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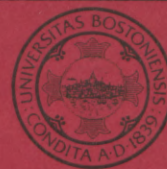
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BRAZILIAN TRADE DURING THE LAST CENTURY

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Discussion Paper Series
Number 53
July 1982

BRAZILIAN TRADE DURING THE LAST CENTURY

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April 1982

Brazilian Trade During the Last Century

The paper studies the Brazilian trade balance between 1907 and 1980. The first section analyses exchange rate behavior and the second examines the empirical evidence concerning the elasticities approach. The third discusses the trade balance using the savings investment approach and analyses the foreign interest rate effects on our trade account. Data construction is carefully described in the Appendix, where protection indices and different exchange rate regimes are reported together with the data used in the paper.

1. Real and nominal exchange rates

During the last quarter of the past century, until 1906, the Brazilian exchange rate regime was one of floating exchange rates. Behavior of exchange rates during that period is discussed in Cardoso (1982). In 1906, the creation of the Caixa de Conversão institutionalizes government intervention in the exchange market. Between 1906/17, the exchange rate oscillates around the rate fixed by the Caixa de Conversão in the free market. Although restrictions were imposed in 1917 on capital flows, and the Caixa de Estabilização was created in 1926 to stabilize the exchange rate, the period between 1907/1930 can be seen as one characterized by the existence of a unified exchange rate and a free market, where the government intervened through different devices (monetary and coffee policies) to keep the exchange rate at a chosen level.

Control over exchange transactions was introduced in 1931 and amended several times. With the 1929/30 crisis, exchange reserves disappeared, the Caixa de Estabilização was closed and the monopoly of exchange transactions by the Banco do Brasil was established. In 1931/32, a black market for exchange appears and from then on, the existence of at least more than one rate is observed.

The informal system of more than one exchange rate that appeared after 1931 is officialized in 1939 with the creation of a system with three exchange rates: free, official and special. (See Appendix for details.) By the end of 1953, a free market was introduced as well as an auction system for imports. Under this system (1953/60), exchange certificates were auctioned for five different categories of imports, established on the basis of their essentiality. This system also provided for bonuses to be paid to different categories of exports on the basis of exchange surrendered.

In March 1961, the auctioning system was abolished and transactions at par value were discontinued, and the reform of the exchange system led to three foreign exchange markets: the market of the monetary authorities, the market of the authorized banks and the manual market. However the policies pursued by the authorities slowly unified the three markets by 1964. A black market continues to exist, but its importance appears to be minor. In 1968, a system of crawling peg was introduced, according to which the exchange rate is devalued at irregular intervals, in small amounts, following the difference between inflation at home and abroad.

Table 2.A. in the Appendix reports the dollar/cruzeiro exchange rate in the free market as well as the relevant exchange rates for imports and exports, and explains how they were calculated. Table 6.A. in the Appendix

reports five different measures for the real exchange rate: FX is the real effective exchange rate in the free market using exports weights, FM is the real effective exchange in the free market using imports weights and D is the real dollar/cruzeiro rate in the free market. (See Appendix for details.) The correlation between any two of the three exchange rates is above .9; in what follows we leave aside effective exchange rates and use dollar exchange rates. DX is the real dollar exchange rate for exporters inclusive of subsidies and DM is the real exchange rate for importers inclusive of tariffs and other protection mechanism, like import deposits.

Diagram 1 depicts the behavior of the real dollar exchange rate and Table I reports the behavior of the five measures of the real exchange rate, suggesting that deviations from Purchasing Power Parity do have persistence. The hard core view of Purchasing Power Parity (PPP) asserts the law of one price: arbitrage by market participants will establish uniformity of price in closely related markets. A more flexible view would argue that price adjustment depends on substitution effects. As we become more competitive, demand would shift toward our goods putting upward pressure on costs and prices. If prices only move slowly, deviations from PPP are not only possible but may persist over time. The empirical content of PPP can be tested by regressing the log of real exchange rate on its own lagged value and a constant. Results reported on Table 1 show that deviations from PPP have persistence. Less than one fourth of the real exchange rate depends on its long run value and at least three fourths depends on its recent history.

2. The elasticities approach

Figure 2 shows the behavior of the log of the ratio between Brazilian exports and imports.

