.3	90.8	94.3	92.8	89.3	91.3	89.3	89.3	88.8	90.5	83.0
Metallurgy	88.0	85.3	88.8	89.8	91.3	92.3	91.3	88.0	88.5	87.3	87.5	89.0	89.3	84.0
Machinery	77.0	78.8	84.0	87.5	86.8	92.3	86.5	86.0	85.0	78.3	77.8	77.8	80.0	76.0
Electrical and Communications Equipment	82.0	78.8	80.3	82.0	86.3	88.3	86.5	85.0	86.3	79.7	78.3	79.3	79.3	73.0
Transport Equipment	76.0	85.5	82.5	90.0	92.0	94.0	91.3	89.3	88.8	79.0	82.8	83.5	86.0	71.0
Wood	-	-	-	-	-	-	-	-	-	79.0	79.5	84.0	85.5	77.0
Furniture	-	-	-	76.0	82.0	84.0	81.3	78.8	79.3	72.7	75.5	78.3	79.0	73.0
Paper	89.0	91.8	91.0	89.3	92.5	93.8	87.8	84.0	88.5	86.7	85.3	88.0	91.3	87.0
Rubber	90.0	81.0	95.3	95.3	95.0	95.5	94.5	95.5	97.0	95.7	94.5	95.3	95.0	93.0
Leather	-	-	-	-	87.7	83.5	79.3	87.0	92.3	90.7	90.3	79.5	77.3	76.0
Chemicals	-	-	84.8	-	-	92.8	90.8	89.3	92.8	88.3	86.0	90.0	87.0	81.0
Pharmaceutical Products	80.0	86.3	85.5	84.8	85.3	86.3	88.0	86.5	85.8	85.0	81.8	83.3	83.0	83.0
Perfumery	75.0	86.0	80.3	84.5	83.8	91.3	84.3	80.3	88.3	86.7	87.3	86.5	87.8	83.0
Plastic Products	83.0	81.5	81.8	82.0	82.5	83.5	79.3	75.3	76.8	75.0	82.0	80.5	81.8	72.0
Textiles	87.0	89.5	90.8	-	90.3	93.5	89.8	89.3	90.8	85.3	87.8	88.5	89.5	82.0
Apparel	81.0	82.0	85.3	88.0	86.8	90.8	86.0	87.8	89.3	85.7	89.5	88.5	87.8	85.0
Food	-	-	-	77.8	81.0	80.3	80.8	84.5	85.8	82.3	79.8	77.5	75.3	72.0
Beverages	82.0	87.5	86.0	87.3	89.3	89.8	87.0	88.3	89.0	84.7	84.0	83.0	83.6	87.0
Tobacco	91.0	86.5	77.3	75.8	74.5	87.0	93.0	91.3	93.8	90.3	90.8	86.3	82.3	93.0
Publishing and Printing	-	-	-	-	-	-	-	-	-	-	86.3	78.3	76.3	67.0
Miscellaneous	-	-	-	-	-	-	-	-	-	-	82.5	81.8	83.3	83.0
General	83.0	85.0	85.8	86.8	87.8	90.5	88.0	87.0	88.5	83.3	83.7	83.6	83.8	78.0

Source: Fundação Getúlio Vargas, Conjuntura Econômica, July 1981.

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Table 2.6 ECONOMICALLY ACTIVE POPULATION BY SECTOR

(percentages)

	1960	1970	1973	1976
Primary activities	54.0	45.8	40.8	36.2
Manufacturing Industry	8.6	11.4	13.6	15.0
Construction Industry	3.4	6.0	5.5	6.7
Other Industries	0.9	1.2	1.1	1.5
Commerce	6.5	7.9	9.0	9.3
Services	12.1	12.7	13.9	13.0
Transport and communications	4.7	4.4	4.1	3.9
Public administration	3.1	4.0	3.4	3.5
Other activities	6.7	6.6	8.6	10.9
Total	100.0	100.0	100.0	100.0

Source: IBGE, Anuário Estatístico do Brasil - 1980, March 1981.

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Table 2.7 INDUSTRIAL EMPLOYMENT, 1962-1980

Industries	1962	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1976	1977	1978	1979	1980
Non-metallic Minerals	146.0	120.7	137.3	135.1	147.0	153.6	155.8	160.4	172.2	211.0	226.2	264.7	285.2	295.1	293.1	295.6
Metallurgy	231.7	231.2	210.5	215.6	233.5	228.4	249.1	266.1	283.4	355.0	405.3	455.5	491.0	501.4	520.9	535.5
Machinery	80.1	72.2	88.3	90.7	103.6	97.3	107.5	133.3	181.2	289.3	337.0	396.9	387.9	388.7	395.9	444.0
Electrical and Communications Equipment	88.3	72.5	94.9	105.4	114.8	106.3	106.8	124.5	133.4	175.1	195.6	193.1	201.8	211.3	227.5	231.7
Transport Equipment	138.5	132.1	134.1	131.2	150.6	153.2	154.3	184.4	185.5	214.1	204.4	221.5	224.4	231.1	247.6	258.7
Wood	80.3	72.6	77.6	75.9	84.7	68.8	85.1	85.0	98.0	148.7	162.4	180.3	n.a.	n.a.	n.a.	n.a.
Furniture	58.0	44.0	55.1	56.1	58.1	61.8	64.0	65.0	72.1	105.7	108.2	128.7	n.a.	n.a.	n.a.	n.a.
Paper	51.0	48.6	48.3	54.2	54.1	53.3	56.4	61.7	70.8	86.6	91.6	89.7	92.8	97.4	103.2	109.5
Rubber	28.0	23.8	25.3	24.9	29.4	24.4	28.5	30.5	33.3	47.0	50.2	51.8	52.5	51.0	51.6	53.7
Leather	21.5	22.2	20.5	22.4	23.8	22.4	23.0	24.4	25.4	29.5	28.6	37.8	n.a.	n.a.	n.a.	n.a.
Chemicals	90.5	77.8	100.1	98.5	104.2	97.9	103.0	117.3	116.6	137.1	139.0	134.0	134.5	138.1	138.8	144.7
Pharmaceutical Products	33.1	34.1	37.7	39.4	35.8	34.8	35.2	36.8	41.8	45.2	47.0	45.4	47.0	45.1	46.1	45.0
Perfumery	13.9	12.3	15.6	15.9	15.4	16.9	17.8	18.7	19.9	24.1	24.2	24.9	25.7	27.3	27.9	28.6
Plastic Products	19.5	18.5	20.4	26.6	30.3	30.1	32.5	37.7	43.3	73.3	76.0	86.9	88.0	89.5	98.4	101.6
Textiles	365.8	307.1	299.9	290.0	308.3	288.5	297.7	310.6	319.7	370.9	354.3	350.8	347.3	351.7	361.4	361.7
Apparel	99.8	91.6	104.3	107.1	109.4	111.0	122.1	133.1	138.3	221.0	239.1	308.6	311.1	321.9	343.2	349.7
Food	239.7	246.8	233.7	232.6	239.9	259.6	272.5	278.5	314.4	399.2	412.1	448.8	473.5	456.5	463.3	479.1
Beverages	45.3	43.3	48.7	47.0	48.5	47.5	47.5	51.1	51.6	57.0	51.7	50.6	56.1	59.4	60.6	60.2
Tobacco	16.0	17.4	19.4	18.9	16.6	16.1	15.1	16.2	16.6	19.5	19.7	23.1	23.1	24.0	25.9	25.4
Publishing and Printing	62.7	57.8	67.3	69.9	74.5	77.2	80.6	86.9	84.5	112.3	111.8	127.6	n.a.	n.a.	n.a.	n.a.
Miscellaneous	40.7	33.6	46.0	43.1	43.1	42.4	43.2	47.8	68.8	77.6	122.3	87.8	n.a.	n.a.	n.a.	n.a.
Supporting Activites and Industrial Services	-	-	-	-	-	-	-	-	-	-	-	77.1	n.a.	n.a.	n.a.	n.a.
TOTAL	1,950.5	1,780.2	1,885.1	1,902.5	2,026.3	2,011.5	2,098.9	2,270.0	2,467.0	3,199.3	3,396.8	3,785.8	3,904.3	3,960.9	4,091.2	4,215.6

Source: IBGE - Anuário Estatístico do Brasil - several issues. Data for 1977 onwards - estimation done based on indexes of employment published by IBGE.

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Table 2.8 NUMBER OF ESTABLISHMENTS AND AVERAGE PLANT SIZE
(Census Data)

	No. of Establishments			Employment			Average Plant Size		
	1960	1970 (a)	1975	1960	1970 (thousands)	1975 (b)	1960	1970	1975 (c) = (b/a)
Non-Metallic Minerals	18,146	25,367	30,983	163.5	236.5	320.3	9	9	10
Metallurgy	4,850	9,681	13,272	174.6	266.9	442.7	36	28	33
Machinery	1,692	6,744	8,532	61.5	180.4	390.3	36	27	46
Electrical and Communications Equipment	982	3,155	2,797	56.6	115.5	176.7	58	36	63
Transport Equipment	2,097	3,319	4,359	79.5	158.3	222.1	38	48	52
Wood	11,196	14,812	17,907	87.8	136.0	203.9	8	9	11
Furniture	8,160	13,127	11,747	63.4	105.3	139.4	8	8	12
Paper	764	1,178	1,537	41.0	67.0	85.7	54	57	57
Rubber	339	974	1,234	20.2	32.9	46.1	67	33	38
Leather	2,350	2,032	1,573	24.7	26.4	36.2	10	13	23
Chemicals	1,774	2,645	3,443	78.7	104.4	126.5	44	40	37
Pharmaceutical Products	504	522	516	27.3	30.8	33.0	55	62	66
Perfumery	1,071	1,060	983	14.7	19.2	21.6	13	19	22
Plastic Products	295	1,311	2,083	9.5	42.6	79.6	32	33	38
Textiles	4,272	5,309	6,137	328.2	342.8	333.8	76	65	55
Apparel	7,639	8,613	11,167	97.9	164.5	302.2	13	19	27
Food	33,534	46,815	48,205	267.5	372.4	500.0	8	8	10
Beverages	3,044	4,798	3,076	43.9	58.6	53.7	14	12	17
Tobacco	278	144	205	13.2	14.5	21.7	44	100	106
Publishing and Printing	3,389	5,526	6,892	60.4	97.1	127.5	18	18	18
Miscellaneous	2,218	3,755	4,000	37.7	62.5	84.5	17	16	21
Industrial Supporting Activities and Services	-	-	3,179	-	-	-	-	-	-
TOTAL	108,593	160,887	183,827	1,750.9	2,634.6	3,816.9	16	16	21

Source: IBGE, Industrial Census 1960, 1970 and 1975

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.9 DISTRIBUTION OF INDUSTRIAL EMPLOYMENT, 1965-1980

(Percentages)

Industries	1965	1970	1974	1980
Non-Metallic Minerals	6.8	7.4	6.7	7.0
Metallurgy	13.0	11.9	11.9	12.7
Machinery	4.0	5.1	9.9	10.5
Eletrical and Communications Equipment	4.1	5.1	5.8	5.5
Transport Equipment	7.4	7.4	6.0	6.1
Wood	4.1	4.1	4.8	n.a.
Furniture	2.5	3.0	3.2	n.a.
Paper	2.7	2.7	2.7	2.6
Rubber	1.3	1.4	1.5	1.3
Leather	1.2	1.1	0.8	n.a.
Chemicals	4.4	5.0	4.1	3.4
Pharmaceutical Products	1.9	1.7	1.4	1.1
Perfumery	0.1	0.1	0.7	0.7
Plastic Products	1.0	1.5	2.2	2.4
Textiles	17.3	14.2	10.4	8.6
Apparel	5.1	5.8	7.0	8.3
Food	13.9	13.0	12.1	11.4
Beverages	2.4	2.3	1.5	1.4
Tobacco	1.0	0.7	0.6	0.6
Publishing and Printing	3.2	3.8	3.3	n.a.
Miscellaneous	1.9	2.0	3.6	n.a.
Supporting Activities and Industrial Services	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0

Source: Table 2.7

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.10 INDUSTRIAL EMPLOYMENT AND WAGES, 1968-1980

	1968		1970		1973		1976		1980	
	Wages (Cr$ million)	Employment (thousands)	Wages (Cr$ million)	Employment (thousands)	Wages (Cr$ million)	Employment (thousands)	Wages (Cr$ million)	Employment (thousands)	Wages (Cr$ million)	Employment (thousands)
Non-metallic minerals	386.9	147.0	617.1	155.8	1,690.5	211.0	5,311.8	264.7	37,015.8	295.6
Metallurgy	910.6	233.5	1,462.4	249.1	3,835.8	355.0	12,830.9	455.5	90,708.0	535.5
Machinery	464.7	103.7	717.2	107.5	3,914.0	289.3	14,854.5	396.9	96,479.9	444.0
Electrical and Communications Equipment	484.3	114.8	691.2	106.8	1,924.4	175.1	5,855.0	193.1	40,885.5	231.7
Transport Equipment	775.5	150.6	1,293.3	154.3	3,103.6	214.1	7,462.5	221.5	49,945.8	258.7
Wood	164.7	84.7	257.2	85.1	862.0	148.7	2,899.9	180.3	n.a.	n.a.
Furniture	153.7	58.1	237.0	64.0	806.8	105.7	2,554.1	128.7	n.a.	n.a.
Paper	184.6	54.1	280.7	56.4	873.2	86.6	2,310.7	89.7	16,426.8	109.5
Rubber	117.6	29.4	157.7	28.5	498.9	47.0	1,348.1	51.8	10,554.2	53.7
Leather	61.3	23.8	82.4	23.0	215.7	29.5	650.0	37.8	n.a.	n.a.
Chemicals	511.8	104.2	833.3	103.0	2,120.2	137.1	4,875.3	134.0	34,541.5	144.7
Pharmaceutical Products	212.4	35.8	305.9	35.2	876.4	45.2	1,841.0	45.4	12,677.1	45.0
Perfumery	65.9	15.9	104.7	17.8	313.4	24.1	744.9	24.9	4,526.8	28.6
Plastic Products	92.5	30.3	160.0	32.5	673.4	73.3	2,130.3	86.9	13,163.1	101.6
Textiles	779.8	308.3	1,099.9	297.7	2,805.8	370.9	6,837.4	350.8	48,436.1	361.7
Apparel	252.1	109.4	361.0	122.1	1,379.3	221.0	5,095.2	308.6	32,909.9	349.7
Food	596.6	239.9	987.5	272.5	2,848.3	399.2	7,936.7	448.8	52,961.6	479.1
Beverage	159.2	48.5	232.2	47.5	545.7	57.0	1,225.6	50.6	6,608.4	60.2
Tobacco	55.8	16.6	75.9	15.1	184.1	19.5	484.4	23.1	3,060.8	25.4
Publishing and Printing	308.4	74.5	516.6	80.6	1,488.0	112.3	4,352.4	126.6	n.a.	n.a.
Miscellaneous	134.0	43.1	197.5	43.2	724.7	77.6	1,953.3	87.8	n.a.	n.a.
Supporting Activities and Industrial Services	-	-	-	-	-	-	-	77.1	n.a.	n.a.
TOTAL	6,873.4	2,026.3	10,671.0	2,098.9	31,684.0	3,199.3	97,039.2	3,785.8	665,494.8	4,215.6

Source: IBGE, Brazil - Series Estatísticas Retrospectivos - 1977 and Table 2.7

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Table 2.11 AVERAGE REAL WAGES PER EMPLOYEE, 1970-1980
(1977 prices)

Industry	1970	1973	1976	1980
Non-metallic Minerals	22,813	26,886	28,844	32,340
Metallurgy	31,096	36,258	40,490	43,747
Machinery	35,339	45,399	53,796	56,120
Electrical and Communications Equipment	34,280	36,879	43,583	45,573
Transport Equipment	44,396	48,644	48,427	49,862
Wood	16,006	19,453	23,119	n.a.
Furniture	19,613	25,614	28,525	n.a.
Paper	26,361	33,836	37,027	38,744
Rubber	29,306	35,621	37,408	50,759
Leather	18,978	24,537	24,718	n.a.
Chemicals	42,850	51,895	52,297	61,651
Pharmaceutical Products	46,028	65,063	58,288	72,756
Perfumery	31,155	43,638	43,001	40,878
Plastic Products	26,075	30,829	35,236	33,460
Textiles	19,571	25,386	28,016	34,585
Apparel	15,662	20,943	23,733	24,305
Food	19,195	23,943	25,419	28,550
Beverages	25,890	32,128	34,815	28,351
Tobacco	26,621	31,681	30,017	31,122
Publishing and Printing	33,946	44,463	49,030	n.a.
Miscellaneous	24,216	31,339	31,978	n.a.
TOTAL	26,928	33,232	36,843	40,771

Source: Table 2.10
Nominal wages have been transformed into real wages using CPI for Rio de Janeiro - Conjuntura Econômica, April 1981.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.12 INDUSTRIAL INVESTMENT, 1969-1979

Industry	1969	1970	1973	1974	1975	1976	1977	1978	1979*
Non-metallic minerals	158	338	448	639	975	1,294	3,599	4,374	6,953
Metallurgy	181	258	2,938	6,284	8,664	10,503	13,413	18,513	31,271
Machinery	64	76	393	724	1,406	1,761	2,680	4,385	3,306
Electrical and Communications Equipment	68	95	863	1,028	1,270	1,495	2,359	3,717	4,701
Transport Equipment	448	554	2,143	2,832	3,978	4,570	6,509	10,374	15,280
Wood	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	278	499	900
Furniture	5	9	49	115	124	113	118	195	185
Paper	2	132	230	375	923	2,332	4,930	5,006	3,818
Rubber	n.a.	n.a.	136	148	392	393	448	373	671
Leather	n.a.	n.a.	12	20	63	96	118	165	215
Chemicals	246	328	1,719	2,455	2,984	3,325	11,275	14,684	19,492
Pharmaceutical products	48	52	83	144	366	747	701	470	830
Perfumery	18	17	82	129	181	188	400	715	1,398
Plastic products	25	26	103	170	291	314	360	553	945
Textiles	244	379	565	828	1,332	1,459	1,426	2,101	2,649
Apparel	62	57	123	211	275	425	257	456	334
Food	123	190	717	1,064	1,177	1,813	3,157	4,573	6,445
Beverages	48	104	175	325	448	550	1,158	2,000	2,307
Tobacco	40	68	56	82	250	483	.641	713	956
Printing and Publishing	n.a.	n.a.	-	-	-	-	70	178	242
Miscallenous	-	n.a.	46	129	-	-	793	639	1,155
Total	1,855(a)	2,699(a)	10,881	17,702	25,100	31,860	54,691	74,656	104,056

*Preliminary data.

(a) Total investment includes the amounts of investment made by all the industries included in the sample. Therefore, the total investment figure is higher than the sume of the investment made by the industries listed in the table.

Source: Fundação Getúlio Vargas, Conjuntura Econômica - Jan. 1980, Dec. 1977, Oct. 1975, June 1971.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.13 STRUCTURE OF INDUSTRIAL INVESTMENT

(Percentages)

	1969	1970	1973	1974	1975	1976	1977	1978	1979
Non-metallic minerals	8.5	12.5	4.1	3.6	3.9	4.1	6.6	5.9	6.7
Metallurgy	9.8	9.6	27.1	35.5	34.5	33.0	24.6	24.8	30.1
Machinery	3.4	2.8	3.6	4.1	5.6	5.5	4.9	5.8	3.2
Electrical and communications equipment	3.7	3.5	7.9	5.8	5.0	4.7	4.3	5.0	4.5
Transport Equipment	24.2	20.5	19.7	16.0	15.8	14.3	11.9	13.9	14.7
Wood	-	-	-	-	-	-	0.5	0.7	0.9
Furniture	0.3	0.3	0.4	0.7	0.5	0.4	0.2	0.3	0.2
Paper	0.1	4.9	2.1	2.1	3.7	7.3	9.0	6.7	3.7
Rubber	-	-	1.3	0.8	1.6	1.2	0.8	0.5	0.6
Leather	-	-	0.1	0.1	0.2	0.3	0.2	0.2	0.2
Chemicals	13.3	12.2	15.8	13.9	11.9	10.4	20.6	19.7	18.7
Pharmaceutical products	2.6	1.9	0.8	0.8	1.5	2.4	1.3	0.6	0.8
Perfumery	1.0	0.6	0.8	0.7	0.7	0.6	0.7	1.0	1.3
Plastic products	1.3	1.0	0.9	1.0	1.2	1.0	0.7	0.7	0.9
Textiles	13.2	14.0	5.2	4.7	5.3	4.6	2.6	2.8	2.5
Apparel	3.3	2.1	1.1	1.2	1.1	1.3	0.5	0.6	0.3
Food	6.6	7.0	6.6	6.0	4.7	5.7	5.8	6.1	6.2
Beverages	2.6	3.9	1.6	1.8	1.8	1.7	2.1	2.7	2.2
Tobacco	2.2	2.5	0.5	0.5	1.0	1.5	1.2	1.0	0.9
Printing and Publishing	-	-	-	-	-	-	0.1	0.2	0.2
Miscellaneous	-	-	0.4	0.7	-	-	1.4	0.8	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Table 2.12

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.14 INDUSTRIAL INVESTMENT APPROVED BY CDI
(Cr$ millions)

Industrial Sector	1977		1978		1979		1980	
	Amount	%	Amount	%	Amount	%	Amount	%
Capital Goods	7,157	18.3	3,671	10.3	3,555	8.0	1,899	7.6
Metallurgy and Intermediate Metal Products	10,699	27.3	16,829	47.1	18,646	41.8	724	2.9
Chemicals, Petrochemicals and Pharmaceuticals	10,807	27.6	5,471	15.3	9,771	21.9	8,557	34.1
Non-Metal Intermediate Products and Industry of Cement, Paper and Cellulose	6,239	16.0	9,722	16.0	9,590	21.5	10,704	42.6
Automotriz and Spare Parts	2,000	5.1	2,741	7.7	1,741	3.9	1,542	6.1
Consumer Goods	2,217	5.7	1,288	3.6	1,309	2.9	1,677	6.7
TOTAL	39,119	100.0	35,722	100.0	44,612	100.0	25,102	100.0

Source: CDI, MIC, Relatório Anual 1979 and 1980.

Table 2.15 INVESTMENTS APPROVED BY FINAME, 1965-1980
(Cr$ millions)

	1965		1968		1970		1973		1975		1976		1977		1978		1979		1980	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Basic Inputs	3.3		20.5		51.5		354.8		2,025.2		10,891.0		14,493.7		21,778.0		20,875.0		40,276.0	
Siderurgy	-		-		-		-		-		6,520.8		12,868.0		17,756.0		1,443.0		3,681.0	
Metallurgy	2.1		13.2		18.5		211.0		666.0		416.4		401.1		816.0		1,443.0		3,681.0	
Chemical and Fertilizer	0.9		3.1		18.6		22.8		647.0		1,257.0		456.2		1,946.0		1,762.0		6,305.0	
Non-Metallic Minerals	-		2.2		5.2		85.1		421.8		920.4		564.3		765.0		1,399.0		3,578.0	
Paper and Cellulose	0.3		2.0		9.2		35.9		290.4		1,776.4		204.1		495.0		643.0		2,534.0	
Equipment	20.4		63.1		94.9		82.5		417.0		1,112.0		928.1		1,249.0		2,483.0		4,140.0	
Mechanic	8.6		22.1		24.3		51.9		277.2		673.5		706.6		948.0		1,633.0		2,756.0	
Transport	11.8		41.0		70.6		30.6		139.8		238.5		221.5		301.0		850.0		1,384.0	
Other Industries	20.1		62.1		116.8		362.8		951.6		2,459.0		1,846.3		3,212.0		8,616.0		11,946.0	
Textiles, Apparel, Footwear	2.7		22.4		25.6		82.4		346.8		690.0		569.5		820.0		1,540.0		2,709.0	
Food Products	5.5		26.2		54.7		138.9		338.8		769.8		901.2		1,099.0		1,885.0		3,824.0	
Printing and Publishing	-		-		-		3.3		9.4		28.2		67.2		252.0		469.0		677.0	
Others	11.9		13.5		36.5		138.2		256.6		971.0		308.4		1,041.0		4,722.0		4,735.0	
TOTAL	43.8		145.7		263.2		800.1		3,393.8		14,462.0		17,268.1		26,239.0		31,974.0		56,363.0	

Source: ENDE - Boletim de Informação, Assessoria de Estatística e Avaliação Econômica, February 1981.

