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PUBLIC SAVINGS AND PRIVATE INVESTMENT: REQUIREMENTS FOR GROWTH  
RESUMPTION IN THE BRAZILIAN ECONOMY<sup>1</sup>

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Rogério L. F. Werneck

June 1992

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<sup>1</sup> A project sponsored by the Inter-American Development Bank as part of a broader research effort on Savings and Investment Requirements for Growth Resumption in Latin America.

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## 1. Introduction<sup>2</sup>

This report presents the results of the research project and a brief prospective look into the obstacles to investment resumption in the Brazilian economy.

Four sections follow this introduction. Section 2 covers mainly the findings related to the fall of the investment/GDP ratio in the Brazilian economy since the seventies. Section 3 concentrates on the evaluation of the financing problems behind the long run fall in investment. After briefly analyzing the (always relatively modest) role of foreign savings for the future growth of the Brazilian economy, it presents an analysis of the behavior of the rate of savings, leading to a closer look into the problems related to the fall of public savings, which is the object of section 4. Finally, in the concluding section, the results of a simulation exercise regarding the needed recovery in public savings under different scenarios are analyzed.

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<sup>2</sup> The authors are grateful to Eliana Soárez, Marcelo Albuquerque Mello, Rui Monteiro Ribeiro and especially to Luciana C. Marques de Sá, for competent research assistance. They are also grateful to Edmar Bacha, Jorge Sapoznikow and Glenn Westley for helpful comments on an earlier version of the paper.

## 2. Investment in the Brazilian Economy, 1970-90

### 2.1 General Assessment

Between the seventies and the nineties, Brazil changed from one of the fastest growing economies on earth to one of the biggest problem in the world economy's debt-led turmoil. The dramatic decrease in the rate of economic growth has been the most striking result of the external debt crisis for the Brazilian economy in the eighties. As seen in Table 2.0, real GDP annual growth slowed down from an average rate of 8.4% between 1970 and 1980 to only 1.5% from 1980 to 1990. This slower growth was also much more erratic, plagued by mounting uncertainty related to high inflation and dramatic changes of macroeconomic policies.<sup>3</sup>

From the early seventies to the mid-eighties, the Brazilian economy suffered a series of important external shocks which had great impact on the public sector accounts as response to the external difficulties and domestic pressures faced by the Brazilian economy along the period were absorbed by the public budget. At first, during the growth-cum-debt period of the seventies, the public sector played an important role as an investor in the leading sectors, as a source of long-run finance for the import-substituting and export promoting program, that was the core of the long-run strategy of adjustment of the Brazilian economy to the oil shocks. Inflationary pressures of an overheated

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<sup>3</sup> For a description of these policies see Carneiro [1987] and Modiano [1989].

TABLE 2.0

BRAZILIAN ECONOMY : Some Background Data (1970-1991)

	Real GDP Growth (%)	Wholesale Prices (1) (%)	Consumer Prices (1) (%)	Real Exchange Rate (1)	Effective Exchange Rate (2)	M/Y (%)	X/Y (%)
1970	7.75	18.49	20.95	243.30	86.48	5.92	6.47
1971	11.41	21.44	18.10	231.62	84.85	6.64	5.94
1972	11.95	15.94	14.01	219.45	85.15	7.25	6.83
1973	13.94	15.53	13.69	190.07	85.54	7.41	7.42
1974	8.25	35.40	33.85	166.82	87.25	11.52	7.24
1975	5.12	29.35	31.19	157.42	89.28	9.45	6.71
1976	10.17	44.90	44.84	147.03	87.50	8.06	6.61
1977	4.93	35.51	43.07	141.60	87.50	6.81	6.87
1978	4.93	42.97	38.15	128.07	86.73	6.83	6.32
1979	6.77	80.09	75.98	139.57	93.69	8.17	6.89
1980	9.11	121.35	86.35	100.00	100.00	9.77	8.57
1981	-4.39	94.29	100.60	100.59	90.45	8.39	8.84
1982	0.57	97.72	101.81	100.03	91.67	6.89	7.17
1983	-3.41	234.04	177.88	115.44	112.62	7.59	10.78
1984	5.28	230.30	208.70	111.14	111.00	6.66	12.93
1985	7.95	225.74	248.51	112.40	114.61	5.90	11.50
1986	7.58	62.55	63.53	101.48	102.65	5.24	8.33
1987	3.62	407.19	432.30	92.82	96.61	5.12	8.92
1988	-0.08	1050.00	1006.41	80.26	84.42	4.45	10.29
1989	3.30	1748.79	1759.16	59.90	68.56	4.09	7.69
1990	-4.04	1449.52	1651.01	64.54	60.37	4.30	6.63
1991	1.21	471.66	492.96	69.90	55.86	4.50	6.80

Note: (1) Dec./Dec.

(2) Annual Average

Sources: Getulio Vargas Foundation

economy in 1973 were exacerbated by a combination of monetization of foreign reserves with the derepression of prices in 1974.

Apprehension with the need to curb inflationary pressures and elasticity-pessimism prevented the government to devalue the cruzeiro. The crawling peg regime barely prevented a dramatic over valuation in the seventies. Control of public tariffs and industrial prices were the major instrument to curtail the acceleration of inflation in the second half of the seventies.

The attempt at making the best use of abundant foreign finance in the seventies, while adapting the economy to the price of imported oil was frustrated by the second oil price shock in 1979, followed by the interest rate increase. The growth-cum-debt strategy became unsustainable when international recession finally frustrated the growth of export proceeds, in spite of the growing export quantum. The strategy of maximization of the economy's annual growth rate had to be abandoned when the Mexican moratorium put an end to voluntary finance for the balance of payment deficits of the Brazilian economy in 1982.

The devaluation of the exchange rate in 1983 and the adjustment of the public sector in the context of an IMF-supported program played an important role in restoring the country's independence of new external loans, but at the cost of a very high rate of inflation, of 200% per year. Sustaining the level of the effective exchange rate of the 1983-85 period turned out to be impossible in the cruzado era between 1986 and 1989. The

frustrated attempts at stopping inflation by means of deindexation shocks followed by price freezes increased substantially the variance of inflation and introduced new sources of uncertainty in the Brazilian economy.

High inflation, deindexation attempts, frustrated attempts at external debt renegotiation and consequently erratic growth were the hallmark of the late eighties. Overburdened by increasing interest payments and by the 1988 Constitution commitments, the Federal budget became unsustainable by the decade's end. Furthermore, relative prices went awry in the wake of the frustrated macroeconomic shocks and repeated inflationary spurts. The exchange rate was no exception, so that by 1990 the index of effective exchange rate against the US dollar was almost 50% below its level in 1985.

The concentration of the adjustment burden on the public sector, revealed by its shrinking share in aggregate income, and the consequent disappearance of its savings capacity poses important questions on the ability of the Brazilian economy to sustain again the high average historical growth rate it was able to maintain from 1940 to 1980. That would involve a significant enhancement of the present low domestic saving effort, what could hardly be obtained without re-establishing the importance of public sector's savings.

By the end of the decade, the dangers of hyperinflation menaced regular economic relationships and economic calculus. At

the same time it meant aggravated social conflict, higher (open or disguised) unemployment, and also grimmer prospects for economic growth. The pessimism concerning the country's future was confirmed by the fall in the rate of investment coupled with lower investment productivity. That could mean slow economic growth being a more permanent phenomenon, lasting for a long time after the external debt crisis and high inflation are left behind.

## 2.2 The Fall in the Investment Ratio

Newly available national accounts data -- IBGE [1991] -- help to throw new light on the behavior of aggregate investment in the Brazilian economy in the past twenty years. The general conclusion is that there has been a significant decrease in investment as a proportion of GDP in real terms. Also that public sector investment has decreased substantially in the eighties, especially the investment of public enterprises. Finally, that the relative price of investment has changed much in the eighties, generating serious implications for the interpretation of aggregate data expressed as a proportion of nominal GDP, as will become clear in section 3 below.<sup>4</sup>

The most recent annual nominal series for aggregate investment and GDP are shown in table 2.1. The behavior of the ratio of investment to GDP from 1947 to 1990 is shown in figure

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<sup>4</sup> See Dinsmoor [1990] on this point.



TABLE 2.1

## GROSS FIXED INVESTMENT - CURRENT PRICES

( % of GDP )

Year	Ratio GFI/GDP (%)	Year	Ratio GFI/GD (%)
1947	14.89	1969	19.11
1948	12.74	1970	18.83
1949	13.03	1971	19.91
1950	12.78	1972	20.33
1951	15.45	1973	20.37
1952	14.82	1974	21.84
1953	15.06	1975	23.33
1954	15.76	1976	22.41
1955	13.49	1977	21.32
1956	14.46	1978	22.26
1957	15.04	1979	23.35
1958	16.99	1980	22.90
1959	17.99	1981	22.94
1960	15.72	1982	21.44
1961	13.11	1983	18.13
1962	15.51	1984	16.89
1963	17.04	1985	16.95
1964	14.99	1986	19.09
1965	14.71	1987	22.30
1966	15.92	1988	22.81
1967	16.20	1989	24.86
1968	18.68	1990	21.67

Source: IBGE - National Accounts Department.

2.1. The overall long-run upward trend, more modest before the mid-sixties, becomes more visible between the 14.7% observed in 1965 and the peak of 23.3% observed in 1975.

From the late seventies onwards, there seems to be a more dramatic change of behavior which is illustrated in Figure 2.2. Following the sharp fall from 23.3 in 1975 to 16.9% in 1984 -- a level typical of the period before the sixties --, figure 2.2 suggests a strong recovery to a new peak in 1989.

In view of the slow pace of economic growth in the Brazilian economy in the eighties, of the high uncertainty brought about by megainflation as well as by the repeatedly unsuccessful stabilization attempts of the second half of the eighties, the recovery in investment ratio after 1984 seems hard to fit the overall picture of the economy.

The puzzle is solved when one isolates the effects of different price deflators. Table 2.2 contains data for investment and GDP at 1980 prices, and the corresponding quotient. The result is pictured at Figure 2.3, where one may see that the apparent recovery in the investment in the second half of the eighties turns out to be essentially a relative price phenomenon, except for the short-lived recovery of 1986, in the wake of the Cruzado Plan demand boom. Figure 2.4 shows what happened to the investment deflator relative to GDP deflator. One may see that the slight upward trend from 1973 to 1982 turned negatively sloped between 1982 to 1986, but the range of relative price movements for this

FIGURE 2.1

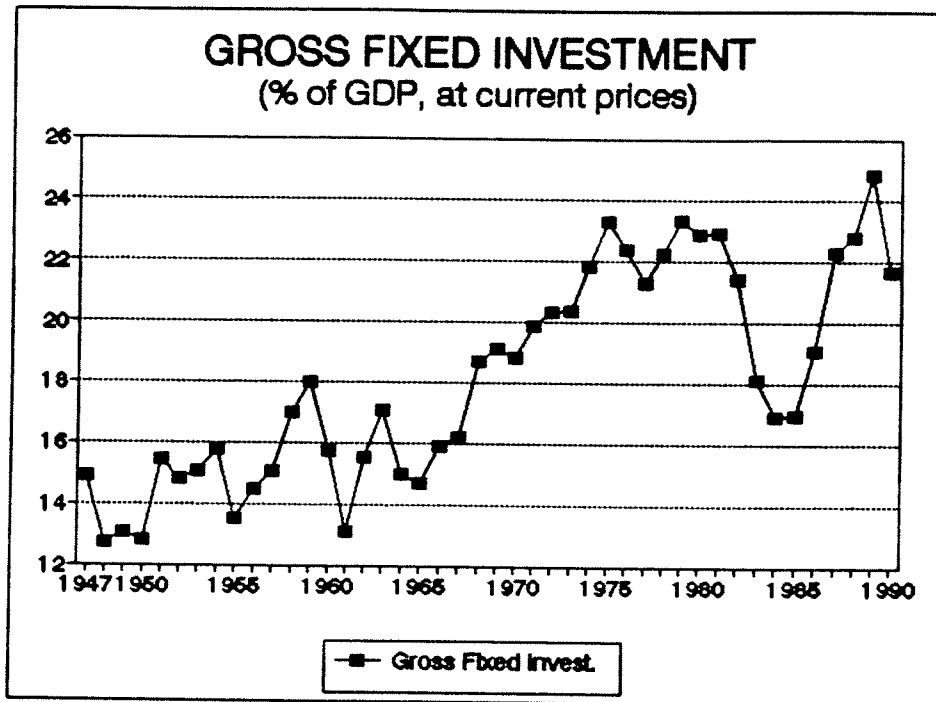


FIGURE 2.2

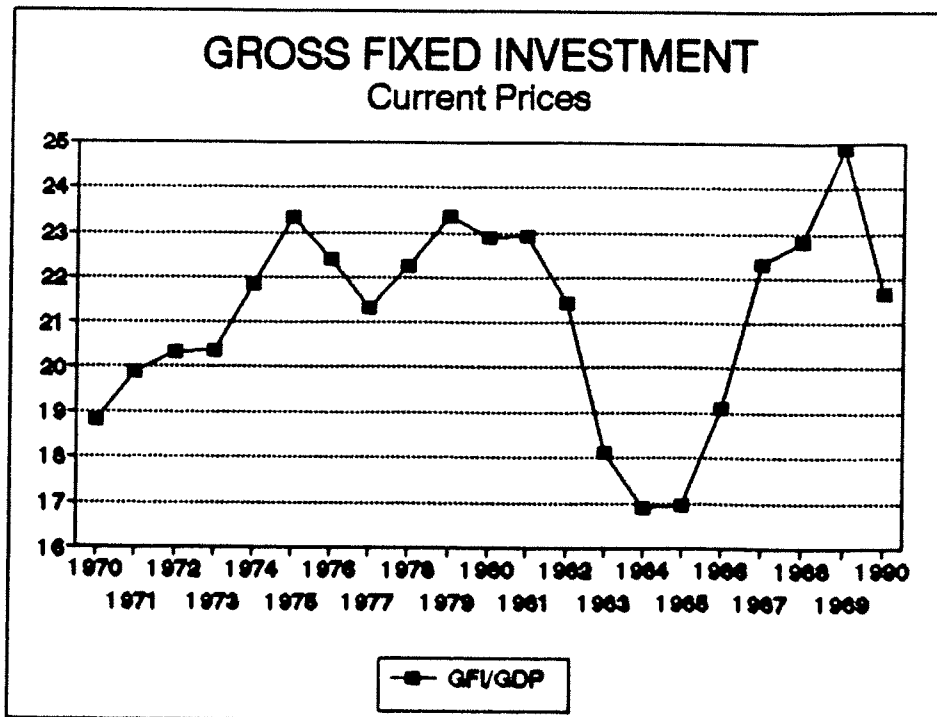


TABLE 2.2

## GROSS FIXED INVESTMENT - 1980 PRICES

CR\$ 1000

Year	GFI	GDP	GFI/GDP (%)
1970	1,115	5,419	20.57
1971	1,286	6,037	21.30
1972	1,501	6,758	22.20
1973	1,816	7,700	23.58
1974	2,056	8,336	24.67
1975	2,256	8,763	25.75
1976	2,415	9,654	25.01
1977	2,387	10,130	23.56
1978	2,500	10,629	23.52
1979	2,597	11,348	22.89
1980	2,835	12,382	22.90
1981	2,484	11,838	20.98
1982	2,317	11,906	19.46
1983	1,944	11,500	16.90
1984	1,968	12,107	16.26
1985	2,141	13,069	16.38
1986	2,633	14,060	18.73
1987	2,603	14,569	17.87
1988	2,477	14,557	17.02
1989	2,507	15,037	16.67
1990	2,306	14,430	15.98

Source: IBGE - National Accounts Department.

