

Huddle, Donald

**Working Paper**

## Notes on the Brazilian Industrialization: Sources of Growth and Structural Change, 1947-1963

Center Discussion Paper, No. 30

**Provided in Cooperation with:**

Yale University, Economic Growth Center (EGC)

*Suggested Citation:* Huddle, Donald (1967) : Notes on the Brazilian Industrialization: Sources of Growth and Structural Change, 1947-1963, Center Discussion Paper, No. 30, Yale University, Economic Growth Center, New Haven, CT

This Version is available at:

<https://hdl.handle.net/10419/159962>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

*file*

ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station  
New Haven, Connecticut

CENTER DISCUSSION PAPER NO. 30

NOTES ON THE BRAZILIAN INDUSTRIALIZATION:

SOURCES OF GROWTH AND STRUCTURAL CHANGE 1947-1963

Lon L. Huddle

June 2, 1967

Note: Center Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the author to protect the tentative character of these papers.

NOTES ON THE BRAZILIAN INDUSTRIALIZATION:

SOURCES OF GROWTH AND STRUCTURAL CHANGE 1947-1963\*

Don L. Huddle

I. Introduction

This paper analyzes the structural change in, and growth sources of, manufacturing industry in postwar Brazil. The importance of a fairly systematic description and examination of manufacturing industry during this period is implicit in the contradictory hypotheses and assertions which abound in the literature on this subject. Moreover, the present analysis may help explain the several apparent paradoxes found in postwar Brazil. First, although the rate of economic growth has been very rapid, the fruits of increasing wealth seem to have eluded a vast proportion of both urban and rural labor. That the dynamic expansion occurred in the industrial, rather than the primary sector and in the central-south as opposed to the other regions helps explain part of the pattern of wealth distribution. But the rapid migration of labor into the dynamic centers should have partly offset the increasing regional dualism. On the contrary, however, labor migration seems to have created a new form of dualism, for the industrial sector absorbed few of the migrants.<sup>1</sup> It instead adopted a capital-intensive technology and hastened the decline of labor-intensive cottage industry, both of which forced the unskilled urban laborers into the parasitic services sector.<sup>2</sup> Second, after the long, sustained period of growth, the industrial sector lapsed by late 1962 into a virtual stagnation which has continued to the present time. Once again, there are abundant explanations, but none of these have been linked empirically and systematically to the Brazilian economy.<sup>3</sup>

---

\*This paper was given at a "Colloquium on the Modernization of Brazil," February 23-25, 1967, at Louisiana State University. The author is visiting research economist at the Economic Growth Center, Yale University, and associate professor of economics at Rice University. Thanks are due to professors Hiromitsu Kaneda and Al Berry who have served as friendly critics.

In what follows, an attempt is made to explain certain aspects of the rise and ultimate demise of industrial growth in Brazil. Part II presents several widely held interpretations of the Brazilian industrialization, which are examined in Part IV for their compatibility with the available evidence. Although Brazilian data are poor in coverage and uncertain in quality, the application of new techniques in Part II to existing data uncovers several enlightening patterns which conflict with assumptions held widely in the literature on the industrialization. The final part attempts to set out a stylized interpretation of Brazilian industrial development with the newly discovered patterns in mind.

## II. Interpretations of the Industrialization

Previous models of the rapid industrialization in Brazil focus attention on the roles played by 1) inflation-induced forced saving; 2) import substitution; 3) the sluggish international demand for Brazil's exports (predominantly primary products); and 4) foreign investment. At the most general level, the model of Brazilian industrialization has been loosely as follows:<sup>4</sup> The government has been committed to a high rate of growth for the economy. However, expansion of export earnings did not permit the target rate of growth to be achieved in a normal pattern; so the country turned to import substitution to reach its goals. Import-substitution industrialization required the government to tinker with the exchange system and expand credit to the industrial sector. An increased rate of inflation necessarily resulted both from the reduction of wage and salary (consumption) goods as a proportion of total imports (for which are substituted capital and intermediate inputs), and from an expansion of loans to the industrialists. Income stabilization of the coffee sector accelerated the inflation, but was not its sole cause. The inflation, however, was not harmful to the industrialization, but actually

favors it by redistributing income from the consuming classes (wage and salary earners) to investing classes (entrepreneurs). Only when wage and salary earners were able to keep up with the price increases did the inflation become destructive. However, the disappearance of price-wage lags is not believed to have been the sole growth-dissipating factor. Although Baer, for instance, seems convinced that the lag was important, he places more emphasis upon both political problems and social imbalances as the causes of stagnation after 1962.<sup>5</sup> Furtado, on the other hand, sees the price-wage lag disappearing in the late 1950's,<sup>6</sup> but also stresses political bottlenecks, the numerous errors he believes the authorities made in selecting infant industries for subsidies and protection, and the worsening external terms of trade.<sup>7</sup> The Economic Commission for Latin America cites a host of bottlenecks, including the lack of sufficient domestic demand and the increasing harm done by longer term absolute protection of industry.<sup>8</sup>

Contradictory interpretations of the sources and patterns of growth abound in the literature. A few passages in the literature bring out this point.

Furtado explains inflation's role as follows:

"During the last three decades, industrialization has persistently been supported by the convergence of...two factors: substitution for imports, and transfer of resources caused by inflation."

"Inflation is a process of redistributing income, variously caused but always operating for the benefit of groups linked to investment."<sup>10</sup>

"Inflation played a major role in raising the investment rate and concentrating investment in the industrial sector. Without inflation, the rate of growth would certainly have been lower."<sup>11</sup>

Baer is more cautious in his assessment of the inflation than Furtado, but it still occupies a central place.

"...the inflationary process is a natural concomitant of a country which faces continuously declining import earnings, which

is committed to a high rate of growth, and which meets its external situation by promoting import-replacement industries and new export industries. The function of the inflationary process is to force the consuming sector to save in order to reduce imports replacements. ...A lag in wages and salaries is...a sine qua non for making the inflationary process a productive one."<sup>12</sup>

He goes on to state that inflation did play a positive role in Brazil without having an obviously negative effect on social productivity.