Figure 1

Brazilian Real Exchange Rate

1907-1980

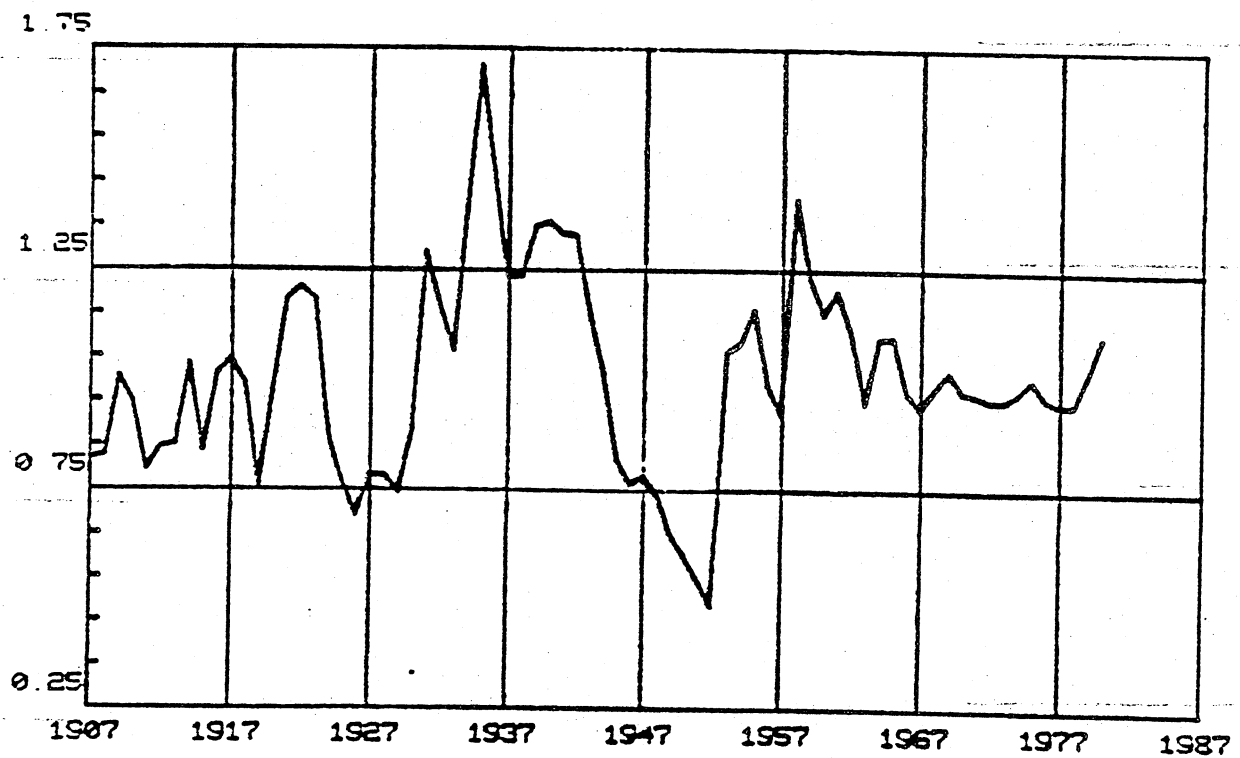


Table I

Brazilian Real Exchange Rates

1908/1980

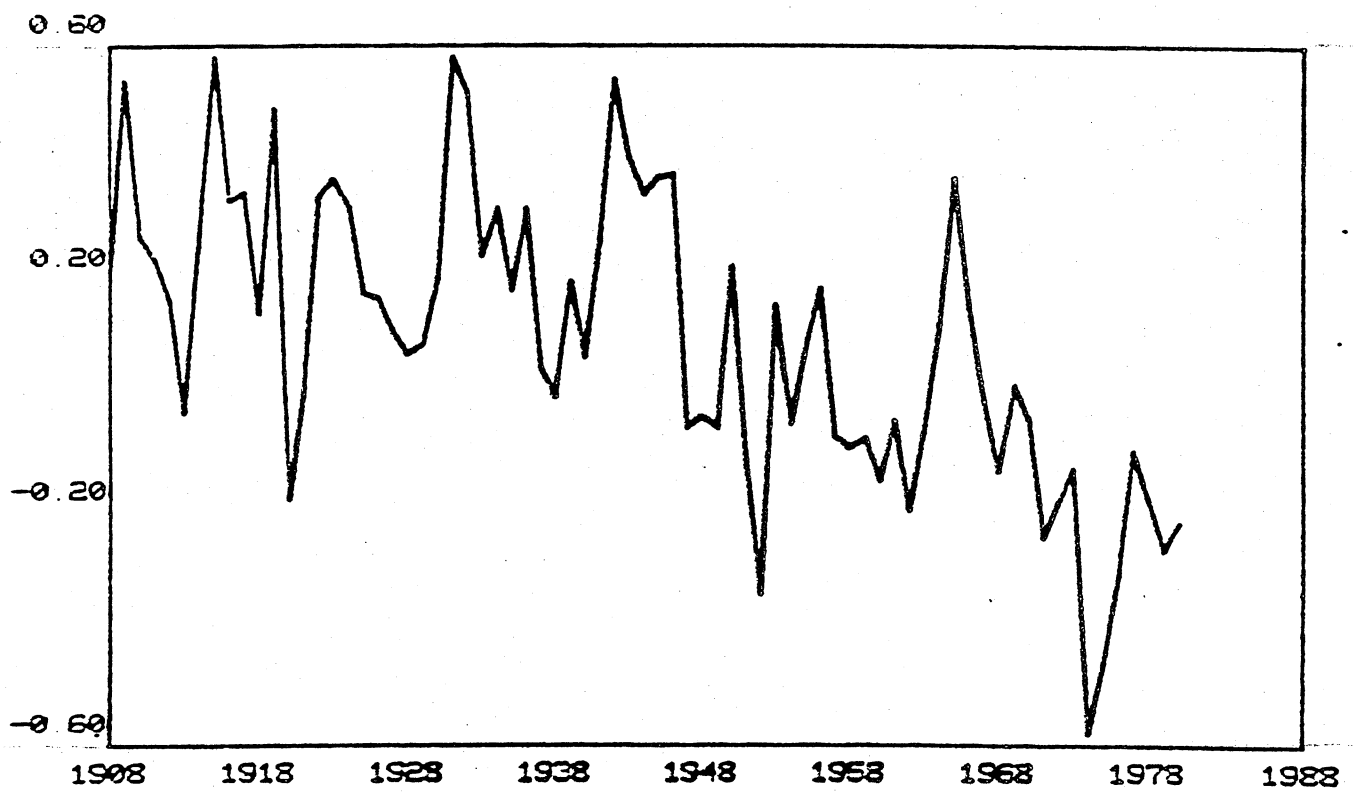
$$e = a_0 + a_1 e_{-1}$$

	a_0	a_1	R^2	SER	D.W
(FX)	23.76 (3.11)	.77 (10.10)	.59	16.12	1.74
(FM)	21.30 (2.88)	.79 (10.75)	.62	14.33	1.80
(D)	26.15 (3.23)	.74 (9.43)	.56	15.10	1.80
(DX)	9.86 (2.33)	.86 (14.42)	.74	9.29	1.79
(DM)	22.06 (2.74)	.80 (11.16)	.64	18.17	1.88

Figure 2

Brazilian Trade Balance: $\text{Log}(X/M)$

1908-1980



The trade balance, defined as the difference between exports and imports is assumed to depend on relative prices and on income at home and abroad. In this section we report the results obtained from the estimation of export and import equations, as well as reduced forms for the trade account. Table II shows the results obtained from the estimation of an export equation. The dependent variables are all real exports except coffee. Equation (1) estimates the supply of exports net of coffee, under the assumption that for all exports, except coffee, Brazil can export all it wants at the international price. Construction of a real exchange rate for exporters inclusive of subsidies is explained in the Appendix. Results show a supply price elasticity of exports equal to .17 in the short run and approximately 2 in the long run.

Equation (2), reported in Table II shows real imports net of oil as a function of their real price inclusive of tariffs. The real exchange rate for imports and its construction are reported and explained in the Appendix. The price elasticity of imports net of oil is equal to $-.21$ in the short run and approximately -1 in the long run. Income effects are separated into cyclical effects, captured by the parameter of income growth (b_2) and trend effects, captured by b_4 . Both appear with positive signs.

Reduced forms equations for the trade balance net of coffee and oil (equations (3) and (4)) as well as equations for the total trade balance (equations (5) and (6)) are reported in Table III.

Table II

Brazilian Real Exports (FOB - net of coffee)

1907-1980

$$\text{Log } X = a_0 + a_1 \text{Log} \left(\frac{\text{ESP}^*}{P} \right) + a_2 \text{Log } X_{-1} + a_3 t$$

	a_0	a_1	a_2	a_3	R^2	SER	S.W.
(1)	-.31	.17	.92	.004	.96	.19	2.13
	(-.8)	(2.05)	(20.51)	(2.24)			

Table III

Brazilian Real Imports (CIF - net of oil)

1907-1980

$$\text{Log } M = b_0 + b_1 \text{Log} \left(\frac{\text{ETaP}^*}{P} \right) + b_2 \hat{Y} + b_3 \text{Log } M_{-1} + b_4 t$$

	b_0	b_1	b_2	b_3	b_4	R^2	SER	D.W.
(2)	2.06	-.21	1.95	.82	.005	.95	.18	2.01
	(3.39)	(-2.58)	(3.69)	(14.69)	(2.62)			

NOTE: Equations were estimated by OLS; t-statics are reported in parentheses.

The equation for the trade balance net of coffee and oil behaves very well. Price and income effects have the predicted signs. As expected, an increase in domestic growth above foreign growth deteriorates the trade balance. This effect is captured by c_4 . On the other hand, an increase in the real exchange rate improves the trade balance. The elasticity of the trade balance in relation to the real exchange rate is .5 in the short run and 1.8 in the long run. Subsidies also appear with the expected positive sign. The coefficient for tariffs appears more troublesome, being negative and imprecisely estimated. The possibility of an adverse effect of an increase in tariffs on the trade balance would require not only a very large share of imported intermediates in exports and a very large elasticity of exports in relation to their price, but also a very small response of imports in relation to their real price. The elasticities previously obtained in the equations for exports and imports do not support such hypotheses and the fact that the coefficient for tariffs in the trade balance equation is imprecisely estimated leaves this question unsettled.

Equations for the trade balance inclusive of coffee and oil do not behave well. The coefficient for the real exchange rate is very small and very imprecisely estimated. Both the coefficients for subsidies and tariffs appear with the wrong sign and are imprecisely estimated. One would say that the elasticities approach is an adequate estimation procedure for structural equations of export and imports but leads one into problems in the estimation of reduced forms of the trade balance, maybe due to aggregation problems, maybe because important determinants of the trade balance are omitted.

Table IV

Brazilian Trade Balance: The Elasticities Approach

1907-1980

$$\text{Log}(X/M) = c_0 + c_1 \text{Log}\left(\frac{EP}{P}\right)^* + c_2 \text{Log } S + c_3 \text{Log } Ta + c_4 (\hat{Y} - \hat{Y}^*) + c_5 \text{Log}(X/M)_{-1} + c_6 t$$

	c_0	c_1	c_2	c_3	c_4	c_5	c_6	R^2	SER	D.W.
(3)	-2.22 (-2.13)	.50 (4.56)	.26 (2.00)	-.29 (-1.77)	-.6 (-1.67)	.72 (9.68)		.72	.20	2.03
(4)	-2.19 (-2.10)	.48 (4.31)	.22 (1.63)	-.25 (-1.48)	-.66 (-1.82)	.70 (9.35)	.001 (1.11)	.72	.20	2.06
(5)	.09 (.09)	.11 (1.07)	-.14 (-1.23)	.02 (.16)	-.68 (-2.07)	.59 (6.34)		.49	.19	2.24
(6)	-.06 (-.07)	.17 (1.78)	-.05 (-.5)	-.04 (-.31)	-.5 (-1.72)	.37 (3.46)	-.005 (-3.5)	.57	.17	2.07

NOTE: Equations (3) and (4) correspond to the trade balance net of coffee and oil. Equations (5) and (6) use the total trade balance: Exports (FOB) and Imports (CIF).

Equations were estimated by OLS and t-statistics are reported in parentheses.

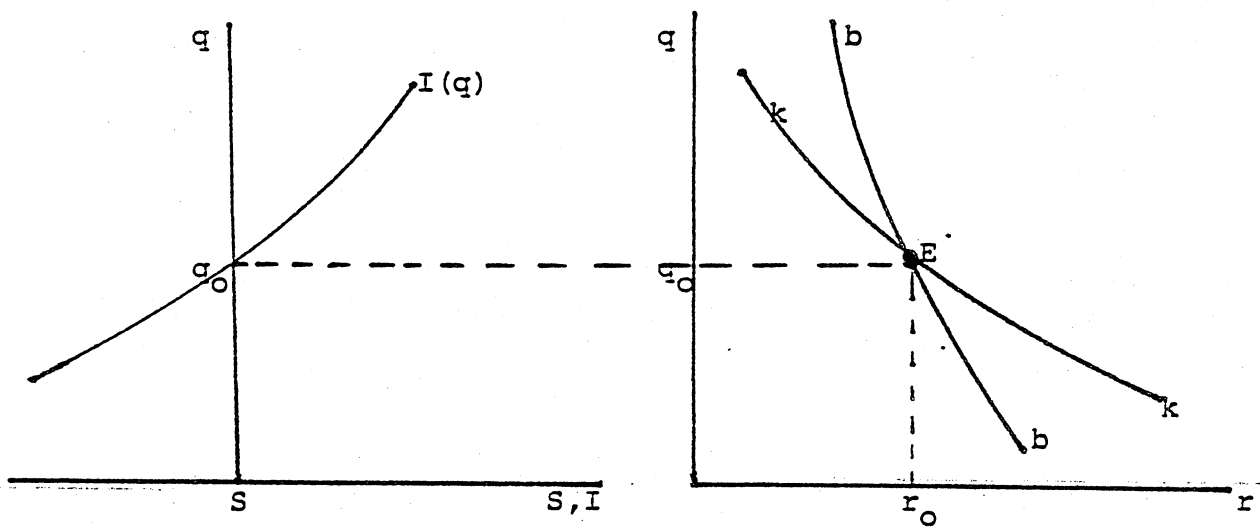
3. The Savings-Investment Approach

Textbooks describe the trade account identity under three different forms: exports minus imports, income minus absorption and savings minus investment. Economists' preference for using one rather than another depends on the aspects of the trade account they want to emphasize. The savings-investment approach is suitable for a long run analysis in which full employment is assumed. In what follows, consumption per capita is assumed to depend on permanent income per capita and to be constant, and so is savings per capita, S . Investment per capita, I , is described as an increasing function of the real price of capital, q , which in turn is determined in the assets market.

The diagrams below illustrate the key variables affecting the trade account. Although assumptions are simplified, the main results carry over in more complete and sophisticated settings.