FIGURE 2.3

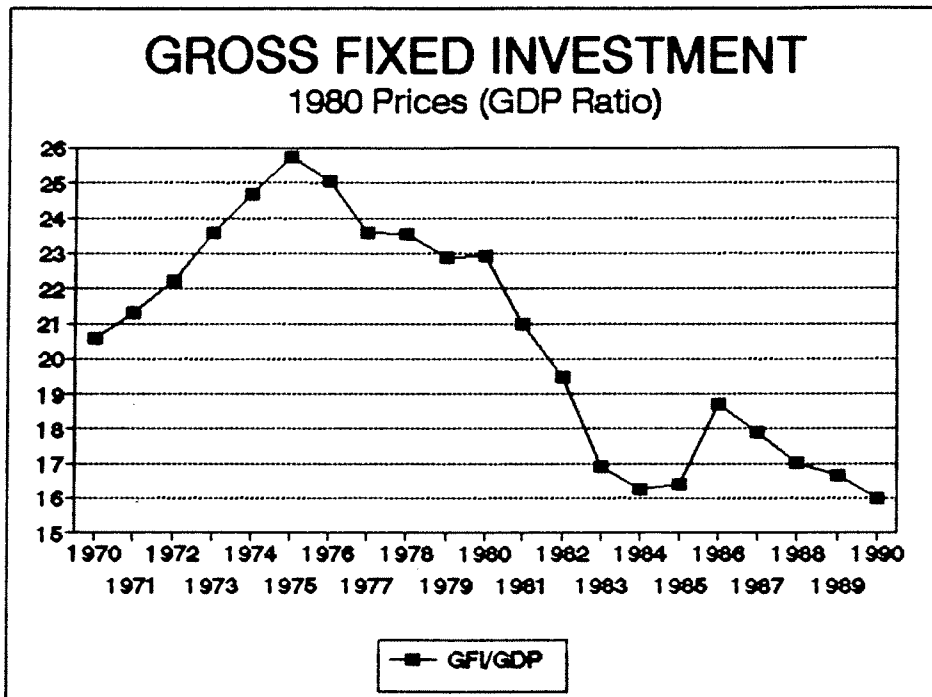
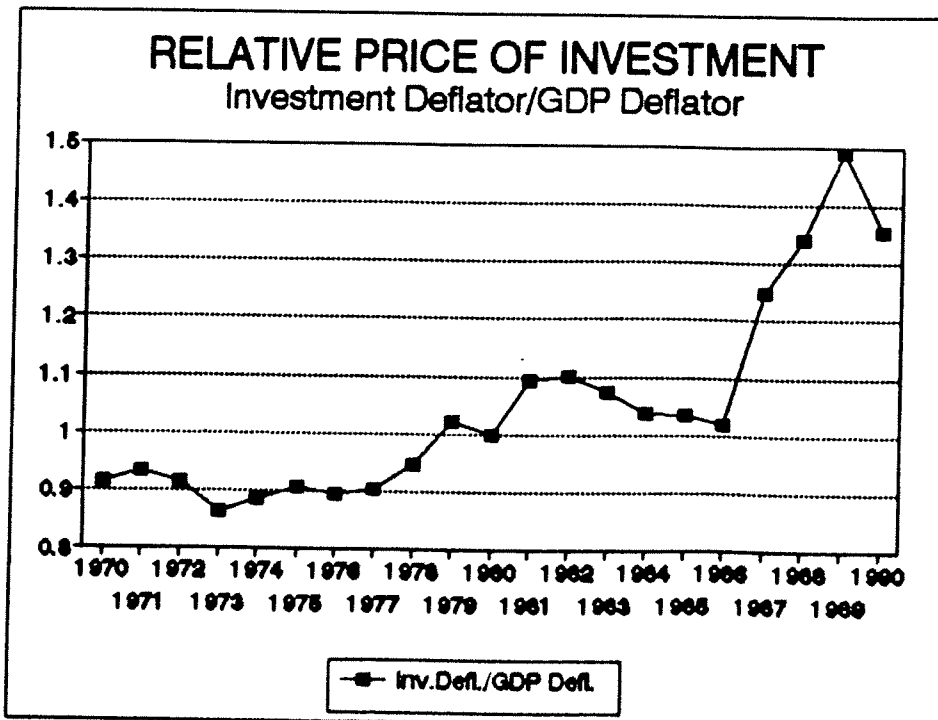


FIGURE 2.4



whole period is less than 20%, in sharp contrast with the behavior after 1986. From 1986 and 1989, the investment deflator rises more than 46% relatively to the price deflator of GDP.

The reason for this sharp rise in the relative prices of investment goods in the second half of the eighties remains to be explained. A closer look into the components of aggregate investment may help to understand what are the phenomena behind this unusually rapid change in relative prices.

This is done in two steps. Total investment consists of expenditures in construction of buildings and structures (b&e), and machinery and equipment (m&e). First, we consider the two components of aggregate investment, namely, building & structures on the one side and machinery & equipment, on the other, at constant 1980 prices. It is clear then that the recovery observed in total investment after 1986 was particular to the building & structures component, as the item labeled machinery & equipment (m&e), although keeping its share in total investment at current prices as may be seen on Table 2.3, remained practically constant in real terms between 1986 (7.39) and 1989 (7.25).<sup>5</sup>

Although there is no published implicit deflator for each component of total investment, one may have an idea of the relative behavior of the first component, by checking the "National Construction Price Index (INCC)" calculated by Vargas

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5      Figures measured in 1980 Cr\$ 10<sup>11</sup>.

TABLE 2.3

CAPITAL ACCOUNT - 1970-90 (as % of total gross investment)

Year	Building and Structures (1)			Equipment (2)			Others (3)	Fixed Gross Investment (1)+(2)+(3)	Inventory Investment (4)	Total Fixed Gross Investment (1)+(2)+(3)+(4)
	Public Administ.	Households and Firms	Total	Public Administ.	Households and Firms	Total				
	1970	17.3	35.8	53.1	4.2	33.3				
1971	17.3	35.7	53.0	2.9	36.8	39.7	1.0	93.6	6.4	100.0
1972	14.9	39.9	54.8	3.5	36.6	40.0	1.1	95.9	4.1	100.0
1973	13.5	41.2	54.8	3.3	33.3	36.6	1.0	92.4	7.6	100.0
1974	13.3	39.5	52.9	2.5	33.3	35.9	1.1	89.9	10.1	100.0
1975	13.2	39.0	52.2	2.2	35.2	37.4	1.2	90.8	9.2	100.0
1976	15.0	42.3	57.3	2.5	35.8	38.3	1.7	97.3	2.7	100.0
1977	12.7	46.4	59.1	2.2	33.5	35.7	1.9	96.8	3.2	100.0
1978	11.6	46.1	57.6	2.1	33.5	35.6	3.4	96.7	3.3	100.0
1979	9.2	53.9	63.1	1.5	33.3	34.8	3.1	101.0	(1.0)	100.0
1980	8.9	50.5	59.3	1.3	33.7	35.0	3.8	98.1	1.9	100.0
1981	9.6	53.2	62.8	1.6	31.6	33.3	3.3	99.4	0.6	100.0
1982	9.2	57.8	67.0	1.9	30.1	32.0	2.6	101.6	(1.6)	100.0
1983	9.1	63.2	72.3	1.8	31.1	32.9	3.4	108.7	(8.7)	100.0
1984	9.8	62.7	72.5	2.3	30.9	33.2	1.5	107.3	(7.3)	100.0
1985	9.8	50.2	60.0	2.3	24.0	26.2	2.0	88.3	11.7	100.0
1986	12.7	57.8	70.5	3.4	22.7	26.1	3.3	100.0	.	100.0
1987	11.9	59.9	71.8	2.5	23.1	25.6	2.6	100.0	.	100.0
1988	11.4	55.7	67.1	2.5	27.8	30.3	2.6	100.0	.	100.0
1989	9.9	61.3	71.2	1.9	24.3	26.2	2.6	100.0	.	100.0
1990	11.5	55.2	66.6	4.7	25.5	30.2	3.2	100.0	.	100.0

Note: Inventory investment has been included in consumption expenditures since 1986.

Source: IBGE - National Accounts Department.

Foundation, while the price behavior of the second component may be evaluated by the Wholesale Price Index of Machines and Equipment calculated monthly by Vargas Foundation.<sup>6</sup>

The price of m&e rose 42,4% relatively to the GDP deflator between 1986 and 1989, an increase some 2.5% less than the investment deflator relatively to GDP deflator (Figure 2.5). This may be interpreted as a visible consequence both of the low level of capacity utilization of the capital goods industry and the high levels of protection enjoyed by this industry, which was one of the most important beneficiaries of the protected industrialization drive of the second half of the seventies.

In a second step one may check what happened to the price of construction. There was a significant fall in the relative price of construction from 1980 and 1986 of 11.6% relative to the GDP deflator (13.4% relatively to the investment deflator). And yet the decline in "building and structures" component of total investment is less than the fall observed in total investment. This means that this component was less affected by the cuts in investment programs during the years of the "debt crisis". After 1986, there is a strong recovery, of more than 38% (mainly concentrated in 1989) in the relative price of residential construction, measured by the INCC index, but this recovery is smaller than the one observed in the total investment deflator,

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<sup>6</sup> It should be kept in mind that the National Construction Price Index (INCC) refers to residential construction and not to heavy construction.



FIGURE 2.5

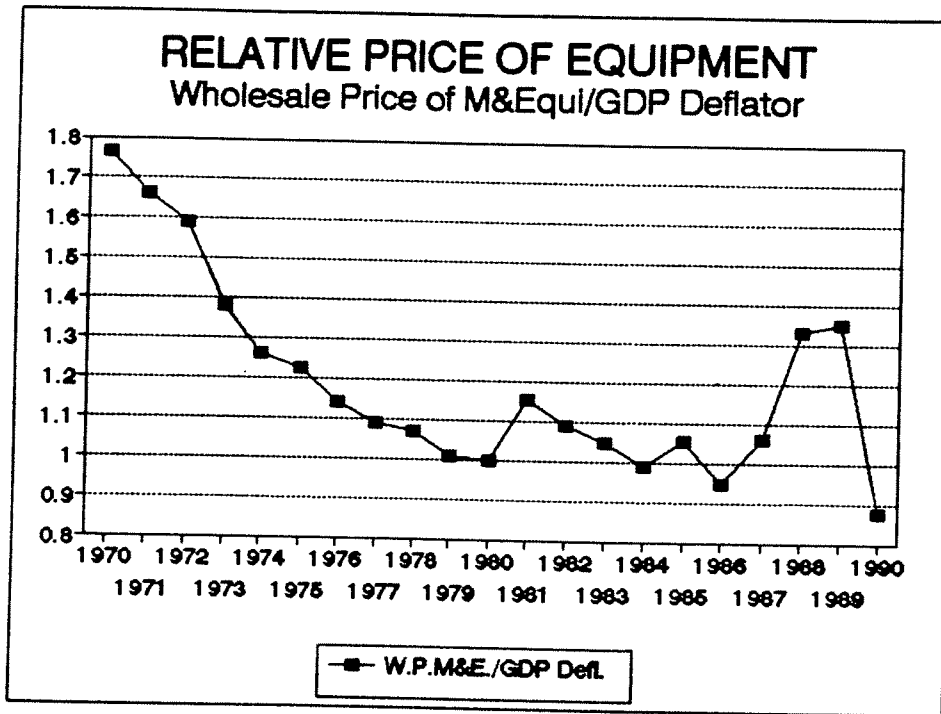
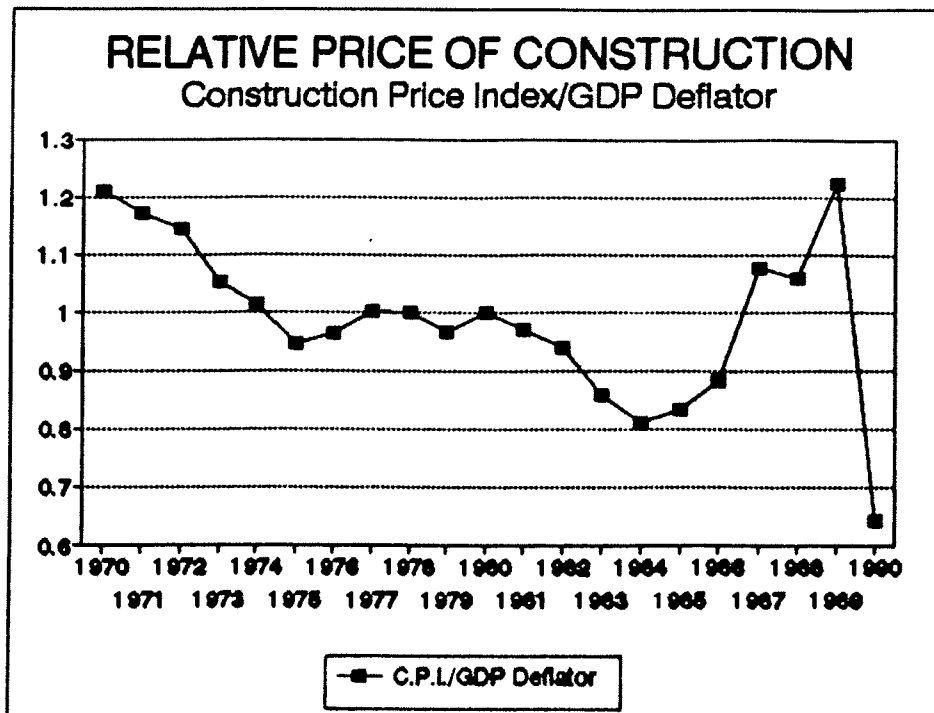


FIGURE 2.6



relative to GDP deflator. This may suggest that the price of heavy construction content in the investment deflator may have increased significantly after 1986.

There is a possible explanation. The Cruzado stabilization experiment in March 1986 inaugurated a series of interventions in the mechanisms of monetary correction which has been an essential element in the long run contracts which are typical of heavy construction.<sup>7</sup> The relative increase in the price of construction may be the consequence of an increase in unit prices as a reaction to higher uncertainty with regard to indexation rules. This has, of course, a serious implication for the total cost of investment, and explains part of the difference between the constant price and the current price investment ratio in the second half of the eighties.

The main conclusion which stands out from the above remarks is that the observed diversity between the behavior of investment at constant prices and at current prices, as a proportion of GDP, reveals a phenomenon which may be of extreme relevance for the interpretation of the long run costs for the Brazilian economy, of the balance of payments crises since the first half of the eighties. In sections 3 and 5 below this topic will be of utmost important as the design of policies directed toward savings mobilization and investment recovery are discussed.

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See Modiano [1989].

### 2.3 The Behavior of Public Investment

The fall in investment associated with the overall slowdown of the Brazilian economic growth in the eighties cannot be analyzed without reference to the separation between public and private investment in the decade. The breakdown of total investment from 1970 to 1990 is presented in table 2.4.

Most public investment in Brazil is carried on by public enterprises and not by government properly. However, official national accounts data on aggregate investment in Brazil treat investment expenditures by public enterprises as private sector investment. The national accounts consider government investment to be simply "public administration" capital expenditures. Independent data, however, allows the estimation of federal enterprises' investment, which comprises most of the total public enterprises' investment.

Figure 2.7 shows the behavior of both parts of public sector investment as a proportion of GDP at current prices. During the two decades the variance of public enterprises investment was strikingly larger than that of government investment. From 1973 to 1982, public enterprises played a key role in the import substitution and export promotion program which was the core of the adjustment to the external difficulties imposed by the oil shocks. Peak public investment expenditures, corresponding to more than 11% of GDP, or more than 50% of the economy's total investment, was reached in 1978-79.