But the inflation eventually lost its virtues according to Furtado

"From the moment when the terms of trade began to deteriorate the only remaining source that could feed inflation without provoking a spiral of prices and costs was lost. The government had to abandon the taxation of exports implicit in the difference of exchange rates, and cover the lack of reserve funds by further emissions of paper currency. Thus, inflation ceased to be an effective mechanism for the redistribution of income, and more and more became simply a sterile game of passing the buck."<sup>13</sup>

Opinions have differed widely regarding the industrialization itself. Baer is probably most laudatory

"Because of the type of protectionist policies encouraging verticle integration, a fairly well balanced industrial growth took place. Industries with high linkages were stimulated, and the linkages worked themselves out through the economy. This explains the rapid spread of the industrialization which resulted ...with industry becoming the principal contributor to the gross domestic product."<sup>14</sup>

"Policy measures which accompanied protectionist actions produced an industrialization of considerable depth...so that in a short period of time most manufactured products were almost entirely produced within the country."<sup>15</sup>

Furtado and the Economic Commission for Latin America do not disagree with the notion that Brazil had to follow an import-substitution industrialization model, but each stresses errors made in its implementation

"A lack of a consistent policy of industrialization was the concentration of investment in 'less essential' industries. The less essential a product the more difficult was its import...there-

fore, sectors producing luxury goods had the greatest attraction for investors. In contrast, the development of the capital goods industry was delayed. "16 "...investments in infrastructure and the basic industries (iron and steel for example) was allowed to lag behind badly...the economic system was badly unbalanced showing excess capacity in some sectors, and inadequate capacity in others...to maintain a reasonable degree of utilization of productive capacity, demanded the raising of the level of expenditure (consumption plus investment) well above that of the income generated by domestic production, a process which is possible only by incurring a substantial margin of foreign indebtedness."17

The Economic Commission for Latin America identifies the problems facing

#### Brazil

"Metal transforming, chemical, rubber, and transport equipment industries are the only branches...in which effective substitution is possible on a fairly large scale...the first three sectors would require a high capital investment for expansion of their productive capacity."18

"...the crux of the problem is not the impossibility of continuing with substitution, but the fact that the series of incentives created have virtually lost all of their power."19

"...the strategic problem confronting the Brazilian economy is to make the transition from an import substitution model to a self-sustaining growth model...Only the public sector...is capable of providing autonomous demand on a sufficient scale to counterbalance the negative effect of the exhaustion of the external stimulus."20

Many other conflicting opinions could be quoted, but the above suffice to show the present state of disagreement.

### III. The Patterns and Sources of Manufacturing

This section attempts to analyze the patterns and sources of sector-growth in manufacturing industry between 1939 and 1963. Since events were far from homogenous during this long period, we distinguished four subperiods: 1) 1939-1949; 2) 1949-1953; 3) 1953-1958; and 4) 1958-1963, each of which represents widely varying growth

patterns, policy instruments and conditions. A brief summary of policy instruments and these conditions in each period are included below.

The analysis of sectoral growth largely follows the Chenery<sup>21</sup>, Lewis-Soligo<sup>22</sup> frameworks which separate out three sources of growth: 1) import substitution; 2) domestic demand; and 3) export demand. Import substitution is defined (as by Chenery) with reference to the proportion of imports in total supply. Import substitution is positive if domestic production rises more rapidly than imports; negative import substitution (import liberalization) occurs if imports increase more than domestic production.

Domestic production is apportioned to the three sources as follows

$$(1) \Delta Z \equiv \Delta X + \Delta M$$

where Z is defined as total supply, X as domestic production, and M as imports

$$(2) \Delta Q \equiv \Delta D + \Delta W + \Delta E$$

where Q is defined as total demand, D as domestic final demand, W as domestic intermediate demand, and E as foreign demand for exports.

The system is closed by the demand-supply identity

$$(3) \Delta Z \equiv \Delta Q$$

Because the data do not distinguish between domestic final demand and intermediate demand, these two elements are combined into a single variable, and (2) becomes

$$(4) \Delta Q \equiv \Delta(D+W) + \Delta E$$

where (D+W) is total domestic demand.

By combining these identity equations, the relative importance of the three sources of growth can be calculated. Expressions (1) and (4) become



Although the government did not actively pursue import substitution, the unavailability of imports during the War gave domestic producers strong effective protection; immediately after the War, protection was greatly reduced by import liberalization, but by the final two years of the period, increasingly pervasive exchange control was re-instituted and protection again increased though only as a by-product of balance of payments control.

Table I - V provides the basis for the following observations. All industrial sectors were advancing, with investment and related goods growing most rapidly, followed by intermediate goods and consumer goods, respectively. Neither export expansion nor import substitution played a significant role overall, although import substitution was of at least minor importance in paper products and metals, machinery and transport equipment. By far the strongest source of growth was domestic demand in all instances. Nonavailability of imports rather than purposeful protection stimulated rather limited substitution for imports. Even the increasingly severe exchange control necessitated by a highly overvalued exchange rate made at best very limited provision for infant industry. Thus, substitution was limited largely because protection was only an accidental consequence of what was essentially a free trade oriented government.

B. The Second Subperiod: 1949-1953

Again there were conflicting trends. Although the period was one of general foreign exchange shortage, the Korean War helped induce a general import liberalization in 1951 and early 1952; import controls were again tightened in late 1952 and 1953, however, as foreign exchange reserves became exhausted. By the end of the period, inflation began to accelerate due partly to reduced import availability and increased government spending. Also, wages and salaries jumped precipitously, particularly the minimum wage which applied to government and unskilled industrial workers. <sup>24</sup>

$$(5) \quad \Delta X + \Delta M = \Delta(D+W) + \Delta E$$

$$(6) \quad \Delta X = \Delta(D+W) + \Delta E - \Delta M$$

The contribution of domestic demand and export demand to domestic production during any given period 'i' is therefore

$$(7) \quad \Delta X_i = \frac{X_i}{Z_i} \cdot \Delta(D+W) + \frac{X_i}{Z_i} \cdot Z_2$$

where  $X_i$  is the contribution of the demand factors to the increment in domestic production. The contribution of import substitution to domestic production is

$$(8) \quad \Delta X_{ii} = \left( \frac{X_2}{Z_2} - \frac{X_1}{Z_1} \right) \cdot Z_2$$

where  $X_{ii}$  is the contribution of domestic production to the increment in total supply and the subscripts refer to two time periods.

By combining (7) and (8) the total contribution of domestic demand, export demand, and import substitution is found as

$$(9) \quad \Delta X = \Delta X_i + \Delta X_{ii} = \frac{X_i}{Z_i} \cdot \Delta(D+W) + \frac{X_i}{Z_i} \cdot \Delta E + \left( \frac{X_2}{Z_2} - \frac{X_1}{Z_1} \right) \cdot Z_2$$

In what follows, output growth patterns and growth sources are discussed for each subperiod between 1939 and 1963. Tables I - III summarize the rates of output growth, and the proportion of imports and domestic production respectively, to total supply. Tables IV and V show the results of calculation using expression (9) to apportion growth among the three sources in terms of gross output. The latter seems methodologically superior to value added with respect to empirical evaluation of the dynamics of import substitution.

