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Abstract
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Pentheus: (to guards) Go swift to all the towers, and bar withal Each gate!

Dionysus: What, cannot God o'erleap a wall?

--Euripides, The Bacchæ †

Quantitative models of import demand have revolved around numerical estimates of demand elasticities for a number of theoretical and practical reasons.[1] Especially in Latin America, much of stimulus and direction of postwar development is said to have originated out of reaction to the trade constraint.[2]

Perhaps the most widely-cited case of rapid, import-substituting industrialization is that of postwar Brazil, a case almost unique among the Latin American nations for its rejection of quantitative controls and its reliance on the price mechanism to ration imports. The pieces of the Brazilian protective system, correctly assembled and aligned, reveal a detailed chronicle of a market which has functioned to restrict and distribute imports under pressure of rapid growth and a severe foreign exchange constraint.[3]

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†Quoted from Gilbert Murray translation (1919), p. 398.

[1]Despite the qualifications set forth in Chs. 24 and 31, Meade (1963), p. 323, concludes "The great issues of fact...is the actual size of these elasticities. On this question much more statistical and factual research needs to be undertaken..." See Houthakker and Magee (1969), and Khan (1974) for international comparisons.

[2]Compare the views presented in ECLA (1964) to H. G. Johnson (1964), pp. 109-114.

[3]By emphasizing the time series of protection, we are undoubtedly compounding these deficiencies with other well-known difficulties of estimating import demand elasticities. See Khan and Ross (1974), for a review of these assumptions.

I. Imports and the Brazilian Economy, 1948-1975

The postwar development of Brazil has been characterized by wide variations in growth, acclaimed as the "miracle" during the upswings and as "structurally stagnant" during the prolong crises.[4] Nevertheless, the economy has sustained an overall annual growth rate of 7.0 percent for the period while exports and imports have fluctuated in unsynchronized cycles. The import coefficient, reduced through the middle sixties, has been rising to a level reminiscent of the early years of the postwar development. (see Table 1, lines 1-2).

Changes in the distribution of imports (Table 1, lines 5a-c) reflect the success of the import substitution process. The decline in the share of consumer imports, achieved early in the 1950's, suggests that little room was to be gained from further substitution of these goods, while the rising importance of fuels and intermediate materials indicates that the continuing import "dependency" was being shifted "backwards" to other sectors of the economy.[5] The declining share of capital goods after 1963 and its rise since 1973 reflects the initial buildup of Brazilian industry and the more recent realignment in the international division of labor by which foreign-owned subsidiaries and the export enclaves rely on imported machinery to expand capacity, while the domestic Brazilian capital goods industry continues to replicate older equipment.

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[4] See the reviews in Baer (1976), and Malan and Bonelli (1977).

[5] Maria Conceição Tavares, writing in the early 1960's, noted that "the maintenance of existing industrial activity itself would remain strategically dependent upon mass imports of raw materials," has amply characterized the "miracle" of the early 1970's and the subsequent crisis as well. See ECLA (1964), pp. 23-24.

Table 1

Brazilian Growth and Imports, 1948-1975
(Five-year Averages)

	1948-52	1953-57	1958-62	1963-67	1968-72	1973-75
1. Gross National Income (%) average annual growth rates	8.3	7.2	7.5	3.5	9.9	8.3 (4.0)[a]
2. Import Coefficient (%) (M/GDP)	12.2	8.1	8.7	8.9	8.9	11.5(14.0)[b]
3. Gross National Output (1948=100)	114.2	155.5	220.8	277.0	387.0	579.0
4. Total Imports (1948=100)	155.9	200.7	261.7	254.0	474.7	964.4
5. Distribution of Imports (%)					[c]	[d]
a. Consumer goods	15.0	9.0	7.2	10.6	10.4	8.7
b. Fuels and lubricants	12.9	20.9	22.2	28.0	24.0	19.3
c. Intermediate goods	32.1	39.1	36.4	42.5	42.1	41.4
d. Capital goods	39.9	30.6	34.2	18.7	23.5	30.6
e. Sample total	100.0	100.0	100.0	100.0	100.0	100.0

Notes: a. Refers to 1975 only. b. Refers to 1974 only. c. Refers to 1968-70 only, same source as 1948-67 in constant 1955 dollars. d. Refers to 1973-75 in current U.S. dollars.

