IMPORT SUBSTITUTION AND INDUSTRIALIZATION IN BRAZIL[1]

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We shall analyze some aspects of the industrialization policies followed by the Brazilian government in the post-World War II period. We shall concentrate on the effects upon the structure of the economy, the rate of growth, and the performance of the principal new industries.

Let us state what we understand to be the realms of discourse comparative cost and development theorists are engaged in. The former are concerned principally with questions related to the structure of international trade and the relative efficiences of those industries in which various countries are specialized. The latter's concern is chiefly with the maximization of the rate of growth and their analysis runs mainly in terms of the rate of investment, changes in the economy's structure, and "linkages" of industries in which investments were at first concentrated. The former is concerned with the maximization of world production, consumption, and trade in a static setting, while the latter is concerned with the maximization of growth of a limited area.

Inevitability of Industrialization

Brazil's industrialization should be viewed against a background of declining earnings of its traditional exports, which consist principally of coffee, cocoa, sugar, and cotton. From the long-term trends in world trade, it would seem that these commodities are not among those which have a bright future. A glance at Table 1 should make it clear that primary goods, in general, and food and agricultural raw materials, in particular, have steadily lost in relative importance in world trade. Part B) of the table indicates that world imports and the imports of industrial countries from nonindustrial countries have been shrinking considerably, much of this shrinkage being due to the decline of the relative share of Latin America.[2]

Further evidence of the dim outlook for the exports of primary producing countries and their continued reliance on specialization in those goods has recently been shown by the U. N. *World Economic Survey, 1962*. The following estimates were obtained for the income

[1] The analysis of this paper will be concerned mainly with events up to and including 1961. We believe that the economic difficulties since then are due to the political crises and not to the past industrialization policies.

[2] This decline would have been even greater had petroleum and petroleum products been excluded.

TABLE 1

CHANGES IN THE STRUCTURE OF WORLD TRADE

A. World Exports of Merchandise
(Percentage Distribution at Current Prices)

	World			World Excluding Iron Curtain Countries	
	1913	1929	1937	1913	1953
Food	29.0	26.1	24.8	27.0	22.6
Agricultural raw materials	21.1	20.0	19.5	20.7	13.9
Minerals	14.0	15.8	19.5	14.7	19.8
Manufactures	35.9	38.1	36.2	37.6	43.7
	100.0	100.0	100.0	100.0	100.0

SOURCE: Lamartine P.Yates, *Forty Years of Foreign Trade* (London: George Allen & Unwin, Ltd., 1959).

	1948	1953	1958
Primary goods	55.5	51.0	48.2
Manufactured goods	44.5	49.0	51.8
	100.0	100.0	100.0

SOURCE: Joseph D. Coppock, *International Economic Instability: The Experience After World War II* (McGraw-Hill Book Co., 1962).

B. World Imports by Geographical Areas
(Percentage Distribution)

Imports from→ to ↓	Nonindustrial Areas			Latin America		
	1953	1960	1961	1953	1960	1961
Industrial Areas (excluding Eastern Europe, including Japan)	37.4	28.3	27.1	12.9	8.7	8.0
World	31.5	24.8	24.3	9.8	6.8	6.5

SOURCE: GATT, *International Trade* (1961).

elasticity of imports of the industrially advanced countries from the developing countries:[3]

[3] "These estimates were derived from regression of gross domestic product of the industrially developed countries on imports of each commodity group from the developing countries. The sample covers the period 1953–1960." U.N. *World Economic Survey, 1962*, p. 1. "The Developing Countries in World Trade," p. 6. In the case of coffee, Brazil's chief export product, a study has shown the existence of low price and income elasticity in the U.S. It was found that an increase of 10 per cent in the price of coffee resulted in a 2.5 per cent reduction of consumption, while an increase of 10 per cent in real consumers' income resulted in a 2.5 per cent increase in coffee consumption (see Rex F. Daly, "Coffee Consumption and Prices in the United States," *Agric. Econ. Res.*, July, 1958).