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Table 2.16 INDUSTRIAL FINANCING BY BNDE, 1965-1980
(Cr$ millions)

Sectors	1965		1968		1970		1973		1975		1976		1977		1978		1979		1980	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Basic Inputs	265.4	80.9	282.0	58.4	608.4	55.8	2,936.7	54.4	17,247.1	65.6	38,939.4	74.4	25,605.4	76.9	46,362.0	79.2	61,038.0	69.6	99,028.0	66.7
Siderurgy	243.3	74.2	56.9	11.8	146.6	13.5	601.7	11.1	6,963.1	26.5	13,433.4	25.7	19,087.9	57.3	27,268.0	46.6	29,171.0	33.2	50,432.0	3400
Metallurgy	4.2	1.3	83.0	17.2	39.1	3.6	800.4	14.8	2,223.5	8.5	4,455.5	8.5	1,489.5	4.5	5,696.0	9.7	5,843.0	6.7	17,683.0	11.9
Chemical and Fertilizers	15.5	4.7	10.6	2.2	303.5	27.9	834.3	15.5	4,645.0	17.7	10,401.3	19.9	3,182.9	9.6	7,761.0	13.3	15,104.0	17.2	12,778.0	8.6
Cellulose and Paper	0.8	0.2	104.4	21.6	58.6	5.4	252.4	4.7	1,915.6	7.3	5,986.4	11.4	712.4	2.1	3,376.0	5.8	7,541.0	8.6	8,764.0	5.9
Non-mineral Products	1.6	0.5	27.1	5.6	60.6	5.6	447.9	8.3	1,499.9	5.7	4,662.8	8.9	1,132.2	3.4	2,261.0	3.9	3,379.0	3.9	9,371.0	6.3
Equipment	35.0	10.7	89.6	18.6	173.5	15.9	572.2	10.6	4,648.8	17.7	5,413.1	10.3	2,512.8	7.5	3,142.0	5.4	6,375.0	7.3	10,605.0	7.1
Electrical and Mechanical	21.5	6.6	43.2	9.0	91.1	8.4	268.9	5.0	3,022.4	11.5	4,531.8	8.7	2,109.5	6.3	2,466.0	4.2	5,386.0	6.1	8,070.0	5.4
Transport	13.5	4.1	46.4	9.6	82.4	7.5	303.3	5.6	1,626.4	6.2	881.3	1.6	403.3	1.2	676.0	1.2	989.0	1.2	2,535.0	1.7
Other Industries	27.5	8.4	117.0	24.2	307.6	28.2	1,891.1	35.0	4,408.5	16.7	7,995.0	15.3	5,188.6	15.6	9,046.0	15.5	20,235.0	23.1	38,717.0	26.1
Textile, Apparel and Shoes	4.7	1.4	39.2	8.1	112.4	10.3	277.8	5.1	1,078.5	4.1	1,232.2	2.4	973.2	2.9	2,119,0	3.6	3,806.0	4.4	5,857.0	3.9
Food	10.2	3.1	47.4	9.8	101.8	9.3	404.9	7.5	1,427.1	5.4	2,903.3	5.5	2,132.4	6.4	2,619.0	4.5	5,384.0	6.1	7,225.0	4.9
Others	12.6	3.9	30.4	6.3	93.4	8.6	1,208.4	22.4	1,902.9	7.2	3,859.5	7.4	2,083.0	6.3	4,308.0	7.4	11,045.0	12.6	25,635.0	17.3
Total	327.9	100.0	482.6	100.0	1,089.5	100.0	5,400.0	100.0	26,304.4	100.0	52,347.5	100.0	33,306.8	100.0	58,550.0	100.0	87,648.0	100.0	148,350.0	100.0

Source: BNDE, Boletim de Informação, Assessoria de Estatística e Avaliação Econômica. February 1981.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.17 REGIONAL DISTRIBUTION OF INDUSTRY, 1940-1976

	Brazil	Southeast	South	Northeast	North	Center-West
A. Establishments						
1940	40,983	24,272	298	6,072	1,306 (3)	-
1950	82,154	43,543	9,333	15,603	1,217	1,067
1960	108,393	58,921	24,735	20,505	1,795	2,697
1970	160,887	83,553	37,146	29,944	3,117	7,125
1975	183,827	95,394	42,338	31,552	4,825	9,716
1976 (1)	90,527	58,785	18,754	8,854	1,372	2,762
B. Number of Persons Engaged (thousand)						
1940	815	542	110	146	17 (3)	-
1950	1,310	883	188	216	14	6
1960	1,750	1,253	261	208	20	15
1970 (2)	2,635	1,854	443	263	39	36
1975 (2)	3,817	2,585	713	387	71	61
1976 (1) (2)	3,786	2,666	697	290	30	40
C. Wages (Cr$ million)						
1940	1.8	1.4	0.2	0.2	0.0 (3)	-
1950	13	10	2	1	0.0	0.0
1960	142	115	16	9	1	0.6
1970 (2)	12,300	10,023	1,419	684	95	78
1975 (2)	59,327	46,546	8,326	3,266	586	603
1976 (1)	97,039	76,664	13,393	4,822	539	602
D. Value Added (Cr$ million)						
1940	6.4	4.7	0.9	0.6	0.2 (3)	-
1950	48	37	6	4	0.5	0.5
1960	542	429	67	37	6	3
1970 (2)	53,277	42,986	6,381	3,053	437	420
1975 (2)	306,934	234,147	45,258	20,380	3,911	3,238
1976 (1)	472,241	364,199	68,889	27,230	3,744	3,418

Source: FIBGE - Industrial Census of 1940, 1950, 1960, 1970, 1975 and Pesquisa Industrial 1976.

Notes: (1) This figure covers establishments which occupied five or more people or which value of industrial production was higher than 640 times the biggest minimum wage fixed in 1976.
(2) Exclusive data of District Federal in Center West, Paraiba in Northeast and Para in the North region.
(3) Includes data of Center-West region.

Table 2.18 REGIONAL STRUCTURE OF INDUSTRY, 1940-1976

	Brazil	Southeast	South	Northeast	North	Center-West
A. Establishments						
1940	100.0	59.2	22.8	14.8	3.2	[illegible]
1950	100.0	53.0	25.2	19.0	1.5	1.3
1960	100.0	54.3	22.8	18.9	1.6	2.5
1970	100.0	51.9	23.1	18.6	1.9	4.4
1975	100.0	51.9	23.0	17.2	2.6	5.3
1976	100.0	64.9	20.7	9.8	1.5	3.1
B. Number of Persons Engaged						
1940	100.0	66.5	13.5	17.9	2.1	-
1950	100.0	67.4	14.3	16.5	1.1	0.5
1960	100.0	71.4	14.9	11.9	1.1	0.9
1970	100.0	70.4	16.8	10.0	1.5	1.4
1975	100.0	67.7	18.7	10.1	1.9	1.6
1976	100.0	70.4	18.4	7.7	0.8	1.1
C. Wages						
1940	100.0	77.8	11.1	11.1	-	-
1950	100.0	76.9	15.4	7.7	0.0	0.0
1960	100.0	81.0	11.3	6.3	0.7	0.0
1970	100.0	81.5	11.5	5.6	0.8	0.6
1975	100.0	78.5	14.0	5.5	1.0	1.0
1976	100.0	79.0	13.0	5.0	0.6	0.6
D. Value Added						
1940	100.0	73.4	14.1	9.4	3.1	-
1950	100.0	77.1	12.5	8.3	1.0	1.0
1960	100.0	79.1	12.4	6.8	1.1	0.6
1970	100.0	80.7	12.0	5.7	0.8	0.8
1975	100.0	76.3	14.7	6.6	1.2	1.1
1976	100.0	77.1	14.6	5.8	0.6	0.7

Source: Table 2.17

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.19 INDUSTRIAL SHARES OF MAIN STATES IN EACH REGION, 1976

	Establishments		Persons Engaged		Wages		Value of Production	
	No.	% of Region	No	% of Region	Cr$ million	% of Region	Cr$ million	% of Region
Amazona (N)	262	18.9	24,809	39.5	447	41.7	6,996	52.7
Para (N)	925	66.8	31,284	49.9	464	43.3	4,673	35.2
Ceara (NE)	1,481	16.2	53,560	16.6	647	12.1	10,115	13.1
Pernambuco (NE)	2,495	27.2	102,711	31.8	1,779	33.3	25,160	32.6
Bahia (NE)	1,862	20.3	70,260	21.7	1,580	29.6	23,706	30.7
Rio de Janeiro (SE)	10,490	17.6	459,167	17.0	12,149	15.7	143,424	15.8
Sao Paulo (SE)	40,246	67.4	1,910,714	70.9	58,135	75.1	660,116	72.6
Rio Grande do Sul (S)	8,243	43.4	354,083	49.8	7,332	53.7	83,020	48.8
Nato Grosso do Sul (C-W)	737	30.0	13,032	25.0	177	19.6	2,969	22.7
Goias (C-W)	1,613	56.8	27,005	51.8	440	48.6	7,903	60.4

Source: FIBGE - Pesquisa Industrial 1976

N - North; NE - Northeast; SE - Southeast; S - South; C-W - Central-West.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.20 REGIONAL STRUCTURE OF INDUSTRIAL SUBSECTORS, 1974

Industry	Participation in the Total Employment (Percentages)			Participation in the Total Value of Production (Percentages)		
	Southeast	South	Northeast	Southeast	South	Northeast
Total Manufacturing Industry	71.9	17.4	7.6	76.8	14.7	6.2
Non-metallic Minerals	69.5	15.3	10.9	74.3	12.0	9.7
Metallurgy	82.2	12.4	4.5	88.3	7.2	4.1
Machinery	81.6	14.8	3.3	85.4	12.7	1.7
Electrical and Communications Equipment	87.0	7.4	4.2	88.3	6.0	3.4
Transport Equipment	88.2	9.5	1.5	94.4	4.8	0.6
Wood	24.3	59.5	4.7	28.5	60.4	2.9
Furniture	69.0	23.9	4.7	74.0	21.4	3.4
Paper	74.4	19.8	4.8	75.0	19.3	5.3
Rubber	83.4	9.3	4.3	90.7	4.8	1.7
Leather	46.2	44.1	8,1	48.1	45.0	6.0
Chemicals	73.3	13.2	11.9	73.7	16.6	8.9
Pharmaceutical Products	81.9	6.4	7.2	87.5	4.7	5.7
Plastic Products	80.6	13.6	5.3	80.6	13.6	5.3
Textiles	74.1	10.4	13.2	71.9	11.0	14.8
Apparel	63.9	26.9	7.9	23.0	-	7.3
Food	55.7	20.8	18.4	61.3	22.9	11.0
Beverages	57.1	19.8	15.7	65.6	19.5	11.1
Tobacco	33.4	36.0	18.7	50.3	31.8	7.3
Publishing and Printing	75.6	12.2	7.7	84.4	8.5	3.9
Miscellaneous	84.7	10.6	3.4	86.4	9.0	2.8

Source: Índice do Brasil 1980/81, Índice O Banco de dados, Rio de Janeiro, 1981. Basic data from IBGE - Pesquisa Industrial of 1974.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.21 REGIONAL DISTRIBUTION OF PROJECTS APPROVED BY CDI, 1971-1980
(Cr$ millions)

Regions and State	1971		1972		1973		1974		1975		1976		1977		1978		1979		1980	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
North	8	0.2	2	0.0	30	0.1	46	2.8	12	0.0	-	-	-	-	-	-	-	-	-	-
Northeast	500	12.8	409	3.3	1,037	5.1	3,712	12.7	1,476	9.0	6,505	7.2	1,489	3.8	3,437	9.6	5,498	12.4	6,238	24.9
Bahia	459	11.8	306	2.5	997	4.9	3,491	12.0	542	3.3	4,156	4.6	1,335	3.4	44	0.2	4,402	9.9	6,154	24.5
Pernambuco	29	0.7	30	0.2	28	0.2	77	0.3	164	1.0	328	0.4	58	0.1	2,797	7.8	1,096	2.5	-	-
Others	12	0.3	73	0.6	12	0.0	144	0.4	770	4.7	2,021	2.2	96	0.3	596	1.6	-	-	84	0.4
Southeast	2,978	76.5	11,402	93.0	17,773	86.9	22,563	77.4	13,050	79.2	78,200	86.2	26,271	67.2	22,913	64.0	25,723	57.7	17,488	69.7
Sao Paulo	1,775	45.6	6,284	51.2	10,443	51.0	11,446	39.3	8,467	51.4	22,064	24.3	15,664	40.0	7,585	21.2	7,863	17.6	9,223	36.7
Minas Gerais	648	16.6	2,213	18.0	5,507	26.9	5,862	20.1	1,580	9.6	35,868	39.5	1,422	3.6	7,620	21.3	14,629	32.8	4,085	16.3
Rio de Janeiro	525	13.5	2,892	23.6	1,778	8.7	2,814	9.7	2,910	17.7	20,247	22.3	9,185	23.6	6,041	16.9	3,231	7.2	2,864	11.4
Espirito Santo	30	0.8	20	0.2	45	0.2	2,441	8.3	87	0.5	21	000	-	-	1,666	4.6	-	-	1,316	5.3
South	313	8.0	437	3.6	1,438	7.0	2,719	9.3	1,844	11.2	6,054	6.7	11,067	26.3	7,055	19.8	11,356	25.5	675	2.9
Rio Grande do Sul	66	1.7	122	1.0	701	3.4	1,363	4.7	872	5.3	3,927	4.3	8,540	21.8	4,312	12.1	9,060	20.3	588	2.3
Others	247	6.3	315	2.6	737	3.6	1,356	4.6	972	5.9	2,127	3.4	2,527	4.5	2,693	7.7	2,296	5.2	87	0.4
Central West	4	0.1	5	0.0	208	1.0	118	0.4	68	0.4	-	-	292	0.7	2,345	6.5	2,034	4.6	702	2.8
BRAZIL	3,893	100.0	12,262	100.0	20,458	100.0	29,142	100.0	16,484	100.0	90,771	100.0	39,119	100.0	35,722	100.0	44,611	100.0	25,102	100.0

Sources: MIC - Conselho de Desenvolvimento Industrial
Indice do Brasil, 1980/81, Indica - O Banco de dados, Rio de Janeiro, 1981.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 2.22 REGIONAL DISTRIBUTION OF PROJECTS APPROVED BY BNDE, 1960-1980
(Cr$ millions)

Regions and State	1960		1965		1970		1973		1975		1977		1979		1980	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
North	-	-	0.9	0.3	12.2	0.7	160.2	2.2	284.1	0.8	360.5	0.8	3,409.0	2.5	5,786.0	1.9
Northeast	0.7	4.6	7.9	2.3	232.3	13.1	1,453.5	19.6	5,833.3	16.3	4,844.1	10.7	23,889.0	17.6	53,755.0	17.6
Bahia	0.6	4.0	3.9	1.1	54.5	3.1	910.1	12.3	4,241.2	11.8	2,536.5	5.6	14,616.0	10.8	29,755.0	9.7
Pernambuco	0.0	-	2.6	0.8	50.2	2.8	138.6	1.9	347.2	1.0	679.6	1.5	1,917.0	1.4	9,617.0	3.1
Others	0.1	0.6	1.4	0.4	127.6	7.2	404.8	5.4	244.9	3.5	1,628.0	2.6	7,356.0	5.4	14,383.0	4.7
Southeast	14.0	93.9	323.0	94.6	1,188.8	67.2	4,242.5	57.2	24,512.4	68.4	31,305.7	69.0	77,424.0	56.9	153,958.0	50.3
Sao Paulo	10.8	72.5	187.6	54.9	574.2	32.5	2,615.2	35.2	11,223.9	31.3	8,836.2	19.5	32,153.0	23.6	86,062.0	28.1
Minas Gerais	1.5	10.1	103.1	30.2	177.5	10.0	820.6	11.1	6,441.8	18.0	6,904.0	15.2	23,087.0	17.0	37,658.0	12.3
Rio de Janeiro	1.5	10.1	21.9	6.4	376.6	21.3	730.3	9.8	5,641.5	15.7	14,983.6	33.0	16,806.0	12.4	20,011.0	6.5
Espiritu Santos	0.2	1.2	10.4	3.0	60.3	3.4	76.2	2.1	1,205.2	3.4	581.9	1.3	5,378.0	3.9	10,227.0	3.3
South	0.1	0.7	8.7	2.5	306.1	17.3	1,305.7	17.6	4,455.2	12.4	3,681.0	8.1	27,441.0	20.2	83,736.0	27.4
Rio Grande do Sul	0.0	0.0	5.0	1.5	203.7	11.5	492.2	6.6	1,957.4	5.7	1,469.4	3.2	14,475.0	10.6	20,538.0	6.7
Others	0.1	0.7	3.7	1.0	102.4	5.8	813.5	11.0	2,497.8	6.7	2,211.6	4.9	12,966.0	9.6	63,198.0	20.7
Central West	0.1	0.7	0.7	0.2	28.4	1.6	260.0	3.5	769.8	2.1	5,161.5	11.4	3,833.0	2.8	8,704.0	2.8
BRAZIL	14.9	100.0	341.6	100.0	1,767.8	100.0	7,422.0	100.0	35,854.8	100.0	45,352.8	100.0	135,996.0	100.0	305,939.0	100.0

Source: BNDE - Boletin de Informação, Assesoria de Estatística e Avaliaçao Econômica, February 1981

Table 2.23 STRUCTURE OF MANUFACTURING VALUE ADDED IN THE NORTHEAST

(percentages)

	1960	1974	Average Annual Growth Rate
Manufacturing	100.0	100.0	11.2
Traditional Industries	70.1	50.3	8.8
Wood	1.7	1.9	10.2
Funiture	1.6	1.0	7.4
Leather	2.3	0.4	-
Textiles	24.1	15.6	8.0
Apparel	2.2	3.8	15.2
Food	29.8	21.0	8.7
Beverages	3.0	3.0	11.3
Tobacco	3.1	1.1	3.9
Publishing and Printing	1.9	1.9	11.3
Diverse	0.4	0.9	18.3
Other Industries	29.9	49.7	15.0
Non-metallic Minerals	8.1	8.0	11.1
Metallurgy	2.1	9.8	23.3
Machinery	0.1	2.9	35.8
Electrical and Communications Equipment	0.1	2.7	37.6
Transport Equipment	0.8	0.9	12.2
Paper	1.7	3.0	15.4
Rubber	0.3	0.4	12.7
Chemicals	15.0	18.9	12.9
Pharmaceutical Products	0.3	0.2	8.7
Perfumery	1.4	0.7	6.1
Plastic Products	0.0	2.2	49.1

Source: SUDENE - "Sudene Vinte anos: 1959-1979" - Recife 1980.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 3.1 EXPORTS SHARE IN GDP, 1965-1974

(Cr$ millions)

	(1) GDP	(2) Total Exports a/	(3) % b/
1965	44,073	3,024	6.9
1966	63,746	3,869	6.1
1967	86,171	4,415	5.1
1968	122,431	6,363	5.2
1969	161,900	9,420	5.8
1970	208,301	12,580	6.0
1971	276,808	15,356	5.5
1972	363,167	23,683	6.5
1973	498,307	37,975	7.6
1974	719,519	53,987	7.5
1975	1,009,380 c/	70,478	7.0
1976	1,560,271 c/	108,116	6.9
1977	2,321,925 c/	171,425	7.4
1978	3,410,019 c/	228,748	6.7
1979	5,511,653 c/	410,902	7.4
1980	n.a.	1,061,238	-

Source: Anuário Estatístico do Brasil, 1980 - March 1981

a/ Computed from value in US dollars shown in Table 17 and the annual average exchange rate shown in Table 21.
b/ (2) ÷ (1) = (3)
c/ Preliminary data.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

TABLE 3.2: MANUFACTURED AND TOTAL EXPORTS, 1961-1983

(US$ million)

Year	Total Exports	Industrial Exports		Semi-Manufactured Exports		Manufactured Exports	
	Amount	Amount	%	Amount	%	Amount	%
1965	1,595	284	17.8	154	9.7	130	8.1
1968	1,881	381	20.3	178	9.5	203	10.8
1970	2,739	665	24.3	249	9.1	416	15.2
1971	2,904	820	28.2	247	8.5	573	19.7
1972	3,991	1,298	32.5	399	10.0	898	22.5
1973	6,199	2,008	32.4	574	9.3	1,434	23.1
1974	7,951	3,180	40.0	917	11.5	2,263	28.5
1975	8,670	3,434	39.6	849	9.8	2,584	29.8
1976	10,128	3,618	35.7	842	8.3	2,776	27.4
1977	12,120	4,884	40.3	1,044	8.6	3,840	31.7
1978	12,659	6,504	51.4	1,421	11.2	5,083	40.2
1979	15,244	8,532	56.0	1,887	12.4	6,645	43.6
1980	20,132	11,384	56.5	2,343	11.6	9,041	44.9
Jan-June 1980	9,193	5,246	57.1	1,071	11.7	4,175	45.4
Jan-June 1981	10,855	6,272	57.8	1,000	9.2	5,273	48.6
Annual Growth							
1965-1970	11.4%	18.6%		10.1%		26.8%	
1970-1975	25.9%	38.9%		27.8%		44.0%	
1975-1980	18.4%	27.1%		22.5%		28.4%	
Jan-June 1980/1981	18.1%	19.6%		-6.7%		26.3%	

Source: CACEX: Desempenho do Comércio Exterior Brasileiro.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 3.3 MANUFACTURED EXPORT VOLUME AND PRICE INDICES

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981 Jan-June	Average Annual Growth 1970-1980 (%)
Export Volume 1/													
Industrialized Products	100	117	153	176	182	202	222	251	316	363	439	488	16.0%
Semi-Manufactures	100	96	112	113	98	96	119	117	135	158	185	187	6.3%
Manufactures	100	134	185	226	250	295	310	366	450	513	631	719	20.2%
(Total Exports)	(100)	(106)	(126)	(137)	(132)	(143)	(143)	(135)	(148)	(158)	(193)	(218)	6.8%
Export Prices 1/ (US$ based)													
Industrialized Products	100	104	111	144	208	200	194	224	231	256	279	287	10.8%
Semi-Manufactures	100	99	109	168	260	252	199	233	235	266	285	268	11.0%
Manufactures	100	107	113	136	189	183	192	219	228	253	278	295	10.8%
(Total Exports)	(100)	(97)	(111)	(151)	(200)	(202)	(259)	(325)	(303)	(333)	(356)	(356)	13.6%

1/ Fisher Indices : 1970 = 100

Source: CACEX - Exportação Brsileira Janeiro/Junho 1981-80

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Table 3.4: STRUCTURE OF MANUFACTURED EXPORTS, 1962-1979 (ISIC)

(US$ million)

ISIC CODE	Sub-Sector	1962	1965	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Annual Growth (%) 1/ 1962-70	1970-79	1979-80
311, 312	Processed Foods	765	938	1,116	1,446	1,466	2,165	3,073	3,372	3,240	4,479	5,721	5,381	5,705		8.3	18.1	
313, 314	Beverages, Tobacco Products	-	1	2	3	3	5	7	8	9	12	12	12	17		27.4	20.0	
321	Textiles	6	21	22	44	59	123	252	359	322	330	439	485	677		29.5	32.5	
322	Clothing	-	-	1	4	7	30	87	121	101	98	100	127	118		51.0	41.0	
323	Leather Goods	2	5	6	15	16	47	50	53	70	109	113	130	199		32.9	31.1	
324	Footwear	-	-	-	8	29	54	93	121	167	170	182	291	367		46.8	42.8	
331	Wood Products	41	63	91	106	111	116	175	178	140	135	156	193	276		12.3	8.2	
332	Furniture	-	-	1	2	2	4	10	13	12	13	15	17	19		60.0	30.0	
341	Paper, Paper Products	1	6	1	6	13	25	48	71	58	63	68	144	306		26.6	41.4	
342	Printing and Publishing	-	-	-	2	6	10	12	14	18	8	11	11	16		70.0	13.8	
351	Industrial Chemicals	10	11	17	21	28	42	65	152	129	96	111	177	303		9.2	29.5	
352	Other Chemicals	8	10	13	21	27	30	52	88	69	78	92	117	166		1.1	24.0	
353, 354	Petroleum Refining	-	-	1	15	13	23	42	44	98	23	60	154	217		-	31.2	
355	Rubber Products	-	3	1	4	5	4	7	13	21	19	45	50	72		39.1	41.9	
356	Plastic Products	-	-	-	1	1	2	3	5	6	6	12	13	22		21.7	42.5	
361	Pottery, Chinaware	-	-	-	1	1	2	3	6	8	9	11	17	19		33.8	43.6	
362	Glass	-	-	6	7	14	12	12	17	20	18	20	25	28		80.0	13.0	
369	Other Non-Metal Mineral Products	1	1	1	2	3	3	7	13	17	20	23	37	59		20.4	45.3	
371	Basic Ferrous Metal Products	1	44	32	98	51	84	111	154	174	230	264	259	778		80.0	29.0	
372	Basic Non-Ferrous Metal Products	-	1	-	6	6	9	12	31	31	17	30	61	102		90.0	34.6	
381	Metal Products	-	1	3	10	12	19	25	43	62	50	79	109	135		52.0	34.5	
382	Non-Electrical Machinery	3	17	33	64	76	98	129	251	367	327	473	636	864		48.0	34.9	
383	Electrical Machinery	1	4	6	16	28	39	83	182	163	196	286	316	341		54.0	41.0	
384	Transport Equipment	9	8	4	15	31	81	94	215	374	443	637	984	1,248		6.8	62.1	
385	Scientific and Other Equipment	-	-	-	1	2	3	5	11	20	16	24	42	65		20.0	56.1	
390	Other Manufactures	1	2	4	12	18	27	51	61	50	39	40	63	71		37.8	17.0	
	Total Manufactures	849	1141	1363	1929	2030	3056	4510	5596	5743	7015	9023	10050	12188		10.8	23.3	

1/ 1962-1970: Average annual growth; 1970-1979: Least squares growth trend.

Source: World Bank/UN Data Bank

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 3.5: MANUFACTURED EXPORT GROWTH, 1965-1979 (ISIC)

(US$ million)

ISIC CODE	Subsector	1965 Amount	1965 (%)	1970 Amount	1970 (%)	1975 Amount	1975 (%)	1979 Amount	1979 (%)	Annual Growth 1965-70 (%)	Annual Growth 1970-75 (%)	Annual Growth 1975-79 (%)
31	Food, Beverages, Tobacco	938.5	82.3	1448.2	75.0	3249.5	56.6	5721.9	46.9	9.1	17.6	15.4
32	Textiles, Garments, Leather Products	26.9	2.4	71.3	3.7	660.3	11.5	1360.8	11.2	21.6	56.0	19.8
33	Wood, Wood Products	63.1	5.5	107.4	5.6	151.7	2.6	294.1	2.4	11.1	7.2	18.0
34	Paper, Printing	6.7	0.6	8.7	0.5	76.0	1.3	322.2	2.6	5.3	54.0	43.9
35	Chemicals	24.9	2.2	62.0	3.2	323.6	5.6	779.2	6.4	20.0	39.2	24.5
36	Non-Metallic Minerals	1.6	0.1	10.4	0.5	44.0	0.8	106.5	0.9	45.4	33.4	24.7
37	Basic Metals	44.8	3.9	103.8	5.4	204.0	3.6	879.6	7.2	18.3	14.3	44.0
38	Metal Products, Machinery	31.8	2.8	105.6	5.5	984.7	17.1	2652.3	21.8	27.1	60.0	28.1
39	Other Manufacturers	2.2	0.2	11.7	0.6	49.7	0.9	71.0	0.6	39.8	33.5	9.3
	Total 1/	1140.5	(71.5)	1929.1	(70.4)	5743.5	(66.2)	12187.6	(80.0)	11.1	24.4	20.7
	(Total Exports)	(1595.5)		(2738.9)		(8669.9)		(15244.4)		(11.4)	(26.0)	(15.2)

1/ Percent share in brackets is share of manufactured exports in total exports.