Sources: Line 1 calculated from national income accounts given in constant 1953 prices from IBGE, Retrospectivas, pp. 215-216, for 1948-62; from IBGE, Anuario 1973, pp. 564-566, for revised series, 1963-72; from FGV, Conjuntura Econômica for 1973-75.
Line 2 calculated from annual values given in current cruzeiros only. See IBGE, Anuario 1975 for revised accounts in current prices.
Line 3-4 output calculated from W. Suzigan series and imports from Conjuntura Econômica, presented in Bacha (1977), Table 1, p. 49, and Table 9, p. 60.
Line 5 calculated from imports expressed in constant 1955 prices from ECLA (1964), Table 9A, p. 22 for 1948-60. Data for 1961-70 from the disaggregated sample made available by the IBGE to the author; data for 1973-75 expressed in current U.S. dollars from Malan and Bonelli (1977), Table A.7, p. 39.

II. The Structure of Protection

The elements and evolution of the protective structure provide one profile of Brazilian political economy for a period during which import policy appears otherwise disordered, turbulent and contradictory. Protection was provided by two major mechanisms. Multiple exchange premiums, determined in public auctions between 1953 and 1958, varied from 8 percent over the "basic" rate for fuels to 250 percent for construction materials.[6] A second layer of protection was added in 1958 with the enactment of ad valorum duties, a highly-differentiated structure which, despite some liberalization moves in 1967, still remains in effect. As "similars" came to be produced locally, high protection was automatically extended to these new categories of goods.[7]

The distribution of the nominal (unweighted) tariffs in 1964 (Table 2, cols. 1-2) indicates that protection varied greatly within and between use classes. With the 1964 military coup, the end of the civilian rule, the extension of generous AID program support from the United States, and the recovery of the balance of payments, pressures built up to "liberalize" imports and lower the general level of protection. As a consequence, the average tariff (unweighted θ_j) fell from 54% in 1964 to 39% in 1967, although the rise in the corresponding coefficients of variation suggest the persistence of extreme inequality in tariff rates. (See Table 2, line 10, cols. 1-2).[8]

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[6] See Clark-Weisskoff (1967) and its appendix entitled, "Research Labyrinth" (1966).

[7] The tariff is criticized as having provided "excessive" protection for too long to too many not-so-infant industries. See P. G. Clark (1967).

[8] This downward trend of mean nominal protection had been reversed by 1973. C. Von Doellinger, et al., (1974), Table VI.13, p. 134, using a different sample, found the overall average to be 49% in 1973.

Table 2
Patterns of Protection, 1953-1970

Import Use-Class	Θ_j Average Unweighted Nominal Tariffs (coeff. var. beneath) 1964	Θ_j 1967	$(1+\Omega)_j$ Average Unweighted Comprehensive Protection (coeff. var. beneath) 1964	$(1+\Omega)_j$ 1966	Θ_j and $(1+\Omega)_j$ Average Annual Weighted Tariffs (Weighted Comp. Protect. beneath) 1953-57[c]	1958-62	1963-67[d]	1968-70[d]
	(percent)		(percent)			(percent)		
1. Nondurable Consumer Goods	73	54	257	139	--	38.2	35.8	37.0
	(52)	(56)	(43)	(30)	(63.0)	(101.0)	(149.8)	--
2. Durable Consumer Goods	80	63	206	130	--	45.4	43.8	40.0
	(38)	(48)	(55)	(27)	(144.2)	(82.8)	(107.3)	--
3. Fuels	65	47	41	-2	--	41.4	28.6	1.0
	(76)	(74)	(95)	(-9)	(-24.0)	(0.0)	(23.3)	--
4. Metallic Intermediate Goods	47	35	122	64	--	36.0	39.8	29.7
	(39)	(44)	(59)	(48)	(33.0)	(95.6)	(87.0)	--
5. Nonmetallic Intermediate Goods[a]	37	27	111	53	--	22.4	22.4	21.7
	(70)	(71)	(91)	(40)	(57.6)	(48.4)	(57.5)	--
6. Construction Materials	62	44	159	78	--	56.0	62.6	42.0
	(38)	(32)	(63)	(46)	(135.6)	(67.8)	(91.8)	--
7. Capital Equipment/Agriculture[b]	32	25	84	43	--	9.0	10.4	24.0
	(80)	(84)	(94)	(100)	(2.6)	(17.4)	(30.8)	--
8. Capital Equipment/Industry[b]	49	37	104	(56)	--	46.0	43.0	39.0
	(49)	(57)	(80)	(45)	(99.4)	(54.0)	(71.0)	--
9. Capital Equipment/Transport[b]	55	42	118	71	--	34.6	33.8	33.0
	(55)	(60)	(77)	(53)	(108.4)	(64.6)	74.0	--
10. Total Imports	54	39	138	73	--	38.6	30.4	26.0
	(53)	(66)	(81)	(16)	(42.8)	(42.8)	(55.0)	--