Commodity Group	*Income Elasticity*
Foodstuffs (SITC groups 0 and 1)	0.76
Agricultural raw materials and ores (SITC groups 2 and 4)	0.60
Fuels (SITC group 3)	(1.40)
Manufactured goods (SITC groups 5 to 8)	1.24

It is also well known that consumption of raw materials by the industries of industrial countries tends to increase at a slower rate than production due to more efficient techniques and the development of synthetics. It is in this context that one should view the industrialization of Brazil.

Although Brazil came out of the second World War with substantial amounts of foreign exchange reserves, these vanished within one year in an import spurt, a large proportion of which consisted of consumer goods. Thereafter, direct controls were instituted, mainly exchange controls, which continued in one form or another until the present time. Even though the terms of trade became increasingly favorable up to 1954, the import needs of the country increased to such an extent, due to the government's development aims, that controls had to continue. And, despite the fact that the present terms of trade are still above those of the immediate postwar period, there has been a basic agreement among policy-makers that import-substituting industrialization was absolutely necessary to achieve a high rate of growth. The need for continued high rates of growth has become especially acute in the 1960's because of increasing population pressure. The population growth rate already increased from an average of 2.4 percent per year in the decade of the 1940's to over 3 percent in the 1950's.

Industrialization Policies

Prior to the postwar era, Brazil did not pursue a systematic industrialization policy. The industrialization which did take place was always a by-product of external crises which limited the supply of imports, such as the two World Wars and the depression. The post-World War II industrialization spurt also began as a measure for coping with external difficulties rather than as a measure to actively protect and promote import-competing industries. The import licensing system from 1947 to 1953, the multiple exchange rate system from 1953 to 1957, and the modified system prevailing since that time only slowly became conscious instruments for the active promotion of an industrial complex.

Although critics at first claimed that these direct trade control measures offered protection to "nonessential" consumer goods industries rather than to industries of a more basic nature, a number of additional measures adopted in the 1950's, when policy-makers shifted the em-

phasis from mere balance-of-payments defense to active industrialization promotion, served to encourage a simultaneous development of the more basic industries.

In early 1955 a decree was issued by the central bank authorities (SUMOC[4] Instruction 113) which enabled foreign investors to import capital equipment without the need for exchange cover, if the investment was deemed desirable by the authorities for the development of the country. This was a great stimulus to the inflow of foreign capital, much of it directed into industries considered basic, like motor vehicles, steel, etc.

Brazil also made use of an old legal tool which was revised during the 1950's, the so-called "law of similars." Already before the first World War Brazilian manufacturers who were producing or intended to produce goods similar to the ones imported could apply for protection. In the 1950's the registration of a product as a "similar" became the basis for a substantial amount of tariff protection and for placing it in a high and protective exchange rate category.[5] The exact definition of a "sufficient quality and quantity" necessary to warrant the application of this law was left rather flexible, and it seems to have been applied in such a way as to encourage a substantial amount of vertical integration, either within firms or within the country by the emergence of supplying firms. Due to fear of outright exclusion from the market, foreign firms would often establish industries supplying the products needed by their initial plants, but the law also stimulated much local capital to establish supplying firms. It could thus be claimed that even if the protective devices used by the government stimulated industries of a nonessential nature, complementary policies provided substantial incentives for vertical integration and thus for the ultimate establishment of a "productive base."

The government, however, adopted further means to stimulate basic industries more directly. In the second World War it built a big steel complex at Volta Redonda with international financing. Also, in the 1950's a development bank was set up whose purpose was to finance certain infrastructure projects and certain key private and government enterprises in fields deemed essential by the government, such as iron and steel, chemicals, transport equipment, and machinery.

Effects of Industrialization Policies

The high rate of real growth experienced by the Brazilian economy in the postwar period (see Table 2), and especially in the 1950's, can in

[4] Superintendency of Money and Credit.

[5] Lincoln Gordon and Engelbert L. Grommers, *United States Manufacturing Investment in Brazil: The Impact of Brazilian Government Policies 1946–1960* (Div. of Res., Grad. Sch. of Bus. Admin., Harvard Univ., 1962).