#### A. The First Subperiod: 1939-1949

Two conflicting trends occurred during this subperiod. Between 1939 and 1946 the wartime unavailability of imports and exchange control greatly biased the process of production and trade. Then for several years following the war there was substantial import liberalization which was followed by increasingly restrictive import licensing and exchange control up to 1949.<sup>23</sup>

ambitious program to establish an automobile industry within several years. Although in 1955 Instruction 113 gave numerous concessions to foreign capital, foreign participation in the economy became most significant just prior to and during the present period.<sup>26</sup> Numerous concessions were made in the way of guarantees, favorable exchange treatment, etc. By 1963, however, foreign investment had fallen to the low levels of the early 1950's. Second, the rate of inflation dangerously accelerated. At the same time the resignation of President Quadros and the appearance of numerous social and economic imbalances raised questions of political and social discontent.<sup>27</sup> By the end of this period, almost all of the factors favorable to expansion seemed to dissipate as indicated by: 1) accelerating inflation without forced saving; 2) disincentives to foreign investment; 3) stagnant export earnings; 4) social unrest and demands for drastic reforms; and 5) weak and vacillating leadership.

Although the over-all rate of growth in industry increased, several sectors which had been instrumental in leading the expansion during the previous period perceptibly slowed; expanding sectors were mainly those intimately connected to the automobile boom and foreign investment. Although import substitution in general was slightly greater than during the previous period, import substitution became negative in four major sectors. The relative gain in substitution occurred in intermediate goods industries. Domestic demand again began to rise in magnitude as the source of growth in consumer goods and investment and related goods while export demand fell in every sector.

#### E. Some Tentative Conclusions

The empirical analysis clears up several misconceptions regarding Brazil's industrialization. According to Furtado, over the past three decades import substitution has been inseparable from the industrialization itself. In fact,

The growth rate in manufacturing fell relative to the earlier period. Numerous bottlenecks inhibited expansion, e.g., shortages of power and loanable funds, and (most importantly) a very inefficient allocation of imports. Domestic demand as a source of growth dominated completely: import substitution was significant only in the investment and related goods industries. In consumer and intermediate product industries, there was import liberalization except in the chemical, petroleum and coal products sector. Export demand was insignificant in all sectors.

C. The Third Subperiod: 1953-1958

Policy instruments were more uniform and exogenous shocks less important than during any of the previous periods. The government undertook a relatively systematic program of subsidies-taxation and protection designed to promote rapid expansion of selected industrial sectors. Moreover, it undertook to provide added social overhead capital for industry in general. Inflation continued, but not beyond the limit which could be considered as uncontrolled or dangerous.<sup>25</sup>

The growth rate of industrial production accelerated relative to the previous period. For the first time, import substitution became a source of growth in every sector, even consumer goods which regained earlier losses caused by import liberalization. With several individual exceptions, export demand played a very small, though positive, role. Domestic demand, on the other hand, remained the prime source of expansion for all sectors.

D. The Fourth Subperiod: 1958-1962

Policy instruments of the previous period still predominated, and yet several important changes affected the operation of the economy. The first of these was the all-out drive for foreign capital investment intimately connected to the

import substitution as a growth source was negative and at times negative prior to 1953 (see Tables II and IV). But neither is the converse statement by Baer accurate. Manufacturing products were not newly produced entirely inside Brazil in a very short time, for this had already been true with the exception of chemicals, paper, metals, and transport products by 1939 (see Table II).<sup>28</sup> The present analysis would also appear to vitiate the claim by Furtado that infant industry protection led to substitution in less essential products such as consumers' durables and luxuries rather than in heavy industry. The ISIC classification is somewhat misleading, however, for it includes consumer durables such as refrigerators, television sets, passenger autos, etc., as investment and related goods. Passenger autos became a particularly significant substitution item after 1958, and raises problems of interpretation which are discussed in Part IV. The other durables, however, were insufficiently large and can be ignored. Thus, the sequential pattern of import substitution was not completely of the classical type: although consumer goods, capital goods, and intermediate goods, respectively were substituted for imports, 'durable' consumer goods became a major substitution item during the final two periods.

The figures in Tables I, II and IV point up the basic dissimilarities of sectoral expansion during the final two periods (1953-58 and 1959-63). Sectoral growth and substitution were apportioned fairly evenly among all manufacturing sectors during the former period whereas in the latter period, the converse occurred. This dichotomy (largely overlooked in the literature) is the primary clue to the roots of the post-1962 stagnation: it is examined more thoroughly in Part IV.

What do these results imply for future import substitution in Brazil? The data of Tables I - V clearly demonstrate that import substitution had already

been carried very far by 1939. Thus, continued import substitution between 1939 and 1963 was necessarily somewhat limited. That which did occur, however, absorbed to a large extent the remaining substitution possibilities. Over the next decade more than minor substitution could occur only in chemicals, petroleum, coal products, metals, machinery, and transport equipment (including durable consumer goods). Even in these sectors, 'potential' substitution is less than was 'actual' substitution between 1953 and 1963 (Table II). An effort directed toward taking full advantage of this limited potential substitution is very questionable, for it would imply that a state of autarky would be preferable to some trade. While international trade theory cannot demonstrate that 'more' trade is better than 'less' trade, it cannot be doubted that 'some' trade is better than complete autarky. Since Brazil already has one of the lowest import coefficients in the world, efforts to increase trade along appropriate lines will likely bring greater benefits than will shrinking trade.

