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VOLUME II

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FACTORS INFLUENCING IRON AND STEEL CONSUMPTION IN LATIN AMERICA

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FACTORS INFLUENCING IRON AND STEEL CONSUMPTION IN LATIN AMERICA

I. GENERAL SUMMARY

The purpose of this paper is to ascertain the determining factors in Latin America's iron and steel consumption [1]. Average steel consumption for the region is low, probably not much more than 20 kilogrammes per capita, in terms of crude steel. There are very marked individual deviations from this average, ranging from 5 to 8 kilogrammes per capita in Bolivia, Ecuador or Guatemala, to almost 80 kilogrammes per inhabitant in Argentina.

In countries planning or developing their own iron and steel industries, the problem is of importance since they have to make an accurate estimate of the actual and potential capacity of the markets. The high investments required for this industry and the influence of the size of the plant on cost of production make it essential to analyse these possibilities carefully. Excessive investment can be the consequence of overestimating the market; high costs and the necessity of immediate expansions may result from an underestimation.

For certain Latin American countries such a study is indispensable to determine whether, according to the size of the potential market, the establishment of a domestic steel industry would be economically justified.

Recent events in Latin America, especially in Brazil, show that historical consumption trends when steel supplies are mainly provided by imports, are not enough to decide whether or not a steel industry should be established or what its size should be. A more detailed analysis should be carried out, to ascertain which factors have influenced consumption and to examine their possible future behaviour.

1/ The analysis has been limited to the consumption of rolled iron and steel plus primary transformation products such as tubes, wire, nails, screws, etc. Consequently consumption and imports of steel contained in durable consumer goods, or equipment requiring a more advanced process of transformation, were not included.

/In highly developed

In highly developed countries, a marked degree of interdependence, between steel consumption and the fluctuntions in the level of manufacturing output, is known to exist 1/. In Latin America, the problem obviously cannot be studied in this manner, not only due to the low prevailing level of industrial development, but also because within the field of development as a whole, the industries actually consuming steel primary products rarely reach a position of any importance. It was therefore decided to investigate the determining factors, by attempting an analysis of the development of steel consumption over the last quarter of a century. To this end, the relationship was established between steel consumption and other important indices of economic activity in six Latin American countries, namely, Argentina, Brazil, Chile, Colombia, Cuba and Mexico.

In selecting these countries, emphasis was laid on adequate statistical data and those countries with such widely differing characteristics to be sufficiently representative of the whole region. Of those chosen, two — i.e. Brazil and Mexico — have for some considerable time been producing bars and structures; moreover their steel industries are now in an active phase of expansion. Argentina, with the highest per capita consumption in Latin America has relied fundamentally upon imports. Although this country's resources for steel production are comparatively poor, its rolling capacity is constantly growing. Chile became the third largest primary steel producer in the region after the Huachipato plant was opened in 1950. Lastly, Colombia and Cuba have until today, relied exclusively upon imports. A study of the position in Colombia is especially interesting since this country is at present building its own steel plant.

1/ In European Steel Trends in the Setting of the World Market, 1949, a report prepared by the Steel Committee of the United Nations Economic Commission for Europe, a relationship such as this was used, in preference to other methods, for discussing the prospects of iron and steel industries in Europe.

An analysis of the particular conditions concerning each of these countries, permits conclusions to be drawn which may be applied to the majority of the remaining Latin-American countries.

Steel consumption, from 1925 until 1952, has not risen as rapidly as the population; in some instances, even, a powerful tendency for consumption to remain stationary was observed, causing a sharp decline in per capita consumption. In many cases, this has led to deferred demand, a frequent obstacle to economic development. A typical example is the consumption of rails, railway material and, in general, of all transport material. In most countries, it was not possible to extend railway mileage and improve rolling stock after 1925 and the supply of replacement materials has been postponed.

Consumption of other groups of steel products has also been delayed, though to a lesser degree in relation to other factors which determine the demand for these products. The building industry is one of the single factors with the largest bearing on steel consumption. All bars, shapes and structural steel are almost directly associated with it, as well as a fair amount of tubular products and, to a lesser extent, plate and sheet. Fluctuations in building activity measured either by the surface being built or by cement consumption were closely related to bar and shape consumption in these six Latin American countries. Nevertheless, the upward trend of these indicators surpasses that of consumption for this group of steel products. It may thus be concluded that there has been a downward trend in the amount of steel employed per square metre and per ton of cement in constructions.