TABLE 2

INDICATORS OF BRAZIL'S GROWTH AND FOREIGN POSITION

	Fixed Investments / GNP (percentages)	Rate of Real Growth	Terms of Trade (1953 = 100)	Export Quantum (1953 = 100)	Balance of Payments: Current Account Balance (Millions of U.S. $)	Foreign Direct Investment (Millions of U.S. $)
1947.....	17	1.8	45	127	n.a.	n.a.
1948.....	16	9.5	44	131	n.a.	n.a.
1949.....	15	5.6	53	117	n.a.	n.a.
1950.....	13	5.0	93	102	+104	28
1951.....	16	5.1	95	109	−470	70
1952.....	16	5.6	90	90	−709	118
1953.....	13	3.2	100	100	+ 17	109
1954.....	17	7.7	134	86	−235	75
1955.....	14	6.8	118	100	− 34	109
1956.....	13	1.9	113	108	+ 7	248
1957.....	13	6.9	117	100	−299	356
1958.....	14	6.6	119	96	−266	230
1959.....	16	7.3	109	117	−311	214
1960.....	15	6.3	101	118	−509	137
1961.....	n.a.	7.7	97	128	−241	169
1962.....	n.a.	4.1*	88*	114*	n.a.	n.a.

* Preliminary Estimates.

SOURCES: Fundação Getulio Vargas, *Conjuntura Economica* and *Revista Brasileira de Economia*, Marco, 1962; SUMOC, *Boletin*, Maio, 1963.

large part be attributed to the industrialization policies. This is clearly indicated by the different sectoral growth rates. While the real product increased by 128 percent from 1947 to 1961, the real agricultural product increased by only 87 percent; the industrial product, however, increased by 262 percent. For the absolute increase of GNP between 1947 and 1961, agriculture was responsible for only 18 percent, while the nonagricultural sector contributed the rest. The key element here was the direct and indirect effects of the more than tripling of the industrial sector. All this is re-enforced when one considers the decline of earnings from agricultural exports during most of the decade of the 1950's. It should be noted that the fixed investment proportion was relatively low during the entire period under review, averaging 15 percent, which implies a low capital-output ratio. We shall have some more comments on this phenomenon in a later section of the paper.

Due to the high import content of investment, the investment proportion was correlated with the balance-of-payments deficit. Especially during the latter part of the period examined, the investment coefficient was maintained by a substantial inflow of private foreign capital.

One indication of the transformation of the economy resulting from these developments is the change in the income distribution by branches

of activity. As measured at 1947 constant prices, the share of agriculture in the net domestic product declined from 27 percent in 1947 to 22 percent in 1961, while industry increased from 21 percent to 34 percent in the same period.

An examination of changes in the structure of the manufacturing sector must, of course, begin with a brief review of changes in the import structure. One important fact which should not be overlooked is the downward trend in the ratio of imports of goods and services to gross domestic product. A first glance at Table 3, which shows the changes in the commodity structure of imports, reveals an important decline in the share of processed goods from 86 to 68 percent between 1949 and 1962. A large share of the increased proportion of raw materials imported represents goods not available in sufficient quantities in Brazil, like crude petroleum, which were, however, of extreme importance to the new industries and for the continued overall growth of the economy.

The newly protected industries did not only represent activities in the last stages of the production process. As can be seen in Table 3, and as will be shown further on with different types of evidence, the newly emerging industrial structure was fairly well balanced both from a horizontal and a vertical point of view. Important items of import substitution can be noticed both from a decline in their share of total imports and in their decline in real terms in relation to the average of 1949–50 (see column 3). Important substitution also took place in items whose share did not change or even went up, and whose real amounts of imports rose because these increases were all substantially less than the increase of industrial production which more than tripled. (This is re-enforced when we realize that for only three categories imports rose by more than real GNP, which doubled in the period.)

Table 4 shows changes in the structure of Brazil's industry according to the proportional distribution by gross value added and by workers employed between 1950 and 1960. It can be seen that the traditional industries of textiles, food products, and clothing have suffered declines in relative position, while the most pronounced growth took place in such key import-substituting industries as transport equipment, machinery, electric machinery and appliances, and chemicals. It is interesting to note that for the traditional industries there has been a greater relative decline in gross value added than in workers employed, while for many new industries the increase in gross value added was greater than the increase of workers employed. This is a reflection of the greater labor intensity of the more traditional industries as compared to the newer ones.