TABLE I

Growth Rates of Manufacturing Industry

ISIC No.	Industry Sector	<u>1939-48</u>	<u>1948-53</u>	<u>1953-58</u>	<u>1959-63</u>
<b>Consumer Goods</b>					
20-22	Food, beverages and tobacco	4.5	8.9	7.1	2.4
24	Clothing	4.6	5.1	9.3	0.9
25-26	Wood Products	13.7	6.6	2.8	0.8
28	Printing	3.6	10.5	7.5	3.7
29	Leather Products	1.3	2.4	5.4	0.3
<b>Intermediate Goods</b>					
23	Textiles	4.6	4.1	2.4	3.1
27	Paper	5.8	9.2	7.5	11.0
30	Rubber	21.3	14.5	5.7	1.1
31-32	Chemicals, petroleum and coal products	10.2	10.7	9.6	7.3
<b>Investment and Related Goods</b>					
33	Non-metallic minerals	11.9	12.7	4.4	1.2
34-38	Metals, machinery and equipment	13.5	4.1	13.9	21.0
<b>Total Manufacturing</b>		<b>11.6</b>	<b>5.3</b>	<b>7.0</b>	<b>8.0</b>

Source: United Nations, The Growth of World Industry, National Tables 1938-1961, Table 2B data for 1959-1963 were calculated from IBGE/Conselho Nacional De Estatística, Anuario Estatístico Do Brasil, 1966, Rio de Janeiro, Brasil, p. 130. ISIC No.'s 25-26, 31-32, and 34-38 were not listed in Table 2B, United Nations; these were calculated from value added data above and deflated by price indices from International Financial Statistics, wholesale prices excluding coffee; and Conjuntura Economica, sectoral price index series for years after 1944. Also see Appendix A.

TABLE II

Proportion of Domestic Production to Total Supply  $\frac{x}{z}$ 

ISIC No.	Industry Sector	1938	1949	1953	1958	1963
Consumer goods		.9913	.9896	.9726	.9918	.9901
20-20	Food, beverages and tobacco	.9880	.9858	.9676	.9917	.9838
24	Clothing	1.000	1.000	.9996	1.000	1.0000
25-26	Wood Products	1.000	1.000	.9931	1.000	1.0000
28	Printing	1.000	1.000	.9655	.9615	.9690
29	Leather products	1.000	1.000	.9780	1.000	1.0000
Intermediate goods		.8618	.8817	.8376	.8619	.9157
23	Textiles	.9649	.9666	.9733	.9960	.9947
27	Paper	.7459	.8538	.8172	.8383	.9205
30	Rubber	1.000	1.000	.9963	1.000	.9736
31-32	Chemicals, petroleum and coal products	.6891	.7313	.6605	.7456	.8567
Investment and Related goods		.5701	.6666	.7223	.8218	.8931
33	Non-metallic minerals	.9305	.9095	.9333	.9993	.9755
34-38	Metals, machinery, and transport equipment	.5053	.6097	.6532	.7943	.8829
Total		.8514	.8805	.8686	.8940	.9317

Source: See Appendix A



TABLE III

Proportion of Exports to Domestic Production  $\frac{E}{X}$

ISIC No.	Industry Sector	1938	1949	1953	1958	1963
Consumer Goods		.0092	.0096	.0106	.0209	.0128
20-22	Food, beverages and tobacco	.0125	.0120	.0140	.0302	.0171
24	Clothing	.0000	.0000	.0001	.0000	.0000
25-26	Wood Products	.0000	.0000	.0014	.0000	.0049
28	Printing	.0000	.0000	.0000	.0000	.0000
29	Leather Products	.0041	.0276	.0144	.0000	.0000
Intermediate Goods		.0083	.0137	.0057	.0245	.0149
23	Textiles	.0124	.0226	.0037	.0308	.0241
27	Paper	.0000	.0000	.0010	.0000	.0000
30	Rubber					
31-32	Chemicals, petroleum and coal products	.0000	.0000	.0119	.0267	.0122
Investment and Related Goods		.0000	.0000	.0005	.0031	.0023
33	Non-metallic minerals	.0000	.0000	.0000	.0000	.0000
34-38	Metals, machinery, and transport equipment	.0000	.0000	.0007	.0037	.0026
Total		.0049	.0092	.0071	.0168	.0100

Source: See Appendix A

TABLE IV.  
Part A  
Sources of Growth

ISIC No.	1939 - 49			1949 - 53		
	Domestic Demand	Exports	Import Substitution	Domestic Demand	Exports	Import Substitution
	$\frac{X_1}{Z_1} \cdot \Delta(D+W)$ $\Delta X$	$\frac{X_1}{Z_1} \Delta E$ $\Delta X$	$\frac{(X_2 - X_1) \cdot Z_2}{(Z_2 - Z_1) \cdot Z_2}$ $\Delta X$	$\frac{X_2}{Z_2} \cdot \Delta(\Delta+W)$ $\Delta X$	$\frac{X_2}{Z_2} \Delta E$ $\Delta X$	$\frac{(X_3 - X_2) \cdot Z_3}{(Z_3 - Z_2) \cdot Z_3}$ $\Delta X$
Consumer goods	.9924	.0096	-.0020	1.0232	.0115	-.0350
20-22	.9908	.0118	-.0026	1.0223	.0157	-.0380
24	1.0000	.0000	.0000	1.0005	.0003	-.0009
25-26	1.0000	.0000	.0000	1.0114	.0028	-.0142
28	1.0000	.0000	.0000	1.0564	.0001	-.0566
29	.9670	.0330	.0000	1.0618	-.0054	-.0563
Intermediate goods	.9590	.0140	.0270	1.1057	-.0018	-.1041
23	.9716	.0264	.0021	1.0047	-.0207	.0160
27	.8548	.0000	.1451	1.0715	.0014	-.0730
30	1.0000	.0000	.0000	1.0052	.0002	-.0055
31-32	.9317	.0000	.0683	1.1759	.0155	.1914
Investment and Related goods	.8346	.0000	.1656	.8666	.0006	.1328
33	1.0263	.0000	-.0263	.9613	.0000	.0387
34-38	.8037	.0000	.1962	.8767	.0008	.1224
Total	.9527	.0084	.0387	1.0220	.0045	-.0265

Source: See Appendix A; the methodology for the growth source calculation is adapted from H. Chenery, "Pattern of Industrial Growth" American Economic Review, September, 1960, pp. 624-54, and S. Lewis and R. Seligo, "Growth and Structural Change in Pakistan's Manufacturing Industry, 1954-64," Pakistan Development Review, Spring 1965, pp. 94-139.