Source: World Bank/UN Data Bank.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 3.6: MANUFACTURED EXPORTS BY ABSOLUTE GROWTH, 1970-1979 (ISIC)

(US$ million)

ISIC CODE	Subsector	1970-1979 Increment	Share of Increment	Annual Growth Rate	1970-1975 Increment	Share of Increment	Annual Growth Rate	1975-1979 Increment	Share of Increment	Annual Growth Rate
3115	Oils and Fats	1611	15.7	34.7	595	15.6	40.5	1016	15.8	24.3
3121	Food Products, n.e.c.	815	7.9	15.8	36	0.7	1.2	789	12.2	28.4
3843	Motor Vehicles	770	7.5	62.3	280	7.3	95.0	490	7.6	28.0
3710	Iron and Steel	680	6.7	29.0	76	2.0	12.1	604	9.4	45.5
3116	Grain Products	598	5.8	12.3	(-49)	(-1.3)	(-1.7)	647	10.0	22.6
3221	Textiles	561	5.0	31.4	230	6.0	42.5	286	4.4	19.8
3119	Cacao Products	450	4.4	40.2	83	2.2	31.0	367	5.7	43.8
3240	Footwear	359	3.5	42.8	159	4.2	80.0	200	3.1	21.7
3113	Fruit Products	303	3.0	36.4	80	2.1	41.3	223	3.5	34.6
3411	Pulp and Paper	295	2.9	41.3	49	1.3	54.0	246	3.8	53.0
3829	Non-Electrical Machinery, n.e.c.	292	2.8	39.5	108	2.8	53.0	184	2.9	25.7
3118	Sugar	279	2.7	9.8	1011	26.6	53.0	(-732)	(-11.8)	(-13.2)
3841	Ship-building	258	2.5	56.4	40	1.0	75.0	218	3.4	5.6
3511	Basic Industrial Chemicals	197	2.0	27.2	76	2.0	38.4	121	1.9	22.8
3530	Petroleum Refining	197	2.0	31.3	81	2.1	45.0	116	1.8	21.7
3824	Industrial Machinery	196	1.9	36.1	58	1.5	39.0	138	2.2	30.4
3111	Processed Meat	179	1.7	5.0	41	1.1	5.7	138	2.2	16.0
3832	Communication Equipment	172	1.7	43.1	77	2.0	60.0	95	1.5	20.5
3845	Aircraft	163	1.6	84.9	27	0.7	120.0	136	2.1	54.0
3311	Wood Products	152	1.5	7.4	27	0.7	4.7	125	2.0	18.1
3231	Tanned Leather	150	1.5	29.2	30	0.8	24.6	120	1.9	38.6
3825	Office Equipment	128	1.2	23.5	82	2.1	40.3	46	0.7	9.1
3220	Garments	114	1.1	41.0	97	2.5	95.0	17	0.3	4.1
3720	Non-Ferrous Metals	96	0.9	34.6	25	0.7	39.8	71	1.1	35.0
3529	Chemical Products, n.e.c.	95	0.9	23.0	37	1.0	27.3	58	0.9	20.6
	Others	1194	11.6	-	468	12.3	-	726	11.4	-
	Total Manufactures	10259	100.0	23.3	3814	100.0	24.4	6445	100.0	20.7

Source: World Bank/UN Data Bank.

Table 3.7: BRAZIL: MANUFACTURED EXPORTS 1979-1981

(US$ million)

	1979	1980	Jan-June 1980	Jan-June 1981	Growth (%) 1979-1980	Growth (%) Jan-June 1980-1981
Chemicals	374.0	499.0	248.6	322.8	33.4	29.8
Plastics, Rubber	144.6	247.9	118.0	128.7	71.4	9.1
Leather	232.1	177.9	93.1	83.1	-23.3	-10.7
Wood Products	315.9	386.1	178.3	192.1	22.2	7.7
Paper and Products	287.7	543.6	230.7	264.2	88.9	14.5
Textiles, Garments	817.6	915.7	483.7	438.7	12.0	-9.3
Footwear	371.4	413.6	183.2	278.1	11.4	51.8
Non-metallic Minerals	144.6	206.0	99.7	139.9	42.5	40.3
Basic Metals	1,001.7	1,196.0	624.8	452.2	19.4	-27.6
Machinery	1,319.8	1,846.3	783.6	1,004.2	39.9	28.2
Transport Equip.	1,100.5	1,514.0	591.0	892.3	37.6	51.0
Other Manufactures	157.8	237.7	105.6	90.1	41.8	-14.7
Subtotal	6,267.7	8,169.8	3,740.3	4,286.4	30.3	14.6
Petroleum Products	227.1	407.2	170.0	499.5	79.3	193.8
	6,454.8	8,577.0	3,910.3	4,785.9	32.9	22.4
Fats & Oil	593.4	694.4	296.3	501.0	17.0	69.1
Meat	311.4	563.2	203.6	367.9	80.9	80.7
Sugar	432.7	1,397.2	634.3	609.9	222.9	-3.8
Other Food	4,363.6	4,685.0	2,152.8	2,717.5	7.4	26.2
Subtotal	5,701.1	7,339.8	3,287.0	4,196.3	28.7	27.7
TOTAL INDUSTRIAL	12,155.9	15,916.8	7,193.3	8,982.2	30.9	24.8
TOTAL EXPORTS	15,244.4	20,132.4	9,193.0	10,854.8	32.1	18.1

Source: CACEX, Brasil Exportação 1980
CACEX, Exportação Brasileira, janeiro, julho 1981.

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Table 3.8 EXPORT RATIOS IN MANUFACTURING, 1965-1980

(Cr$ millions)

Year	Value of Manufactured Output	Manufactured Exports	Export Ratios (%)
1965	19,057	539	2.8
1966	30,633	653	2.1
1967	38,043	917	2.4
1968	55,237	1,292	2.3
1969	69,625	2,014	2.9
1970	87,583	3,051	3.5
1971	124,064	4,336	3.5
1972	185,926	7,232	3.8
1973	318,145	11,850	3.7
1974	526,664	21,592	4.1
1975	782,797	27,884	3.6
1976	1,167,663	38,676	3.3
1977	1,694,941	69,016	4.1
1978	2,464,444	117,579	4.8
1979	3,960,361	229,980	5.8
1980	8,320,719	644,425	7.7

Sources: Tables 3.2 and 2.2.

Note: The value of manufactured exports was computed from the value in US dollars shown in Table 3.2 and the annual average exchange rates.

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Table 3.9: EXPORT RATIOS IN MANUFACTURING, 1965-1980 (ISIC)

(US$ million)

ISIC CODE	Subsector	Production			Exports			Average Export/Output Ratio (%)		Marginal Export/Output Ratio (%)
		1965	1970	Change 1965/70	1965	1970	Change 1965/70	1965	1970	1965/70
311,12	Food	2016.7	5125.8	3109.1	938.0	1445.4	507.4	46.5	28.2	16.3
313,14	Beverages, Tobacco	335.7	720.8	385.1	0.5	2.9	2.4	0.1	0.4	0.6
321	Textiles	1117.2	2356.6	1239.4	21.3	43.9	22.6	1.9	1.8	1.8
322,24	Clothing and Footwear	305.2	856.5	551.3	0.6	12.0	11.4	0.2	1.4	2.1
323	Leather, Leather Goods	83.4	167.2	83.8	4.9	15.4	10.5	5.9	9.2	12.5
331,32	Wood Products, Furniture	298.1	1032.3	734.2	63.1	017.7	44.6	21.2	10.4	6.1
341	Paper, Pulp	279.1	619.5	340.4	6.5	6.3	(-0.2)	2.3	1.0	neg.
351-56	Chemicals, Rubber, Plastics	2025.5	4508.7	2483.2	24.9	61.7	36.8	1.2	1.4	1.5
361-69	Non-Metallic Minerals	428.7	1056.8	628.1	1.5	10.4	8.9	0.4	1.0	1.4
371-72 381	Basic Metals, Metal Products	1098.5	3163.2	2064.7	46.2	113.6	67.4	4.2	3.6	3.3
382	Mechanical Machinery	327.9	1445.5	1117.6	16.8	63.6	46.8	5.1	4.4	4.2
383	Electrical Machinery	460.3	1193.8	733.5	4.3	16.5	12.2	0.9	1.4	1.7
384	Transport Equipment	963.1	2079.6	1116.5	8.0	14.8	6.8	0.8	0.7	0.6
342,385 390	Other	311.5	1041.8	730.3	2.9	14.0	11.1	0.9	1.3	1.5
	Total	10050.9	25368.1	15317.2	1140.5	1929.1	788.6	11.3	7.6	5.1

Source: World Bank/UN Data Bank.
IBGE: Anuário Estatístico do Brasil, 1980.

Table 3.10: EXPORT RATIOS IN MANUFACTURING, 1975-1979 (ISIC)

(US$ million)

ISIC CODE	Subsector	Production				Exports				Average Export-Output Ratio		Marginal Export-Output Ratio	
				Change				Change					
		1975	1979	1970/75	1975/79	1975	1979	1970/75	1975/79	1975	1979	1970/75	1975/79
311,12	Food	15603.3	23339.8	10477.5	7736.5	3240.0	5705.1	1794.6	2465.1	20.8	24.4	17.1	31.9
313,14	Beverages, Tobacco	1968.4	3239.0	1247.6	1270.6	9.4	16.9	6.5	7.5	0.5	0.5	0.5	0.6
321	Textiles	6456.3	9559.2	4099.7	3102.9	322.1	677.0	278.2	354.9	5.0	7.1	6.8	11.4
322,24	Clothing and Footwear	3321.8	5835.9	2465.3	2514.1	267.7	485.2	255.7	217.5	5.9	8.3	10.4	8.7
323	Leather, Leather Goods	466.3	n.a.	299.1	n.a.	70.5	198.6	55.1	128.1	15.1	n.a.	18.4	n.a.
331,32	Wood Products, Furniture	3642.7	n.a.	2610.4	n.a.	151.7	294.1	44.0	142.4	4.2	n.a.	5.8	n.a.
341	Paper, Pulp	2259.8	4105.4	1640.3	1845.6	57.9	306.0	51.6	248.1	2.6	7.5	3.1	13.4
351-56	Chemicals, Rubber, Plastics	20510.8	29014.9	16002.1	8504.1	323.5	779.2	261.8	455.7	1.6	2.7	1.6	5.4
361-69	Non-Metallic Minerals	2876.0	5606.9	2819.2	1730.9	43.9	106.5	33.5	62.6	1.1	1.9	1.2	3.6
371-72 381	Basic Metals, Metal Products	12847.4	23135.6	9684.2	10288.2	266.1	1014.4	152.5	748.3	2.1	4.4	1.6	7.3
382	Mechanical Machinery	7587.8	9584.5	6142.3	1996.7	366.6	864.3	303.0	497.7	4.8	9.0	4.9	24.9
383	Electrical Machinery	4834.0	7794.4	3640.2	2960.4	162.9	340.7	146.4	177.8	3.4	4.4	4.0	6.0
384	Transport Equipment	8654.5	12455.5	6574.9	3801.0	373.6	1247.6	358.8	874.0	4.3	10.0	5.5	23.0
385,390 1/	Other	1251.2	n.a.	848.8	n.a.	69.5	135.7	57.0	66.2	5.6	n.a.	n.a.	n.a.
	Total 1/	95374.9	146924.9 (133671.1)	70006.8	51550.0 (45751.0)	5743.5	12187.6	3814.3	6444.1	6.0	8.3	5.4	12.5

1/ Excluding industrial services and printing.

Source: World Bank/UN Data Bank.
IBGE: Anuário Estatístico do Brasil, 1980.

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Table 3.11: VOLUME INDEX OF MAJOR MANUFACTURED EXPORTS, 1971-1980

(Tons, 1970 = 100)

Product	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	June 1980 - May 1981	Average Growth 1970-1980 (%)	Amount 1980 (US$ million)
Soluble Coffee	112	147	169	160	135	188	137	189	228	177	194	5.9	286.9
Soy Flower and Cake	173	266	299	384	593	827	996	1,008	962	1,224	1,617	28.6	1,449.0
Soy Oil	1	8	830	31	3,556	6,120	6,585	6,590	7,090	9,560	12,626	60.0	398.3
Cacao Products	212	272	258	275	232	235	386	461	573	622	n.a.	20.1	402.4
Raw Sugar	116	249	360	774	609	121	219	155	196	495	n.a.	17.3	624.5
Orange Juice	243	281	431	401	557	683	1,200	2,250	1,900	2,280	2,890	36.7	338.7
Transport Equipment	168	462	658	1,237	1,550	1,560	1,980	2,990	3,410	4,850	5,470	47.5	1,512.3
Mechanical Machinery 1/	100	143	186	338	670	686	1,090	1,460	1,950	2,460	3,260	42.5	945.1
Footwear	187	306	464	580	726	643	546	805	773	796	930	23.0	388.0
Textiles and Garments 1/	100	243	331	310	424	381	496	537	576	583	n.a.	20.6	596.0
Total Exports	110	114	160	196	232	224	204	219	245	276	295	10.7	20,132.4
Export of Semi-manufactures	96	137	161	124	131	167	177	215	248	295	281	11.5	2,343.0
Export of Manufactures	85	151	210	140	182	150	203	323	381	492	540	17.3	9,040.7

1/ No data available for 1970, therefore 1971 = 100 and Average Growth 1971-1980.

Source: FUNCEX - Desempenho do Comércio Exteriro Brasileiro 1980; Indicadores de Balanca Comercial, August 1981.

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Table 3.12: EXPORTS OF PROCESSED FOOD, 1962-1979

(ISIC 311 and 312 - US$ million)

ISIC CODE	Subsector	1962	1965	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Annual Growth (%) 1965-70	Annual Growth (%) 1970-79
3111	Meat	26.6	71.0	68.1	128.7	202.4	299.1	335.9	202.9	169.7	246.3	280.9	253.4	307.5	12.6	5.0
3112	Dairy Products	0.0	0.1	0.3	0.4	0.4	2.8	1.1	1.5	1.4	2.3	4.3	6.3	5.7	47.7	33.4
3113	Fruit Products	0.5	3.3	13.3	17.3	38.4	45.7	70.7	72.8	97.5	118.4	199.4	362.1	319.9	39.4	36.4
3114	Fish Products	0.1	0.1	0.2	0.2	0.5	1.0	1.7	1.0	1.7	1.4	2.5	7.4	7.2	5.4	42.1
3115	Oils and Fats	31.9	55.7	77.4	134.1	176.7	281.4	638.7	539.3	729.1	1,154.1	1,608.0	1,564.5	1,744.9	19.3	34.7
3116	Grain Products	384.2	443.3	478.7	566.4	474.6	589.4	745.1	542.1	517.3	1,307.4	1,457.5	1,208.5	1,164.2	5.0	12.3
3117	Bakery Products	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	1.1	2.4	1.0	1.0	2.8	-	75.7
3118	Sugar	39.5	56.7	106.3	134.4	161.7	417.1	589.9	1,380.9	1,145.4	347.6	509.1	383.8	413.3	18.8	9.8
3119	Cacao Products	16.9	13.5	26.2	28.9	30.8	41.6	61.1	129.9	111.7	143.0	323.4	391.8	479.1	16.4	40.2
3121	Food, n.e.c.	264.8	293.8	344.0	435.0	380.3	486.6	628.1	501.2	461.1	1,152.1	1,328.0	1,196.0	1,249.6	8.2	15.8
3122	Animal Feeds	0.0	0.6	1.7	0.1	0.0	0.1	0.6	0.2	4.0	4.3	6.8	5.9	10.9	-	96.2
311,312	Total	764.5	938.0	1,116.2	1,445.4	1,465.8	2,164.8	3,073.1	3,372.1	3,240.0	4,479.4	5,720.8	5,380.7	5,705.1	9.0	18.1

Source: World Bank/UN Data Bank

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 3.13: EXPORTS OF CAPITAL GOODS, 1961-1979

(ISIC 38, US$ million)

ISIC CODE	Subsector	1962	1965	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Annual Growth 1965-1970	Annual Growth 1970-1979
381	Metal Products	0.3	1.4	3.2	9.8	11.5	18.8	25.0	43.1	61.8	50.3	78.7	109.3	134.8	47.6	24.5
3811	Cutlery, Hand Tools	0.0	0.8	2.4	6.8	6.7	11.1	12.9	22.7	32.8	23.0	33.0	45.1	63.2		28.2
3812	Metal Furniture	0.0	0.0	0.1	0.1	0.3	0.5	1.1	2.0	2.8	2.3	2.7	4.9	4.0		48.2
3813	Structural Metal Products	0.2	0.2	0.2	0.3	1.6	2.1	3.3	2.9	7.6	6.0	8.7	14.1	27.0		49.7
3819	Metal Products, n.e.c.	0.1	0.4	0.5	2.7	3.0	5.1	7.7	15.4	18.6	19.0	34.3	45.2	40.6		40.5
382	Non-Electrical Machinery	2.7	16.8	33.3	63.6	76.2	98.4	128.9	251.4	366.6	326.7	473.0	636.1	864.3	30.5	34.9
3821	Engines and Turbines	0.0	0.1	0.0	0.3	0.9	2.0	1.5	4.8	17.6	13.7	33.0	36.1	41.6		76.5
3822	Agricultural Machinery	0.0	0.4	0.5	1.4	1.4	2.3	6.9	17.1	24.5	17.2	48.6	63.9	90.2		64.7
3823	Metal and Wood Working Machinery	0.3	2.5	3.1	5.7	5.3	8.3	6.7	12.9	19.6	15.6	17.2	32.9	60.2		27.9
3824	Special Industrial Machinery	1.0	4.4	7.4	14.1	18.3	23.6	26.8	48.0	72.9	80.0	114.2	153.2	210.6		36.1
3825	Office Machinery	0.1	0.3	13.6	28.3	27.6	31.6	42.5	97.4	109.9	82.8	116.6	130.0	155.8		23.5
3829	Machinery, n.e.c.	1.3	6.3	8.6	13.9	22.6	30.6	44.6	71.1	122.1	117.5	143.4	219.9	306.0		39.5
383	Electrical Machinery	0.5	4.3	5.9	16.5	27.9	38.7	83.4	182.2	162.9	196.1	286.0	315.7	340.8	30.8	41.0
3831	Industrial Machinery	0.0	1.2	1.8	5.6	9.0	12.7	15.8	45.2	53.1	58.1	79.5	89.9	100.1		39.9
3832	Radio, Television, Comm. Equip.	0.3	1.6	2.9	7.9	12.8	19.2	58.0	118.3	85.5	113.7	168.0	180.8	180.3		43.1
3833	Electrical Appliances	0.0	0.2	0.2	0.4	0.7	1.0	1.9	4.4	5.7	4.7	7.3	7.8	13.5		46.1
3839	Electrical Equipment, n.e.c.	0.2	1.4	1.0	2.6	5.4	5.7	7.7	14.3	18.6	19.6	31.2	37.3	46.8		36.2
384	Transport Equipment	8.7	8.0	4.4	14.8	30.8	80.9	94.1	215.2	273.6	443.2	636.8	984.3	1247.6	13.1	62.1
3841	Ships, Ship repairs	0.0	4.0	0.1	2.8	11.5	23.7	21.4	13.7	43.1	68.0	116.9	209.1	261.5		56.4
3842	Railroad Equipment	0.8	0.0	-	0.2	0.8	0.4	1.7	3.2	5.4	6.5	10.4	22.3	25.2		72.6
3843	Motor Vehicles	5.3	3.8	1.5	11.1	15.2	53.7	66.7	172.8	290.9	318.1	428.2	624.6	781.3		62.3
3844	Motorcycles, Bicycles	0.2	0.0	0.0	0.1	0.3	0.9	1.9	4.7	5.8	5.0	11.3	15.0	15.5		72.3
3845	Aircraft	2.4	0.2	2.8	0.7	2.9	2.3	2.3	20.8	28.4	45.5	69.9	113.1	164.0		84.9
3849	Transport Equipment, n.e.c.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2		49.3
385	Scientific, Other Equipment	0.2	0.5	0.3	0.9	2.4	2.9	4.7	10.9	19.8	16.0	23.7	41.8	64.7	12.5	56.1
3851	Scientific, Measuring Equipment	0.2	0.5	0.3	0.6	1.7	2.0	2.9	5.9	9.2	9.4	17.7	29.0	31.7		53.7
3852	Photographic, Optical Goods	0.0	0.0	0.0	0.3	0.5	0.5	1.2	3.9	5.2	4.9	3.9	9.8	28.6		59.3
3853	Watches, Clocks	0.0	0.0	0.0	0.0	0.1	0.4	0.6	1.1	5.4	1.8	2.3	3.0	4.4		60.0
38	Total	12.5	32.2	47.1	105.7	148.8	239.7	336.1	702.7	984.7	1032.3	1498.2	2087.2	2652.2	26.8	44.2

Source: World Bank/UN Data Bank.

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Table 3.14: DIRECTION OF MANUFACTURED EXPORTS, 1965-1979

(US$ million)

Importing Area/Country	1965 Amount	1965 (%)	1970 Amount	1970 (%)	1975 Amount	1975 (%)	1979 Amount	1979 (%)	Annual Growth 1970-1979 (%)
Industrial Countries									
311,12	768	81.9	1189	82.1	1743	53.8	3868	67.8	15.7
321	15	71.4	32	72.7	220	68.3	410	60.6	30.5
324	-	-	8	100.0	162	97.0	360	98.1	42.6
364	1	12.5	6	40.0	107	28.6	493	39.5	66.5
38	4	12.5	30	28.3	315	32.0	956	36.0	49.7
there of European Common Market									
311,12	263	28.0	528	36.5	912	28.1	2093	36.7	17.5
321	5	23.8	11	25.0	135	42.2	252	37.2	39.3
324	-	-	-	-	18	10.8	96	26.2	87.2
384	-	-	4	26.7	37	9.9	202	16.2	71.7
USA									
311,12	386	41.2	475	32.9	427	13.2	1225	21.5	12.5
321	9	42.9	14	31.8	37	11.5	79	11.7	20.4
324	-	-	7	87.5	134	80.2	237	64.6	37.5
384	1	12.5	2	13.3	27	7.2	228	18.3	61.9
Japan									
311,12	7	0.7	31	2.1	239	7.4	172	3.1	27.6
321	-	-	3	6.8	15	4.7	25	3.7	19.8
324	-	-	-	-	1	0.6	4	1.1	177.6
384	-	-	-	-	1	0.3	18	1.4	381.1
Developing Countries									
311,12	108	11.5	171	12.0	1036	32.0	1196	21.0	25.4
321	6	28.6	9	20.5	75	23.3	219	32.3	38.5
324	-	-	-	-	2	1.2	7	1.9	43.6
384	7	87.5	9	60.0	267	71.4	754	60.5	61.2
38	28	87.5	76	71.7	668	67.9	1693	63.9	41.6
there of Latin America and Caribbean									
311,12	43	4.6	42	2.9	108	3.3	225	3.9	21.7
321	6	28.6	7	15.9	50	15.5	145	21.4	33.4
324	-	-	-	-	2	1.2	6	1.6	42.9
384	7	87.5	7	46.7	162	43.3	437	35.0	55.8
38	28	87.5	70	66.0	512	520	1200	45.3	37.0
Other Countries									
311,12	62	6.6	85	5.9	461	14.2	641	11.2	24.1
321	-	-	3	6.8	27	8.4	48	7.1	30.4
324	-	-	-	-	3	1.8	-	-	-
384	-	-	-	-	-	-	-	-	-
38	-	-	-	-	1	0.1	2	0.1	60.4
Total									
311,12	938	100.0	1445	100.0	3240	100.0	5705	100.0	18.1
321	21	100.0	44	100.0	322	100.0	677	100.0	32.5
324	-	-	8	100.0	167	100.0	367	100.0	42.8
384	8	100.0	15	100.0	374	100.0	1248	100.0	62.1
38	32	100.0	106	100.0	985	100.0	2652	100.0	44.2

Note: 311,12-Food, 321-Textiles, 324-Footwear, 384-Transport Equipment, 38-Machinery and Equipment.

Source: World Bank/UN Data Bank.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 3.15: LARGEST EXPORTERS OF NON-FOOD MANUFACTURED PRODUCTS, 1979

(US$ million)

	Enterprise	Main Product	Exports 1979	Exports Jan.-March 1981
1.	Petrobras	Gasoline	323.8	101.4
2.	Volkswagen	Motor Vehicles	213.3	96.4
3.	Interbras	Alcohol	133.2	35.7
4.	General Motors	Motors	128.4	28.9
5.	Mercedes Benz	Trucks	126.9	61.6
6.	Ford	Motor	116.7	43.1
7.	Philco	Radios	111.7	25.2
8.	Fiat	Motors	93.3	69.1
9.	IBM	Office Equipment	92.4	20.5
10.	Siderurgia Nacional	Steel Sheets	89.6	N.A.
11.	Siderurgia Paulista	Steel Slabs	78.4	22.1
12.	Metal Mineracao	Iron	75.8	27.0
13.	COBEC	Cast Iron	73.5	N.A.
14.	Saab	Trucks	71.5	N.A.
15.	Aracruz Cellulose	Pulp	68.8	27.1
16.	Embraer	Aviation Equipment	68.5	27.1
17.	Comex	Trucks	64.4	N.A.
18.	Fiat Diesel	CKD Cars	59.9	N.A.
19.	Cellulose Nipo	Cellulose	56.4	N.A.
20.	Comp. Navegacao	Freight Ships	49.3	N.A.
21.	Verolme Etal.	Freight Ships	47.9	N.A.
22.	Engesa	Armoured Vehicles	47.2	N.A.
23.	Caterpillar	Earthmoving Equipment	42.5	N.A.
24.	Engexco	Optical Instruments	41.4	N.A.
25.	Pirelli	Car Types	34.1	N.A.
26.	Estonefera	Steel Pipes	33.7	N.A.
27.	Chrysler	Motors	33.3	N.A.
	Total 27 Enterprises		2,375.9	N.A.
	Total Non-food Manufactured Exports		6,494.8	N.A.
	Share of 27 Enterprises		36.6%	N.A.