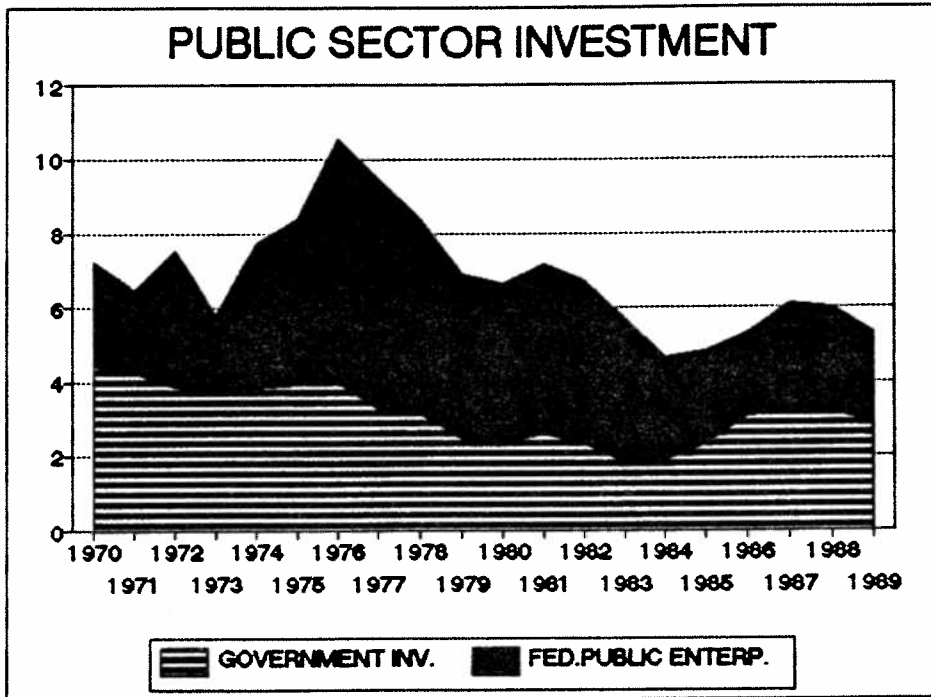
TABLE 2.4

INVESTMENT ( as % of GDP )

Year	Total Investment	General Government Investment	Federal		Private Investment	Others
			Enterprises Investment	Public		
1970	18.83	4.42	2.83		11.37	0.21
1971	19.91	4.28	2.25		13.17	0.21
1972	20.33	3.88	3.66		12.56	0.22
1973	20.37	3.71	2.09		14.34	0.23
1974	21.84	3.86	3.95		13.77	0.28
1975	23.33	3.95	4.47		14.60	0.31
1976	22.41	4.03	6.54		11.44	0.39
1977	21.32	3.29	6.20		11.41	0.43
1978	22.26	3.15	5.30		13.03	0.78
1979	23.35	2.47	4.46		15.71	0.71
1980	22.90	2.37	4.30		15.35	0.89
1981	22.94	2.60	4.58		15.00	0.77
1982	21.44	2.35	4.40		14.13	0.55
1983	18.13	1.83	3.87		11.87	0.57
1984	16.89	1.90	2.79		11.95	0.24
1985	16.95	2.32	2.53		11.71	0.38
1986	19.09	3.08	2.25		13.13	0.64
1987	22.30	3.21	2.91		15.61	0.58
1988	22.81	3.17	2.86		16.19	0.59
1989	24.86	2.93	2.40		18.88	0.64
1990	21.67	3.50	1.45		16.04	0.68

Sources: IBGE - National Accounts Department  
 Centro de Estudos Fiscais/IBRE/FGV

FIGURE 2.7



From 1979 to 1984 there was a consistent effort to cut back public enterprises investment, within a broader policy aiming at enhancing government's control on these enterprises, through a special agency empowered to exert such control. This effort was inspired in the need to increase the effectiveness of fiscal policy as part of anti-inflation policy, giving government the possibility of determining not only its own expenditures but also those of public enterprises.<sup>8</sup> In 1984 that effort had managed to reduce total public investment to less than 5% of GDP and public enterprises capital expenditures to less than 3% of GDP. The relatively small increase in the importance of public investment from 1984 to 1987 was largely due to a recovery of government investment.

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8 See Werneck [1987a].

### 3. The Financing of Investment

The objective of this section is to review the behavior of the different components of savings in the period 1970/90. The idea is to identify what happened with public as compared to private savings, as well as to check the pattern of foreign savings defined by the excess of net foreign transfers (equal to the excess of the trade and non factor services deficit over net factor income sent abroad).

It is of interest to policy design to assess to what extent the fall in investment may be associated with shrinking sources of finance, as obviously occurred in the case of public funds and flows from abroad. Aggregate savings data obtained from National Accounts were decomposed into public, private and foreign, and some attempt has been made (not always successfully) at distinguishing between primary savings and interest payments at all three levels. The major traditional difficulty of obtaining this type of decomposition, of course, has been the lack of official data on public savings encompassing public enterprises, as well as the difficulties to make consistent estimates from primary savings to net savings due to the inexistence of a fund of flows account where one could evaluate transfer of funds between the private and the public sector and the rest of the world.

The Central Bank has recently published fresh official data on the evolution of public savings which allowed the estimation of the data described in Tables 3.1. and 3.2. They are

also the main source for the decompositions of the fall in government savings performed later in section 4. Since government savings have been found to be at the heart of the Brazilian growth crisis -- and are a crucial matter for restoration of economic growth -- the possibilities for their recovery will be one major concern of the remainder of this paper and concluding section.

Table 3.1 is the main source for the analysis in this section. In the notes to the Table the sources of raw data as well as the criteria utilized in an attempt to obtain consistent estimates are reported. Lines 1 through 3 have been obtained from Table 3.2. Net foreign transfers and foreign factor income have been estimated from IMF Balance of Payments Statistics breakdown of the capital account. From the capital account of the National Accounts tables lines 10 through 13 were obtained. Finally, lines 14 and 15 present the relative price change and gross investment at fixed (1980) prices respectively.

### 3.1 The Importance of Foreign Savings

Figure 3.1 shows the evolution of aggregate savings as a proportion of GDP in the period. The rise in total investment and savings in the first half of the seventies occurred mainly due to an increase in foreign savings following the attempt at opening up the economy in the wake of the Brazilian economic miracle. Abundant foreign finance permitted the sharp rise in the current account deficit due to the first oil shock to be financed by



FIGURE 3.1

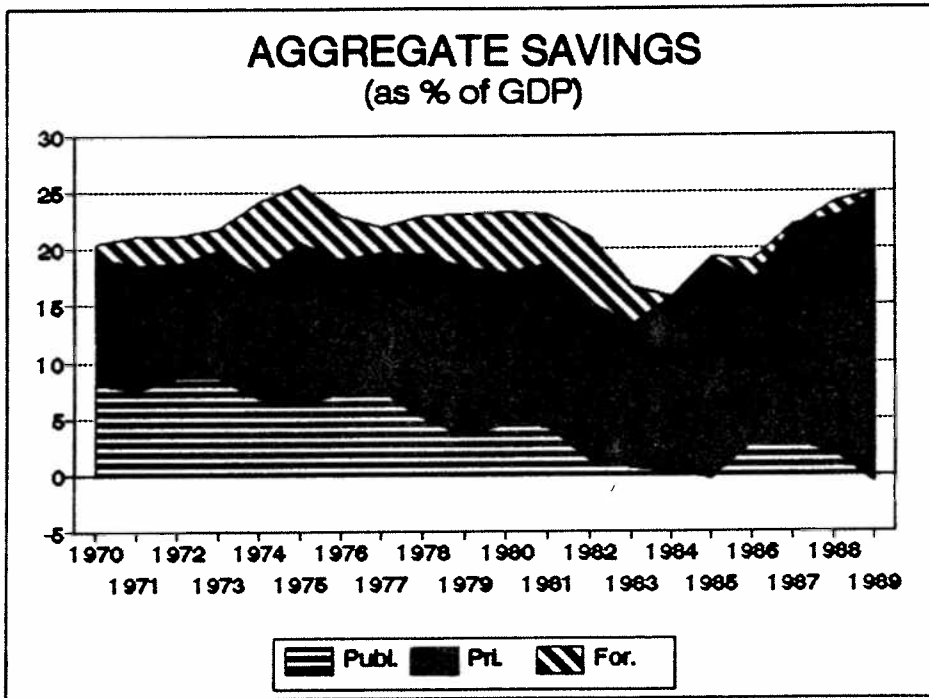
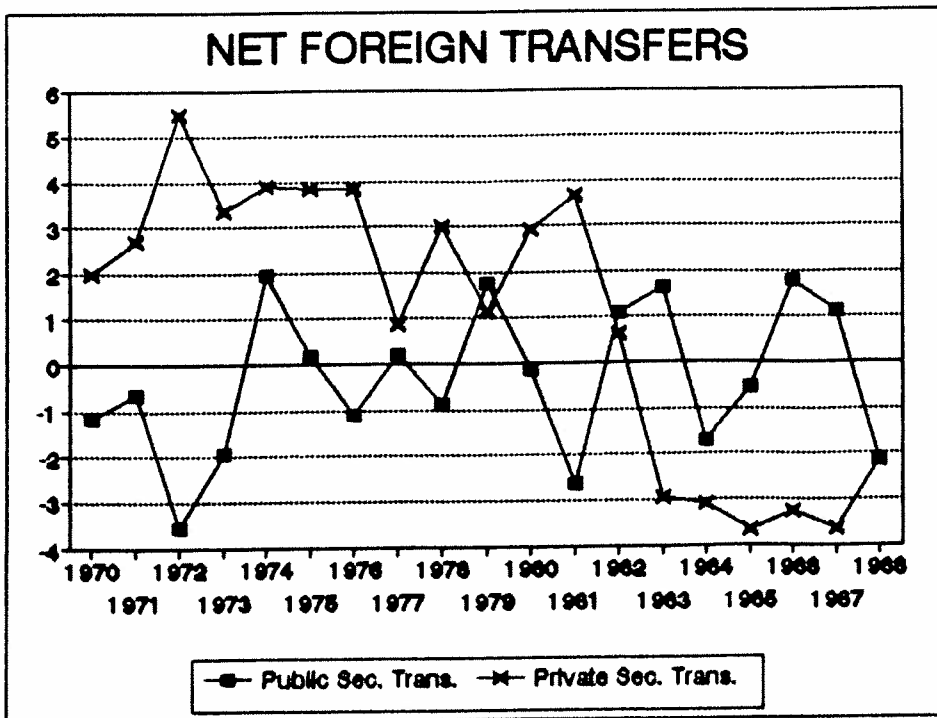


FIGURE 3.2



increased foreign transfers of real resources. There was a slight decrease in public savings and practically no increase in private savings as a proportion of GDP.

In sharp contrast with what happened in the seventies, the contribution of foreign savings for the financing of the investment effort in the Brazilian economy has been shrinking in the eighties. Following the external debt crisis in 1982/83, when current account deficits of 5.8 and 3.4% of GDP respectively remained by and large financed by arrears, the contribution of foreign savings has been negligible for most years, being negative for 1984, 1988 and 1989, as may be seen in table 3.1.

When one separates foreign savings into its components -- foreign resource transfers (line 7) and foreign factor income (line 8) -- it is possible to verify that, as interest payments on accumulated debt gradually corresponded to most of foreign factor income, there was first a decline in foreign transfers from a record high of 6.45% of GDP in 1974 to the first years of the eighties, becoming negative from 1983 onwards (figure 3.2). After the debt crisis of 1982/83, two things stand out as elements of the loss of importance of foreign savings: that the country becomes a net exporter of goods and services, and that this transfer of real resources abroad is done fundamentally by the public sector -- as can be seen in line 7 of table 3.1 -- as the interest payments burden becomes essentially a public sector problem with the transfer of external debt to government. The sharp rise and fall of net foreign factor income in the period may

TABLE 3.1

		AGGREGATE SAVINGS AND INVESTMENT 1970-90 (as % of GDP in current domestic prices)						
		1970	1971	1972	1973	1974	1975	1976
1	PUBLIC SECTOR PRIMARY SAVINGS (before net interest)	8.69	8.04	9.15	9.19	7.40	6.91	8.02
2	PUBLIC SEC. INFLATION-CORRECTED NET INTEREST EXP.	0.56	0.47	0.46	0.50	0.49	0.59	0.69
	nominal interest on net public sector domestic debt	0.52	0.39	0.29	0.39	0.40	0.38	0.49
	nominal interest on net public sector foreign debt *	0.04	0.08	0.17	0.11	0.09	0.21	0.20
3	PUBLIC SECTOR SAVINGS (1-2)	8.13	7.57	8.69	8.69	6.91	6.32	7.33
4	PRIVATE SECTOR PRIMARY SAVINGS (or Private sector savings before net interest exp.)	11.04	11.15	10.13	11.43	11.05	14.79	12.28
5	PRIVATE SEC. INFLATION-CORRECTED NET INT. EXP.	-0.06	0.12	0.15	0.08	0.10	0.57	0.49
	nom. interest received on public sec. domestic debt (a)	0.52	0.39	0.29	0.39	0.40	0.38	0.49
	nominal interest paid on net private foreign debt (b)	0.24	0.28	0.30	0.28	0.28	0.57	0.54
	Error due to inconsistencies [ 5 - (b-a) ]	0.23	0.23	0.14	0.19	0.22	0.37	0.44
6	PRIVATE SECTOR SAVINGS (4-5)	11.10	11.03	9.98	11.35	10.95	14.22	11.80
7	NET FOREIGN TRANSFERS (equal to the trade and non-factor services deficit in the current acc. of B/P)	0.81	2.07	1.93	1.43	5.86	4.00	2.73
	net transfers to the public sector	-1.16	-0.64	-3.55	-1.95	1.95	0.17	-1.11
	net transfers to the private sector	1.97	2.71	5.48	3.37	3.91	3.83	3.84
8	NET FOREIGN FACTOR INCOME	0.50	0.59	0.61	0.58	0.59	1.16	1.18
	interest on public sec. foreign debt	0.27	0.31	0.31	0.30	0.31	0.58	0.64
	interest on private sec. foreign debt	0.24	0.28	0.30	0.28	0.28	0.57	0.54
9	FOREIGN SAVINGS (7+8)	1.32	2.66	2.53	2.01	6.45	5.16	3.91
10	AGGREGATE SAVINGS (3+6+9 = 1+4+7)	20.54	21.26	21.21	22.04	24.31	25.70	23.03
11	GROSS FIXED INVESTMENT	18.83	19.91	20.33	20.37	21.84	23.33	22.41
	public sector gross fixed investment	7.25	6.53	7.55	5.80	7.80	8.42	10.57
	private sector gross fixed investment	11.58	13.38	12.78	14.57	14.04	14.91	11.84
12	INVENTORY INVESTMENT	1.71	1.35	0.88	1.68	2.47	2.37	0.62
13	GROSS INVESTMENT ( 11+12 = 10)	20.54	21.26	21.21	22.04	24.31	25.70	23.03
14	RELATIVE PRICE CORRECTION (imp. price deflator of gross fixed investment/imp. price deflator of GDP)	91.6	93.5	91.6	86.4	88.6	90.6	89.6
15	FIXED GROSS INVESTMENT AT CONSTANT PRICES (11/14)	20.56	21.29	22.20	23.57	24.65	25.75	25.01

Note: \* Public Enterprises not included.

From 1970 to 1982, these interest payments are simply "transfers abroad" from the National Accounts.

From 1983 on, these payments are Central Bank's estimates, based upon balance of payments data.

Inventory investment included in the Household's Final Consumption after 1985.

Other investments included in private sector gross fixed investment.

TABLE 3.1 (cont.)