TABLE IV  
Part B

Sources of Growth

ISIC No.	<u>1953 - 58</u>			<u>1958 - 63</u>		
	<u>Domestic Demand</u>	<u>Exports</u>	<u>Import Substitution</u>	<u>Domestic Demand</u>	<u>Exports</u>	<u>Import Substitution</u>
	$\frac{X_3}{Z_3} \cdot \Delta(D+W)$ $\Delta X$	$\frac{X_3}{Z_3} (\Delta E)$ $\Delta X$	$\frac{(X_4 - X_3)}{(Z_4 - Z_3)} Z_4$ $\Delta X$	$\frac{X_4}{Z_4} \cdot \Delta(D+W)$ $\Delta X$	$\frac{X_4}{Z_4} (\Delta E)$ $\Delta X$	$\frac{(X_5 - X_4)}{(Z_5 - Z_4)} Z_5$ $\Delta X$
Consumer goods	.9417	.0270	.0322	.9902	.0117	-.0019
20-22	.9181	.0405	.0416	.9879	.0154	-.0033
24	.9995	.0000	.0006	1.0000	.0000	.0000
25-26	.9903	-.0006	.0104	.9944	.0056	.0000
28	1.0080	.0000	-.0084	.9912	.0000	.0088
29	.9745	-.0062	.0317	1.0000	.0000	.0000
Intermediate goods	.9311	.0270	.0400	.9227	.0119	.0654
23	.9202	.0445	.0353	.9811	.0231	-.0042
27	.9659	-.0003	.0345	.9003	.0000	.0994
30	.9941	-.0001	.0060	1.0284	.0017	-.0303
31-32	.8329	.0204	.1468	.8497	.0081	.1423
Investment and Related goods	.8429	.0028	.1544	.9105	.0018	.0877
33	.8859	.0000	.1141	1.0278	.0000	-.0277
34-38	.7819	.0034	.2156	.8880	.0020	.1097
Total	.9403	.0185	.0413	.9467	.0082	.0447

Source: Ibid., Table IV, Part A

V. An Evaluation of the Industrialization

This section attempts to provide a stylized synthesis of the Brazilian industrialization. Previous authors have emphasized the key roles played by inflation, exchange control, inter-industry linkages, and the terms of trade. Their assessment of the process by which these variables operated on the economy, however, often has been vague and inaccurate. Previous studies have differed also in their assessment of the success of the industrialization. For instance, industrial growth has been characterized as both balanced (Baer) and unbalanced (Furtado); choices made by the government have been evaluated as good, though relatively unplanned (Baer), and as poor (Furtado), etc. In what follows, these and other aspects of the industrialization are analyzed.

After 1953 the government was the central force behind the industrialization. During the early postwar years the government greatly influenced the course of events also, but much less comprehensively and successfully. Only after the exchange control system was drastically improved in October 1953 and large-scale financing of industrial activities commenced did the manufacturing sector begin its 'take off'. Table V demonstrates the power which the government exercised during these years. The placement of an import in either the favored or the penalty category determined the viability of all import-competing domestic activities. Favored sectors could import capital and intermediate goods at one-fifth to one-sixth the exchange cost of other sectors. The former also received absolute protection from foreign competitors. A second major weapon of the authorities was control of finance capital. Loans of the monetary authorities and the National Development Bank rose

continuously in real terms, and up to 1959 were equivalent in amount to 'total' private fixed capital investment in industry. Other sources of funds for long-term investments were comparatively insignificant. Commercial banks typically loaned short-term and the capital market was too underdeveloped to provide funds on any scale. Retained earnings, on the other hand, were fairly small until 1959. Finally, the government became an increasingly important direct investor. By 1962, new government fixed investment surpassed that of the private sector. In the last two columns of Table VI are shown the non-inflationary sources of government expenditure.

Two facts are prominent in the context of industrial growth and import substitution in Brazil. First, between 1953 and 1958 both the rate of growth and import substitution as a source of growth were high and reasonably well apportioned among all manufacturing sectors (see Tables I and IV). Second, after 1958 this balance was lost and rapid growth and substitution were confined to several industries--metals, machinery and transport equipment, and in chemicals and paper industries (see Table IV). These facts tend to contradict the notion that the impetus of industrialization was lost as soon as the terms of trade turned against Brazil in 1954 (Furtado), or only when social imbalances and political uncertainties arose in the early 1960's (Baer). Only after 1958 did there arise excess capacity in some sectors (textiles, household appliances, transport materials and light equipment) and under capacity in others (basic metallurgical, chemicals, rubber and paper).<sup>30</sup>

In my opinion, these developments were not primarily a consequence of either reduced price-wage lags or the worsening external terms of trade. Price-wage lags

per se have never been demonstrably important. The data do not reveal a price-wage lag. As Baer notes, however, since taxes were very regressive and rising, sizable income transfers could have occurred. This hypothesis cannot be tested since data on tax incidence and regressivity are unavailable. In Appendix B, an indirect test under various assumptions show that the data are inconsistent with the notion that regressivity led to transfers which significantly raised the saving rate. Given that the savings coefficient did not increase in Brazil despite rapidly rising income, either the redistribution effect was small or entrepreneurs' marginal savings rates were little higher than the wage and salary earner's; or alternatively other unidentified factors reduced transfers/savings. One decisive point is undisputed--the government financed industry in an amount equivalent to total fixed capital formation in industry between 1953 and 1958 (Table VI). Although industry's use of these funds is indeterminant, it is clear that they constituted an important source of subsidized financing alternative to saving out of current profits. Firms financed so generously may well have reduced saving out of profits, which would help explain the absence of a rising saving coefficient for the economy. <sup>31</sup>

An alternative explanation of the rise and fall of industrialization in Brazil might go as follows: the manufacturing sector responded strongly to the various incentives provided by the government through the exchange system which greatly raised the marginal efficiency of investment. The inflation essentially operated so as to transfer resources from other sectors of the economy to the government; in turn the government lent these resources to favored industrial sectors. Although price-wage lags per se were unimportant, domestic infant industries profitably expanded. These firms--oligopolists and monopolists with a protected

domestic market--received government loan subsidies which averaged from 20 to 30 per cent of total industrial profits (to the favored industries much more).<sup>32</sup>

Only by the late 1950's did unfavorable factors appear. The first of these was the not unnatural phenomenon of rising costs in the subsidized sectors. As the industrialization widened, the original infant industries had to purchase more and more inputs from new high cost infants. These later protected infants were often unreliable in meeting quotas, deadlines, and specifications.<sup>33</sup> The older industries tried to offset the threat to their price-cost structures through verticle integration, but this was a palliative for the firm and not the economy. Second, incomes began to be redirected to the formerly neglected, penalized sectors (agriculture and wage earners). This redistribution operated partly through normal market forces. For instance, productivity in the primary sector tended to suffer as a consequence of its relative unprofitability. As production lagged, and could not be offset by larger imports, primary product prices began to rise. Also, as prices of wage goods began to rise, workers were able to demand and receive higher wages. The interplay of these forces--urbanization, rising incomes, and relatively constant productivity in the primary sector--greatly reduced the amount of resources which could be transferred to industry. By 1958, government transfers to industry were increasingly offset by the intersectoral shift in the terms of trade.<sup>34</sup> Efforts to neutralize this development through price controls and export restrictions on primary products were unsuccessful.<sup>35</sup> Instead, these measures mainly reduced the capacity to import and drove up the exchange price of imports.<sup>36</sup>