In the financial markets, domestic residents face the choice among four assets: real money, real foreign bonds, real domestic bonds and equities. Assets demand depend on rates of return and wealth. Fixed exchange rates imply that the money stock is fully endogenous. Domestic residents can trade money for foreign bonds at the going foreign real interest rate, r^* , and the central bank has to accommodate portfolio shifts through exchange market intervention. It follows that we do not have to worry about the composition of money and foreign bonds. The right hand panel of Diagram 1 shows the assets market equilibrium conditions, kk and bb , under the assumption that assets are gross substitutes. The equilibrium condition in the equities market, kk , requires that the existing stock of claims to capital be willingly held. Given the capital stock, the domestic bonds stock and

Diagram 1

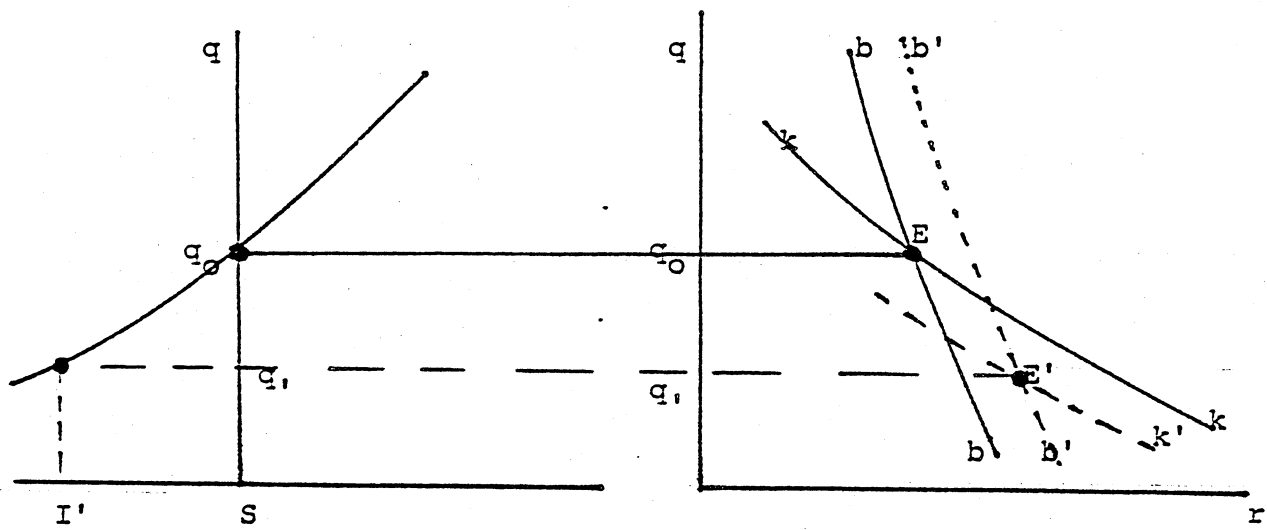


net foreign assets, an increase in the rate of return of domestic bonds, r , creates excess supply for capital. This situation therefore, requires a fall in the price of capital, q , to induce the public to hold a larger fraction of their wealth in the form of equities. The capital market equilibrium schedule, kk , reflects the negative relation between the price of capital and the return on domestic bonds. The domestic bonds market equilibrium condition, bb , requires that the existing stock of domestic bonds be happily held. Given the capital stock, the stock of domestic bonds and net foreign assets, an increase in the price of capital creates excess demand for bonds. This requires a fall in the domestic interest rate to induce the public to hold a smaller fraction of their wealth in domestic bonds. The bb schedule reflects this relation between q and r .

Short run equilibrium in the assets markets sets the equilibrium price of capital, therefore determining investment, as shown in the left hand panel of Diagram 1. That Diagram depicts an initial stationary equilibrium, with balanced current account, the difference between savings and investment being zero.

Suppose that the foreign interest rate increases. This implies that the existing stocks of capital and domestic bonds will be held only if the price of capital falls and domestic interest rate increases, as shown in the right hand panel of Diagram 2. The fall in the price of capital reduces investment, thus leading to a trade account surplus, as illustrated in the left hand panel of Diagram 2. This situation corresponds to a short run equilibrium only. As time goes by, the trade account surplus accumulates into higher net foreign assets, inducing an increase in the price of capital, recovery of investment, and elimination of the trade surplus.

Diagram 2



From the above analysis, it follows that, in the absence of main innovations in technology and preferences, the foreign interest rate appears as the main exogenous determinant of the trade account. The empirical evidence on this issue is reported in Table V. The effect of the foreign interest rate on the trade account is positive, as predicted by theory, in all equations, either when it is used by itself or in conjunction with other variables such as relative prices and relative incomes.

- *** -

References

Cardoso (1982), "Exchange Rates in XIXth Century Brazil," CLADS Discussion Paper No. 51, July 1982.

Table V

Brazilian Trade Balance: The Investment-Savings Approach - 1907-1980

$$\text{Log (X/M)} = g_0 + g_1 r^* + g_2 (\hat{Y} - \hat{Y}^*) + g_3 \text{Log (X/M)}_{-1} + g_4 \text{Log} \left(\frac{EP}{p} \right)^* + g_5 \text{Log S} + g_6 \text{Log T}_a + g_7 t + g_8 \text{Dummy}$$

	g_0	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	R^2	SER	D.W.
(7)	.02 (.93)	.44 (1.78)		.69 (7.35)						.43	.19	2.21
(8)	.04 (1.77)	.53 (2.24)	-.9 (-2.91)	.67 (7.55)						.50	.18	2.39
(9)	.21 (3.36)	.33 (1.38)	-.73 (-2.43)	.45 (3.90)				-.004 (-2.86)		.55	.17	2.19
(10)	.75 (.89)	.32 (1.35)	-.64 (-2.07)	.38 (3.03)	.06 (.64)	-.14 (-1.31)	-.05 (-.32)		-.18 (-3.15)	.58	.17	2.16
(11)	.25 (.28)	.5 (2.0)	-.81 (-2.47)	.65 (6.78)	.10 (1.05)	-.09 (-.82)	-.05 (-.33)			.52	.18	2.35
(12)	.05 (.06)	.29 (1.21)	-.62 (-1.97)	.43 (3.66)	.16 (1.69)	-.03 (-.32)	-.08 (-.56)	-.004 (-3.04)		.58	.17	2.15

NOTE: The dependent variable is total trade balance (Exports (FOB) / Imports (CIF)).

Equations were estimated by OLS. t-statistics appear in parentheses. The dummy in equation (8) is equal to zero in the pre-war years (1907/1947) and equal to one in the post-war years (1948/1980).

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TABLE 1.A.: NOMINAL EXCHANGE RATE INDICES, 1975 = 100

YEARS	CRUZEIROS PER POUND	CRUZEIROS PER DOLLAR	CRUZEIROS PER DEUTSCHE MARK	CRUZEIROS PER PESO	CRUZEIROS PER LIRE	CRUZEIROS PER FRANC	CRUZEIROS PER GUILDER	CRUZEIROS PER ESCUDO	CRUZEIROS PER YEN	CRUZEIROS PER PESETA
1907	.087	.039	.024	60.811	4.980	3.260	.040	1.069	-	-
08	.087	.041	.024	62.613	5.141	3.376	.040	.943	-	-
09	.087	.041	.024	62.613	5.141	3.376	.040	.943	-	-
1910	.082	.037	.021	57.027	4.659	3.054	.037	.943	-	-
11	.083	.038	.021	59.009	4.739	3.054	.040	.943	-	-
2	.083	.038	.021	59.009	4.739	3.154	.040	.943	-	-
3	.083	.038	.021	59.009	4.739	3.154	.037	.880	-	-
4	.090	.042	.024	64.865	5.301	3.523	.044	.912	-	-
5	.106	.050	.024	77.252	5.462	3.882	.053	.880	-	-
6	.110	.053	.024	82.072	5.301	3.850	.056	.912	-	-
7	.104	.049	.021	79.009	4.257	3.660	.053	.755	-	-
8	.102	.049	-	75.090	4.096	3.755	.059	.755	-	-
9	.091	.047	.004	74.414	3.454	2.743	.047	.660	-	-
1920	.091	.059	.002	85.135	1.928	1.783	.050	.314	-	-
1	.159	.096	.003	111.892	2.651	3.070	.081	.252	-	-
2	.184	.095	.001	125.225	2.972	3.328	.093	.157	-	-
3	.246	.121	.000006	152.207	3.614	3.144	.118	.126	-	-
4	.222	.113	.060	142.432	3.213	2.537	.109	.094	-	-
5	.216	.102	.060	151.351	2.651	2.089	.103	.126	-	-
6	.184	.086	.051	128.694	2.169	1.197	.087	.126	-	-
7	.225	.105	.060	162.252	3.534	1.756	.106	.126	-	-
8	.223	.103	.060	160.315	3.534	1.730	.106	.126	-	-
9	.225	.105	.060	160.859	3.614	1.756	.106	.126	-	-
1930	.274	.113	.067	152.342	3.855	1.904	.115	.126	16.436	-
1	.346	.176	.103	189.459	5.944	2.959	.177	.189	25.567	-
2	.266	.174	.103	166.667	5.944	3.006	.177	.157	16.071	-
3	.294	.156	.118	180.180	6.908	3.407	.205	.157	12.783	-
4	.407	.181	.151	171.171	10.201	5.143	.308	.220	16.436	-
5	.471	.214	.157	202.703	11.566	6.023	.370	.252	18.262	-
6	.478	.212	.215	216.216	10.120	5.686	.352	.252	18.627	-
7	.437	.197	.194	220.721	6.827	3.465	.274	.220	17.166	-
8	.479	.217	.215	220.721	7.470	2.690	.302	.252	18.627	-
9	.475	.236	.239	198.198	8.032	2.579	.311	.252	18.262	-
1940	.416	.244	.236	207.207	8.032	2.215	.327	.252	17.166	-
1	.443	.242	.239	211.712	8.193	1.846	-	.252	17.166	-
2	.441	.241	.288	211.712	9.157	2.426	-	.252	17.166	-
3	.441	.241	-	220.721	-	2.479	-	.252	-	-
4	.439	.241	-	220.721	1.606	2.110	.327	.252	-	-
5	.437	.240	.182	220.721	1.606	2.321	.327	.252	16.071	1.271
6	.428	.239	.182	216.216	1.606	0.897	.327	.248	16.071	1.271

TABLE 1.A. (cont.)

