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**Industrialization and Interventions. The
Role of Governments in Developing
Countries: Brazil**

Mauricio Mesquita Moreira

TEXTOS PARA DISCUSSÃO

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Texto para Discussão

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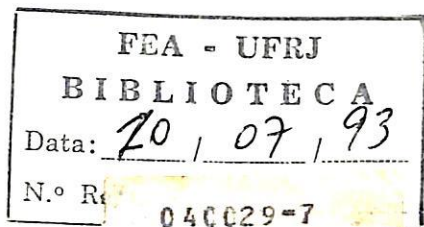


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Industrialization and Interventions. The Role of Governments in Developing Countries: Brazil.

Introduction

The results of nearly a century of industrialization in Brazil are an open invitation to controversy. A writer keen on painting a rosy picture could, for instance, draw attention to its exceptional growth record, which until the 1980s compared favourably with most developing countries—LDC (table 1). He could also point out that Brazil has today a large and diversified manufacturing sector, whose value-added ranked seven in the world in 1988; and that over 1965-80, the growth of manufactured exports reached East Asian standards.¹

Yet, it would not be difficult to paint a gloomy picture either. For instance, Brazil has one of the worst inflation records among the LDCs, one of the highest debt-service ratios, and one of the worst income distributions. In 1980, 35.4 % of the economically active population was estimated to be under-employed.² The indicators of productivity and technological activity are not encouraging either, with Brazil lagging behind countries like Korea and Mexico. To complete the picture, in the 1980s, output and manufactured export growth fell sharply to well below the LDC's average.

¹ All growth rates in this study, unless stated otherwise, are average real annual rates, computed using the least-squares method, with the regression equation taking the form $\log X_t = \log X_0 + \log(1+r)t + \epsilon_t$, where X_0 is the relevant variable, r is the rate of growth, and t is time.

² Wells (1987:96)

Table 1: International Comparison. Selected Indicators.

	growth (%)		Mnf. Exports	external patent. ³	GDP deflator	Inc. dist. top 20%	Productivity (%) ¹	debt/exp. ⁴
	GDP	1980-89						
	1965-80	1980-89	1965-80	1980-89	1980-89	1987	1970-80	1989
Brazil	9.0 (10)	3.0 (2)	22.1	7.2	227.8	64.5(0.59)	1.0	31.3
Korea	9.9 (16)	9.7 (12)	31.2	16.2*	5.0	43.7(0.36)	5.8	11.4
India	3.6 (4)	5.3 (7)	3.0	8.1*	7.7	41.4	0.1	26.4
Mexico	6.5 (7)	0.7 (0)	9.4	24.3	78.7	n.a.	3.6	39.6
LDC ²	5.8 (7)	3.8(6)	n.a.	n.a.	53.7	n.a.	n.a.	18.5

¹ Value added per worker in the mnf. sector. ² Low-middle-income countries. World Bank definition ³ external patenting accumulated in the US, normalised by mnf. value added in 1988. ⁴ external debt service as a percentage of exports. * 1980-88. Note: Numbers in parentheses are real growth rates for mnf., output and Gini coefficients.
Source: IBGE (1990) for Brazil's and PCRER (1988) for Korea's data on income distribution. Data on productivity and patenting from UNCTAD as quoted in Lall and Kell (1991). The rest of the data is from World Development Report (1991) and World Tables.

This sort of disparate results has been generally associated in the trade and development literature, with an inward-oriented policy regime with lapses of outward orientation. Rather unsurprisingly, neoclassicals have been inclined to credit the good results to the allegedly export-oriented, hands-off periods of the government's policy, and the bad ones to those when import substitution (IS) and selective intervention prevailed. The arguments are well known. Outward-orientation, equated with a neutral incentive regime, would have led, *inter alia*, to better resource allocation, economies of scale and technological dynamism. Conversely, IS and its selective policies would have, *inter alia*, distorted resource allocation, hampered exports, and promoted oligopolistic markets, rent-seek behaviour and technological backwardness.¹

Authors closer to the structuralist tradition, in turn, emphasise the role of IS policies in building a diversified industrial structure, in overcoming supply inelasticities, and in boosting growth. It is acknowledged that the IS strategy has hurt exports, but the bad results, particularly of the 1980s, would have come from the side of macroeconomic failure, not a debilitating sectoral misallocation, as Fishlow (1990: 66) put it. Sceptical of export-promotion strategies, they argue that the state has failed to back up IS with sound fiscal and monetary policies.

Although there are merits in these two interpretations, they both have important drawbacks. The neoclassical

¹ For a detailed analysis of the neoclassical critique of the IS strategies and the advantages of outward-orientation see Krueger (1984) and Balassa (1989).

view correctly draws attention to the benefits of a more open economy, but, given its assumptions that product and factor markets are generally efficient in LDCs, they tend to underestimate the market failures facing the Brazilian government, and therefore, fail to consider the dynamic interaction between the IS and export promotion periods². On the other hand, the structuralist view rightly points out that, given the nature of the market failures in the product and factor markets, government intervention was vital. However, it does not address the point that under an inward-oriented incentive regime, the diagnosing and correction of market failures was far from satisfactory, leading to often misguided and wholesale government interventions, which, in turn, set the stage for much of the 'macroeconomic failures'.

All these things considered, this paper seeks to show that the understanding of the role of the government in Brazil's industrialization, and its mixed results, can be substantially improved if the analysis is focused on the nature of the market failures it has addressed, and the validity of the remedies it has used. Drawing on Lall (1991a), the underlying assumption is that the degree of industrialization success in LDCs, varies in direct proportion to the efficiency with which the government has tackled imperfections in product and factor markets. The analysis is divided into five sections, broadly reflecting the evolution of the government policy towards industrialization. That is, the minimalist government of the pre-1956 period, the 1956-63 import-substitution strategy; the pseudo-neoclassical revolution of 1964-73;

² For a general critique of the neoclassical approach to industrialization in LDCs see Lall (1991a, 1991b).

the half-hearted attempt to reform the IS during 1974-79; and the complete lack of direction of the 1980s.

I- The 'Unintentional' Industrialization: the pre-1956 period.

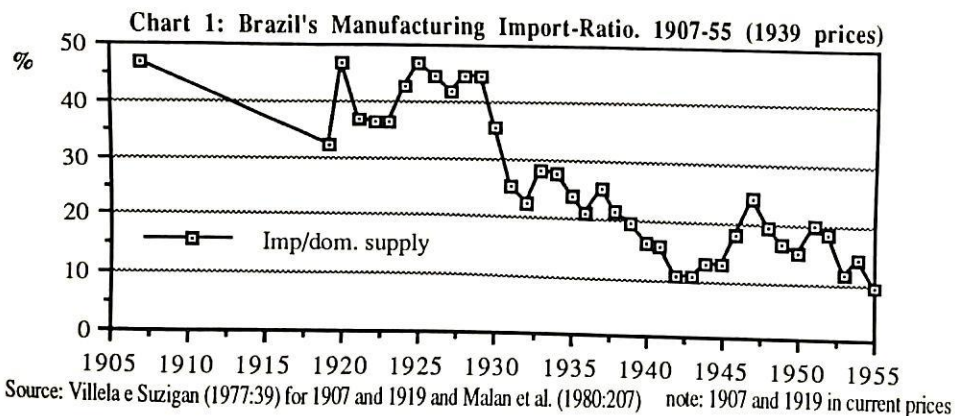
When the first significant surge of manufacturing investment took place in the 1890s, Brazil could be described as an open, export-oriented and agricultural-based economy, with its trade-GDP ratio standing roughly at 28 % (table A.3). At that time, agriculture accounted for 56% of GDP (table A.2), with more than a half of the agricultural output (mainly coffee) being exported. Industry accounted for only 12 % of GDP and consisted mostly of small establishments in the textile and food sectors.³ Manufactured exports were virtually inexistent, with coffee accounting for as much as 60 % of total exports.

Half a century later, though, the picture was somewhat different. Notwithstanding the low (by subsequent standards) levels of foreign direct investment (FDI), the nearly uninterrupted growth experienced during this period had increased the industry's share of GDP to 30% and the manufacturing import-ratio had dropped to an amazing 10% (see chart 1). Yet, Brazil's industrial structure was still 'shallow' and lacking diversification. The share of the so-called heavy industries was only 35% (table A.1), and despite considerable development, both the capital and durable consumer good sectors were still incipient, accounting for not more than 11% of the total manufacturing output (table A.5). As for exports, they

³ A 1907 industrial inquire gave the textile, food, beverage and apparel sectors the combined share of 62%. See IBGE (1990).

continued to be entirely dominated by agricultural products, with coffee still coming close to 60% of total exports (table A.6). Overall, the economy had significantly reduced its 'dependence' on foreign trade, halving the trade-GDP ratio to around 7%. To use a cliché, Brazil seemed to have completed in mid-1950s the 'easy' stage of import substitution.

The government's role in this first phase of the Brazil's industrialisation is somewhat polemical, but most authors seem to agree that, whatever it was, it has changed markedly after the Great Depression. It makes sense, then, to look at these two periods—pre and post Great Depression—separately.



Before the Great Depression.

The dominant view in the literature is that the government's role in the first steps of Brazil's

industrialization was minimal, or put it differently, that industrialization originated from changes in the relative prices provoked by external shocks, and/or from linkages between the coffee and manufacturing sectors.⁴ No doubt, this perception seems to square with the liberal rhetoric of the first republican governments and their agrarian political base.⁵ The fly in the ointment, though, is the existence of evidences suggesting, first, that tariffs were anything but low, and second, that the state has granted incentives and subsidies, notably, to the heavy industry.

Table 2, for instance, shows a significant, if not monotonic, increase in the actual tariff rates since the independence, to levels that cannot be outright dismissed as not affecting resource allocation. In addition, evidences on light industry sectors such as textiles, footwear and beverages, indicate that they were heavily protected, with actual tariffs reaching three-digits in certain periods.⁶ As to the other incentives, they seem to have included, e.g., tariff exemptions for capital good imports, a 'law of similar' (1890) which prohibited tariff exemptions for goods produced domestically, and loans and profit-guarantees for heavy industries such as steel, cement and caustic soda. The latter appear to have grown in

⁴ For an excellent review see Suzigan (1984).

⁵ The first republic was proclaimed in 1889, overthrowing the monarchy which had ruled since the independence from Portugal in 1822. One of the republicans aims was to "free" the economy from the excessive regulations of the monarchical era. See, e.g., Topik (1980).

⁶ See Versiani (1979) on the textile-cotton industry, and Suzigan (1984, chapters 3 and 4) on the other industries. In 1916, the United States Federal Trade Commission found that Brazil had the highest tariff in the Western Hemisphere (Topik, 1980:606).

Table 2: Brazil's Actual Tariff Rates*. 1893-55 (%)

1823-32	1833-42	1893-1902	1903-12	1913-22	1923-32	1933-42	1943-52	1951-55
10.0	27.2	24.0	28.0	36.0	37.0	23.0	7.0	5.6

* Tariff revenue divided by total imports. Arithmetic average. Source: Silva, G. A. (1983) 'A Reforma Aduaneira no Brasil' in Estudos Aduaneiros nº11, ESAF, Brasília, as quoted by Machado (1990).

importance after the WWI, prompted by a security-conscious government.⁷

However, these evidences are played down on the grounds that they do not prove that the government was systematically pursuing industrialization, nor that the measures taken were effective. Much ammunition is spent on tariffs whose main purpose is thought to have been fiscal, and whose impact is believed to have been limited given that they were specific, and tended to be offset by international prices and exchange rate variations.⁸ In Suzigan (1984:88), for instance, this argument is underpinned by evidence showing that the real landed price of imports (i.e. including actual tariffs and exchange rate variations) has actually fallen until 1930, except for the WWI period. As to the other incentives, the claim is that they were not used in a systematic fashion, and had more of a *de jure* than a *de facto* existence.⁹

⁷ See Topik (1980) and Villela e Suzigan (1977) for details.

⁸ During 1893-1932, customs revenues accounted in average for 52% of the government revenue (Machado 1990:79).

⁹ The tariff exemptions for capital goods and the 'law of similar' are cases in point. The former is said to have lacked any clear criteria (being an easy prey to rent-seekers), and to be limited in scope for fiscal reasons (tariffs were the main source of government revenue). The latter is believed to have been strictly enforced only in the 1950s.

Strong as these arguments may be, it seems difficult to deny that changes in the relative prices received a valuable, if modest, assistance of government's incentives, particularly as far as tariffs and the light industry go. That protection seems to have declined during the period does not tell us much about the its absolute level. Moreover, if one takes into account that productivity in the light industry was apparently well below the international frontier, protection appears to have been all the more necessary.¹⁰ The long arm of coincidence would have to be stretched too far to explain why the first spurts of manufacturing investment occurred only after quasi-free-trade 'agreements' with Portugal and England had expired.¹¹ This does not mean to say, however, that state was interventionist or developmental. In fact, the limited service that it rendered industry by raising tariffs and giving incentives, appears to have been more than offset by its inaction regarding market failures in the financial markets, infrastructure, education and science and technology (S &T).

During all the period, the financial sector remained basically geared to cater for the coffee-export sector's financial needs, and even though the state owned the largest commercial bank—Banco do Brasil—there was virtually no source of long-term credit for

¹⁰ According to Clark, W. (1910) "Cotton Goods in Latin America, Part II". Department of Commerce Special Agents Ser. nº36. 1910, quoted in Fishlow (1972:18), labour productivity in the Brazilian textile-cotton industry was in 1910 between 50 to 30% below that of the US, and even somewhat below that of the American industry 50 years earlier.

¹¹ The last trade agreement expired in 1844. According to this agreement, the tariff rates on English products could not exceed 15%. See Machado (1990) for details.

manufacturing.¹² The government played an important 'functional' role in expanding the infrastructure, yet, as these investments were mainly targeted to serve the coffee-export sector (concentrated in the south-east), they neither provided industry with access to a unified national market, nor with an adequate energy supply. As to education, despite being free and compulsory, the share of total population enrolled in school in 1930 (6.3 %) was well below the already dismal Latin America's average (8%) (Albert, 1983:38). Finally, government action in the area of S&T was limited to the creation a few specialised institutions in the engineering and biomedical fields (the first university was established as late as 1920), with virtually no links with industry.¹³

After the Great Depression

In the post-1930 period, the government's hand became more visible, although most of the policies that favoured industrialization can be said to have had other targets in mind, i.e., balance of payment (BP) adjustment, and growth. Most accounts give trade and exchange rate policies the pride of place. In fact, the government handling of these policies took the classical contours of an import-substitution (IS) strategy. Its response to the Great Depression is seen to have been ground-breaking. Instead of pursuing the classical BP-adjustment policies of exchange rate devaluation and fiscal-cum-monetary

¹² See Tavares (1973) and Villela e Suzigan (1977) for details. During 1914-1945, Banco do Brazil accounted for approximately 30 to 40% of total loans. (Goldsmith 1986:171).

¹³A notable exception was the Institute for Technological Research at the São Paulo Polytechnic School which according to Leff (1968:19) "played an important role in promoting the early technical development of this [capital goods] and other São Paulo industries."

contraction, the government opted for a different package that included the former but not the latter.¹⁴ Given the size of the gap in the external accounts, this policy mix had to be complemented by foreign exchange and import controls. The success of this policy in sustaining income levels, adjusting the BP and boosting manufacturing investment seems to have left a permanent mark in Brazilian policy makers. From then on, except for a few short periods, import and foreign exchange controls would be a key element of the government's policies whatever the ideological colours of the incumbents.

During 1930-55, import and exchange rate controls took different forms and were combined with different exchange-rate policies, gradually becoming more favourable to industry. Customs tariffs were left playing second fiddle (they remained specific until 1957, see table 2). From 1930 until the outbreak of the WW1, except for the brief 1934-37 liberal period, imports were controlled by a licensing system, used concurrently with a rising real exchange rate. Until 1934, foreign debt payments and government's imports were given priority in the allocation of foreign exchange. This, however, changed after 1937, when producer goods gained precedence. An improvement in the BP during the war led to a short-lived liberalisation, but import controls were re-introduced in 1947. This time under a fixed and increasingly over-valued exchange rate, and with a tacit policy of not allowing competitive imports in. In 1953, a complex multiple-exchange-rate system was adopted, with product-specific rates for exports, and a five-

¹⁴ See Furtado (1963) and Villela and Suzigan (1977) for details.

category auction system for imports. Imports of producer goods, however, continued to be favoured.¹⁵

These policies are seen to have helped industry in two main ways. First, by virtually eliminating import competition to the light industry, and by increasing protection for the fledgling heavy industry. This would have allowed these industries not only to survive and learn, but also to grow ahead of income through IS. Second, by subsidizing the imports of capital goods and raw material, notably after 1947, with a highly overvalued exchange rate.¹⁶ The changes in Brazil's import structure (table A.4), the behaviour of the manufacturing-import ratio (chart 1 and table A.7), and an annual growth rate of 8.4 % for manufacturing output (1930-55), all tend to support these arguments.

However, the cost involved are no less visible. One could mention, for instance, the much-heralded rent-seeking and static costs of protection which came along with import controls. These costs, however, can be said to have been attenuated, first, by the fact that the manufacturing structure remained dominated by light industries, very much in line with Brazil's factor endowment (table A.1). Second, because the 1953 auction system reduced significantly the opportunity for rent seeking. And third, because the welfare gains associated with rapid growth have probably made up for the

¹⁵ A minimum premium was set for each category of the auction, which varied in accordance to the goods perceived priority. Capital and intermediary goods had the lowest premium while consumer goods the highest. As for exports, a system of bonuses was used to obtain product-specific exchange-rates. All financial transaction were carried out in a 'free' exchange rate market. See Bergsman (1970), and Malan et al (1980).