TABLE 3

CHANGES IN BRAZIL'S COMMODITY IMPORT STRUCTURE*

(Percentage Distribution)

Commodity Groups	1949–50† (At Current Prices)	1962	Percentage Change of Imports in Constant 1949 U.S. Dollars Between 1949 and 1962
Nonmetallic mineral products	*2.1*	*1.3*	*−1*
Cement	1.1	—	−99
Basic metal industries and metal products	*11.2*	*11.6*	*+61*
Iron and steel	4.2	3.4	+27
Nonferrous metals	3.0	4.0	+108
Machinery	*18.3*	*13.0*	*+6*
Metal working machinery	7.0	7.6	+63
Other machinery	11.3	5.4	−29
Electric machinery and appliances	*6.5*	*6.3*	*+46*
Transport equipment	*14.5*	*10.2*	*+5*
Motor vehicles	9.1	2.4	−60
Other transport equipment	5.4	7.8	+112
Paper and paper products	*2.6*	*2.6*	*+55*
Chemicals and products	*21.8*	*18.0*	−0.3
Chemicals (proper)	19.7	17.1	+5
(Products of petroleum and coal)	(11.9)	(6.9)	(−43)
(Fertilizers)	(2.1)	(1.2)	(−14)
Medicinal and pharmaceutical preparations	2.1	0.8	−42
Textiles	*3.5*	*0.1*	*−89*
Processed food products	*1.9*	*3.0*	*+245*
Beverages	*0.4*	*0.2*	*+25*
Printing and publishing	*0.3*	*0.5*	*+320*
Miscellaneous	*2.5*	*1.2*	*−34*
Nonprocessed raw materials	*13.6*	*32.2*	*+45*
Total	*100.0*	*100.0*	
Change in industrial production			*+213*
Change in real GNP			*+105*

* The original data used were those expressed in current dollars.

† Average.

SOURCES: Serviço de Estatistica Economica e Financeira, *Comercio Exterior do Brasil*, several years. The basic data from this source were retabulated in order to make them comparable to the industrial census classification.

TABLE 4

SECTORAL DISTRIBUTION OF GROSS VALUE ADDED AND EMPLOYMENT IN BRAZIL
(Percentages)

	Gross Value Added		Employment	
	1950	1960	1950	1960
Nonmetallic minerals	7.2	6.7	9.7	9.7
Iron and steel and metal products	9.4	11.9	7.9	10.2
Machinery	2.1	3.5	1.9	3.3
Electrical machinery and appliances	1.6	3.9	1.1	3.0
Transport equipment	2.2	7.5	1.3	4.3
Wood and wood products	4.2	3.2	4.9	5.0
Furniture	2.2	2.2	2.8	3.6
Paper and paper products	2.2	3.0	1.9	2.4
Rubber and products	1.9	2.3	.8	1.0
Leather and products	1.3	1.1	1.5	1.5
Chemicals	5.3	8.7	3.7	4.1
Pharmaceuticals	2.8	2.5	1.1	.9
Perfumes, soap, candles	1.6	1.4	.8	.7
Plastic products	.3	.8	.2	.5
Textiles	19.6	12.0	27.4	20.6
Clothing, shoes, etc.	4.2	3.6	5.6	5.8
Food products	20.5	16.9	18.5	15.3
Beverages	4.4	2.9	2.9	2.1
Tobacco	1.4	1.3	1.3	.9
Printing and publishing	4.0	3.0	3.0	3.0
Miscellaneous	1.6	1.6	1.7	2.1
	100.0	100.0	100.0	100.0

SOURCE: IBGE, Recenceamento Geral do Brasil, 1960, *Censo Industrial.*

Measurement of Repercussions

To the development economist the important criteria of success of a development program based on import-substitution industrialization are the direct and indirect impacts which such a program will have.[6] In Table 5 we tried to measure the repercussion effects which resulted from the industrialization of Brazil in the 1950's.

Our approach was as follows: we classified all imports according to the industrial classification used by the Brazilian Industrial Census. We then chose those industry groups where there was the greatest amount of import substitution between 1949–50 and 1962, as measured by the percentage decline or increase in the constant (1949–50) dollar value of imports of each category. (A more direct measure of import substitution such as the ratio of imports to value of output plus imports was not used because as this paper is being written, the pertinent data of the 1960 Census are not yet available.)