Notes: (a) Figures exclude wheat. (b) Figures are not adjusted for administrative reductions and waivers. (c) From 1953-1957 tariffs were specific and are ignored here. (d) Coefficients for $(1 + \Omega)$ refer to years 1963-66, since the "special" exchange category was abolished in 1967.

A measure of nominal protection which includes both tariff and the exchange premium we shall call here the "comprehensive rate of protection," $(1 + \Omega)_j$, to express the import barrier as a percentage over and above the price of the same commodity imported at a zero tariff and at the basic exchange rate. (See the appendix for specification and sources.)[9] The decline in average, unweighted comprehensive protection (Table 2, line 10, cols. 3-4) from 138% in 1964 to 73% in 1966, and in the corresponding coefficients of variation, reflect the consolidation of the numerous exchange categories, the narrowing of the differential between the categories, and the shifting of goods to less protected categories.

The comparison of weighted tariffs to comprehensive protection during the period 1953-70 (cols. 5-8) indicates the extent to which the exchange premiums overshadowed the tariffs in shielding national industry, as, for example, in the consumer goods categories, or the extent to which the exchange premium subsidized imports, as in the case of fuels. Except for the lone case of metallic intermediate goods, comprehensive protection rose from the 1958-62 to the 1963-67 period, the latter representing years of the most severe crisis and political upheaval. With the elimination of the "special" exchange category and final unification of the exchange rate in 1967, the tariff structure has come to dominate the protective process.[10]

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[9] These comprehensive rates ranged from a 20 percent subsidy for "essential" fuels and foods to a premium of more than 350 percent for "national similars" and luxury goods.

"Comprehensive" protection is here distinguished from "effective" protection which refers to direct and indirect tariffs in the input-output sense. The concept of "effective" protection encounters formidable theoretical and statistical complexities when both tariffs and exchange rates vary. See Corden's (1971) comment on Kaldor's proposal, p. 188, n. 10.

[10] The time series of protection and imports is here carried through 1970 to correspond with import series provided by the IBGE and prior to the introduction of "minimum prices" in 1971. With the renewed exchange crises which began in 1975, the government has again moved to require exchange deposits on protected and locally-financed imports.

III. The Demand for Imports

The relationship between import demand, on the one hand, and income and relative price, on the other, is grounded in the contradiction between local industry's need for foreign materials and its continuing success in replacing those needs by national production. In the aggregate model, the price variable reflects the ability of local production to compete with and limit the general level of imports. In the disaggregate model, relative prices serve to distribute the available foreign exchange among priority imports, especially in those years when growing internal demand for imports in many sectors coincide with a tightening overall exchange constraint.

The general model of import demand to be applied is of the form:

$$M_{jt} = \alpha_j Y_t^{\beta_{1_j}} P_{jt}^{\beta_{2_j}} e^{\delta_j t} e^{d_j} u_{jt}$$

where M_{jt} is the quantum index of merchandise imports for the total and for nine use classes ($j = 1, \ldots, 9$) for year t ($t = 1, \ldots, 18$), calculated in constant 1953 U.S. dollar import prices. The coefficient α_j is a constant for each use class; Y_t is the relevant activity variable (GNP, capital formation, etc.), expressed in constant values; P_{jt} is the index of the relative price of imports.[11] The coefficient u_{jt} is the error term, assumed to be log normally distributed with unit mean and constant variance.