¹⁶ See Furtado (1963) and Fishlow (1972).

consumer loss. More damaging losses appears to have been inflicted on two other interrelated issues, i.e., the long term efficiency of the Brazilian industry and the external balance.

Economic theory has already shown that the replacement of tariffs for non-tariff barriers (NTBs) leads to non-competitive behaviour, aggravating the infant industry problems of X-inefficiency and endless-learning periods.¹⁷ The experience of countries like Korea, however, also suggests that these problems can be largely avoided, and monopolistic behaviour even turned into a positive factor, if protection is made conditional on export performance, forcing firms into the international market. In Brazil, during 1930-55, external competition was totally removed but nothing was put in place to push firms down the learning curve. Firms had, then, incentives to expand to fill the gaps left by imports, but little incentive to increase efficiency given the technologically poor domestic competition.

With the wrong set of incentives, it does not come as a surprise that manufacturing exports never really took off. Table A.7 shows that the manufacturing-export ratio has decreased sharply over 1907-49 to a mere 2.3%, and in 1955 this figure must have been even lower, given that during 1950-55 manufacturing output has outperformed manufactured exports by a large margin.¹⁸ This lack of incentives to export has also led to a BP increasingly dependent on coffee exports (table A.6), which, thanks to the price-inelasticity of its international demand, tended

¹⁷ See Bhagwati (1965) and Helpman and Krugman (1989, chap. 3).

¹⁸ During 1950-55, manufactured exports nominally decreased (table A.6), while manufacturing output has increased 65 percent in real terms (IBGE 1990).

to be less affected by the exchange-rate policy. Yet, this has not prevented regular foreign exchange crises from happening, or the external debt to grow, notably in the first half of the 1950s.¹⁹

These inefficiencies provoked by the trade policy were aggravated by the government's belated and, largely, unsatisfactory response to the industry's growing requirements for infrastructure, financing and human capital. It was not until the beginning of the 1950s, that effective steps were taken to tackle some of these market failures. An exception to this rule, was the state's direct intervention in the production of intermediary goods in the early 1940s. Although this move had little to do with an industrialization strategy—it was prompted mainly by military reasons related to WWII—and was carried out only when the state had run out of private options, it would later prove to be economically sound. This intervention not only smoothed the transition towards a more integrated industrial structure, but also contributed to develop a major source of comparative advantage.²⁰

But going back to the industry's needs, the state's actions in the area of infrastructure were hampered by a government thorn between the virtues of public and private investment, and ending up with the worst of both

¹⁹ The external debt that had been stable around \$600 million in the second half of the 1940s, shot up to \$1445 billion in 1955 (IBGE 1990).

²⁰ During 1941-45 the government built Latin America first fully integrated steel mill (Cia Siderúrgica Nacional), established the Vale do Rio Doce Co. to mine and export iron ore, set up a factory to produce barilla and caustic soda (Cia. Alcalis), and, in its only venture out of the intermediary good sector, started to assemble aeroplanes engines and trucks (Fabrica Nacional de Motores). The share of this state enterprises investment in the total capital formation, though, was only 3% during 1947-55. See table A.9.

worlds. Key sectors such as electric power and telecommunications were dominated by private firms (mainly foreign companies), but were regulated by state and municipal governments that constantly imposed unrealistic rates. The result was low and uncoordinated investments. On the other hand, services that had passed to public hands (e.g. railways), tended to suffer from the lack of long-term planning and the state's inadequate financial and fiscal base. It was only in the early fifties that a clear option for public sector investments emerged, with key state enterprises (SEs) being created, particularly in the energy sector (oil and electric power). This move was backed up by the establishment of a development bank (National Development Bank—BNDE—1952), to be funded by fiscal and external resources, with the specific aim to finance improvements in the infrastructure.²¹ Major investments, however, would only begin in 1956.

On the financial side there was little progress, if at all. Government intervention, to a certain extent, was more of a hindrance than a help. For instance, the development of the financial sector was considerably delayed by the ill-conceived 'usury law' (1933) which limited the maximum rate of interest to an annual rate of 12%. This, coupled with inflation averaging 13% annually over 1940-55, led the financial sector to shrink exactly when the economy's increasing degree of industrialization and

²¹ These measures were inspired by the reports of two joint Brazil-US technical commissions (1948, 1949), set up to look into Brazil's development problems. Both reports maintained that the poor infrastructure was a major bottleneck to be overcome. See Malan et al. (1980). Tendler (1968) gives an accurate account of the acute power supply problems facing the industry in the post-war period.

commercialisation was demanding the opposite.²² As a result, industry ended up without both long-term financing and short-term funds for working capital. Without proper credit, and with a negligible stock market, firms had to increasingly rely on internal finance, whose limits were pushed by constant, increasingly elusive, attempts to raise mark-ups. In this endeavour, firms were 'helped' not only by the trade policy but also by government's use of monetary expansion to finance the Treasury deficit .

This disastrous intervention contrasted sharply with more positive, if timid, moves to provide industry with long-term loans. The first endeavour in this direction came in 1937, through Banco do Brasil, aiming at extending medium and long-term credit for the purchase of machinery and equipment. However, most of the loans ended up going for agriculture (Malan et al. 1980). A second attempt came only in 1952, with the already mentioned establishment of the BNDE. Industry, however, had to wait until the mid-1950s to benefit from a significant share of its loans, and even then the lion's share went for the government-owned heavy industries (table A.11).

Finally, S&T and education continued not to figure among the government's priorities, even though important, if uncoordinated, steps were taken in this direction. In the case of the S&T infrastructure, the pre-1930 trend of establishing isolated institutions in

²² In the pre-WWII period it was well below two digits. The M2/GDP ratio increased from 28.3% to 34% during 1930-45 but fell to 19.2% in 1955 responding to the acceleration of the inflation in the post-war period (Goldsmith 1986:245).

military-strategic areas continued²³, but two new institutions—the National Research Council (CNPQ) and the Campaign for the Improvement of the Higher Education Staff (CAPES)—were set up in 1951, with the more functional aim to finance investments in human capital. As to education, the establishment of National Service for Industrial Apprenticeship (SENAI) was an important and successful initiative in the area of vocational training.²⁴ Overall, though, no substantial improvement appears to have occurred. As of 1950, 50% of the population was still illiterate, and only 40% of the literate population had completed the first five grades of elementary education (table A.15).

In all, it can be said that government intervention played an important, if incoherent and largely unintentional, part in this first stage of Brazil's industrialization. In the pre-1930 period, fiscal considerations seem to largely explain the tariff protection given to manufacturing, which, nonetheless, appears to have been instrumental in allowing Brazil's long suppressed comparative advantages in the light industry to develop. Little else was done, though, to tackle other market failures. After the Great Depression, government intervention clearly increased but, again, BP and growth considerations seem to have been the main motivation. As in the previous period, the local industry was protected, but this time, by imposing NTBs and by

²³ The most important specialised institutes set up during this period were an aerospace engineering training institute (ITA) in 1946, and an aerospace research centre (CTA) in 1954 which would later provide the human capital basis for the internationally successful Brazilian aircraft industry. World Bank (1983:95).

²⁴ SENAI was established in 1942, financed by a pay-roll tax on industrial firms with 500 or more employees. See World Bank (1979).

discouraging exports with an overvalued exchange rate, the government virtually eliminated the healthy pressure and guidance provided by international prices and competition. These policy mistakes were compounded by the government's timid and sometimes ill-advised action in key areas such as infrastructure, finance, S&T and education. As a result, the local industry not only lacked incentives to go down the learning curve, but it also had to face social-overhead and financial costs above the international average.

II-Heavy Industry 'at all costs': The 1956-64 period.

As shown above, more than half a century of 'unintentional' and inward looking industrialization had good results in terms of growth but gave rise to a manufacturing sector of dubious quality, threatening to be 'forever young' given the lack of the right incentives, and the burden of serious bottle-necks in infrastructure, financing and human capital. However, it was not until the mid-1950s that the government acknowledged that industrialization was part of its agenda, and was not until the mid-1960s that the benefits of a more open economy were taken in.

The 'Targets Plan' ('T' plan)—1956-61—marked the former event. Influenced by pro-industrialization arguments of the structuralists, the Plan, rather than being an integrated comprehensive program, was a collection of five-year targets for output and investment in infrastructure, heavy industry, food and education. As suggested by the make-up of the targets, the intention was to deal not only with functional market failures, but also to carry on with IS in the intermediate, capital and durable-consumer goods sectors. In the end, functional interventions were limited, in practice, to infrastructure (transport and energy), with the food and education receiving a perfunctory 6.6 % of the proposed investment

(no mention was made of finance or S&T). The bulk of the investment went into IS.²⁵

The decision to launch the plan was not accompanied by significant institutional changes. Even though a National Development Council, with the initial purpose of acting as a central planning agency, was set up in 1956, it was soon fragmented into several sectoral agencies, the so-called 'executive groups'. The program remained then with little central coordination, except for the measures taken by the BNDE and SUMOC (sort of central bank), imposed by the financial and macroeconomic constraints.²⁶

This institutional weakness was compounded by an inhospitable macroeconomic environment, particularly inappropriate to a plan whose expending programs would amount to about 5% of GDP in the following five years.²⁷ On the external front, an erratic export performance compounded by a rising debt-service and falling terms of trade, suggested little room for the increase in imports implicit in the plan's investments. In the domestic front, inflation was above two digits reflecting not only the already high GDP rate of growth (8% in 1955), but also, as

²⁵ The plan also envisaged the construction of the new capital, Brasilia. The total proposed investment had 43.4 % going for energy, 29.6% for transports, 3.2% for food production and distribution, 3.4% for education and 20.4 % for the heavy industry. As to the latter, the most important targeted sectors were steel, cement, automobile, shipbuilding, and machinery. See Lessa (1982: 35).

²⁶ The executive groups were made up of private sector and government representatives of the various agencies providing finance and incentives for the relevant sector. They had the task of overseeing the implementation of the sectoral programs, and of suggesting fiscal and financial incentives. See Lessa (1982) for details.

²⁷ Sochaczewski and Orenstein (1990:178).

suggested earlier, the lack of proper funding for the state and private investments. In order to circumvent these macroeconomic and institutional constraints, the government went again for an eclectic policy mix, still dominated by trade and exchange rate policies, but this time, other important ingredients were added, i.e., incentives to foreign capital and an expanded government participation in infrastructure, intermediary goods industry and in the financial sector.

The government policies

Beginning with trade and exchange rate policies, there was little change in the overall orientation. These policies continued to serve the dual purpose of avoiding a balance of payment crisis and promoting IS, and therefore, competitive imports continued to be kept out, while the non-competitive remained subsidised by exports. The aim to deepen the industrial structure, though, meant that the non-competitive group had to be streamlined even further to increase protection for the heavy industry. There was also a refinement on the instruments used. In 1957, seeking to make protection more selective and the exchange rate policy more flexible, the government revived custom tariffs and reformed the exchange rate-auction system. *Ad valorem* tariffs were introduced, ranging from 0 to 150 %, and auction categories were reduced from five to two low (non-competitive producer goods) and high premium (consumer goods) groups. The average effective purchase-power-parity (PPP) exchange rate for imports, though, continued to be substantially

higher than that of exports (table A.17).²⁸ Moreover, the 'law of similar' was eventually put officially into effect.²⁹

The net effect of these changes was a rise in protection, now consisting not only of the high premiums of the exchange rate auctions but also of generally prohibitive tariff rates.³⁰ Table A.20 shows that all manufacturing sectors had very high effective tariff rates, with the structure of protection reflecting 'essentially' rather than comparative advantages.

The now traditional policy of trade and exchange rate restrictions, though, was not enough to keep the plan afloat. Given the import intensity, and the capital and technological requirements of the heavy industry targets, a new element had to be brought in: i.e. foreign capital. To this end, the government reformed the already liberal legislation, dropping the remaining restrictions and creating lavish incentives.³¹ In addition to the deregulation of remittances (profits, interest and dividends), sectors of 'special interest' could benefit from a preferential, notably, overvalued exchange rate (with registration of the principal at the 'free' market rate).

²⁸ Exports continued to have product-specific exchange rates up to 1959, when their proceeds were allowed to be sold on the free market.

²⁹ On the 1950s trade policies see Bergsman (1970) and Doellinger et al. (1977).

³⁰ One estimate put tariffs for the goods in the general category up to about 80% plus 15% of average premium, and for the ones in the special category, tariffs ranging up to 150% plus a premium of 100 to 200% (Bergsman 1970:33).

³¹ Until 1953 the restriction to foreign capital were limited to investments in infrastructure and in the financial sector but even there they were not strictly enforced. There were attempts to control and limit remittances in 1946 and 1952 but only survived for a brief period. For details see Abreu (1990:101) and Guimarães et al. (1982, Appendix A.)

This process was crowned by Instruction 113 (1955), which authorised foreign investors to import equipment without exchange rate cover.³² On the requirement side, investments had to be in the targeted sectors (virtually all manufacturing sectors) and a programme for domestic procurement of inputs had to be agreed, to name but the more important.

This legislation combined, on the one hand, with the threat of loss of Brazil's fast growing and highly protected market, and on the other hand, with the virtually non-existent local capital market, had an immediate effect on the amount of foreign capital flowing into Brazil. Table A.12 shows that annual FDI surged in 1956, and suppliers credits rapidly became the major source of autonomous capital, accounting for more than two thirds of the gross inflows over the 1954-61 period.³³

The third prong of the government's strategy involved, as noted earlier, an increase in the state's presence in the infrastructure, intermediary goods and financial sector. The public sector's average share of the gross fixed capital formation rose substantially (table A.9), led by SEs' investments in the steel industry and infrastructure.³⁴ Likewise, the public sector's share of total loans went up from 26 (1951-55) to 36% (1956-63).

³² As the exchange rate for imports were generally higher than the 'free' market rate, avoidance of the foreign exchange transaction was a substantial subsidy. In addition, when these imports were financed, the debt could be also serviced at a preferential exchange rate.

³³ Malan and Bonelli (1990:37).

³⁴ During 1956-61, 65% of SEs' investments were in infrastructure (energy, transport and telecommunication) and 17% in the steel industry. The rest was scattered in other manufacturing sectors, mining, financing (Werneck 1969:99).

whereas as a lender, its share rose from 48 to 57% over the same period.³⁵

Leaving for the moment the financial aspects aside, these events rather than reveal the government's socialist tendencies, reflect mainly the plan's division of labour between the private and public sector, with the latter taking on the targets where market imperfections (particularly the lack of capital market) virtually ruled out a private solution. This explanation seems to be accurate even for the intermediate goods sector, where the case of the steel industry, which received the most of the public sector's investment in manufacturing, is quite revealing. Although both the size of the Brazilian market and the characteristics of the industry's production function (mature technology, inputs which were abundant in Brazil, and the medium-skill requirements) were pointing to static and dynamic comparative advantages, not even the U.S. Steel accepted a government's invitation to set up an integrated steel mill.³⁶

On the financial side, the expanded state presence, both as borrower and lender, can be only partially justified by its greater role in infrastructure and heavy industry, and it had little to do with the local private firms'(LPFs) lack of long term finance. Much of this expansion reflected the inadequacy of the public sector's financing schemes. Despite the ambition of its targets, the Plan was short of specifics on how investments would be financed, and arrangements were virtually limited to the set up of various earmarked fiscal funds, placed under BNDE control. Even though this move, combined with the

³⁵ Boletim SUMOC various years.

³⁶ See Baer (1969).

possibility of issuing foreign-loan guarantees, significantly increased BNDE resources, it proved to be thoroughly inadequate to the public and private sector's financial needs.³⁷

In the case of the public sector, the lack of adequate financing was compounded by the SEs' unrealistic pricing policy, part of an ill-advised attempt by the government to control the rising inflation. As an increase in the national debt was not a viable option (the 'usury law' prevented the government from issuing securities with positive returns), the gap in the public sector's finances was almost entirely financed by monetary expansion under the guise of Banco do Brasil 'loans' to the treasury.³⁸

As to the private sector, whereas foreign firms had access to foreign loans at preferential exchange rates, local firms continued to have problems in arranging long-term financing, due to their diminished creditworthiness in the international financial markets. The BNDE's loans and guarantees, a possible answer to this problem, had a reduced impact since, as indicated, they were meagre

³⁷ Table A.11 shows that BNDE loans in the 1956-64 period were limited in average to 2.2% of the gross fixed capital formation.