Next, we calculated for the census years 1949 and 1959 the percent

[6] In developing this section we were influenced by the ideas of A. O. Hirschman, *The Strategy of Economic Development*, and P. N. Rasmussen, *Studies in Inter-Sectoral Relations* (Amsterdam: North-Holland Pub. Co., 1956).

TABLE 5

MEASURES OF DIRECT AND INDIRECT REPERCUSSIONS OF BRAZIL'S IMPORT SUBSTITUTION INDUSTRIALIZATION

	CHANGE OF SHARE OF TOTAL IMPORTS BETWEEN 1949-50 and 1962 (CONSTANT 1949-50 PRICES)	R*	CHANGE OF PERCENTAGE SHARE OF TOTAL BETWEEN 1949 AND 1959				BACKWARD LINKAGE	FORWARD LINKAGE	R*	RANKING OF TOTAL REPERCUSSIONS	
			Workers	R*	Gross Value Added	R*				A†	B†
1. Nonmetallic mineral products	−0.8	7.5	0.0	11	−0.5	11	0.89	0.78	11	12	12.5
Basic metal industries and metal products											
2. Iron and steel	−0.8	7.5	1.3	3	2.2	4	1.13	2.32	1	2.5	2
3. Nonferrous metals	1.0	11	0.1	10	0.2	9	1.17	1.65	2	8	7
4. Others	0.0	9.5	1.0	4	0.1	10	0.94	0.70	11	9	8.5
Machinery											
5. Metal working machinery	−0.4	5.5	0.8	5	0.6	7	0.95	0.58	13	7	8.5
6. Other machinery	−6.1	3	0.6	6.5	0.7	6	1.07	0.81	8	5	6
7. Electrical machinery and appliances	−0.4	5.5	1.9	2	2.3	3	1.06	0.67	9	4	3
Transport equipment											
8. Motor vehicles	−6.7	2	2.3	1	4.9	1	1.30	1.01	5	1	1
9. Other transport equipment	2.1	13	0.6	6.5	0.4	8	0.98	0.61	11	11	10
10. Paper and paper products	0.0	9.5	0.5	8	0.8	5	1.04	1.68	3.5	6	5
11. Chemicals and petroleum and coal products	−7.8	1	0.4	9	3.4	2	1.10	1.59	3.5	2.5	4
12. Textiles	−3.4	4	−6.8	13	−7.6	13	1.03	1.13	7	10	12.5
13. Food, beverages, and tobacco	1.1	12	−3.2	12	−3.6	12	1.27	0.91	6	13	11

* Ranking (ranking of ties were taken as corresponding to the average of ranks which they jointly occupy).

† A—includes import substitution ranking. B—excludes the latter.

SOURCES: Column 1 computed from data in *Commercio Exterior do Brasil;* columns 2 and 3 computed from IBGE, *Censo Industrial,* Brasil, 1950 and 1960; columns 4 and 5 computed from W. D. Evans, and Hoffenberg, "The Interindustry Relations Study for 1947," *Rev. of Econ. and Statis.* May 1959.

of the gross value added and total workers employed for each of these industries.

Using data from the 1947 input-output table of the United States, we computed the indexes of dispersion (backward linkage) and sensitivity to dispersion (forward linkage), using the following formulas:

$$U_j = \frac{\frac{1}{m} Z_j}{\frac{1}{m^2} \sum_{j=1}^{m} Z_j} \quad (j = 1, 2 \cdots m) \quad \text{and} \quad U_i = \frac{\frac{1}{m} Z_i}{\frac{1}{m^2} \sum_{i=1}^{m} Z_i} \quad (i = 1, 2, \cdots m)$$

where U_j = index of the power of dispersion, U_i = index of the sensitivity to dispersion, Z_j = sum of the row elements of the transposed inverse matrix, Z_i = sum of the column elements of the transposed inverse matrix, m = number of industries.[7]

The index U_j indicating the extent of the expansion induced by industry j in the economy as a whole corresponds to an estimate of what Hirschman called the "backward linkage effect." U_i indicates the extent to which industry i is affected by an expansion of the economy at large and is an estimate of the "forward linkage effect."[8]

We also made the same calculations for the main traditional industry groups: textiles, food, beverages, and tobacco. Due to the type of policy encouraging vertical integration, which we described above, we should not be too far off when assuming that the repercussion coefficients will work themselves out in the direction indicated and will not be substantially weakened by leakages through increased imports of needed supplies.