Partly because of the above circumstances, the government shifted its efforts toward large-scale substitution in the automotive sector. Through numerous inducements, foreign and domestic investors increased the domestic coefficient of

TABLE V

Indicators of Government Influence on Industry

	<u>Exchange Rates For:</u> (cr.'s per US \$)			<u>Loans to Industry by:</u> (bil.'s of 1949 cr.'s)		<u>Private Industry's</u> (bil.'s of 1949 cr.'s)		<u>Government's:</u> (bil.'s of 1949 cr.'s)		
	(1)*	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Favored Imports	Penalty Imports	Total Imports	Monetary Authorities	BNDE	Fixed Investment	Retained Earnings	Fixed Investment	Exchange Revenue	Other Revenue
1953	40	195	49	10	.8	12.	5.5	9.1		41.7
1954	55	200	62	12.3	.8	13.	7.3	10.4	3.0	47.7
1955	55	340	114	12.3	.8	11.	7.3	9.6	-.1	46.0
1956	70	320	112	12.2	.8	13.	6.7	9.2	3.7	47.2
1957	70	310	88	13.5	.6	14.	6.4	14.5	4.4	51.6
1958	80	360	152	14.5	1.5	19.	9.6	18.1	4.0	62.7
1959	120	320	203	13.3	.9	21.	14.0	17.6	.7	68.3
1960	120	450	228	13.2	1.9	30.	20.2	20.7	10.5	81.4
1961	120	620	240	14.0	.9	27.		20.7		73.1
1962				16.6	.3	24.		25.5		70.0

- \* (1) 'Cost of exchange' plus official rate as of Aug. 1, of each year.  
 (2) Category V plus official rate as of Aug. 1 between 1953 and 1957; special category rate plus official rate between 1958 and 1961.  
 (3) Weighted average exchange rate plus official rate. Tariffs became important after 1957, but are not included because of data unavailability.  
 (4) to (10) in 1949 prices; G.N.P. deflator.  
 (6) Sectoral investment data are not available for Brazil. Therefore from total investment, industrial investment had to be estimated by assuming that its incremental capital output ratio was fifty per cent higher than the ICOR for the entire economy. This assumption is consistent with industrial ICOR's found in other industrializing economies.  
 (7) Retained earnings in industry were estimated by deducting the commercial sector's share of total retained earnings by its weighted share of product.  
 (9) Net of exchange earnings used to purchase coffee.

Source: Columns (1) - (3) Banco de Brasil; (4), (5) & (9) calculated from Boletim Superintendencia de Moedas e Credito, July 1966; (6), (7), (8), and (10), Revista Brasileira de Economia,



total supply of motor vehicles from about .42 in 1958 to .98 in 1963.<sup>37</sup> These coefficients overstate the extent of import substitution, however. Imports of accessories increased in value roughly in proportion to motor vehicle production; moreover (backward linked) supplying industries, e.g., iron and steel, machines and equipment, rubber, etc., required higher imports in order to meet automotive demand. In addition, the massive push in motor vehicles may have entailed high social costs. Government switching of financial and foreign exchange resources from the more traditional and early infants to motor vehicles and related industries caught the former sectors in a debilitating squeeze which was accentuated after 1957 by the worsening domestic terms of trade (see Table V and Fn. 34). The much greater availability of passenger autos after 1958 (comprising about half of vehicle production)<sup>38</sup> diminished domestic demand for products of industries unlinked to the newly favored industries. Since many of these unfavored sectors already had excess capacity, reduced demand for their products resulted in lower growth rates; the wisdom of making available and subsidizing passenger autos in partial substitution for the products of the neglected sectors seems questionable in terms of both consumption and foreign exchange use.<sup>39</sup> Finally, the substitution for imports of domestically produced tractors and other primary sector inputs did not tend to reduce costs and increase agricultural productivity.<sup>40</sup> Therefore, cost-push inflation and dualism were aggravated.

In retrospect, the new industrialization strategy in 1957-58 had high opportunity costs. If policy had been focused instead on removing disincentives in the agricultural and export sectors, while retaining the incentives earlier given to a broad spectrum of manufacturing industries, the post-1962 stagnation, as well as increasing unemployment and underemployment, might have been averted. The

industrialization had many anti-employment biases, some of which were natural given the greater productivity of capital-intensive techniques in many lines. The fact that substitution and rapid expansion were centered in capital and intermediate goods after 1952 also meant that the industrialization would be skewed toward capital-intensive factor proportion. But capital intensive factor use was unnecessarily encouraged in two ways: 1) import subsidies excluded labor (a non-traded good internationally) and were not offset by domestic subsidies for labor use; 2) sectors favored by the government, especially after 1957-58, tended to have higher capital/labor ratios than other manufacturing industries though not noticeably higher productivity. Although the anti-employment biases of these developments might have been offset if the production and incomes created had caused a heightened demand for high productivity services and primary products, the contrary seems to have occurred. While labor force growth in services more than doubled that of industry, productivity in the former sector actually declined between 1950-60; agricultural workers fared little better.<sup>41</sup> The data (admittedly incomplete) indicate that the factor share of labor fell over time; and along with it the distribution of income probably became more unequal.<sup>42</sup> In welfare terms, these findings imply that the fruits of rapid GNP growth and industrialization in the Brazilian instance may well have bypassed the unskilled, working-age masses. It is particularly in this sense that the economic events of the postwar years in Brazil have been so disappointing.

## VI. Conclusions

The empirical findings of this paper have dispelled some of the vague and contradictory assertions regarding the Brazilian industrialization. However, the present study has also found it necessary to go beyond what can be firmly

established empirically. Any reasonably complete evaluation and interpretation of the import-substitution industrialization in Brazil must be somewhat speculative and intuitive, for there are as yet no means available for accessing completely the incentives and disincentives provided by the government. Nor can either the size of intersectoral transfers or the long run dynamic comparative advantage of the industries artificially created be measured.