		AGGREGATE SAVINGS AND INVESTMENT 1970-90 (as % of GDP in current domestic prices)						
		1977	1978	1979	1980	1981	1982	1983
1	PUBLIC SECTOR PRIMARY SAVINGS (before net interest)	8.24	5.72	4.31	5.80	5.65	3.71	3.57
2	PUBLIC SEC. INFLATION-CORRECTED NET INTEREST EXP.	0.66	0.67	0.84	1.13	1.37	2.31	2.95
	nominal interest on net public sector domestic debt	0.48	0.47	0.55	0.76	1.08	1.17	1.55
	nominal interest on net public sector foreign debt *	0.18	0.20	0.29	0.37	0.29	1.14	1.40
3	PUBLIC SECTOR SAVINGS (1-2)	7.58	5.05	3.47	4.67	4.28	1.40	0.62
4	PRIVATE SECTOR PRIMARY SAVINGS (or Private sector savings before net interest exp.)	12.70	15.14	15.89	14.71	16.40	15.64	14.42
5	PRIVATE SEC. INFLATION-CORRECTED NET INT. EXP.	0.53	0.64	1.03	1.50	2.04	1.74	1.72
	nom. interest received on public sec. domestic debt (a)	0.48	0.47	0.55	0.76	1.08	1.17	1.55
	nominal interest paid on net private foreign debt (b)	0.51	0.50	0.68	0.80	1.00	1.30	1.48
	Error due to inconsistencies [ 5 - (b-a) ]	0.50	0.61	0.90	1.46	2.12	1.62	1.79
6	PRIVATE SECTOR SAVINGS (4-5)	12.17	14.50	14.85	13.22	14.36	13.90	12.70
7	NET FOREIGN TRANSFERS (equal to the trade and non-factor services deficit in the current acc. of B/P)	1.08	2.16	2.93	2.83	1.03	1.74	-1.31
	net transfers to the public sector	0.21	-0.88	1.76	-0.11	-2.62	1.11	1.65
	net transfers to the private sector	0.87	3.04	1.17	2.94	3.66	0.63	-2.95
8	NET FOREIGN FACTOR INCOME	1.19	1.31	1.87	2.63	3.41	4.05	4.67
	interest on public sec. foreign debt	0.68	0.81	1.19	1.83	2.41	2.76	3.19
	interest on private sec. foreign debt	0.51	0.50	0.68	0.80	1.00	1.30	1.48
9	FOREIGN SAVINGS (7+8)	2.28	3.47	4.80	5.45	4.44	5.79	3.37
10	AGGREGATE SAVINGS (3+6+9 = 1+4+7)	22.03	23.03	23.13	23.34	23.08	21.09	16.68
11	GROSS FIXED INVESTMENT	21.32	22.26	23.35	22.90	22.94	21.44	18.13
	public sector gross fixed investment	9.49	8.45	6.94	6.66	7.17	6.75	5.69
	private sector gross fixed investment	11.83	13.81	16.42	16.24	15.77	14.69	12.44
12	INVENTORY INVESTMENT	0.70	0.77	-0.22	0.44	0.15	-0.34	-1.45
13	GROSS INVESTMENT ( 11+12 = 10)	22.03	23.03	23.13	23.34	23.08	21.09	16.68
14	RELATIVE PRICE CORRECTION (imp. price deflator of gross fixed investment/imp. price deflator of GDP)	90.5	94.6	102.1	100.0	109.3	110.2	107.3
15	FIXED GROSS INVESTMENT AT CONSTANT PRICES (11/14)	23.56	23.53	22.87	22.90	20.98	19.46	16.90

TABLE 3.1 (cont.)

		AGGREGATE SAVINGS AND INVESTMENT 1970-90 (as % of GDP in current domestic prices)						
		1984	1985	1986	1987	1988	1989	1990
1	PUBLIC SECTOR PRIMARY SAVINGS (before net interest)	4.10	3.59	5.32	5.15	5.10	2.16	
2	PUBLIC SEC. INFLATION-CORRECTED NET INTEREST EXP.	3.76	3.81	2.42	2.28	3.01	2.68	0.13
	nominal interest on net public sector domestic debt	2.08	2.30	1.19	1.01	1.58	1.44	-1.09
	nominal interest on net public sector foreign debt *	1.68	1.51	1.23	1.27	1.43	1.24	1.22
3	PUBLIC SECTOR SAVINGS (1-2)	0.34	-0.22	2.90	2.87	2.09	-0.52	
4	PRIVATE SECTOR PRIMARY SAVINGS (or Private sector savings before net interest exp.)	16.44	19.78	15.25	19.65	21.99	25.06	
5	PRIVATE SEC. INFLATION-CORRECTED NET INT. EXP.	1.01	0.47	1.03	0.71	-0.01	-0.56	
	nom. interest received on public sec. domestic debt (a)	2.08	2.30	1.19	1.01	1.58	1.44	-1.09
	nominal interest paid on net private foreign debt (b)	1.18	0.86	0.59	0.39	0.37	0.24	0.19
	Error due to inconsistencies [ 5 - (b-a) ]	1.91	1.91	1.63	1.32	1.20	0.64	
6	PRIVATE SECTOR SAVINGS (4-5)	15.42	19.31	14.23	18.95	22.00	25.61	
7	NET FOREIGN TRANSFERS (equal to the trade and non-factor services deficit in the current acc. of B/P)	-4.80	-4.17	-1.48	-2.50	-4.28	-2.35	-1.40
	net transfers to the public sector	-1.70	-0.52	1.78	1.13	-2.14		
	net transfers to the private sector	-3.09	-3.65	-3.26	-3.63	-2.14		
8	NET FOREIGN FACTOR INCOME	4.77	4.28	3.45	2.99	3.00	2.12	1.90
	interest on public sec. foreign debt	3.59	3.42	2.86	2.59	2.63	1.89	1.71
	interest on private sec. foreign debt	1.18	0.86	0.59	0.39	0.37	0.24	0.19
9	FOREIGN SAVINGS (7+8)	-0.02	0.11	1.97	0.49	-1.28	-0.23	0.50
10	AGGREGATE SAVINGS (3+6+9 = 1+4+7)	15.74	19.20	19.09	22.30	22.81	24.86	21.67
11	GROSS FIXED INVESTMENT	16.89	16.95	19.09	22.30	22.81	24.86	21.67
	public sector gross fixed investment	4.69	4.85	5.33	6.12	6.03	5.34	4.95
	private sector gross fixed investment	12.19	12.10	13.76	16.18	16.79	19.53	16.72
12	INVENTORY INVESTMENT	-1.15	2.25	-	-	-	-	-
13	GROSS INVESTMENT ( 11+12 = 10)	15.74	19.20	19.09	22.30	22.81	24.86	21.67
14	RELATIVE PRICE CORRECTION (imp. price deflator of gross fixed investment/imp. price deflator of GDP)	103.9	103.5	102.0	124.8	134.1	149.1	135.6
15	FIXED GROSS INVESTMENT AT CONSTANT PRICES (11/14)	16.26	16.38	18.73	17.87	17.02	16.67	15.98

TABLE 3.1 - SOURCES

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LINE 1:	Table 3.2
2:	Table 3.2
3:	Computed by the authors.
4:	Residual ( 4 = 10 - (1+7))
5:	Residual (5 = 4 - 6)
6:	Computed by the authors.
7:	IMF - Balance of Payments Statistics, various issues.
8:	Boletim do Banco Central, various issues.
9:	IBGE - National Accounts Department.
10:	IBGE - National Accounts Department.
11:	IBGE - Nat. Accounts Dpt and IBRE - FGV (for Public Invest.)
12:	IBGE - National Accounts Department.
13:	IBGE - National Accounts Department.
14:	Computed by the authors.
15:	IBGE - National Accounts Department.

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be seen on figure 3.3, with a noticeable difference between public and private interest payments.

In most probable scenarios concerning the likely direction of foreign capital flows and external debt renegotiation, it seems realistic to assume that the future contribution of foreign savings will remain negligible at least for the rest of the nineties.

On the other hand, the nature of the foreign constraint to Brazilian economic growth as assessed in exercises with a three-gap model (Carneiro and Werneck, 1989) indicate that a very modest contribution of foreign capital of an estimated 0.5% of GDP is sufficient to alleviate the burden of foreign exchange constraints, under conservative assumptions concerning the results of foreign debt renegotiation, implying annual economies of around 20% of interest payments. In the simulations described in section 5 below, a different scenario in which foreign savings may play a critical role, in the context of a liberalized trade account, will be discussed.

The focus of the analysis will now be directed towards domestic savings, which corresponds roughly to total savings since 1984.

FIGURE 3.3

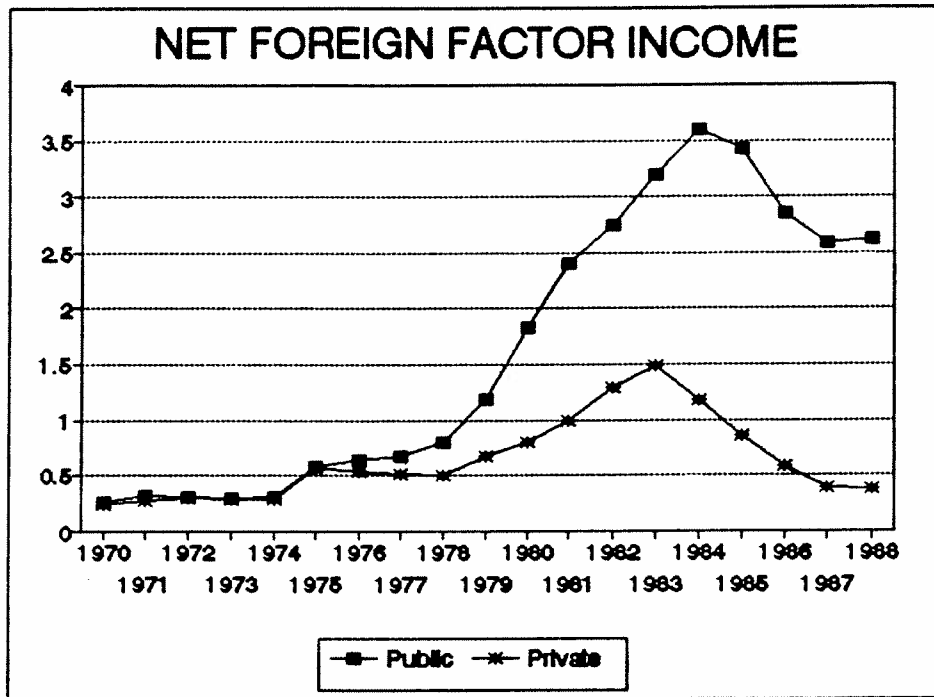
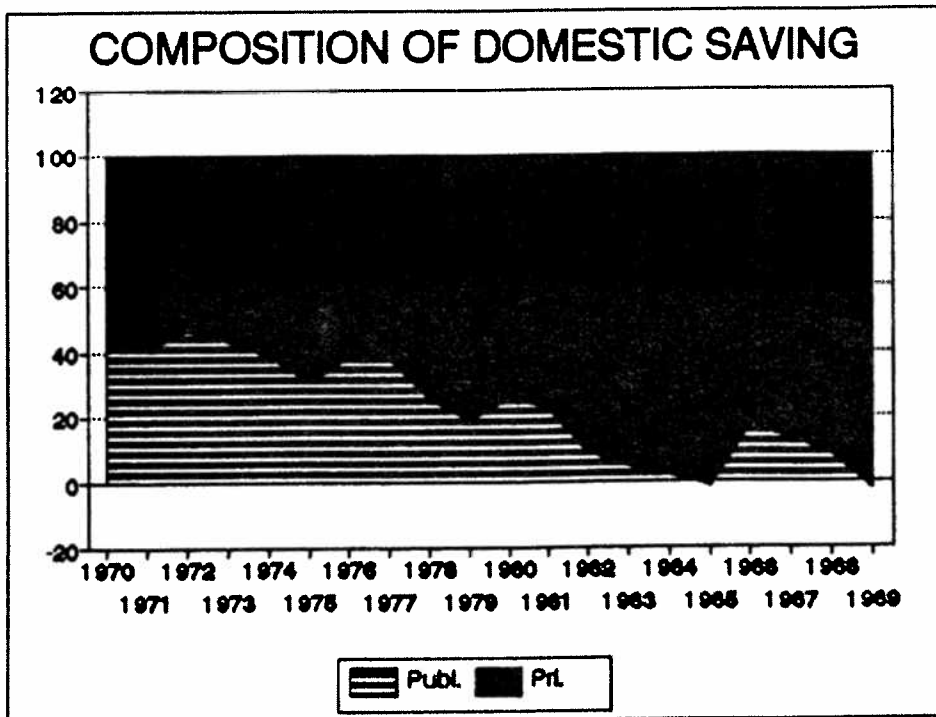


FIGURE 3.4





### 3.2 Private Savings: Adjustment or Illusion?

In Table 3.1 two types of decomposition of total savings (line 10) are shown: the traditional one of the capital account, between private, public and foreign (lines 3,6 and 9) and a decomposition between primary savings, i.e. before interest (public and private, lines 1 and 4) and interest expenditures (line 2 for public) and line 5 (for private).

Behavior of aggregate savings follows definitionally from the behavior of aggregate investment, and therefore, total savings as a proportion of GDP at current prices (line 10) present the same recovery between 1984 and 1989 as has been mentioned in section 2 above following the decline in saving/GDP ratio between 1975 and 1984.

The interesting question now is to what extent this means that there has been a significant adjustment, first of domestic savings to the loss of foreign finance, and second, of private savings to the disruption of public savings in the second half of the eighties.

Figure 3.1 dramatizes the pattern of "adjustment" of private savings to the recovery of investment precisely when foreign and public savings have lost their importance as sources of investment financing. Figure 3.4 shows the composition of domestic savings. A simple recovery story could be told: higher

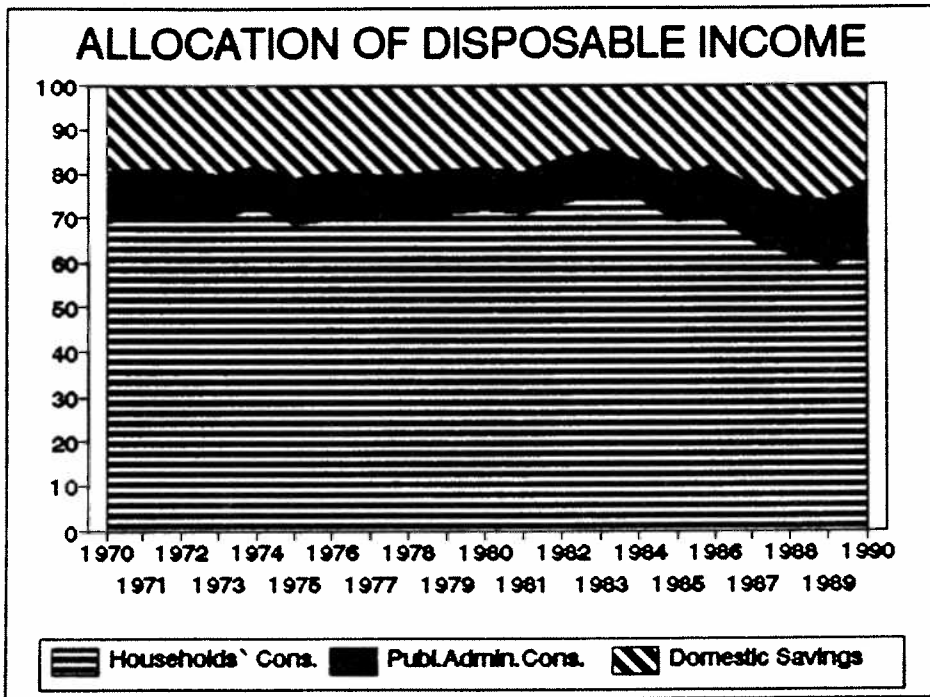
investment without either fiscal adjustment or foreign financial support led to a substitution of private savings for public and foreign.