All this is summarized in Table 5. In addition, we ranked each of these measures. The backward and forward linkages were combined in a single ranking, giving double weight to the backward linkages.[9] The two last columns combine these rankings, representing an overall ranking of total repercussions. The next to the last column contains changes in the percentage of total imports at 1949–50 prices. However, in the last column we excluded the import-substitution ranking. This did not significantly change the overall ranking.

[7] Rasmussen, *op. cit.*, Chap. 8.

[8] The use of the United States input-output table can be justified on two grounds. First, the differences of technical coefficients of the manufacturing sector between various countries do not in our judgment significantly change the ranking of repercussions. Second, the U.S. table is particularly useful for our purposes because of the relatively small dependence of the U.S. manufacturing sector on imported inputs; i.e., the set of technical coefficients are not affected by imported inputs.

[9] As Hirschman indicates, backward linkages are more important than the forward ones because " . . . forward linkage could never occur in pure form. It must always be accompanied by backward linkage, which is the result of the 'pressure of demand.' In other words, the existence or anticipation of demand is a condition for forward linkage effects to manifest themselves." Hirschman, *op. cit.*, pp. 116–17.

From the table we reach the following conclusions. Those industries which show higher import substitution are at the same time those which ranked higher in terms of total repercussions in the economy.

One of the most dramatic types of import substitution occurred in the motor vehicle industry and the repercussions in terms of increased employment and gross value added were higher than anywhere else. It should be noted that the overall linkage effects are also the highest. Another high import-substituted product, machinery, also had a strong direct impact in terms of employment and value added, and relatively weaker, though not ineffectual, linkage coefficients.

The highest import substitution occurred in the chemical industry, especially in petroleum products. Its final repercussion rankings were somewhat lower, however, because of its low employment effect. Iron and steel are relatively low in terms of import substitution. It reveals a substantial area for further import substitution; i.e., an increase of steel producing capacity. (Some of this capacity is already being expanded.) A similar analysis would hold for the paper and paper products industry.

We have listed for comparison purposes the two big traditional sectors: textile and food products. They obviously grew at a much slower rate in terms of increased employment and gross value added; hence they lost considerably in relative importance.

Finally, one can see in Table 5 that in capital goods industries, such as machinery and transport equipment, the forward linkage is lower than the backward linkage. This is due to the fact that investment is treated in the input-output table as a final demand sector.

The picture which emerges from these linkages, that is, from the simultaneous growth of industries which to a large extent are each other's customers, is that of a remarkably balanced growth. This is not to say that Brazil did not experience imbalances. The latter occurred in some areas: e.g., between the growth of industries and the lagging of certain infrastructure facilities (one of the most acute being the expansion of power supply capacity), between the requirements for trained manpower and the dearth of training facilities, or the imbalances between the various regions, between agricultural production and the requirements of the growing population, etc. But it remains a fact that many complementary industries grew up simultaneously and acted as self-re-enforcing factors. This was mainly due to the policies discussed above.

Capital-Output Ratio and Sectoral Growth Rates

We already noted that Brazil's growth was characterized by a low capital-output ratio. Let us briefly account for this. The overall incremental capital-output ratio (ICOR) is a weighted average of sec-