The coefficients, β_{1j} and β_{2j}, are the income and price elasticities of import demand; δ_j is the trend coefficient; and d_j a dummy variable to indicate shifts in the function due to changes in the regime. The time coefficient δ_j may be interpreted to reflect successful import substitution ("national

[11] The price variable itself is composed of four principal components: international prices, tariffs, and exchange premiums in the numerator; local prices of a comparable basket of goods in the denominator, all weighted by 1962 imports. See the Appendix for detailed definitions.

stock adjustment") when negative in sign or increasing import dependency ("habit formation") when positive.[12]

The variable nature of overall imports and of the disaggregated categories juxtapose many different patterns of import demand: for example, the highly volatile nature of capital and metallic intermediate goods to the rather steady growth of fuels, nonmetallic intermediate goods, and consumer nondurables. The reponsiveness of different sectors to periodic import rationing, that is, the region of the long-run demand surface on which the society finds itself, we suspect is related to the stage of manufacturing, the availability of local materials, and the effort and success of import-substituting activity.

The import markets, as summarized by their functional elasticities, may be viewed as the possible inverse of national demand, complementary to, yet competitive with, domestic supply. A category, such as consumer durables which is normally thought as characterized by both high income- and high price-elasticities of total national demand,[13] may rely on imports to satisfy only the price-inelastic portion of the demand surface. By contrast, the demand for intermediate products and fuels, which is generally thought to be a "necessary" material input or highly income-inelastic, if not "fixed" in a technical sense, may, in terms of import demand, prove to be highly elastic with respect to income and inelastic to price. The demand for capital goods, normally thought as linked to GNP through a mechanical, stock-adjustment process, may, in its import-form, prove extremely responsive to both income and relative price.

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[12] For parallels in household expenditures, see Houthakker and Taylor (1966), pp. 8-11.

[13] See Houthakker and Taylor (1966), p. 81; Weisskoff (1971), Table 14.17, p. 355.

IV. Results

The results of OLS estimates of the log-log coefficients, presented in Table 3, summarize the differential impact of economic activity, price, and the success or failure of the import-substitution efforts. The coefficients of the overall import equation (line 1) suggests a high income(GNP)- and low price-elasticity, strong substituting activity throughout the period, and a significant upward shift in the import function with the opening of the Brazilian economy to unprecedented levels of capital inflows in 1968. The substitution of the more volatile capital formation variable (KAP) in line 1b for the sluggish GNP indicator separates more completely the cyclical income component of import demand from the secular effects of import substitution, and reduces all the elasticities.[14]

In three disaggregated sectors--nondurable consumer goods, wheat and fuels--the positive time coefficient indicates a deepening import dependency, and in the two intermediate goods sectors, a comparatively weak substitution trend.[15] (The elasticities are summarized in Figure 1.)

The strongly negative time coefficients in the remaining sectors record successful import substitution. The high activity elasticity of consumer durables (line 4), a sector which was originally the object of the import-

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[14] See Khan and Ross (1974) for an alternative formulation.

[15] The lack of progress in these categories has conventionally been explained by the "absence of resources," oil, coal, copper, or phosphates, for example, an apology which underscores the extent to which local innovations and styles have yielded to multinational technological and consumer imitation. The continued import dependency on foods, however, can hardly be excused by the absolute scarcity of good farmland in Brazil, a country which has continued to emphasize export crops (coffee, sugar, and soybeans), while neglecting domestic foodstuffs and maintaining, if not enlarging, "modern" (i.e., temperate-zone) consumption preferences for wheat and milk products.

See Magee (1975), p. 190, for comments on the sign of the activity coefficient. Theoretically, either sign is permissible.

