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External Shocks and Growth Prospects: The Case of Brasil, 1973-1989 (final version)

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Abstract

A quantitative analysis is provided of the interplay between external shocks and domestic policy actions, in Brazil's balance of payments adjustment processes, from the mid-seventies to the early eighties. A simple two-gap macro-simulations model is deployed to investigate the economic prospects of the country through 1989, under varying assumptions regarding the external environment and domestic policy-making.

1. Introduction

This is a study of the factors underlying the current account deficits experienced by Brazil since the mid-seventies. It also searches the economic perspectives of the country through 1989, with the help of a simple macro-simulations model.

The current account deficit is identically equal to the excess of domestic spending over national income. Provided that net external financing is available, this excess may increase for a number of reasons. Prominent among them is an expansion of real domestic spending, associated with increases either of real consumption expenditures or real domestic capital formation. Even if domestic absorption is invariant, the external deficit may worsen because of inadequate domestic pricing policies. These may make local firms unable to compete with cheaper foreign products, thus forcing a contraction of national income and employment. A temporary reduction of GNP below its potential value may also be caused by domestic supply shocks of a climatic or other nature. But there are still other ways to obtain a deterioration of the current account.

First, worsening terms of trade cause an increase in the nominal value of domestic spending (which includes imports), relative to the nominal value of national output (which includes exports), even as the relevant real magnitudes remain constant. Second, increased real inter- national interest rates reduce the value of national income out of a given domestic income, if the country is a net debtor to start with. Finally, for a given domestic spending level, national income is reduced as real exports fall on the wake of a world recession or of external protectionism.

Thus, a current account deficit may emerge even when domestic prices are "right" and a country's real expenditure is within its (external shocks purged) GNP. Under these circumstances, external debt may accumulate because of suddenly deteriorating terms of trade, interest rate shocks, and world recession.

In this context, this paper investigates the factors underlying the evolution of the external accounts of Brazil since the mid-seventies, following an approach suggested in the Dell report and elaborated by Balassa[1].

The reasons for a deterioration of the current account are divided into three groups: external shocks, burden of accumulated debt, and domestic policy actions. The first group deals with terms of trade, International interest rates, and world recession. The second relates to the accumulated effect of past shocks and domestic policy actions. Finally, the third group encompasses the variables supposedly under control of local policy makers: domestic absorption and the economy's

[1] Cf. Dell and Lawrence (1980) and Balassa (1983).

tradeabi1ity.

This frame of reference is developed in the next section, being applied to the balance of payments experience of Brazil from 1973 to 1983. Two periods are considered, 1973-1978 and 1978-1983, the first corresponding to the first oil-shock and subsequent adjustments, and the second, to the shock-wave of the late seventies and early eighties, leading to the debt crisis of 1982-1983. A tentative evaluation of adjustment Brazi1ian-style is attempted at the end of the section.

The third section searches the economic perspectives for the country through 1989, with the help of a simple macro-simulation model. The discussion starts with the income multipliers revealed by the model, as the magnitudes of these are essential for an appropriate understanding of the factors affecting the growth prospects of the country in the next few years. There follows a summary of the results of the simulations for the 1984-1989 period, under three alternative scenarios. Conclusions are summarized in the fourth section. The algebra of the current account decomposition exercises and the structure of the model used in the simulations are presented in appendices.

2. External Shocks and Domestic Policies, 1973-1983

Brazil's balance of payments and growth experience since the late sixties can be summarized as follows[2]:

1968-70: Strong economic recovery, following the 1963-1967 stabi1ization period, when economic activity slowed down. Serious export promotion activities begin with the institution of mini-devaluations. New mechanisms are introduced to facilitate the access of domestic residents to the Eurodollar market.

1971-73: "Brazilian economic miracle" period, during which growth rates attain previously unrecorded magnitudes. Primary exports boom and heavy borrowing abroad starts. Inflation stabilizes at under 20 percent per year.

1974-75: First oi1 shock and its immediate aftermath. Inflation reignites. There is turmoil and indecision in Brazilian policy-making.

1976-78: Adjustment Brazilian style is put into practice. Imports are repressed and relatively high GDP growth rates are maintained. Inflation rates reach a new plateau of 40 percent per year.

1979-80: Second oi1 shock and the October 1979 "Monetarist Revolution" in U.S. monetary policy. Brazil considers slowing down under Simonsen, but an expansionist policy

[2] For details, see Bacha (1980) and Bacha and Malan (1984).

course is favoured under Delfim Netto. Inflation skyrockets to 100 percent per year.

1981-...: Drastic adjustment to rapidly deteriorating external circumstances and galloping domestic inflation. An Extended Arrangement is signed with the IMF in January 1983.

This section skips the 1968-1973 experiences to deal initially with the first oi1 shock period, from 1974 to 1978. The second part discusses the shock wave and domestic adjustments of the late seventies and early eighties. A tentative evaluation of the failures and accomplishments of the adjustment policies followed by Brazil closes the section.

2.1. The 1973-1978 Experience

The first oi1 shock hit the Brazilian economy at the height of a formidable economic expansion, stretching from 1968 to 1973. Worsening terms of trade were, however, by no means alone in accounting for the massive deterioration of Brazil's external accounts after 1973. A bulge of import volumes in 1974 and a decline of world trade in 1975 loom large in explaining why Brazil's current account deficit more than tripled from 2.0 percent of potential GDP in 1973 to 6.3 percent in 1974, while declining only to 5.1 percent in the following year[3].

More precise estimates are displayed in Table 1. In it, a decomposition is offered for the factors underlying the worsened external accounts of the country after 1973. The variations in the current account deficit ratio to potential GDP between each year in the 1974-78 period and the 1973 base-year are decomposed in three groups of explanatory factors: *external shocks*, *burden of accumulated debt*, and *domestic policy actions*.

The first group – *external shocks* – is subdivided into *terms of trade deterioration*, *interest rate shocks*, and *retardation of world trade growth*. The measurement of the first two effects is quite standard, but an explanation is needed for the computation of the effect of world trade growth deceleration, which may be controversial[4]. First the ratio of Brazil's exports to potential GDP is expressed as a product of the ratio of Brazil's export to world exports, times the ratio of world exports

[3] Figures for Brazil's potential GDP are taken from Bonelli and Malan (1984). Departing from a popular procedure in the literature, we replace actual GNP by potential GDP, as the appropriate scalar to measure the size of current account deficits. This is done on the presumption that potential GDP is a better measure than actual GNP of the permanent income of a country. Potential GNP would perhaps be a better scalar than either of them, if measures were available of the 'permanent' rates of return on net foreign liabilities for each year of the observation period. With the exception of 1983, observed exchange rates are used to convert into dollars the potential GDP initially measured in cruzeiros. This implies the assumption that market exchange rates adequately reflect the external purchasing power of both actual and potential domestic production. A better alternative would have been to calculate the dollar value of potential GDP using "equilibrium" exchange rates, if these were available for the period under consideration. See Appendix 1 for additional methodological details.

[4] A similar procedure to calculate the impact of world recession was used by Balassa (1983).

to potential GDP (all variables in constant dollar terms). Thus, the variations in the Brazilian exports to potential GDP ratio can be (approximately) written as the sum of two components, one related to changes in the ratio of Brazil's exports to world exports, the other to changes in the ratio of world exports to Brazil's potential GDP. It is the latter which is designated as the *retardation of world trade growth* effect in Table 1. The former appears as *export deepening*, among the domestic policy actions in the table. The appearance of the world trade growth effect as an external shock in Table 1 presumes that the growth rate of Brazil's potential GDP in the period (of about 7.6 percent per year) was in line with a normal behaviour of world trade growth. Hence, if the ratio between the two fell, the explanation lies in an insufficient growth of world trade after the first oi1 shock, rather than in any excessive expansion of Brazil's potential GDP in the period.