³⁸ The Treasury deficit rose from 1.2% of GDP in 1955 to 5.1% in 1962 (Boletim SUMOC). During 1950-64, Brazil's financial system had a very peculiar structure, with the monetary authorities being composed of three institutions: a) SUMOC, the normative and controlling institution, which performed usual tasks of a traditional central bank, except for the fact that the execution of its policies was carried out by the BB. b) the BB, which acted simultaneously as SUMOC executive agent, as the treasury financial agent, and as major commercial bank. Finally, c) the Treasury, responsible for currency issues. As the BB used to make no distinction between its various operations, it had no limits to expand its loans, which had the same effect of a primary expansion of the money supply. See Sochaczewski (1980) for details.

and mostly directed towards the public sector (table A.11). LPFs continued, then, to resort to auto finance via higher mark-ups, an option favoured by the lax monetary policy, but that became increasingly inefficient as inflation accelerated towards 30% in the late 1950s. Moreover, the supply of short-term funds was further restricted by the combination of high inflation with negative interest rates. The extent of this problem can be gauged by the fact that, in real terms, outstanding domestic loans to the private sector remained stagnant over 1956-61, despite a two-fold increase of GDP.³⁹

Assessing the results

At first sight, the Plan's overall results point to a remarkable success. As table 3 shows, most of the targets, either in infrastructure or manufacturing, were met within a reasonable margin of error. In addition, GDP grew at an annual average rate of 9.4 % (1955-61), whereas the same figure for manufacturing output was 12%. IS and industrial diversification were successfully carried further down the road, notably in the heavy industry, whose import-ratio reached 9 % in 1964 (table A.7), and whose share of the total manufacturing output, rose from 35 to 48% over 1955-65 (table A.1).⁴⁰ Yet,

³⁹ Boletim SUMOC, various years. The financial sector continued to shrink with the financial-asset-to-GDP ratio falling from 45% in 1956 to 34% in 1964 (Goldsmith 1986:245). At the end of the 1950s, the increasingly restricted supply of finance by the institutionalised banking system led to the appearance of a curb market, which in 1963/64 reached about 5% of total bank credit. See Sochaczewski (1980, chap 6) for details.

⁴⁰ From an 'end-use' perspective, the capital goods sector almost doubled its share of the manufacturing output, while durable and intermediary goods also expanded their participation at the expense of non-durable consumer goods (table A.5).

impressive as these results might be, one of the Plan's main objectives—the decision to a speedy move into the heavy industry—can be seriously questioned if the options involved, and the results achieved, are examined more carefully.

Table 3: Targets Plan. Selected Targets and Performance (1956-61)

	planned	achieved
Electric Power (10^3 KW)	5000	5205
Oil production (10^3 barrels per day)	100	95.4
Railways (Km)	1624	1093
Roads (Km)	12000	13169
Steel ingots (10^3 tons per year)	2300	1843
Cement (10^3 tons per year)	5000	4678
Pass. Cars (10^3 units and localization index)	58 (95%)	52 (89%)
Shipbuilding (capac. 10^3 DWT per year)	160	158

Source: Data from Lessa (1982) except for steel production (achieved) which is from Baer (1969)

One can begin by arguing that in the mid-1950s there was hardly a sound case for a hasty and massive move into heavy industry. Looking first from a static point of view, Brazil was far from any Lewisian turning point as demonstrated by the falling unit labour costs (table A.13). Factor prices, therefore, were suggesting that resource allocation would be improved not by widespread targeting of heavy industry, but by giving light industry the right incentives and financial means to 'grow' and sell in the international market (whose access in the mid-Fifties was no longer restricted). Instead, as we have seen, not only exports continued to be discriminated, but the light industry was almost completely left out of BNDE long-term loans (table A.11). As a result, both manufacturing employment growth and its elasticity were halved at a

time when almost half of the economically active population was under-employed.⁴¹

From a dynamic and, say, 'strategic' perspective, it is true that a move towards the heavy industry was justified, first, by the possibility of exploiting dynamic economies of scale, particularly in technologically mature sectors, and second because of the human capital spillovers, higher productivity and above-the-average-cost profits, usually associated with this industry. However, it seems that in order to take full advantage of these benefits, any attempt in this direction would have allow for the limitations of the existing resource endowment, and for the market failures and imperfections that affect competition in this industry. This, not only to prevent benefits being offset by excessive resources misallocation, in the static sense, but also to give LPFs realistic chances to grow and compete.

Yet, as we have seen, the government overlooked all these considerations. Despite Brazil's poor capital and human capital resources, several heavy industry sectors were targeted at once. Notwithstanding, the 'lumpiness', long-term maturation, and economies of scale that marks investment in this industry, very little was done to centralise capital in the hands of schumpeterian entrepreneurs, either through the stock market or banking credit, and an excessive number of producers was allowed in. Despite the obvious limitations of the

⁴¹ Wells (1987:96). See table A.18. One could also argue that low-labour absorption resulted from subsidies to capital via the exchange-rate mechanism, and from a minimum wage legislation implemented in 1943. Yet, as Clements (1987:31) put it, there is no conclusive econometric evidence regarding the magnitude of capital-labour elasticity of substitution, and most of the qualitative evidence seems support the view that the possibilities of factor-substitution are, and were, limited, particularly the heavy industry.

domestic market, backward integration, through domestic content incentives, was excessively pursued. And finally, notwithstanding the industry's high technological and skill requirements, improvements in the S&T and education remained out of the government's agenda.⁴² It was as if all these constraints and preconditions could have been quickly overcome by a large and unregulated inflow of FDI, thought to be in itself, a guarantee of efficiency. True enough, the targets were met and manufacturing growth was high, yet the costs seemed to have been too high.

Even though the analysis of FDI costs and benefits tends to be controversial, there seems to be a rare consensus in the literature regarding the inapplicability of the infant industry argument to TNC affiliates.⁴³ Whereas there is no doubt that these firms also face a learning curve, and generate pecuniary and non-pecuniary externalities, their unrestricted access to capital and technology in the international market does not make them legitimate candidates for protection. The more so if one takes into account, first, that their access to parent company technology tends to exclude the 'know why' from their contribution to domestic technological capabilities (Lall 1992); second, that foreign ownership

⁴² In fact, between 1956 and the end of the 1960s, the already poor S&T infrastructure fell into decline because of lack of government support. See Bielschowsky (1978). As to education, progress continued to be sluggish (table A.15), despite some success in the areas of technical and vocational training, mainly through the SENAI. Leff (1968:61), commenting on the capital goods industry in 1963 argued that 'the supply of engineers has not keep pace with the demands of the labour market principally because of insufficient expansion of the educational system.'

⁴³ See for instance Johnson (1965), Graham (1991) and Westphal (1982).

invalidates the welfare gains related to the 'profit-shifting' argument (Brander 1986); and third, that their protection is hardly compatible with that of those who really need to 'mature', i.e., the LPFs.

Therefore, even though heavy reliance on 'protected', inward-looking, and unregulated FDI allowed the government to ignore the resource and technological constraints, and LPFs' human capital and financial needs, it ended up compromising much of the dynamic benefits involved in a move into the heavy industry. In fact, by taking this 'short cut', the government created a situation where, on the one hand, the local firms were thoroughly exposed to the imperfect competition of the affiliates, and, despite the highly protected internal market, they had largely to settle for marginal or subcontractor positions, when not driven out of the market. And, on the other, the combination of high domestic prices and lax investment licensing, led to the so-called 'crowd in' effect (Horstman and Markusen 1986). An inefficient industrial structure was then built—oversized vis-à-vis the domestic market but with most of the plants below the international MES— heavily dependent on permanent protection, even though most of the heavy industry sectors were either led or totally dominated by the most efficient producers of the world (table A.8).⁴⁴

⁴⁴ The automobile industry is a case in point. Despite the fact that investment was, to a certain extent regulated by the GEIA (Executive Group for the Automobile Industry) no less than 8 firms were assembling passenger cars (including pick-ups) in 1962 (see Bergsman 1970). According to Suzigan (1978:47) the industry's capacity utilisation until 1967/68 was less than 50%. Leff (1968:29) also reports widespread excess capacity in the capital goods industry in the beginning of the 1960s.

Finally, a more selective approach to the heavy industry, coupled with neutral trade incentives and supported by pro-market intervention in the financial market (to overcome market failures not to aggravate them), would have avoided, in all likelihood, the serious macroeconomic imbalances of the first half of the 1960s. During this period, inflation approached three digits, and the widening current account deficit had to be financed by increasingly costly short-term loans.⁴⁵ This alternative approach would also have acted in the direction of avoiding the deep recession that followed the implementation of the Plan. The rush into the heavy industry produced an industrial capacity well beyond what the internal market could absorb, which, in turn, made a slow-down in growth inevitable. Greater export orientation would have allowed growth to go on irrespective of the limits of the internal market, which could have become bigger had the resource been used more efficiently.⁴⁶

IV-The Pragmatic 'Miracle'. The 1964-73 period.

The last section has shown that the government's first conscious attempt to promote industrialization led to a considerable, and long overdue, improvement in the country's infrastructure, and took IS to most of the heavy industry sectors. Yet, keen on removing the 'foreign exchange gap', the government pursued IS without due

⁴⁵As Malan and Bonelli (1990:38) pointed out, in 1960, Brazil was already the largest international debtor among LDCs (\$3.9 billion), with 70% of the debt scheduled to be paid in the following three years. As to inflation, GDP deflator reached 50% in 1962 and 90% in 1964.

⁴⁶The real GDP annual growth rate fell from 8.5% in 1961 to 0.6% in 1963. For details of the economic policy over the 1961-64 period see Abreu (1990).

regard for the resource endowments, and the financial and technological requirements. Exports continued to be unduly discriminated, and foreign capital was invited in to fill the micro and macroeconomic gaps, often at expense of the LPFs. The side effects of this strategy did not take long to show their 'ugly face'. The lack of proper financing and the trade bias, led to high inflation and a BP crisis, which coupled with the polarisation of the political situation, resulted eventually in a military coup, in 1964. A new team of neoclassical policy makers, then, took over the command of the economy.

Apparently utterly opposed to the interventionist ideas that had inspired its predecessors, the new team set out to implement comprehensive institutional and policy reforms that would spark off a new period of rapid industrial and economic growth. Even though the reforms were aimed at restoring 'the supremacy of the price mechanism', in practice, as we shall see, theoretical principles quickly gave way to a puzzling pragmatism, which has not fundamentally altered either the government's role or the previous pattern of industrialization. The reforms were largely designed to deal with two major issues—the inadequacy of the public and private sector financing, and the incentive-bias against exports and foreign capital—thought to have been the underlying causes of the chronic inflationary and BP problems. Moreover, at a less prominent level, there were also changes in the industrial and S&T 'policies'.

Reforming public and private sector financing

Looking first at the public sector, a fiscal reform was implemented to modernise taxes and protect fiscal

revenue from inflation, the SEs' prices were adjusted, and earmarked, compulsory saving funds were set up to finance investments in infrastructure and housing. In addition, a central bank was finally created⁴⁷, and the treasury was allowed to issue bonds with monetary correction. As Sochaczewski (1980:360) pointed out, this last measure allowed the government to circumvent the 'usury law', whose 12% ceiling was now reinterpreted as referring to the real and not the nominal rate. As a result, the state improved its control over the monetary policy, and significantly increased its resources, which became more in line with its new responsibilities in the infrastructure and intermediary goods industry, whose legitimacy was not questioned by the newcomers. On the contrary, SEs increased investment in these areas, doubling their share of the gross fixed capital formation over 1965-73 (table A.9).

As to the private sector, new non-banking financial institutions and assets were created, and old ones reformed. The principal innovation was the introduction of assets with monetary correction, which, as with public bonds, would allow interest rates to be positive.⁴⁸ These new assets were to be part of a specialised financial market, with commercial banks and credit societies supplying, respectively, short term and consumer credit ; and the stock and debenture markets, supported by fiscal incentives, the long awaited long-term funds. In this task, they would have the support of the newly created

⁴⁷ See footnote 57. BB, though retained its double role as the government's financial agent and major commercial bank, continuing to compromise the transparency of the government's accounts.

⁴⁸ For details, see Sochaczewski (1980) and World Bank (1984). Although positive, interest rates continued to be controlled by the government until 1974.

investment banks, authorised to undertake underwriting operations, and to supply medium term working-capital. Foreign loans were also to be another important source of medium, long-term capital, and new legislation was enacted to expedite these operations (see below). The immediate impact of these measures was a substantial increase in financial savings that rose from 16 to 26% of GDP (1965-73), sustained by a two-fold increase in the financial-asset-to-GDP ratio and a stock-market boom.⁴⁹

Reforming the trade regime and foreign capital policy.

Beginning with the trade regime, the government gradually moved towards a unified exchange rate via devaluation (table A.17), and removal of most of the NTBs.⁵⁰ In addition, a crawling-peg system was adopted, aiming at curbing speculation and reducing the real exchange fluctuations. These measures were accompanied by the implementation of export incentives, and by a selective import liberalisation. On the export side, manufactured exports were exempted from indirect and income taxes, granted product-specific fiscal subsidies, a system of drawback was implemented, and heavily subsidised export credits were made available.⁵¹ Exports

⁴⁹ World Bank (1984:11). Real savings though increased only slightly, from 16% (1956-64) to 18% (1965-73) (IBGE 1990). The total stock market value, as percentage of GDP, increased from 3% in 1968 to 41% in 1971. (Goldsmith 1986:422).

⁵⁰ A less restrictive version of the law of similar remained in place, with the nature of the prohibition changed from a total ban on import of goods produced domestically, to a veto on the concession of government incentives to these imports.

⁵¹ The indirect tax exemption involved the IPI (federal tax on industrial products), and the ICM (state turnover tax). Both are value-added taxes, and the former varies according to the type of product. The

cont.

responded quickly, particularly manufactured exports, which grew at an average annual rate of 29% over the period, with an almost five-fold increase in their share of total exports (table A.6)

On the import side, apart from the already mentioned tariff exemptions for export production and the removal of most NTBs, tariffs were reduced with the manufacturing average falling from 99 to 66% over 1966-73.⁵² In addition, tariff exemptions were extended to capital goods imports of 'priority' sectors, irrespective of the market targeted, and an 'import processing zone' was created in the Amazon region, which allowed the assemble products (mainly electric and electronic consumer goods) for the domestic market with inputs close to the international prices. However, legal and effective protection remained rather high and its inter-industrial structure unchanged (tables A.20 and A.18). The changes in import composition and the modest increase in import ratios (tables A.4 and A.7) suggest that non-competitive, producer-goods imports, given the tariff

fiscal subsidies took the form of a tax credit equivalent to a percentage of the IPI and ICM exempted. These incentives were limited to manufactured and semi-manufactured goods. For details see, e.g., Doellinger et al. (1974) and Tyler (1976). Export credits were given mainly to pre-shipment activities, for a maximum of one year, and were supplied by the commercial banks that had access to unlimited rediscounts at the Central Bank. See Baumann and Braga (1985).

⁵² The 1967 tariff reform almost halved legal tariffs for most manufactured sectors. However, BP difficulties in 1968 led to a revision of this reform, which ended up moving tariff rates upward again, although to levels below to those of 1966 (Table A.14). Importers were also required to make a pre-payment for goods with tariff above 50%. See Doellinger (1977) for details.

and tax exemptions, were largely the sole beneficiaries of the liberalisation.⁵³

With respect to foreign investment, the government was quick to alter Law 4131 (1962), one of the last acts of the civilian government, which, *inter alia*, restricted profit remittances to 10% of the capital, and for the first time tried to screen and limit technology imports. Most of these restrictions were, then, dropped (Law 4390), but a supplementary income tax was levied on remittances that exceeded 12 % of the registered capital.⁵⁴ As before, the manufacturing sector continued to be totally open to FDI. As to foreign loans, even though they still required Central Bank authorisation, there were no restrictions on the borrower's nationality or sector of activity. In fact, the access to foreign loans was further facilitated by two new pieces of legislation: instruction 289 and resolution 63. The former allowed short-term loans to be registered and serviced, and the latter, granted local banks permission to raise funds abroad to be reloaned to local firms with a shorter maturity. These measures, in conjunction with economic recovery, triggered off a new spurt of FDI (table A.12), and a rapid growth of the external debt (11% annually over 1965-73).

⁵³ Table A.4 shows that, in 1972, the share of consumer goods in total imports remained negligible, whereas that of capital goods increased 61%. Yet, even in this sector, the growth in imports seem to have been mainly non-competitive, since production grew 13% p.a. over the period, and the import ratio has never gone beyond 28%, a level below the 32% achieved at the end of the 'T' Plan. See Bergsman (1970) for the pre-1964 period and Bonelli and Façanha (1978) for post-1965 data. See also Coes (1991) for a detailed account of the 1967-73 trade reforms.

⁵⁴ A restriction to intra-firm royalty payments remained, but not for 'technical assistance'. In addition the investment registration system made no allowance for inflation in the country of origin. See Guimarães et al. (1982) for details.

Changes in the industrial and S&T 'policies'.

Despite the policy-makers' neoclassical credentials, the uncoordinated group of institutions that were the tools of the industrial and S&T 'policies' during the 'T' plan and earlier, were not wound up but reformed; and as regards S&T, there was even an attempt to come up with a strategy worthy of the term. On the industrial side, the government set up, in 1964, the Industrial Development Council (CDI), made up of representatives of the main economic agencies, which were to incorporate the executive groups (see last section), and to co-ordinate and establish criteria for the concession of fiscal and credit incentives to the manufacturing sector. These initial ambitions, though, have never materialised. CDI's incentives were distributed at random, without any clear criteria, but to increase investments.⁵⁵ Moreover, there were at least a dozen regional and sector-specific government institutions, conceding similar incentives, with the CDI having little or no control over them.

As to S&T, it finally became, in 1968, an explicit policy aim. The government eventually came to the conclusion that IS was not enough to assure '*self-sustained development*' and that it had to be complemented by the development of local technological capabilities.⁵⁶ A

⁵⁵ Until 1970, these incentives included: exemption from indirect and import taxes for capital goods imports, access to subsidised credit from state banks such as BNDE, and accelerated depreciation for income tax purposes to buyers of local capital goods. After 1970, the latter were granted exemption from indirect taxes, fiscal credit. See Suzigan (1978). During 1969-74, the projects which received CDI incentives averaged 82% of the total manufacturing investment (Central Bank Annual Reports).