FIGURE 1

Summary of Time, Activity and Price Elasticities

TIME ELASTICITY

ACTIVITY ELASTICITY	Strong ($\delta \leq -.15$) I.S.		Weak ($0 > \delta > -.15$) I.S.	Positive ($\delta \geq 0$) I.D.
	Price Elastic $1.0 \leq \lvert\beta_2\rvert$	Price Inelastic $\lvert\beta_2\rvert < 1.0$	Price Inelastic $\lvert\beta_2\rvert < 1.0$	Price Inelastic $\lvert\beta_2\rvert < 1.0$
Strong $\beta_1 \geq 1.0$	Construction Materials Agricultural Equipment Industrial Equipment	Consumer Durables Transportation Equipment	Total Imports Metallic Intermediate Nonmetallic Intermediate	
Weak $\beta_1 < 1.0$				Consumer Nondurables Wheat Fuels

substitution program, reflects the reduced but token flow of luxury prototypes around which conspicuous consumption has come to be modeled. The spreading popularity of this style of consumption and, as a consequence, the critical dependence on imported intermediate materials and fuels to sustain the local production and final use of these consumer goods, is reflected in the weak time elasticity and the high income- and low price-elasticity of derived import demand for these necessary inputs. The strong substitution coefficient and the high income- and high-price elasticity for three-capital goods categories (construction materials, agricultural and industrial equipment) summarizes the record of the local sector to expand capacity rapidly by means of imports when exchange becomes available and then to reproduce equipment locally during periods of exchange scarcity. The juxtaposition of high income and low price responsiveness for transport equipment, however, reflects the reliance on imports of diesel locomotives, telecommunications equipment, and cargo ships, capital which, until very recently, could not be produced locally.[16]

These coefficients are summarized schematically in Figure 2, where the chain of successful import substitution, (I.S.), on the center left, namely capital equipment, through metallic intermediate materials and durable consumer goods, contrasts with the "chain" of continued import dependence (I.D.) on the right-hand side and in fuels.[17]

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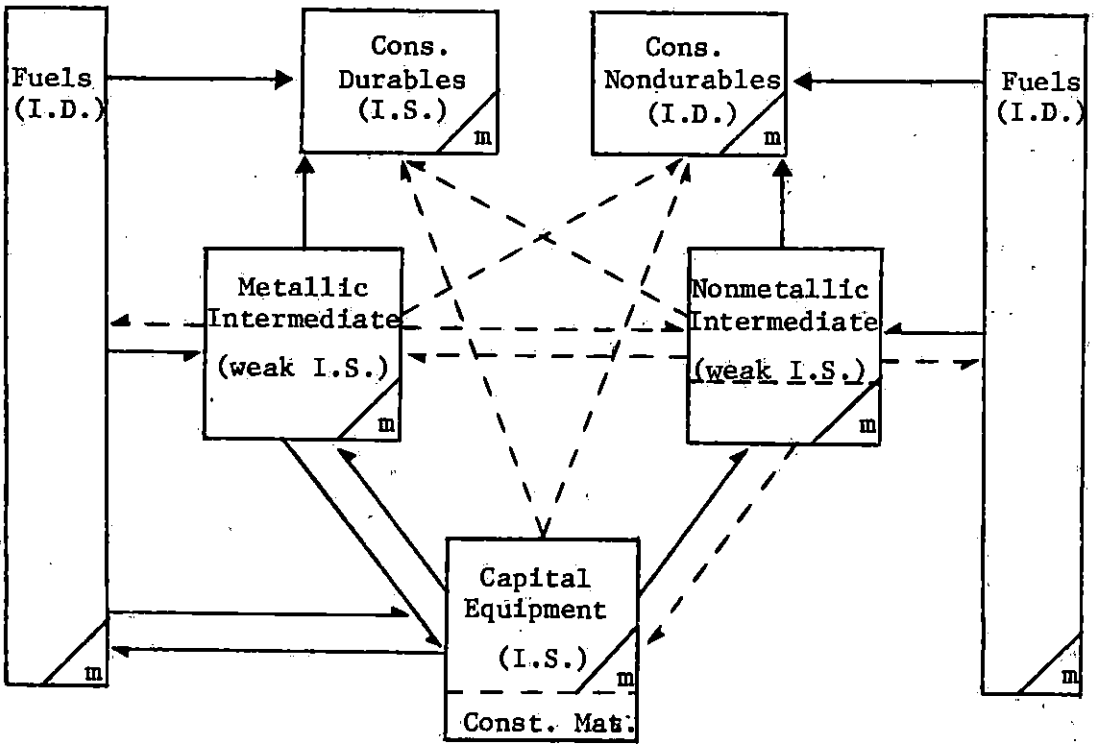
[16] The regression of imports of capital goods on gross capital formation would lead to a positive bias in the activity coefficient unless imported capital goods compose but a small and differently fluctuating component of the total capital formation variable.