Had the recovery of the rate of investment been a real phenomenon, this adjustment would have generated a recovery of economic growth (with a parallel recovery of investment at constant prices). In this case, the burden of adjustment of less private consumption (as a share of disposable income) -- private plus public --, as depicted in figure 3.5 could be compensated by better prospects for economic growth in the nineties.

The reality of the second half of the eighties, however, is that this sacrifice of private consumption has been the result of an entirely different process. The burden of adjustment has not been achieved through taxation but rather through more deficit and more inflation. Inflationary deficit spending meant that financing of the increased (because more expensive) investment financing requires transfers of income from the private to the public sector as well as from consumption to saving. The increase in government consumption, as seen in figure 3.5, meant that not only inflation-compressed private consumption had to bear the burden of more expensive investment and external transfers but also of increased public sector consumption.

The picture of savings and investment recovery as a share of GDP at current prices in the second half of the eighties becomes now clearer. Higher cost of investment was the result of

FIGURE 3.5



higher prices of capital goods and higher cost of construction fed by high inflation and uncertain rules presiding over long run contracts. An overburdened fiscal budget due to higher interest payments, higher government consumption after 1984 and smaller tax burden, completed the picture of high inflation which compressed household's consumption and transferred income to close the gap of investment financing needs.

Needless to say, inflationary adjustment proves to be an illusion as higher and higher rates of inflation become necessary to close the same inflationary gap. This story of hyperinflation has been, in the second half of the eighties, interrupted from time to time by a policy shock. Failure to promote fiscal adjustment so as to replace inflationary finance by higher tax collection and better spending summarizes the sad experience of Brazil in the second half of the eighties.

### 3.3 The Public Sector Saving Effort

The two decades under analysis witnessed a dramatic change in the importance of public sector savings. In the early seventies the public sector played a very important role as a saver, being responsible for more than one third of the domestic saving effort. As seen in table 3.2, lines 7 and 9, from 1970 to 1973 public sector savings were high enough not only to finance all public investment -- federal public enterprises' included -- but also to finance part of private investment, mainly through state-owned development banks.

PUBLIC SECTOR SAVINGS AND INVESTMENT, 1970-90  
(as % of GDP in current domestic prices)

	1970	1971	1972	1973	1974	1975	1976
1.CURRENT REVENUE	28.80	27.04	27.59	26.96	24.98	26.53	27.23
Taxes	20.61	19.26	19.47	18.36	18.44	17.73	17.24
Social Security Revenue	5.68	5.93	6.46	6.64	6.67	7.50	7.85
Federal Public Enterpr.' Current Account Surplus	1.41	1.02	1.85	2.11	2.00	2.03	2.36
Other Current Non-Interest Revenue	1.10	0.83	-0.19	-0.15	-2.13	-0.73	-0.22
2.CURRENT GOVERNMENT NON-INTEREST EXPENDITURE	20.11	19.00	18.44	17.77	17.58	19.62	19.21
Wages and Salaries	8.25	8.53	7.78	7.03	6.44	7.14	7.16
Other Purchase of Goods and Non-Interest Services	3.09	2.71	2.88	2.93	2.95	3.05	3.30
Subsidies	0.52	0.78	0.58	1.17	2.15	2.67	1.53
Other Current Transfer	8.25	6.98	7.20	6.64	6.04	6.76	7.22
3.SAVING BEFORE INTEREST ON GOVERNMENT DEBT (1-2)	8.69	8.04	9.15	9.19	7.40	6.91	8.02
4.NOMINAL INTEREST EXP. ( on Government Debt )	1.35	1.30	1.44	1.26	1.15	1.40	1.59
on net domestic debt.	1.31	1.22	1.27	1.15	1.06	1.19	1.39
on net ext. debt.	0.04	0.08	0.17	0.11	0.09	0.21	0.20
5.INFLATION CORRECTED NET INTEREST EXPENDITURE	0.56	0.47	0.46	0.50	0.49	0.59	0.69
on net domestic debt.	0.52	0.39	0.29	0.39	0.40	0.38	0.49
on net ext. debt.	0.04	0.08	0.17	0.11	0.09	0.21	0.20
6.SAVING AFTER NOMINAL NET INTEREST (3-4)	7.34	6.74	7.71	7.93	6.25	5.51	6.43
7.SAVING AFTER INFLATION CORRECTED INTEREST (3-5)	8.13	7.57	8.69	8.69	6.91	6.32	7.33
8.CAPITAL EXPENDITURE - GROSS FIXED INVESTMENT	7.25	6.53	7.55	5.80	7.80	8.42	10.57
Government	4.42	4.28	3.88	3.71	3.86	3.95	4.03
Federal Public Enterprises	2.83	2.25	3.66	2.09	3.95	4.47	6.54
9.PSBR (primary) (8-3)	-1.44	-1.51	-1.60	-3.39	0.40	1.51	2.55
10.PSBR (operational) (8-7)	-0.88	-1.04	-1.14	-2.89	0.89	2.10	3.24
11.PSBR (nominal) (8-6)	-0.09	-0.21	-0.16	-2.13	1.55	2.91	4.14

Source: LINE

1.IBGE - National Accounts Department, ECLAC and Werneck

2.IBGE - National Accounts Department

3.Computed by the authors

4.Banco Central/Gazeta Mercantil

5.Banco Central/Gazeta Mercantil

6.Computed by the authors

7.Computed by the authors

8.IBGE - National Accounts  
Department and IBRE

9.Computed by the authors

10.Computed by the authors

11.Computed by the authors

TABLE 3.2 (Cont.)

PUBLIC SECTOR SAVINGS AND INVESTMENT, 1970-90							
(as % of GDP in current domestic prices)							
	1977	1978	1979	1980	1981	1982	1983
1.CURRENT REVENUE	26.41	25.40	23.92	26.63	25.87	24.78	24.24
Taxes	17.49	17.19	16.33	17.21	16.85	16.20	16.78
Social Security Revenue	8.16	8.49	8.33	7.49	7.80	9.06	8.29
Federal Public Enterpr.' Current Account Surplus	2.32	1.26	-0.15	2.96	2.31	0.77	0.71
Other Current Non-Interest Revenue	-1.56	-1.54	-0.59	-1.03	-1.09	-1.25	-1.54
2.CURRENT GOVERNMENT NON-INTEREST EXPENDITURE	18.17	19.68	19.61	20.83	20.22	21.07	20.67
Wages and Salaries	6.58	6.91	6.98	6.31	6.46	7.05	6.61
Other Purchase of Goods and Non-Interest Services	2.85	2.76	2.92	2.89	2.86	2.96	3.05
Subsidies	1.48	1.88	1.91	3.86	2.68	2.48	2.65
Other Current Transfer	7.26	8.13	7.80	7.77	8.22	8.58	8.36
3.SAVING BEFORE INTEREST ON GOVERNMENT DEBT (1-2)	8.24	5.72	4.31	5.80	5.65	3.71	3.57
4.NOMINAL INTEREST EXP. ( on Government Debt )	2.09	2.30	2.38	2.30	2.55	4.44	5.62
on net domestic debt.	1.91	2.10	2.09	1.93	2.26	3.30	4.22
on net ext. debt.	0.18	0.20	0.29	0.37	0.29	1.14	1.40
5.INFLATION CORRECTED NET INTEREST EXPENDITURE	0.66	0.67	0.84	1.13	1.37	2.31	2.95
on net domestic debt.	0.48	0.47	0.55	0.76	1.08	1.17	1.55
on net ext. debt.	0.18	0.20	0.29	0.37	0.29	1.14	1.40
6.SAVING AFTER NOMINAL NET INTEREST (3-4)	6.15	3.42	1.93	3.50	3.10	-0.73	-2.05
7.SAVING AFTER INFLATION CORRECTED INTEREST (3-5)	7.58	5.05	3.47	4.67	4.28	1.40	0.62
8.CAPITAL EXPENDITURE - GROSS FIXED INVESTMENT	9.49	8.45	6.94	6.66	7.17	6.75	5.69
Government	3.29	3.15	2.47	2.37	2.60	2.35	1.83
Federal Public Enterprises	6.20	5.30	4.46	4.30	4.58	4.40	3.87
9.PSBR (primary) (8-3)	1.25	2.73	2.63	0.86	1.52	3.04	2.12
10.PSBR (operational) (8-7)	1.91	3.40	3.47	1.99	2.89	5.35	5.07
11.PSBR (nominal) (8-6)	3.34	5.03	5.01	3.16	4.07	7.48	7.74

		PUBLIC SECTOR SAVINGS AND INVESTMENT, 1970-90 (as % of GDP in current domestic prices)						
		1984	1985	1986	1987	1988	1989	1990
1.	CURRENT REVENUE	:21.73	: 22.29	:25.43	:26.44	: 26.11	: 25.91	:
	Taxes	:14.79	: 15.57	:17.17	:16.28	: 15.56	: 14.56	:18.70
	Social Security Revenue	: 7.03	: 6.96	: 8.18	: 7.07	: 6.33	: 7.38	: 8.73
	Federal Public Enterpr.' Current Account Surplus	: 0.64	: 0.63	: 1.74	: 1.32	: 1.49	: -0.19	:
	Other Current Non-Interest Revenue	:-0.73	:-0.87	:-1.66	: 1.77	: 2.73	: 4.16	: 3.24
2.	CURRENT GOVERNMENT NON-INTEREST EXPENDITURE	:17.63	: 18.70	:20.11	:21.29	: 21.01	: 23.75	:25.65
	Wages and Salaries	: 5.65	: 6.94	: 7.30	: 7.77	: 7.92	: 9.72	:10.49
	Other Purchase of Goods and Non-Interest Services	:2.63	: 2.93	: 3.37	: 4.39	: 4.68	: 4.60	: 5.15
	Subsidies	: 1.59	: 1.59	: 1.47	: 1.59	: 1.23	: 1.93	: 1.72
	Other Current Transfer	: 7.76	: 7.24	: 7.97	: 7.54	: 7.18	: 7.50	: 8.29
3.	SAVING BEFORE INTEREST ON GOVERNMENT DEBT (1-2)	: 4.10	: 3.59	: 5.32	: 5.15	: 5.10	: 2.16	:
4.	NOMINAL INTEREST EXP. ( on Government Debt )	: 7.96	:12.63	:11.93	:11.22	:17.58	:23.66	:16.42
	on net domestic debt.	: 6.28	:11.12	:10.70	: 9.95	:16.15	:22.42	:15.20
	on net ext. debt.	: 1.68	: 1.51	: 1.23	: 1.27	: 1.43	: 1.24	: 1.22
5.	INFLATION CORRECTED NET INTEREST EXPENDITURE	: 3.76	: 3.81	: 2.42	: 2.28	: 3.01	: 2.68	: 0.13
	on net domestic debt.	: 2.08	: 2.30	: 1.19	: 1.01	: 1.58	: 1.44	:-1.09
	on net ext. debt.	: 1.68	: 1.51	: 1.23	: 1.27	: 1.43	: 1.24	: 1.22
6.	SAVING AFTER NOMINAL NET INTEREST (3-4)	:-3.86	:-9.04	:-6.61	:-6.07	:-12.48	:-21.50	:
7.	SAVING AFTER INFLATION CORRECTED INTEREST (3-5)	: 0.34	:-0.22	: 2.90	: 2.87	: 2.09	:-0.52	:
8.	CAPITAL EXPENDITURE - GROSS FIXED INVESTMENT	: 4.69	: 4.85	: 5.33	: 6.12	: 6.03	: 5.34	: 4.95
	Government	: 1.90	: 2.32	: 3.08	: 3.21	: 3.17	: 2.93	: 3.50
	Federal Public Enterprises	: 2.79	: 2.53	: 2.25	: 2.91	: 2.86	: 2.40	: 1.45
9.	PSBR (primary) (8-3)	: 0.59	: 1.26	: 0.01	: 0.97	: 0.93	: 3.18	:
10.	PSBR (operational) (8-7)	: 4.35	: 5.07	: 2.43	: 3.25	: 3.94	: 5.86	:
11.	PSBR (nominal) (8-6)	: 8.55	:13.89	:11.94	:12.19	:18.51	:26.84	:

However, the public sector savings generation capability has continuously deteriorated over the late seventies and the following decade. As shown in line 7 of table 3.2, by the end of the seventies public sector savings as a proportion of GDP had been reduced to less than half what it used to be in the beginning of the decade. Ten years after, public sector's contribution to domestic savings had become negative. To analyze what determined this sharp fall in public sector savings during this period is the main purpose of the next section.



#### 4. Public Sector Savings

The behavior of public sector savings during the seventies and eighties can only be properly understood within a broader perspective on the overall adjustment patterns followed by the public sector, in response to both external difficulties and domestic pressures faced by the Brazilian economy along the period.

##### 4.1 The Public Sector from 1970 to 1984<sup>9</sup>

During the growth-cum-debt period of the seventies, the public sector adjustment was characterized by two different trends that were obviously inconsistent in the long run. On one hand, the huge import-substituting and export promoting program, that constituted the core of the long-run strategy of adjustment of the Brazilian economy to the oil shocks, imposed on the public sector a sizable and central part in the required investment effort. On the other hand, despite those enhanced commitments, public sector's share in aggregate income shrank significantly along the seventies. That latter trend stemmed from the falling gross tax burden, the rising transfer and subsidies to the private sector, and the decreasing real prices charged for the goods and services produced by public enterprises.

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<sup>9</sup> See Werneck [1991] for a detailed analysis of the public sector behavior in the period.

Though untenable in the long-run, the coexistence of those two trends played important roles in the designed adjustment strategy in the seventies. That strategy meant a maximization of the economy's annual growth rate, even if it meant growth well above the rate consistent with an equilibrium in the balance of payment's current account in the medium run. Public sector's increasing borrowing requirements constituted a secure way to assure the steady flow of foreign loans that was needed to finance the external accounts deficit. The maintenance of the high investment self-financing capacity that public enterprises and government itself displayed in the early seventies would mean having to rely more extensively on the nervous and risk averting private sector's investment behavior, to accomplish the increasingly difficult foreign capital flow targets.

In what concerns public enterprises, the implicit logic of the adopted economic policy was the following. As public enterprises had such an easy access to badly needed foreign loans to finance their investments, there seemed to be no problem in reducing their self-financing capacity. Actually, it would induce them to resort to debt in order to carry on their investment plans. There was therefore room to let the real public prices to be somewhat eroded, what would be particularly convenient since it would avoid unnecessary pressures on the worrisome evolution of inflation.<sup>10</sup>

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 10 In fact, in the mid-seventies public enterprises were forbidden to resort to new equity capital from minority private shareholders and forced to limit their borrowing in the domestic financial markets, in order to induce them to resort to foreign loans. There is no room in the Brazilian case to ascribe the explosive behaviour of the foreign debt to a liberalization of borrowing restrictions imposed on public enterprises and agencies, that would have lead to unwanted indebtedness from the point of

The reduction in the net tax burden and in public enterprises' real prices allowed the burden of the adjustment to fall upon the public sector, and to delay therefore the required adjustment on the part of the private sector. But within the public sector, the response to the shrinking share in aggregate income was the virtual disappearance of the important role the public sector had been playing as a saver.<sup>11</sup>

As interest payments on the, predominantly public, foreign debt soared in the wake of higher international interest rates after 1979, there was still no effort to recover the public sector's share in aggregate income in order to accommodate the mounting expenditures. Avoiding a rise in taxes and fearing the inflationary impact of a correction in public enterprises' real prices, the government simply resorted to increasing foreign and domestic indebtedness.