Source: CACEX.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 4.1 MANUFACTURED IMPORTS, 1962-1979
(US$ millions)

	Activity	1962	1965	1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Annual Growth (%) 1962-1970	Annual Growth (%) 1970-1979
311,312	Processed Foods	33.8	36.5	75.7	83.3	89.9	88.6	180.6	284.1	176.7	154.0	177.7	265.9	860.8	11.9	20.8
313,314	Beverages, Tobacco Products	12.2	9.0	15.7	19.0	23.7	31.3	39.1	66.7	89.9	83.0	85.1	104.4	101.9	5.7	29.0
321	Textiles	5.5	2.0	27.0	32.2	42.0	49.7	72.3	132.4	87.7	63.5	58.8	69.0	68.9	28.0	6.5
322	Clothing	-	-	2.7	6.7	7.6	7.8	9.8	9.9	9.4	13.9	10.4	9.6	13.1	-	6.3
323	Leather Goods	0.3	0.3	0.8	1.0	1.9	2.8	5.3	7.3	7.0	9.2	10.5	16.9	23.0	16.2	36.4
324	Footwear	-	-	0.1	-	-	0.1	0.3	0.3	0.4	0.6	0.5	0.6	1.2	-	45.6
331	Wood Products	1.0	0.7	1.7	1.9	2.1	2.7	5.5	13.1	11.0	16.8	22.1	32.8	30.3	8.4	42.1
332	Furniture	0.1	0.1	0.3	0.8	0.6	1.3	1.5	3.5	3.9	3.8	3.3	5.0	5.4	23.0	27.2
341	Paper, Paper Products	37.8	18.7	52.8	57.1	76.8	99.8	128.3	307.5	193.8	191.7	188.9	187.1	228.5	5.3	14.7
342	Printing and Publishing	7.3	8.9	16.7	17.7	20.8	26.4	27.0	34.8	39.5	38.0	36.2	50.5	57.7	11.7	12.6
351	Industrial Chemicals	147.7	153.9	280.9	392.0	478.6	659.6	911.3	2,032.3	1,574.7	1,779.7	1,781.2	1,985.1	2,568.2	13.0	22.6
352	Other Chemicals	30.9	30.1	56.4	78.1	99.9	127.9	184.7	271.2	244.2	283.6	260.1	297.5	378.6	12.3	17.5
353	Petroleum Refining	50.9	36.2	73.2	66.4	92.3	78.4	129.5	326.2	216.4	295.9	236.3	172.0	211.8	3.4	14.5
354	Miscellaneous Products of Petroleum and Coal	5.1	7.8	8.8	15.7	15.1	19.3	21.1	50.8	43.2	35.9	31.5	67.8	66.6	15.1	18.1
355	Rubber Products	0.8	0.7	2.8	7.3	9.8	14.5	26.0	73.9	57.5	44.1	52.6	60.2	54.6	31.0	26.3
356	Plastic Products	0.3	0.3	2.0	3.6	3.2	5.3	8.3	15.9	17.5	11.4	11.4	11.3	13.9	36.0	17.0
361	Pottery, Chinaware	0.7	0.6	1.3	2.0	2.5	4.7	5.5	7.0	8.3	6.2	9.8	12.2	12.7	14.0	21.4
362	Glass	7.7	7.1	7.1	10.0	12.0	21.4	31.8	44.1	39.4	38.4	42.2	59.2	72.8	3.3	22.0
369	Other Non-Metals Mineral Products	5.2	3.4	14.8	19.7	20.6	22.5	27.7	63.6	60.2	51.1	58.3	55.8	71.0	18.1	16.4
371	Basic Ferrous Metal Products	71.7	59.2	88.0	160.6	262.3	259.5	506.9	1,702.5	1,355.8	615.9	618.6	509.4	507.0	10.6	12.7
372	Basic Non-Ferrous Metal Products	60.0	56.9	107.5	147.4	149.8	184.2	305.9	621.1	400.1	454.9	549.5	462.8	712.6	11.9	18.7
380	Metal Scrap	0.6	-	0.3	0.3	0.5	1.9	6.1	20.5	6.0	3.1	7.4	24.8	34.2	9.1	56.3
381	Metal Products	31.5	15.6	35.8	71.7	87.7	96.6	128.5	239.8	249.4	179.4	167.1	164.6	168.1	10.8	10.1
382	Non-Eletrical Machinery	251.5	126.1	327.9	516.3	832.6	1,213.7	1,360.5	1,945.3	2,532.2	2,167.3	1,705.0	1,984.8	2,278.9	9.6	14.8
383	Electrical Machinery	90.8	48.3	135.7	210.9	241.5	373.3	551.0	810.4	988.4	1,029.8	941.2	1,027.5	1,189.5	11.1	21.7
384	Transport Equipment	153.7	64.6	182.0	247.4	250.9	278.2	408.6	600.8	680.2	678.4	681.5	788.2	613.2	6.1	14.5
385	Scientific and Other Equipment	21.4	15.8	47.9	87.1	115.8	160.7	223.6	292.7	313.4	293.5	294.2	374.4	472.9	19.2	18.0
890	Other Manufactures	1.0	0.7	5.5	7.2	9.6	14.3	20.5	30.8	31.3	25.6	22.7	25.8	33.4	28.0	15.4
	TOTAL MANUFACTURES	1,029.5	703.5	1,571.4	2,263.4	2,950.1	3,846.5	5,327.2	10,008.5	8,441.5	8,588.6	8,064.1	8,825.2	10,850.8	10.3	19.0

Source: World Bank/U.N. Data Bank

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 4.2: IMPORT AND EXPORT RATIOS AT 4-DIGIT LEVEL

IBGE Four Digit Code	Industry	Ratio of Imports to Available Domestic Supply (M/(X + M)) 1970	1974	1979	Ratio of Exports to Output (E/X) 1970	1974	1979
0101	Forestry and Fishing	.018	.033	.067	.040	.024	.075
0201	Agriculture	.073	.033	.043	.073	.221	.056
0301	Livestock and Poultry	.005	.004	.009	.012	.004	.001
0501	Mining	.099	.246	.189	.372	1.102	.961
0502	Combustible Mineral Extraction	.630	.892	.982	.003	.083	.000
1001	Cement	.031	.021	.006	.000	.006	.011
1002	Glass Products	.055	.111	.083	.042	.044	.035
1003	Other Non-Metallic Mineral Products	.019	.033	.017	.003	.007	.016
1101	Pig-Iron, Iron Alloys & Primary Steel	.014	.026	.003	.065	.049	.060
1102	Iron & Steel Sheets	.113	.349	.039	.047	.006	.034
1103	Iron & Steel Castings	.019	.011	.005	.053	.007	.010
1104	Non-Ferrous Metals	.339	.418	.176	.018	.035	.032
1105	Miscellaneous Metal Products	.061	.033	.086	.006	.012	.047
1201	Pumps and Engines	.233	.416	.354	.003	.267	.739
1202	Machine Parts	.343	.318	.259	.039	.032	.274
1203	Industrial Equipment & Machinery	.295	.376	.221	.017	.032	.044
1204	Agricultural Equipment & Machinery	.131	.099	.019	.013	.028	.049
1205	Office & Domestic Use Equipment & Machinery	.188	.279	.213	.120	.190	.283
1206	Tractors	.351	.273	.049	.039	.046	.134
1301	Electric Energy Equipment	.400	.185	.208	.012	.021	.018
1302	Electric Wire & Cables	.046	.039	.037	.001	.005	.010
1303	Electric Equipment	.108	.206	.116	.006	.044	.055
1304	Electrical Machinery & Appliances	.145	.153	.133	.006	.020	.012
1305	Electronic Equipment	.405	.583	.519	.088	.489	.176
1306	Communications Equipment	.195	.216	.072	.019	.087	.046
1401	Automobiles	.003	.018	.000	.001	.116	.036
1402	Trucks and Buses	.026	.017	.006	.007	.039	.207
1403	Motor & Vehicle Parts	.061	.052	.011	.016	.030	.120
1404	Shipbuilding	.177	.090	.121	.010	.008	.162
1405	Railway Equipment & Other Vehicles	.424	.514	.225	.006	.038	.263
1501	Wood	.004	.007	.009	.142	.118	.089
1601	Furniture	.000	.002	.001	.003	.013	.008
1701	Wood Pulp	.222	.249	.059	.135	.203	.306
1702	Paper	.105	.151	.107	.001	.015	.061
1703	Paper & Paperboard Products	.031	.031	.007	.001	.018	.023
1801	Rubber	.029	.083	.043	.009	.014	.034
1901	Leather & Leather Products	.005	.032	.026	.135	.178	.213
2001	Chemical Elements & Compounds	.402	.491	.450	.011	.064	.082
2002	Alcohol	.000	.000	.000	.000	.260	.000
2003	Petroleum Refining	.127	.184	.057	.010	.022	.042
2004	Coke & Coal Derivatives	.072	.141	.056	.002	.001	.001
2005	Chemical Resins & Fibers	.229	.333	.132	.008	.022	.040
2006	Vegetable Oils & Oilseed Products	.008	.006	.023	.288	.396	.512
2007	Pigments & Paints	.070	.139	.049	.001	.005	.005
2008	Miscellaneous Chemical Products	.205	.244	.149	.058	.069	.043
2101	Pharmaceutical Products	.060	.083	.081	.008	.017	.025
2201	Perfumary & Soaps	.022	.041	.012	.002	.005	.011
2301	Plastics	.005	.017	.003	.000	.002	.008

Table 4.2: IMPORT AND EXPORT RATIOS AT 4-DIGIT LEVEL
(continued)

IBGE Four Digit Code	Industry	Ratio of Imports to Available Domestic Supply (M/(X + M)) 1970	1974	1979	Ratio of Exports to Output (E/X) 1970	1974	1979
2401	Basic Textile Processing Products	.004	.009	.002	.368	.053	.039
2402	Synthetic Fiber Textile Products	.007	.040	.007	.002	.025	.020
2403	Natural Fiber Textile Products	.003	.005	.001	.032	.168	.117
2404	Other Textile Products	.009	.037	.015	.006	.130	.055
2501	Apparel	.011	.006	.000	.004	.046	.018
2502	Footwear	.000	.001	.001	.023	.209	.267
2601	Coffee Bean Products	.000	.001	.000	1.490	1.809	.429
2602	Processed Coffee Products	.000	.000	.000	.168	.296	.267
2603	Processed Rice	.000	.000	.161	.012	.027	.000
2604	Wheat Flour	.009	.464	.383	.000	.000	.000
2605	Other Vegetable Products	.034	.039	.020	.209	.259	.417
2606	Meat Products	.002	.075	.058	.065	.124	.063
2607	Poultry Products	.004	.005	.000	.000	.000	.137
2608	Prepared Fish Products	.045	.244	.221	.240	.263	.405
2609	Dairy Products	.028	.029	.006	.001	.001	.002
2610	Crude Sugar Products	.000	.000	.001	.217	1.157	.143
2611	Refined Sugar	.000	.000	.000	.000	.301	.127
2612	Bakery & Pastry Products	.000	.001	.000	.000	.006	.007
2613	Edible Oils & Fats	.030	.024	.015	.002	.239	.010
2614	Other Food Products	.015	.007	.010	.004	.035	.035
2701	Beverages	.043	.069	.013	.003	.029	.018
2801	Tobacco Products	.000	.009	.001	.114	.185	.220
2901	Publishing and Printing	.023	.020	.020	.003	.008	.006
3001	Miscellaneous Manufactured Products	.217	.288	.211	.022	.073	.077

Note: Because of differences in valuation procedures the comparability between trade and output data for some sectors is problematic. This is particularly the case where there are substantial internal transportation costs and differences between international and domestic prices, such as for sectors 0501, 0502, 2601 and 2609.

Source: Estimates of 1974 and 1979 output were made from unpublished IBGE data for value added. The 1970 output and trade data were taken from the published IBGE input-output tables (IBGE, Matrix de Relações Intersetoriais-Brasil, 1970). The 1974 and 1979 export and import series were taken from FUNCEX and mission calculations, respectively, based upon manual reclassifications of the published trade data.

Table 4.3: SOURCES OF MANUFACTURING DEMAND GROWTH, AT 2- DIGIT LEVEL, 1970-79

INDUSTRY	1970-74			1974-79			1970-79		
	Transport Substitution	Export Expansion	Domestic Demand	Import Substitution	Export Expansion	Domestic Demand	Import Substitution	Export Expansion	Domestic Demand
Non-Metallic Minerals	-0.060	0.040	1.020	0.043	0.035	0.922	-0.001	0.037	0.963
Metallurgy	-0.162	0.043	1.119	0.247	0.134	0.620	0.127	0.091	0.783
Machinery	-0.097	0.071	1.025	0.208	0.122	0.670	0.125	0.124	0.752
Electrical Equipment	-0.081	0.091	0.989	0.128	0.046	0.827	0.073	0.054	0.872
Transportation Equipment	-0.014	0.109	0.904	0.071	0.125	0.804	0.056	0.115	0.829
Lumber & Wood Products	-0.017	0.135	0.882	0.006	0.109	0.886	-0.009	0.113	0.896
Furniture	-0.011	0.024	0.987	0.011	0.012	0.977	0.002	0.013	0.985
Paper	-0.042	0.060	0.981	0.084	0.101	0.814	0.051	0.097	0.852
Rubber	-0.119	0.065	1.054	0.085	0.073	0.842	-0.002	0.078	0.924
Leather	-0.051	0.334	0.717	0.013	0.316	0.671	-0.023	0.327	0.696
Chemicals	-0.149	0.145	1.003	0.172	0.111	0.716	0.063	0.120	0.815
Pharmaceutical Products	-0.052	0.043	1.003	0.004	0.045	0.951	-0.031	0.046	0.985
Perfumary	-0.035	0.012	1.023	0.037	0.014	0.949	0.011	0.014	0.975
Plastics	-0.019	0.025	0.994	0.041	0.033	0.926	0.021	0.033	0.946
Textiles	-0.051	0.246	0.805	0.031	0.097	0.872	-0.004	0.110	0.893
Apparel	0.005	0.124	0.871	0.005	0.085	0.910	0.008	0.089	0.904
Food Products[1]	-0.118	0.343	0.775	0.008	0.104	0.887	-0.036	0.124	0.913
Beverages	-0.046	0.043	1.002	0.069	0.018	0.912	0.034	0.021	0.946
Tobacco	-0.014	0.223	0.791	0.009	0.229	0.762	-0.001	0.231	0.770
Printing & Publishing	0.001	0.014	0.985	0.003	0.010	0.987	0.003	0.011	0.986
Miscellaneous	-0.140	0.077	1.063	0.115	0.059	0.827	0.009	0.066	0.925
AVERAGES[2]									
Manufacturing	-0.084	0.120	0.964	0.101	0.094	0.805	0.043	0.093	0.865
Capital Goods	-0.066	0.089	0.976	0.141	0.101	0.758	0.088	0.101	0.811
Intermediate Goods	-0.116	0.081	1.034	0.146	0.101	0.753	0.061	0.090	0.850
Consumer Goods	-0.059	0.184	0.876	0.025	0.081	0.893	-0.005	0.091	0.914

Notes: 1. Coffee beans have been excluded.
2. Value added weights for 1974 and 1979 have been used for the averages for those measures ending in those years.

Source: Annex Table 4.2.

Table 4.4: SOURCES OF DEMAND GROWTH AT 4-DIGIT LEVEL, 1970-1979

IBGE Case	Industry	1970-74			1974-79			1970-79		
		Import Substitution	Export Expansion	Domestic Demand	Import Substitution	Export Expansion	Domestic Demand	Import Substitution	Export Expansion	Domestic Demand
0101	Forestry and Fishing	- .123	.166	.957	.080	.156	.764	-.004	.169	.835
0201	Agriculture	- .001	.463	.538	.014	.200	.786	.012	.217	.771
0301	Livestock and Poultry	- .027	.045	.983	.010	.035	.955	-.009	.036	.973
0501	Mining	- .386	1.227	.159	.161	.667	.172	-.095	.880	.215
0502	Combustible Mineral Extraction	-3.378	.077	4.301	-17.992	.246	18.746	-23.877	.336	24.541
1001	Cement	.004	.016	.980	.026	.016	.959	.026	.016	.958
1002	Glass Products	- .227	.136	1.091	.096	.070	.834	-.052	.085	.968
1003	Other Non-Metallic Mineral Products	- .044	.028	1.016	.038	.033	.929	.002	.033	.964
1101	Pig-Iron, Iron Alloys & Primary Steel	- .196	.071	1.125	.295	.100	.605	.149	.113	.738
1102	Iron & Steel Sheets	- .491	.027	1.463	.411	.048	.542	.140	.063	.797
1103	Iron & Steel Castings	.007	.029	.965	.114	.056	.830	.110	.054	.836
1104	Non-Ferrous Metals	- .207	.062	1.145	.397	.040	.563	.270	.047	.683
1105	Miscellaneous Metal Products	.013	.045	.941	.733	.903	.830	-.210	.305	.905
1201	Pumps and Engines	- .419	.279	1.140	.130	.474	.396	-.172	.588	.584
1202	Machine Parts	.046	.058	.901	.138	.241	.621	.157	.211	.631
1203	Industrial Equipment & Machinery	- .185	.061	1.123	.248	.059	.693	.107	.067	.827
1204	Agricultural Equipment & Machinery	.042	.036	.922	.106	.061	.834	.125	.055	.819
1205	Office & Domestic Use Equipment & Machinery	- .207	.192	1.014	.103	.218	.679	-.034	.242	.792
1206	Tractors	.141	.043	.815	.300	.130	.570	.356	.107	.537
1301	Electril Energy Equipment	.328	.022	.650	-.013	.023	.991	.252	.017	.730
1302	Electric Wire & Cables	- .018	.033	.985	.036	.035	.929	.018	.036	.946
1303	Electric Equipment	- .221	.090	1.131	.153	.072	.775	.001	.084	.915
1304	Electrical Machinery & Appliances	- .024	.032	.992	.036	.019	.945	.017	.020	.963
1305	Electronic Equipment	- .618	.419	1.199	.212	.083	.705	-.192	.149	1.043
1306	Communications Equipment	- .035	.092	.942	.194	.036	.770	.153	.042	.805
1401	Automobiles	- .073	.444	.629	.024	.035	.940	.004	.040	.956
1402	Trucks and Buses	.010	.047	.943	.016	.264	.721	.021	.216	.763
1403	Motors & Vehicle Parts	.012	.059	.929	.070	.238	.692	.065	.201	.733
1404	Shipbuilding	.190	.010	.800	-.032	.171	.861	.071	.150	.779
1405	Railway Equipment & Other Vehicles	- .261	.038	1.224	.423	.145	.432	.269	.164	.567
1501	Wood	- .017	.135	.882	.006	.109	.886	-.009	.113	.896
1601	Furniture	- .011	.024	.987	.011	.012	.977	.002	.013	.985
1701	Wood Pulp	.015	.158	.827	.262	.244	.494	.245	.231	.524
1702	Paper	- .082	.045	1.037	.070	.114	.816	-.005	.108	.897
1703	Paper & Paperboard Products	- .006	.053	.953	.048	.055	.896	.039	.055	.906
1801	Rubber	- .119	.065	1.054	.085	.073	.842	-.002	.078	.924
1901	Leather & Leather Products	- .051	.334	.717	.013	.316	.671	-.023	.327	.696

Source: Mission calculations.

Table 4.4: SOURCES OF DEMAND GROWTH AT 4-DIGIT LEVEL, 1970-1979
(continued)

IBGE Case	Industry	1970-74			1974-79			1970-79		
		Import Substitution	Export Expansion	Domestic Demand	Import Substitution	Export Expansion	Domestic Demand	Import Substitution	Export Expansion	Domestic Demand
2001	Chemical Elements & Compounds	-.305	.105	1.200	.158	.081	.761	-.060	.100	.960
2002	Alcohol	-.152	.396	.756	.126	.007	.867	.025	.029	.946
2003	Petroleum Refining	-.183	.079	1.103	.198	.062	.740	.079	.071	.850
2004	Coke & Coal Derivatives	-.485	.116	1.368	.375	.074	.551	.122	.101	.777
2005	Chemical Resins & Fibers	-.220	.071	1.149	.280	.051	.668	.127	.061	.812
2006	Vegetable Oils & Oilseed Products	-.002	.528	.474	.004	.512	.484	.002	.514	.484
2007	Pigments & Paints	-.195	.088	1.107	.162	.048	.790	.034	.056	.909
2008	Miscellaneous Chemical Products	-.057	.122	.934	.136	.081	.782	.081	.089	.830
2101	Pharmaceutical Products	-.052	.043	1.008	.004	.045	.951	-.031	.046	.985
2201	Perfumary & Soaps	-.035	.012	1.023	.037	.014	.949	.011	.014	.975
2301	Plastics	-.019	.025	.994	.041	.033	.926	.021	.033	.946
2401	Basic Textile Processing Products	-.019	.064	.954	.018	.110	.872	.002	.106	.892
2402	Synthetic Fiber Textile Products	-.058	.086	.972	.048	.042	.910	.001	.048	.951
2403	Natural Fiber Textile Products	-.017	.292	.725	.016	.138	.847	.002	.153	.845
2404	Other Textile Products	-.100	.400	.700	.040	.086	.874	-.018	.111	.907
2501	Apparel	.007	.058	.935	.007	.016	.977	.011	.020	.969
2502	Footwear	-.002	.300	.701	.000	.274	.725	-.001	.277	.724
2601	Coffee Bean Products 1/	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2602	Processed Coffee Products	-.001	.363	.638	.001	.265	.734	.000	.270	.730
2603	Processed Rice	-.002	.048	.953	-.220	.001	1.219	-.206	.004	1.202
2604	Wheat Flour	-1.638	.014	2.623	.156	.007	.836	-.657	.013	1.644
2605	Other Vegetable Products	-.014	.313	.701	.026	.460	.514	.014	.452	.535
2606	Meat Products	-.256	.262	.995	.025	.058	.918	-.072	.072	1.000
2607	Poultry Products	-.001	.001	1.001	.006	.151	.844	.004	.139	.857
2608	Prepared Fish Products	-.384	.279	1.104	.034	.341	.625	-.250	.421	.829
2609	Dairy Products	-.003	.004	.999	.029	.004	.967	.025	.004	.971
2610	Crude Sugar Products	-.020	1.839	-.819	.012	.064	.924	-.002	.184	.818
2611	Refined Sugar	-.005	.627	.378	.003	.117	.881	.000	.135	.864
2612	Bakery & Pastry Products	-.001	.009	.992	.001	.007	.992	.000	.007	.993
2613	Edible Oils & Fats	-.001	.346	.655	.018	.010	.992	.016	.019	.965
2614	Other Food Products	-.000	.079	.921	.004	.062	.934	.004	.063	.933
2701	Beverages	-.046	.043	1.002	.069	.018	.912	.034	.021	.946
2801	Tobacco Products	-.014	.223	.791	.009	.229	.762	-.001	.231	.770
2901	Publishing & Printing	.001	.014	.985	.003	.010	.987	.003	.011	.986
3001	Miscellaneous Manufactured Products	-.140	.077	1.063	.115	.059	.827	.009	.066	.925

Notes: 1. Because of data inconsistency, the coffee bean product industry has been excluded.

Source: Mission calculations.

Table 5.1: PRICE ADJUSTED EXCHANGE RATE WITH RESPECT TO THE MAIN TRADING PARTNERS

(December 1978 = 100)

Year	Trade Weighted	Import Weighted	Export Weighted
1962	94.26	95.57	92.95
1963	81.97	82.93	81.01
1964	95.37	96.26	94.50
1965	97.74	98.51	96.98
1966	85.87	86.51	85.24
1967	81.59	82.09	81.10
1968	84.13	84.89	83.87
1969	85.56	87.53	85.60
1970	83.78	84.67	82.91
1971	84.88	85.59	84.18
1972	87.37	87.81	86.93
1973	91.28	91.78	90.79
1974	94.12	94.69	93.56
1975	96.08	96.35	95.81
1976	90.55	91.68	89.94
1977	91.93	92.27	91.59
1978	96.25	96.36	96.13
1979(I)	101.79	101.69	101.90
1979(II)	103.18	103.00	103.36
1979(III)	104.92	104.47	105.36
1979(IV)	111.80	111.30	112.30
1980(I)	129.97	129.17	130.75
1980(II)	122.70	122.18	123.22
1980(III)	112.98	112.47	113.50
1980(IV)	102.24	102.09	102.39
1981(Feb)	96.25	96.60	95.90

Source: IMF unpublished data.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

TABLE 5.2: NOMINAL AND PRICE ADJUSTED EXCHANGE RATE WITH RESPECT TO THE USE DOLLAR

Year	Nominal Exchange Rate	Brazil Wholesale Price Index	US Wholesale Price Index	Price Adjusted Exchange Rate Index
1962	0.343	6.37	85.9	100.0
1963	0.521	11.08	85.6	87.0
1964	0.970	21.20	85.8	84.8
1965	1.751	32.07	87.5	118.6
1966	2.173	43.85	90.4	96.8
1967	2.559	54.97	90.6	91.1
1968	3.184	68.19	92.8	93.6
1969	4.026	81.94	96.5	102.5
1970	4.494	100.00	100.0	97.1
1971	5.304	120.42	103.3	98.3
1972	5.960	142.58	107.9	97.5
1973	6.128	166.10	122.0	97.3
1974	6.790	214.88	145.0	99.0
1975	8.127	273.65	158.4	101.7
1976	10.673	392.14	165.7	97.5
1977	14.144	558.52	175.8	96.2
1978	18.070	768.41	189.6	96.4
1979(I)	21.939	959.42	202.8	100.2
1979(II)	24.550	1081.74	209.9	102.9
1979(III)	27.999	1249.76	216.5	102.2
1979(IV)	33.994	1501.24	224.1	109.7
1980(I)	45.007	1788.30	234.4	127.5
1980(II)	49.825	2150.07	239.3	119.9
1980(III)	57.700	2666.17	247.1	115.6
1980(IV)	61.325	3288.18	252.3	101.7
1981(I)	70.801	3972.85	259.6	100.0

Source: IMF, International Financial Statistics. Mission calculations.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 6.1: INCOME TAX REDUCTIONS AND EXPORT TAX CREDIT CERTIFICATES, 1978

(Cr$ million)

	Sector	Number of Firms	Incentivised			Non-incentivised		Export Profit	Taxable Profit	Taxes Paid
			Exports	Domestic Sales	Credito Premio	Exports	Domestic Production			
	Total	422,465	125,869	17,327	22,110	79,933	2,135,197	10,518	340,893	96,258
10	Non-Metallic Minerals	4,412	1,094	51	163	1,495	70,867	137	7,724	2,303
11	Metallurgy	7,681	9,812	1,132	2,393	1,416	239,422	805	17,435	5,229
12	Mechanical Industry	4,227	6,041	3,503	1,743	1,513	106,686	735	11,039	3,314
13	Electrical Equipment	1,897	4,841	1,372	1,187	510	109,776	505	11,397	3,419
14	Transport Equipment	1,533	20,659	401	5,751	2,177	172,287	865	13,872	4,162
15	Wood Products	5,134	2,667	344	563	547	33,177	319	2,994	898
16	Furniture	4,258	400	145	79	149	30,573	18	2,193	657
17	Paper	973	1,534	497	208	54	49,058	22	3,038	910
18	Rubber Products	787	1,041	112	291	22	39,190	95	3,253	976
19	Leather Products	776	2,355	24	293	177	12,270	180	963	289
20	Chemicals	1,821	3,570	412	500	6,232	329,943	305	16,188	4,856
21	Pharmaceuticals	467	649	30	74	28	39,074	36	1,536	461
22	Perfumes, Soap	483	141	61	8	39	23,950	8	1,676	503
23	Plastics	1,916	293	90	65	11	46,033	30	3,670	1,101
24	Textiles	3,313	8,092	966	2,915	353	132,759	1,051	10,975	3,293
25	Clothing, Footwear	7,553	4,836	347	786	148	61,344	420	4,622	1,386
26	Food	9,695	26,940	4,727	3,148	21,397	270,678	2,902	14,194	4,257
27	Beverages	981	377	25	28	5	34,710	50	2,985	895
28	Tobacco Products	92	47	1	12	2,933	54,206	4	1,870	561
29	Printing	3,679	226	9	25	7	26,525	3	3,137	940
30	Other Industry	2,962	2,768	131	432	604	31,761	237	3,938	1,181
	Total Industry	64,640	98,383	14,380	20,664	39,817	1,914,289	8,727	138,699	41,591
	Non-Industry	357,825	27,486	2,947	1,446	40,116	220,908	1,791	202,194	54,667

Source: Ministry of Finance, Secretaria de Receita Federal.