[17] In this consolidated scheme, the arrows correspond to the significant off-diagonal elements of a triangulated input-output system. Primary flows are shown in solid lines; other inter-industry flows are designated by dashed arrows.

Imports of each type of good must be thought of as net inflows into each non-zero cell, rather than as simple additions to row totals. Contrast the role of imports and the webs of inter-industry relationships associated with intermediate and capital goods here to Leamer (1973), p. 443 and 447, who relates linear stages of processing to import elasticities. Capital goods do not enter his scheme, however.

Figure 2

Import Substitution and Dependency by Sector



I.S. = import substitution
I.D. = import dependency
m = imports

Finally, it should be noted that the weighted sum of the disaggregated price elasticities, estimated with capital formation as the activity variable and corrected for variations in the component prices, totals -.23, closer to the actual estimate of -.26 than the "simple" weighted sum of the price-elasticities of -.49.[18] The weighted sum of the disaggregated capital elasticities is 1.87, compared to the aggregate coefficient of 1.76; the weighted sum of the disaggregated GNP elasticities is 2.61, compared to the aggregate estimate of 2.33.

V. Conclusions and Postscript

The empirical findings document the strong negative secular trend associated with import-replacing development, the elastic and volatile effect of income and capital formation. We have related these findings to the chain of interdependence and to the growth strategy pursued in the expansion of the Brazilian economy.

However, other dimensions of political economy must be sought to explain the spectacular surge in imports which began in 1970. In the years since 1969, trade deficits of magnitudes once thought intolerable under the old rules of international policy, have been cavalierly offset by gargantuan capital inflows. The conventional single-equation model, true to the caveats of Meade, mirror neither the tides of capital movements which signal Brazil's changing role in the international division of labor[19] nor reflect the growing uneasiness over

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[18] Magee (1975), pp. 235-238, calls these price variations, "distribution elasticities," and demonstrates the bias which may be caused by their ommission in aggregating component elasticities.

[19] Hand in hand with this centralization...develop, on an ever-extending scale, the cooperative form of the labour process...the methodical cultivation of the soil, the transformation of the instruments of labour into instruments of labour only usable in common---the entanglement of all peoples in the net of the world-market, and this, the international character of the capitalistic regime.

[Marx, (1967) edition, Vol. I, p. 363)]

her cumulating indebtedness.[20]

By 1975, the Brazilian "miracle" had ground to a halt with the evaporation of the huge inflows of foreign capital, the rise in the world price of oil, and a drop in Brazil's export prices. Rather than seek a solution, as in the early 1960's, with a renewed round of import substitution and the development of other, or perhaps simpler, consumer patterns which might reduce the need for intermediate imports and new capital, the current response has been to seek refuge in and further integration with the international economy. Today a path of continued openness and export promotion combine with repressive domestic policies to reduce mass (but not luxury) consumption and with this, life expectancy as well.[21]

The reimposition of a balance-of-payments constraint, a drop in the real national growth rate for 1975 and 1976, and the return of higher rates of inflation, all raise the old specter of a balance-of-payments crisis. These events could trigger a new era of import substitution only if Brazil were to turn to an inwardly-directed strategy of growth. In such a new era of political economy, the protective system may be called upon again to serve a defensive and dynamic role in Brazilian economic development.

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[20] Of 25 developing countries, the share of inflows of liquid capital relative to GDP in Brazil rose from .1% in 1967, the lowest, to 7.8% in 1972, the fifth highest. See Von Doellinger, et al., (1974, p. 154), Table VII.9.

[21] Bacha (1977) relates the rise in infant mortality to the fall in the real wage and the differential rise in basic consumer goods' prices. Only the forcible dismantling of working class organizations has allowed the government to carry out the reduction in real wages.

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Appendix I

Data Sources and Procedures for Constructing the Price Variable

A. Commodity Tariffs:

$$\theta_{it} = \Sigma_i(\theta_{kit}/n)$$ where

θ_{it} = nominal tariff for each commodity $\underline{i}$ ($i = 1, \ldots, 463$) in each year $\underline{t}$, ($t = 1958, \ldots, 1970$) adjusted for administrative decrees and waivers.