Although only more reliable and extensive data will clarify many specific issues, the necessary condition for increased long-run social welfare in Brazil will most probably be radical reform in the primary sector, rather than heavily subsidized import-substitution industrialization. The present government is apparently aware of the many complex problems which it faces--growing unemployment and underemployment especially in the urban centers for unskilled labor, inequitable income distribution, and low productivity agriculture. Whether it will have the political courage and means with which to implement the basic reforms which will necessarily be unpopular with powerful landed and industrial oligarchs is another question. Up to now, the increased welfare of 'os povos' has been only an incidental byproduct of the industrialization with meagre results. To remedy both the poverty and the fragmented nature of the economy, however, may well require decisions which are innovative and revolutionary in character.

## Footnotes

<sup>1</sup>Population migration into the south-central regions has been estimated at over 5 per cent annually for the 1950-60 decade. Industrial labor growth has been only 2.5 per cent annually during the same period despite a product growth of almost 9 per cent annually. Source: Calculated from census data 1950 and 1960.

<sup>2</sup>Most of the migrants have found employment in petty services. Employment growth in services was 5.2 per cent annually between 1950 and 1960 although real product growth in the services sector was only about 5 per cent. The inactive to working-age population ratio rose during the period. Source: Ibid

<sup>3</sup>Cf. Werner Baer, Industrialization and Economic Development in Brazil Irwin Inc. (Homewood, Illinois) 1965; Celso Furtado, Diagnosis of the Brazilian Crisis, University of California Press (Berkeley and Los Angeles) 1966; United Nations, "Fifteen Years of Economic Policy in Brazil" Economic Bulletin for Latin America, Vol. IX, No. 2, Nov. 1964, pp. 153-215; United Nations "The Growth and Decline of Import Substitution in Brazil," Economic Bulletin for Latin America, Vol. IX, No. 1, March 1964, pp. 1-61.

<sup>4</sup>The studies in note 3 all generally agree on this model.

<sup>5</sup>Op. cit., pp. 193-201.

<sup>6</sup>Celso Furtado, "Political Obstacles to Economic Growth in Brazil," International Affairs, April, 1965.

<sup>7</sup>"The whole problem...lies in the fact that the restrictions in absolute terms should not last too long," United Nations, op. cit., March 1964, p. 51.

<sup>8</sup>Op. cit., pp. 255-256.

<sup>9</sup>Celso Furtado, Diagnosis of the Brazilian Crisis, op. cit., p. 101.

<sup>10</sup>Ibid., p. 103.

<sup>11</sup>Ibid., p. 104.

<sup>12</sup>Cf. Verner Baer, Industrialization and Economic Development in Brazil, op. cit., p. 115.

<sup>13</sup>Celso Furtado, Diagnosis of the Brazilian Crisis, op. cit., p. 107.

<sup>14</sup>Ibid., p. 149.

<sup>15</sup>Ibid., p. 149.

<sup>16</sup>Celso Furtado, "Political Obstacles to Economic Growth in Brazil," op. cit., p. 255.

<sup>17</sup>Ibid., p. 255.

<sup>18</sup>United Nations, "The Growth and Decline of Import Substitution in Brazil," Economic Bulletin for Latin America, Vol. IX, No. 1, March 1964. Op. cit., p. 51.

<sup>19</sup>Ibid., p. 57.

<sup>20</sup>Ibid., p. 57.

<sup>21</sup>Hollis Chenery, "Patterns of Industrial Growth," American Economic Review, September, 1966, pp. 624-634.

<sup>22</sup>Stephen R. Lewis, Jr., and Ronald Soligo, "Growth and Structural Change in Pakistan's Manufacturing Industry, 1954-1964," The Pakistan Development Review, Vol. V, No. 1, Spring 1965, pp. 94-139.

<sup>23</sup>Cf. Donald Huddle, "Balances de Pagamentos e Controles de Cambio no Brasil." Revista Brasileira de Economia, Fundacao Getulio Vargas, Marco 1964, pp. 6-40.

<sup>24</sup>The minimum wage more than doubled in January 1952. Source: Anuario Estatistico, IBGE, 1962.

<sup>25</sup>Wholesale prices increases fluctuated from 25 per cent in 1953 to 3 per cent in 1957. Cost of living increases were less volatile and slightly higher than wholesale price increases. Data source: Conjuntura Economica, March 1964.

<sup>26</sup>The Superintendency of Money and Credit issued Instruction 113 in early 1955. Under it, a foreign investor could import equipment by accepting payment in the form of a capital participation in the importing firm for favored industries.

<sup>27</sup>Both Baer and Furtado, op. cit., discuss these developments.

<sup>28</sup>The Economic Commission for Latin America, op. cit., stresses the great degree of import substitution accomplished in all but the "very" capital intensive industries. However, evidence regarding the capital intensity of remaining industrial activities capable of substitution is unclear.

<sup>29</sup>Earlier import substitution processes for western countries are interestingly discussed in Alexander Gerschenkron, Economic Backwardness in Historical Perspective, Harvard Press, 1962. Import substitution in Pakistan is discussed, Lewis and Soligo, op. cit., cf. the Argentine case in Carlos Diaz Alejandro, Exchange-Rate Devaluation in a Semi-Industrialized Country, M.I.T. Press, 1966.

<sup>30</sup>Cf. Economic Commission for Latin America, "The Growth and..." op. cit., p. 52.

<sup>31</sup>The savings coefficient actually fell slightly between 1947-48 and 1957-58 and then increased by 1962-63. Over-all there was no apparent upward trend. Source: Revista, op. cit., Fundação Getulio Vargas.

<sup>32</sup>Loan subsidies were calculated by assuming that the market interest rate would have exceeded the observed rate of price increase (implicit deflator) by twelve per cent. The actual interest rate of B.M.E.C. and the monetary authorities which varied from ten to fourteen per cent was subtracted from the assumed market rate and the resulting figure was multiplied by total loans to get the subsidy figure. Subsidies were cr. 2.45 bil. in 1953 and cr. 7164 bil. in 1958. Imputed industry profits were cr. .9 bil. in 1953 and cr. 38.9 bil. in 1958.

<sup>33</sup>Cf. L. Gordon and E. Grommer, United States Manufacturing Investment in Brazil, Harvard University, 1962, which discusses many difficulties of U.S. firms in obtaining inputs in terms of price, quality and delivery dates.