Table 6.2: INCOME TAX REDUCTIONS AND EXPORT TAX CREDIT CERTIFICATES, 1979

(Cr$ million)

	Sector	Number of Firms	Incentivised Exports	Incentivised Domestic Sales	Tax Credit	Non-incentivised Exports	Production for Domestic Market	Profit on Exports	Taxable Profits	Taxes Paid
	Total	20,560	231,003	20,261	35,414	111,613	2,919,738	24,331	411,140	93,174
10	Non-Metallic Minerals	285	1,561	70	237	1,112	92,287	229	9,624	2,401
11	Metallurgy	910	22,348	6,263	4,742	907	342,441	2,466	21,153	5,706
12	Mechanical Equipment	890	11,408	3,197	2,628	1,186	143,227	710	12,643	3,343
13	Electrical Equipment	427	8,217	2,228	1,876	1,293	163,803	879	15,952	3,857
14	Transport Equipment	311	39,393	965	9,912	4,140	252,488	2,364	20,093	5,296
15	Wood Products	230	4,143	119	770	753	30,610	697	4,075	1,092
16	Furniture	196	528	93	95	24	25,271	39	1,796	440
17	Paper	231	4,125	1,163	758	261	76,067	714	6,484	1,903
18	Rubber Products	105	2,094	106	471	35	56,416	168	4,505	1,196
19	Leather Products	94	2,714	11	294	1,196	14,493	225	1,361	330
20	Chemicals	544	6,883	273	798	10,787	528,969	762	20,679	4,824
21	Pharmaceuticals	148	1,129	28	114	61	57,294	63	2,121	594
22	Perfumes, Soap	74	184	70	27	69	32,976	23	2,021	533
23	Plastics	272	662	167	131	137	57,233	57	5,334	1,426
24	Textiles	657	13,480	1,004	3,853	463	160,658	2,104	15,233	3,942
25	Clothing, Footwear	429	7,150	182	833	87	53,760	862	5,581	1,420
26	Food	1,238	45,864	1,892	4,741	27,276	391,108	5,504	20,056	4,795
27	Beverages	146	498	1	47	4	49,097	40	3,833	851
28	Tobacco Products	23	65	-	12	4,979	79,465	7	4,174	1,213
29	Printing	204	348	13	33	11	29,438	9	2,947	742
30	Other Industry	265	4,455	268	708	1,237	38,725	386	4,846	1,080
	Total Industry	7,499	177,249	18,113	33,080	56,018	2,675,826	18,290	184,511	46,984
	Non-Industry	13,061	53,754	2,148	2,334	55,595	243,912	6,041	226,629	46,190

Source: Ministry of Finance, Secretaria de Receita Federal.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 6.3: TOTAL IMPORT TAX AND DUTY EXEMPTIONS, 1980

	Importing Sector	Import Amount		Import Duties (Cf $ Million)		Taxes (Cr $ Million)		Total Exemption
		US Dollar Million (CIF)	CR $ Million (FOB)	Calculated	Deducted	Calculated	Deducted	(Cr $ Million)
	All Sectors	24,960.55	1,236,388	304,775	222,163	44,294	23,091	245,254
10	Non-Metallic Minerals	92.36	4,543	2,107	810	342	58	868
11	Metallurgy	1,891.78	92,938	32,951	29,259	3,962	3,021	32,280
12	Mechanical Equipment	704.49	36,136	18,660	9,402	4,030	1,660	11,062
13	Electrical Equipment	1,024.42	51,032	30,697	18,484	7,617	3,749	22,233
14	Transport Equipment	1,077.20	55,299	36,569	32,628	5,714	4,793	37,421
15	Wood Products	49.64	2,426	2,208	1,949	82	41	1,990
16	Furniture	3.78	184	100	32	18	3	35
17	Paper	120.25	6,002	2,515	1,186	348	85	1,271
18	Rubber Products	185.82	9,379	2,767	791	401	42	833
19	Leather Products	19.99	1,005	535	385	39	19	404
20	Chemicals	12,637.28	622,242	38,658	25,993	3,349	887	26,880
21	Pharmaceuticals	456.20	22,647	6,569	1,854	322	9	1,863
22	Perfumes, Soap	65.77	3,116	1,554	998	132	1	999
23	Plastics	126.49	6,382	2,851	1,374	572	157	1,531
24	Textiles	246.97	12,184	5,377	2,705	608	150	2,855
25	Clothing, Footwear	41.30	2,022	1,853	1,537	113	64	1,601
26	Food	440.16	21,486	9,599	7,953	450	184	8,137
27	Beverages	122.05	6,202	1,805	793	494	70	863
28	Tobacco Products	17.24	798	420	35	69	5	40
29	Printing	154.68	7,639	1,511	1,141	777	653	1,794
30	Other Industry	312.56	16,011	6,358	2,252	2,256	520	2,772
	Total Industry	19,790.43	979,673	205,664	141,561	31,695	16,171	157,732
	Non-Industry	5,170.12	256,665	99,111	80,602	12,599	6,920	87,522

Source: Ministry of Finance, Secretaria de Receita Federal.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 6.4: IMPORT TAX AND TARIFF EXEMPTIONS FOR EXPORT PROMOTION, 1980

(CR $ million)

		Regime 04: Exemption Proportionate to Export Increase			Regime 05: BEFIEX			Regime 06: Duty Draw-back (Exemption)			Regime 07: Duty Draw-back (Suspension)			Total Export Incentives		
	Importing Sector	Imports	Duty Exempt.	Tax Exempt.	Imports	Duty Exempt.	Tax Exempt.	Imports	Duty Exempt.	Tax Exempt.	Imports	Duty Susp.	Tax Susp.	Imports	Duty Exempt.	Tax Exempt.
	All Sectors	4,947	2,988	343	28,798	20,063	2,122	6,978	2,692	224	39,450	20,439	3,436	80,173	46,182	6,125
10	Non-Metallic Minerals	79	51	4	70	30	4	49	16	1	40	21	2	238	118	11
11	Metallurgy	628	328	46	1,182	719	102	2,176	452	20	2,669	994	118	6,655	2,493	286
12	Mechanical Equipment	495	318	44	1,710	1,461	136	943	664	88	3,761	1,992	469	6,909	4,435	737
13	Electrical Equipment	305	218	27	1,870	1,462	158	396	253	33	5,157	3,097	838	7,728	5,030	1,056
14	Transport Equipment	331	246	27	20,384	15,152	1,552	396	262	35	9,739	7,822	1,627	30,850	23,482	3,241
15	Wood Products	82	55	5	140	56	6	3	3	0	336	449	11	561	563	22
16	Furniture	11	7	1	-	-	-	-	-	-	12	7	1	23	14	2
17	Paper	352	201	25	175	79	11	25	11	3	234	87	10	786	378	49
18	Rubber Products	11	7	1	235	115	21	631	206	3	638	201	13	1,515	529	33
19	Leather Products	161	98	9	20	6	1	47	6	1	192	228	8	420	338	19
20	Chemicals	258	182	13	157	72	13	1,215	403	11	2,400	754	26	4,030	1,411	63
21	Pharmaceuticals	44	31	3	74	26	3	167	42	0	189	55	2	474	154	8
22	Perfumes, Soap	1	0	0	3	2	1	0	0	0	0	0	0	4	2	1
23	Plastics	14	11	1	242	85	14	111	58	10	262	125	45	629	279	70
24	Textiles	634	320	34	594	203	30	312	132	2	1,418	701	2	2,958	1,356	68
25	Clothing, Footwear	201	117	12	9	3	0	38	25	0	543	787	47	791	932	59
26	Food	1,005	530	65	89	34	5	66	19	3	9,873	2,358	95	11,033	2,941	168
27	Beverages	10	7	1	-	-	-	2	3	0	0	0	0	12	10	1
28	Tobacco Products	-	-	-	-	-	-	-	-	-	16	30	4	16	30	4
29	Printing	16	3	0	-	-	-	-	-	-	-	-	-	16	3	0
30	Other Industry	94	54	7	236	79	13	69	37	3	275	182	37	674	352	81
	Total Industry	4,732	2,784	325	27,190	19,584	2,070	6,646	2,592	213	37,754	19,890	3,351	76,322	44,850	5,959
	Non-Industry	215	204	18	1,608	479	52	332	100	11	1,696	549	85	3,851	1,332	166

Source: Ministry of Finance, Secretaria de Receita Federal.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 6.5 IMPORT TAX AND TARIFF EXEMPTIONS FOR EXPORT PROMOTION
January - May 1981

($Cr million)

	Importing Sector	Regime 04: Exemption Proportionate to Export Increase			Regime 05: BEFIEX			Regime 06: Duty Draw-back (Exemption)			Regime 07: Duty Draw-back (Suspension)			Total Export Incentives		
		Imports	Duty Exempt.	Tax Exempt.	Imports	Duty Exempt.	Tax Exempt.	Imports	Duty Exempt.	Tax Exempt.	Imports	Duty Susp.	Tax Susp.	Imports	Duty Exempt.	Tax Exempt.
	All Sectors	2,330	1,309	149	27,532	18,409	2,251	5,261	1,911	168	34,661	16,758	2,399	69,784	38,387	4,967
11	Metallurgy	386	186	24	7,580	4,640	650	1,741	428	27	1,485	504	93	11,192	5,758	796
12	Mechanical Equipment	224	147	19	1,762	1,298	156	588	381	52	3,690	1,578	455	6,264	3,804	682
13	Electrical Equipment	75	70	8	1,375	855	122	338	172	24	3,581	2,237	587	5,369	3,334	741
14	Transport Equipment	213	115	15	13,032	9,885	1,065	186	103	16	7,471	5,830	997	20,902	15,933	2,093
20	Chemicals	226	118	6	146	81	12	812	285	10	2,072	576	32	3,256	1,060	60
24	Textiles	209	116	13	672	265	31	208	88	1	794	351	5	1,883	820	50
26	Food	281	159	15	19	9	1	30	8	2	10,935	2,135	62	11,265	2,311	80
30	Other Industry	744	404	51	1,614	711	110	1,105	400	30	2,734	2,606	115	6,197	4,121	306
	Total Industry	2,302	1,303	147	26,200	17,744	2,147	5,008	1,865	162	32,726	16,217	2,346	66,236	37,129	4,802
	Non Industry	28	6	2	1,312	655	104	253	46	6	1,935	541	53	3,548	1,258	165

Source: Ministry of Finance, Secretaria de Receita Federal.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 6.6 TOTAL FISCAL INCENTIVES

1979

(US$ million)

	Industry	Duty and Tax Exempt. Regime 04 [1] Value of Exports	Duty and Tax Exempt. Regime 04 [1] Amount	Duty and Tax Exempt. Regime 04 [1] %	BEFIEX [2] Amount	BEFIEX [2] %	Draw-back Systems 06 and 07 [1] Amount	Draw-back Systems 06 and 07 [1] %	Export Tax Credit [3] Amount	Export Tax Credit [3] %	Corporate Tax [3] Incentive Amount	Corporate Tax [3] Incentive %	Total Fiscal Incentives Amount	Total Fiscal Incentives %	Fiscal Incentive Rate (%)
10	Non-Metallic Minerals	99.4	0.60	1.4	0.40	0.2	0.50	0.1	8.41	0.8	2.54	1.3	12.45	0.6	12.5
11	Metallurgy	864.4	5.50	12.9	10.30	3.8	23.30	6.7	137.18	12.2	27.40	13.5	203.68	10.3	23.6
12	Mechanical Equipment	468.2	4.60	10.8	20.20	7.4	40.60	11.6	75.92	6.8	7.89	3.9	149.21	7.5	31.9
13	Electrical Equipment	353.5	3.10	7.3	20.30	7.5	52.30	15.4	52.99	4.8	9.77	4.8	138.46	7.0	39.2
14	Transport Equipment	1,608.3	3.70	8.7	211.00	77.1	124.00	36.4	366.00	33.0	26.27	12.9	730.97	37.0	45.5
15	Wood Products	182.0	0.80	1.9	0.80	0.3	5.90	1.7	27.72	2.5	7.74	3.8	42.96	2.2	23.6
16	Furniture	20.5	0.10	0.2	0.00	0.0	0.10	0.0	2.99	0.3	0.43	0.2	3.62	0.2	17.7
17	Paper	163.0	2.40	5.7	1.10	0.4	1.20	0.3	21.90	2.0	7.93	3.9	34.53	1.7	21.2
18	Rubber Products	79.1	0.10	0.2	1.70	0.6	4.40	1.3	16.60	1.5	1.87	0.9	24.57	1.2	31.1
19	Leather Products	145.4	2.40	5.7	0.10	0.0	5.60	1.6	10.80	1.0	2.50	1.2	21.40	1.1	14.8
20	Chemicals	656.9	2.60	6.1	1.10	0.4	15.80	4.5	28.43	2.6	8.47	4.2	56.40	2.9	8.6
21	Pharmaceuticals	44.2	0.50	1.1	0.30	0.1	4.20	1.2	4.08	0.4	0.70	0.3	9.78	0.5	22.1
22	Perfumes, Soap	9.4	0.00	0.0	0.00	0.0	0.00	0.0	0.72	0.1	0.26	0.1	0.98	0.0	10.4
23	Plastics	29.7	0.10	0.2	1.20	0.5	3.00	0.9	3.87	0.3	0.63	0.3	8.80	0.4	29.6
24	Textiles	518.3	5.60	13.1	2.90	1.1	13.20	3.8	132.86	12.0	23.17	11.4	177.73	9.0	34.3
25	Clothing, Footwear	269.0	1.80	4.2	0.00	0.0	13.70	3.9	30.11	2.7	9.58	4.7	55.19	2.8	20.5
26	Food	2,712.5	8.00	18.7	0.40	0.2	33.20	9.5	162.31	14.5	61.16	30.1	265.07	13.7	9.8
27	Beverages	18.7	0.10	0.2	0.00	0.0	0.00	0.0	1.74	0.2	0.44	0.2	2.28	0.1	12.2
28	Tobacco Products	187.5	0.00	0.0	0.00	0.0	0.40	0.1	0.45	0.0	0.08	0.1	0.93	0.0	0.5
29	Printing	13.3	0.00	0.0	0.00	0.0	0.00	0.0	1.18	0.1	0.10	0.1	1.28	0.1	9.6
30	Other Industry	211.6	0.80	1.8	1.20	0.4	3.40	1.0	24.74	2.2	4.29	2.1	34.43	1.7	16.3
	Total Industry	8,654.0	42.80	100.0	273.00	100.0	350.00	100.0	1,111.00	100.0	203.22	100.0	1,980.02	100.0	23.0

1/ Estimates based on 1980 data of Table 6.4 applying the difference in export values.

2/ Estimates based on 1980 data in Table 6.4 applying the difference in total BEFIEX supported exports of 1979 and 1980.

3/ Some under-estimation of the amounts of tax credits and tax incentives (probably less than 5%) is due to the sample base of only 7,500 industrial firms.

Source: Ministry of Finance, Secretaria de Receita Federal. Mission calculated.

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Table 6.7 TOTAL FISCAL INCENTIVES

1980

(US$ million)

	Industry	Value of Exports	Duty and Tax Exempt. of Regime 04		BEFIEX		Draw-back Systems 06 and 07		Export Tax Credit		Corporate Tax Incentive 1/		Total Fiscal Incentives		Fiscal Incentive Rate
			Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	
10	Non-Metallic Minerals	163.2	0.97	1.8	0.60	0.2	0.87	0.2	-	-	4.87	1.6	7.31	0.5	4.5
11	Metallurgy	1,037.6	6.61	12.0	14.51	3.8	27.99	6.1	-	-	38.51	12.3	86.62	6.0	8.3
12	Mechanical Equipment	654.0	6.40	11.6	28.22	7.4	56.77	12.3	-	-	12.90	4.1	104.29	7.2	15.9
13	Electrical Equipment	495.0	4.33	7.9	28.62	7.5	73.42	16.0	-	-	15.98	5.1	122.35	8.4	24.7
14	Transport Equipment	2,201.0	4.82	8.8	295.12	77.1	170.19	37.0	240.00	100.0	44.07	14.1	754.20	52.0	34.3
15	Wood Products	251.0	1.06	1.9	1.10	0.3	8.18	1.8	-	-	12.49	4.0	22.83	1.6	9.1
16	Furniture	28.0	0.14	0.3	0.00	0.0	0.14	0.0	-	-	0.69	0.2	0.97	0.1	3.5
17	Paper	274.0	3.99	7.3	1.60	0.4	1.96	0.4	-	-	15.60	5.0	23.15	1.6	8.4
18	Rubber Products	135.0	0.14	0.3	2.40	0.6	7.47	1.6	-	-	3.74	1.2	13.75	1.0	10.2
19	Leather Products	112.0	1.89	3.4	0.12	0.0	4.29	0.9	-	-	2.26	0.7	8.56	0.6	7.6
20	Chemicals	875.0	3.45	6.3	1.50	0.4	21.10	4.6	-	-	13.20	4.2	39.25	2.7	4.5
21	Pharmaceuticals	59.0	0.60	1.1	0.50	0.1	4.67	1.0	-	-	1.10	0.4	6.87	0.5	11.6
22	Perfumes, soap	13.0	0.00	0.0	0.05	0.0	0.00	0.0	-	-	0.42	0.1	0.47	0.0	3.6
23	Plastics	51.0	0.21	0.4	1.75	0.5	4.20	0.9	-	-	1.25	0.4	7.41	0.5	14.5
24	Textiles	580.0	6.26	11.3	4.12	1.1	14.79	3.2	-	-	30.35	9.7	55.52	3.8	9.6
25	Clothing, Footwear	299.0	2.28	4.2	0.05	0.0	15.18	3.3	-	-	12.46	4.0	29.97	2.0	10.0
26	Food	3,574.0	10.51	19.0	0.69	0.2	43.73	9.6	-	-	95.01	30.4	149.94	10.3	4.2
27	Beverages	25.0	0.14	0.3	0.00	0.0	0.05	0.0	-	-	0.69	0.2	0.88	0.1	0.4
28	Tobacco Products	247.5	0.00	0.0	0.00	0.0	0.60	0.1	-	-	0.12	0.0	0.72	0.0	0.0
29	Printing	21.0	0.05	0.1	0.00	0.0	0.00	0.0	-	-	0.19	0.1	0.24	0.0	0.1
30	Other Industry	288.6	1.08	2.0	1.63	0.4	4.58	1.0	-	-	6.86	2.2	14.15	1.0	4.9
	Total Industry	11,383.6	54.93	100.0	382.58	100.0	460.18	100.0	240.00	100.0	312.76	100.0	1,450.45	100.0	12.7

1/ Estimates based on 1979 tax incentives (Table 6.2) assuming a 35% corporate tax rate.

Source: Ministry of Finance, Secretaria de Receita Federal. Mission calculation.

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Table 6.8: BEFIEX IMPORTS, 1980

(Cr$ million)

NBM Chapter	Imported Items	Amount	Tariff Exemptions	%
84	Non-Electrical Machinery	15,073	7,663	50.8
87	Automobiles (and parts)	5,414	7,083	130.8
73	Iron, Steel	1,983	992	50.8
85	Electrical Machinery	1,753	1,412	80.5
77	Magnesium (Metals)	1,494	299	20.0
90	Optical & Scientific Equipment	1,279	613	47.9
70	Glass	478	744	155.6
82	Metal Products	412	305	74.0
40	Rubber	279	413	48.0
39	Plastics	125	190	152.0
	Subtotal	28,290	19,714	69.7
	Other	667	556	83.4
	Total	28,957	20,270	70.0

Source: Secretaria da Receita Federal

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Table 6.9: DRAWBACK IMPORTS (SUSPENÇAO), 1980

(Cr$ million)

NBM Chapter	Imported Items	Amount	Tariff Exemptions	%
84	Non-Electrical Machinery	7,692	4,437	57.7
12	Oil Producing Vegetables	6,481	1,011	15.6
85	Electrical Machinery	5,196	3,357	64.6
02	Meat	3,742	936	25.0
73	Iron, Steel Products	2,953	1,139	38.6
29	Chemicals (Organic)	1,881	614	32.6
76	Aluminum	1,715	738	43.0
87	Automobiles & Parts	1,697	2,051	120.9
40	Rubber	984	811	82.4
39	Plastics	722	648	89.8
90	Optical & Scientific Equipment	697	360	51.6
28	Chemicals (Inorganic)	668	230	34.4
27	Petroleum and Products	529	106	20.0
	Subtotal	34,957	16,438	47.0
	Other	5,398	4,632	85.8
	Total	40,355	21,070	52.2

Source: Secretaria da Receita Federal

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Table 6.10: ADJUSTED FISCAL INCENTIVES, 1980

(US$ million)

	Export Tax Credit	Income Tax Reduction	BEFIEX	Draw-back	Other	Total Incentives	Exports	Incentive Rate (%)
Non-Metallic Minerals	-	4.87	0.36	0.60	0.66	6.49	163.2	4.0
Metallurgy	-	38.51	8.81	19.20	4.51	71.03	1,037.6	6.8
Machinery	-	12.90	17.13	38.94	4.37	73.34	654.0	11.2
Electrical Equipment	-	15.98	17.37	50.37	2.96	86.68	495.0	17.5
Transport Equipment	156.0	44.07	179.14	116.75	3.29	499.25	2,201.0	22.7
Wood Products	-	12.49	0.67	5.61	0.72	19.49	251.0	7.8
Furniture	-	0.69	-	0.10	0.10	0.89	28.0	3.2
Paper	-	15.60	0.97	1.34	2.73	20.64	274.0	7.5
Rubber	-	3.74	1.46	5.12	0.10	10.42	135.0	7.7
Leather Products	-	2.26	0.07	2.94	1.29	6.56	112.0	5.9
Chemicals	-	13.20	0.91	14.47	2.36	30.94	875.0	3.5
Pharmaceuticals	-	1.10	0.30	3.20	0.41	5.01	59.0	8.5
Perfumes	-	0.42	0.03	-	-	0.45	13.0	3.5
Plastics	-	1.25	1.06	2.88	0.14	5.33	51.0	10.5
Textiles	-	30.35	2.50	10.15	4.28	47.08	580.0	8.1
Clothing, Footwear	-	12.46	0.03	10.41	1.56	24.46	299.0	8.2
Processed Food	-	95.01	0.42	30.00	7.18	132.61	3,574.0	3.7
Beverages	-	0.69	-	0.03	0.10	0.82	25.0	3.3
Tobacco	-	0.12	-	0.41	-	0.53	247.5	0.2
Printing	-	0.19	-	-	0.03	0.22	21.0	0.1
Miscellaneous	-	6.86	0.99	3.14	0.68	11.67	288.6	4.0
Manufacturing	156.0	312.76	232.20	315.70	37.50	1,054.16	11,383.6	9.3

Source: Tables 6.6 to 6.9. Mission calculations.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 6.11: FINANCING OF MANUFACTURED EXPORTS, 1975-1981

	1975	1976	1977	1978	1979	1980	June 1981
1. Manufactured Exports (674) a/ b/	3,650	4,230	5,765	6,565	9,575	10,950	7,311
2. Capital and Consumer Durable Goods b/	880	935	1,360	1,700	2,440	3,385	2,275
3. =1 in Cruzeiros c/	33,215	52,030	92,815	13,720	406,935	777,725	568,065
4. =2 in Cruzeiros c/	8,010	11,500	21,985	35,530	103,700	221,775	176,765
5. Export Credit							
a) 674	5,940	10,995	18,580	27,905	42,010	74,245	134,190
b) FINEX	3,840	7,820	12,730	20,370	37,925	89,450	
Ratio 5a to 3	18%	21%	20%	20%	10%	9.5%	24%
Ratio 5b to 4	48%	68%	58%	57%	37%	40%	
Ratio of Certificates Issued to 1			25%	25%	20%	16%	27%

a/ Includes all the products entitled to 674 financing.

b/ In US$ Millions.

c/ Converted at the average exchange rate of the year.

Sources: Banco Central do Brasil: Boletim Mensal and Relatorio Anual 1981.