θ_{kit} = nominal tariff for each imported item $\underline{k}$ ($k = 1, \ldots, n, \ldots, 9000$).

n = number of items, $\underline{k}$, which correspond to each sampled commodity, $\underline{i}$.

B. Commodity Exchange Rates:

$$E_{it} = \Sigma_i(\epsilon_{kit}/n)$$ where

E_{it} = the exchange rate at which commodity $\underline{i}$ in each year t ($t = 1953, \ldots, 1970$).

ϵ_{kit} = the exchange rate applied to each import item $\underline{k}$. There were five standard "category" rates from 1953-57 and two from 1958-67. Different exchange rates were applied for wheat, petroleum, newsprint, fertilizers, insecticides, fruits, and auto chasses, during different periods.

C. Comprehensive Protection for Commodities

$$(1 + \omega)_{it} = \theta_{it}[\phi/\rho]_t + [E_i/\rho]_t$$ where

$(1+\omega)_{it}$ = comprehensive rate of protection for each commodity, $\underline{i}$ in each year $\underline{t}$ (1953, ..., 1970).

ϕ_t = the "fiscal dollar" rate applied to the dollar price of imports to calculate the cruzeiro tariff.

ρ_t = the annual "basic" exchange rate. A commodity subject to a zero tariff and subsidized exchange rate, $E_{it} < \rho_t$, can be said to have entered st a "negative" rate of protection relative to a tariff-free good entering at the basic exchange rate, $E_{it} = \rho_t$.

D. Comprehensive Protection for Use Classes:

$$(1 + \Omega)_{jt} = \Sigma_i[m_i(1 + \omega)_{it}]/\Sigma_i m_i$$ where

$(1+\Omega)_{jt}$ = comprehensive rate of protection for each use class $\underline{j}$ ($j = 1, \ldots, 9$) in each year $\underline{t}$.

m_i = imports of commodity $\underline{i}$ in 1962 expressed in constant 1955 dollar prices, used for weighting commodity protection.

E. Index of International Prices for Use Classes:

$$\pi'_{jt} = \Sigma_i P_{it} m_i/\Sigma_i m_i$$ where

π'_{jt} = index of international prices of Brazilian imports, weighted.

P_{it} = index of the current dollar price of each commodity $\underline{i}$ in year $\underline{t}$ relative to its 1953 price.

m_i = imports of each commodity $\underline{i}$ in 1962 as expressed in 1955 dollar prices. (Price indices using weights of 1955 and 1970 imports in 1955 dollar prices were also estimated.)

F. Index of Comprehensive Import Prices:

$$(P_m)'_{jt} = \pi'_{jt}\,(1 + \Omega)'_{jt}\,\rho'_t$$

where $(P_m)'_{jt}$ = index of import prices including comprehensive protection.
(') Accented variables indicate variable indexed to their corresponding 1953 base.

G. The Price Variable:

$$P'_{jt} = [P_m/P_d]'_{jt}$$

where P'_{jt} = index of relative prices by use class and year.

P'_d = index of domestic prices by use class and year. Domestic price indices for use classes 1, 3, 4 and 5 were constructed by weighing 87 annual wholesale price series for competitive goods by corresponding 1962 imports. Wholesale prices indices for the remaining five use classes were selected from FGV wholesale price series which most clearly correspond to competitive domestic supply.

H. The Import Variable:

$$M'_{jt} = \Sigma_i [p_o q_t / p_o q_o]_i$$

where M'_{jt} = quantum index of imports by use class j for each year.

$(p_o q_t)_i$ = imports of commodity i in constant 1955 dollar prices.

$(p_o q_o)_i$ = imports of commodity i in current dollar prices.

I. Activity Variables:

GNP = Index of gross national product given cruzeiros calculated in constant 1953 prices.

KAP = Index of capital formation calculated in constant prices.

CONSUP = Index of GDP for final use in consumption.

IND = Index of GDP originating in the industrial sector (other activity variables include GDP originating in agriculture, aervices, and transportation; the number of construction permits issued; and all the above variables lagged one period).

$(OIL)_{-1}$ = National production of crude petroleum, 1953 = 100.