YEARS	CRUZEIROS PER POUND	CRUZEIROS PER DOLLAR	CRUZEIROS PER DEUTSCHE MARK	CRUZEIROS PER PESO	CRUZEIROS PER LIRE	CRUZEIROS PER FRANC	CRUZEIROS PER GUILDER	CRUZEIROS PER ESCUDO	CRUZEIROS PER YEN	CRUZEIROS PER PESETA
1947	.418	.230	.182	211.712	.723	.844	.215	.242	-	1.201
8	.418	.230	.182	202.703	.643	.475	.221	.239	-	1.201
9	.387	.230	-	148.649	.321	.369	.212	.230	-	1.201
1950	.290	.230	.173	94.594	.241	.280	.153	.207	.190	0.353
1	.290	.230	.136	84.234	.241	.280	.153	.207	.190	0.353
2	.290	.230	.136	84.234	.241	.280	.153	.207	.190	.353
3	.723	.573	.336	209.910	.602	.701	.383	.503	.471	.847
4	.954	.757	.442	277.027	.787	.928	.504	.660	.625	1.130
5	1.162	.922	.539	337.387	.964	1.129	.613	.818	.760	1.342
6	1.152	.914	.539	167.342	.964	1.118	.610	.818	.752	1.342
7	1.175	.932	.545	170.495	.964	1.087	.619	.818	.767	1.271
8	2.006	1.591	.932	194.144	1.687	1.625	1.058	1.415	1.311	2.189
9	2.428	1.926	1.129	88.108	2.008	1.672	1.282	1.698	1.589	2.189
1960	2.942	2.333	1.365	106.757	2.410	2.025	1.553	2.075	1.925	2.260
1	4.224	3.351	2.043	153.333	3.534	2.911	2.322	2.987	2.761	3.178
2	6.015	4.771	2.993	158.784	4.980	4.140	3.333	4.245	3.934	4.590
3	8.952	7.101	4.368	185.631	7.390	6.166	4.961	6.321	5.855	6.780
4	19.720	15.642	9.621	408.964	16.064	13.582	10.927	13.899	12.897	14.972
5	29.344	23.276	14.316	501.171	24.096	20.207	16.262	20.692	19.190	22.246
6	34.384	27.274	16.774	475.405	28.112	23.677	19.053	24.245	22.484	26.059
7	40.815	32.762	20.149	363.378	34.538	28.440	22.888	29.119	27.010	30.932
8	45.131	41.765	25.686	436.802	43.373	36.257	29.177	37.107	34.431	34.251
9	54.140	50.102	31.257	523.964	52.209	41.342	35.004	44.528	41.305	41.102
1970	61.025	56.473	37.956	543.964	58.635	43.673	39.454	50.189	46.558	46.328
1	71.303	65.063	45.848	517.703	68.514	50.330	46.986	58.711	55.199	53.743
2	82.264	73.025	56.331	325.991	81.687	62.050	57.533	69.088	71.504	65.184
3	83.229	75.388	69.379	293.559	84.418	72.546	68.190	78.082	82.497	74.294
4	87.998	83.559	79.424	343.649	83.855	74.455	78.588	84.025	85.076	83.121
5	100	100	100	100	100	100	100	100	100	100
6	106.772	131.307	128.281	34.324	102.972	117.738	125.598	111.006	131.415	112.641
7	136.775	173.985	184.322	15.631	128.675	151.785	179.303	116.163	192.315	131.427
8	194.162	222.286	272.182	10.225	170.923	211.108	259.902	129.277	313.459	166.384
9	315.928	330.667	443.768	9.189	259.759	333.082	416.881	172.704	447.847	282.698
1980	679.185	648.523	877.526	12.928	493.976	657.746	825.016	331.038	848.862	519.068

- Sources: - International Financial Statistics, several issues.
- League of Nations: Statistical Yearbook, 1942-1944 and 1931-1932.
 - Anuário Estatístico do Brasil, FIBGE, several issues.
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Notes: Exchange Rate Indices reported in Table 1 correspond to the "free" exchange rate. See notes below Table 2.A. for definition. Also observe that:

- (a) Brazilian currency: On February 13, 1967, a new cruzeiro equal to 1000 old cruzeiros was introduced. The old cruzeiro was equivalent to 1000 réis. All data was calculated in new cruzeiros.
- (b) Argentinian currency: During 1969, a new peso was introduced equivalent to 100 old pesos. All data was transformed in new pesos.
- (c) French currency: A new franc equal to 100 old francs was introduced on January 1, 1960. All data reported in new francs.
- (d) Japanese currency: Between March 2 and March 9, 1946, all Bank of Japan notes were surrendered for 1:1 conversion into new yen notes, limited to 100 yens per person.
- (e) German currency: Following the 1948 currency reform, the currency exchange rate was determined for the Reichsmark. In an amendment which became effective June 21, 1948, the word Reichsmark was replaced by the term Deutsche Mark.

TABLE 2.A.

Nominal Cruzeiro/Dollar Exchange Rates: 1907-1980

YEARS	D	EX	EM	EM ^π
1907	.0032			.0046
1908	.0033			.0047
1909	.0033			.0046
1910	.0030			.0042
1911	.0031			.0043
1912	.0031			.0042
1913	.0031			.0042
1914	.0034			.0046
1915	.0041			.0052
1916	.0043			.0053
1917	.0040			.0048
1918	.0040			.0047
1919	.0038			.0044
1920	.0048			.0056
1921	.0078			.0093
1922	.0077			.0091
1923	.0098			.0118
1924	.0092			.0111
1925	.0083			.0122
1926	.0070			.0101
1927	.0085			.0106
1928	.0084			.0105
1929	.0085			.0107
1930	.0092			.0117
1931	.0143			.0189
1932	.0141			.0190
1933	.0127			.0171
1934	.0147	.0147	.0131 ⁽¹⁾	.0175
1935	.0174	.0155 ⁽²⁾	.0174	.0218
1936	.0172	.0153 ⁽²⁾	.0172	.0213
1937	.0160	.0144 ⁽²⁾	.0160	.0195
1938	.0176 ⁽³⁾	.0176 ⁽³⁾	.0181 ⁽⁴⁾	.0218

TABLE 2.A. (cont.)

Nominal Cruzeiro/Dollar Exchange Rates

YEARS	D	EX	EM	EM*
1939	.0192	.0184 ⁽⁶⁾	.0202 ⁽⁵⁾	.0244
1940	.0198 ⁽⁷⁾	.0184 ⁽⁶⁾	.0208 ⁽⁵⁾	.0291
1941	.0197	.0188 ⁽⁶⁾	.0207 ⁽⁵⁾	.0247
1942	.0196	.0187 ⁽⁶⁾	.0206 ⁽⁵⁾	.0236
1943	.0196	.0187 ⁽⁶⁾	.0206 ⁽⁵⁾	.0226
1944	.0196	.0187 ⁽⁶⁾	.0206 ⁽⁵⁾	.0229
1945	.0195	.0185 ⁽⁶⁾	.0204 ⁽⁵⁾	.0228
1946	.0194	.0185 ⁽⁶⁾	.0204 ⁽⁵⁾	.0226
1947	.0187 ⁽⁸⁾	.0187 ⁽⁹⁾	.0196 ⁽⁸⁾	.0212
1948	.0187	.0187 ⁽⁹⁾	.0196 ⁽⁸⁾	.0211
1949	.0187	.0187 ⁽¹⁰⁾	.0196 ⁽¹⁰⁾	.0211
1950	.0187	.0187 ⁽¹⁰⁾	.0196 ⁽¹⁰⁾	.0212
1951	.0187	.0187 ⁽¹⁰⁾	.0196 ⁽¹⁰⁾	.0210
1952	.0187	.0187 ⁽¹⁰⁾	.0196 ⁽¹⁰⁾	.0210
1953	.0466 ⁽¹¹⁾	.0284 ⁽¹²⁾	.0249 ⁽¹³⁾	.0263
1954	.0615	.0311 ⁽¹²⁾	.0517 ⁽¹³⁾	.0538
1955	.0749	.0450 ⁽¹²⁾	.0734 ⁽¹³⁾	.0761
1956	.0743	.0550 ⁽¹²⁾	.0881 ⁽¹³⁾	.0906
1957	.0757	.0550 ⁽¹²⁾	.0810 ⁽¹³⁾	.0836
1958	.1293	.0750 ⁽¹²⁾	.1494 ⁽¹³⁾	.1681
1959	.1565	.1000 ⁽¹²⁾	.2018 ⁽¹³⁾	.2258

TABLE 2.A. (cont.)

Nominal Cruzeiro/Dollar Exchange Rates

YEARS	D	EX	EM	EM*
1960	.1896	.180 ⁽¹⁴⁾	.2228 ⁽¹³⁾	.2478
1961	.2723	.2723	.3865 ⁽¹⁵⁾	.4367
1962	.3877	.3877	.5910 ⁽¹⁵⁾	.6785
1963	.5770	.5770	.8714 ⁽¹⁵⁾	.9969
1964	1.2711	1.2762 ⁽¹⁶⁾	1.8541 ⁽¹⁵⁾	2.1285
1965	1.8914	1.9860 ⁽¹⁶⁾	2.5365 ⁽¹⁵⁾	2.9144
1966	2.2163	2.3271 ⁽¹⁶⁾	2.5868 ⁽¹⁵⁾	3.0136
1967	2.6622	3.2452 ⁽¹⁶⁾	2.6622	2.9524
1968	3.3938	4.2932 ⁽¹⁶⁾	3.3938	3.8859
1969	4.0713	5.3578 ⁽¹⁶⁾	4.0713	4.6535
1970	4.5890	6.2823 ⁽¹⁶⁾	4.589	5.176
1971	5.287	7.4705 ⁽¹⁶⁾	5.287	5.858
1972	5.934	8.4441 ⁽¹⁶⁾	5.934	6.575
1973	6.126	8.7847 ⁽¹⁶⁾	6.126	6.788
1974	6.790	9.9813 ⁽¹⁶⁾	6.790	7.435
1975	8.126	12.1077 ⁽¹⁶⁾	8.427 ⁽¹⁷⁾	9.438
1976	10.670	15.9303 ⁽¹⁶⁾	12.647 ⁽¹⁷⁾	14.607
1977	14.138	21.2918 ⁽¹⁶⁾	16.435 ⁽¹⁷⁾	18.818
1978	18.063	27.2029 ⁽¹⁶⁾	20.970 ⁽¹⁷⁾	23.717
1979	26.870	40.4662 ⁽¹⁶⁾	29.768 ⁽¹⁷⁾	33.191
1980	52.699	52.6990	52.699	59.339

TABLE 2.A.