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Table 6.12: FINANCIAL INCENTIVES TO EXPORTS, 1980-81

	1980			1981		
	Subsidy a/	Exports a/	Rate	Subsidy a/	Exports	Rate
Meats						
Beef	750	8,815	8.5%	1,330	11,315	11.8%
Broilers	720	7,270	9.9%	1,470	10,150	14.5%
Horse Meat	250	1,370	18.2%	140	1,230	11.2%
Fish	140	665	21.1%	105	1,105	9.5%
Shrimp and Lobster	885	2,880	30.9%	355	3,075	11.5%
Processed Agriculture Products						
Tea	140	385	36.4%	70	430	16.3%
Cocoa Products	1,495	14,115	10.6%	1,540	9,470	16.3%
Shell Nut	580	2,810	20.6%	355	2,830	12.5%
Wax	165	595	27.7%	90	555	16.2%
Pepper	250	2,070	12.1%	210	1,970	10.7%
Vegetable Oils and Cakes						
Soybean Oil	1,110	14,785	7.5%	-	-	-
Peanut Oil	580	2,985	20.0%	460	2,150	21.4%
Castor Oil	360	3,125	11.5%	195	1,410	13.5%
Other Oils	140	980	14.2%	160	1,475	10.8%
Soybean Cake	3,795	50,920	7.5%	3,085	63,405	4.9%
Peanut Cake	80	595	13.4%	90	365	24.7%
Other Cakes	110	595	18.5%	15	675	2.2%
Leather	555	3.545	15.7%	210	3,010	7.0%
Leather Products	275	1,225	22.4%	250	860	29.1%
Rubber Products	445	4,530	9.8%	690	3,440	20.1%
Wood Products	940	8,250	11.4%	1,260	6,210	20.1%
Paper Pulp	995	12,815	7.8%	1,295	10,580	12.2%
Fibers						
Synthetic	195	1,440	13.5%	140	1,720	8.1%
Cotton	1,300	6,355	20.5%	1,275	4,485	28.4%
Silk	140	980	14.3%	140	860	16.3%
Fabrics						
Synthetic	385	1,335	28.8%	265	1,230	21.5%
Cotton	970	3,860	25.1%	780	2,765	28.2%
Others	305	1,335	22.8%	265	1,660	16.0%
Apparel	385	1,300	29.6%	265	1,475	18.0%
Footwear	2,910	13,625	21.4%	2,750	12,730	21.6%
Iron Products	1,245	12,360	10.1%	745	7,320	10.2%
Vegetable Juice	80	875	9.1%	90	1,045	8.6%
Orange Juice	1,245	11,905	10.5%	1,205	18,080	6.7%
Machinery						
Electrical Equipment	2,880	16,115	17.9%	2,445	16,915	14.5%
Mechanical Equipment	5,960	33,180	18.0%	5,035	35,240	14.3%
Tool Machines	470	2,530	18.6%	515	3,750	13.7%
Transport Equipment	6,070	53,025	11.4%	5,355	53,690	10.0%
Precious Stones	250	1,055	23.7%	70	1,280	5.5%
Sub-total	37,005	306,320	12.1%	34,930	275,225	12.7%
Other b/	12,750	126,065	10.1%	265	174,055	-
Total 674	49,755	432,680	11.5%	31,195	419,275	-

a/ At constant prices (see Worksheet).

b/ Residual estimated as the difference between the exports entitled to 674 financing and the value of exports included in the items of this table. The residual of certificates is the difference between the certificates issued during the period and those estimated as having been issued for the itemized exports of this table.

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Table 6.13: EXPORT FINANCING AND FINANCIAL INCENTIVES, 1978-1981

Products	Exports [a]			Certificates [a]		Financing [b]		Present Value Subsidy [c]		Cruzeiro Value of Exports [e]		Present Value Exports	
	1979	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981
Meats	-	-	-	-	-	-	-	46.9[d]	22.0[d]	-	-	1.552[f]	127.8[f]
Beef	135	251	184	27	75	1,595	6,045	750	1,330	13,680	14,460	8,815	11,315
Broilers	81	207	165	26	83	1,535	6,690	720	1,470	11,280	12,970	7,270	10,150
Horse Meat	47	39	20	9	8	530	645	250	140	2,125	1,570	1,370	1,245
Fish	15	19	18	5	6	295	485	140	105	1,035	1,415	665	1,105
Shrimp and Lobster	108	82	50	32	20	1,890	1,610	885	355	4,470	3,930	2,880	3,075
Processed Agricultural Products	-	-	-	-	-	-	-	-	-	-	-	-	-
Tea	17	11	7	5	4	295	320	140	70	600	550	385	430
Cocoa Products	448	402	154	54	87	3,190	7,010	1,495	1,540	21,910	12,105	14,115	9,470
Shell Nut	81	80	46	21	20	1,240	1,610	580	355	4,360	1,650	2,810	1,290
Wax	19	17	9	6	5	355	405	165	90	925	470	595	365
Pepper	47	59	32	9	12	530	965	250	210	3,215	705	2,070	1,550
Vegetable Oils and Cakes	-	-	-	-	-	-	-	-	-	-	-	-	-
Soybean Oil	334	421	295	40	-	2,365	-	1,110	-	22,945	23,180	14,785	18,135
Peanut Oil	72	85	35	21	26	1,240	2,095	580	460	4,630	2,750	2,985	2,150
Castor Oil	107	89	23	13	11	770	885	360	195	4,850	1,805	3,125	1,410
Other Oils	43	28	24	5	9	295	725	140	160	1,525	1,885	980	1,475
Soybean Cake	1,135	1,450	1,031	137	174	8,095	14,025	3,795	3,085	79,025	81,035	50,920	63,405
Peanut Cake	15	17	6	3	5	175	405	80	90	925	470	595	365
Other Cakes	32	17	11	4	-	235	80	110	15	925	865	595	675
Vegetable Juices	17	25	17	3	5	175	405	80	90	1,360	1,335	875	1,045
Orange Juice	221	339	294	45	68	2,660	5,480	1,245	1,205	18,475	23,110	11,905	18,080
Leather	165	101	49	20	12	1,180	965	555	210	5,505	3,850	3,545	3,010
Leather Products	34	35	14	10	14	590	1,130	275	250	1,905	1,100	1,225	860
Rubber Products	82	129	56	16	39	945	3,145	445	690	7,030	4,400	4,530	3,440
Wood Products	171	235	101	34	71	2,010	5,720	940	1,260	12,805	7,940	8,250	6,210
Paper Products	181	365	172	36	73	2,125	5,885	995	1,295	19,890	13,520	12,815	10,580
Fibers	-	-	-	-	-	-	-	-	-	-	-	-	-
Synthetic	36	41	28	7	8	415	645	195	140	2,235	2,200	1,440	1,720
Cotton	155	181	73	47	72	2,775	5,805	1,300	1,275	9,865	5,735	6,355	4,485
Silk	24	28	14	5	8	295	645	140	140	1,525	1,100	980	860
Fabrics	-	-	-	-	-	-	-	-	-	-	-	-	-
Synthetic	46	38	20	14	15	825	1,210	385	265	2,070	1,570	1,335	1,230
Cotton	110	110	45	35	44	2,070	3,545	970	780	5,995	3,535	3,860	2,765
Other Fabrics	37	38	27	11	15	650	1,210	305	265	2,070	2,120	1,335	1,660
Apparel	46	37	24	14	15	825	1,210	385	265	2,015	1,885	1,300	1,476
Footwear	352	388	207	105	155	6,205	12,495	2,910	2,750	21,145	16,270	13,625	12,730
Iron Products	372	352	119	45	42	2,660	3,385	1,245	745	19,185	9,355	12,360	7,320
Electric Equipment	345	459	275	104	138	6,145	11,120	2,880	2,445	25,015	21,615	16,115	16,915
Mechanic Equipment	715	945	573	215	284	12,705	22,890	5,960	5,035	51,500	45,035	33,180	35,240
Tools	55	72	61	17	29	1,005	2,335	470	515	3,925	4,795	2,530	3,750
Transport Equipment	1,095	1,510	873	219	302	12,940	24,340	6,070	5,355	82,295	68,615	53,825	53,690
Precious Stones	30	30	38	9	4	530	320	250	70	1,635	2,985	1,055	1,280
Sub-Total	7,025	8,730	4,475	1,335	1,970	78,900	158,780	37,005	34,930	475,785	351,735	306,620	275,225
Other	2,360	3,590	2,830	460	15	27,185	1,210	12,750	265	195,655	222,440	126,065	174,055
Total 674	9,385	12,320	7,305	1,795	1,985	106,085	159,990	49,755	35,195	671,440	574,115	432,650	449,275
Other Primary	4,935	6,450	3,045										
Other Manufactured	760	1,015	400										
Non-Classified	165	285	105										
Total Export	15,245	20,130	10,855										

a/ In U.S. Dollars.
b/ Converted at the weighted average of the exchange rate prevailing on the months of the issue of the certificates (Cr$59.1 in 1980 and Cr$80.6 in 1981).
c/ Estimated at constant prices under the formula (rm-rs) divided by (1+i); where rm is the market rate; rs is the subsidy rate; and i the inflation rate. A positive rate of 10% was used as a proxy of the market rate.
d/ 1980: 46.9 = (131 - 32.5)/2.15; 1981: 22 = (52.9 - 21)/1.457.
e/ Exchange rate (1980 = 54.5) (1981 = 78.6).
f/ Average price indexed for 1980 and 1981 (CPI-DS).

Note: 1981 data refers to the period of January to June.

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Table 7.1
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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS
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	51.4
11031	Iron & Steel Castings	95.9	3	31.3	65.3	
1104	Non-Ferrous Metals	44.1	11	-16.5	64.0	-3.6
11041	Copper	44.5	5	-19.2	96.9	
11042	Other Non-Ferrous Metals	44.0	6	-14.3	25.4	

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

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 (%)
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 Equipment	55.9	n.a.	n.a.	--	
12023	Other Machine Parts, inc. Tools	58.1	30	85.1	83.8	
1203	Industrial Equipment & Machinery	51.8	22	29.5	73.2	66.5
12031	Industrial Equipment & Machinery	51.8	22	29.5	73.2	
1204	Agricultural Equipment & Machinery	42.0	10	-18.3	8.6	5.1
12041	Agricultural Equipment & Machinery	42.0	10	-18.3	8.6	
1205	Office & Domestic Use Equip. & Mach.	130.4	10	-10.8	23.9	3.5
12051	Office Equipment & 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 Equip.	176.9	2	-22.0	44.1	
13062	Other Communications Equip.	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 Equip. & 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, Plywood & 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	

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

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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 (%)
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	1	24.9	59.1	
2004	Coke & Coal Derivations	18.0	31	-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	

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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	Plastic 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	Cloth 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	165.6	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	--	

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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).

Source: W. Tyler, Política Comercial e Industrial no Brasil: Uma Análise sob a Ótica de Proteção Efetiva para Vendas no Mercado Doméstico. IPEA, July 1981 (mimeo).

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

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EFFECTIVE PROTECTION ESTIMATES AT 4 DIGIT LEVEL, 1980-81

IBGE CODE	Industry	Effective Protection Estimate (%)	Effective Protection Decomposition: Subsidy Effect (%)	Effective Protection Decomposition: Tax Effect (%)	Net Effective Protection (%)
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 and 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 Wires & 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 Refining	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	Pharmaceutical Products	116.3	122.2	5.9	82.1

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EFFECTIVE PROTECTION ESTIMATES AT 4 DIGIT LEVEL, 1980-81

IBGE CODE	Industry	Effective Protection Estimate (%)	Effective Protection Decomposition: Subsidy Effect (%)	Effective Protection Decomposition: Tax Effect (%)	Net Effective Protection (%)
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
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: W. Tyler, Política Comercial e Industrial no Brasil: Uma Analise sob a Otica de Protecão Efetiva para Vendas no Mercado Doméstico. IPEA, July 1981 (mimeo).

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Table 9.1: CHRONOGRAM OF MAIN EVENTS IN BRAZILIAN SCIENCE AND TECHNOLOGY POLICY

Year	Events
1920/1950	Creation and implantation of R & D institutions in the area of engineering and sciences: INT -- Instituto Nacional de Tecnologia, 1921 IPT -- Instituto de Pesquisas Tecnológicas de São Paulo, 1934 CTA -- Centro Técnico Aerospacial, 1954 ITB -- Instituto Tecnologico da Bahia ITERS - Instituto Tecnológico do Rio Grande do Sul ITEP - Instituto Tecnologia de Pernambuco
1951	Creation of two organizations for the development of human resources for science and technology (S & T): CNPq -- Conselho Nacional de Pesquisas Capes -- Coordinacion de Aperfeicoamento de Pessoal de Nível Superior
1964/1965	Creation of organizations for the financing of S & T policy: Funtec (BNDE) -- Fundo de Desenvolvimento Tecno Científico Finame (BNDE) -- Fundo de Financiamento para Acquisição de Maquinas e Equipamentos Industriais (1964) Funat (INT) -- Fundo de Amparo a Tecnologia Finep (BNDE) -- Financiadora de Estudios y Projetos (1965)
1968	PED -- Programa Estrategico de Desenvolvimento -- has first explicit government policy for S & T
1969	FNDT -- Fundo Nacional de Desenvolvimiento Científico e Tecnologico
1970	Creation of Ceped -- Centro de Pesquisa e Desenvolvimento da Bahia
1971	Emphasis on S & T in IPND (First National Development Plan) Setting up institutionalization of FNDCT/Finep scheme Creation of INPI -- Instituto Nacional de Propriedade Industrial Creation of Cetec -- Centro Tecnologico de Minas Gerais Finame transformed into BNDE subsidiary
1972	Creation of STI/MIC -- Secretaria de Tecnologia Industrial of the Ministry of Industry and Commerce Institutionalization of SNDCT -- Sistema Nacional de Desenvolvimento Científico y Tecnológico Linkage of CNPq with the Ministry of Planning (Seplan), which gave it advisory status for S & T planning
1973	Approval of PBDCTI -- First Basic Science and Technology Plan (effective 1973/1974)
1974	Restructuring CNPq and integration into Seplan Restructuring of Capes Creation of Conmetro -- Conselho Nacional de Metrologia, Normalização e Qualidade Industrial Creation of BNDE subsidiaries for equity participation in national industry: Embramec (Mecanica Brasileira S.A.) Fibase (Financiamentos e Participações) Ibrasa (Investimentos Brasileiros)
1975	Reformation of SNDCT Establishment of Sector Systems Creation of NAIS -- Nucleos de Articulacao com a Industria (Coordinated by Finep)
1976	Creation of Fipec -- Fundo de Incentivo a Pesquisa Tecnico-Científica (Banco do Brasil) Approval of PBDCT II (effective 1975-1979)
1977	Creation of FTI -- Fundacion de Tecnologia Industrial
1980	Approval of PBDCT III (effective 1980-1985)

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Table 9.2: FNDCT FINANCING 1970-1979 1/

(Cr$ thousands at 1978 prices 2/)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	19791/	Total
Development of New Technologies (Nuclear Energy, Space, Ocean Resources, Non-Conventional Energy)	4,172 (1)	6,605 (1)	28,709 (1)	348,633 (7)	117,810 (3)	1,230,208 (15)	359,766 (10)	186,438 (8)	899,600 (13)	41,837 (10)	3,181,941 (69)
Infrastrcuture Technology (Electric Energy, Petroleum Transport and Communications)	9,394 (1)	5,713 (1)	18,092 (1)	69,249 (2)	2,499 (1)	417,712 (3)	205,706 (2)		227,027 (8)	42,946 (1)	998,338 (20)
Industrial Technology	5,364 (1)	31,730 (2)	304,043 (5)	218,750 (7)	266,904 (7)	179,508 (7)	184,048 (8)	367,781 (7)	1,172,784 (15)	94,149 (6)	2,825,161 (65)
Agricultural Development		24,160 (2)			121,891 (3)	11,480 (2)	172,309 (4)	70,497 (3)	318,986 (14)	1,299 (1)	720,622 (29)
Technology Applied to Regional and Social Development		5,107 (1)	14,548 (1)	112,822 (4)	231,004 (5)	139,020 (4)	240,946 (7)	119,180 (9)	571,870 (11)	17,540 (3)	1,452,037 (45)
Scientific Development and Creation of Human Resources for Research	34,158 (5)	214,490 (18)	819,892 (17)	1,029,794 (22)	936,964 (29)	1,679,227 (35)	1,380,690 (40)	1,518,453 (49)	1,562,002 (69)	958,925 (20)	10,134,595 (304)
Support Activities for Scientific and Technological Development		40,235 (2)	26,450 (1)	108,108 (2)	41,798 (3)	15,820 (2)	85,437 (6)	35,236 (4)	436,301 (11)	97,587 (6)	929,170 (37)
Total	53,089 (8)	328,039 (27)	1,211,733 (26)	1,887,357 (44)	1,718,869 (51)	3,672,975 (68)	2,628,953 (77)	2,297,585 (80)	5,188,570 (141)	1,254,733 (47)	20,241,903 (569)

1/ Excludes Cr. 1,341 million applied in Special Programs in 160 operations.

2/ Figures in parenthesis refer to number of operations.

Source: Perreira, "Desenvolvimento...", p. 89a.

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Table 9.3: FINANCING BY CNPq, FUNTEC/BNDE, FINEP/FNDCT

	CNPq funds for Grants and Scholarships 1/ 2/	Funtec/BNDE Value of Operations Approved 2/	Finep & FNDCT Value of Operations Approved 2/	Total	Total (thousands of U.S. dollars) 3/
1964	28,511	2,407	--	30,918	1,711
1965	69,084	25,500	--	125,502	6,945
1966	34,627	42,208	--	81,835	4,528
1967	89,023	265,944	83,118	519,920	28,773
1968	82,270	571,442	234,454	888,166	49,151
1969	131,116	117,910	7,187	320,897	17,759
1970	202,039	577,239	150,524	929,802	51,456
1971	169,356	706,944	484,769	1,361,069	75,322
1972	217,036	300,777	1,458,776	1,976,589	109,385
1973	242,992	780,298	2,936,910	3,960,200	219,159
1974	219,082	635,261	2,753,423	3,607,766	199,655
1975	245,212	616,681	7,161,849	8,023,742	444,037
1976	387,507	430,805	4,683,593	5,501,905	304,477
1977	512,106	192,941	4,656,933	5,361,980	296,734
1978	604,167	134,867	11,069,982	11,809,016	653,515
1979	712,693	71,669	3,739,934	4,524,296	250,376

1/ This does not represent the total budget of the CNPq including its own research activities but only the amount spent on grants and scholarships.

2/ Thousdands of cruzeiros at 1978 prices.

3/ Converted at 1978 average exchange rate of Cr. 18.077/US$.

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Table 9.4: IMPORTS OF TECHNOLOGY AND OF CAPITAL GOODS, 1966-1979

	INPI Approvals[1/] U.S. millions	Imports of Technology[2/] U.S. millions	Index	Imports of Capital Goods[3/] U.S. millions	Index	Imports of Technology / Imports of K Goods x 100
1966		46	100	366	100	12.6
1967		63	137	459	125	13.7
1968		70	152	625	171	11.2
1969		91	198	738	202	12.3
1970		104	226	946	258	11.0
1971		132	282	1,288	352	10.2
1972		154	335	1,806	493	8.5
1973	400	166	361	2,196	600	7.6
1974	340	212	461	3,208	877	6.6
1975	415	311	676	3,992	1,091	7.8
1976	284	362	787	3,738	1,021	9.7
1977	695	513	1,115	3,252	889	15.8
1978	453	591	1,285	3,753	1,025	15.7
1979		782	1,700	3,975	1,087	19.7

Sources: 1/ O Globo, Dec. 21, 1978, p. 21 and July 1, 1979, p. 28, reproducing official INPI data, cited in Luiz A. Correa do Lago, Fernando Lopes de Almeida, Beatries M F de Lima. A Industria Brasileira de Bens da Capital (Estudos Especiais IBRE No. 1). Rio de Janeiro: Fundação Getalio Vargas, 1979, pp. 423.

2/ Central Bank data. Includes diverse services, administration, technical assistance patents, royalties, and rentals.

3/ Relatório Cacex: Series Estatísticas, 1979, pp. 235 (includes automobiles).

Note: INPI approvals tend to be greater than the figures for imports of technology given by the Central Bank in the first years because they refer to the total approved, regardless of the actual disbursements, whereas the Central Bank figures are the actual figures for annuyal payments authorized.

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Table 9.5: FUNTEC: OPERATIONS APPROVED BY TYPE OF ACTIVITY AND TYPE OF INSTITUTION, 1964-1978

	1964-1971		1972-1974		1974-1978	
	No. of Operations	Distribution of Value of Operations	No. of Operations	Distribution of Value of Operations	No. of Operations	Distribution of Value of Operations
I. Type of Activity						
Human Resource Development	89	76%	30	19%	---	---
Basic Research	5	2%	18	16%	---	---
Applied Research (Supply of Study)	32	19%	81	60%	17	31%
Applied Research (Demand of Technology)	6	3%	---	---	20	56%
Other Lines of Activity	4	---	8	5	6	13%
Total	136	100%	137	100%	43	100%
II. Type of Institution						
Educational	100	71%	112	76%	9	15%
Research	30	29%	21	23%	5	6%
Industry	2	---	---	---	21	61%
Other	4	---	4	1%	8	18%
Total	136	100%	137	100	43	100%

Source: Ferreira "Desenvolvimento . . .", pp. 66b-c, based on BNDE data.

Table 9.6: FUNTEC DISBURSEMENTS BY SECTOR, 1974-JULY 1978

	Sector	Thousands of Cruzeiros at 1978 Prices	Percentage Distribution
1.	Transformation Industry	800,678	99.8
	Steel and Metallurgical	70,669	8.8
	Mechanical	339,419	42.3
	Electrical, Electronic and Communications	302,242	37.7
	Transport and Transport Material	2,026	0.3
	Food Products	5,870	0.7
	Petrochemicals	-	-
	Chemicals	-	-
	Others	80,452	10.0
2.	Agriculture	1,753	0.2
	TOTAL	802,451	100.0

Source: Ferreira "Desenvolvimento . . ." pp. 69a, based on BNDE data.

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Table 9.7: PROJECTS FINANCED BY FUNTEC

Firm	Summary of Project
Electrometal Aços Finos	Experimental development of Eletroslag process and absorption of technology for the manufacture of special steels.
Maquinas Piratiningo	Development of products and processes, personnel training, quality control program.
Fupresa	Transfer of technology for precision foundry for molds.
Indústrias Reunidas F. Matarazzo	Development research for the obtention of food products with high nutritive value.
Industrias Romi	Development and creation of new high technology products including numerically controlled machine tools.
Dabi -- Industria Brasileira de Aparalhos Dentários	Research and development of new products and improvements in existing ones.
Electromotores Jaragua	Execution of research projects for project development and adequate manufacturing technology.
Confab Industrial	Development of calculation methods, manufacturing processes, and materials for application in production line.
Transit Semiconductores	Set up of R & D lab; development of know-how for product manufacture; integrated circuit projects.
Engesa -- Engenheiros Especializados	Development of a model of forestry tractor.
Ind. de Maquinas Agrícolas Ideal	Development of grain harvesters.
Embraer	Design and construction of electronic components for aircraft applications.
unknown	Design and development of tape recorder elements and manufacturing process.
	Design and construction of a radiation sterialization unit.
	Design and construction of a pilot plant for the mechanical drying of Carnaba (wax) plant leaves.
	Experimental design for telephone apparatus head pieces.
	Develop and improve aircraft crop dusting techniques.
	Experimental development for raising shrimp in artificial environment.

Sources: A. Villela and W. Baer, O Sector Privado Nacional: Problemas e Políticas para seu Fortalecimento (IPEA, Coleção Relatórios de Pesquisa No. 46), Rio de Janeiro, IPEA, 1980, pp. 71-72.

J. Baranson, North South Technology Transfer Financing and Institution Building, Mt. Airy, Maryland: Lomond Publications, 1981, pp. 44-46.

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Table 9.8: FINEP OPERATIONS BY PROGRAM 1967-1979
(in 1979 prices) 1/

	AUSC (*)			ACN 2/			ADTEN 2/			TOTAL		
		(Cr$1,000)			(Cr$1,000)			(Cr$1,000)			(Cr$1,000)	
Years	Operations	Finep Value	Total Cost of Project	Operations	Finep Value	Total Cost of Project	Operations	Finep Value	Total Cost of Project	Operations	Finep Value	Total Cost of Project
1967	03	127,920	128,909	--	--	--	--	--	--	--03	127,920	128,909
1968	18	360,838	418,209	--	--	--	--	--	--	--18	360,838	418,209
1969	15	110,613	208,915	--	--	--	--	--	--	--15	110,613	208,915
1970	41	149,957	179,960	--	--	--	--	--	--	--41	149,957	179,960
1971	25	240,341	432,201	--	--	--	--	--	--	--25	240,341	432,201
1972	76	380,231	454,153	--	--	--	--	--	--	--76	380,231	454,153
1973	120	1,578,237	2,953,409	08	32,397	33,712	02	4,695	5,657130	1,615,330	2,992,778	
1974	110	1,199,711	1,570,735	30	180,846	363,549	14	211,689	293,091154	1,592,246	2,227,375	
1975	93	4,807,466	6,821,309	26	355,243	719,793	20	206,613	246,149139	5,269,322	7,787,251	
1976	59	818,293	1,403,209	15	83,872	712,551	40	1,440,645	6,753,527114	2,342,810	8,869,287	
1977	76	2,060,391	2,661,578	19	170,560	170,560	87	1,399,076	2,169,736182	3,630,027	5,001,874	
1978	111	1,990,855	2,978,382	08	57,692	60,942	125	2,477,199	2,879,106244	4,525,746	5,918,430	
1979	32	669,420	759,475	11	134,151	166,887	59	957,536	1,427,276102	1,760,927	2,353,638	
TOTAL	779	14,494,273	20,970,444	117	1,014,761	2,227,994	347	6,697,274	12,774,5421,243	22,206,308	36,972,980	
Percentage Distribution	(62.7)	(65.3)	(56.7)	(9.4)	(4.6)	(6.0)	(24.9)	(30.2)	(27.3)(100.0)	(100.1)	(100.0)	

1/ Using FGV General Price Index 1967-1979.

2/ Includes both direct operations and operations through financial agents.

Source: Finep, Annual Report 1979.

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Table 9.9: FINEP AND FNDCT OPERATIONS, 1967/1979

(in mid-1979 millions of cruzeiros)

	Total Number of Operations Contracted		Financed Amount		Total Cost of Project
I. Finep Resources	1,243	(62.9%)	33,206.3	(39.3%)	36,973.0
AUSC	779		14,494.3		20,970.4
ADTEN	347		6,697.3		13,794.5
ACN	117		1,014.8		2,228.0
II. FNDCT	732	(37.1%)	34,242.2	(60.7%)	49,986.3
Total (I + II)	1,975	(100.0)	56,448.5	(100.0)	86,959.2

Source: Finep, Annual Report 1979.

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Table 9.10: FINEP OPERATIONS BY SECTOR

		1979	1978	1977
I. Percentage Distribution				
Global Planning	Number	3	9	8
	Value	1.2	1.4	3.3
Agriculture	Number	3	8	6
	Value	1.4	7.7	8.2
Mineral Extraction	Number	2	-	1
	Value	0.8	0.3	0.3
Industry in General	Number	61	56	59
	Value	48.6	54.0	30.9
Electric Energy	Number	7	2	1
	Value	29.9	9.5	11.6
Fuels	Number	1	2	1
	Value	0.1	6.0	0.3
Transport	Number	8	5	5
	Value	7.5	10.0	36.5
Housing	Number	1	-	-
	Value	1.8	1.6	0.2
Education, Culture, Science and Technology	Number	3	2	1
	Value	1.8	1.6	0.2
General Services	Number	12	15	18
	Value	8.2	7.9	8.7
II. Total				
Number of Operations		102	244	182
Value in 10^6 Current Cruzeiros		1,761	2,941	1,701

Source: FINEP, Annual Reports 1977-1979.