The second group of factors consists of only one component – *the burden of accumulated debt* – which measures the deterioration in the Service accounts explained by an increase in the (end-of-past-year) debt to potential GDP. This effect is calculated under the assumption of unchanged interest rates, as the effects of the latter are captured by the *interest rate shocks*, in the first group of factors.

Domestic policy actions designate the third and last group of explanatory factors. The *domestic recession* component accounts for a shrinkage of imports, explained either by a lowering of the fixed investment ratio, or by a reduction of the overall capacity utilization rate. Fixed investment is given privileged attention because its materialization is assumed to require complementary capital goods imports, in addition to the imports of other goods and Services which are associated to the generation of aggregate domestic output. *Increased tradability* measures the effects of both an expansion of Brazil's market shares in world exports, and a replacement of imports by domestic substitutes. *Import replacement* is measured by a reduction of the import coefficients in the production of domestic output and in the composition of fixed investment. Underlying the classification of import replacement as an increased tradability phenomenon is the assumption that the resources for the production of the domestic substitutes were drawn either out of idleness or the home goods sector, not of potential export activities. The final domestic policy component relates to changes in the ratio of profit remittances to potential GDP. Such changes may be due to factors only remotely associated to domestic policy actions, but their relatively small magnitude in the period seemed to make unnecessary a more precise classification procedure.

Table 1

Brazil: Decomposition of the current account deficit increases between each year in the 1974-78 period and the 1973 base-year*. (All variables are ratios to potential GDP)

Explanatory Factors	1974	1975	1976	1977	1978
1. External Shocks	2.46	3.90	1.43	.45	2.00
1.1. Terms of trade deterioration[1]	2.01	2.45	0.60	-0.70	0.75
1.2. Interest rate shocks[2]	0.03	0.18	-0.06	-0.04	-0.03
1.3. Retardation of world trade growth	0.42	1.27	0.89	1.20	1.28
2. Burden of Accumulated Debt[3]	-0.07	0.33	0.59	0.57	0.67
3. Domestic Policy Actions[4]	2.18	-1.09	-0.19	-0.85	-2,06
3.1. Domestic Recession[5]	0.46	0.23	0.37	0.02	-0.14
3.1.1. Fixed Investment Cuts[6]	(0.16)	(0.31)	(0.30)	(0.09)	(0.06)
3.1.2. Domestic Output Contraction[7]	(0.00)	(-0.08)	(0.07)	(-0.07)	(-0.20)
3.2. Increased Ttradability[8]	2.00	-1.30	-0.60	-0.92	-1.95
3.2.1. Export Deepening[9]	(0.11)	(-1.06)	(0.01)	(0.05)	(-0.41)
3.2.2. Import Replacement[10]	(1.89)	(-0.24)	(-0.61)	(1.42)	(-1.54)
3.3. Profit Remittances Compression[11]	0.02	-0.02	0.04	0.05	0.03
4. Calculated Deficit Increase [(1) + (2) + (3)]	4.57	3.14	1.83	0.18	0.61
5. Interaction Effects and Adding-up Errors	-0.28	-0.11	-0.06	0.02	0.17
6. Observed Deficit Increase [(4) + (5)]	4.29	3.03	1.77	0.20	0.78

Notes:

*The decomposition factors were calculated using an average of current-year and 1973 weights.

[1]Negative value means terms of trade improvement.
[2]Negative value means interest rate.
[3]Negative value means reduced foreign liabilities ratio to potential GDP.
[4]Positive value means deficit increasing policy.
[5]Positive value means domestic expansion.
[6]Positive value means investment increases.
[7]Positive value means output expansion.
[8]Positive value means reduced tradability.
[9]Positive value means export contraction.
[10]Positive value means import additions.
[11]Positive value means profit remittances decompression.

The sum of the effects of external shocks, accumulated debt burden, and domestic policy actions is equal to the observed variations in the current account deficit ratio to potential GDP, once account is taken of interactions effects and adding-up errors, as in Table 1.

After the Sharp rise in the current account deficit ratio in 1974-75, a significant improvement occurs in the 1976-77 period, by and large explained by a temporary recovery of the terms of trade,

on the wake of the mini-commodity boom and the coffee frosts of the period. In spite of a considerably improved domestic policy performance, the deficit situation worsens again in 1978, as these temporary factors fade away, and the growth of world trade continues to lag behind the expansion of Brazil's productive capacity.

The economy was kept in high gear during the period, as witnessed by the positive signs and values in the "domestic recession" line except for 1978. Also, the negative impacts of external shocks and increased debt were not at all compensated by a deeper penetration of Brazil's exports in foreign markets. Hence, the bulk of the adjustment was done through import replacement, which proceeded at an expanding rate since 1975. The following two observations should however be made. First, the dismal performance of Brazilian exports in the period is entirely explained by the very poor quantitative behaviour of coffee exports. Indeed, the following picture is obtained, if we decompose the figures for export deepening in Table 1 between coffee and non-coffee exports:

	1974	1975	1976	1977	1978
Export Deepening	0.11	-1.06	0.01	0.50	-0.41
Coffee exports	0.64	0.36	0.65	1.51	1.01
Non-coffee exports	-0.53	-1.42	-0.64	-1.01	-1.42

Hence, non-coffee exports were indeed promoted but not at a sufficient scale to compensate for the coffee market losses in the period.

Second, the decomposition below of the import replacement effect clearly indicates that practically nothing was done to substitute oi1 imports in the short-run, hence, the emphasis of import substitution fell on items the relative prices of which did not in fact increase over the period under consideration:

	1974	1975	1976	1977	1978
Import Replacement	1.89	-0.24	-0.61	-1.42	-1.54
Capital goods	0.43	0.64	-0.33	-0.87	-0.95
Other imports	1.59	-0.76	-0.27	-0.52	-0.57
Oi1	-0.13	-0.12	-0.01	-0.03	-0.02

The final picture is of a developing economy that decided not to ride a recession as a means of coping with an adverse external environment. Having made that decision, it proceeded to adjust its balance of payments through a significant replacement of capital goods and other non-oil imports

after 1975. Its efforts to substitute foreign energy sources and to penetrate foreign markets were, however, much less than required under the circumstances. Hence, foreign debt piled up, and the problem was essentially postponed for the future.

2.2. The 1978-1983 Experience

The future, as we now know, did not prove to be particularly accommodating. Much to the contrary, after 1978 Brazil was hit by a renewed series of external shocks of increasing strength, which finally forced its government to apply for help to the International Monetary Fund.

The relevant facts are synthesized in Table 2. In a similar fashion to the previous exercise, this table decomposes the variations in the current account deficit in each year of the 1979-83 period, taking 1978 as the base-year from which changes are measured.

The increasing strength of the external shocks is clearly revealed in this table. Everything else remaining constant these shocks would have produced a deterioration of the current account deficit ratio to potential GDP of no less than 5.6 percentage points, when 1978 is compared either with 1982 or 1983. Terms of trade deterioration accounts for the bulk of the total shock, while interest rate increases and retardation of world trade growth share responsibi1ity for the remaining losses.

As in the early seventies, domestic policy-making was slow to react to these shocks, and in 1979 did in fact manage to magnify their effect on the current account. However, once forced into action by a deteriorating international reserves position, domestic policy makers displayed a considerable capacity both to slow down the economy and even more so to expand its tradability. The extent of both export deepening and import replacement in the 1981-83 period is impressive indeed.