⁵⁶ 'Plano Estratégico de Desenvolvimento'. Presidência da República. 1968.

National System of Scientific and Technological Development (SNDCT) was then set up, which would co-ordinate the existing S&T institutions, formulate S&T development plans, and would be funded by the National Fund for Scientific and Technological Development (FNDCT). Particular emphasis was given to the need to develop more appropriate technologies to Brazil's resource endowment. This move was soon followed by a new emphasis on higher education, and by the reintroduction of the screening of technology imports (1971), whose responsibility fell to a new agency, INPI (National Institute of Industrial Property Rights). The alleged motivation of this last measure was reduce the cost of technology imports and to facilitate its absorption. Its impact, though, would only be felt in earnest in the next period, in so far as it did not affect the contracts in force.⁵⁷

Behind the 'miracle'

As noted before, these measures sparked off a new period of exceptional growth. During 1965-73, GDP grew at an average annual rate 10%, whereas manufacturing output reached 11%. The latter was spearheaded by the heavy industry, notably by the durable consumer sector. Other indicators point to better resource allocation, with a substantial increase in labour absorption in manufacturing (table A.18), and a remarkable decline in incremental capital output ratios (ICORs), which reached its lowest level in the post-war industrialization (table

⁵⁷ INPI imposed a ban on contracts that restricted the absorption and dissemination of the imported technology, or included export restrictions. Moreover, it put a ceiling on royalty rates that amounted to 5% of net sales, and limited to five years the concession of tax brakes for technology imports. See Guimarães et al. (1982).

A.10). There was also a considerable reduction in inflation that fell from around 90 to 16% over 1964-70, reflecting not only the reforms examined above, but also a rather heterodox stabilisation program (1964-67), which combined a 'stop-and-go' monetary policy with outright intervention in the labour market.⁵⁸ Finally, the BP also improved—helped by the export take-off and the substantial inflow of foreign capital—showing an overall surplus in the whole period, except for 1967.

These impressive results prompted largely two sorts of reading. First, that they reflected industry reaching its maturity and, therefore, vindicated the previous IS strategy, and second, that they were the results of the adoption of an outward-looking trade regime.⁵⁹ Apparently contradictory, these interpretations can be easily reconciled, if we argue, for instance, that the 'miracle' would not have been possible, without, on the one hand, the capacity and capability building of the IS period, and, on the other hand, the incentive changes and financial and fiscal reforms that put them to good use. Yet, even when cobbled together, these views can be misleading for two interrelated reasons. First, because

⁵⁸ On the stabilization policy see Resende (1990). Until the 1960s, government intervention in the labour market had been limited to labour union legislation (1931) and to the introduction of a minimum wage (1940). In 1965, the military government introduced a 'wage formula', bringing public and private sector nominal wages under its control. According to this formula, wages were to be adjusted once a year according to the government's expected inflation, plus a productivity-related bonus. As the former was consistently underestimated, the average real wage fell 9% between 1965-67. In 1968, this formula was changed with wages being indexed not to the expected but to the past inflation.

⁵⁹ See, e.g., Tyler (1976) on the former, and Balassa (1979) on the latter.

despite being instrumental for export and economic growth, IS policies left a legacy that made a move towards a more open economy costlier and economic growth unsustainable. And second, because, it gives the wrong impression the reforms have successfully tackled the key shortcomings of Brazil's industrialization 'strategy', i.e., its excessive inward-orientation, lack of selectivity, inadequate finance, and lack of investment in education and S&T.

In order to clarify these points, we can begin by looking at the changes in the trade regime and its results. Whereas there is no doubt that the reforms reduced the bias against exports, they fell well short of turning Brazil into an outward-oriented economy. Growth accounting estimates show that exports played a minor role in the 'miracle', accounting for not more than 6% of manufacturing growth (Baumann 1985). As a number of authors have already pointed out, the 'miracle' was largely an 'internal matter', the upshot of the explosive combination of the industry's excess capacity, a consumer credit boom, and public sector's investment in infrastructure and housing.⁶⁰

While there is nothing wrong in principle with a domestic-market-led boom, the fact that manufactured exports remained marginal suggests that much of the old regime, and its drawbacks, were still in place. The government, as we have seen, continued to give incentives and highly protect virtually all manufacturing sectors (except for non-competitive capital goods). Inward, 'protected' FDI continued to be encouraged, and to expand its presence increasingly at expense of the

⁶⁰ See Serra (1982) and Tavares and Beluzzo (1982).

local firms.⁶¹ With protection still high, the exchange rate remained overvalued. In other words, notwithstanding its liberal inclinations, the government instead of going for an across-the-board liberalisation, leaving the exchange rate to bear the burden of the adjustment, and selective protection and relative prices to restructure the manufacturing sector, the option was to maintain protection high enough not to upset the prevailing (inefficient) industrial structure, and to use subsidies to reduce the bias against exports.

While an apparently similar strategy was successfully pursued by other NICs such as Korea (see chapter ?), in Brazil, even though it succeeded in expanding manufactured exports, it turned out to be rather costly (table A.24), and did not make exports more than a poor alternative to internal sales. The reasons for that seems to lie not so much in Brazil's 'continental' market⁶², but in three other factors: (a) Whereas Korea made protection and incentives to industrialization conditional on export performance, Brazil relied solely on export subsidies; (b) Whereas in Korea, IS was selective, plants were built at international scale, and exporters were given full access to inputs at international prices; in Brazil, IS lacked selectivity, plants were built below the MES, and given

⁶¹ Table A.28 shows that in 1971, TNCs accounted for more than 50% of the heavy industry sales, and for 45% of those of the whole manufacturing sector. Morley and Smith (1971) estimated that in 1965 this last figure was 33.5%. Moreover, whereas during 1956-60, 33% of US-based TNCs were set up via take-overs of local firms, this percentage rose to 52% during 1966-70, and to 61% during 1971-72. (Newfarmer 1979).

⁶² Germany and Canada, e.g., whose GDPs in 1970 were respectively 4.5 and 2.0 times bigger than Brazil's, had export-to-GNP ratios more than twice higher (18.5% in Germany and 20.4% in Canada, against 7.1% in Brazil) (OECD 1989).

the limitation of its 'drawback' scheme, exporters had to shoulder the burden of an excessively backward-integrated industrial structure (table A.24).⁶³ And, (c) Unlike Korea, Brazil relied heavily on 'protected' FDI, a strategy that made export diversification easier, but that restricted mainly to intra-firm trade the access to the important developed country markets, in view of parent-subsidiary arrangements.⁶⁴

This last characteristic of Brazil's strategy also raises doubts about the economic justification behind heavy subsidisation of TNCs' exports. In contrast to the LPFs' case, the dynamic benefits to be gained there were unlikely to offset the costs involved, the more so because their protection was far from justifiable.

In short, in spite of the reforms, Brazil continued with a trade regime that reflect neither static nor possible dynamic comparative advantages, but rather an urge to save foreign exchange. As the regime did not become more selective and outward-oriented, the export drive had to bear the burden of an excessively protected, integrated and fragmented industrial structure, imposing heavy costs to the treasury. Moreover, as export success never really became a necessary condition for survival, it did not exert the necessary pressure on firms to go down

⁶³ Drawback users, until 1975, would lose part of the fiscal subsidy, and both drawback incentives and export credits were conditional on localisation indices above 70% (Pastore et al. 1979:75 and Guimarães 1989).

⁶⁴ Fajnzylber op. cit. showed that in 1967, only 34% of the MNC's exports were to DC. Table A.16, in turn, reveals that most of the heavy industry exports during the period were to LDCs, whereas table A.23 shows that most of these exports were done by TNCs. BNDE (1988b), quoting ECLA/UN. data, put the share of intra-firm exports from American TNCs based in Brazil, at 70% in 1977.

the learning curve, and for the industrial structure to find more efficient and sustainable configurations.⁶⁵

For not increasing the economy outward-orientation, Brazil also missed the opportunity to have a more sustainable economic growth, combined with better resource allocation. As suggested earlier, the 'miracle' was very much built on the indebtedness of a tiny middle-class⁶⁶, which could not keep on accumulating durable goods at 22% annual rate forever; and for all the improvements in labour absorption, Brazil's manufacturing sector continued to employ, *vis-à-vis* its share of GDP, far less labour than its capital-intensive DCs counterparts.⁶⁷

Apart from the trade regime, there are two other points worth making concerning the financial reforms, and investments in S&T and education. As to the former, while they were successful in improving the state's finances, and in providing funds for current activities, they failed to eradicate inflationary financing and to provide industry with a proper source of long-term funds. Inflation has never gone below 16%, and indexation was

⁶⁵ Sustainable in Baumols'(1982) sense. For instance, a 1973 study of the machinery sector by an Italian consultancy firm, revealed that productivity in most product lines was well below that of Italy, because, *inter alia*, plants were below the MES and lack specialisation (Villela and Baer 1980).

⁶⁶ According to Hoffman (1989:217) 42% of the population in 1970 was below the 'poverty line', defined as the prevailing minimum wage.

⁶⁷ Despite being more labour-intensive than importables (see Carvalho and Haddad, 1981), the export contribution to greater labour absorption was limited, given its small share of total sales. In 1974, the manufacturing's share of GDP was 14.4% greater than its share of employment. The same figure for the US and Canada was -0.8%, and -3.3 respectively (ANESTBR and OECD 1989).

too clever by half. True, it allowed interest rates to be positive, and reduced the worst inflationary effects upon the government's income and the creditors' and savers' assets. Yet, those on fixed incomes continued to suffer, and as indexation swiftly spread throughout the economy (exchange rate, wages), relative price changes became increasingly difficult, since they were quickly fed into monetary correction and passed on to other prices. More to the point, in so far as indexation made the past inflation the floor to future price rises, inflation got increasingly resistant to any sort of therapy.

With respect to long-term financing, the stock-market boom soon proved to be ephemeral and the debenture market has never really taken off. Whereas risk-aversion and informational imperfections seem to have played a part, government policy was less than helpful. The combination of high inflation and short-term indexed assets, made long-term investment in non-indexed assets even riskier.⁶⁸ Hence, BNDE and foreign loans continued to be the only sources of long-term funds. Even though access to these sources was increased, first by expanding and redirecting BNDE loans to the private sector, and second, by the already mentioned new legislation to foreign loans, they remained well short of the industry's needs, particularly of those of LPFs. BNDE's manufacturing loans over the period were equivalent to only 19% of manufacturing investment (table A.11), and the bulk of foreign loans went for state and foreign firms (table A.27). In the face of it, LPFs, whose association with banks was forbidden by law, continued to rely heavily on

⁶⁸ The total stock market value, as percentage of GDP, fell from 22 to 7% over 1972-77 (Goldsmith 1986:422). The ratio of indexed to non-indexed assets increased from 5 to 43% over 1965-73 (World Bank, 1984:9).

internal and inflationary financing for their capacity expansion, a conduct that curtailed their chances of growth and diversification. Not surprisingly, the local firm's share of the top 25 and 500 firms' sales in 1974 was zero and a mere 39%, respectively (Exame, various issues).

As for education, investments in basic skills continued to be inadequate. As of 1970, the illiteracy rate was still high, and less than half of the literate population over 20 had elementary education (table A.15). Apart from the implications for industry's efficiency, the continuation of scarcity conditions in the market for skilled workers seems to have contributed—together with the economy's product mix and the high-inflation-cum-indexation policies—for the worsening of income distribution experienced during the 1960s.⁶⁹

Finally, in spite of SNDCT investments, R&D expenditures remained limited even by LDC's standards (table A.31), and the fact that investments came only after the heavy industry was set-up, and since the latter was done mainly through 'protected' FDI, posed the problem of who would demand the top quality human capital, technologies and infrastructure that the SNDCT was proposing to deliver. This would hardly come from either the TNCs or LPFs. The former, because of their advantageous access to the parent's company

⁶⁹ As Lago (1990:286) pointed out, skilled workers during the 'miracle' had wage rises well above those of the non-skilled workers. As to income distribution, the share of the 20% highest income group increased from 55% in 1960 to 62% in 1970 (IBGE 1990).

technology.⁷⁰ And the latter because they were either located in the light industry, where technology is easily acquired off-the-shelf, or were sustaining marginal positions in the heavy industry, with TNC competition leaving no option but to import technology. In addition, the inward-orientation of the incentive regime added to the attractiveness of technology imports, since the usual export restrictions were not in practice binding.

V- Heavy Industry Revisited: the 1974-79 period

For all its shortcomings, primarily for its narrow base of growth, the pragmatic 'miracle' could not last for long, but it took the oil shock in 1973 to convince the government the adjustments were necessary. Clearly something had to be done. In 1974, the current account deficit hit an unprecedented 6.5% of GDP and inflation was above 30%. The response came with the 'Second National Development Plan'—II NDP—(1974-79). By then the liberal rhetoric had been forgotten, and the 'old' structural analysis was back in business. The inflationary and BP difficulties were put down to Brazil's 'unbalanced growth model', whose insufficient investments in the basic inputs and capital goods industry, would have created inflationary bottle-necks and an undue dependency on imports. The therapy prescribed, then, was massive IS investments in these areas, which would concurrently promote structural adjustment and growth.⁷¹

⁷⁰ In a study of foreign technology contracts over 1965-70, Biato and Guimarães (1973) revealed that the TNCs' share in value terms was 73%, 52% of which consisting of parent-subsidiary deals.

⁷¹ In 1974, raw material, intermediate and capital goods accounted for 87% of total imports (Table A.4). The plan also envisage substantial investments in transport and communication.

Even though it all looks very much like the previous IS strategy, there were new elements in the II NDP that suggested a more favourable treatment for exports, and a more consistent approach to market-failures. In fact, the government seemed to have come close to realize that there is more to infant industry promotion than import protection and FDI. For instance, the plan emphasised the need to carry out IS in conjunction with the promotion of exports and local private conglomerates, capable of competing against TNCs in the scale, technology-intensive heavy industry. There were also references to the importance of promoting sustainable market structures, technological capabilities, and of changing the role of the TNCs. The latter were now supposed to increase exports, carry out R&D, and form joint ventures instead of taking-over local firms. SEs, in turn, were seen continuing their investments in infrastructure and in key basic input industries such as steel, fertilisers, basic petrochemicals and mining.⁷² Before discussing the results of this 'neo-IS' strategy, though, let us look at its policy mix.

Trade and exchange rate policies

The adjustments in the trade regime sought, in the short term, to avoid a BP crisis, and in the long term, to carry out IS and to promote exports, in this order of importance. Right from the start, a real exchange rate devaluation was ruled out on the grounds, first, that it would be ineffective given the widespread indexation and would increase inflation, and second, that it would impose heavy losses on externally indebted firms, and

⁷²II Plano Nacional de Desenvolvimento. Brasília. For a thorough analysis, see Batista (1992).

discourage further borrowing abroad.⁷³ Hence, the bulk of the changes was in the trade policy. On the import side, the government reintroduced a whole range of NTBs and raised tariffs (table A.14), virtually banning consumer good imports, and imposing tough restrictions on those of intermediate and capital goods.⁷⁴ The latter were particularly affected by a curb on tariff and tax exemptions, a stricter interpretation of the 'law of similar' (notably for SEs), and by the imposition of tougher localisation indices and 'participation agreements' on projects benefiting from CDI incentives. In addition, the fiscal incentives available for manufactured exports were extended to domestic sales of locally made capital goods.⁷⁵

As to exports, the government increased subsidies (table A.24) mainly by expanding the credit available, and by keeping interest rates at around 8%, despite the 41% average annual inflation during the period. In addition, the 'drawback' was made more attractive by giving its users access to export fiscal subsidies, and the CDI began

⁷³ Simonsen (1988:299). Simonsen was the finance minister in charge during the II NDP.

⁷⁴ The NTB barriers included advanced deposits, outright ban on 'non-essential' products (e.g. cars, motorbikes), imposition of import ceilings on state enterprises which were also prohibited to buy imported consumer goods, and restrictions on certain types of import payments. See Dib (1985).

⁷⁵ The share of imported equipment in the CDI approved projects fell from 67 to 19% over 1973-79. The 'participation agreements' were restricted to large scale industrial and infrastructure projects, and consisted of the withdrawal of import restrictions for capital goods imports in exchange for the purchase of a certain amount of these goods locally. Finally, the fiscal 'export' incentives to locally-purchased capital goods were restricted to equipment considered 'sophisticated' by the Ministry of Finance. See Suzigan (1980) and Tyler (1981).

to 'suggest' long-term export agreements (so-called BEFIEX), particularly to foreign firms, as a pre-condition to exempt capital goods imports from tariffs and NTBs.⁷⁶ This increase in incentives more than offset the appreciation of the official exchange rate, keeping the PPP-export rate well above the 1973 level (table A.17).

Financial policies

The financial side of the II NDP did not involve any significant institutional change, and the traditional combination of 'policy' loans, foreign capital incentives and a permissive attitude towards inflation continued to hold sway. There were, though, some adjustments. BNDE resources were beefed up by compulsory saving funds, allowing a significant increase in manufacturing loans, with the heavy industry and LPFs being the major beneficiaries.⁷⁷ The subsidy implicit in these loans was also increased, notably during 1975-76 when the interest rate charged became sharply negative.⁷⁸ In addition, new BNDE programs were set up, seeking to offer competitive

⁷⁶ These agreements, first used in 1972, allowed firms to import equipment and inputs, tax and NTB free (on top of the regular export incentives), in return for a commitment to reach export targets over a long-term period (usually 10 years). Imports of inputs were limited to one-third of the value exported. BEFIEX share of manufactured exports rose from 9% in 1974 to 17% in 1979. TNCs in the transport equipment sector accounted for 87% of these exports (1974-79) (Guimarães 1989:22).