TABLE 6A

RATES OF GROWTH AND INCREMENTAL CAPITAL-OUTPUT RATIOS

	GROWTH (PERCENTAGE PER ANNUM) OF					ICOR							
									Industry		Basic Facilities		
	Period	GDP	Agri-cul-ture	Mining and Manufac-turing	Other	Period	Overall	Agricul-ture	Total	Manu-factur-ing	Transpor-tation Communi-cations	Electric and Water	Other
Norway	1952–60	3.4	−0.1	3.8	4.0	Index,* 1955 (power and utilities =100)	9.8	55	15	*n.a.*	37	100	13
Denmark	1952–60	3.8	1.4	4.3	4.1		7.3						
United Kingdom	1952–60	2.7	2.2	3.0	2.6		6.5						
Belgium	1952–59	2.6	2.1	3.1	2.7		5.0						
United States	1952–60	2.6	(1.5)	(3.0)	*n.a.*		5.0						
France	1952–60	4.2	2.5	4.8	4.2		4.0						
Italy	1952–60	5.9	2.4	8.8	5.5		3.6						
Germany (Federal Republic)	1952–60	7.2	1.9	8.9	6.6	Index,* 1955 (power and utilities =100)	2.8	29	11	*n.a.*	91	100	13
Portugal	1953–60	4.9	1.0	6.4	5.9	1952–57	4.0	3.7	1.7	1.6	11.3	7.2	6.2
Austria	1952–60	5.8	2.7	7.0	5.8		3.8						
Venezuela	1952–60	7.2	4.7	7.8	7.0		2.1						
Turkey	1952–60	4.7	2.7	4.8	7.0		1.5						
Greece	1952–60	6.2	4.3	8.1	6.2	1950–58	2.2	0.6	1.7	1.7	8.6	8.1	3.9
Philippines	1952–60	5.7	2.9	9.3	7.0		1.0						
Burma	1954–60	4.6	3.0	15.5	5.5		3.0						
Colombia	1952–59	4.5	3.4	6.4	4.6	1945–53	3.7	4.5	2.6	2.8	4.6	*n.a.*	3.6
Ecuador	1952–60	4.7	3.5	4.8	5.8	1950–55	2.3	1.7	2.7	3.1	4.7	5.7	1.5
Thailand	1952–60	5.2	4.1	4.3	6.4		2.8						
Brazil	1952–60	6.0	4.7	9.9	3.5		2.3						
India	1952–59	3.0	2.3	2.9	3.9		2.2	0.9	2.6	*n.a.*	6.5	*n.a.*	*n.a.*
Chile	1952–59	3.2	0.2	7.6	3.1		4.2						
Argentina	1952–60	1.9	1.7	2.4	2.0	1950–55	15.0	3.5	37.9	*n.a.*	33.6	*n.a.*	19.0
Algeria	1952–57	8.8	3.3	6.4	11.3		2.5						
Jamaica	1954–59	8.0	5.6	22.4	12.9		2.9						
Korea (Republic of)	1954–60	4.8	4.9	19.4	5.7		2.6						
Nicaragua	1952–59	4.6	3.3	5.1	5.6		3.5						
Nigeria	1952–56	3.7	2.4	6.1	3.9		2.8						

* Only sectoral ICOR's are presented as indexes.

SOURCES: U.N., *World Economic Survey 1959*, U.N., *Yearbook of National Accounts Statistics;* W. B. Reddaway, *The Development of the Indian Economy; Economic Report to the President; Revista Brasileira de Economia.*

TABLE 6B

SECTORAL DIFFERENCES IN CAPITAL-OUTPUT RATIO, INDEX OF INCREMENTAL CAPITAL-OUTPUT RATIO

(Median for Eight Countries; Index, Power and Utilities = 100)*

Power and utilities	100
Transport, communications, and storage	65
Agriculture	39
Industry	26
(Manufacturing)	(24)
Trade and services	18

* Canada, Denmark, West Germany, Japan, Italy, Netherlands, Norway, United Kingdom, United States.

SOURCE: U.N., *World Economic Survey, 1959.*

toral ICOR's. Thus, the level of the ICOR of the sector (sectors) which is (are) growing most rapidly will have a dominant influence on the overall ICOR. Unfortunately, for Brazil we do not have sectoral ICOR's. We believe, however, that the evidence from many other countries substantially documents our case.

In Table 6 we have listed for a number of countries the rate of growth of the gross domestic product and its components, the overall ICOR's, and, for those countries where available, the sectoral ICOR's. An examination of these data shows that the overall ICOR is strongly influenced by the ICOR of the most rapidly growing sector (or sectors).