Domestic reaction was eventually very forceful, but unfortunately it carne too late. In view of the extent of the damage done by the external shocks, it certainly was not enough to maintain the country's creditworthiness in international credit markets, after the Malvinas War and the Mexican Moratorium. The rupture of the international private financial market precipitated by these events made Brazil suddenly unable not only to finance its current account deficits but also to roll-over its previously accumulated debts. In a short period of time after Black September 1982, the country had to be rescued by a hastily composed package of short-term official credits, while negotiations took place for a restructuring of its previously accumulated private and public debt. Fresh money was also required, given the permanence of the current account deficit and the exhaustion of Brazil's international reserves. Made unable to honour its debt Service commitments, the country was thus forced to submit an adjustment program to the International Monetary Fund[5].

[5] More details are provided in Bacha (1983 b).

2.3. Adjustment Brazilian Style: An Interpretation

There is no denying the tardiness in Brazil's adjustment efforts. But the reluctance to adjust should be viewed in the context of the severity of the external shocks to which the country was submitted in the mid-seventies and early eighties. A less exuberant response would certainly have been welcome both in 1974-76 and 1979-80. Even in those years, the negative effect of domestic growthmanship on the current account was relative minor when compared with the impact of external shocks. (See the values in lines 1.1. and 3.1, in Tables 1 and 2.) The Brazilian government is certainly guilty of excess optimism, perhaps also of insufficient exchange rate aggressiveness, but much less of excess spending.

Table 2

Brazil: Decomposition of the current account deficit variations between each year in the 1979-83 period and the 1978 base-year[1]

Explanatory Factors	1979	1980	1981	1982	1983
1. External Shocks	1.08	3.42	5.00	5.64	5.60
1.1. Terms of Trade Deterioration	0.85	2.35	2.87	2.98	3.47
1.2. Interest Rate Shocks	0.30	0.80	1.23	1.47	0.61
1.3. Retardation of World Trade Growth[1]	-0.07	0.27	0.90	1.19	1.52
2. Burden of Accumulated Debt	0.21	0.62	0.65	0.90	0.83
3. Domestic Policy Actions[3]	0.12	-2.06	-5.00	-4.47	-6.35
3.1. Domestic Recession[4]	-0.04	0.13	-0.86	-1.13	-1.39
3.1.1. Fixed Investment Cuts	(-0.04)	(-0.06)	(-0.28)	(-0.34)	(-0.40)
3.1.2. Domestic Output Contraction	(0.00)	(0.19)	(-0.58)	(-0.79)	(-0.99)
3.2. Increased Tradability[6]	0.13	-2.02	-3.96	-3.34	-4.90
3.2.1. Export Deepening	(.00)	(-1.40)	(-2.35)	(-1.65)	(-2.25)
3.2.2. Import Replacement[7]	(0.13)	(-0.62)	(-1.61)	(-1.69)	(-2.65)
3.3. Profit remittances compression[8]	0.03	-0.17	-0.18	-0.06	-0.06
4. Calculated Deficit Increase[9]	1.41	1.98	0.65	2.08	-1.45
5. Interaction Effects and Adding-Up Errors	-0.07	0.09	-0.02	-0.63	0.25
6. Observed Deficit Increase[9]	1.34	2.07	0.63	1.37	-1.20

Notes: [1]The decomposition factors were calculated using current weights.
[2]Negative value means acceleration of world trade growth.
[3]Positive value means deficit increasing policies.
[4]Positive value means domestic expansion.
[5]Positive value means output expansion.
[6]Positive value means reduced tradability.
[7]Positive value means import additions.
[8]Positive value means profit remittances decompression.
[9]Negative value means deficit decrease.

There is, however, one sense in which this is perhaps too lenient an evaluation of Brazil's pattern of adjustment to external shocks. On hindsight, a more export-oriented strategy would have paid handsome dividends indeed. To illustrate this with a somewhat extreme example, let us assume that, after 1975, Brazil's non-coffee exports would have managed to maintain their share in world exports growing at the same rate as in 1973-75, that is, at 11.4 percent per year. Not much would be involved in terms of external market penetration: in 1978, the share of Brazil's non-coffee exports in total world exports would have been 1.6 percent, rather than the observed 1.2 percent. Relative magnitudes would also have been small, in comparison to Brazil's productive potential: the non-coffee exports ratio to potential GDP in 1978 would have climbed to 9.0 percent from the observed 6.7 percent. In 1978, the Brazilian economy was operating at 96 percent of its capacity, hence there was some room for expansion, but not much. This means that if exports were higher, domestic absorption needed to be somewhat lower, but then (ignoring product composition differences between exports and domestic absorption) the maximum contraction required would have been 2.7 percentage points, distributed over a period of three years. This would hardly seem to imply an austerity program of major dimensions[6]. While austerity and external market penetration would have been minor, the results in terms of reduced current account deficits would have been extraordinary. Not even taking into account the lesser debt burden, the current account deficits would have been cut in half in 1976, disappeared in 1977, and turned into a surplus in 1978.

Similarly, the deterioration in the external accounts of the country after 1978 could have been lessened substantially, in case a prompter response to the external shocks had taken place already in 1979, as was indeed the plan of the ousted Planning Minister, Mario Simonsen[7].

There are, of course, good economic reasons explaining why the Brazilian government chose not to push exports out more aggressively. On one hand, in the mid-seventies there was no reason to anticipate the complete reversal (which eventually occurred in 1979) of the cheap money policy traditionally followed by the industrial countries since World War II. Hence, if the international banks made credit available, it seemed to pay to get into debt, even at floating rates of interest. On the other hand, pushing non-traditional exports out would require either more subsidies or exchange rate devaluations. Costs would be measured in terms of larger budget deficits and increased inflationary pressures, at a time when both were already getting out of hand.

These economic calculations are real enough, but in the end a broader political economy question seems to be at stake. The alternative program of export expansion which was previously outlined seems reasonable when measured against Brazil's tiny share in world markets or the

[6] This calculation presumes that domestic absorption was equal to potential GDP, which was roughly the case in the late seventies.

[7] For further evaluation of post-1979 Brazilian economic policies, see Bacha (1983 a) and Diaz-Alejandro (1983).

country's potential GDP. But it implies that non-coffee exports would have to grow at an average real rate of 20 percent per year, sustained over the entire period from 1973 to 1978. It might be done, but it would require a fundamental commitment of the government to it, both in political and organizational terms. However, previous to the current crisis, a strong political movement has never developed in Brazil that would defend *at the same time* a vigorous policy of both import substitution *and* export promotion, as the seventies required. Historically, it has always been one or the other. Import substitution comes together with export discrimination, as exemplified by the traditional Latin American rule of privileged access of residents to national products. In inward-oriented growth strategies, non-traditional exports typically are only the residual which is left over from domestic production after local demand has been satisfied. By contrast, export orientation tends to be associated with import liberalization. In the late seventies in Latin America, this association was carried to its extremes by the Southern Cone monetarists' misuse of traditional comparative advantage theory, as a justification for their naive attempt to promote exports by opening up domestic markets to competitive imports. At a more mundane level, Northern neoprotectionism increasingly seems to require North-South trade in manufactures to be based on "reciprocity" of trade regulations, except when, as in the case of East Asian NICs, the geopolitics of the East-West conflict determine otherwise. These considerations help explain why in Brazil it has always been so difficult to work out a compromise between a "nationalist" (i.e., pro-import substitution) and an "internationalist" (i.e., pro-export promotion) growth strategy. They also help explain why Brazil, when deciding to promote manufactured exports in the seventies, also chose to diversify its customers, out of OECD and into third world and socialist countries.

3. Economic Perspectives Through 1989

This section investigates the aftermath of the debt crisis. The first part initially establishes the fact that, as a consequence of this crisis, Brazil has become a foreign exchange constrained economy. The income multipliers extracted from the simulations model are then used to investigate the sensitivity of Brazil's actual and potential GDP to variations in relevant exogenous variables. The second part presents a summary of medium-term GDP growth simulations under three alternative scenarios. The first represents a continuation of current trends in the world economy and in the debt renegotiation process, assuming a passive stance of domestic policy-making *vis-a-vis* the tradability of the Brazilian economy. The second scenario illustrates the effects of additional export promotion efforts, and the third contemplates the consequences of an enhanced access of Brazil to external sources of finance.