⁷⁷ Table A.11 shows that the bank's approved manufacturing loans were equivalent to 43% of the manufacturing investment during the period. Yet, the figure for loans effectively disbursed was a great deal more modest, averaging 28%.

⁷⁸ During 1975-76, monetary correction on BNDE loans was limited to 20% annually despite the 37% average annual inflation. As of 1976, their nominal interest rates varied from 0 to 8% plus monetary correction (Revista do BNDES 1978).

finance for the purchase of locally made capital goods; and to capitalise and 'equity strengthen' the LPFs, particularly in the capital goods and basic input sectors.⁷⁹

As for foreign capital, there was a certain swing towards portfolio investments (table A.12), with some restrictions being imposed on FDI (see below). Yet, both forms of investment kept on growing rapidly. The average annual inflow of FDI during the period (US\$ 1.1 billion) was well above that of the 'miracle' (US\$ 0.2 billion), whereas the external debt trebled to US\$ 50 billion in 1979. This exceptional increase in foreign borrowing resulted largely from the government's strategy of using the cheap Eurocurrency funds available, to finance the plan's investments and the BP. This strategy involved the concession of foreign borrowing incentives, the liberalisation of domestic interest rates in 1976, and, as noted earlier, a passive exchange rate policy.⁸⁰ Unlike BNDE credits, though, there was no attempt to control the allocation of these loans, which were supposed to be guided by relative prices. This, despite the distortions provoked by the trade policy, and high-inflation-cum-indexation.

Finally, the government continued to look at inflation as a necessary evil, a price worth paying for growth and structural adjustment. To be sure, there were attempts to

⁷⁹ Subsidised finance to the purchase of locally-made capital goods had been on offering since 1964 by the BNDE subsidiary FINAME. However, it received a major boost in 1974, when a new program targeting the made-to-order sector was set up. On the capitalisation programs, see Villela and Baer (1980).

⁸⁰ Foreign borrowing incentives included reductions in the loans minimum maturity, fiscal concessions on interest rate payments, and the assumption by the Central Bank of a portion of the exchange rate risks. See Cruz (1984) and World Bank (1984).

pursue a tight monetary policy but, as the finance minister of the day put it, "[they were] soon abandoned because wage-indexation was considered to be encouraging the wage-price spiral. Eventually the government chose monetary accommodation, which kept the annual inflation rates in the range of 30-40 a year until 1978." (Simonsen 1988:293) This 'stabilisation' of the inflation rate was, to large extent, achieved at the cost, first, of a substantial increase in the government's internal debt, issued to finance policy loans, and to offset the monetary expansion provoked by the massive foreign capital inflow. And second, of compromising the SEs' financial position with an unrealistic pricing policy.⁸¹

Industrial and S&T policies

Part of what can be understood as the II NDP industrial policy was already discussed above, and involved greater protection and an increased amount of subsidised credit to the capital goods and basic input industries, in general, and for LPFs, in particular. These measures were supposed to be part of a broader strategy, which, as suggested earlier, aimed not only at carrying out IS but also at fostering large LPFs, sustainable market structures, and technological capabilities. Leaving for the moment the latter aside, the pursuance of the first two objectives was left to the discretion of the government's loosely co-ordinated 'army' of federal, sectoral and regional

⁸¹ The federal debt increased from 5 to 9% of GDP over 1973-79 (ANESTBR). Credit subsidies favoured not only industry and exports, but also small firms and agriculture. During 1977-78, they were estimated at 5.5% of GDP, with agriculture accounting for 60% of the total (World Bank 1984:38). Excluding oil and derivatives, SE's prices in real terms fell 12% in average over 1974-79 (Dinsmoor 1990).

'incentive' agencies—which still had the CDI formally on top—and to BNDE and SEs (through procurement).⁸²

These institutions, though, tended to have different interpretations of what would be a LPF or a sustainable market structure, and had different instruments and capacities to pursue the government's guidelines. As a result, quite a few policy regimes emerged during the period, even in technologically related segments of the capital goods and basic input industries. In some sectors, strict investment licensing was enforced together with different sorts of FDI restrictions, ranging from the imposition of joint ventures (e.g. petrochemicals and telecommunications equipment) to a complete ban on foreign firms (e.g. micro and mini-computers). In others—the great majority—restrictions continued to be limited to localisation requirements, and the objectives of promoting LPFs and efficient market structures, were left to BNDE credit and CDI incentives, despite the obvious limitations of these institutions.⁸³

As to technological capabilities, investments in S&T were significantly increased, particularly regarding graduate education and research.⁸⁴ This was combined with initiatives aiming at financing R&D activities at the private firm level, and at imposing stricter controls on

⁸² Public sector procurement was a particularly powerful instrument. Table A.9 shows that the state enterprises' share of gross fixed capital formation increased to 22% during the period.

⁸³ None of these institutions could block investments, and BNDE credit was only relevant for the LPFs. For a review of the industrial policy see Suzigan (1978) and Villela and Baer (1980).

⁸⁴ Elementary education, though, continued to be neglected. The FNDCT's share of federal expenditures, which average 0.4% over 1970-73, increased to 0.9% over 1974-79 (World Bank 1983, IBGE 1990). Graduate enrolments grew at annual average rate 18% over 1974-79 (Castro 1989).

technology imports. The former was done through the concession of subsidised credit by BNDE and SNDCT institutions, and the latter, through new guidelines issued by the INPI, which made new contracts conditional upon absorption of technology by the recipient firms.⁸⁵ In addition, the SEs were used to foster the LPFs' technological capabilities by favouring the purchase of locally developed capital goods, and by offering technological support through, either their research institutes, or via NAIs (centre for co-operation with industry).⁸⁶

The results

The results of this neo-IS strategy are controversial. Enthusiasts claim quite a few successes. They argue, first, that economic growth was kept at a relatively high rate

⁸⁵ This was supposed to be done by requiring full disclosure of technical knowledge by the licensors, and by requiring the licensees to present plans for the absorption of technology and for local personnel training. Import of technology, though keep, on growing fast. As a percentage of GDP it averaged 0.3% over the period against 0.2% during the 'miracle'. World Bank (1983) and IBGE (1990).

⁸⁶ In 1975, the government set up NAIs in the most important SEs, aiming at fostering technological links between them and the local capital goods industry. See Villela (1984).

(6.4%), and exports, notably manufactured exports, continued to grow fast (6 and 16%, respectively), substantially increasing their share of world exports (table A.30). Second, that export growth was accompanied by diversification towards the heavy industry (table A.1), partly reflecting the success of IS investments during the period. Third, that IS contributed not only to export diversification, but also to reduce dependency on imported capital goods and basic inputs (table 4), assisting therefore in the structural adjustment whose first signs came out in the early 1980s.⁸⁷

Table 4: Selected Results of II NDP investments.

	(a) Capital goods		(b) Rolled Steel		(c) Aluminium		(d) paper pulp		(e) Oil
	imp ratio ¹	exp. ratio ²	imp ratio	exp. ratio	imp ratio	exp. ratio	imp ratio	exp. ratio	imp ratio
1974	29.0	7.0	39.1	2.2	50.4	1.6	16.6	11.8	79.7
1978	20.0	8.0	5.7	5.4	26.3	2.0	4.4	14.8	84.7
1983	23.0	19.0	1.0	39.1	2.3	40.0	0.8*	27.7*	68.7
1987	25.0	20.0	0.5	50.7	n.a.	n.a.	n.a.	n.a.	52.0

¹Imports divided by domestic supply. ² Exports divided by total production. * 1982.
Source: BNDE (1988b) for (a), Batista (1992) for (c) and (d), and IBGE (1990) and ANESTBR, various issues

Yet, critics draw attention to the costly macroeconomic 'side-effects', whose most obvious manifestations were a huge-external debt, whose service was taking up 62% of export revenue even before the interest and second oil shocks, and a record inflation (38% in 1978) fuelled by indexation and by the deterioration of public sector finances. The latter, provoked by the combined effect of the mounting indexed domestic debt, credit subsidies, fiscal incentives and the

⁸⁷ See, e.g., IPEA (1979), Castro and de Souza (1985), and Batista (1992).

SEs' external debt.⁸⁸ In addition, IS contribution to BP adjustment is viewed with scepticism, particularly when measured by import coefficients, since these indicators would also reflect the slowdown in growth and investment during the 1980s.⁸⁹

Even though the task of disentangling macroeconomic from industrial strategy failures is fraught with difficulties, it seems that the problem with the neo-IS strategy went well beyond unsound macroeconomic policies. In fact, a case can be made out that these macroeconomic imbalances were just part of a series of adverse results, overlooked by the enthusiasts, which were rooted in the government's failure to go beyond a mere patch up of the old IS strategy.

To begin with, despite the government's attempts to increase the selectivity of the incentive regime by better targeting BNDE credits and CDI incentives, the clamp down on imports and the lack of control over the allocation of foreign loans, ensured that resources remained dispersed across virtually all manufacturing activities, regardless of the existence of static or dynamic comparative advantages. This was made particularly worse by the increased obsession with localisation indices, which kept mocking kept mocking Adam Smith's insight⁹⁰ that the division of labour is limited by the extent of

⁸⁸ According to one estimate (Conjuntura Econômica, February 1982) the global federal deficit as a percentage of GDP was 8.1% in 1979. Subsidies as a percentage of tax revenue increased from 13 to 41% over 1974-79 (C. G. Langoni, "Bases Institucionais da Economia Brasileira" BACEN as quoted in Dinsmoor (1990:129).

⁸⁹ See, e.g., Balassa (1979), Fishlow (1986), and Tavares e Lessa (1985).

⁹⁰ This insight was later developed by Stigler (1955).

the market. As a result, exports became an even more subsidised and costlier business (table A.24).⁹¹ Despite responding to greater subsidies, they remained at 9% of the manufacturing output, and under 7% of GDP (tables A.8 and A.2). Apart from efficiency implications, this result—given the low level of imports—left the bulk of the BP adjustment to foreign loans, which in turn led to the debt build-up.

On the issue of targeting the basic input and capital goods industries, whereas the potential static and strategic benefits were unquestionable (as the export success of some of these industries was to prove), a number of considerations regarding the choice and implementation of the targets seemed to have been overlooked. Looking first at the target chosen, there were still clear gains to be made from better resource allocation by increasing investments in the light industry. Brazil's under-employment in mid-1970s was unabated and unit labour costs were still falling (table A.13).⁹² This opportunity, though, was largely missed since, amid an incentive bias against exports, BNDE credits and fiscal incentives were concentrated in the heavy industry. As expected, the light industry's export performance was

⁹¹ To make things worse, a increasingly disproportionate amount of subsidies were directed to the TNCs, with no obvious dynamic benefits. In 1978, Braga (1981) estimated that TNCs accounted for 42% of the fiscal subsidies whereas their share of total exports was 37%. The results in terms of greater outward-orientation were not impressive. According to one estimate (Baumann 1985) affiliates increased marginally their export ratio from 15.4% in 1971 to 18.6% in 1978. Blomström (1987) estimated in 8.7% the export ratio of the American affiliates in 1977, well below the LDCs' average.

⁹² As of 1980, under-employment was still at 35% of the economically active population (Wells 1987:96).

disappointing⁹³, and labour absorption in the manufacturing sector slumped (table A.18).

Moreover, the technological and strategic externalities involved in the production of capital goods, should have been set against: a) the benefits of intra-industry trade and access to state-of-the-art embodied technology, and b) the disadvantages of spreading scarce resources too thinly. Yet, although the ratio of capital goods to GDI in 1975 was lower than that of the US (Frischtak and Dahlman 1990), the government went on to substitute as much as capital goods imports as possible.

As for the implementation, despite the measures taken to promote LPFs and sustainable market structures, the results were mixed, and on the whole unsatisfactory. In the basic input sector, strict investment licensing, FDI restrictions, and greater outward-orientation, seemed to have guaranteed plants close to the MES and an efficient number of producers, but SE remained as the dominant player. In the capital goods sector, the fact that the TNCs were already firmly installed, combined, as noted earlier, with an inconsistent industrial policy, led, more often than not, to the entry of LPFs in already crowded and inward-oriented industrial structures. Apart from aggravating the latter's inefficiency, this process precludes LPFs from benefiting from economies of scale and specialisation, doing no wonders for their learning

⁹³ In fact, Brazil's share of world exports of textiles and basic industry increased significantly during the period (table A.30). Yet, it remained unimpressive vis-à-vis other NICs. For instance, Korea's share of textile exports in 1980 was 5.5 times larger than Brazil's. As Lucke (1990:23) put it "The very modest export performance [1960-85] of the textile and clothing industries in Brazil contrasted sharply with that of the Asian NICs... this confirm the conclusion that the sector is still very inward oriented."

process or for the prospects of a limited period of protection.⁹⁴

In view of this environment of inconsistent industrial policy, inward-orientation, and fragmented and often FDI dominated industrial structures, the objectives of fostering LPFs' technology capabilities and large private conglomerates turned out to be elusive. In the former's case, whereas the S&T infrastructure was significantly improved, its links with manufacturing remained weak. The evidence available suggests that the majority of the firms did not go beyond the routine and adaptive/duplicative technological tasks, to use Lall's (1992) taxonomy. During 1974-79 only 0.7% of the industrial firms conducted formal R&D, the great majority (63%) SEs; whereas the private sector's outlays on technology (R&D and royalties in 1978 and 1982) were under 0.2% of net sales.⁹⁵ No wonder why the bulk of the internationally successful technology developments over the period, came from SEs in the steel, arms and aircraft industries.

⁹⁴ The custom-built segment, where the entry of LPFs was more successful, is a case in point. BNDE (1988a) speaks of inward-oriented and excessively diversified LPFs, struggling with the large number of producers and the limited and cyclical internal market. It also points out that vertical-integration was unduly pursued. The table A.29, shows that despite Brazil's limited internal market, the number of custom-built goods producers tends to be higher than in developed countries.

⁹⁵ Data on R&D reviewed by Frischtak and Dahlman (1990). Data on formal R&D involved the universe of legally established firms. Data on R&D ownership is for 1983, for a sample of 1,118 firms. As to technology outlays, the source was Braga and Matesco (1986), who using income tax data for approximately 5000 large firms, find out that LPFs, 81% of the sample, accounted in average for 92% of the R&D outlays in 1978/80/82, whereas TNCs, 19% of the sample, accounted for only 8%. With respect to royalties, the TNCs accounted for 45% of the payments.

As for the formation of large, internationally competitive, private conglomerates, the limited evidence available suggest modest advances. For instance, as of 1980, the LPFs' share of the top 100 non-financial groups' sales was only 30.7%, with TNCs and SEs taking 31 and 38% respectively (Willmore 1987:169). At the firm level, as of 1980, LPFs had still only 6% of the top 25 firms' sales, 20% of the top 100, and their share of the top 500 fell from 39 to 35% over 1974-80 (Exame, various issues). A comparison with Korea shows that even by NICs' standards, Brazil's private conglomerates are small. As of 1989, the sales of Brazil's largest private group (US\$ 3.8 billion) were lower than that of Korea's twelfth *jaebol* (US\$ 4.2 billion).⁹⁶

Apart from the factors indicated above, the small scale achieved by Brazil's private groups seems to have also a bearing on the precariousness of the government intervention in the financial sector. Tables A.19 and A.26 indicate that, despite the increase in BNDE credits, the LPFs' financing pattern did not change significantly during the period. Retained earnings continued to be the main source of long-term financing, a characteristic that put them side by side with American firms, even though they did not have anything like their size, or their access to intra-firm capital markets.

It seems clear, then, that government intervention led to a financial system that was neither credit- nor capital market-based, to use Zysman's (1983) categorising. Since BNDE, at its peak, did not controlled more than 8% of

⁹⁶ Data originally in local currencies and exclude financial activities. It was converted to U.S. dollars using the annual average exchange rate. Brazil's data is for 1989 and Korea's for 1990 (Quem e Quem, Visão 1991 and Far Eastern Economic Review, March 1990).

the private sector loans (table A.11), and private commercial and investment banks remained largely out of the manufacturing sector (even though legal restrictions were removed), LPFs have never had the amount of credit available to their Koreans, Japanese and German counterparts.⁹⁷ On the other hand, high inflation-cum-indexation, continued to preclude the development of a capital market, and encourage inflationary financing.

In sum, for all its success in deepening the industrial structure, diversifying exports, strengthening the LPFs position and improving the S&T infrastructure, the II NDP did not go far enough to change substantially the pattern of Brazil's industrialization. The incentive regime continued to be largely non-selective, biased towards the internal market, and exports a heavily subsidised and lesser business. Under total protection, largely market-led credit allocation, lax investment and FDI licensing, fragmented and inefficient industrial structures continue to survive and proliferated as IS moved upstream. On the financial side, the key issue of long term financing for LPFs was only precariously solved. In this sort of environment, the LPFs' growth was bound to be hampered and macroeconomic imbalances, inevitable, regardless of any 'macroeconomic failure'.