With the further acceleration of inflation following the inconsistent macroeconomic policies of 1979-80, the government decided to adopt a stricter monetary policy in 1981, without any support either from a consistent fiscal policy or from an IMF program.<sup>12</sup> The resulting rise in domestic public debt and the

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view of the central government. Strict control on foreign exchange and external credit operations were maintained throughout the period under analysis in this paper. Foreign borrowing targets were explicitly established by government and their accomplishment carefully surveyed month after month by the Central Bank.

<sup>11</sup> See Werneck [1986] for a more complete analysis of this point.

<sup>12</sup> See Carneiro [1987] for a description of stabilization and adjustment programmes of the early eighties.

pressure on interest rates in the domestic financial markets contributed to increase the transfers of resources from the public to the private sector over the eighties. Furthermore, when the external debt crisis came in 1982 there was an effort to bail out private sector's borrowers through arrangements that permitted the absorption of foreign exchange risks by the Central Bank, aggravating the public sector's financial strains.

#### 4.2 The Public Sector from 1985 to 1990

In 1984, the gross tax burden had fallen to less than 22% of GDP, well below the average of 25.6% of GDP observed in the 1970-73 period. Subsidies, which had risen from .8% of GDP in 1970-73 to a record high 3.9% of GDP in 1980, had been cut back to 1.6% of GDP, as seen in figure 4.1. Transfers -- mostly social security expenditures -- corresponded to 7.8% of GDP in 1984, as also shown in figure 4.1, only half a percentage point above the 1970-73 average. The net tax burden had fallen to the period record low 12.5% of GDP, as seen in figure 4.1, well below the 17.6% average reached in 1970-73.

The rise in current expenditures had been dominated by the evolution of interest payments, particularly on government's foreign debt. As may be seen in figure 4.2, total interest payments increased from an average of only 0.5% of GDP in 1970-73 to more than 3.3% of GDP in 1984. But consumption expenditures --

FIGURE 4.1

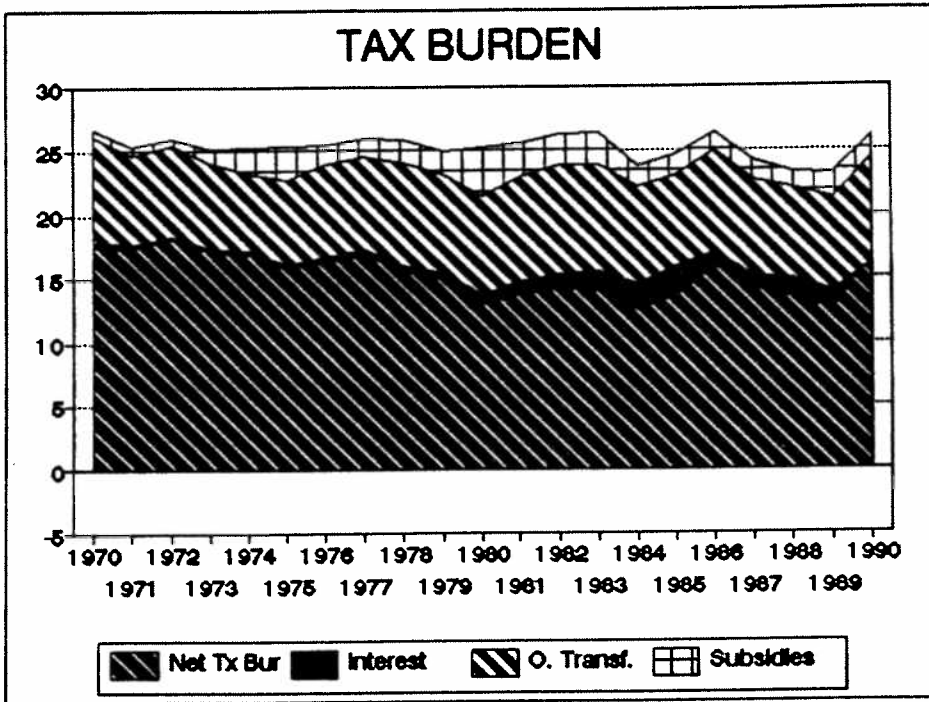
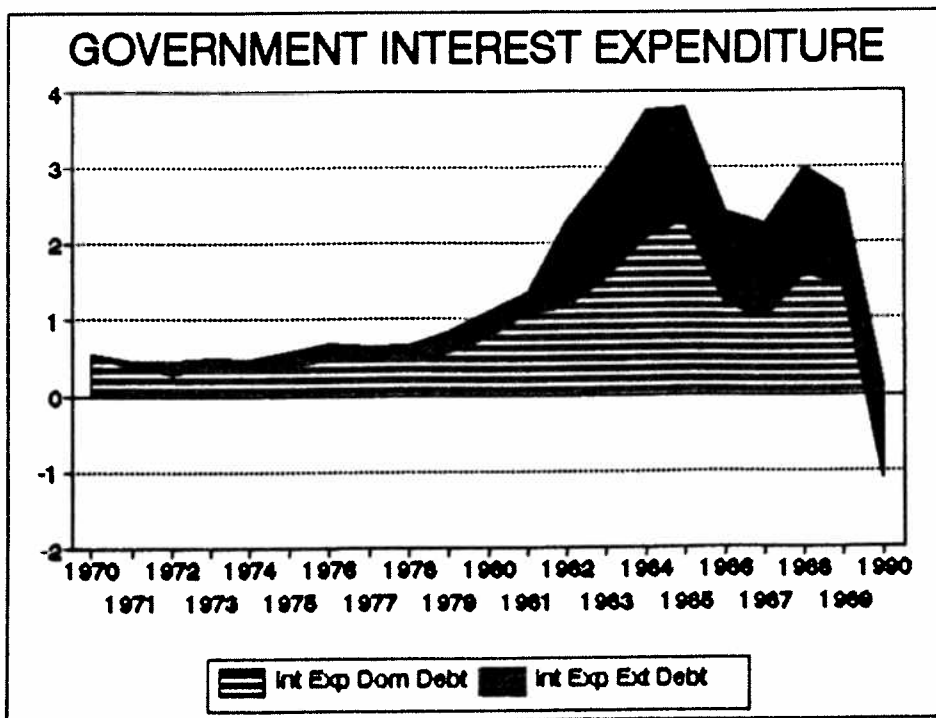


FIGURE 4.2



payroll and purchases of goods and services -- had fallen from an average of 10.8% of GDP in 1970-73 to 8.8% of GDP in 1984, as seen in figure 4.3.

That pattern changed dramatically from 1985 on, when consumption expenditures started to increase very fast, reaching more than 15.6% of GDP in 1990, as shown in figure 4.3. Purchases of goods and services rose from 2.6% of GDP in 1984 to more than 5.1% of GDP in 1990. And the government's payroll, which corresponded to approximately 6.9% of GDP in 1984, jumped to almost 10.5% of GDP in 1990 - a rise of more than 50% in the proportion.

The virtual explosion of government's payroll since 1985 has been largely attributable to the increase in state and municipal governments payroll, as may be seen in figure 4.4. Infra-national governments were particularly benefited by the new fiscal federalism arrangement embodied in the 1988 Constitution. The Union lost important revenue sources to the states and municipalities and a larger share of taxes collected by federal government had to be transferred to Infra-national governments.

Measured as a proportion of GDP, the federal government's disposable revenue -- net of intergovernmental transfers -- fell almost 24% from 1980 to 1989. During the same period, the state's disposable revenue rose approximately 15% and the municipalities' 25%. The additional revenue allowed an extraordinary increase in payroll expenditures by the infra-national governments. Measured

FIGURE 4.3

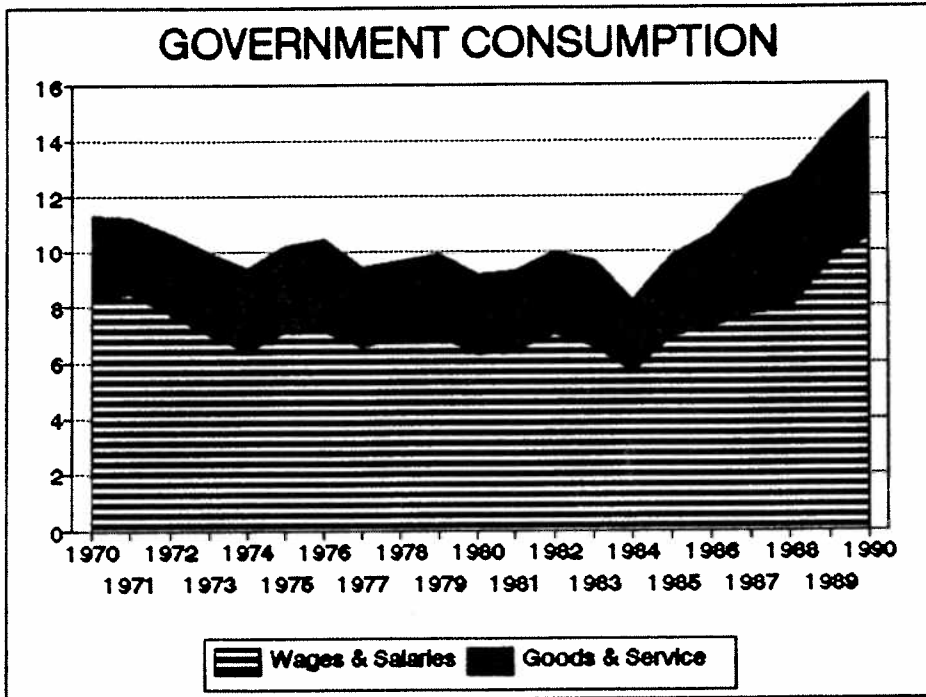
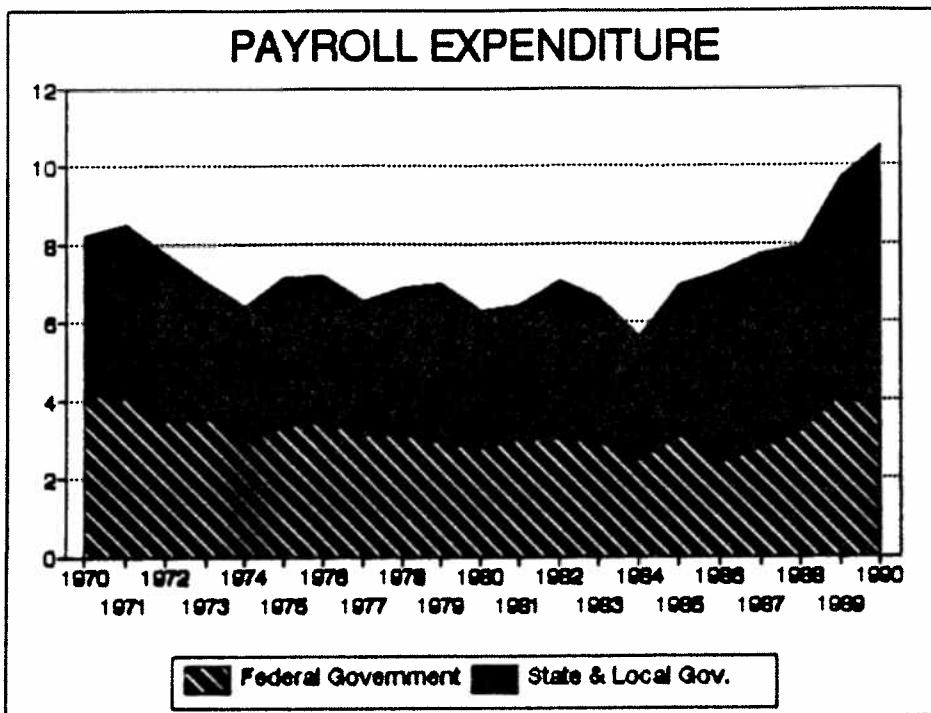


FIGURE 4.4



again as proportion of GDP, those expenditures expanded almost 77%, while the federal governments payroll increased less than 19%. In fact, that rapid growth in payroll expenditures by states and municipalities surpassed by far the fast increase in their revenue made possible by the 1988 Constitution. From 1985 to 1989 the ratio of those expenditures to the infra-national government's disposable revenue rose by approximately one third.<sup>13</sup>

It does not follow from the simple evidence of a substantial increase in the payroll's weight that there has been a rise in state and municipal government's average salary level. Though there is a large variance of experiences behind the averages, and generalizations should be certainly cautious, there are indications that most of the infra-national government's employees had sizable real salary losses during the period under analysis. If that is true, the rise in the payroll's weight has to be attributed to an unrestrained increase in the government employment, what is supported by abundant fragmentary evidence.

#### 4.3 The Shrinking Public Sector Savings: A Decomposition

The dramatic fall in public sector savings over the last two decades is shown in table 4.1. The data refer to federal, state and municipal governments' accounts, and to federal public enterprises'.<sup>14</sup> In the 1970-73 period, public sector savings

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13 See Werneck [1992].

14 Notice however that table 4.1, as well as table 4.2 and 4.3 below, excludes "other government current non-interest revenues", an item included at the top of table 3.2 above. The quality of recent estimates of those revenues have been subject to criticism and could lead to severe distortions in the



averaged 7.87% of GDP. This impressive contribution to the country's saving effort started to fall in the late seventies and became negative in the late eighties. In 1989, government disaved 5.28% of GDP. The sizable fiscal adjustment of the Collor I Stabilization Plan allowed government savings to become positive again (.75% of GDP) in 1990, though it is well known that part of that adjustment was of a once-and-for-all kind, what means that government savings may become negative again in 1991. Table 4.1 also shows the evolution the various public sector revenue and expenditure variables -- also as a percentage of GDP -- which determine public sector savings (PS) according to the following equation:

$$PS = SE + SG$$

where SE is the federal public enterprises' surplus and SG is government savings, given by

$$SG = T - SU - Jp - OT - WNu - WNem - OG - Jf$$

where T is gross taxes, SU subsidies, Jp interest payments on domestic government debt, OT other transfers, WNu federal government payroll, WNem state & municipal governments payroll, OG other government consumption expenditures and Jf interest payments on government foreign debt. Therefore,

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decomposition exercises performed below. The exclusion explains the discrepancy between the public sector savings data in the first column of table 4.1 and those presented in line 7 of table 3.2 above.