3.1. Income Multipliers in The Simulation Model

Brazil's industrial economy has been in deep recession since the last quarter of 1980. In November 1983, industrial production was 11 percent lower than its average value in 1980. Most severely hit was the capital goods sector, the production index of which stood in November 1983 at 55 percent of its average value in 1980. The Vargas Foundation quarterly industrial survey estimates that only 72 percent of Brazil's manufacturing capacity was in operation in January 1984[8]. For the economy as a whole, Bonelli and Malan (1984) estimate an overall output gap of 22 percent in 1983.

These considerations indicate that there is considerable slack capacity in the Brazilian economy in early 1984. Hence, up to a point, in the near future output growth can indeed by demand-driven, provided that sufficient foreign exchange is made available to equilibrate the external accounts[9].

The dynamics of a large economy constrained by the availability of foreign exchange, like Brazil in the mid-eighties, are peculiar indeed. For the relevant marginal import coefficients are unlikely to go over 10 percent of Brazil's GDP in the near future. The implication is that each additional dollar of imports (apart from inventory replenishment) will tend to be associated with about 10 additional dollars of GDP. This example helps explain why the income multipliers for foreign exchange related variables are as large as shown in the first line of Table 3. For example, each additional one-percent increase in world interest rates lead to a decline of 11.4 billion dollars in Brazil's GDP (or 3.8 percent of its estimated dollar value in 1983).

Table 3 displays the income multipliers of export demand, foreign savings (i.e., current account deficit financing), foreign capital income (i.e., interest on foreign debt and profit remittances), domestic savings, and import substitution (i.e., reductions of the import coefficients both in the production of domestic output and in the composition of fixed investment). A distinction is made between the values of the multipliers when the economy is constrained by foreign exchange (implying that actual GDP is less than potential GDP) and when it is constrained by domestic capacity (which implies that actual GDP is equal to potential GDP). In the first case, separate multipliers are shown for (current-year) actual GDP and (next-year) potential GDP. In the second, the same multipliers apply for both concepts, as income generating capacity is fixed in the short-run and, in Harrod-Domar fashion, a function of fixed investment in the long-run (which in our case occurs next year, because a simple one-year lag is assumed for the maturation of investment).

[8] Interpretation of this figure should take into account that 90 percent was the highest capacity utilization rate ever reported by Brazilian industrialists in this survey, which is conducted by the Vargas Foundation since 1968.

[9] Most of the 20-odd percentage points of excess capacity in the Brazilian economy in 1983 consists of non-exportables. However, in 1983, only 6.3 percent of available capacity was used to generate exports, and in none of the follow simulations the expansion of exports requires the use of more than 8.4 percent of the contemporaneously available domestic productive capacity. Hence, specific capacity limitations in exportable production are also unlikely to be a major constraint on Brazil's economic growth in the remainder of the decade.

Table 3

Brazil: Income multipliers in the Simulation Model, with and without a Foreign Exchange Constraint

	Exogenous Changes at Time t						
	US $1 billion increase in real export demand	US $1 billion increase in current account deficit financing	US 1billion increase in factor service payments	1 percentage point increase in dollar interest rates[1]	1 percentage point increase in domestic savings rate	1 percentage point reduction in capital goods import coefficient	1 percentage point reduction in current goods import coefficient
Endogenous Variations							
Case A Foreign exchange constraint applies							
Variation of GDP in US$ billions at time t	11.2	10.2	-11.0	-11.3	-2.9	11.5	33.7
Variation of potential GDP in US$ billions at time $t+1$	1.7	2.6	-1.9	-1.9	0.83	0.38	4.2
Case B Domestic capacity constraint applies							
Variation of GDP and of potential GNP in US$ billions at time $t+1$	N/A[2]	0.41	-0.06	-0.06	1.5	N/A[2]	N/A[2]

Notes:

[1]Calculated for the estimated value of net foreign liabilities in December 1982 (US $ 103 billion).

[2]Not applicable because the trade balance is endogenously determined by the difference between potential output domestic absorption.

The values of the multipliers in the first line of Table 3 were derived from a one-sector fix-price macroeconomic model. Hence, they tend to overstate the importance of the foreign exchange constraint, as they are unable to capture the possibilities for import substitution which exists in a real world multisectoral flex-price economy. For example, Brazil succeeded in significantly compressing its imports coefficients in the 1980-83 period, even though the values of these coefficients were already relatively low, in comparison with the mid-seventies. Nonetheless, with the exception of the energy sector, Brazil seems now to have exhausted its limits for import substitution, within the confines of its open developing capitalist economy model. Hence, the restriction to import should indeed be a critical determinant of the growth prospects of the country in the remaining of the eighties. The thrust of this conclusion is appropriately captured by the multipliers in Table 3, even though the "real world" importance of the foreign exchange constraint probably is exaggerated by the numbers in the table.

In this context, it should also be pointed out that the multipliers in Case A presume that each and every dollar added to (or subtracted from) the Brazilian economy is used only to increase (or reduce) necessary imports. No room is allowed either for luxury imports (defined negatively as those not required to increase domestic production or to complement domestic investment) or for induced variations in net international assets. Thus, for example, if part of an additional US $1 billion of exports is used to allow some luxury imports, or to replenish international reserves, or to anticipate foreign debt repayments, the relevant income multipliers should be reduced accordingly, i.e., they should be multiplied by the share of the additional US $1 billion which is actually used to increase necessary imports.

If the provision of foreign exchange is critical, the impact of domestic savings on growth is more intricate. An increase in domestic savings releases both domestic and imported resources from the consumption goods sector. The foreign exchange thus saved can be used to expand domestic investment. But the capital good sector is much more import intensive than the consumption goods sector. Hence, not a 11 domestic resources released from consumption can be redeployed to expand investment. The result is that national income falls as domestic savings expands, when the economy is foreign exchange constrained.

Notice that the underlying mechanism is rather distinct from the "paradox of parsimony" in simple macro Keynesian models. For investment does respond to an increase in savings, as indicated by the positive multiplier of domestic savings on (next year's) potential output in Table 3. The problem here has to do not with a postulated insensitivity of investment to domestic savings, but with distinct sectoral import intensities in a foreign exchange constrained context. The underlying assumption is that the government has full control over the investment activities in the economy; hence, that it can connect or disconnect them at will, according to the availability of foreign exchange.

However, in a mixed developing economy, like Brazil, a government sponsored credit expansion mail fail to bring forth private investment, if the situation is one of generalized unused capacity in the industrial sector. In this "Keynesian" context, more than the mere provision of foreign exchange would be required to reignite the private economy, after a prolonged recession.

The magnitudes of the income multipliers are very different, depending on whether the economy is constrained by foreign exchange or by domestic capacity. Multipliers are generally much lower in the latter case, with the notorious exception of domestic savings, which has its highest impact on income when the economy is constrained by available capacity. Furthermore, export demand increases and import coefficient reductions have a very strong impact on income when the economy is foreign exchange constrained, but not when the domestic capacity constraint applies. The reason is that in the latter case the trade balance is endogenously determined by the difference between potential GDP and domestic absorption. Hence, an increase in export demand cannot materialize in higher exports, unless domestic absorption falls by an equal amount. Similarly, a reduction of import coefficients must be read as a switch of domestic demand from imports into domestic output. But as potential output is given, this implies a reduction of actual exports, which nullifies the effect of import replacement both on the trade balance and on income levels.