⁹⁷ LPFs' access to foreign loans were mainly for medium-term working capital (resolution 63) (table A.27) which unlike the direct, long term loans, had high positive interest rates. For instance, even if 1979 is left aside, the average annual real interest rate for these loans during 1974-78 was 11.8% (including spread, commissions and taxes) (Cenarios, various issues).

VI-The Dismal Decade. The 1980s

When the interest and second oil shocks struck at the turn of the decade, Brazil could not be in a more vulnerable position. As noted earlier, a huge external debt had been accumulated, inflation was high and reinforced by widespread indexation, and oil made up more than one third of imports (table A.4). In such a scenario, the three-fold increase in oil prices and the two-fold increase in international interest rates over 1978-82, could only play havoc. In fact, the current account deficit reached 5.8% of GDP in 1982, and debt-service ratio 98%. Inflation, in turn, broke the three digit barrier in 1980. Unlike previous BP crises, this time there was no substantial imports to substitute, and the option of 'borrowing its way out the crisis' received its *coup de grâce* with Mexico's default in 1982. With little room to manoeuvre and resorting to misguided stabilization policies, the government would pass the rest of the decade struggling with these macroeconomic imbalances, creating an environment of low, unstable growth and near hyperinflation, hardly appropriate to industrial development.

Facing chaos in the short-term management of the economy, and apparently influenced by a simplistic structuralist notion that the II NDP had 'completed' industrialization, the government would also forsake any attempt to formulate a long-term industrial strategy. In practice, this meant that the previous pattern of intervention lingered on, and given the depth of the BP crisis and the sharp deterioration of the public sector finances, its shortcomings were further aggravated by extra cuts in imports, S&T expenditures, and curbs on long term financing.

This troubled decade can be roughly divided in two periods, marked by different policy responses to the

growing macroeconomic difficulties. That is, the 1980-84 period, when an orthodox BP-adjustment policy was adopted, and the 1985-89 period, when the threat of hyperinflation, led to a series of heterodox stabilisation plans. Let us look at their implications for industry.

Under orthodox adjustment

Living up to the country's tradition, the government's first response to the crisis was to pursue a strategy designed to adjust and stabilize the economy without hurting growth. At its core was an attempt to shift relative prices in favour of public sector and tradable goods. This was done by adjusting public sector prices and devaluing the currency in 30% (December 1979), while imposing strict price controls (including interest rates), and a prefixed monetary and exchange rate correction for 1980 well below the expected rate of inflation. In this process, fiscal subsidies to exports, advanced deposits on imports and CDI tariff exemptions were eliminated. By the end of 1980, though, expansionary policies had allowed the relative price changes to be reversed by a two-fold increase in inflation, while the BP situation continued to deteriorate.⁹⁸

The government, then, finally caved in, adopting an orthodox program in 1981. At first, given the 1979 experience, a real exchange devaluation was avoided (crawling-peg was reintroduced) and efforts were concentrated on restricting demand and escalating export subsidies and import controls. On the demand side, fiscal policy was tightened, wages partially de-

⁹⁸ The PPP exchange rate for exports in 1980 was below that of 1979 (table A.17). See Belluzzo and Coutinho (1983) for details of the macroeconomic policies during the period.

indexed, quantitative credit controls imposed and interest rate ceilings removed. On trade policy, fiscal subsidies to exports were reinstated and export credits expanded.⁹⁹ Moreover, new NTBs were introduced including import surcharges, mandatory import programs for major importers, and an expanded list of prohibited imports.¹⁰⁰ The interruption of voluntary capital inflows provoked by the Mexico's default, led eventually to a new maxi devaluation in early 1983, this time already under IMF supervision.¹⁰¹

These measures eventually adjusted the BP, with the current account showing a small surplus in 1984. Even though, as noted earlier, II NDP investments seem to carry considerable weight in explaining these results, the 34% growth in exports and the 39% fall in imports accumulated over 1980-84, cannot be dissociated from the all-time high reached by export subsidies and import controls, and from the brutal recession that hit the country. The GDP fell by 0.7% per year over the period, with output falling sharply in 1981 (-4.2%) and 1983 (-

⁹⁹ During the Tokyo Round, Brazil had agreed to phase out the fiscal subsidy to exports until 1983. Yet, as mentioned, it was abruptly eliminated in December 1979. When reinstated in 1981, it lost its product-specific character and a flat 15% rate of the export value was introduced. This rate was to be phased out until 1983. In 1982, however, Brazil negotiated with the US, which was threatening to impose countervailing duties, the extension of the subsidy until 1985 (CEPAL 1985a).

¹⁰⁰ According to a conservative estimate, the percentage of imports affected by NTBs (in item terms) rose from 4 to 56% over 1975-84 (Guimarães 1989). Yet, Moreira and Araújo (1984) estimated that, as of 1983, 75% of total imports were affected by NTBs, while, if oil is excluded, only 12% of imports entered the country without being related to a specific government program of fiscal incentives.

¹⁰¹ See on the adjustment policies see Carneiro (1987).

3.6%). The aggregate investment ratio fell continuously from 21 to 16%.

Industry was severely hurt in this process. The slump in domestic demand combined with restrictions on BNDE loans¹⁰² and real interest rates for working capital averaging 25% per year, led output to fall on average by 3% yearly over the period, whereas manufacturing investment fell 36% in 1981, and was around the 1976 level in 1984. Among the manufacturing sectors, capital goods, a key II NDP target, was worst hit. Output in 1984 was 22% below the 1975 level, and its share of manufacturing structure fell below the 1970 mark (table A.5).

The depth and length of the recession helped to put into perspective the much-heralded good manufactured export performance over period. True enough, Brazil managed to increase its share of world exports in most sectors (table A.30). Yet, despite the highest ever subsidies (table A.24) and the collapse of domestic demand, the shift to exports was less than impressive, with its contribution to recovery coming only in 1984. Even then, exports made up less than 10% of the manufacturing output (table A.7). The external constraint argument does not seem to hold against the fact that countries like Korea, increased manufactured exports at an annual rate of 12% against Brazil's 4% (1980-84). More to the point, in the crucial machine and transport equipment sector, its share of world exports fell to 0.6%, whereas Korea's nearly trebled to 1.9 % (UN ITSY, HIT).

¹⁰² See table A.11. In 1979, BNDE had its priorities changed towards agriculture and infrastructure, and stopped receiving resources from the treasury. See Zoninsein (1984).

All those years of 'protected' FDI, non-selective and inward-oriented incentive regime seem to have produced an industry that was not very happy or prepared to take on the international market. An increase in the already comprehensive NTBs could only aggravate this situation. Estimates of effective protection rates, for what they are worth¹⁰³, put the average protection for manufacturing at the end of the period as high as 43%, with an inter-industry structure that bore no logic (table A.25). Apart from competitiveness considerations, the prospect of having another period of unchallenged inward-oriented growth after the recession, might have certainly precluded a stronger commitment to exports.

Needless to say that this scenario of falling output and investments, coupled with a limited shift towards the external market, did not help much the long term competitiveness of the industry. The static and dynamic diseconomies of scale associated with a prolonged recession added to the old problems of fragmented industrial structures and sub-optimal plants, causing productivity to plunge (table A.21). Moreover, investments in R&D fell from its modest levels (table A.31), with the public sector cutting back drastically its investments in the modest S&T infrastructure.¹⁰⁴ Technology imports also fell by 35% over 1979-84 (BACEN).

¹⁰³ To add to the effective protection conceptual (e.g. fixed technical coefficients) and direct price comparisons (i.e. non-homogenous goods) shortcomings, the estimates for Brazil are further compromised by the widespread price controls, high inflation, out-of-date technical coefficients (5 to 10 years) and by the use of export prices as international prices.

¹⁰⁴ The FNDCT fell 74% in real terms over 1975-84 (Becker and Egler 1992:93). See Castro (1989) on the effects of the cuts on the research establishment.

To complete the picture, the orthodox adjustment failed to stabilize the economy and ended up aggravating the problem. Inflation more than doubled to 213% in 1984, reflecting again the widespread indexation and the increasing deterioration of the public sector finances. Despite the draconian cuts in government expending, which reduced the operational fiscal deficit from 6.8 to 3.1% of GDP over 1982-84, the PSBR rose from 16.6 to 27.5%, due to the impact of higher inflation on the indexed internal debt.¹⁰⁵ Apart from turning cost accounting into a nightmare, this rampant inflation, coupled with short-term indexed assets offering stratospheric interest rates, made the prospect of developing a proper source of long-term financing even gloomier. Not surprisingly, LPFs moved even further into internal financing (table A.26).

Paradoxically, it was amid this inhospitable environment that the government, or at least part of it, took the most important industry related initiative of the 1980s. That is, the decision to consolidate the so-called 'market-reserve' for mini- and micro computers, set up in 1977, and to expand it to much of the professional electronics industry.¹⁰⁶ Among the several policy regimes

¹⁰⁵ BACEN. PSBR stands for public sector borrowing requirements. Unlike the operational deficit, it includes the monetary correction on the internal debt.

¹⁰⁶ The market reserve began officially when CAPRE (Coordination of Electronic Processing Activities), ultimately responsible for issuing import licenses for electronic processing equipment and components, put to tender, in mid-1977, the production of minicomputers and selected only LPFs. In 1979, CAPRE was replaced by SEI (Special Secretariat for Informatics) which gradually expanded its control over the professional electronics industry except for mainframe computers and telecommunication equipment. This process was crowned in 1984, by the introduction of the 'informatics law'. See, e.g., Piragibe (1985) for details.

originated in the late 1970s, this initiative stands out for its almost unique attempt to apply correctly the infant industry principle. That is, to protect LPFs (instead of affiliates) in an industry where the importance of strategic benefits and positive externalities are widely recognised.¹⁰⁷

Unfortunately, the basic IS, inward-oriented notion remained dominant. The government did not act as if it was keen on promoting an internationally competitive industry. For instance, despite market imperfections such as R&D and production related economies of scale, there were about 37 different firms producing PC-clones in 1985 (Schimtz and Hewitt 1992). Despite the limited human capital base¹⁰⁸, and the benefits of intra-industry specialisation, vertical and horizontal diversification was unduly encouraged. Finally, despite the capital market failures, BNDE loans came only late in the day, a problem somewhat mitigated by the unprecedented decision of some commercial banks (heavy user of computer systems) to entry the industry.

The results achieved so far seems to reflect these shortcomings. On the one hand, despite the macroeconomic chaos, the local computer industry grew at about 23% annually during the 1980s (Evans and Tigre 1989), and 'the skilled technical and engineering

¹⁰⁷ See, e.g. Krugman (1984).

¹⁰⁸ Apart from the deficiencies of the educational system, there was a limited manufacturing tradition on electronics to build on, since production of mainframes and consumer electronics had been long dominated by TNCs or pseudo-joint ventures. As Erber (1985:301) pointed out, LPFs could not rely on human capital externalities created by the TNCs since the majority of the university trained personnel was used in administrative and marketing activities. Hewitt (1992) gives more up-to-date information on the continuing problem of skill shortage.

component of the labour force has grown substantially' (Hewitt 1992:196). But on the other, after more than a decade of protection, exports remained negligible and prices are said to be twice that of US, despite the obvious differences in quality.¹⁰⁹

Under heterodox stabilization

If the implications of the orthodox adjustment for industry were disastrous, and the flaws of government intervention aggravated (except perhaps for the isolated case of the computer industry), things were not much better under the heterodoxy. The BP adjustment gave the newly installed civilian government (March 1985) more room to manoeuvre, and after a short-lived austerity, fiscal and monetary policies became clearly expansionary. As a result, the recovery initiated in 1984 continued in 1985 with GDP growing 7.9%. Yet, the combination of fast growth, a higher fiscal deficit and a food supply shock in a very closed and indexed economy, put the monthly inflation by year-end at 15%, or at an annualised rate of 435%.

With hyperinflation knocking at its door, and believing that indexation was to blame, the government launched the Cruzado Plan in February 1986—a heterodox attempt to stabilize the economy that had at its core a price-wage freeze and the abolition of monetary correction.¹¹⁰ Despite its success in reducing inflation to a monthly average of 0.5% in the first six months, expansionary fiscal, monetary and wage policies led to a consumer

¹⁰⁹ Schimtz and Hewitt (1992:28ff). According to these authors, the technological lag of the industry at the end of the decade was 'below two years'.

¹¹⁰ For details see, e.g., Modiano (1990) and Dinsmoor (1990).

boom that, in turn, raised inflation to above pre-plan levels in early 1987. To add to the gloom, the frozen exchange rate coupled with the domestic boom, produced a 2% of GDP current account deficit, which, given the low level of reserves, led the government to an interest moratorium in February 1987.

After the failure of the Cruzado Plan, another two stabilization plans were implemented (mid 1987 and early 1989) pursuing variants of the price-freeze-cum-de-indexation formula, but combined with more restrictive fiscal and monetary policies. Even though they managed to slow down the economy—GDP growth fell from 7.6% in 1986 to an annual average of 2% over 1987-89—and adjust the BP, they both went down the Cruzado path. Initial successes were followed by unprecedented rates of inflation and re-indexation. By December 1989, inflation had reached a mind-boggling monthly rate of 49%. Underlying these failures was an increasingly intractable fiscal deficit approaching 7% of GDP in 1989.¹¹¹

Reflecting this highly unstable macroeconomic environment, the performance of the manufacturing sector was erratic and on the whole poor. After growing on average 11.3% in 1985 and 1986, output fell annually by 0.3% until 1989. Manufacturing investment in 1986 was still well below 1980 levels, and fell even further in 1987, following the decline of the aggregate investment ratio.¹¹² The latter, after recovering to 18.7% in 1986,

¹¹¹ Operational concept. The PSBR in 1988 was estimated in 48.5% of GDP (BACEN). On these two plans see Dinsmoor, *op. cit.*

¹¹² Manufacturing investment estimates are from Sondagem Conjuntural and IDB as quoted in Dinsmoor (1990:69). They are not available for the post 1987 period. FDI also plunged to record levels (table A.12) reflecting uncertainty surrounding the government policies.

fell continuously to 16.7% in 1989. Labour productivity, in turn, stagnated around the dismal 1980-84 levels (table A.21), and the whole decade produced the worst ICOR of the post war period (table A.10).¹¹³

As one would expect, manufactured exports were also affected. Apart from the disruption of relative prices, low investment and low productivity, competitiveness also suffered from a higher incentive bias against exports. The steep appreciation of the PPP-exchange rate prompted by the price freezes (table A.17), coincided with a gradual and substantial reduction of export subsidies¹¹⁴, which was not properly balanced by a meaningful import liberalisation.¹¹⁵ These events reinforced the export market position as a poor and occasional alternative to domestic crises, discouraging long-term commitments. This is clearly indicated by an export performance that mirrored the 'boom and bust' developments of the internal market, with exports growing on average 18.7% in the years of negative or no growth (1987-88), and

¹¹³ A survey of the views of the most important industrial producers in October 1987, revealed that only 53% of those interviewed considered its sector to be technologically update (Sondagem Conjuntural, FGV/PEC/CEI). Another survey in 1990 by the National Confederation of Industry revealed similar findings. See Frischtak and Dahlman (1990).

¹¹⁴ Table A.24. It began in early 1984, triggered by the deterioration of public finances and pressures from trade partners. First, monetary correction (MC) was introduced on export loans. Then, the Central Bank's open-ended discounts to export credits were abolished and interest rates raised from 3% plus MC to market interest rate less 10%. In March 1985, the fiscal subsidies were finally dropped, and in 1989 the corporate tax exemption raised from 0 to 3%. (Guimarães 1989 and IMF).

¹¹⁵ The most 'daring' attempt to liberalise imports came only in mid 1988. See below.

stagnating or declining when growth resumed (-0.2 over 1985-86 and -16% in 1989).

Not surprisingly, Brazil's share of world manufactured exports over 1984-87 fell or stagnated in most segments, including the light industry despite falling unit labour costs.¹¹⁶ This decline could have been worse had it not been for the long-term export agreements under the BEFIEEX scheme, which forced firms to export whatever the costs, and that continued to receive, until 1989, the fiscal subsidy eliminated for the regular exports in 1985. The BEFIEEX's share of manufactured exports rose from 17 to 40% over 1979-86 and reached 50% in 1989.¹¹⁷

Amid the disruption and stagnation provoked by the failure of successive stabilization plans, there were two attempts to reform the policy regime that are worth noting. The first came in the beginning of the period, when worries about the industry's competitiveness led to a new emphasis on developing the local S&T infrastructure.¹¹⁸ The Ministry for Science and Technology (MCT) was then created in 1985, giving the

¹¹⁶ The ratio of Brazil's unit labour cost to the East Asia NICs' average (Korea, Taiwan, Hong-Kong and Singapore), measured in dollars per hour, fell from 1.4 in 1975 to 0.6 in 1986 (US Bureau of Labour Statistics as quoted in Araujo Jr. et al. 1990:17). With regard to the rest of the world (weighted average) Brazil's unit labour costs fell 25% over 1976-87, although it has presented heavy fluctuations over this period (BNDE 1992b).

¹¹⁷ Baumann (1990). The elimination of the CDI tariff exemptions for capital goods in 1979, also boosted BEFIEEX exports since this benefit could be obtained under the scheme.