For example, in the case of Greece, Ecuador, and India, although the ICOR in the industrial sector is higher than in agriculture, the overall ICOR is relatively low. This is because in those cases it is the agricultural sector which might be contributing to the lowering of the ICOR, since total output is growing faster than the industrial sector. In Colombia and Portugal, the ICOR of industry is smaller than that of agriculture, but the overall ICOR's are relatively high. Here the explanation lies in a fast growing tertiary sector with a high ICOR. In Argentina the overall ICOR is the highest of those listed; it is caused by an unusually high ICOR in the industrial sector due to unused capacity.[10]

Our conclusion for Brazil is that the low overall ICOR must be due to a low ICOR in the industrial sector, which is also the most rapidly growing sector. Besides the fact that the industrial ICOR is generally lower than that of the other sectors (see Tables 6A and B), the Brazilian industrial ICOR might also be influenced by a greater degree of labor

[10] " . . . In a succession of years dating from the late nineteen forties, industry operated well below capacity levels partly because the absence of growth in the fuel, electrical power and transport sectors, when combined with acute balance of payments difficulties, created severe shortages throughout the economy; thus the level of manufacturing production attained by 1954 did not exceed the level previously reached in 1948. At the same time, however, investment intended partly to overcome the sectoral bottlenecks depressing output in the economy as a whole continued to rise." U.N., *World Economic Survey, 1959*, p. 74.

intensity in Brazilian industries, especially in areas marginal to the firm, like the handling of materials.[11]

Concluding Remarks

In his famous Wicksell Lecture, Nurkse said that:[12]

> If in an underdeveloped country the stock of productive factors is growing, but if development through increased exports to the advanced industrial centers is for one reason or another retarded or blocked, there arises a possible need for promoting increases in output that are *diversified in accordance with domestic income elasticities of demand* so as to provide markets for each other locally, in contrast to output expansion for exports, which is *specialized in accordance with international comparative advantage.* That the increase in production for the home market in these circumstances must ultimately conform to the pattern of domestic demand expansion is indeed a platitude if not a tautology.

We have shown that due to shrinking world markets for traditional exports and due to its high development aims, Brazil found it necessary to engage in import-substitution industralization. We have shown that in the postwar period, Brazil attained a high rate of growth with a relatively low savings ratio.

The industrialization proceeded on a broad front. It was not an industrialization promoting "final touch" activities, since the policies of the government forced a vertical integration. This made the process self-re-enforcing. It resulted in a great expansion of industries with high repercussion effects. The industrialization did not result, however, in a perfectly balanced growth, since lags occurred in such sectors as agriculture, infrastructure facilities, and there still exists little effort to diversify exports.

We do not believe that the positive elements of Brazil's experience are necessarily worth copying by all underdeveloped countries. Much of its success was due to the country's size and variety of resource availability. The Brazilian case is relevant either for countries of similar size or for a number of countries which have formed an economically integrated area.

It might now be asked whether Brazil's growth could not have been accelerated even more had it been more selective in its import substitution along comparative advantage. This might have resulted in a relatively greater expansion of traditional sectors and light industry. This course was not possible due to the barriers to entry in world markets for such products.[13]

We might generalize by saying that comparative advantage is not dead for choosing industrialization paths for developing countries.

[11] This will be treated more thoroughly in a forthcoming volume on the industrialization of Brazil.

[12] *Equilibrium and Growth in the World Economy: Economic Essays by Ragnar Nurkse,* edited by G. Haberler (Harvard Univ. Press, 1961), p. 317.

[13] The U.N., *World Economic Survey,* 1962, Part I, has an excellent documentation of the many barriers to the exports of developing countries to the markets of developed countries.

Traditional theory teaches us a division of labor according to comparative costs. In the past this implied a concentration of countries like Brazil on primary products. With the change in the world consumption structure, where primary materials play a decreasing role, a correct division of labor would imply a change in the industrial structure of advanced countries, which would stop producing some of the goods they at present produce. Since such a sacrifice has not been forthcoming in great enough quantity from the developed world, i.e., since developed countries have not changed their structure fast enough, according to comparative costs, underdeveloped countries were forced to adopt industrialization lines which went beyond the area which comparative advantage would normally have offered them. Thus, development policies and comparative advantage are not necessarily at odds with each other but require the adherance of both the center and the periphery to be valid.