The results in Table 3 help to illuminate the question of how to measure the foreign contribution to domestic growth: by foreign savings (i.e., the current account deficit), or by net resource transfers (i.e., the trade-cum-non-factor-services deficit).

The first measurement should be favoured in Case B in Table 3, when growth is constrained by domestic capacity. In this case, factor Service payments have only a very marginal impact on domestic growth, when compared to current account deficit financing. Each additional one-billion dollars of current account deficit financing generates US $451 million in potential GDP, whereas in increase of the same amount in foreign capital income reduces domestic growth by only 60 million dollars. The reason is that a dollar of current account deficit adds a full dollar to the financing of domestic investment, whereas an additional dollar of foreign capital income reduces domestic savings only in proportion to the marginal propensity to save of domestic residents, from whose income the additional dollar was subtracted.

By contrast, Case A illustrates a situation in which net resource transfers or the so-called resources gap is the relevant concept. In this case, in which both multipliers are much higher than previously, factor Service payments levels off with foreign savings in its importance for domestic growth. Measured in terms of actual output, the impact of factor Services is in fact marginally higher than that of foreign savings: each additional US $1 billion of factor Service payments reduces GDP by a full US $11 billion, whereas additional deficit finance of the same amount is capable of adding US $10.2 billion to domestic income. The underlying reason is that a dollar is a dollar, independently

of where it comes from. The important thing is that it is used to increase imports, which are assumed to be the only factor constraining growth in Case A.

The differences in magnitude and even in signs of the relevant multipliers help explain the fierceness of the debate in Latin America in general and in Brazil more particularly, about the nature of IMF conditionality. Specifically in the case of Brazil, the priority target of the IMF program is a significant increase in the domestic savings rate[10]. The justification is that this is supposed to be the only way to maintain economic growth when foreign savings dry up. The advice is unobjectionable in case the economy is constrained by domestic capacity, as Table 3 indicates: per each percentage point increase in the domestic savings rate, there will correspond an increase of US $1.5 billion in GDP starting the following year. A different picture, however, emerges when the economy is working below capacity because it lacks foreign exchange. Sure enough, to more domestic austerity there still will correspond in increase in the capacity to produce, though more moderate than in the first case: for each percentage point increase in the domestic saving rate there is an addition of US $830 million to potential output. However, in this case it is not only the sacrifice of current consumption that is at stake. For an income drop is required in order to accommodate the foreign exchange constraint, when the import-intensive investment sector partially replaces the consumption sector as a user of the available pool of foreign exchange. For each one-percentage increase in domestic savings, there corresponds a drop in actual GDP of US $2.9 billion dollars, according to the figures in Table 3. More capacity to produce is forthcoming from an increase in domestic savings, but less of it is put to productive use. Under these circumstances those of us who do not expect Brazil to be soon out of its present foreign exchange bind will naturally tend to be much less sanguine about domestic austerity than the IMF is.

3.2. Simulations for 1984-1989

We start from the assumptions, which are reasonably grounded in facts, first, then in early 1984 the Brazilian economy is not fully employing its available productive capacity. Second, that the most important reason for this is the compression of domestic demand, particularly fixed investment, which results from the tight fiscal and monetary policies applied by the government since the last quarter of 1980. Finally, that these policies are by and large a response to the balance of payments difficulties starting in 1980 and reaching a crisis situation since the last quarter of 1982. Hence, we presume that these policies will be reversed, in the measure that the foreign exchange constraint abates, as long as the Brazilian economy continues working below capacity.

[10] Cf. appendix to Galveas (1983).

Starting from the presumed economic conditions for the base-year 1983, the simulation model generates projections until 1989. Estimates of both actual and potential GDP are produced. The former is normally constrained by the availability of foreign exchange (except when it happens to hit its ceiling, i.e., the level of potential output). The latter is driven by accumulated fixed investment minus depreciation. Imports are of two types. Capital goods imports depend on the level of investment. Non-capital goods, imports depend on the level of domestic output. Domestic consumption (which includes inventory changes) is a fixed fraction of national income. Fixed investment is generated jointly with GDP, as a function of domestic savings and the availability of foreign exchange[11].

Exports are given by an exogenous foreign demand, except when the overall economy or the export sector happens to operate at capacity. In these cases, exports are respectively assumed to be equal to the residual between total supply and domestic absorption, or to the domestic exportable capacity.

Foreign capital inflows are also given exogenously, together with international reserves accumulation. This means that the current account deficit is exogenous. Dollar interest rates are also exogenous. The end of the year external liabilities is equal to those existing at the beginning of the year plus this year's current account deficit.

In the following scenarios, terms of trade are assumed constant, and dollar inflation is put at 5 percent per annum. The savings rate (gross of depreciation but net of inventory changes) is kept constant at 15.5 percent of national income. The income elasticity of employment is a constant 0.4, as suggested in Bonelli and Malan (1984). In line with the results of these same authors, the degree of capacity utilization (ratio between actual and potential GDP) is set equal to 80 percent in 1983. In view of the diversified nature of Brazilian exports, export capacity is arbitrarily set at 10 percent of potential GDP (or 3.7 percentage points above its observed value in 1983).

The growth of real export demand initially is assumed to be related only to GDP growth in industrialized countries. This is projected at 3 percent per annum, as in the base cases of the recent world outlooks of different international organizations. In line with the econometric results of Cline (1983), as qualified in Leven and Roberts (1983) and Fishlow (1984), an income elasticity of 1.67 is assumed for the growth of Brazilian exports *vis-a-vis* industrial countries' growth. There results a growth of real export demand at 5 percent per annum. However, in view of the good export results for 1983 and the Brazilian government projections for 1984-85, a higher real growth rate of 7 percent per annum is postulated for exports both this year and in 1985.

The projections assume that the extremely compressed import coefficients obtaining in 1983

[11] See Appendix 2 for a specification of the model.

are unsustainable in a growing economy. At the margin, $9 of capital goods imports are assumed to be required for each $100 of fixed investment. This is quite higher than the $7.50 to $100 ratio calculated for 1983, but it is comparable to the coefficients observed immediately before 1982. Also, $7.50 of non-capital goods imports are assumed to be required, at the margin, for each $100 of GDP. This contrasts with a ratio of $5.60 to $100 obtaining in 1983, and presumes that additional gains in energy substitution will be more than compensated for by an abatement of the current restrictions of non-oil imports.

World interest rates are presumed to remain relatively constant at their current high levels, as no dramatic departures are anticipated from the neoconservative posture of monetary policy in the main industrial countries. This means that Brazil is assumed to pay a dollar rate of return on its net foreign liabilities of 10.5 percent per year, throughout the simulation period. This compares with an implicitly estimated 10 percent rate of return on Brazil's net debt plus direct investment from abroad in 1983. Thus, it allows for the upward interest rate drift which has taken place since the last quarter of 1983[12].

Except for trade financing, private international credit markets are assumed to remain closed to Brazil. This means that only "involuntary" lending will continue to take place, at a rapidly dwindling rate. Squeezed between reduced budgets, on one hand, and increased demands from the least developed countries, on the other, multilateral credit agencies are also assumed to contribute progressively less to financing Brazil's current account deficit. Direct investment, however, is predicted to grow continuously from its current depressed levels. Finally, a significant build-up of international reserves is predicted throughout the period, in order to compensate for the dramatic losses since the beginning of the decade. These assumptions are spelled out in numerical terms in Table 4. Altogether, they imply that current deficit financing for Brazil declines sharply during the decade. In fact, Brazil is assumed to be in need of starting to generate current account surpluses as early as 1987. These projections seem to be in line with the medium-term outlook of Brazil's extended arrangement with the IMF.