NOTES:

Variables appearing in Table 2. A. are:

D \equiv cruzeiro/dollar rate in the free market

EX \equiv average cruzeiro/dollar rate for exports except coffee and inclusive of subsidies.

EM \equiv average cruzeiro/dollar rate for imports

EM* \equiv average cruzeiro/dollar rate for imports inclusive of tariffs.

Table 2 reports the free market exchange rate under column D and until 1930, this is the relevant exchange rate for exports. For the same period, the same exchange rate, inclusive of tariffs is reported under column EM*. Between 1931/33, although only the official rate is reported, a black market, tolerated by the Banco do Brasil existed as well as a rate, called cinzenta (grey) and used in a semi-official market. For the period 1934/80, the Table reports different exchange rates for exports and imports and the footnotes (1) to (18) below explain how they were calculated and the different systems in existence at different times. Exchange rates for coffee exports are not reported, nor are special regulations and taxes concerning this commodity.

During the last quarter of the past century, until 1906, the Brazilian exchange rate regime was one of floating exchange rates. In 1906, the creation of the Caixa de Conversão institutionalizes government intervention in the exchange market. Between 1906/1917, the exchange rate oscillates around the rate fixed by the Caixa de Conversão in the free market. Although restrictions on capital flows were imposed in 1917 and the Caixa de Estabilização were created in 1926 to stabilize the exchange rate, the period between 1906/1930

can be seen as one characterized by the existence of a single free market, where the government intervened through different devices (monetary and coffee policies) to keep the exchange rate at a chosen level.

Control over exchange transactions was introduced in 1931 and has been amended several times. With the 1929/30 crisis, exchange reserves disappeared, the Caixa de Estabilização was closed and monopoly of exchange transactions by the Banco do Brasil was established. In 1931/32, a black market for exchange appears and from then on, the existence of at least more than one rate is observed.

The informal system of more than one exchange rate that appeared after 1931 is officialized in 1939 with the creation of a system with three exchange rates: free, official and special (see footnotes (5), (6) and (7) for details).

By 1949, practically all imports and exports were made subject to official authorization, and up to 1953, they were subject to quotas (see footnotes (9) to (11)).

By the end of 1953, a free market was introduced as well as an auction system for imports. Under this system (1953/60), exchange certificates were auctioned for five different categories of commodities, established on the basis of their importance. This system also provided for bonuses to be paid to different categories of exports on the basis of exchange surrendered. (See notes (12), (13) and (14).)

In March 1961, the auctioning system was abolished and transactions at par value rates were discontinued. In Table 2.A., unless where explicitly specified by a footnote, the free rate applies. Par value rates used in some calculations prior to 1961 are:

Period	Par value rate
1934	.021
1935	.0119/
1936	.0118
1937	.0114
1938	.0176
1939/44	.01666
1945/46	.0165
1947/61	.0187

In March 1961, the reform of the exchange system led to three foreign exchange markets: the market of the monetary authorities, the market of the authorized banks and the manual market. However, the policies pursued by the authorities slowly unified the three markets by 1964. A black market for foreign exchange has existed at least in the post-war period although its relative importance seems to be minor.

Notes: (see Table 2.A. for the relevant exchange rate under respective members below)

- (1) Official rate for 60% of imports and free rate for remaining 40%
- (2) 35% of export revenues surrendered to Banco do Brasil at the official rate; the remaining 65% sold in the free market.
- (3) Due to balance of payments problems the free market was abolished in 1937. All exports surrendered at the official rate.
- (4) Official rate plus 3% tax.
- (5) Free rate plus 5% tax.
- (6) 30% of export revenues surrendered at the official rate; remaining 70% sold in the free market.
- (7) A special rate existed in this period 1940/44 mainly for tourism and payments abroad:

1940	.0208
1941	.0206
1942	.0205
1943	.0204
1944	.0200

- (8) The three markets regime (official, free, and special) introduced in 1939 came to an end in 1946. The exchange rate was fixed between 1946/1952 and the system depended on the application of quantitative restrictions to trade and exchange transactions. A tax of 5% yields the effective selling rates reported for imports.
- (9) Higher exchange rates than those reported were certainly observed: Exports proceeds were to be surrendered to authorized banks. Those banks used part of those proceeds in a parallel market. Existence of a black market was also observed.
- (10) Exchange rates were certainly above the ones reported in this table due to the existence of operations called vinculadas (private compensation). The foreign exchange proceeds of certain exports could be used for the importation of goods, without being surrendered. A premium was paid by the importer to the exporter. It should also be observed that during the 1949/52 period, 20% of exports proceeds were to be invested in negotiable Treasury Bills which paid 3% interest per annum and matured in 120 days.
- (11) From the end of 1953 to 1960 a fluctuating free market rate applied to all invisible transactions not directly related to the movement of goods and most capital transactions.
- (12) Before October 1953, a "mixing" system applied to exports. There was a list of export products permitted to benefit from the free market. Exports were divided into groups according to different percentages that could be sold in the free market. In October this arrangement was abolished and export bonuses of 5 cruzeiros velhos for coffee and 10 cruzeiros velhos for other exports was established (see Table 2.1). In August 1954 the system of bonuses to exports was again modified (see Table 2.1 and footnotes). For the period 1954/1958, exchange rates in Table 2.A. column DX were calculated as weighted averages of the different exchange rates for exports, excluding the category for coffee and giving a weight equal to 25% to the highest exchange rate.
- (13) Under the system introduced in October 1953, exchange certificates were auctioned for five different categories of commodities. (See Table 2.2). In August 1957 the five categories were reduced to two.

For details see IMF: Exchange Restrictions, and Doellinger et alia (1977), Política e Estrutura das Importações Brasileiras, IPEA: Coleção Relatório de Pesquisas, R. J. . The exchange rates for imports (1954/1956) under column EM are weighted averages from Table 2.1. In the period 1958/1960, they correspond to the exchange rate under the category called geral.

- (14) The proceeds of all exports, except coffee, cocoa and few others were surrenderable at the free market rate, but exporters would receive cash only to the extent of 130 cruzeiros velhos per dollar. For the balance they would receive notes of the Banco do Brasil with six months' maturity and interest of 6% per annum. Given that the inflation rate was 30%, the exchange rate for exporters was below the free market rate.
- (15) The auctioning of exchange was abolished and exchange to pay for imports was to be obtained in the free market. The importer was required to purchase 150-day bills and to pay a premium. Deposit requirements for imports, introduced in April 1961 were modified in different periods. In August 1964, a tax of 20% financial charge was introduced, raised to 30% in September, and reduce to 10% in December. The effective exchange rates for imports net of tariffs reported for the period 1961/66 were calculated by Maria Helena Horta (1982), "Import Equations," research being developed at IPEA, Rio de Janeiro.
- (16) Includes subsidies. For 1964/77, the subsidy rates come from Cardoso (1980). "Incentivos às exportações de manufaturas: Série histórica", Revista Brasileira de Economia, 34 (2). The subsidy rates for 1978/79 were assumed to be the same prevailing in 1977. Subsidies were abolished in December 1979 and slowly reintroduced by late 1980, beginning of 1981.
- (17) A system of advance import deposit requirements was reintroduced in July 1975 and modified on different occasions until it was suspended in December 1979. The effective exchange rates net of tariffs for that period come from Rosa J. A., et alia, Alguns Aspectos da Política Tarifária Recente no Brasil, CECEX: 1979.

TABLE 2.1

Multiple Exchange Rates for Exports
Cruzeiros per Dollar

PERIODS	I	II	III	IV	SPECIAL
1953 - Oct./Dec.	.02336	.02836			
1954 - Jan./Aug	.02336	.02836			
1954 - Sep./Dec.	.028	.035			
1955		.0371	.0431	.051	
1956	.0371	.0431	.055	.067	
1957	.0371	.0431	.055	.067	.103
1958 - Jan./June	.0371	.0431	.055	.067	.103
1958 - July/Dec	.0371	.0431	.070	.092	
1959 - Jan./June	.060	.070	.100		
1959 - July/Dec.	.076	.100			

NOTES:

- Oct. 1953 - Export bonuses of 5 cruzeiros velhos per dollar of coffee and 10 cruzeiros velhos per dollar of other exports were introduced.
- Aug. 1954 - The bonuses of 5 and 10 cruzeiros velhos now applied to only 80 percent of the value of exports instead of 100 percent as previously. In the remaining 20%, a premium equal to the difference between the official rate of exchange and the average free market rate for the previous day was to be paid.
- Jan. 1955 - Exports were divided into four categories and the premiums paid on export proceeds were fixed according to the type of commodity involved and the currency received. Category I consisted only of coffee.
- Data reported on Table 2.1 refers to bonus for exports against convertible currencies.
- Feb. 1955 - Coffee export proceeds were granted category II export bonuses.
- June 1957 - A bonus not to exceed 36 cruzeiros velhos per dollar would be paid to exporters of textile products.
- June 1958 - Export proceeds were reclassified and the fixed bonuses were revised.
- The special exchange rate for exports of textiles was eliminated.
- Oct 1958 - Proceeds of exports not in Categories I through IV were permitted to be negotiated in the free market.