¹¹⁸ These worries were expressed in a series of industrial policy proposals commissioned by the new administration. None of this documents, though, were of much consequence, except for the S&T policies. See Suzigan (1986, 1988).

subject an unprecedented ministerial status, with investments increasing sharply in 1986.¹¹⁹ Yet, this revival was short lived, and expending cuts initiated in 1987 brought investments back to the depressed 1984 levels, with the MCT being abolished in 1989. The cuts in S&T expenditures coupled with falling LPFs' investments, not only worked against increases in the latter's technological capabilities but also widened the gap between the productive sector and the S&T infrastructure. To add to the problem, human capital indicators showed little progress during the 1980s (table A.15), with Brazil still ranking poorly among NICs.¹²⁰

The second attempt came only in 1988, with the so-called 'New Industrial Policy.' Seeking to increase productivity, technological capabilities and reduce government intervention, this initiative comprised: a) a limited import liberalisation involving a partial removal of NTBs¹²¹ and a tariff reform that reduced the average manufacturing tariff from 90 to 43% (table A.25); b) the re-introduction of fiscal incentives to capital good imports, coupled with new incentives to R&D activities and BEFIEEX exports, to be administered by a revamped CDI; and c) legislation allowing the establishment of export processing zones (EPZ).¹²² These measures,

¹¹⁹ The FNDCT, for instance, almost doubled over 1984-86 (Becker and Eagler 1992).

¹²⁰ For instance the tertiary education enrolment ratio for Brazil in 1988 was 11% against 37% in Korea, 41% in Argentina (UNESCO). See Frischtak and Dahlman (1990) for an assessment of the present conditions of Brazil educational system.

¹²¹ Import surcharges were removed, the list of prohibited imports shortened from 2400 to 1200 items and the minimum financing requirements for some imports lifted (IMFa).

¹²² For details see Matesco (1988) and IMFa

though, had little impact. First, legal tariff remained high and the system of import licensing remained in place, including NTBs such as the 'law of similar'. And second, the dire financial conditions of the public sector left little room for fiscal benefits, a fact that largely prevented their implementation, including the anachronistic EPZs. Serious changes in the incentive regime would have to wait until the next decade.

In sum, the impact of external shocks magnified by previous misguided intervention in the product (trade bias) and financial markets (indexation), largely reduced the government's action over the 1980s to a series of unsuccessful adjustment and stabilization attempts. Facing a highly unstable environment, industry fell into a vicious circle of falling output, investments and productivity, which coupled with a higher trade bias, produced declining market shares abroad. This decline in competitiveness, however, cannot be dissociated from the industry's structural weaknesses fostered by decades of an ill-conceived approach to market failures. That is, its fragmented and excessively integrated structure, its sub-optimal plants, its weak local private sector, the lack of long-term financing, the limited and isolated S&T infrastructure, and the poor human capital endowment.

Conclusion

The mixed results presented by Brazil's industrialisation seem to closely reflect the dubious quality of government intervention throughout the various stages of its development. It seems clear that instead of being moulded and disciplined by the international prices, and by the nature of the relevant market failures, government action was largely guided by the pressures to keep the economy growing at all costs, and by the need to remove what was seen to be the most binding of the constraints, i.e., the foreign exchange gap. This, coupled

with a solid export pessimism—deeply rooted on the backwardness caused by centuries of 'export-oriented' colonial history—set the stage for an industrialization strategy that blindly followed the country's import composition.

Whereas there is no doubt that this strategy was successful in turning an agrarian country into a highly sophisticated industrialised economy, the combination of wrong incentives and an inconsistent and often misguided approach to market failures, led not only to a damaging waste of resources, but also produced serious structural weaknesses that seriously compromised the industry's efficiency and competitiveness, while exposing the economy to violent macroeconomic imbalances.

Decades of a non-selective, inward-oriented incentive regime coupled with 'protected' FDI, lax investment licensing and largely market-oriented credit allocation, took industrial diversification and vertical integration beyond what would be economically sound. It also produced unsustainable market structures, held together only by high and permanent protection. Facing inward-oriented incentives, squeezed by the TNCs' imperfect competition, lacking a proper source of long term financing, having a poor human capital base to build on, and handicapped by a limited S&T infrastructure, LPFs did well to survive and grow. Yet, this growth, as we have seen, was largely modest both in terms of size and technological capability. The macroeconomic chaos of the 1980s only added to these problems.

Since the beginning of the 1990s, the government has been taking important steps towards a serious overhaul of the incentive regime. A program of import liberalisation was adopted, which included the removal of the relevant NTBs and a four year advanced schedule for tariff reductions, envisaging an average nominal tariff of 20% in

1994, with a maximum of 40% for infant industries.¹²³ However macroeconomic stability continues to be elusive, with yet another heterodox stabilization plan failing to control inflation. Moreover, the reforms have been taking place amid a liberal, anti-government rhetoric that threaten to throw away the baby with the bath-water.

The source of most of Brazil's problems, as suggested, is not government intervention *per se* but the quality of this intervention. Deficiencies such as a weak local private sector, lack of long-term financing, low domestic technological effort, poor human capital base and limited S&T infrastructure, are not going to be solved by market forces alone. They all arise from market failures in the product (static and dynamic economies of scale) and factor markets (informational imperfections and externalities), and they all call for government action. Not of the type that Brazil had in the past, but one focused on the nature of these market failures, and disciplined by the need to increase the industry's competitiveness in a more open and outward-oriented economy.

¹²³ For an analysis of the reforms during the Collor government (1990-1992) see Horta et al. (1991), Erber (1991) and IMFb.

Appendix

Table A.1: Share of the Heavy Chemical (HCI) and Light Industry in Brazil's Manufactured Exports and Output: 1919-88. (%)

		1919	1939	1949	1955	1965	1973	1980	1984	1988
exports ¹	HCI	n.a.	n.a.	3.9	2.0*	8.8	18.0	43.3	51.2	60.1*
	Light	n.a.	n.a.	96.1	98.0*	90.8	82.0	56.7	48.7	40.0*
output ²	HCI	9.8	19.2	24.0	35.2	48.0	51.0	60.0	60.0	59.0
	Light	90.2	80.8	76.0	64.9	52.0	49.0	40.0	40.0	41.0

¹HSIC. HCI includes chemicals (35), non metal mineral (36), basic metal (37) and metal manufactures (38). Light industry covers food, beverage and tobacco (31), Textiles(32), wood products (33), paper products (34) and other manufactures (39). ² HCI is defined according to the IBGE two-digit classification and includes: chemicals, non metal mineral, metallurgy, machinery, elec. & comm. equipment, transp. equipment and pharmaceuticals. IBGE data at 1986 prices. Figures for 1955 and 1988 were estimated using two-digit quantum indices.
* 1987 ** includes electronic and communication equipment. *1954
Source: U.N. (TTSY) for export data, and ANESTBR (1990) and IBGE (1990)

Table A.3: Brazil's Trade-to-GDP Ratios, 1889-1989 (%)^a

Periods	Exp./GDP	IMP/GDP	Trade/GDP
1889-1929	16.0	12.6	28.6
1930-39	11.5	9.4	20.9
1940-50	9.9	8.3	18.1
1951-55	7.1	8.1	15.2
1956-64	4.7	6.4	11.1
1965-73	6.0	6.4	12.3
1974-79	6.6	9.1	15.7
1980-85	10.6	8.9	19.5
1986-90	9.4	5.8	15.2

^a Current Prices.
Source: Data from Goldsmith (1986:11) for the 1889-46 GDP and IBGE (1990) and UN (TTSY).

Table A.2: Brazil GDP Structure, 1889-1990.

	Agriculture	Industry	Services ¹	total
1889	56.5	12.0	31.5	100
1929	37.8	20.0	42.2	100
1939	32.7	24.7	42.6	100
1947	33.9	24.5 (18.7)	41.6	100
1955	27.4	30.0 (23.8)	42.6	100
1960	19.7	35.8 (28.3)	44.5	100
1965	17.7	35.7 (27.8)	46.6	100
1970	12.2	37.8 (28.9)	50.0	100
1975	12.0	45.4 (35.2)	42.6	100
1980	11.2	44.6 (34.0)	44.2	100
1985	13.0	51.2 (38.1)	35.8	100
1990	11.7	44.2 (30.0)	44.1	100

¹ It does not include rent, financial institutions and non-specified services. Note: figures until 1947 are in constant prices. The rest of the series is on current prices. Numbers in parenthesis are the GDP share of the manufacturing sector. Source: Goldsmith (1986:11) for 1889 to 1947 and IBGE (1990) for the rest of the period.

Table A.4: Brazil's Composition of Imports by End Use(%), 1901-1987

	1901-07	1924-29	1935-39	1955	1964	1972	1974	1978	1982	1987
Food and Bev.						7.3	7.1	8.7	8.3	7.4
Cons. goods	36.9	21.3	17.0	9.7	8.8	4.3	2.5	2.3	1.7	2.9
durables	n.a.	n.a.	10.3	2.8	2.4	2.4	1.4	1.0	0.5	0.9
non-durables ¹	n.a.	n.a.	6.7	6.9	6.4	1.9	1.2	1.3	1.1	2.0
Ind. supplies ²	46.9	52.8	51.1	41.5	47.4	34.0	41.8	29.4	18.8	30.5
Fuel	8.2	11.1	12.2	21.5	20.4	12.6	22.8	32.5	53.4	32.3
Capital goods	7.1	14.8	26.3	27.3	23.4	37.7	22.9	24.2	15.6	22.6

¹ Includes food until 1964. ² Includes raw material, intermediate goods minus fuel.
Notes: Percentages may not add to 100 % because of non specified goods. Definition of the categories among the sources are not strictly comparable. Source: Data for 1901 to 1930 from Villela e Suzigan (1977:42), for 1935 to 1964 from "Estatística do Comércio Exterior do Brasil: 1920-1964." Vol. 2. FGV, Rio de Janeiro, as quoted by Dib (1985:74) and Fuhlow (1972:44). For the rest of the period, U.N. (TTSY).

	1907	1939	1949	1964	1967	1970	1974	1979	1984	1986	1988	1990
Import¹												
Total mnf.	47.0	21.5	13.9	6.1	7.1	8.0 (8.8)	11.9 (12.2)	6.8 (7.4)	(5.1)	(5.7)	(4.4)	(5.7)
HCI	n.a.	n.a.	26.9	9.0	10.2	11.8	15.2	8.4	n.a.	n.a.	n.a.	n.a.
Light	n.a.	n.a.	3.8	1.6	2.2	2.3	5.1	3.4	n.a.	n.a.	n.a.	n.a.
Export²												
Total mnf.	9.0	7.6	2.3	2.0	2.6	5.7 (4.5)	6.9 (6.4)	9.1 (8.0)	9.8 (16.0)	(9.8)	(11.5)	(9.3)
HCI	n.a.	n.a.	5.2	1.8	2.0	2.3	3.6	8.2	8.7	n.a.	n.a.	n.a.
Light	n.a.	n.a.	1.5	1.8	2.3	5.8	10.0	8.5	11.4	n.a.	n.a.	n.a.

¹ Imports divided by the total domestic supply. ² Exports divided by total output. ³ Estimated by quantum indices. Notes: a) see table A.5 for light and heavy industry definitions. b) Ratios are the weighted average (value-added) for two-digit sectoral data. (IBGE classification). Source: Villela e Suzigan (1977:39) for 1907-39, Tyler (1976) for the 1949-1967, World Bank (1983) for 1970-79, ANESTBR (1990) for 1984 data. Numbers in parenthesis are from a recent BNDE (1992a) study.

Goods	1919	1949	1955	1959	1970	1975	1980	1985	1988
Consumer	82.1	69.8	64.2	57.3	54.3	50.1	47.9	49.3	48.9
durables	1.3	2.0	5.5	5.9	9.3	13.3	13.5	11.7	12.4
n.durables	80.8	67.8	58.7	51.4	45.0	36.8	34.4	37.6	36.5
Intermediate	16.5	25.3	30.4	33.0	34.4	34.6	37.4	40.0	39.5
Capital	1.4	5.1	5.3	9.7	11.3	15.4	14.7	10.6	11.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Manufacturing output data. For 1919-1970 at current prices. The rest of the period at 1970 cruzeiros. Source: Bonelli e Facanha (1978:319) for 1919 to 1959 except for 1955 which was taken from Bergzman (1970:92); and Serra (1982) for 1970-1980. For the rest of the period, the structure was estimated by using IBGE (1990) end-use-quantum indices for manufacturing output.

Categories	1946	1950	1955	1964	1974	1980	1987
Total exports	985.3	1355.5	1423.0	1429.8	7950.9	20132.0	26228.6
primary & semi-manuf. ¹	912.6 (92.6)	1339.5 (98.8)	1407.8 (98.9)	1353.5 (94.7)	6030.3 (75.8)	12541.9 (62.3)	13223.1 (50.4)
coffee	(35.3)	(63.9)	(58.9)	(53.1)	(12.3)	(13.7)	(8.3)
manufactured products ²	72.7 (7.4)	16.0 (1.2)	15.2 (1.1)	76.3 (5.3)	1920.6 (24.1)	7590.1 (37.7)	13005.5 (49.6)

¹ STIC divisions 0,1,2,3,4,9,68. ² STIC divisions 5 to 8 minus 68. Note: numbers in square brackets are the shares in total exports. Source: Tyler (1976:123) for 1946 to 1955 and U.N.(TISY) for the rest of the period.

sectors	FF	LPF	SEs
non-met min.	33	67	0
metal products	22	42	36
machinery	79	21	0
electrical & com	61	39	0
transp.	82	18	0
lumber	30	69	0
rubber	92	3	5
cbchemicals	69	25	7
pharma	100	0	0
plastics	49	52	0
textiles	47	54	0
food	43	32	0
miscellaneous	43	57	0
Total	51	41	8

Source: Newfarmer, R. and Miller, W. (1975).

	state firms ²	gov. budget	public sector	private sector	total
1947-55	2.9	23.2	26.1	73.9	100
1956-64	9.3	23.8	33.1	66.9	100
1965-73	18.7	23.7	42.4	57.6	100
1974-79	22.1	14.7	36.9	63.1	100
1980-87	19.4	15.2	34.6	65.4	100

¹ Arithmetic average. ² Over 1966-79, includes only the federal large state firms in steel, mining, petrochemicals, telecommunications, electricity and railroads. Source: State firms data from Werneck (1969:99) for 1947-65, Trebat (1983:122) for 1966-79, and Dinsmoor (1990:126). Rest of data from IBGE (1990).

1948-55	2.69
1956-64	2.34
1965-73	1.94
1974-79	4.70
1980-89	9.50

¹ 1980 prices. GDP deflated by the implicit deflator and the gross fixed capital formation by the WPI. Source: Data from IBGE (1990) and Conjuntura Econômica July 1991.

	sectors (% of total loans)					% loans to private sector ⁴	loans/GFCF ⁵ %	mnf. loans/mnf. investment(%)		
	HCI ²	light ³	manuf.	public	private			HCI	light	manuf
1953-55	88.6	11.4	10.3	89.1*	10.9*	n.a.	2.2	n.a.	n.a.	n.a.
1956-64	97.4	2.6	56.0	86.5	13.5	1.1	3.3	n.a.	n.a.	8.8
1965-73	67.9	32.1	72.9	39.9	60.5	4.8	5.5	n.a.	n.a.	19.3
1974-79	74.2	25.8	66.2	18.9 [#]	81.1 [#]	8.1	13.0	51.4	31.5	43.1 (28)
1980-82	72.2	27.8	49.9	n.a.	n.a.	7.2	10.2	50.4 [†]	36.7 [†]	43.9 (23) [†]
1983-89	60.9	39.1	52.9	n.a.	n.a.	3.1	9.1	n.a.	n.a.	n.a.

¹ Arithmetic average of approved loans, except for the figures in parentheses which are disbursed loans. 1981 prices. ² Metallurgy, chemicals, non-metallic, machinery, transport equip. ³ Textile, footwear and others. ⁴ BNDE's share of total loans to the private sector. ⁵ Gross fixed capital formation. *1952-55. [#] 74-77. [†] 1980-81. Source: Zoninsein (1984) for 1953-81 loans and BNDES (1992). Investment data from Serra (1983:102) and IBGE (1990).

	US\$ million ²	% mnf. inv. ³	% net capital inflow ⁴
1948	16.5	n.a.	45.9
1952	8.6	n.a.	14.0
1956	84.4	29.6	30.9
1960	104.4	21.7	20.0
1964	47.4	5.9	12.7
1968	99.4	10.3	12.3
1972	486.5	14.5	10.9
1976	1036.3	14.9	12.5
1980	1461.0	22.6	11.3
1984	366.4	n.a.	4.1
1988	95.8	n.a.	5.9

¹ Three-year moving average. ² Total FDI plus reinvestments minus withdrawals, debt-swaps and Brazilian investment abroad. ³ 1970 prices. ⁴ Net FDI plus medium and long term loans. Source: For FDI, BACEN, various issues. For 1955-69 mnf. investment, Serra (1982: 102). For the rest of the data IBGE 1990.

Table A.13: Brazil's Real Unit Labour Costs¹, 1949-84.

	1949	1959	1962	1963	1964	1967	1968	1969	1970	1972	1973
Total ²	100	93	99	91	90	90	85	82	82	86	77
Direct ³	100	81	79	80	78	n.a.	n.a.	n.a.	74	70	66
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	76	68	71	74	76	74	62	66	69	61	53
Direct	62	62	65	68	69	64	66	66	64	58	51

¹ Changes in the real manufacturing average wage (deflated by the WPI, 1986=100) adjusted by the changes in labour productivity (Value-added per employee). ² All employees ³ Production Workers. Source: ANESTBR, various issues and IBGE 1990.