Under this set of external circumstances, the short and medium term prospects of Brazil are dismal indeed. As shown in Table 5, it is only in 1989 that Brazil will be able to resume GDP growth rates above the rate of growth of its population. These simulations imply that in 1989 real GDP per capita will be 6 percent lower than in 1983, and 19 percent lower than in 1980[13].

[12] The implicit rate of return for 1983 subdivides into an implicit interest rate on net foreign debt of 11.5 percent, and an implicit profit remittances rate on foreign direct investment from abroad of 3.8 percent. The latter is very low for historical standards and likely to increase in the near future, as foreign exchange Controls are relaxed. Thus, the assumption of a constant rate of return presumes that this effect will be compensated by a higher share of direct investment in foreign liabilities, and by lower international interest rates in the outer years of the projections period.

[13] These figures presume that Brazil's population grows at 2.5 percent per annum, and that the on-going revision of the national accounts will confirm the Bonelli-Malan (1984) estimate of a 3.5 percent drop in real GDP in 1981.

The simulations are based on current trends of Brazil's extended arrangement with the IMF, assuming, moreover, an essentially passive domestic policy stance *vis-a-vis* the tradability of the Brazilian economy. Their purpose, thus, is not to project what is actually going to happen, but rather to dramatize the need both for a relaxation of external constraints and for an expanded tradability of the Brazilian economy.

As the multipliers under Case A in Table 3 make abundantly clear, the Brazilian economy should rebound dramatically if external circumstances are improved, and renewed efforts are put into increasing the country's tradability.

The limitations on the latter should, however, be pointed out. First, import coefficients are already rather low. Hence, with the exception of energy substitution, not much should be expected from import replacement as a means of increasing the tradability of Brazil's economy. Export deepening is the way out. But there are two related difficulties here. There is first the generalized lack of foreign exchange in Brazil's clients in the Third World and socialist countries. Special payments arrangements and trade agreements will need to be worked out, before these markets can resume the importance which they had in the seventies for the growth of Brazilian exports. This means that Brazil in the eighties will depend much more than before on a successful penetration of the highly competitive markets of the First World. The problem is that, as Brazil succeeds in doing so, both its terms of trade are likely to decline, and the pressures from the North for reciprocity of trade arrangements are likely to increase.

Table 4

Brazil: Projections for Current Account Deficit Financing, 1984-89
(in billions of U.S. dollars)

Year	Gross Loan Disbursements[1]	Amortizations	Direct Investment[2]	Gross Foreign Reserves Accumulation[3]	Current Account Deficit Financing
	(1)	(2)	(3)	(4)	(5)
1984	17.2	-8.3	0.7	-4.3	5.3
1985	14.9	-9.6	0.7	-2.0	4.0
1986	14.1	-12.2	0.8	-0.9	1.8
1987	12.5	-12.5	0.9	-1.0	-0.1
1988	9.8	-11.9	1.0	-1.0	-2.1
1989	6.4	-9.6	1.1	-1.7	-3.8

Notes: [1]Net of errors and omissions and of Brazilian lending abroad;
[2]Excluding reinvestments;
[3]Minus sign means increase;
[4]Excluding reinvested profits.

Table 5

Brazil: External constraints and growth prospects, 1984-83[a]

Year	C/A Deficit financing (US$ billion)	Real growth rate of exports	GDP (US$ billion) (1983 prices)	GDP growth rate
1983	6.3	7.1[b]	300	-3.3
1984	5.3	7.0	306	1.9
1985	4.0	7.0	311	1.7
1986	1.8	5.0	306	-1.5
1987	-0.1	5.0	309	0.9
1988	-2.1	5.0	315	2.0
1989	-3.8	5.0	327	3.9

[a]Dollar inflation: 5% a.a. Dollar rate of return on net foreign liabilities: 10.5% a.a.
[b]Growth rate of purchasing power of exports.

Memo: End-Period-Values	1989
Employment (1983 = 100)	104
Foreign capital stock/GDP (1983 = 0.34)	0.25
Foreign capital stock/exports (1983 = 4.4)	2.5
Factor services/exports (1983 = 0.44)	0.27
Capacity use (1983 = 0.80)	0.79
Imports/GDP (1983 = 0.065)	0.065
Exports/Potential GDP (1983 = 0.063)	0.079

In the measure that these imply a reduction in the purchasing power of exports and an increase in Brazil's import coefficients, a corresponding reduction will obtain in the foreign exchange constrained growth rate of GDP.

In the limit, Brazilian exports might be expected to expand in real terms at 7 percent per annum after 1985, which is 1.5 times higher than the anticipated growth rate of world trade in the period. As indicated in Table 6 this would improve the country's medium-term prospects considerably, but would still leave Brazilians at the end of the decade with a real per capita income barely above those obtaining in 1983.

This discussion suggests that a relaxation of the external constraint needs in fact to take place, in order to ensure a better performance of the Brazilian economy in the remaining of the eighties.

One possibility is displayed in Table 7, where simulations are done under exactly the same assumptions as in Table 6, except that current account deficit financing is assumed to remain constant in real dollar terms, at the level of US$ 5.3 billion in 1984 prices. As indicated in the second column

in the table, this essentially amounts to capitalizing ha 1f of the factor Services bill in each year of the period. To put it in another way, the negative resource transfers implicit in Tables 5 and 6 need to be cut in half to guarantee the GDP growth rates displayed in Table 7.

These growth rates average 6.5 percent per year after 1984. Although quite high when compared with the recent experience of the country, they would be no more than sufficient to guarantee to Brazilians, at the end of the decade, the same per capita income which they enjoyed in 1980.

These GDP growth rates are accompanied by an improvement in the relevant debt ratios. As indicated in the memoranda accompanying the table, the foreign capital stock to GDP ratio (a proxy for the debt to GDP ratio) falls from 0.34 to 0.25 between 1983 and 1988, while the factor Services to export ratio (a proxy for the ratio of interest to exports) drops from 0.44 in 1983 to 0.29 in 1988.

Table 6

Brazil: Growth prospects with additional export promotion, 1984-89[a]

Year	Current account deficit financing (US$ billion)	GDP (US$ billion) (1983 prices)	GDP growth rate
1983	6.3	300	-3.3
1984	5.3	306	1.9
1985	4.0	311	1.7
1986	1.8	312	0.5
1987	-0.1	322	3.1
1988	-2.1	336	4.2
1989	-3.8	356	6.1

[a]Real export growth rate: 7% a.a. Dollar inflation: 5% a.a. Dollar rate of return on net foreign liabilities: 10.5% a.a.

Memo: End-of-Period Values	1989
Employment (1983 = 100)	107
Foreign capital stock/GDP (1983 = 0.34)	0.23
Foreign capital stock/exports (1983 = 4.4)	2.3
Factor services/exports (1983 = 0.44)	0.25
Capacity use (1983 = 0.80)	0.85
Imports/GDP (1983 = 0.65)	0.067
Exports/Potential GDP (1983 = 0.063)	0.084

Table 7

Brazil: Growth prospects under export promotion and constant real capital inflows, 1984-893

Year	Current Account (US$ billion)	Deficit Financing (as a ratio to factor Services)	GDP (US$ billion) (1983 prices)	GDP growth rate
1983	6.3	0.61	300	-3.3
1984	5.3	0.49	306	1 .9
1985	5.6	0.49	325	6.4
1986	5.8	0.49	346	6.5
1987	6.1	0.49	369	6.5
1988	6.4	0.49	393	6.6
1989	6.8	0.49	419	6.6

[a]See note (a) in Table 6.