TABLE 4.1  
PUBLIC SECTOR SAVINGS (as % of GDP)

Year	Public Sector Savings	Federal Public Enterprises Current Account Surplus	Government Savings	Gross Taxes	Subsidies	Interest on Government Domestic Debt	Other Transfers	Federal Government Payroll	State & Municipal Government Payroll	Other Government Consumption Expenditures	Interest on Government Foreign Debt
	(PS)	(SE)	(SG)	(T)	(SU)	(Jp)	(OT)	(WNU)	(WNUm)	(OG)	(Jf2)
1970	7.03	1.41	5.62	26.29	0.52	0.52	8.25	4.18	4.07	3.09	0.04
1971	6.74	1.02	5.72	25.19	0.78	0.39	6.98	4.07	4.46	2.71	0.08
1972	8.88	1.85	7.03	25.93	0.58	0.29	7.20	3.46	4.32	2.88	0.17
1973	8.83	2.11	6.72	25.00	1.17	0.39	6.64	3.54	3.50	2.93	0.11
1974	9.04	2.00	7.04	25.11	2.15	0.40	6.04	2.95	3.49	2.95	0.09
1975	7.05	2.03	5.02	25.23	2.67	0.38	6.76	3.33	3.81	3.05	0.21
1976	7.55	2.36	5.19	25.09	1.53	0.49	7.22	3.43	3.73	3.30	0.20
1977	9.04	2.32	6.72	25.55	1.48	0.48	7.26	3.13	3.45	2.85	0.18
1978	6.59	1.26	5.33	25.68	1.88	0.47	8.13	3.12	3.79	2.76	0.20
1979	4.06	-0.15	4.21	24.66	1.91	0.55	7.80	2.89	4.09	2.92	0.29
1980	5.70	2.96	2.74	24.70	3.86	0.76	7.77	2.76	3.55	2.89	0.37
1981	5.37	2.31	3.06	24.65	2.68	1.08	8.22	2.96	3.50	2.86	0.29
1982	2.65	0.77	1.88	25.26	2.48	1.17	8.58	3.02	4.03	2.96	1.14
1983	2.16	0.71	1.45	25.07	2.65	1.55	8.36	2.89	3.72	3.05	1.40
1984	1.07	0.64	0.43	21.82	1.59	2.08	7.76	2.47	3.18	2.63	1.68
1985	0.65	0.63	0.02	22.53	1.59	2.30	7.24	3.06	3.88	2.93	1.51
1986	4.54	1.74	2.82	25.35	1.47	1.19	7.97	2.40	4.90	3.37	1.23
1987	1.09	1.32	-0.23	23.34	1.59	1.01	7.54	2.78	4.99	4.39	1.27
1988	-0.64	1.49	-2.13	21.89	1.23	1.58	7.18	3.21	4.71	4.68	1.43
1989	-4.68	-0.19	-4.49	21.94	1.93	1.44	7.50	4.11	5.61	4.60	1.24
1990	1.65	n.a.	1.65	27.43	1.72	-1.09	8.29	3.63	6.86	5.15	1.22

Source: Banco Central/Gazeta Mercantil  
ECLAC (1991)

$$PS = SE + T - SU - Jp - OT - WNu - WNem - OG - Jf$$

Table 4.2 shows the fall in public sector savings over the seventies and eighties. The first column presents for each year, as proportion of GDP, the fall in public sector savings as compared to the 1970-73 average. Of course, negative values represent increases in government savings vis-à-vis the benchmark 1970-73 average. The remaining columns present similar differences for the other variables, i.e. differences between the 1970-73 average and each year's value.

In 1990, public sector savings were 7.12% of GDP below the benchmark value. It is interesting to know how this fall may be explained by the evolution of the variables which are on the right side of the equation above. For 1990, that may be done dividing the last line of table 4.2 by 7.12 and multiplying it by 100. If all lines are treated similarly one may construct table 4.3. In order to ease the interpretation of the table, the sign of the values of cells corresponding to variables which enter the above equation preceded by a minus sign were inverted.

One may say, for example, looking into in the last line of table 4.3, that 22.44% of the fall in public sector savings from 1970-73 to 1990 may be ascribed to the fall in the federal public enterprises surplus and 77.56% to the fall in government savings. Amongst the determinants of government savings, it may be seen that the rise in state & municipal governments payroll (WNem) was

TABLE 4.2

## FALL IN PUBLIC SECTOR SAVINGS AS COMPARED TO THE 1970-73 AVERAGE

	Public Sector Savings	Federal Public Enterprises Current Account Surplus	Government Savings	Gross Taxes	Subsidies	Interest on Government Domestic Debt	Other Transfers	Federal Government Payroll	State & Municipal Government Payroll	Other Government Consumption Expenditures	Interest on Government Foreign Debt
	(P8)	(SE)	(SG)	(T)	(SU)	(Jp)	(OT)	(Wku)	(Wkm)	(OG)	(Jf2)
Year											
Avg											
70-73	7.87	1.60	6.27	25.60	0.76	0.40	7.27	3.81	4.09	2.90	0.10
1974	-1.17	-0.40	-0.77	0.49	-1.39	-0.00	1.23	0.86	0.60	-0.05	0.01
1975	0.82	-0.43	1.25	0.37	-1.91	0.02	0.51	0.48	0.28	-0.15	-0.11
1976	0.32	-0.76	1.08	0.51	-0.77	-0.09	0.05	0.38	0.36	-0.40	-0.10
1977	-1.17	-0.72	-0.45	0.05	-0.72	-0.08	0.01	0.68	0.64	0.05	-0.08
1978	1.28	0.34	0.94	-0.08	-1.12	-0.07	-0.86	0.69	0.30	0.14	-0.10
1979	3.81	1.75	2.06	0.94	-1.15	-0.15	-0.53	0.92	-0.00	-0.02	-0.19
1980	2.17	-1.36	3.53	0.90	-3.10	-0.36	-0.50	1.05	0.54	0.01	-0.27
1981	2.50	-0.71	3.21	0.95	-1.92	-0.68	-0.95	0.85	0.59	0.04	-0.19
1982	5.22	0.83	4.39	0.34	-1.72	-0.77	-1.31	0.79	0.06	-0.06	-1.04
1983	5.71	0.89	4.82	0.53	-1.89	-1.15	-1.09	0.92	0.37	-0.15	-1.30
1984	6.80	0.96	5.84	3.78	-0.83	-1.68	-0.49	1.34	0.91	0.27	-1.58
1985	7.22	0.97	6.25	3.07	-0.83	-1.90	0.03	0.75	0.21	-0.03	-1.41
1986	3.31	-0.14	3.45	0.25	-0.71	-0.79	-0.70	1.41	-0.81	-0.47	-1.13
1987	6.78	0.28	6.50	2.26	-0.83	-0.61	-0.27	1.03	-0.90	-1.49	-1.17
1988	8.51	0.11	8.40	3.71	-0.47	-1.18	0.09	0.60	-0.62	-1.78	-1.33
1989	12.55	1.79	10.76	3.66	-1.17	-1.04	-0.23	-0.30	-1.52	-1.70	-1.14
1990	6.22	.	4.62	-1.83	-0.96	1.49	-1.02	0.18	-2.77	-2.25	-1.12

Source: Banco Central/Gazeta Mercantil  
ECLAC (1991)

responsible for 38.94% of the reduction in public sector savings. Accordingly, the increase in subsidies (SU) was responsible for 13.45% of the fall and so on. Negative values, as 25.67% for gross taxes (T), mean that the corresponding variable contributed in fact for an increase in government savings. Gross taxes in 1990, as a percentage of GDP, as compared to the 1970-73 average, had a positive effect on government savings, corresponding to roughly one fourth of the observed fall of those savings in the period. In other words, were it not for the evolution of gross taxes, the fall in government savings would be one fourth higher. Notice, however, that till 1989, (T) was in fact contributing to the fall in government savings. This was only reversed by the fiscal adjustment of the Collor I Plan, as mentioned above.

Comparing the lines corresponding to 1984 and 1990 in table 4.3, one may perceive very clearly the two different patterns of public sector savings reduction stressed above in the first two parts of this section. The assessment in 1984 is that the main factors behind the fall in public sector savings, as compared to the early seventies, were the lower net tax burden: reduction in gross taxes and increase in transfers and subsidies. In 1990, completely different factors are identified. Most of the fall in public sector savings are now attributable to the increase in government consumption, in the form of both swelling payroll expenditures and fast growing purchases of goods and services.

TABLE 4.3

## DECOMPOSITION OF THE FALL IN PUBLIC SECTOR SAVINGS

Year	Public Sector Savings	Federal Public Enterprises Current Account Surplus	Government Savings	Gross Taxes	Subsidies	Interest on Government Domestic Debt	Other Transfers	Federal Government Payroll	State & Municipal Government Payroll	Other Government Consumption Expenditures	Interest on Government Foreign Debt
	(PS)	(SE)	(SG)	(T)	(SU)	(Jp)	(OT)	(WMu)	(WMem)	(OG)	(Jf2)
1974	100.00	34.40	65.60	-42.09	-118.59	-0.21	104.91	73.72	51.07	-4.06	0.85
1975	100.00	-52.74	152.74	45.43	232.62	-2.13	-61.89	-58.84	-33.84	17.99	13.41
1976	100.00	-238.28	338.28	160.16	239.84	28.91	-14.84	-119.53	-111.72	124.22	31.25
1977	100.00	61.75	38.25	-4.49	-61.32	-7.05	0.64	58.33	54.49	4.49	-6.84
1978	100.00	26.37	73.63	-6.05	87.30	5.66	67.38	-54.10	-23.24	-11.13	7.81
1979	100.00	45.87	54.13	24.74	30.12	4.00	13.98	-24.21	0.07	0.46	4.99
1980	100.00	-62.79	162.79	41.59	142.74	16.71	23.16	-48.50	-24.77	-0.58	12.44
1981	100.00	-28.50	128.50	38.10	76.70	27.30	38.10	-34.10	-23.50	-1.70	7.60
1982	100.00	15.85	84.15	6.56	32.90	14.80	25.14	-15.18	-1.10	1.10	19.92
1983	100.00	15.54	84.46	9.33	33.06	20.18	19.13	-16.16	-6.44	2.58	22.77
1984	100.00	14.08	85.92	55.62	12.17	24.74	7.24	-19.74	-13.35	-4.01	23.24
1985	100.00	13.40	86.60	42.56	11.46	26.35	-0.38	-10.42	-2.87	0.38	19.53
1986	100.00	-4.31	104.31	7.63	21.37	23.94	21.22	-42.67	24.55	14.12	34.14
1987	100.00	4.09	95.91	33.37	12.21	9.03	4.02	-15.23	13.31	21.94	17.26
1988	100.00	1.26	98.74	43.63	5.49	13.90	-1.03	-7.08	7.31	20.89	15.63
1989	100.00	14.24	85.76	29.18	9.30	8.31	1.85	2.37	12.13	13.53	9.08
1990	100.00	-	74.32	-29.38	15.39	-23.91	16.44	-2.95	44.57	36.13	18.01

Source: Banco Central/Gazeta Mercantil  
ECLAC (1991)

## 5. Simulations and Policy Conclusions

The fall in investment in the eighties is the most important immediate cause of the slowdown in economic growth. Although several reasons add up to explain the observed fall in investment at constant prices, attempts at recovery will have to cope with either higher voluntary private savings or with higher public savings. This conclusion was seen to be sensitive to the yet uncertain facts behind the increase in the relative price of capital in the second half of the eighties.

High inflation, uncertainty as to indexation clauses in long term contracts as well as a high rate of protection both to capital goods industry and to contractors all have their share among the causes of low investment and low investment productivity.

Previous results evaluating the importance of fiscal adjustment as a means to increase the overall rate of domestic savings in the Brazilian economy turned out to be confirmed by data on the fall of public savings, as analyzed in sections 3 and 4 above.<sup>15</sup> In fact, the available estimates pointed to a fiscal effort of around 6% to 8% of GDP, what corresponds grossly to the observed decrease in governments' savings from mid seventies to the beginning of the eighties, as shown in table 3.1 above. The further deterioration of public sector savings observed in the

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15 See Werneck [1987b] and Carneiro and Werneck [1990].

eighties, due to the increase in public sectors' interest payments from 1.1% of GDP in 1980 to 3.9% of GDP in 1989 contributed to aggravate the unbalance between financial needs of capital formation and availability of funds.

When one considers alternative scenarios for the 1990's, however, one has to take into consideration two major issues: first, the possible effects of changes in the relative price of investment goods -- as well as the possible increase in investment productivity -- which one may hope to obtain from trade policy reform;<sup>16</sup> second, the expected effect of public investment on private investment, which has to do with the composition of public investment and the role of the several government levels in the economy.

Dealing with the former issue, alternative scenarios for growth recovery in this context depend on the possible effect of a more open trade policy on the productivity of the capital formation effort. Making use of a modified version of the model presented in Carneiro and Werneck [1990] and [1991], one may incorporate the effect of a more open economy by increasing the marginal propensity to import capital goods, previously estimated to be 0.15, and speculate on its net effect on the productivity of investment.<sup>17</sup> A description of the model is provided in an appendix.

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<sup>16</sup> For a brief analysis of Brazilian trade policy in the nineties see Fritsch [1991].

<sup>17</sup> Note that two effects are considered in this analysis. First, the effect of lower price of capital goods, which may be achieved by less protection; second, the possible increase in the efficiency of investment through the enhanced use of state of the art machinery and equipment.



The dependence of the investment productivity  $k$  (the inverse of the capital/output ratio) on the marginal propensity to import capital goods was assumed to have a constant elasticity functional form of the type:

$$k = k_0 (m_k)^v$$

with the parameters  $k_0$  and  $v$  being initially taken to be 0.389 and 0.25 respectively. The latter means that doubling the marginal propensity  $m_k$  to import capital goods increases investment productivity by 20%.<sup>18</sup> When  $m_k = 0.15$  the value of investment productivity implies a capital/output ratio ( $1/k$ ) equal to 3.5, which had been previously used in the simulations of required fiscal adjustment without the trade policy effects. The table below gives an idea of the sensitivity of the capital/output ratio to assumed values for the elasticity  $v$  for different values of the marginal propensity to import capital goods  $m_k$ :

TABLE 5.1

Sensitivity of the Capital/Output Ratio ( $1/k$ ) to  $v$  and  $m_k$

$m_k$	$v = 0.2$	0.25	0.3
0.15	3.5	3.5	3.5
0.25	3.2	3.1	3.0
0.30	3.0	2.9	2.8

See text for explanations.

<sup>18</sup>

This elasticity is consistent with the estimated increase

A successful trade policy which is able to significantly lower protectionist barriers has two impacts on the results of the growth exercises which lead to the estimates of the needed fiscal effort to restore GDP growth for the 1990's.<sup>19</sup> The first impact, is of course the increase in investment productivity mentioned above. A lower fiscal effort should be needed, as more growth may be obtained per unit of saving. If domestic savings are the binding constraint to increase economic growth, a smaller increase in savings will be more effective if accompanied by efforts to increase the international exposure of the traditionally protected capital-goods industry. This effect, however, may require additional foreign finance, if the country's economic growth is bound by dearth of foreign exchange, and that is the second impact.

In order to have a quantitative evaluation of the size of such effects for the Brazilian economy, some exercises were performed, using a modified version of Carneiro and Werneck [1990]. The idea was to evaluate the trade-off between domestic fiscal effort and foreign exchange requirements in the context of restoring economic growth at an annual average of 5%. Results are summarized in table 5.2 below. In the basic scenario, with zero

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 which was observed between the mid-seventies to the mid-eighties . following the increase in protection to the newly installed capital-goods industry in the context of the II National Development Plan.

<sup>19</sup> See Carneiro and Werneck [1990].

foreign savings no additional fiscal effort and  $m_k = 0.15$ , economic growth is restricted by the domestic saving constraint at around 2.6% for the 1990's.<sup>20</sup>

If the marginal propensity to import capital goods does not change, a fiscal adjustment involving an increase of as much as 10% of GDP in the fiscal effort in order to eliminate the government's deficit and promote a transfer of savings to the private sector of 6.1% of GDP, would be sufficient to restore growth at 5.2% per annum, with a need of foreign finance to sustain a current account deficit of around 0.9% of GDP. If import liberalization manages to double the propensity to import capital goods and assuming an elasticity  $v$  of 0.25, a fiscal effort of 5.5% of GDP (with a transfer of savings to the private sector of 3.0% of GDP) is sufficient to bring about economic growth at an annual rate of 5.4% due to the gain in investment productivity. But this scenario of a more open economy will be only feasible from the viewpoint of the balance of payments if a financial inflow of foreign exchange can sustain twice the current account deficit of the previous scenario.

Table 5.2

Fiscal Adjustment, Openness and Foreign Savings requirements  
(Two scenarios under investment complementarity)

	Scenario I	Scenario II
Propensity to import ( $m_k$ )	0.15	0.30
Fiscal effort(*)	10%	5.5%
Savings to Private sector(*)	6.1%	3.0%
External Savings(*)	0.9%	1.65%
Growth Rate	5.2%	5.4%

Notes: See text for explanations and sources.