Jan 1959 - Export proceeds were reclassified in three categories and bonuses were revised.

April, June, 1959 - Proceeds of exports of sugar, cotton and meat were to be surrendered at the free market rate.

July 1959 - Export proceeds were reclassified and bonuses were revised.

Dec. 1959 - Proceeds of all exports except coffee beans, roasted coffee, cocoa, castor beans and crude mineral oil were to be surrendered at the free market rate, but exporters would receive cash only to the extent of 130 cruzeiros velhos per dollar. For the balance they would receive notes of the Banco do Brasil with 6 months maturity and interest of 6 percent per annum.

TABLE 2.2

Multiple Exchange Rates for Imports

Cr\$/U\$: Period Average

YEARS	I	II	III	IV	V	AVERAGE
1953 - Jan./Set.						
1953 - Oct./Dec.	.03119	.03782	.04397	.04882	.08149	.04082
1954	.04178	.04488	.05781	.06830	.11084	.05167
1955	.06380	.06600	.08242	.08632	.17165	.07337
1956	.07376	.08129	.10315	.11556	.22236	.08809
1957 - Jan./Ago.	.05829	.07451	.10060	.13803	.29907	.08200
	GERAL		ESPECIAL			
1957 - Set./Dec.	.08029		.17967			
1958	.14935		.30036			
1959	.20175		.36588			
1960	.22279		.52737			
1961 - Jan/Mar.	.20886		.63876			

Sources: IPEA, Setor de Comércio Internacional - Diagnóstico Preliminar, Nov. 1966, mimeo, quoted by Doellinger, Cavalcanti and Castelo Branco (1977), Política e Estrutura das Importações Brasileiras, IPEA: Relatórios de Pesquisa, Rio.

TABLE 2.3

Effective Exchange Rate for Imports

Cr\$/US\$: Period Average

YEARS	FREE RATE	MANDATORY DEPOSIT	BONECO	EFFECTIVE RATE
1961 - Ap./Dec.	.28612	.03952		.32565
1962	.38983	.09374	.01192	.49550
1963	.57508	.13682	.05583	.76777

Source: Same as Table 2.2.

TABLE 3.A.

Export Weights for the Effective Exchange Rate

<u>Countries:</u>	<u>U.S.</u>	<u>U.K.</u>	<u>Germany</u>	<u>France</u>	<u>Netherlands</u>	<u>Argentina</u>	<u>Japan</u>	<u>Italy</u>	<u>Spain</u>	<u>TOTAL</u>
<u>Periods</u>										
1907/14	.425	.179	.162	.109	.065	.046	0	.014	0	1
1915/19	.502	.129	0	.151	.048	.097	0	.073	0	1
1920/29	.504	.067	.093	.126	.068	.072	0	.070	0	1
1930/39	.475	.108	.150	.093	.050	.062	.025	.037	0	1
1940/49	.685	.172	0	0	0	.143	0	0	0	1
1950/56	.590	.078	.860	.060	.036	.075	.030	.031	.014	1
1957/64	.548	.061	.102	.046	.066	.082	.032	.046	.017	1
1965/72	.408	.059	.118	.052	.085	.094	.055	.093	.036	1
1973/80	.315	.067	.136	.062	.120	.064	.107	.075	.054	1

Note: The weights were obtained from the shares of these countries in Brazilian exports.

Sources: Boletim do Banco Central do Brasil, several issues.
Anuário Estatístico do Brasil, several issues.

TABLE 4.A.

Import Weights for the Effective Exchange Rate

<u>Countries:</u>	<u>U.S.</u>	<u>U.K.</u>	<u>Germany</u>	<u>France</u>	<u>Portugal</u>	<u>Netherlands</u>	<u>Argentina</u>	<u>Italy</u>	<u>Japan</u>	<u>TOTAL</u>
<u>Periods</u>										
1907/14	.167	.323	.193	.108	.062	0	.104	.043	0	1
1915/19	.468	.225	0	.052	.045	0	.179	.031	0	1
1920/29	.330	.260	.125	.071	.023	.017	.134	.040	0	1
1930/39	.312	.185	.211	.047	.021	.032	.155	.037	0	1
1940/49	.711	.095	0	0	.023	0	.171	0	0	1
1950/56	.503	.083	.107	.074	0	.030	.126	.037	.040	1
1957/64	.526	.050	.154	.058	0	.027	.093	.042	.050	1
1965/72	.472	.063	.171	.048	0	.026	.101	.048	.071	1
1973/80	.419	.049	.180	.056	0	.034	.070	.051	.141	1

Note: The weights were obtained from the shares of these countries in Brazilian imports.

Sources: Boletim do Banco Central do Brasil, several issues.
Anuário Estatístico do Brasil, several issues.

TABLE 5.A.

PRICE INDICES

1975 = 100

	U.K.	U.S.	GERMANY	ARGENTINA	ITALY	FRANCE	NETHERLANDS	PORTUGAL	JAPAN	SPAIN	BRAZIL
1907	7.7	18.9	27.1	.014	.15	.23	15.0	.94			.009
08	7.5	18.2	25.1	.014	.14	.21	15.0	.94			.009
09	7.6	19.6	25.4	.014	.14	.21	15.5	.95			.008
10	7.9	20.4	25.9	.015	.14	.23	15.0	.92			.008
1911	8.0	18.8	26.2	.015	.16	.24	16.5	.97			.009
12	8.4	20.0	28.5	.015	.17	.25	16.9	.97			.009
13	8.5	20.2	27.9	.015	.16	.25	15.8	.99			.009
14	8.6	19.7	29.3	.015	.16	.25	16.9	.98			.008
15	10.5	20.1	39.2	.017	.20	.34	22.9	1.13			.012
16	13.7	24.8	42.0	.018	.29	.46	34.9	1.34			.013
17	17.7	34.1	49.5	.021	.45	.64	39.3	1.59			.016
18	19.6	38.1	60.2	.026	.65	.83	44.4	2.9			.019
19	21.7	40.2	115.3	.025	.74	.87	44.8	3.1			.025
1920	26.9	44.7	411.9	.029	.94	1.2	41.4	5.4			.027
21	17.2	28.3	529.9	.026	.86	.83	32.4	8.0			.023
22	13.9	28.0	9,475.9	.024	.86	.79	25.4	11.1			.022
23	13.9	29.2	4,607,561.4	.024	.90	1.0	23.7	16.8			.030
24	14.6	28.4	34.0	.026	.90	1.2	25.0	26.0			.037
25	14.0	30.0	36.0	.026	.98	1.3	25.0	22.4			.040
26	12.9	29.0	36.4	.024	1.0	1.7	22.4	21.0			.036
27	12.4	27.6	38.0	.023	.86	1.5	21.6	23.8			.037
28	12.3	28.0	39.2	.024	.82	1.5	21.6	22.5			.037
29	12.0	27.6	39.6	.023	.78	1.5	21.2	22.3	.24		.039
1930	10.5	25.0	36.0	.022	.69	1.3	18.6	21.7	.20		.032
31	9.2	21.2	32.1	.021	.61	1.1	15.8	19.7	.18		.029
32	9.0	18.8	27.7	.021	.57	1.0	13.7	19.2	.18		.028
33	9.0	19.1	26.9	.020	.53	.91	13.3	19.6	.19		.028
34	9.3	21.7	28.5	.023	.49	.87	13.3	19.7	.20		.028
35	9.3	23.2	29.3	.023	.57	.83	12.9	19.7	.20		.029
36	9.9	23.4	30.1	.024	.61	1.0	13.3	20.1	.21		.034
37	11.5	25.0	30.5	.027	.74	1.3	15.8	20.8	.23		.040
38	10.7	22.8	30.5	.025	.78	1.5	15.0	20.1	.24		.040
39	10.8	22.3	30.9	.026	0.82	1.6	15.5	19.0	.27		.039
1940	14.4	22.8	31.7	.027	0.9	2.1	19.4	19.9	.30		.041
41	16.0	25.3	32.5	.030	1.1	2.6	22.0	22.5	.32		.046
42	16.8	28.6	32.9	.038	1.2	3.0	23.2	27.4	.35		.052
43	17.1	29.9	33.7	.041	1.8	3.5	23.7	30.9	-		.063
44	17.5	30.1	33.7	.045	6.7	3.9	24.1	31.8	.42		.072
45	17.8	30.7	-	.049	16.1	5.5	26.4	34.4	.64		.09
46	18.4	35.1	-	.056	22.5	9.5	37.0	39.6	3.0		.11
47	20.2	44.1	-	.058	40.3	14.5	39.8	40.7	8.8		.13

TABLE 5.A. (cont.)