Memo: End-of-Period Values	1989
Employment (1983 = 100)	114
Foreign capital stock/GDP (1983 = 0.34)	0.25
Foreign capital stock/exports (1983 = 4.4)	2.9
Factor services/exports (1983 = 0.44)	0.29
Capacity use (1983 = 0.80)	0.96
Imports/GDP (1983 = 0.065)	0.072
Exports/Potential GDP (1983 = 0.063)	0.081

A final point needs to be stressed. Notice in Table 7 that, with a 6.5 percent growth rate after 1984, the degree of capacity utilization is 96 percent in 1989. This means that towards the end of the decade, the currently low rate of domestic savings in Brazil will start preventing the economy from sustaining such a GDP growth rate. When domestic capacity becomes fully utilized actual GDP cannot grow more than potential GDP does. And the pace of the latter is determined by the sum of domestic and foreign savings. In the simulation in Table 7, potential GDP is growing at 3 percent per year in 1989, while the foreign savings to GDP ratio is only 1 percent. Hence, domestic savings would need to increase significantly at that stage, to keep the economy growing at 6.5 percent per year.

Domestic austerity will thus be eventually required, if sufficient foreign exchange is provided during the remaining of the eighties. Currently, however, domestic austerity only ensures that the economy is kept in a recessive State, hence, that it negatively adjusts to the external shocks of the late seventies and early eighties. Undoubtedly, domestic recession helps to tame inflation, but the careful econometric study of Modiano (1983) confirms that the Phillips curve pay-offs are very low indeed in the highly indexed Brazilian economy.

In fact, the main result up until early 1984 of the monumental monetary squeeze implemented since 1980 has been a spectacular near doubling of the velocity of circulation of money accompanying a more than doubling of the rate of inflation. In spite of this evidence, the IMF is still insisting in lowering the target rate of money supply growth for 1984 to 50 percent, even as it acknowledges the need to raise the expected inflation range from 75-100 to 100-130 percent[14]. This stance may succeed in preventing even the mil d recovery of the Brazilian economy in 1984-85 suggested in Tables 5-7. More generally, the whole posture of the IMF program misses the fact that the indispensable condition for the resumption of growth is the provision not of savings but of foreign exchange. Significant increases in Brazil's savings rate will be required only if external circumstances in the mid and late-eighties turn out to be much better than forecasters are currently daring to expect or statesmen willing to deliver.

4. Conclusions

Practical orthodoxy will often start an analysis of the external debt problem of the developing countries inquiring whether the debt was incurred to increase consumption or to expand investment. Consumption increases are immediately castigated. Investment expansion may be condoned, provided that the rate of return on capital was expected to be higher than the interest rate.

This perspective misses the actual reasons for external debt accumulation in the seventies and early eighties, certainly the case of Brazil, probably in other non-oil developing countries as well. For the worsening of Brazil's external accounts was by and large unrelated to real domestic spending excesses. Foreign debt accumulated throughout the period mostly because of deteriorating terms of trade, interest rate shocks, and world recession.

It is true that, faced with adverse external circumstances, Brazil opted for external financing rather than domestic adjustment. This adventurous option was doomed by the shock-wave of the late seventies and early eighties. But it must be evaluated in the context of the development strategy of a country, whose previous successful growth experience led it to believe in the possibility of catching up with the industrial leaders of its time.

Brazil is now in the fourth consecutive year of declining GDP per capita. If the Brazilian Central Bank (1984) prediction of a flat GDP in 1984 is confirmed, the standard of living of the average Brazilian this year will be 17.4 percent lower than in 1980. This is calculated adding to an estimated 14.1 percent decline in GDP per capita the additional real income Tosses implied by lower external terms of trade and higher factor payments to abroad.

[14] Cf. data in Central Bank of Brazil, 1983 and 1984.

The Brazilian population is estimated to grow at 2.5 percent per year. Hence, total GDP would need to grow at an average rate of 6.5 percent per year, after 1984, simply to recover by the end of the decade the average standard of living enjoyed by Brazilians in 1980. Coincidentally, as indicated in Table 7, this is also the rate of demand growth which would achieve nearly full utilization of available domestic capacity by the end of the decade.

Brazil will not achieve this objective if it is compelled to start generating current account surpluses as early as 1987. With exports growing initially at 7% and, after 1985, at 5% a year in real terms, the average GDP growth rate will be only 1.8% per year in the 1985-89 period. Under this scenario, in 1989 Brazilians stand to be 20 percent poorer than they were in the beginning of the decade.

Part of the distance between this scenario and the target 6.5% GDP growth rate can be covered by higher export growth rates, but not all of it. A realistic possibility is the maintenance, until 1989, of the 7 percent real growth rate of exports that Brazil achieved in 1983, and which the Brazilian government hopes to maintain both in 1984 and 1985. Inserting this hypothesis, we calculated an average GDP growth rate of 3.1 percent for the remaining of the decade, under constant international interest rates.

Very little at an aggregate level can be expected from additional import substitution. Barring first prizes in the oi1 lottery, the energy substitution that Brazil is likely to achieve will only leave room for the necessary decompression of non-oil imports, which are at present at levels 50 percent below those of 1980, in real terms.

Hence, the rest of the distance will have to be covered by additional finance. If the current account deficit remains constant in *real* terms – that is, if it grows at the rate of 5 percent per year from its expected $5.3 billion base in 1984 – then Brazil's GDP will grow at the required 6.5 percent, if exports expand at 7 percent in real terms, and Libor remains constant.

World trade may expand better than predicted, Libor may fall, and international banks may flow back to Latin America. However, as the multipliers in Table 3 make it abundantly clear, for Brazil these questions are too critical to be left floating in the air. An international understanding needs to be reached, guaranteeing Brazil the access to external markets and the additional finance which it requires for an adequate resumption of GDP growth rates.

According to our calculations, the successful implementation of the later scenario will result not only in satisfactory GDP growth rates, but also in considerable improvement in debt ratios. The foreign liabilities ratio to exports would fall from 4.4 in 1983 to 2.9 in 1984, whereas the ratio of factor Services (mostly interest) to exports would decline from .44 in 1983 to .29 in 1989. Thus, under this program, Brazil would start the nineties with both a renovated economy and a good balance of payments situation.

Appendix 1

Algebra of the Current Account Decomposition Exercises

The current account deficit (excluding reinvested profits) at time t, in dollars, is initially expressed as the difference between imports of goods and non-factor Services (NFS) plus net factor Services, minus exports of goods and NFS, inclusive of unrequited transfers.

$$D(t) = M(t) + V(t) - E(t) \tag{1}$$

Imports are decomposed into capital goods, oil and other imports, each of them being expressed as the product of price and volume indexes (in 1975 dollars):

$$M(t) = P_k(t) + J_k(t) + P_0(t)J_0(t) + P_j(t)J_y(t) \tag{2}$$

Import coefficients relate the capital goods import volume to fixed investment in real terms, and the volumes of oil and other imports to real GDP:

$$J(t) = j_k(t)I(t) \tag{3}$$

$$J_0(t) = j_0(t)Z(t) \tag{4}$$

$$J_y(t) = j_y(t)Z(t) \tag{5}$$

Net factor Services are divided into net interest and other investment income (excluding reinvested profits), with the former expressed as the product of an implicit dollar interest rate by the net stock of foreign debt at the end of the previous year:

$$V(t) = V_i(t) + V_d(t) \tag{6}$$

$$V_i(t) = r_i(t) + F_i(t-1) \tag{7}$$

Exports are decomposed into coffee and non-coffee exports, each of them being expressed as the product of price and volume indexes (in 1975 dollars):

$$E(L) = P_c(t)X_c(t) + P_n(t)X_n(t) \tag{8}$$

Export coefficients relate the volume of both coffee and non-coffee exports to the real value of world trade (as measured by the U.N. volume index of world exports of market economies, in 1975 dollars):

$$X_c(t) = x_c(t)W(t) \tag{9}$$

$$X_n(t) = x_n(t)W(t) \tag{10}$$

Substituting (2) to (10) in (1) and dividing the result by the dollar value of potential output, there results:

$$\frac{D(t)}{Y^*(t)} = \frac{j_k(t)p_k(t)I(t)}{Z^*(t)} + \frac{j_y(t)p_j(t)Z(t)}{Z^*(t)} + \frac{j_0(t)p_0(t)Z(t)}{Z^*(t)} + \frac{r_i(t)F_i(t-1)}{Y^*(t)} + \frac{V_d(t)}{Y^*(t)} - \frac{x_c(t)p_c(t)W(t)}{Z^*(t)} + \frac{x_n(t)p_n(t)W(t)}{Z^*(t)} \tag{11}$$

where the dollar value of potential output is related to its real value by use of the implicit GDP price deflator, expressed in dollars:

$$Y^*(t) = P_y(t)Z^*(t) \tag{12}$$

and where the small p's result from the division of the respective big P's by P_y.