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Table 9.11: FINEP OPERATIONS BY ACTIVITY

		1979	1978	1977
I. Percentage Distribution				
General Studies	Number	17	27	29
	Value	3.2	14.1	38.8
Feasibility Studies	Number	3	5	5
	Value	6.5	1.3	0.9
Project Execution	Number	12	14	8
	Value	34.1	28.6	17.0
Quality Control	Number	11	14	9
	Value	5.7	11.2	2.0
Product R & D	Number	25	22	12
	Value	21.7	13.7	9.8
Process R & D	Number	10	9	12
	Value	3.8	18.8	11.3
R & D Centers	Number	7	2	2
	Value	10.3	2.9	1.4
Improvements in Technological Capacity	Number	5	4	3
	Value	13.0	8.2	14.0
Consulting Firms* and Others	Number	11	3	10
	Value	7.5	1.3	4.7
II. Total				
Number of Operations		102	244	182
Value 10^6 Current Cruzeiros		1,761	2,941	1,701

Source: FINEP, Annual Reports 1977-1979.

* For 1977 and 1978 this category refers to operations contracted for development of consulting firms. For 1979 the category may include some other operations too.

Table 9.12: FINEP--STOCK PARTICIPATION POSITION IN 1979

	Total Capital (thousands of cruzeiros)	FINEP Share
Tectronic S.A. -- Empresa Brasileira de Tecnologia Electronica	15,000	40%
Sulfab -- Cia Sulfo Quimica da Bahia	74,720	13%
Bioferm -- Pesquisa e Desenvolvimento S.A.	n.a.	--
Digibras -- Empresa Digital Brasileira, S.A.	40,000	41%
Microlab, S.A.	39,469	57%
Cemaq -- Ceara Maquinas Agricolas S.A.	34,500	47%
Propar -- Promocoes e Participacoes da Bahia S.A.	60,000	6%
"S" -- Electro Acusticas S.A.	31,000	35%
Total	--	(US$ 127,395 thousand)

Source: FINEP, Annual Report 1979.

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Table 9.13: TERMS OF FINEP FINANCING

I. General Operating Conditions

Grace Period	up to 3 years	up to 2 years	up to 1 year
Amortization Period	up to 9 years	up to 3 years	up to 3 years
Finep Participation	up to 80%	up to 70% in the states of RS, SC, PR, SP RJ & MG. Up to 80% interest.	up to 80%

II. Financial Charges for ADTEN Program

A. Monetary Correction by Type of Project	Percentage of change of ORTN in period
Alternative energy sources	40%
Agriculture	40%
Social Development	40%
Others	60%

B. Interest Rates by Nature of Project	Normal	Size Enterprises	Special*
Basic engineering done in country with technological development	8%	4%	-
Establishment of R & D centers	8%	4%	2%
Product or project development	8%	4%	2%
Pioneering commercialization	8%	4%	2%
Purchase and absorption of technology developed abroad	12%	6%	3%
Establishment or expansion of quality control systems	12%	6%	3%
Others	12%	6%	-

III. Financial Charges for AUSC Program

A. Monetary Correction by Type of Project	% of change of ORTN in period
Energy	60%
Agriculture	60%
Social Development	60%
Others	80%

B. Interest Rates by Nature of Project	Normal	Small & Medium Size Enterprises
Directive plans and sectoral studies within national and regional programs	8%	-
Feasibility studies	8%	4%
Basic projects realized in country	8%	4%
Project execution	12%	6%
Studies and projects for the expansion of technical, administrative, productive or operational capacity	12%	6%
Others	12%	6%

IV. Financial Charges for ACN Program

Nature of Project	Monetary Correction	Interest Rates
Exports of services: market surveys, and elaboration of project proposals	60%	4%
Internal investments	80%	8%
Others	100%	8%

*Projects carried out by university or research centers.

Source: Finep brochure.

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Table 9.14: FINAME COMMITMENTS, 1965-1980

	BNDE System (Cr.$ million)	Finame (Cr.$ million)	% BNDE	Heavy Capital Goods Program (Cr.$ million)	Heavy Capital Goods Program U.S. Equivalent in Millions*
1965	342	44			
1966	526	74			
1967	730	112			
1968	976	224			
1969	1,329	246			
1970	1,768	362			
1971	3,181	762			
1972	4,648	1,159			
1973	7,422	1,970		554	81.6
1974	20,557	3,456		1,565	192.6
1975	35,855	8,519		4,782	448.0
1976	66,236	26,244		16,955	1,198.7
1977	45,352	27,244		19,676	1,088.9
1978	153,454	112,580		100,938	5,586.9
1979	135,996	54,433		34,742	1,289.4
1980	305,939	172,268		134,320	2,548.1

* Converted at average official exchange rate for each year.

Source: BNDE, Boletim de Informações 02/81.

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Table 10.1: BRAZIL-LARGEST EXPORTERS OF PRODUCTS REQUIRING RELATIVELY SOPHISTICATED TECHNOLOGY, 1979

No. of Firms	Sector	Main Product Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
41	TRANSPORTATION		1553.6	41.7
12	Automobiles and trucks (including engines)		936.4	25.1
	VW	(passenger automobiles)	213.3	
	GM	(internal combustion engines)	128.4	
	Mercedes Benz	(trucks weighing up to 4 tons)	126.9	
	Ford	(engines)	116.7	
	Fiat	(engines)	93.3	
	Saab Scania	(trucks weighing more than 4 tons)	71.5	
	Comex*	(trucks weighing more than 4 tons)	64.4	
	Fiat Diesel	(CKD vehicles)	59.9	
	Chrysler	(internal combusion engines)	33.3	
	VM Vendas*	(cargo vehicles)	18.8	
	Caemi-Cummins Motors	(internal combustion engines)	6.6	
	MWM Motores Diesel	(internal combustion engines)	3.3	
2	Auto Radios		139.3	3.7
	Philco		111.7	
	Robert Bosch		27.6	
13	Vehicle Parts and Components		126.0	3.3
	Metal Leve	(pistons)	22.7	
	Rockwell	(wheels)	16.7	
	Marco Polo S A.	(bus bodies including electric buses)	14.5	
	Equipamentos Clark	(gear boxes)	13.8	
	Albaras	(differentials for automobiles)	11.0	
	Monroe	(shock absorvers)	9.8	
	Krupp Metal Campo Lindo	(parts)	9.5	
	TRW Gemmer Thompson	(valves for engines)	6.7	

No. of Firms	Sector	Main Product Exported (U.S. millions)	Value of Exports		Percent of Total in Sample
	Motores Perkins	(cylinder blocks and other engine parts)	6.7		
	ZF Brasil	(parts)	4.5		
	Fras-le	(friction pads for brakes and clutches)	3.8		
	Marcel Blum Imp. Export. Repr. Ltda.*	(parts)	3.2		
	Trans-Trading Brasil Exp. S.A.*	(cylinder blocks and other engine parts)	3.1		
3	Tires			53.0	1.4
	Pirelli	(inner tubes for automobiles)	34.1		
	Goodyear	(inner tubes for trucks and bases)	18.9		
	Firestone	(inner tubes)			
4	Ships			145.6	3.9
	Caneco	(cargo ships)	49.2		
	Verolme	(cargo ships and tankers)	47.9		
	Emaq	(cargo ships and tankers)	32.7		
	Estaleiro So	(cargo ships)	15.8		
2	Airplanes			71.8	1.9
	Embraer	(turbo prop airplanes)	68.4		
	Varig	(parts for airplane engines)	3.4		
1	Military Vehicles			47.2	1.2
	Engesa	(armored personnel carriers)	47.2		
4	Trains and Parts			34.3	0.9
	General Electric	(locomotives)	21.9		
	Cobrasma	(parts and pieces for railroad equipment)	4.9		
	Mat. Ferroriario S.A.	(forged railroad wheels)	3.9		

No. of Firms	Sector	Main Product Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
	Pidner S.A. Const. Reconstr. Mat. Ferror.	(passenger railroad cars)	3.6	
45	IRON AND STEEL AND BASIC METAL PRODUCTS		668.2	17.9
11	Pig Iron		163.5	4.4
	Cia Bras. Entrepostos e Comércio*		73.5	
	Cimetal		31.2	
	Usina Siderúrgica Paraense S.A-- USIPA		11.8	
	Cia Setelagoana Siderúrgica - Cosigua		10.0	
	Cia Siderúrgica Pitangui		7.6	
	Indústria Siderúrgica Vipa Ltd.		6.8	
	Unexport União Exp. Gasa Ltda*		6.2	
	Cia Bras. Ferro		4.9	
	Usina Quieroz Júnior S.A. Ind. Siderúrgica		4.2	
	Siderúrgica Bandeirante Ltda.		3.8	
	Siderúrgica Melo Figuereido Ltda.		3.5	
19	Steel		330.7	8.9
	CSN	(slabs)	89.6	
	Cosipa	(iron and steel plates)	78.4	
	Usiminas	(iron and steel plates)	30.0	
	Acesita	(stainless steel slabs)	16.7	
	Acos Villares	(stainless steel slabs)	14.9	
	Siderurgia J.L. Aliperti S.A	(iron and steel bars)	14.5	
	Cia Siderúrgica Guanabara - Cosigua	(iron and steel bars)	11.0	
	Siderúrgica Fie-el Korf S.A.	(wire)	10.0	
	Cia Siderúrgica Belgo			

No. of Firms	Sector	Main Product Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
	Mineira	(iron and steel wires)	9.2	
	Siderúrgica Rio Grandense S..	(iron and steel bars)	8.8	
	Iochpe Trade Com. Internacional S.A.*	(iron and steel bars)	8.8	
	Usina Siderúrgica Bahia S.A.- USIBA	(iron and steel bars)	7.1	
	Afos Finos Piratini	(rolled steel slabs)	5.9	
	Cia Siderúrgica Pains	(iron and steel bars)	5.7	
	Belgo Mineira -Bekaert Art. Arame Ltda.	(iron and steel wire)	5.0	
	Siderúrgica Dedini	(iron and steel bars)	5.0	
	Rio Negro Com. Ind. Aco S.A.	(cold rolled iron and steel plates)	3.6	
	Siderúrgica Cofferaz S.A.	(iron and steel bars)	3.5	
	M. Andrion Exp. Ferragens Ltda.	(ondulated plate)	3.0	
10	Tubes and Pipes		144.0	3.9
	Cia Estanifera do Brasil	(hollow tubes and pipes)	33.7	
	Confab	(iron and steel pipes)	18.2	
	Fundição Tupi	(accessories for iron and steel pipes)	18.1	
	Equipetrol	(seamless pipe)	16.7	
	Eluma S.A. Ind. Com	(pipes and hollow bars)	14.6	
	Mannesmann Com. Ltda.	(seamless iron and steel pipe)	14.4	
	Persico Pizzamiglio S.A. Ind. Com.	(seamless iron and steel pipe)	12.1	
	Aco Anhanquera S.A.	(iron and steel pipes)	6.7	
	Cia Ind. Fulminense	(hollow tubes and bars)	6.4	
	Cia Metal Barbara	(cast iron pipes)	3.1	

No. of Firms	Sector	Main Product Exported	Value of Exports (U.S. millions)		Percent of Total in Sample
3	Iron and Steel Structures			16.1	0.4
	Mangels	(recipients for compressed or liquid gases)	8.9		
	Morrison Knudson Eng.	(towers)	3.8		
	Sade Sul Americana Eng.	(towers)	3.4		
2	Cutlery			14.2	0.4
	Zivi S.A. Cutelaria	(scissors)	10.2		
	Tramontina S.A. Cutelaria		(tableware) 4.0		
15	PULP AND PAPER			319.7	8.6
5	Pulp			190.1	5.1
	Aracruz		68.8		
	Cenibra		56.4		
	Nemo		30.6		
	Rio Grande		20.7		
	Jari		13.6		
6	Paper & Cardboard			82.1	2.2
	KSP		26.3		
	Champion		16.6		
	Kodak		23.7		
	Caemi		6.5		
	Ripasa		5.3		
	Elof Hansen		3.7		

No. of Firms	Sector	Main Product Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
2	Paperboard		39.2	1.1
	Eucatex		15.3	
	Duratex		23.9	
2	Books and Magazines		8.3	0.2
	Abril		4.3	
	AGGS		4.0	
25	INDUSTRIAL MACHINERY AND EQUIPMENT		208.1	5.6
2	Earthmovers		58.1	1.6
	Caterpillar		42.5	
	Dresser		15.6	
2	Machinery for Paper and Plastic Industries		22.1	0.6
	Voith	(paper)	17.5	
	Ferrostaal	(plastic)	4.6	
3	Refrigeration and Air Conditioning		18.8	0.5
	Soc. Intercontinental Compr. Hermeticos	(motorcompressors for refrigeration)	8.9	
	Springer Refrigeracao	(air conditioners)	6.3	
	Emp. Bras Compress S.A.	(motor compressors for refrigeration)	3.6	
2	Mechanically Powered Compression Rollers		18.5	0.5
	Dynapac		13.7	
	Tema Terra		4.8	

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No. of Firms	Sector	Main Products Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
2	Machine Tools		17.7	
	Romi	(horizontal parallel lathes)	13.7	
	Nardini	(horizontal parallel lathes)	4.0	
2	Sifting and Separating Equipment		16.8	0.5
	Fábrica de Aco Paulista		9.7	
	Barber Greene		7.1	
2	Motors		13.8	0.4
	Cofab	(parts and pieces for motors)	10.2	
	Ferropecas Villares	(parts and pieces for motors)	3.6	
3	Tools		12.8	0.3
	Fab. Paulista Brocas	(drill bits)	4.7	
	Sandvek	(drill bits for rock perforation)	4.5	
	Norton	(sandpaper)	3.6	
2	Mills		9.1	0.2
	M. Dedini Metalurgica	(large mills > 10 tons)	6.1	
	Metal Abramo Ebeerle	(for coffee, meal, pepper, etc.)	3.0	
1	Others		20.4	0.5
	Johnson and Johnson	(mechanical machines and instruments)	5.1	
	Piratininga	(mechanical machines and instruments)	4.2	
	Constr. Destilarias Dedini	(distilleries and rectifiers)	3.9	
	Hyster Brasil S.A.	(cleaning, preparation and packing equipment)	3.7	

No. of Firms	Sector	Main Products Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
1	GASOLINE		323.8	8.9
	Petrobras	(type A automobile gasoline)	323.8	
25	CHEMICALS AND PHARMACEUTICALS		174.2	4.7
	Propensa	(condensation products, resins, polyester)	17.1	
	Dow	(propelyne oxide)	15.8	
	Petroflex Ind. Com. S.A.	(polibutadienstyrene)	10.0	
	Dxiteno Nordeste S.A. Ind. Com.	(etilenoglycol)	9.7	
	Cia Nitro Química Bras	(viscose rayon threads)	9.4	
	Mercke Sharp & Dohme Ind. Química Farm Ltd.	(chemical products)	8.7	
	Pronor Prod. Orgânicos S.A.	(tereftalato de dimetilla)	8.2	
	I.B. Sabba Cia Ltda.	(chemical products)	7.8	
	Sandoz S.A.	(fungicides)	7.7	
	Ebanco Química Ltda.	(chemical products)	7.4	
	Bayer Brasil (S.A.)	(sodium bicarbonate)	7.2	
	Rohmand Haas Brasil S.A. Quim. Textile	(fungicides)	7.1	
	Ciex Com. Ind. Exp. Ltda.	(chemical products)	6.6	
	Ciba Geigy Quim. S.A.	(chemical products)	5.6	
	Cotonifício Guilherme Giorfi S.A.	(polyester threads)	5.5	
	Du Pont Brasil	(herbicides)	5.4	
	Poliolefinas S.A.	(low density polioletins)	4.7	
	Salgema Ind. Quim S.A.	(lixivia)	4.2	
	Polibrasil S.A. Ind. Com.	(polipropelyne resin)	4.1	
	Cia Nortox Insecticidas Fertilizantes	(ammonia compounds)	4.0	

No. of Firms	Sector	Main Products Exported	Value of Exports (U.S. millions)		Percent of Total of Sample
	Squibb Ind. Quim. S.A.	(micostatin)	3.8		
	Cyanamid Quim Brasil Ltda.	(chemical products)	3.7		
	Metalquímica Bahia S.A. Mecânica Química	(chemical products for photographic use)	3.6		
	Explo. Ind. Quim. Explosivos S.A.	(oxalic acid)	3.5		
	Merck S.A. Ind. Quimica	(pilocorpina)	3.4		
7	ELECTRONIC PARTS AND EQUIPMENT			152.8	4.1
1	Information Processing Units			92.4	2.5
	IBM		92.4		
3	Microelectronic Structures			48.6	1.3
	Philips		22.2		
	Burroughs		21.4		
	Texas Instruments		5.0		
2	Calculators			8.0	0.2
	Dismac		4.5		
	Hewlet Packard		3.5		
1	Other			3.8	0.1
	Semikron Sudamericana	(diodes of germanium or similar material)	3.8		

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No. of Firms	Sector	Main Products Exported	Value of Exports (U.S. millions)	Percent of Total in Sample
16	CONSUMER AND OTHER DURABLES		111.1	3.0
4	Typewriters		32.6	0.9
	Olivetti		15.2	
	Remington		7.7	
	Facit		5.5	
	Hermes		4.2	
3	Sewing Machine		29.3	0.8
	Singer		21.0	
	Elgin		4.9	
	Vigorelli		3.4	
4	Domestic Appliances		27.6	0.7
	Consul	(refrigerator)	11.3	
	Brastemp	(washing machines)	6.2	
	Walita	(floor waxing machines)	5.3	
	Electrolux	(floor waxing machines)	4.8	
3	Rifles and Shotguns for Hunting		10.5	0.3
	Amadeo Rossi		3.7	
	Forjas Texanas		3.4	
	E. R. Amantino		3.4	
1	Bicycles		7.4	0.2
	Bicicletas Caloi		7.4	

No. of Firms	Sector	Main Products Exported	Value of Exports (U.S. millions)		Percent of Total in Sample
1	Cash Registers		3.7	0.1	
	NCR Brasil		3.7		
13	ELECTRICAL PARTS AND EQUIPMENT			94.0	2.5
3	Electrical Parts			24.8	0.7
3	Constanta Electronica	(fixd and variable resistances)	10.1		
	Siemens	(automatic interruption equipment)	9.5		
	Icotron	(fixed electrolitic condenses)	5.2		
3	Television			24.5	0.7
	Ibrape Ind. Bras. Prod. Electron S.A. tubes)	(black and white television	8.9		
	Philips	(television)	8.8		
	RCA	(electron guns for television)	6.8		
2	Telephones			23.4	0.6
	Standard Electric	(telephone exchanges)	17.5		
	GTE	(telephones)	5.9		
1	Motors			7.5	0.2
	Electro Motores Weg S.A.	(triphase motors)	7.5		
4	Others			13.8	0.4
	Elevadores Otis	(table, cabin, panel, etc. with electric distribution system)	3.6		

No. of Firms	Sector	Main Products Exported	Value of Exports (U.S. millions)		Percent of Total in Sample
	Nicrolite	(dry cells)	3.6		
	Osram	(tungsten filaments)	3.3		
	BASF	(magnetic tape)	3.3		
16	AGRICULTURAL MACHINERY AND EQUIPMENT			55.9	1.5
5	Tractors and Parts			49.3	1.3
	Massey Ferguson	(four wheeled agricultural tractors)	19.2		
	J. I. Case	(wheel traction units for escavating/ cargo tractors)	12.0		
	Komatsua - FNV Equip	(tractor trucks)	9.7		
	Baldan Implementos Agrícolas	(disc plows)	4.8		
	Valmet	(four wheeled agricultural tractors)	3.6		
1	Combines			6.6	0.2
	Sperry Rand	(self propelled combines)	6.6		
7	OTHERS			67.2	1.8
3	Optical Instruments			50.0	1.3
	Engexco	(optical instruments)	41.4		
	Ind. Xerograficas Brasil	(optical copying machines)	5.2		
	DF Vasconcelos	(fixed focus photographic equipment)	3.4		
3	Glass			13.4	0.4
	Vidrios Corning	(glass works)	6.2		
	Becton Dickinson	(plastic or glass syringes)	3.9		
	Vitrofarma Ind. Com Vidrios	(glass in bars, pipes, or balls)	3.3		
1	Ammunition			3.81	0.1
	Cia Bras Cartuchos	(sport and hunting ammunition)	3.8		
201	TOTAL			3728.9	100.0

* Belived to be a retailer or trading company rather than a manufacturer.

Source: Cacex, Brasil, Comércio Exterior Series Estatísticas, 1979.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.1: BRAZILIAN VEHICLE PRODUCTION -- 1957-1978

(thousands of units)

	Passenger Vehicles A	Utilitarian Vehicles B	Pick-ups C	Trucks D	Buses E	Commercial Vehicles F = C+D+E	Total A+B+F
1957	1.2	9.7	1.2	18.0	0.5	19.7	30.5
1958	3.8	21.8	4.7	30.8	0.7	35.4	61.0
1959	14.5	34.1	7.9	38.4	1.3	47.6	96.1
1960	42.6	39.2	9.6	39.8	1.9	51.3	133.0
1961	60.2	42.5	12.3	28.9	1.6	42.8	145.6
1962	83.9	48.7	18.9	38.7	0.9	58.6	191.2
1963	94.8	41.3	14.1	22.9	1.2	38.1	174.2
1964	104.7	39.8	14.7	22.2	2.2	39.2	183.7
1965	113.8	34.4	12.1	22.7	2.3	37.0	185.2
1966	128.9	43.6	17.1	32.3	2.8	52.1	224.6
1967	136.3	39.3	15.0	28.6	3.2	46.8	225.5
1968	165.3	44.9	21.9	42.0	5.7	69.5	279.7
1969	244.7	40.8	21.9	40.6	5.7	68.2	353.7
1970	307.5	40.9	25.2	38.4	4.1	67.7	416.0
1971	400.1	43.3	29.4	38.9	4.4	72.7	516.1
1972	465.8	49.1	39.4	50.0	5.2	94.6	609.5
1973	552.2	53.9	52.0	64.9	6.1	123.1	729.1
1974	691.5	61.7	63.4	79.4	8.3	151.0	905.1
1975	713.9	65.2	62.0	78.7	10.1	150.8	929.8
1976	766.4	66.7	56.4	83.9	12.1	152.3	985.5
1977	733.0	40.9	30.7	101.4	13.8	145.9	919.9
1978	873.7	49.9	40.0	86.3	14.3	138.5	1,062.2

1/ Jeeps and VW vans.

Source: Guimarães and Gadelha, op. cit. Statistical Appendix, Table 2.1 based on Anfavea data.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.2 : BRAZIL DISTRIBUTION OF MARKET SHARE BY FIRM — AUTOMOBILE MARKET

(1957/1978)

Years	Simca	Chrysler	FNM	Fiat	Willys	Ford	GM	Puma	Vemag	Volkswagen	Herfindal Concentration Index
1957									100.0		1.000
1958									100.0		1.000
1959	8.4				3.6		0.1		29.6	58.3	0.436
1960	8.5		1.0		32.0		0.8		17.7	40.0	0.301
1961	9.7		0.8		21.7		0.9		15.5	51.5	0.346
1962	8.2		0.5		25.6		1.2		17.8	46.7	0.323
1963	10.1		0.3		27.3		0.8		14.8	46.7	0.325
1964	10.6		0.2		25.0		0.5		12.1	51.6	0.355
1965	6.3		0.3		24.4		1.1		13.4	54.4	0.378
1966	4.1		0.4		20.8		1.1		11.5	62.1	0.444
1967		2.7	0.5		12.3	6.6	1.5	0.1	8.2	68.1	0.507
1968		5.2	0.7			14.1	2.5	0.1		77.5	0.624
1969		3.6	0.2			22.4	12.5	0.1		61.3	0.442
1970		3.4	0.4			14.9	15.3	0.1		66.0	0.482
1971		3.8	0.2			14.7	14.6	0.1		66.6	0.488
1972		3.3	0.1			16.3	15.4	0.1		64.8	0.471
1973		6.1				18.5	17.1	0.1		58.2	0.406
1974		3.9		0.5		17.3	19.3	0.2		58.8	0.415
1975		1.9		0.7		16.2	19.0	0.2		62.1	0.448
1976		2.3		1.7		16.4	18.9	0.2		60.5	0.429
1977		2.1		9.6		13.2	16.3	0.4		58.5	0.395
1978		1.6		11.5		14.3	18.8	0.4		53.4	0.354

Source: Guimarães and Gadelha, op. cit. Statistical Appendix, Table 2.5.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.3: BRAZILIAN VEHICLE ASSEMBLY AND PARTS INDUSTRY EXPORTS

Year	Number of Vehicles	Dollar Value of Vehicles (in millions)	Dollar Value of Parts (in millions)	Total Dollar Value (in millions)
1974	64,718	260	300	560
1975	77,175	477	271	748
1976	80,190	523	370	893
1977	70,192	591	539	1,130
1978	95,445	810	821	1,631
1979	101,000	920	940	1,860

Source: Amconsul, São Paulo cited in Westacott, op. cit., p. 18.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Tabke 11.4: BRAZIL -- VEHICLE PRODUCTION AND EXPORTS, 1980 AND 1972 COMPARED

(units)

	1980 1/			1972			1980/1972		
	Production	Export	Exports as Share of Production	Production	Export	Exports as Share of Production	Production A	Exports B	Relative Increase of Exports Over Production B/C
Passenger Cars	580,143	60,470 (38.5)	10.4	407,457	6,526 (48.2)	1.6	1.42	9.27	6.53
Multiple Use Pick-ups	372,873	69,407 (44.2)	18.6	101,382	886 (6.5)	.9	3.68	78.34	21.29
Utility Vehicles 2/	5,595	1,568 (1.0)	28.0	5,504	84 (0.6)	1.5	1.02	18.67	18.30
Cargo Pick-ups	64,042	4,229 (2.7)	6.7	42,420	1,964 (14.5)	4.6	1.51	2.19	1.45
Trucks	100,914	18,977 (12.1)	18.8	54,293	3,136 (23.2)	5.8	1.86	6.05	3.25
Buses	13,919	2,391 (1.5)	17.2	5,154	932 (6.9)	18.1	2.7	2.57	.95
Total	1,137,486	157,112	13.8	616,210	13,528	2.0	1.85	11.61	6.28

1/ Preliminary figures.