	U.K.	U.S.	GERMANY	ARGENTINA	ITALY	FRANCE	NETHERLANDS	PORTUGAL	JAPAN	SPAIN	BRAZIL
48	23.1	47.8	-	.067	42.5	25.0	41.4	38.4	23.5		.15
49	24.1	44.9	54.8	.083	40.0	25.0	43.7	39.6	38.3		.16
1950	29.3	46.8	52.9	.1	38.0	31.0	48.7	40	45.1	20.4	.18
51	34.3	52.1	62.8	.1	43.2	43.3	59.9	43	54.6	26.2	.22
52	35.1	50.7	64.3	.2	40.8	43.2	58.2	44	55.7	26.5	.24
53	34.4	50.0	62.6	.2	40.7	40.6	56	44	56.1	28.3	.27
54	34.5	50.1	61.6	.2	40.3	39.6	56.7	42	55.7	28.5	.35
55	35.4	50.2	62.7	.2	40.7	39.8	58.2	42	54.7	29.6	.40
56	36.9	51.9	63.6	.3	41.3	41.4	58.2	44	57.1	32.3	.48
57	38.1	53.3	64.7	.4	41.8	43.4	59.7	44	58.8	36.2	.54
58	38.4	54.1	64.5	.5	41.1	45.6	58.9	44	55.0	41.4	.61
59	38.5	54.2	64.0	1.2	39.9	48.9	59.0	44	55.5	42.4	.85
1960	39.0	54.3	64.7	1.4	40.2	50.6	59.0	45	56.1	43.2	1.10
61	40.0	54.1	65.7	1.5	40.2	52.1	58.9	45	56.7	44.4	1.51
62	40.9	54.2	66.3	1.9	41.5	52.4	59.1	45	55.8	46.5	2.33
63	41.3	54.0	66.6	2.5	43.7	53.9	60.5	46	56.7	48.5	4.05
64	42.6	54.1	67.4	3.1	45.0	55.8	64.2	46	56.9	49.9	7.75
65	44.1	55.2	69.0	3.9	45.8	56.2	66.1	48	57.3	55.0	11.72
66	45.4	57.1	70.3	4.6	46.5	57.8	69.4	50	58.7	56.4	16.02
67	46.8	57.2	69.6	5.8	46.4	57.3	70.1	51	59.7	56.7	20.09
68	48.7	58.6	69.1	6.4	46.7	56.3	71.4	54	60.3	58.0	24.92
69	50.5	60.9	70.3	6.7	48.4	62.3	69.6	56	61.5	59.5	29.94
1970	54.1	63.1	73.8	7.7	52.0	67.0	72.8	57	63.8	60.4	36.62
71	59.0	65.2	77.0	10.7	53.7	68.4	76.1	59	63.3	63.9	43.94
72	62.1	68.1	79.0	18.9	55.9	71.6	80.0	62	63.8	68.3	52.11
73	66.7	77.0	84.2	28.5	65.5	82.1	85.5	69	73.9	75.3	60.85
74	81.8	91.5	95.5	34.2	92.2	106.0	93.7	89	97.1	88.8	78.59
75	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00
76	117.3	104.6	103.9	599.1	123.8	107.4	107.8	119	105.0	115.3	143.27
77	140.5	111.0	106.6	1494.3	144.3	113.4	114.1	154	107.0	135.1	204.08
78	153.3	119.7	108.0	3675.8	156.4	118.3	115.6	202	104.3	153.9	280.82
79	172.2	134.7	113.4	9163.5	180.7	134.0	118.7	262	111.9	170.6*	437.76
1980	200.0	153.6	121.5	16084	217.0	145.8	128.4	279	131.8	(197.2*)	903.9

TABLE 5.A.

Price Indices

Sources:

- International Financial Statistics, wholesale prices, line 63: for U.S., U.K., Germany, France, Italy, Argentina, Portugal and Spain from 1950 to 1980; for Netherlands from 1953 to 1980; for Japan from 1937 to 1980; for Brazil from 1945 to 1980.
- European Historical Statistics, 1750-1970, B. R. Mitchell, Columbia University Press, 1978: for U.K., Germany, France and Italy from 1907 to 1950, Netherlands from 1907 to 1953, and Portugal from 1927 to 1950.
- Historical Statistics of the U.S., U.S. Bureau of Census, Washington, 1960, Series E-13-14, pp. 116/7, for US from 1907 to 1950.
- Financial and Economic Annual of Japan, 1939, The Department of Finance, Tokyo, 1939. Retail prices for Japan from 1929 to 1937.
- Boletim Mensal de Estatística, Instituto Nacional de Estatística de Portugal, set. 1948, and Jorge Braga de Macedo, Portuguese Currency Experience, Coimbra, 1979: consumer prices for Portugal from 1907 to 1927.
- Carlos Diaz Alejandro, Essays on the Economic History of the Argentina Republic, Yale University Press, 1970 and Exchange Rates and Terms of Trade in the Argentina Republic 1913-1976, Economic Growth Center Discussion Paper 341, Yale University 1980; Roberto Cortes Conde, El Progreso Argentino, 1880-1914, Editorial Sudamerica, Buenos Aires, 1979. Argentinian price indices were calculated backwards using the inflation rate of consumer prices for the period 1907-1921.
- Annibal Villela e Wilson Suzigan, Política do Governo e Crescimento da Economia Brasileira, IPEA/INPES, Rio, 1973: Price indices for Brazil: 1907-1945, p. 424.
- Note: When wholesale prices were not available, consumer prices or a general price index were used (early periods in Argentina, Portugal and Brasil).

TABLE 6.A.

Real Exchange Rates

YEAR	FX	FM	D	DX	DM
1907	.667	.778	.819 _n	.546	1.023
1908	.667	.778	.829	.546	1.007
1909	.750	.875	1.004	.662	1.193
1910	.750	.875	.944	.638	1.135
1911	.667	.778	.794	.543	.953
1912	.667	.778	.844	.578	.989
1913	.667	.778	.853	.584	.999
1914	.750	1.000	1.034	.690	1.199
1915	.917	.833	.837	.570	.923
1916	1.077	1.000	1.011	.687	1.072
1917	1.062	1.062	1.044	.703	1.085
1918	1.210	1.053	.983	.662	.999
1919	.880	.760	.756	.498	.749
1920	.852	.777	.977	.662	.982
1921	1.130	1.087	1.181	.787	1.212
1922	1.545	1.091	1.209	.814	1.227
1923	1.033	1.033	1.178	.778	1.217
1924	.838	.784	.867	.583	.903
1925	.750	.750	.765	.510	.970
1926	.639	.639	.639	.467	.862
1927	.784	.757	.783	.522	.838
1928	.784	.757	.779	.522	.842
1929	.718	.718	.743	.495	.803
1930	.812	.875	.883	.594	.969
1931	1.172	1.172	1.287	.863 *	1.462
1932	1.107	1.036	1.168	.779 *	1.350
1933	1.071	1.107	1.064	.716 *	1.235
1934	1.393	1.429	1.403	.938	1.434
1935	1.690	1.621	1.712	1.024	1.848
1936	1.529	1.588	1.459	.867	1.555
1937	1.225	1.275	1.231	.744	1.294
1938	1.250	1.325	1.237	.827	1.317
1939	1.359	1.410	1.349	.852	1.475
1940	1.366	1.390	1.357	.845	1.713
1941	1.370	1.348	1.331	.853	1.441
1942	1.365	1.192	1.326	.847	1.375
1943	1.190	1.190	1.144	.731	1.134
1944	1.056	1.069	1.007	.644	1.016
1945	.878	.889	.819	.522	.825
1946	.800	.818	.763	.488	.763
1947	.777	.792	.780	.522	.763

YEARS	FX	FM	D	DX	DM
1948	.673	.747	.733	.491	.714
1949	.656	.656	.645	.432	.629
1950	.561	.539	.598	.400	.585
1951	.495	.491	.545	.365	.528
1952	.475	.487	.486	.325	.471
1953	1.041	1.063	1.061	.435	.517
1954	1.060	1.083	1.084	.368	.816
1955	1.138	1.157	1.157	.466	1.012
1956	.935	.937	.988	.491	1.036
1957	.885	.883	.920	.448	.875
1958	1.320	1.311	1.411	.549	1.579
1959	1.128	1.118	1.228	.527	1.524
1960	1.074	1.070	1.148	.734	1.298
1961	1.140	1.140	1.201	.806	1.659
1962	1.050	1.049	1.110	.745	1.673
1963	.905	.903	.947	.635	1.406
1964	1.078	1.077	1.092	.736	1.574
1965	1.074	1.082	1.096	.773	1.454
1966	.938	.944	.972	.685	1.138
1967	.877	.880	.933	.763	.891
1968	.906	.913	.982	.834	.968
1969	.935	.946	1.019	.900	1.003
1970	.906	.919	.973	.894	.945
1971	.923	.936	.965	.916	.921
1972	.939	.946	.954	.912	.910
1973	.981	.988	.954	.918	.910
1974	1.006	1.017	.973	.960	.917
1975	1.000	1.000	1.000	1.000	1.000
1976	.966	.975	.959	.961	1.130
1977	.961	.966	.946	.956	1.084
1978	1.028	1.030	.947	.958	1.071
1979	1.144	1.140	1.018	1.028	1.082
1980	1.244	1.244	1.102	.740	1.068

Sources: Tables 1, 2, 3, 4, 5, and 7

NOTES:

FX \equiv Real Effective Exchange Rate. It uses export weights and exchange rates in the free market.

$$FX \equiv \frac{\sum_{i=1}^9 W_i P_i E_i}{P}$$

where: $W_i \equiv$ export weight of country i (see Table 3.A.)

$P_i \equiv$ price index of country i (see Table 5.A.)

$E_i \equiv$ index for the exchange rate expressed as cruzeiros per currency of country i (see Table 1.A.)

$P \equiv$ Brazilian price index

FM \equiv Real Effective Exchange Rate. It uses import weights and exchange rates in the free market.

$$FM \equiv \frac{\sum_{i=1}^9 M_i P_i E_i}{P}$$

where $M_i \equiv$ import weights of country i (see Table 3)

D \equiv Real dollar exchange Rate. It uses the cruzeiros per dollar rate (E_{us}) in the free market.

$$D \equiv \frac{P_{us} E_{us}}{P}$$

Correlation Matrix (1907-1980)

	FX	D	FM
FX	1.000		
D	.926	1.000	
FM	.945	.957	1.000

DX \equiv Real dollar exchange rate for exporters. It uses an index, I_x , (1957 \equiv 100), which was calculated using the rate of cruzeiros received for one dollar of exported good, reported in Table 2.A. as EX.

$$DX \equiv \frac{P_{us} I_x}{P}$$

DM \equiv Real dollar exchange rate for importers. It uses an index, I_M (1975 \equiv 100), which was calculated using the rate of cruzeiros paid for one dollar of imported good reported in Table 2.A. as EM*.

$$DM \equiv \frac{P_{us} I_M}{P}$$

Correlation Matrix (1907-1980)

	D	DX	DM
D	1.000		
DX	.604	1.000	
DM	.849	.558	1.000

TABLE 7.A.