Except for 1983, the conversion of the cruzeiro value of potential GDP (as calculated by Bonelli and Malan, 1984) into dollars was done by use of the average dollar/cruzeiro exchange rate in the Boletim Mensal of the Central Bank of Brazil. The maxi devaluation of February 1983 significantly changed the real parity of the cruzeiro in that year. Consequently, for 1983, the decision was taken to calculate the value of potential GDP adding the U.S. WPI inflation to the real change of potential GDP, as estimated in Bonelli and Malan (1984). Thus, the value of potential GDP in 1983 in Table 2 differs from that used in the simulations.

The final formula, as numerically expressed in Tables 1 and 2, is obtained by taking first differences in equation (11):

$$\begin{aligned}\left[d\left(\frac{D(t)}{Y^*(t)}\right)\right] = &\left[j_k(s)\left(\frac{I(s)}{Z^*(s)}\right)dp_k(t) + j_y(s)\left(\frac{Z(s)}{Z^*(s)}\right)dp_j(t) + j_0(s)\left(\frac{Z(s)}{Z^*(s)}\right)dp_0(t)\right.\\ &\left. - x_c(s)\left(\frac{W(s)}{Z^*(s)}\right)dp_c(t) - x_n(s)\left(\frac{W(s)}{Z^*(s)}\right)dp_n(t)\right] + \left[\left(\frac{F_i(s-1)}{Y^*(s)}\right)dr_i(t)\right]\\ &- \left[\left(p_c(s)x_c(s) + p_n(s)x_n(s)\right)d\left(\frac{W(t)}{Z^*(t)}\right)\right] + \left[r_i(s)d\left(\frac{F_i(t-1)}{Y^*(t)}\right)\right]\\ &+ \left[p_k(s)j_k(s)d\left(\frac{I(t)}{Z^*(t)}\right) + \left(p_k(s)j_y(s) + p_0(s)j_0(s)\right)d\left(\frac{Z(t)}{Z^*(t)}\right)\right.\\ &+ \left(p_k(s)\left(\frac{I(s)}{Z^*(s)}\right)dj_k(t) + p_j(s)\left(\frac{Z(s)}{Z^*(s)}\right)dj_y(t) + p_0(s)\left(\frac{Z(s)}{Z^*(s)}\right)dj_0(t)\right)\\ &\left. - \left(p_c(s)\left(\frac{W(s)}{Z^*(s)}\right)dx_c(t) + p_n(s)\left(\frac{W(s)}{Z^*(s)}\right)dx_n(t)\right) + d\left(\frac{V_d(t)}{Y^*(t)}\right)\right]\\ &+ [interaction\ terms]\end{aligned} \tag{13}$$

where "d" stands for the difference in the value of the magnitude following this sign between each year of the 1974-1978 period and 1973 (or between 1979-83 and 1978), and where the bracketed terms are identified in Tables 1 and 2 as follows:

[variation in the current account deficit ratio to potential GDP between year and base-year 1973 (or 1978)] = [terms of trade deterioration] + [interest rate shock] + [retardation of world trade growth] + [burden of accumulated debt] – [fixed investment cuts + domestic output contraction + import replacement + export deepening + profit remittances compression] + [interaction effects and adding-up errors].

Note also the symbol "s" in equation (13), which indicates the year for which the "weights" of the decomposition terms were calculated. In this research, both a "Laspeyres" procedure, or base-year weights, and a "Paasche" procedure, or current-year weights, were initially adopted. The procedure finally selected was that which minimized the value of the interaction effects in equation (13).

Appendix 2
Simulation Model for Brazil
(Constant terms of trade version)

1. Import Functions

$$M(t) = P(t)J_z(t) + P(t)J_k(t)$$

$$J_z(t) = 0.9I(t) - 1{,}578 \qquad [e_z(1983) = 1.27]$$

$$j_k(t) = 0.75Z(t) - 4{,}820 \quad [e_k(1983) = 1.50]$$

(the constant terms are in millions of 1983 dollars)

2. Export Functions

$$E(t) = P(t)X(t)$$

$$X(t) = X(t-1)\big(1 + h(t)\big) < X_{max}(t)$$

3. Current Account Deficit

$$D(t) = M(t) + V(t) - E(t)$$

4. Domestic Absorption

$$P(t)A(t) = D(t) + P(t)Z(t) - V(t)$$

5. Fixed Investment

$$P(t)I(t) = P(t)A(t) - P(t)C(t)$$

6. Consumption

(domestic absorption other than fixed investment)

$$P(t)C(t) = 0.845 \quad [P(t)Z(t) - V(t)]$$

7. Factor Services

$$V(t) = r(t)F(t-1)$$

8. Net Foreign Capital Stock

$$F(t) = F(t-1) + D(t)$$

9. Dollar Price Level

$$P(t) = P(0)1.05^t; \;\; P(0) = 1$$

10. POTENTIAL OUTPUT

$$Z^*(t) = 0.967Z^*(t-1) + 0.413I(t-1)$$

11. EMPLOYMENT

$$N(t) = q[Z(t)]^{0.4}; \;\; N(0) = 100$$

Definitions of Variables in Appendix 1 and 2

The following symbols appear in the two previous appendix:

$M =$ dollar value of imports of goods and NFS

$J_z =$ non-capital goods imports in constant dollars, which subdivides into:

$J_0 =$ oil imports in constant dollars

$J_y =$ other imports in constant dollars

$J_k =$ capital goods imports in constant dollars

$I =$ fixed investment in constant dollars

$Z =$ GDP in constant dollars

$E =$ dollar value of exports of goods and NFS

$C =$ consumption (private consumption plus government consumption plus inventory changes) in constant dollars

$D =$ current account deficit in dollars, excluding reinvested profits

$V =$ factor services in dollars, which subdivides into:

$V_i =$ net interest

$V_d =$ other investment income (excluding reinvested profits)

$r =$ rate of return of foreign capital (%)

$r_i =$ rate of interest on net debt (%)

$F =$ net stock of foreign liabilities (net of international reserves on the balance of payments concept) in dollars

$F_i =$ net foreign debt in dollars

$Y^* =$ potential output in dollars

$Z^* =$ potential output in constant dollars

$P =$ dollar price level

$P_y =$ implicit price deflator, in dollars

$P_k =$ dollar price index of capital goods imports

$P_j =$ dollar price index of other imports

$P_O =$ dollar price index of oil imports

$P_c =$ dollar price index of coffee exports

$P_n =$ dollar price index of non-coffee exports

$X_{max} =$ equal to the minimum between 10% of potential GDP, and the sum of potential GNP plus imports minus domestic absorption, in constant dollars

$h =$ growth rate of real export demand

$e_k =$ elasticity of capital goods imports with respect to fixed investment

$e_z =$ elasticity of current goods imports with respect to GDP

$N =$ employment index with $N(0) = 100$

$q =$ conversion factor such that $N(0) = 100$; or $q = \frac{100}{Z(0)^{0.4}}$

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