$(WHEAT)_{-1}$ = National production of wheat, 1953 = 100.

Table 3

Import Elasticities for Brazil, 1953-70
log-log, annual data

	Constant	β_1 Activity Variable			β_2 Price	δ Time	d Dummy	$\bar{R}^2$ (S.E.E.)	D.W. (F-stat)
		GNP	KAP	Other					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total imports	-5.994	2.333*			-.374	-.131**	Dum 68 .260**	.823	1.89
	(1.702)	(3.039)			(2.193)	(2.890)	(2.796)	(.0943)	(15.08)*
	-2.744**		1.759*		-.262**	-.080*		.896	1.77
	(2.778)		(7.488)		(2.921)	(5.876)		(.070)	(40.09)*
All consumer goods	-3.831		2.187*		-.267	-.129**	Dum 64 .321	.602	1.79°
	(1.300)		(3.087)		(1.243)	(2.581)	(1.643)	(.185)	(4.92)**
Consumer nondurables	6.159			Consup. -.267	-.489**	.048	Dum 68 1.236	.773	1.86
	(.785)			(.197)	(2.203)	(.586)	(1.422)	(.195)	(11.08)*
	10.57*			Ind. GDP -1.312	-.347	.130**	Dum 68 .243	.836	1.81
	(3.523)			(1.988)	(1.736)	(2.585)	(1.693)	(.171)	(15.38)*
Consumer durables	7.341		2.878*		-.072	-.209*	Dum 68 .587**	.811	1.90
	(2.018)		(3.358)		(.339)	(4.566)	(2.415)	(.203)	(13.98)*
Fuels	4.907*					.043*	dom. oil (-1) -.054**	.882	1.97
	(37.74)					(6.633)	(2.217)	(.064)	(55.91)*
Metallic intermediate	-7.939	2.747			-.415**	-.130		.638	2.44°
	(1.133)	(1.797)			(2.341)	(1.413)		(.216)	(8.23)*
Nonmetallic intermediate	-3.565		2.008*		-.407*	-.091*		.840	1.66
	(1.744)		(4.137)		(3.144)	(3.196)		(.144)	(24.49)*
	-11.49	3.581**			-.668*	-.200**		.782	1.35°
	(2.083)	(2.969)			(4.019)	(2.666)		(.168)	(16.71)
			Dom. wheat (-1)						
Wheat	4.335*		.027			.033*		.669	1.61
	(23.35)		(.833)			(5.494)		(.128)	(15.16)*
	4.480					0.032*		0.614	1.60
	(71.80)*					(5.496)		(.127)	(30.21)
Construction materials	-19.06	5.112**			-1.705*	-.298**		0.715	2.06
	(2.079)	(2.558)			(5.756)	(2.552)		(.299)	(11.72)*
	-8.162		2.982*		-1.397*	-.166*		.757	2.20
	(2.059)		(3.169)		(5.174)	(3.042)		(.277)	(14.51)*
	-7.697			Ind. GDP 2.642**	-1.735*	-.192**		.697	2.08
	(1.470)			(2.310)	(5.597)	(2.252)		(.308)	(10.75)*
Capital Equipment for Agriculture	-23.01**	6.105**			-1.279*	-.341**		.507	2.89°
	(2.44)	(2.963)			(3.059)	(2.971)		(.256)	(4.79)**
	-6.106		2.620*		-.373	-.157**		.514	2.87°
	(1.673)		(3.023)		(1.096)	(2.973)		(.254)	(4.94)**
Capital Equipment for Industry	-19.57*	5.286*			-1.156*	-.294*		.578	1.77
	(3.16)	(3.907)			(3.262)	(3.743)		(.192)	(6.39)*
	-8.459**			Ind. GDP 2.873*	-1.201*	-.194*		.557	1.89
	(2.410)			(3.725)	(3.251)	(3.477)		(.197)	(5.87)*
Capital Equipment for Transport & Commun.	-23.26*		6.770*		.338	-.446*		.647	1.27°
	(3.354)		(4.100)		(.728)	(4.742)		(.480)	(8.54)*

es: * significant at 99% level.
** significant at 95% level.
° indicates null hypothesis of autocorrelation cannot be rejected.