2/ Utility Vehicles include jeeps and VW vans.

Source: Anfavea.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.5: BRAZILIAN AUTOMOBILE SECTOR EXPORTS BY FIRMS AND TYPE OF EXPORT - 1977 (1)

(U.S. millions)

Firms	Automobiles	Commercial Vehicles	Motors and Their Parts	Other Parts and Components	Other Items	Non-specified Items	Total
Chrysler	---	11.2	34.6	5.2	---	1.6	52.6
FNM	---	18.7	----	---	---	1.6	20.3
Fiat	1.9	----	32.2	---	---	1.2	35.3
Ford	7.2	----	68.9	---	---	1.7	77.8
GM	9.9	4.8	11.9	---	3.4	2.8	32.8
Mercedes	---	63.6	7.9	4.6	---	7.3	83.4
Saab-Scania	---	13.2	7.7	---	---	1.8	22.7
Volkswagen	107.8	2.0	31.0	23.9	---	3.9	168.6

1/ Only includes products for which exports in 1976 and 1977 were greater than U.S.$500,000.

2/ Includes utilitarian vehicles.

Source: Guimarães and Gadelha, op. cit., Statistical Appendix, Table 2.11, based on Cacex data.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.6: EXPORTS BY FIRMS PRODUCING VEHICLES - 1969/1978

(millions of dollars)

	Chrysler	FNM	Fiat	Ford	GM	Mercedes	Puma	Scania	Toyota	Volkswagen	Total
1969	0.0	0.0	---	0.5	2.0	0.8	---	---	---	0.7	4.1
1970	0.3	0.3	---	2.8	0.8	4.0	0.0	0.0	---	0.7	8.8
1971	3.1	0.1	---	0.9	1.9	3.4	0.0	0.1	0.0	1.7	11.3
1972	15.9	0.2	---	3.3	1.7	17.0	0.1	0.3	0.0	13.1	51.7
1973	18.4	0.3	---	1.8	3.8	8.0	0.2	1.6	0.2	20.6	54.9
1974	32.2	1.0	0.0	23.4	6.7	29.8	0.2	4.9	0.4	80.8	179.4
1975	50.3	0.8	0.0	60.3	9.1	59.3	0.1	10.7	1.1	133.1	324.9
1976	40.1	4.8	0.0	45.6	16.0	76.7	---	18.8	---	148.4	350.5
1977	52.6	20.3	35.3	77.8	32.9	83.4	---	22.7	---	168.6	493.7
1978	42.0	41.0	58.3	69.3	120.4	106.8	---	24.6	0.6	227.7	690.7

Source: Guimarães and Gadelha, op. cit., Statistical Appendix, Table 2.10, based on Anfavea data.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.7: BRAZIL 1980 VEHICLE SALES AND EXPORTS, BY COMPANY

(units)

	Sales	Exports	(Exports/Sales) x 100
Chrysler	13,876	4700[5/]	33.9
Fiat Automoveis	160,982	40,312	25.0
Fiat Diesel[1/]	5,033	1,779	35.3
Ford	165,468	5,652	3.4
GM	230,972	18,683	8.1
Gurgel[4/]	1,842	329	17.9
Mercedes Benz[1/]	58,738	11,546	19.7
Puma[2/]	3,054	331	10.8
Saab Scania[1/]	4,521	1,220	27.0
Sta Matilde[2/]	147	---	---
Toyota[3/]	4,273	253	5.9
Volkswagen	488,020	72,222	14.8
Volvo[1/]	420	58	13.8
Total	1,137,346	157,085	

1/ Produce only trucks and buses.

2/ Produces sports cars based mostly on VW chasis.

3/ Produces only utility vehicles and pick-ups.

4/ Produces special four-wheel drive vehicles.

5/ Exports consist almost entirely of trucks and pick-ups.

Source: Anfavea data collected by mission.

BRAZIL

INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.8: BEFIEX: PROGRAMS APPROVED THROUGH 1977

(U.S. Millions)

Firm	Period	Export Commitment
01 - Ford Brasil S.A. Philco Radio e Televisão Ltda.	07/72 - 12/82	1,000,000,000[1/]
02 -Volkswagen do Brasil S..	01/73 - 12/82	1,028,000,000[2/]
03 - Chrysler Corporation do Brasil	01/73 - 12/82	314,000,000[3/]
04 - Kanebo Textil do Brasil S.A	07/73 - 12/83	150,000,000
05 - Fiacao e Tecelagem Kanebo do Brasil S.A.	03/74 - 03/84	65,000,000
06 - Ajinomoto Interamericana Indústria e Comércio Ltda.	06/74 - 12/86	115,500,000
07 - S.A. Industrias Matarazzo do Paraná S.A. Indústrias Reunidas F. Matarazzo S.A. Geon do Brasil-Indústria e Comércio Fermeta Productos Químicos Amalia S.A. COCAM-Cia de Cafe Soluvel Derivados	12/74 - 11/84	159,000,000
08 - Fiat Diesel Brasil S.A.	01/75 - 12/84	400,000,000[4/]
09 - Mercedes Benz do Brasil S.A.	01/75 - 12/84	500,000,000[5/]
10 - Industria Textil Serido S.A.	11/75 - 11/85	133,000,000
11 - Jari Florestal e Agropecuária Ltda.	01/76 - 12/85	616,000,000
12 - Frutesp S.A. Agroindustrial	01/76 - 12/80	75,400,000
13 - Fiat Automóveis S.A. - FMB	01/76 - 12/85	550,000,000[6/]
14 - Algodoeira Matsubara Indústria e Comércio Ltda.	01/76 - 12/85	40,700,000
15 - J. I. Case do Brasil Comércio e Indústria Ltda.	01/76 - 12/85	125,000,000*
16 - Saab-Scania do Brasil S.A.	01/76 - 12/85	415,400,000[7/]
17 - COPATE - Cia do Brasil Comércio e Indústria Ltda.	05/76 - 12/85	40,700,000
18 - Duratex S.A. Indústria e Comércio	05/76 - 12/85	36,000,000
19 - General Motors do Brasil S.A.	07/76 - 07/86	1,009,500,000[8/]
20 - Motores e Veículos Volvo do Brasil Ltda.	11/76 - 12/88	351,800,000[9/]
21 - Frigorífico Kaiowa S.A.	12/76 - 12/82	81,800,000
22 - ITABRÁS - Máquinas-Ferramenta Ltda.	12/76 - 12/86	28,300,000
23 - Sew do Brasil Motores - Redutores Ltda.	01/77 - 12/83	12,000,000
24 - Orchard Industrial S.A.	02/77 - 12/85	26,000,000
25 - Fábrica de Rendas e Bordados Hoepke S.A.	06/77 - 12/88	43,000,000
26 - Gunsan Fiação de Seda Ltda.	06/77 - 12/86	22,900,000
27 - ENGESA - Engenheiros Especializados S.A. ENGEX S.A. - Equipamentos Especializados	07/77 - 12/81	240,000, 00*
28 - BRASILPAN - Aglomerados de Madeira S.A.	08/77 - 12/83	22,000,000
29 - INGO-Máquinas Opticas Ltda.	09/77 - 12/87	6,719,200
30 - STAEDTLER-Fábrica de Art. Para Desenhar e Escrever	11/77 - 12/82	4,000,000
TOTAL		7,530,019,200

1/ Motors, motor parts and components, marine engines, auto radios and electronic components.

2/ CKD and CBU vehicles, motors and transmission systems.

3/ CKD and CBU vehicles and V-8 motors.

4/ Previously known as FNM - CBU trucks.

5/ Trucks and diesel motors.

6/ CBU vehicles, motor and components.

7/ Trucks and motors.

8/ CKD and CBU vehicles, land moving construction equipment and diesel motors.

9/ Trucks.

* Other vehicle manufacturers.

Source: Befiex, cited in Annibal V. Villela and Werner Baer, O Setor Privado Nacional: Problemas e Políticas para seu Fortalecimiluto IPEA, Colecao Relatórios de Pesquisa No. 46, Rio de Janeiro: IPEA/INPES, 1980, p. 163.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.9: INVESTMENT IN THE AUTOMOBILE SECTOR AND EXPORTS

(U.S. millions)

	Approved by CDI	Approved by Befiex	Exports
1965	59.9	not applicable	----
1966	39.2	not applicable	----
1967	128.9	not applicable	----
1968	----	not applicable	----
1969	83.0	not applicable	4.1
1970	308.4	not applicable	8.8
1971	1.4	not applicable	11.3
1972	777.0	not applicable	51.7
1973	87.0	211.3	54.9
1974	----	647.8	179.4
1975	----	79.3	324.9
1976	----	2,188.2	350.5
1977	----	20.7	493.7
1978	----	----	690.7

Source: Eduardo Augusto de Almeida Guimarães, "A Dinamica de Crescimiento da Indústria de Automóveis no Brasil: 1957/78," Pesquisa e Planejamento Econômico 10(3) (dezembro, 1980), p. 791.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.10: BRAZILIAN CARS: RELATIVE PRICE INDICES, 1961-1978

(Car Prices Deflated by General Price Index)

	Average	VW Small		VW	General Motors		Ford		Chrysler
		1	2	Medium	Medium/Large	Large	Medium	Large	Large
1961	133	100*							
1962	122	90							
1963	140	106							
1964	134	100							
1965	125	94				177			
1966	105	77				158			
1967	99	73				133		141	
1968	100*	75			133	133	117	139	
1969	97	72		114	116	131	105	141	119
1970	90	69		100*	113	118	100	118	106
1971	85	62		93	108	121	93	124	110
1972	81	60		88	102	113	80	124	107
1973	78	57	100*	84	100*	106	86	118	104
1974	72		92	77	94	100*	80	100*	100
1975	77		99	83	100	108	86	108	108
1976	69		86	73	91	98	77	105	105
1977	68		83	74	91	100	79	106	108
1978	68		83	75	87	101	84	111	106

Note: Computed based on production statistics provided by Anfavea and manufacturer's list prices published in Quatro Rondas. The values are chained Laspeyres indices of the model deflated by the general price index (disponibilidade interna of Conjuntura Econômica.

Source: Guimarães and Gadelha, op. cit., Statistical Appendix, Table 3-13 and 3-14.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.11: BRAZIL-- EVOLUTION OF RELATIVE PRICE INDICES: CAPITAL GOODS RELATED VS. AVERAGE MANUFACTURING 1970-80

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Metallurgy	100.0	.967	.940	.960	1.03	1.02	.990	.945	.904	.806	.777
Machinery	100.0	.970	.972	.943	.881	.875	.870	.924	.859	.752	.776
Electrical and Communication Equipment	100.0	.931	.897	.896	.845	.804	.820	.799	.803	.739	.727
Transport Equipment	100.0	.982	.954	.913	.841	.866	.793	.881	.833	.721	.712
Manufacturing	100.0	117.5	136.2	156.3	202.2	261.6	369.3	503.8	713.9	1,252.9	2,631.1

Source: Table .

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.12: DIRECT PRICE COMPARISONS, TRANSPORTATION SECTOR AND KEY RAW MATERIALS, 1980 - 1981 PERIOD

	Nominal Legal Tariff %	Number of Products in Sample n	Average Implicit Tariff %	Standard Deviation %	Implicit Nominal Protection
Vehicles					
Automobil	126.3	5	-23.2	9.1	-15.3
Trucks and Buses	83.6	3	-46.2	3.6	-39.3
Motors and Vehicle Parts	112.5	3	-15.5	1.9	-9.1
Tires and Inner Tubes	85.0	2	-20.9	8.2	n.a.
Other Transportation Sector					
Tractors	41.5	6	-47.8	23.0	-32.9
Railway Equipment and Other Vehicles	63.5	4	-6.4	32.3	20.4
Railway Rolling Stock	39.3	3	-21.7	12.6	
Other Vehicles	84.0	1	39.6	----	
Materials					
Pig Iron Alloys and Primary Steel	49.2	5	-13.7	37.2	-0.5
Pig Iron	70.2	1	-32.9	----	
Steel Ingots and Iron Alloys	37.6	4	-8.9	41.2	
Iron and Steel Sheets	37.4	16	-8.5	32.3	5.5
Flat Iron and Steel Sheets	38.4	5	-9.9	36.9	
Rolled Iton and Steel Sheets	37.5	6	-22.2	35.2	
Scrap Metal	16.6	5	9.5	17.7	
Iron and Steel Castings	95.9	3	31.3	65.3	-3.6
Iron and Steel Forgings	107.5	2	-16.4	16.1	n.a.

Source: William Tyler, "Implicit Tariffs and Implicit Nominal Protection" (IPEA: Textos Para Discussões Internas, No. 35, Julho 1981), pp. 38-40.

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Table 11.13: EMBRAER AIRCRAFT PRODUCTION THROUGH DEC. 1979

Airplane	Characteristics	Design	Cumulative Production through 1979
Bandeirantet (EMB 110)	Twin engine turbo prop for passengers made in 13 different versions.	Own	252
Xingu (EMB 121)	Twin engine turbo prop executive plane for up to 7 persons.	Own	19
Xavante (EMB 326 6B)	Single engine military jet trainer and ground attack plane.	Aeronautica Macchi SpA (Italy)	162
Ipanema (EMB 201 A)	Single engine single seater for agricultural plane for seeding, spraying, and fertilizing	Own	388
Carioca (EMB 710)	Single engine four seater with fixed landing gear.	Piper Pathfinder	268
Corisco II (EMB 711 T/ST)	Single engine four seater with retractable landing gear.	Piper Arrow IV	263
Tupi (EMB 712)	Single engine four seater with retractable landing gear.	Piper Archer II	30
Minuano (EMB 720)	Single engine 6/7 seater with with fixed landing gear.	Piper Cherokee Six	110
Sertanejo (EMB 721)	Single engine 6/7 seater with retractable landing gear.	Piper Lance	145
Seneca II (EMB 810)	Twin engine 6/7 seater with retractable landing gear.	Piper Seneca II	314
Navajo (EMB 820)	Twin engine 10 seater with retractable landing gear, various versions.	Navajo Chieftain	110
Urupema	Glider (no longer produced).	----	10
		Total	2071

Source: Embraer.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.14: AIRPLANES EXPORTED BY EMBRAER (THROUGH DECEMBER 1979)

Client	Country	Type	Sales	Deliveries
Ministerio da Agricultura	Uruguay	EMB-201	10	10
Forca Aerea do Uruguay	Uruguay	EMB-110C	5	5
Forca Aerea do Uruguay	Uruguay	EMB-110B1	1	1
Transamerica S.A.	Uruguay	EMB-201A	1	1
Armada de Chile	Chile	EMB-110C (N)	3	3
Armada de Chile	Chile	EMB-111A (N)	6	6
Ministerio da Defesa do Togo	Togo	EMB-326	3	3
Governo do Togo		EMB-326	3	3
Air Littoral	France	EMB-110P2	2	2
Brittany Air	France	EMB-110P2	2	2
Chambre du Commerce et D'industrie du Havre	France	EMB-110P2	1	1
C.A. Languedoc	France	EMB-110P2	1	1
Lucas Aigle Azur	France	EMB-110P1	1	1
Air Walles	England	EMB-110P2	2	2
C.S.E. Aviation	England	EMB-110P2	2	2
C.S.E. Aviation	England	EMB-121	1	1
C.S.E. Aviation	England	EMB-110P1	3	3
Fairflight Charters Ltd.	England	EMB-110P2	1	1
Fairflight Charters Ltd.		EMB-110P1	1	-
Clanair Ltd.	England	EMB-110P2	2	1
Clanair Ltd.		EMB-110-P1	4	3
Lynwood Upholstery and Furnishing	England	EMB-110P1	1	-
Masling Commuter Services	Australia	EMB-110P2	4	3
Landura Pty. Ltd. e Te Oka Holdins	Australia	EMB-110P1	1	1
Dudley Pty. Ltd.	Australia	EMB-110P2	1	1
Dudley Pty. Ltd.	Australia	EMB-110P1	1	1
A. J. Aviation	Australia	EMB-110P1	1	1
Edgar N. Garcia	Bolivia	EMB-201A	1	1
Alhikmah Ashbon	Saudi Arabia	EMB-110P1	2	2
Talyr P.Ltd.	New Guinea	EMB-110P2	1	1
Robert M. Terry	U.S.A.	EMB-110P1	2	2
Robert M. Terry, R. A. Jones, and P. W. Russell	U.S.A.	EMB-110P1	1	1
Charlie Hammonds	U.S.A.	EMB-110P1	1	1
A. Jack Schaps	U.S.A.	EMB-110P1	2	2
Shaps-Terry Investment Co.	U.S.A.	EMB-110P1	9	1
New Haven Airways	U.S.A.	EMB-110P1	1	1
Aeromech Inc.	U.S.A.	EMB-110P2	1	1
Aeromech Inc.	U.S.A.	EMB-110P1	4	4
Royale Airlines	U.S.A.	EMB-110P1	2	2
MacNamara and Associates Inc.	U.S.A.	EMB-110P1	1	1
Imperial Airlines Inc.	U.S.A.	EMB-110P1	5	5
ITT Industrial Credit Co.	U.S.A.	EMB-110P1	1	1
Woodhaven Leasing Inc.	U.S.A.	EMB-110P1	1	1
Air Affaires du Gabon	Gabon	EMB-110P1	1	1
Air Volta	Upper Volta	EMB-110P2	1	1
Air Pacific Ltd.	Fiji Islands	EMB-110P1	2	2
Kar-Air Oy	Finland	EMB-110P1	1	1
Finnair Oy	Finland	EMB-110P1	2	2
Instituto Mexicano de Sercico Social	Mexico	EMB-110P1	5	5
Island Aviation Inc.	Guam	E -110P1	2	2
Republica do Paraguai	Paraguay	EMB-326GB	9	9
Finnaviation Oy	Finland	EMB-110P1	1	-

Source: Embraer.

Table 11.15: BRAZIL -- CAPITAL GOODS PRODUCTION

(all value figures in U.S. millions of dollars)

	GDP A	Industrialized Products B	Capital Goods C	Capital Goods / Industrialized Products C/B	Made to Order Capital Goods 1/ D	Made to Order / Industrialized Products D/B	Made to Order / Capital Goods D/C
1970	45,391	13,182	2,155	16.3	351	2.7	16.3
1974	105,967	34,351	8,348	24.3	1,124	3.3	13.5
1975	124,216	40,600	9,909	24.4	1,653	4.1	16.7
1976	146,229	46,049	11,273	24.4	1.794	3.9	15.9
1977	164,163	50,507	11,409	22.5	2,430	4.8	21.3
1978	192,293	57,848	12,876	22.3	2,728	4.7	21.2
1979	215,188	65,256	13,496	20.7	3,597	5.5	26.6
1980	231,352	66,080	14,978	22.7	3,333	5.0	22.3

1/ ABDID products. ABDID is the Brasilian Association of Made to Order Capital Goods for Basic Industry. In 1980 it had 110 members -- 100 manufacturers and 10 engineering firms. The manufacturing firms were distributed as follows: 48 in the mechanical sector, 17 in the electrical, 26 in naval, and 9 others. Fifty-seven were Brazilian (52 private and 5 state owned), the other 43 were foreign.

Source: ABDID Annual Report, 1980.

Table 11.16: BRAZIL-- EXPORTS OF MADE TO ORDER CAPITAL GOODS FOR BASIC INDUSTRIES

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total (U.S. million FOB)	22.4	32.7	20.5	34.5	53.4	90.6	111.8	244.4	384.5	529.5
				Percentage Distribution						
Mechanical Machines	18.6	18.9	26.0	13.5	15.7	15.7	15.9	4.0	7.3	20.9
Furnaces	1.2	0.9	4.0	8.0	11.1	7.3	7.5	15.7	26.1	23.6
Industrial Equipment	8.0	2.5	5.8	17.3	12.9	7.9	6.8	8.6	4.4	7.6
Generators, Convertors, Electric Motors	6.8	9.5	1.1	8.3	12.1	5.2	7.3	3.5	3.6	5.9
Transformers, Electric Boxes, Electric Furnaces	5.9	7.6	17.9	17.4	16.4	9.0	7.5	3.6	3.3	5.1
Electric Cables	1.4	0.9	0.3	1.2	0.4	0.1	0.4	0.2	0.5	0.9
Metallic Structures	0.9	1.0	7.0	1.7	0.2	0.2	1.9	1.5	2.0	0.9
Industrial Components	9.1	12.4	12.1	17.0	15.8	9.5	5.9	5.7	5.5	4.5
Railroad Equipment	3.9	1.4	8.7	9.8	10.8	7.4	9.7	10.3	7.5	12.5
Naval	44.2	44.9	17.1	5.8	4.6	37.7	37.1	46.9	39.8	18.1

Source: ABDIB.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.17: SUMMARY OF EXPORTS OF BRAZILIAN SHIPYARDS

	Ships	Small Vessels	Deadweight Tons	Thousand U.S.$
1964	2	-	26,200	5,210
1965	1	-	3,040	927
1966	1	1	3,040	2,727
1971	1	-	25,000	4,700
1972	2	-	24,000	14,600
1973	-	50	---	2,000
1974	-	13	---	2,494
1975	-	5	---	4,061
1976	6	10	90,000	32,361
1977	3	4	62,500	37,845
1978	12	-	265,500	134,902
1979	8	5	323,700	123,902
1980	9	21	151,300	106,471
Total	45	109	971,280	471,493

Source: Esabrás.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.18: BRAZIL: RAILROAD INDUSTRY EXPORTS

(U.S. thousand FOB)

			Wagons			Locomotives			
Year	Components	%	Units	Value	%	Units	Value	%	Total Value
1971	---	---	46	587	74.5	01	200	25.5	787
1972	---	---	14	201	100	---	---	---	201
1973	---	---	121	1,416	100	---	---	---	1,416
1974	---	---	203	2,944	100	---	---	---	2,994
1975	---	---	169	4,156	100	---	---	---	4,156
1976	---	---	90	1,954	58.7	02	1,370	41.3	3,324
1977	---	---	260	5,795	36.2	18	10,250	63.8	16,045
1978	4,792	12.2	860	15,136	38.7	16	19,200	49.1	39,128
1979	12,819	41.4	95	2,882	9.3	25	15,247	49.3	30,948
1980	27,380	40.1	288	5,585	8.1	54	35,167	51.6	68,125

Source: Assoc. Bras. Ferroviária, cited in ABDID, Annual Report 1980.

Table 11.19: MADE TO ORDER CAPITAL GOODS: INVESTMENTS, EMPLOYMENT AND CONSTRUCTED AREA (1975-1980)

	(U.S. millions)	Number of People Employed (thousands)	Constructed Area (millions of square meters)
1975	286	223	3.7
1976	687	239	4.2
1977	608	262	5.1
1978	143	266	6.0
1979	60	266	6.7
1980	24	250*	6.8

* Estimate.

Source: ABDID.

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INDUSTRIAL POLICY AND MANUFACTURED EXPORTS

Table 11.20: EVOLUTION OF BRAZILIAN MARKET OF MADE TO ORDER CAPITAL GOODS

(Values in Millions)

	National Production A	Exports B	National Production - Exports C = A - B	Imports D	Apparent Consumption E = A - B + D	Share of Brazilian Industry F = C/E
1969	256	8	248	312	560	44
1970	351	15	336	380	716	47
1971	475	22	453	419	872	52
1972	618	33	585	603	1,188	49
1973	870	20	850	570	1,420	60
1974	1,124	34	1,090	721	1,811	60
1975	1,653	53	1,600	1,074	2,674	60
1976	1,794	91	1,703	1,151	2,854	69
1977	2,430	112	2,318	1,106	3,424	68
1978	2,728	244	2,484	1,514	3,998	68
1979	3,597	384	3,213	1,321	4,534	79
1980*	3,333	529	2,804	1,656	4,460	75

* Estimate.

Source: ABDID.

IBRD-15685


APRIL 1981
BRAZIL
COLOMBIA
VENEZUELA
GUYANA
SURINAME
FRENCH GUIANA
PERU
BOLIVIA
CHILE
PARAGUAY
ARGENTINA
URUGUAY
PACIFIC OCEAN
ATLANTIC OCEAN
RORAIMA TERRITORY
AMAPÁ TERRITORY
AMAZONAS
PARÁ
MARANHÃO
CEARÁ
RIO GRANDE DO NORTE
PARAÍBA
PIAUÍ
PERNAMBUCO
ALAGOAS
SERGIPE
BAHIA
ACRE
RONDÔNIA TERRITORY
MATO GROSSO
GOIÁS
MATO GROSSO DO SUL
MINAS GERAIS
ESPÍRITO SANTO
SÃO PAULO
RIO DE JANEIRO
PARANÁ
SANTA CATARINA
RIO GRANDE DO SUL
Disputed State Boundary
Federal District
BRASÍLIA
Boa Vista
Macapá
Marajó Island
Belém
São Luís
Manaus
Fortaleza
Teresina
Natal
João Pessoa
Recife
Maceió
Aracaju
Salvador
Porto Velho
Rio Branco
Cuiabá
Goiânia
Campo Grande
Belo Horizonte
Vitória
São Paulo
Santos
Rio de Janeiro
Curitiba
Florianópolis
Porto Alegre
L. dos Patos
Sobradinho Reservoir
Tres Marias Reservoir
Furnas Reservoir
R. Negro
R. Padauri
R. Branco
R. Trombetas
R. Jari
R. Japura
Rio Amazonas
Rio Solimões
Rio Putumayo
R. Napo
R. Amazonas
R. Javari
Rio Juruá
Rio Purus
R. Purus
Rio Madeira
R. Aripuanã
R. Jiparaná
R. Juruena
R. Arinos
R. Teles
Rio Tapajós
Rio Iriri
R. Curuá
R. Xingu
Rio Xingu
Rio Tocantins
Rio Araguaia
R. Pindaré
Rio Parnaíba
Rio São Francisco
R. Grande
Rio Paraná
R. Paranapanema
Rio Paraguay
Rio Uruguay
70°
60°
50°
40°
30°
0°
10°
20°
KILOMETERS 0 100 200 300 400 500
MILES 0 100 200 300
National capital
State and territory capitals
State and territory boundaries
International boundaries
Rivers
SOUTH AMERICA
BRAZIL
Brasília
PACIFIC OCEAN
ATLANTIC OCEAN
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