Tariffs

YEARS	(1+t)	YEARS	(1+t)
1907	1.445	1944	1.113
1908	1.418	1945	1.117
1909	1.393	1946	1.108
1910	1.404	1947	1.082
1911	1.400	1948	1.079
1912	1.366	1949	1.078
1913	1.342	1950	1.080
1914	1.347	1951	1.071
1915	1.262	1952	1.070
1916	1.227	1953	1.055
1917	1.190	1954	1.041
1918	1.173	1955	1.037
1919	1.159	1956	1.028
1920	1.167	1957	1.032
1921	1.189	1958	1.125
1922	1.187	1959	1.119
1923	1.206	1960	1.112
1924	1.203	1961	1.130
1925	1.214	1962	1.148
1926	1.214	1963	1.144
1927	1.248	1964	1.148
1928	1.254	1965	1.149
1929	1.263	1966	1.165
1930	1.267	1967	1.109
1931	1.322	1968	1.145
1932	1.347	1969	1.143
1933	1.349	1970	1.128
1934	1.335	1971	1.108
1935	1.253	1972	1.108
1936	1.237	1973	1.108
1937	1.221	1974	1.095
1938	1.203	1975	1.120
1939	1.206	1976	1.155
1940	1.197	1977	1.145
1941	1.192	1978	1.131
1942	1.144	1979	1.115
1943	1.096	1980	1.126

Sources:

From 1907-1944: Villela and Suzigan, Política do Governo e Crescimento da Economia Brasileira, 1889-1945, IPEA: Rio, 1973, Table XIX, pp. 439-40 and Table IV, pp. 418-9.

From 1945-1947: Malan et al., Política Econômica Externa e Industrialização no Brasil, IPEA, Rio, 1979, Table V. 28, pp. 382-3.

From 1948-1960: Doellinger et al., opus cit., Table III. 1, p. 84.

From 1960-1980: M. Helena Horta, IPEA, 1982. Tariffs rates were calculated net of oil and wheat imports starting in 1960, due to the increasing importance of oil imports in the 70's. Oil imports were not subjected to tariffs.

Table 8.A.

Real Exports and Imports in Millions of 1975 Dollars

1907/1980

Years	Real Exports			Real Imports
	Real Exports	Net of Coffee		
1907	1423.28	673.0		1066.14
1908	1175.27	561.5		944.51
1909	1571.94	746.4		916.84
1910	1534.80	885.8		1166.67
1911	1722.87	682.4		1361.70
1912	1806.00	679.0		1534.50
1913	1567.82	591.1		1608.91
1914	1128.43	477.2		839.09
1915	1264.68	509.5		707.46
1916	1066.13	512.9		760.08
1917	873.90	554.0		614.37
1918	746.19	514.2		649.34
1919	1426.12	623.1		873.38
1920	816.78	415.7		974.27
1921	774.56	313.1		765.37
1922	1081.79	383.9		766.43
1923	1152.05	410.3		792.12
1924	1478.87	357.7		1067.61
1925	1615.33	452.3		1356.00
1926	1571.72	411.7		1332.76
1927	1553.26	455.1		1395.29
1928	1692.50	482.5		1576.07
1929	1668.12	483.7		1525.72
1930	1277.60	478.0		1042.40
1931	1150.94	358.0		643.87
1932	954.79	271.3		568.62
1933	1135.08	305.2		892.15
1934	1348.85	524.9		974.19
1935	1161.64	550.4		969.40

Table 8.A. (Cont.)

Real Exports and Imports in Millions of 1975 Dollars

Years	Real Exports	1907/1980		Real Imports Net of Oil
		Real Exports Net of Coffee	Real Imports	
1936	1370.94	747.0	992.31	
1937	1387.20	799.2	1322.00	
1938	1290.79	710.1	1288.60	
1939	1375.34	826.5	1132.74	
1940	1149.56	784.6	1073.25	
1941	1415.42	990.9	1080.63	
1942	1400.70	1032.2	815.04	
1943	1559.20	1057.2	1034.78	
1944	1908.64	1219.6	1344.85	
1945	2134.85	1389.9	1462.54	
1946	2806.27	1815.7	1917.38	1725.6
1947	2623.58	1663.3	2759.64	2483.7
1948	2474.89	1445.4	2554.39	2110.7
1949	2449.89	1042.3	2574.61	2317.1
1950	2903.85	1053.4	2329.06	1991.5
1951	3399.23	1366.6	3813.82	3363.7
1952	2792.90	733.7	3909.27	3361.9
1953	3078.00	902.0	2638.00	2092.0
1954	3117.76	1225.5	3261.48	2677.6
1955	2834.66	1153.4	2603.59	2121.9
1956	2855.49	870.9	2377.65	1890.2
1957	2611.63	1024.4	2793.62	2302.1
1958	2297.60	1025.9	2500.92	2016.6
1959	2365.31	1012.9	2535.05	2068.3
1960	2335.17	1025.9	2692.45	2221.0
1961	2593.35	1281.0	2698.71	2245.8
1962	2239.85	1053.5	2721.40	2273.1
1963	2603.70	1218.5	2753.70	2305.6
1964	2643.25	1238.4	2334.57	1922.4
1965	2891.30	1610.5	1985.51	1625.0
1966	3049.04	1711.0	2619.96	2243.4
1967	2891.61	1659.1	2914.34	2515.7
1968	3209.90	1887.4	3638.22	3145.1
1969	3794.74	2459.8	3719.21	3269.3
1970	4340.73	2852.6	4515.06	4001.6
1971	4453.99	3268.4	5676.38	4961.7
1972	5860.50	4408.2	7023.50	6182.1
1973	8050.65	6435.1	9089.61	7809.1
1974	8689.62	7745.4	15484.2	11950.8
1975	8670.00	7815.0	13592.0	10292.0
1976	9682.60	7605.2	13122.4	9218.0
1977	10918.90	8847.7	11943.2	8158.6
1978	10575.60	8949.0	12576.4	8719.3
1979	11317.00	9893.1	14702.3	9566.4
1980	13106.80	11488.3	16277.3	9535.8

Sources: Boletim do Banco Central do Brasil and Anuário Estatístico, several issues.

For the pre-war years, the share of oil in total imports was assumed to be negligible; for the years 1946/49 the share was assumed to be 10%. Actual shares for 1950/80 are available from sources above.

Table 10.A.
Interest Rates and Growth: 1908/1980

Years	Foreign Real Interest Rate: r^*	Difference Between Domestic and Foreign Growth Rates ($y - y^*$)
1908	.076	-.017
1909	-.039	-.061
1910	-.001	.044
1911	.118	-.023
1912	-.024	.049
1913	.032	.007
1914	.066	.056
1915	.021	-.004
1916	-.194	-.035
1917	-.333	.047
1918	-.072	-.103
1919	-.008	.094
1920	-.059	.144
1921	.418	.105
1922	.054	-.080
1923	.001	-.036
1924	.068	.016
1925	-.018	-.084
1926	.070	-.007
1927	.082	.108
1928	.019	.108
1929	.050	-.056
1930	.127	.077
1931	.185	.043
1932	.150	.188
1933	.017	.107
1934	-.105	.001
1935	-.041	-.068
1936	.018	-.019

Table 10.A. (Cont.)

Interest Rates and Growth: 1908/1980

Years	Foreign Real Interest Rate: r^*	Difference Between Domestic and Foreign Growth Rates ($y - y^*$)
1937	-.041	-.007
1938	.114	-.005
1939	.046	-.061
1940	.002	-.095
1941	-.089	-.112
1942	-.106	-.156
1943	-.021	-.047
1944	.018	.004
1945	.004	.049
1946	-.121	.235
1947	-.234	.033
1948	-.059	.026
1949	.084	.065
1950	-.019	-.031
1951	-.087	-.020
1952	.054	.056
1953	.042	-.013
1954	.022	.090
1955	.026	-.008
1956	-.002	.0
1957	.009	.055
1958	.018	.088
1959	.041	-.008
1960	.072	.072
1961	.083	.083
1962	-.013	-.013
1963	-.025	-.025
1964	-.026	-.026
1965	-.036	-.036
1966	-.027	-.027
1967	.022	.022

Table 10.A. (Cont.)

Interest Rates and Growth: 1908/1980

Years	Foreign Real Interest Rate: r^*	Difference Between Domestic and Foreign Growth Rates ($y - y^*$)
1968	.065	.065
1969	.074	.074
1970	.091	.091
1971	.103	.103
1972	.060	.060
1973	.085	.085
1974	.112	.112
1975	.068	.068
1976	.036	.036
1977	-.008	-.008
1978	.013	.013
1979	.032	.032
1980	.082	.082

Notes and Sources:

The real interest rate is defined as: $r^* = i^* - \pi^*$, where i^* is the yields percent per annum on U.S. Treasury securities, 10 years maturity for the years 1919/1980 and the yields on Railroad Bonds for the years 1908/1918. The sources for the nominal interest rates are: Economic Report of the President and Historical Statistics of U.S., U.S. Department of Commerce. The U.S. inflation rate was calculated using the prices reported in Table 5.A.

Column 2 reports the difference between the Brazilian real GNP growth rate and the U.S. real GNP growth rate. Sources are: Claudio Haddad, Crescimento do Produto Real no Brasil, 1900-47 (for the years 1908-1940); Malan et.al., opus cit., (for the years 1940-52) and Conjuntura Econômica, several issues. For U.S. sources are: U.S. Historical Statistics; Federal Reserve Bank of St. Louis and the Economic Report of the President.