Table A.14: Brazil's Legal Tariff Rate, 1966-77 (%)

	1966	1967	1971	1975	1977
Manufacturing	99	48	67*	n.a.	70.0
Capital goods for mnf.	49	36	43.6	41.0	60.6
Capital goods for agric.	32	25	44	38.7	41.3
Interm. goods for mnf	42	30.5	45.6	51.1	75.9
Interm. goods for agric			26.4	12.8	20.0
Transport equipment	55	42	36.5	47.7	65.2
Consumer durables	80	64	100.7	115.2	140.2
Consumer non-durables	73	54	102.7	105.7	154.4

Note: Data for manufacturing is the sectoral average weighted by the 1970 output. For the rest of the data, simple averages.* 1973. Source: Doellinger et al.(1974:134) for 1966-67, Rosa et al. (1979:12) for 1971-77 and Baumann (1985:230) for the manufacturing average.

Table A.15: Selected Human Capital Indicators, 1940-1988.

	illiteracy rate ¹	primary			secondary			tertiary		
		≥10*	≥20*	Enr. ratio ¹	≥10*	≥20*	Enr. ratio ¹	≥10*	≥20*	Enr. ratio ¹
1940	65.0	12.1	12.1	n.a.	3.3	3.8	n.a.	0.3	1.3	n.a.
1950	57.0	31.4	31.7	n.a.	6.6	7.0	n.a.	1.6	1.3	n.a.
1960	51.6	33.6	n.a.	108.0**	8.5	n.a.	16.0**	1.9	n.a.	2.0**
1970	39.4	n.a.	32.2	125.0	n.a.	13.0	26	n.a.	1.9	5.6
1980	25.5	n.a.	n.a.	99.0	n.a.	n.a.	34	n.a.	n.a.	11.9
1988	15.3	n.a.	n.a.	104.0	n.a.	n.a.	38.0	n.a.	n.a.	11.1

¹ Aged 10 and over. * Highest school attainment of the literate population aged over 10 and 20.
² Enrolment as a percentage of the age group. **1965 Source: IBGE Indicadores Sociais as quoted in World Bank 1979:121, UNESCO Statistical Yearbook and ANESTBR, various issues.

Table A.16: Direction of Manufactured Exports, 1965-79

	light ¹		heavy ²	
	DC	IDC	DC	IDC
1965	81.7	18.3	12.5	87.5
1970	81.4	18.6	30.3	69.8
1975	63.5	36.5	31.1	68.9
1979	89.8	10.2	37.2	62.8

¹ Includes food, textile and footwear. ² Includes transport equipment, machinery and other equipment. Source: Data from World Bank (1983:194)

Table A.17: Brazil's Effective Purchase-Power-Parity Exchange Rates¹: 1954-87 (1980 prices)

year	exports ²	imports ³	official	year	exports ²	official
1954	23.9	53.7	m. r. ⁴	1972	58.7	46.7
1955	29.3	63.8	m.r.	1973	57.8	46.6
1956	29.4	76.0	m.r.	1974	62.0	51.8
1957	31.3	97.3	m.r.	1975	61.0	48.9
1958	34.0	89.2	m.r.	1976	62.6	48.7
1959	41.7	104.3	m.r.	1977	64.5	48.5
1960	44.6	87.6	m.r.	1978	61.5	46.9
1961	49.5	117.9	m.r.	1979	64.1	49.7
1962	49.2	131.7	45.6	1980	56.5	52.7
1963	42.1	120.3	39.6	1981	67.4	52.8
1964	51.7	122.4	41.5	1982	74.3	56.2
1965	53.0	106.9	49.5	1983	83.8	70.4
1966	45.8	75.4	45.8	1984	77.8	68.4
1967	43.1	61.2	42.1	1985	79.0	72.3
1968	46.1	62.5	43.5	1986	n.a.	67.4
1969	53.4	70.8	48.2	1987	n.a.	62.9
1970	56.5	70.9	47.7	1988	n.a.	52.7
1971	58.2	n.a.	47.6	1989	n.a.	32.6

¹ Relevant exchange rate times the ratio of the average WPI of Brazil's major trade partners (EUA, U.K., Germany, France, Italy, Netherlands.) to Brazil's WPI ² Includes export bonuses and net subsidies. ³ Includes legal tariffs and surcharges. Not available for the post-1970 period. ⁴ Multiple rates
Source: For 1955-68 nominal effective rates on exports and imports (until 1969) Bergsman (1970:38). Rest of the data own calculation using Baumann (1990:180) estimates for export subsidies and data from BACEN and IMF(b).

Table A.18: Brazil's Manufacturing Employment Elasticities, 1939-84.¹

(%)	1939-49	1949-59	1959-70	1970-75	1975-80	1970-80	1980-84
	0.6 (4.7)	0.3 (2.9)	0.6 (4.0)	1.0 (11.7)	0.8 (5.2)	0.9 (7.3)	1.2 (-3.5)

¹ Total employment growth divided by real output growth. Compound annual rates until 1970 and ordinary least square rates thereafter. Numbers in parenthesis are manufacturing employment growth. Source: IBGE 1990

Table A.19: Debt-equity ratios of Brazil, Korea, Japan, USA and Germany: 1964-83*

year	Brazil	Korea	Japan	US	Germany
1954	92.3	n.a.	n.a.	n.a.	n.a.
1964	112.7	100.5	n.a.	n.a.	n.a.
1973	92.6	272.7	449.0	92.0	185.0
1976	137.5	364.6	488.0	86.0	212.0
1978	120.0	366.8	421.0	93.2	222.7
1980	142.0	487.9	377.8	101.5	215.3
1982	115.0	385.8	298.6	106.1	247.8
1983	114.0	360.3	277.0	103.5	241.7

*For Brazil debt-equity ratios are for the non-financial sector while for rest of the countries they are for the manufacturing sector. Ratios are liabilities divided by net-worth. Source: For Korea, BOK, Financial Statement Analysis, various years. For Brazil, Goldsmith (1986) for 1954-76 and Almeida (1988) for the rest of the period. Other countries, Bank of Japan (1990).

Sectors	1958 ^a	1963 ^a	1966 ^a	1967 ^a	1966 ^b	1967 ^b
Total industry	30	75	44	14	83	36
Agriculture	-47	-15	-13	-14	n.a.	n.a.
Manufacturing	106	184	108	48	118	66
Capital goods	53	113	69	52	100*	60*
Intermediate goods	65	131	68	39	110	67
Consumer durables	242	360	230	66	151	75
Consumer non-durables					173	101

* Machinery only. Source: a) Fishlow (1975:58) "Foreign Trade Regimes and Economic Development: Brazil" Mimeo, as quoted in Carvalho and Haddad (1981:42). Non-specified method based on legal tariff. Sectoral figures are averages weighted by the 1959 value-added adjusted for tariffs. b) Bergsman and Malan (1971:122) 1970 output as weights. Corden method based on legal tariff plus non-tariff barriers.

1949-64	4.5
1965-73	4.5
1974-79	3.1
1980-84	-1.3
1985-88	0.0

¹ Compound rate of growth of value added per production worker, 1986 prices. Source: IBGE 1990.

	Brazil	Germany	US	Japan
Water turbines	4	2	1	3
Hydrogenerators	4	2	3	4
Rolling Mills	7	3	3	3
Blast furnaces	4	3	1	4
Large mechanical presses	5	2	2	n.a.

Source: Lago et al. "A Indústria Brasileira de Bens de Capital" Estudos Especiais I, BRF/FGV as quoted in Vilella (1984).

	a) total	b) mnf. and semi-mnf.	c) equip. and instrum.	d) other mnfs
1967	n.a.	33.8*	n.a.	n.a.
1974	n.a.	30.0†	67	17
1978	23.1	44.9(38.8)	64	23
1980	28.4	50.2(38.3)	62	22
1984	26.7	39.4	67	18
1985	27.8	41.7	63	18
1986	28.4	42.2	n.a.	n.a.

*Fanjzylber (1971:207). Sample includes 1147 firms, but restricted to manufactures, excluding semi-manufactured exports.† Baumann (1985:238). Notes: 1) In (a) and (b) foreign firm is defined as having non-residents as the major shareholder. Data from a Cacex study whose results were published in BNDES (1988b:111). The results in (b) tend to overestimate the foreign firms' share since it includes firms from agriculture and mining sectors. These two sectors, however, made up for only 3% in average of the total stock of FDI during the period. 2) (c) and (d) is from Fritsch and Franco (1988) using Cacex data. 3) The number in parentheses are Cepal's (1985) and Willmore's (1987) estimates, for 1978 and 1980 respectively. The 1978 figure was drawn from a sample of 12435 firms, while the 1980 estimate involved 47769 firms, accounting for more than 95% of manufacturing output.

Sectors	1975-89 (%)							
	legal				effective (Corden)			
	1975	1980	1984	1989	1980	1985	1988	1988
total mnf	86.4	99.4	90.0	43.1	46.4	42.9	32.6	
capital	62.9	83.3	69.4	58.6	71.9	14.5	19.0	
intermediate	77.3	76.5	76.9	33	42	45.9	42.2	
consumer	125.4	132.5	131.5	62.7	35.7	38.7	13.6	
durable	163.9	n.a.	173.6	58.5	n.a.	-15.5	-10.5	
non-durable	117.4	n.a.	122.7	46.6	n.a.	50.1	18.9	

Notes: a) All sectoral data are averages weighted by the 1975 output at international prices, except for 1980 which is weighted by the 1979 value-added. c) Effective rates were derived from direct price comparisons, and used 1970 (1980) and 1975 (other years) technical coefficients. Source: Tyler (1983:553) for 1980, Braga et al. (1988) for 1975, 1984, 1985 and Kume (1988) for 1988 and 1989

year	Korea (%)			Brazil (%)		
	subsidies ¹	imports ³	% of exp.	subsidies ²	imports ³	% of exp.
1969	6.4	27.8	66.3	10.8	42.7	2.34
1970	6.7	28.3	56.2	21.0	52.7	6.51
1971	6.6	29.6	63.6	22.3	53.1	8.05
1972	3.2	26.8	54.8	25.8	58.8	8.55
1973	2.2	23.7	53.1	24.1	58.3	11.69
1974	2.1	21.2	49.3	19.9	55.2	10.50
1975	2.7	16.7	48.6	25.3	56.0	16.28
1976	2.5	16.9	43.3	29.0	65.8	14.07
1977	1.9	19.2	n.a.	33.5	72.5	9.37
1978	2.3	19.5	n.a.	31.6	68.1	10.04
1979	2.3	20.2	n.a.	30.3	67.5	n.a.
1980	3.3	21.3	n.a.	7.4	45.1	n.a.
1981	2.2	n.a.	n.a.	29.8	71.8	n.a.
1982	0.4	n.a.	25.9	34.6	76.7	n.a.
1983	0.0	n.a.	n.a.	20.6	58.5	n.a.
1984	n.a.	n.a.	n.a.	13.9	53.0	n.a.
1985	n.a.	n.a.	n.a.	10.0	49.2	n.a.

¹ Korea data for total exports. Yet manufactured exports averaged 94% during the period. Net subsidies include direct cash subsidies, export dollar premium, direct tax reduction and interest rate subsidy. Gross subsidies includes net subsidy plus indirect tax exemptions and tariff exemptions. ² Net subsidies comprise direct tax reduction, tax credits and interest rate subsidy. Gross subsidies include net subsidies plus indirect tax and tariff exemptions. ³ Export-related imports consists of parts and raw material used in export production which were exempted from import and indirect taxes. Source: Original data from Kim, S. K. (1991:33), Hong (1979:68) and KFTA (1989) for Korea; and from Baumann (1990) and Musalem (1983:746) for Brazil.

	Brazil			external		
	autofinance	external	total	loans	shares	others
Brazil						
1978	58.8	41.2	100	51.1	35.9	13.0
1980	62.5	37.5	100	69.6	24.1	6.3
1982	65.7	34.3	100	58.8	29.0	12.1
1984	76.8	23.2	100	54.7	24.8	20.6
Korea						
1977-81	23.3	76.7	100	53.7	24.8	21.5
1982	27.0	73.0	100	55.4	31.8	12.8
1984	33.3	66.7	100	60.5	32.1	7.4
US						
1979	78.7	21.3	100	84.5	15.4	—
1982	78.7	21.3	100	71.8	28.1	—
1984	83.5	16.5	100	124.8	-24.8	—

Note: Data for Brazil was based in a sample of the 90 largest locally owned firms. Source: For Brazil, D.G. Rodrigues "Empresas Não-Financeiras no Brasil: Evolução de Desempenho no Período 1975-84." IBMEC, 1986, as quoted in Cysne et al. (1990:330). For Korea Amsden and Euh (1990:66). And for the US, Ross et al. (1988:378)

Table A.27: Share of Foreign Loans by Type and Firm Ownership (1966-81)¹

	1966	1968	1971	1973	1975	1977	1979	1981
Indirect short-term loans (res. 63)	32.8	27.6	25.4	27.7	42.0			
Direct long-term loans (law 4131)	67.2	72.4	74.6	72.3	58.1			
total	100	100	100	100	100			
	all loans			Direct loans (law 4131)				
local firms	6.5	13.1	20.9	21.4	7.9	5.0	5.1	4.7
foreign	44.2	76.3	60	45.3	46.5	40.8	23.7	22.3
public sec	46.4	6.3	3.9	33.3	45.6	54.3	71.2	73.1
total	100	100	100	100	100	100	100	100

¹ three year moving average from 1973 onwards.
 Source: For 1966-71 Pereira, J.E. (1974) "Financiamento Externo e Crescimento Econômico no Brasil: 1966-73." Rio de Janeiro: IPEA/INPES, Coleção Relatórios de Pesquisa nº27, as quoted in Villela and Baer (1980); and for 1972-81 Cruz (1984:100,140)

Table A.28: Share of Government, Foreign and Domestic Firms in Brazilian Manufacturing: 1971-80 (% of sales)

	1971			1980		
	DF	FF	GF	DF	FF	GF
Manufacturing	43.6	45.1	11.3	59.0	28.5	12.5
Light Industry	67.7	28.5	0.0	77.5	19.3	0.8
Heavy Industry	11.6	51.8	36.6	45.5	36.8	17.7
Metallurgy	44.6	27.3	28.1	n.a.	n.a.	n.a.
Machinery	35.8	64.2	0.0	59.0	41.0	0.0
Elec. & Comm. eq.	35.1	64.9	0.0	56.0	44.0	0.0
Transp. equipment	42.7	57.3	0.0	29.0	68.0	0.0
Chemical	17.8	30.0	52.2	27.0	21.0	52.0
Pharmaceutical	39.5	60.5	0.0	28.0	71.0	0.0

Notes: a) The figures for the three years are not strictly comparable due to differences in the sample sizes. For 1971, it covered the largest firms accounting for about 60 % of manufacturing output, which tends to underestimate the share of the smaller DFs. For 1980, the firms involved accounted for roughly 95% of manufacturing output. b) data for heavy and light industry (defined as in table A.5), own calculation using manufacturing value-added as weights. c) DF stands for Domestic firm, MNC for foreign firm and GF for government firm. Source: Tyler (1976:52) for 1971, and Willmore (1987: 165) for 1980.

Table A.29: International Comparison of the Number of Producers of Selected Capital Goods, 1980

	Brazil	Germany	US	Japan
Water turbines	4	2	1	3
Hydrogenerators	4	2	3	4
Rolling Mills	7	3	3	3
Blast furnaces	4	3	1	4
Large mechanical presses	5	2	2	n.a.

Source: Lago et al. "A Indústria Brasileira de Bens de Capital" Estudos Especiais 1. BRE/FGV as quoted in Villela (1984).

Table A.30: Brazil's Share of Exports by Economic Group and Sector 1950-89.

SITC	1950	1960	1970	1975	1980	1984	1987	1989
World	2.2	1.0	0.9	1.0	1.0	1.4	1.1	1.1
LDC mnf.			0.9	1.5	2.6	3.8	3.9	n.a.
World mnf.			0.2	0.4	0.7	0.9	0.8	n.a.
chemicals (5)			0.2	0.3	0.5	1.1	0.8	n.a.
iron & steel (67)			0.6	0.4	1.2	3.2	2.4	n.a.
non-ferrous (68)			0.0	0.2	0.2	1.4	1.9	n.a.
mach.+transp. (7)			0.1	0.4	0.7	0.6	0.6	n.a.
textile (26+65+84)			0.2	1.0	0.8	1.1	0.7	n.a.
basic (6+8-68)			0.3	0.6	0.8	1.4	0.9	n.a.

Notes: a) manufacturing defined as 5 to 8 minus 68. b) figures for industrial sectors are world shares. Source: UN (ITSY and HIT).

Table A.31: R&D Expenditures in Selected Countries as a proportion of GNP

	1970	1977	1982	Latest year
Brazil	0.24	0.70	0.59	0.59 (1987)
Argentina	n.a.	1.80	0.20	0.20 (1982)
Mexico	0.20	0.30	0.20	0.60 (1984)
India	n.a.	0.50	0.76	1.00 (1985)
S. Korea	0.39	0.60	0.90	1.80 (1986)
Taiwan	n.a.	2.00	0.90	1.06 (1985)
Japan	1.90	2.00	2.40	2.90 (1987)
U.S.	2.60	2.10	2.50	2.60 (1987)

Source: UNESCO, Statistical Yearbook 1988, as quoted in Dahlman and Frischtak (1990:19)

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