(\*) Ratios of potential GDP

## 5.2 Policy Simulations Under Crowding-out

Interesting evidence concerning the crowding out of private by public investment in Brazil has been recently obtained by Studart [1992]. Such evidence could lead to a radical change in the established intuition on the recovery of public savings needed for resumption of economic growth. One might expect that if an increase in public investment reduces private investment at each level of capacity utilization, a smaller adjustment in public savings might be needed for resumption of economic growth at a given rate. If both are assumed to be equally productive, a reduction in public investment might open space for more private investment. This issue has been examined in greater detail elsewhere (Carneiro and Werneck [1991]). It was then pointed out that the gist of the matter is that the degree of complementarity between public and private investment will basically determine how the resources generated by the fiscal adjustment will be allocated, between the financing of public and private investment, but will not influence the required increase in public savings.

The extent to which public investment complements or crowds-out private investment must certainly depend on the

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The scenarios considered in these exercises suppose that the major current obstacles to the operation of the economy at a reasonably high rate of capacity utilization have of course been removed, so that hyperinflation menace is out of the horizon.

composition of public investment. In an economy starving for infrastructure items such as transport facilities, energy and telecommunications, private investment profitability may be expected to react favorably to government's commitment to guarantee the supply of such items, leading to complementarity. The issue, thus, may be of extreme relevance to economic policy. The simulations model was used to evaluate the sensitivity of the conclusions on the effects of trade policy discussed before to the complementarity parameter ( $\alpha$ ).

In view of the econometric evidence pointing to a negative ( $\alpha$ ), public investment was divided into two parts: a value of 4% of GDP (which corresponds approximately to the average value observed for the late seventies) was assumed to prevail for non-infrastructure investment of the public sector for the simulation period. The "public investment" variable, therefore, was redefined as the capital expenditures in infrastructure, which is the part of public investment most likely to exert a positive influence on private investment. With this new definition, a new set of simulations has been performed in order to check the implications for selected policy variables of different values for the complementarity parameter.

The simulations results are summarized on Table 5.3 below. The two scenarios regarding the degree of openness of the economy were defined as in the previous subsection, and may be represented by the propensity to import capital goods (the derivative of capital goods imports with respect to aggregate investment). As in

the preceding subsection, the simulation exercises tried first to evaluate the degree of fiscal effort and external savings which are necessary to keep the Brazilian economy around a 5% growth path. The results reported below show that for a 5.2% annual growth, the scenario with higher import propensity requires more external savings and about half of the fiscal effort. As one replicates each scenario making the complementarity parameter vary from -0.40 to +0.40, the implications for the composition of total investment and savings may be read on the lower part of the table.<sup>21</sup>

Table 5.3

Public Investment and Public Savings Requirements  
(Two scenarios under crowding out)

	Scenario I	Scenario II
Propensity to import capital goods:	0.15	0.3
Fiscal effort <sup>(1)</sup>	10%	5%
External Savings <sup>(1)</sup>	0.9%	1.5%
Growth Rate	5.2%	5.2%
	d <sup>(2)</sup> infra <sup>(3)</sup>	d <sup>(2)</sup> infra <sup>(3)</sup>
value of the parameter alpha:		
-0.4	5.0 28.4	5.5 5.6
-0.2	5.5 26.4	5.5 5.8
0	6.0 24.6	4.5 10.7
+0.2	6.0 24.5	4.0 13.1
+0.4	6.0 24.4	3.5 15.5

Notes: See text for explanations and sources.

(1) % of potential GDP; (2) transfer of public savings to the private sector; (3) infrastructure investment as a % of total investment.

Composition of total investment is given by the share of infrastructure investment in total investment (infra). The data on Table 5.3 confirm that the lower the value of  $(\alpha)$ , the higher the share of infrastructure investment in aggregate investment (infra) and the lower the transfer of savings to the private sector, measured as proportion of GDP. When  $(\alpha)$  is assumed to be equal to  $-0.4$ , the share of infrastructure investment in total investment (infra) is 28.4 (compared with 31.6% in the case when  $(\alpha)$  was taken as equal to 1) and the transfer of savings reaches 5% of GDP (as opposed to a value of 6.8% previously obtained)<sup>22</sup>. In the more open scenario, however, the improvement in investment productivity resulting from higher imports of capital goods produces a surprising effect: the reversal of the share of infrastructure in total investment as complementarity increases. The reason for this result is that with greater efficiency in total investment, there is less need for public savings to supplement private savings, the higher the ability of public investment to bring about private investment.

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 21 Notice that, according to Studart's [1992] estimates, the value of  $(\alpha)$  could reach  $-0.66$  implying a crowding-out effect much stronger than was considered above in the range of  $(\alpha)$  values of table 5.3. Such a strong crowding-out effect was obtained, however, from a specification form involving other explanatory variables besides those which appear in the private investment function of the simple simulation model described in the appendix.

22 Carneiro and Werneck [1990b], section 4, panel 4.1.

Finally, another interesting implication of the set of simulations summarized on Table 5.3 is the different behavior of the transfer of savings from the public to the private sector as the complementarity parameter increases. In the case of the more closed scenario, higher complementarity means higher public surpluses, as a means to supplement private savings. In the more open scenario, however, as total savings are allowed by the higher current transactions deficit, not only smaller investment is needed because of higher efficiency but smaller transfers of savings to private sector are needed for the same rate of economic growth.

The policy implications of the above simulations results should be clear by now. The most important implication seems to be the relevance of the composition of public investment in the context of growth-oriented fiscal adjustment, as well as the need to consider the effects of policies aimed at increasing the efficiency of investment. In the case of the Brazilian economy, where policy efforts in the seventies, directed to import substitution in the capital goods sector may have left a track of excessive protectionism with negative effects to the productivity of investment, liberalizing trade-policies may help to alleviate the political costs of fiscal adjustment.



## Appendix: The Model

The model that is used here is a new version of that presented in Carneiro and Werneck [1990a], which follows, with small adaptations, that proposed by Taylor [1988] to serve as a common analytical framework for the recent WIDER country studies on medium term development.

The model's formulation is presented in table 1. All level variables are defined as a proportion of potential GDP. The average annual growth rate ( $g$ ) is determined in the first equation as a function of aggregate investment. The parameter ( $k$ ) is the output-capital ratio and ( $g_0$ ), which would usually be negative, may be associated to a depreciation allowance. In equation [2] it is assumed that private investment ( $ip$ ) depends on public investment in infrastructure ( $iel$ ), other public investment ( $ieo$ ) and the capacity utilization rate ( $u$ ), and has an autonomous component ( $io$ ). The parameters ( $\alpha$ ) determines the intensity of crowding-out/crowding-in effects of both kinds of public investment on private investment. Total investment, which results from adding up private and public investment, is given by equation [3].

Equation [4] introduces the notion of fiscal effort embodied in the variable  $z$ , which is defined as the tax revenue, net of subsidies and transfers, plus public enterprises'

TABLE 1  
THE MODEL'S FORMULATION

Average Annual Growth Rate [1]

$$g = g_0 + k.i$$

Private Investment [2]

$$i_p = i_0 + \alpha_0.i_{e0} + \alpha.i_{e1} + \beta.u$$

Total Investment [3]

$$i = i_p + i_e = i_0 + (1 + \alpha_0).i_{e0} + (1 + \alpha).i_{e1} + \beta.u$$

Public Sector's Savings [4]

$$s_g = z - j_s$$

Fiscal Effort [5]

$$z = z_0 + \tau + z_1.u$$

Public Sector's Deficit [6]

$$d.u = i_e - s_g$$

Private Savings [7]

$$s_p = \sigma_0 + \sigma_1.(u - z - c_g)$$

Foreign Savings [8]

$$\phi = m + (\alpha_0 + \alpha_1.u) + (\Gamma_0 + \Gamma_1.i) + j_t - (\epsilon_0 + \epsilon_1.u)$$

operational surplus, less government consumption expenditures and interest payments on the public sector's domestic debt. In equation [4] public sector savings are determined as the difference between the fiscal effort ( $z$ ) and ( $js$ ), interest payments on the public sector's foreign debt. Another way to interpret equation [4] is to notice that resources ( $z$ ) generated by the fiscal effort may be channeled to either savings ( $sg$ ) or to interest payments ( $js$ ) on the public sector's foreign debt.<sup>23</sup> In equation [5] it is assumed that  $z$  is determined by the capacity utilization rate ( $u$ ) and a coefficient ( $z_0$ ) which may be changed by fiscal policy instruments. A separate fiscal adjustment variable ( $\tau$ ) was introduced to explicitly designate the increase in the fiscal effort through an increment in ( $z_0$ ). Public sector's deficit is defined in equation [6] as the difference between public sector's investment ( $ig$ ) and savings ( $sg$ ). In that equation ( $d$ ) is the overall public sector borrowing requirement (PSBR) measured as a proportion of GDP. The product  $d.u$  is equal to the PSBR in proportion of potential GDP.

In equation [7] it is assumed that private savings ( $sp$ ) is determined by the private sector's disposable income for each level of capacity utilization rate ( $u$ ). To obtain private sector's disposable income one has to subtract from aggregate output, not only the fiscal effort variable ( $z$ ), but also government consumption ( $cg$ ). Foreign savings are defined in equation [8] as

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<sup>23</sup> This equation was presented in Carneiro and Werneck [1988] to analyze some policy issues related to the external debt problem.

the balance of payments' current account deficit ( $\phi$ ). Intermediate imports are represented by the term  $(a_0 + a_1 \cdot u)$ , capital goods imports by the term  $[(\gamma)_0 + (\gamma)_1 \cdot i]$  and interest payments on the foreign debt by  $(j \cdot t)$ . Total exports are represented by the term  $[(\epsilon)_0 + (\epsilon)_1 \cdot u]$ , where one would expect  $(\epsilon)_1$  to be negative. The algebraic sum of other current account items -- including other imports -- is denoted by  $m$ . Again, as already made clear, all level variables are defined as proportions of potential GDP. As may be noticed, intermediate imports and total exports are determined by the capacity utilization rate ( $u$ ) and capital goods imports by aggregate investment ( $i$ ).

Table 2 presents semi-reduced form equations. Equations [9], [10] and [11] establish, for each constraint, the maximum level of public investment in infrastructure for each level of the fiscal adjustment variable ( $\tau$ ), relating two variables which are thought to be extremely relevant for the assessment of growth possibilities for the Brazilian economy in the nineties. This may be done by computing public investment in infrastructure as a proportion of GDP for the decade, for given assumptions concerning the structural parameters, the rate of capacity utilization and policy variables. The sustainable level of public investment in infrastructure has to be consistent, for each level of ( $\tau$ ), with the feasible public sector borrowing requirement, the domestic rate of savings and the feasible balance of payments current account deficit.

TABLE 2  
SEMI-REDUCED FORM EQUATIONS

Fiscal Budget Consistency Equation [9]

$$ig = (d + z1) \cdot u + zo + \tau - js$$

Aggregate Investment-Saving Consistency Equation [10]

$$is = \frac{(\sigma1 \cdot (1 - z1) + z1 - \beta) \cdot u}{1 + \alpha} + \frac{(zo + \tau - js + \sigma0 - \sigma1 \cdot (zo + \tau + cg) + \phi - io - (1 - \alpha) \cdot ieo)}{1 + \alpha}$$

External Accounts Consistency Equation [11]

$$if = \frac{-(a1 + \Gamma1 \cdot \beta - \epsilon1) \cdot u}{\Gamma1 (1 + \alpha)} + \frac{\phi - m - jt - (io + (1 + \alpha) \cdot ieo) \cdot \Gamma1 - ao + \epsilon0 - \Gamma0}{\Gamma1 \cdot (1 + \alpha)}$$

Average GDP Growth Rate Implied by Fiscal Consistency [12]

$$gg = go + k \cdot [io + (1 + \alpha) \cdot ieo + (1 + \alpha) \cdot ig + \beta \cdot u]$$

Average GDP Growth Rate Implied by Investment-Saving Consistency

$$gs = go + k \cdot [io + (1 + \alpha) \cdot ieo + (1 + \alpha) \cdot is + \beta \cdot u] \quad [13]$$

Average GDP Growth Rate Implied by External Account Consistency

$$gf = go + k \cdot [io + (1 + \alpha) \cdot ieo + (1 + \alpha) \cdot if + \beta \cdot u] \quad [14]$$

Equation [9] determines, for each level of the fiscal adjustment variable ( $\tau$ ), the value of public investment in infrastructure ( $ig$ ) which is consistent with a given PSBR value ( $d$ ). Substituting the value of  $z$  in equation [5] into [4] and using the resulting expression for ( $sg$ ) in [6], one gets equation [9], after rearranging terms. The notation ( $ig$ ) is used in that equation in order to make it clear that what is involved is the level of public investment in infrastructure consistent with the public budget.

Making the expression for aggregate investment ( $i$ ) in equation [3] equal to aggregate saving, defined as the sum of the left hand side of equation [8] and the right hand sides of equations [7] and [4], after substituting in the latter the value of ( $z$ ) given by [5], one gets equation [10], after rearranging terms. Public investment in infrastructure is designed by ( $is$ ) in [10] in order to make it clear that the equation establishes the value of that part of public investment which allows aggregate investment to be consistent with aggregate savings. For a given assumption about the value of foreign savings available ( $\phi$ ), that equation sets the value of ( $is$ ) consistent with each level of the fiscal adjustment variable ( $\tau$ ).

Equation [11] determines the level of public investment in infrastructure that is consistent with the external accounts, given a current account deficit ( $\phi$ ). It is obtained by simply substituting the expression for aggregate investment ( $i$ ), given by equation [3], into equation [8], and rearranging terms. In

equation [11], the public investment in infrastructure variable is denoted by  $(if)$ , since what is being taken into account is the current account consistency. For a given assumption about the feasible current account deficit  $(\phi)$ , it determines the maximum value of public investment in infrastructure. Notice that  $(if)$  does not depend on the fiscal adjustment variable  $(\tau)$ .

Equations [12], [13] and [14] establish the average annual growth rates which would be allowed by each of the previous three consistency equations. To get them, one has simply to substitute the value of aggregate investment  $(i)$ , given by equation [3], into [1], and to consider in the resulting expression, one at a time, the three public investment in infrastructure values established by equations [9], [10] and [11]. In the frontiers loci obtained, the GDP growth rates consistent with different values of  $(\tau)$  are designed  $(gg)$ ,  $(gs)$  and  $(gf)$ , depending on which consistent equation is being considered in each case.

In order to use the model for simulations, plausible values were attributed to the parameters and exogenous variables. Typically, the values of the parameters in the one-variable linear equations were obtained on the basis of known passage points and plausible elasticity values. The elasticities of total exports and intermediate imports with respect to capacity utilization were assumed to be equal to 2.0 and 0.5, respectively. The elasticity of capital goods imports with respect to total investment was assumed to be equal to 2.0. A value of 4.0 was initially assumed for the elasticity of public sector savings with respect to

capacity utilization. In the case of private sector savings the corresponding elasticity was assumed to be equal 2.0.

The values of the parameters of the private investment behavior equation [2] used in the basic simulations were assumed to be equal to one. Then estimates obtained from Studart [1992], discussed in appendix II below, were used. Those estimates led the the sensitivity analysis carried out in section 5 above. When other values were attributed to these parameters, a known passage point was used to (endogenously) define values consistent with these hypotheses to the linear coefficient ( $\lambda$ ). The value of  $\lambda$ , non-infrastructure public investment was set at 4% of potential GDP. Finally, the value initially attributed to  $\alpha$  was consistent with the assumption of an incremental capital-output ratio equal to 3.5, and the value of  $\beta$  with the assumption of depreciation being equivalent to 5% of the potential GDP. In order to simulate the effects of trade liberalization on aggregate investment efficiency, it was assumed, as described in section 5 above, that  $\alpha$  depends positively on the importance of import capital goods in aggregate investment.



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