<sup>34</sup>The terms of trade between agriculture and industry were almost constant between 1948 and 1954. They began to rise slightly in favor of agriculture up to 1958 and then turned precipitously against industry (117 to 138 between the years 1958 and 1962 from an index of 100 in 1953). Source: Plano Trienal, Presidencia Da Republica, (Rio de Janeiro, 1963) and Conjuntura Economica: op. cit., May 1965.

<sup>35</sup> Cf. M. S. Simonsen, Os Controles de Preços na Economia Brasileira, CONSULTEC (Rio de Janeiro, 1961).

<sup>36</sup> Restrictions could be used to prevent the export of any primary commodity deemed to be in short supply domestically. Outright prohibitions were not common, but the possibility of prohibition probably directed the attempt of exporters away from foreign markets.

<sup>37</sup> Calculated from value data in Gordon and Grommers, op. cit., p. 63 and Anuario Estatístico, IBGE (Rio de Janeiro), various dates.

<sup>38</sup> Calculated from: Gordon and Grommers, op. cit., p. 62.

<sup>39</sup> The concepts of social essentiality is rather subjective, but I would expect passenger autos to be less essential to the population at large than foods, clothing, and housing. Government subsidies to the former would be difficult to justify.

<sup>40</sup> Apparently, fewer tractors were available after the large-scale substitution than even a decade earlier. IBGE, op. cit., various issues.

<sup>41</sup> Labor force growth was slightly higher than product growth in service (5.2 per cent p.a. versus 5.1 per cent p.a.) between 1950 and 1960.

Source: census data.

Labor productivity increased in agriculture, but it is well known that agricultural labor still receives far less than the minimum wage in most areas. The minimum wage multiplied by the number of workers in the sector exceeds the total product by a wide margin. The plight of wage labor in rural regions is well drawn in: Celso Furtado, Diagnosis...op. cit.; and Robert Alexander Labor Relations in Argentina, Brazil, and Chile, McGraw Hill, 1962.



<sup>42</sup> Both the wage share in total value added (industry) and the ratio of workers remuneration to total profits began to fall during the 1950's after having risen in the late 1940's.

Source: Data from Fundaco Getulio Vargas, "Contas Nacionais do Brasil", Revista Brasileira de Economia, Marco 1962.

Appendix A

Tables II - V

1. Data on value added and gross output for the years 1939-1958 were taken from United Nations, The Growth of World Industry, 1939-1961, Tables 4.C (p. 73) and 6 (p. 78); 1963 data was taken from IBGE/Conselho Nacional de Estatística Anuario Estatístico Do Brasil, 1966, Rio de Janeiro (p. 130). Gross output data was also taken from G. Loeb, Industrialization and Balanced Growth, Walters/Groningen, 1957, p. 91.

Data on Foreign Trade were computed from United Nations, Yearbook of International Trade Statistics, various years, and Anuario Estatístico Do Brasil, various dates.

2. Imports and exports were converted from U.S. dollars into cruzeiros by using the ratio of manufacturing prices in Brazil relative to those in the United States beginning from the base year of 1939. General wholesale prices had to be used as a basis for computation, however, prior to 1953 due to the unavailability of manufacturing price data. The data source was United Nations, Yearbook of International Trade Statistics, various dates.

3. The above method of conversion is believed to be more satisfactory than that followed by Chenery and others who converted all domestic production into U.S. dollars at official exchange rates. In Brazil the latter rates were typically either overvalued or unrepresentative due to multiple exchange rates.

4. Domestic production for individual sectors was in all instances defined as gross output. But although gross output and value added grew at disparate rates, the use of value added would not change our major findings.

5. The caveat which applies to this as well as other quantitative studies of industrialization relates to the unreliability and coverage of data on manufacturing industry. Coverage is limited first to firms of five or more employees. Thus, even during a census year significant amounts of production are excluded from measured output. Moreover, except during census years (every decade in Brazil) data on industrial production is derived from only a sample of firms (8060 of 40,790 total estimated in the year 1963). The reliability of the data for even the covered firms is open to serious question. However, since alternative means of estimation do not exist, the data must be used although not without attaching to the results an error coefficient perhaps as high as +25 per cent. The best general discussion of Brazilian income and product statistics is found in Baer.

#### Appendix B

##### Redistribution Effects of Inflation in Brazil

To test the frequently postulated assertion that post-tax income was redistributed from consuming to entrepreneurial classes in Brazil, a simple model is developed here which relates an increase in indirect taxes with an increase in saving. Let

$$(1) S_t = S_c + S_e$$

where  $S_t$  is total saving,  $S_e$  is entrepreneurial saving, and  $S_c$  is consumer saving.

$$(2) S_c = (1-a) (cY - dTi)$$

where for the consuming classes after tax saving is determined by  $a$  (the average propensity to consume),  $c$  (the proportion of GNP which it receives) and  $d$  (the proportion of indirect tax,  $Ti$ ).

$$(3) S_e = (1-b) [(1-c) Y] + dTi$$

where for the entrepreneurial class  $b$  is the average propensity to consume and  $dTi$  is assumed to be completely saved by the government. Therefore

$$(4) S_t = (1-a) (cY - dTi) + (1-b) [(1-c) Y] + dTi$$

Values for the variables based on Brazilian data are inserted as follows:  $a = .9$ ,  $b = .7$ ,  $c = .7$ , and  $Y = 100$ .  $Y$  is chosen for convenience.  $c$  was the actual share of consumer classes. Values for  $a$  and  $b$  were derived from a set of simultaneous equations which would yield a propensity to save for the consuming class one-third of that of the entrepreneurial class to approximate Joutnabber's findings. These values were also designed to yield the rate of saving achieved by Brazil. Two values were selected for  $d$ , one which would place the indirect tax burden equally among the saving and consuming classes (.50) and one (.67) which would reflect regressive incidence. The beginning year value of  $Ti$  was 10 and the end value 15, both of which correspond to indirect taxes in the years 1950 and 1960.

The results are rather surprising. The fifty per cent increase in indirect taxes leads to an increase in total saving as a percentage of GNP of only three per cent if  $d = .67$  and only 2.25 per cent if  $d = .5$ .

Thus, even for these relatively favorable values for the variables, the increase in saving is small, and would be smaller still if the acknowledged pre-tax income shift over these years to wage earners had been included.

It is therefore perhaps not surprising that despite the numerous arguments concerning wage lags and regressive indirect taxes, neither marginal nor total savings rose in Brazil during the postwar years. Indirectly, these findings support the hypothesis that entrepreneurial classes had a not much higher propensity to save than did the consuming classes.