Population growth, a faster development of urban centres, and the existence, in many cases of an actual housing shortage, are factors which should maintain a future high level of building activity in Latin America. Demand for steel products required by this industry will not only be influenced by the existing backlog in their consumption, but also by a probable increase in building activity.

/In countries

In countries for which statistics are available, the trend of steel consumption has also been compared with the development of manufacturing activity. The resulting relationship is less significant than those between consumption of bars and shapes with building activity. While a general upward trend in Latin American manufacturing activity has taken place during the past quarter of a century, iron and steel consumption remained fairly stationary. The explanation for this different behaviour appears to be that, except in Argentina where transforming industries have existed for some time, industrial development has been concentrated in the manufacture of consumer goods. These are not dependent upon a supply of iron and steel products as raw materials (foodstuffs, textiles, chemical products, etc.). Thus industries directly consuming iron and steel products have only recently begun to develop in a few Latin American countries, principally those in which primary iron and steel production exists.

The rapid development of steelmaking in Argentina, Brazil and Mexico, for example, has influenced steel consumption, especially upon flat products (plate and sheet), indicating that as steel production progresses, demand will also expand rapidly.

The preserved food industries, older than those mentioned above, and which exist, to a greater or lesser extent, in all the countries studied here, have exerted considerable influence on tin-plate consumption. In many cases, however, the industry has developed faster than the supply of tinplate, so that this expansion has been limited by the shortage and substitutes for tin-plate have been used in some instances.

A similar tendency to replace other iron and steel products by substitutes was noted in many activities in which such practice was possible. For instance, asbesto-cement tubes were increasingly used in sewage systems, while asbesto-cement sheets replaced galvanized sheets for roofing. Although in many cases these substitutions resulted from favourable price relations, the most important reason appears to be the difficulty in obtaining steel supplies; these must usually be imported, and are therefore limited by foreign exchange availabilities.

/These considerations

These considerations alone are insufficient to explain past trends in steel consumption, nor can they underline the factors determining future trends. All individual indicators mentioned so far, are related to national income and investment activity. Fluctuations in aggregate steel consumption in these countries, may prove to be more closely related to variations in the gross national product than to any individual indicators.

With limited statistical data, it is exceedingly difficult to study fluctuations of national income and of investments in each country. Adequate net investment figures are not available; national income data refer only to relatively short periods, insufficient to measure the influence of their variations on steel consumption. Most Latin-American national income estimates do not reach beyond 1939; the intial data thus refer to the war period during which restrictions existed in the steel export markets. No significant relationship between these factors can therefore be established.

But the available information permits a comparison for a given year of the relationship between income and investment on the one hand, and steel consumption on the other. These data can be obtained for the same period in various Latin American countries. Such a comparison would clarify the factors affecting steel consumption in a given country, and also the different consumption rates of other Latin-American countries. Such differences are considerable. Chart 1 shows the ratio between steel consumption, in terms of crude steel,[1/] and national income, in dollars of 1949, for twelve Latin American countries. In three of them (Brazil, Chile and Mexico) which have recently established integrated steel industries, or added production of flat products to their previous industry, a pre-war and a recent year have been considered. For the rest

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1/ Crude steel figures have been ascertained by estimating finished imported and locally produced steel as representing 70 per cent of the former. In the case of Venezuela, tubes for the petroleum industry, mainly financed by it, have been excluded.

/of them —

of them - Argentina, Bolivia, Colombia, Cuba, Ecuador, Guatemala, Peru, Uruguay and Venezuela - national income figures correspond to 1949, and steel consumption to the average for 1947-1949. This has been done to level out the considerable fluctuations from one year to the other. 1/ Thus it has been possible to include the respective points on the scatter chart.

The coefficient of correlation, based on this analysis, is fairly high - 0.898 - indicating a close relationship between per capita income and steel consumption. Considerable deviations for individual countries appear from the regression line. The equation for the latter is $X_1 = 0.170\ X_2 + 0.5733$ in which X_1 correspond to crude steel consumption and X_2 to national income in 1949 dollars, both per capita. For instance, Cuba and Uruguay have a lower steel consumption ratio compared with their income than the other countries. Thus, although a close correlation has been established for the region in general, this factor alone seems unable to explain some of the individual deviations. It is thus necessary to take additional factors into account.

If it is assumed that steel is mainly used in Latin America for capital goods, and that distribution of income between capital and consumer goods is not uniform, it appears that some of the remaining deviations could be explained by also considering the level of investment. Unfortunately, lack of data regarding investments creates a serious difficulty. Recourse had, therefore, to be made to some indicators related to investments; imports of capital goods and building activity were selected for this purpose.

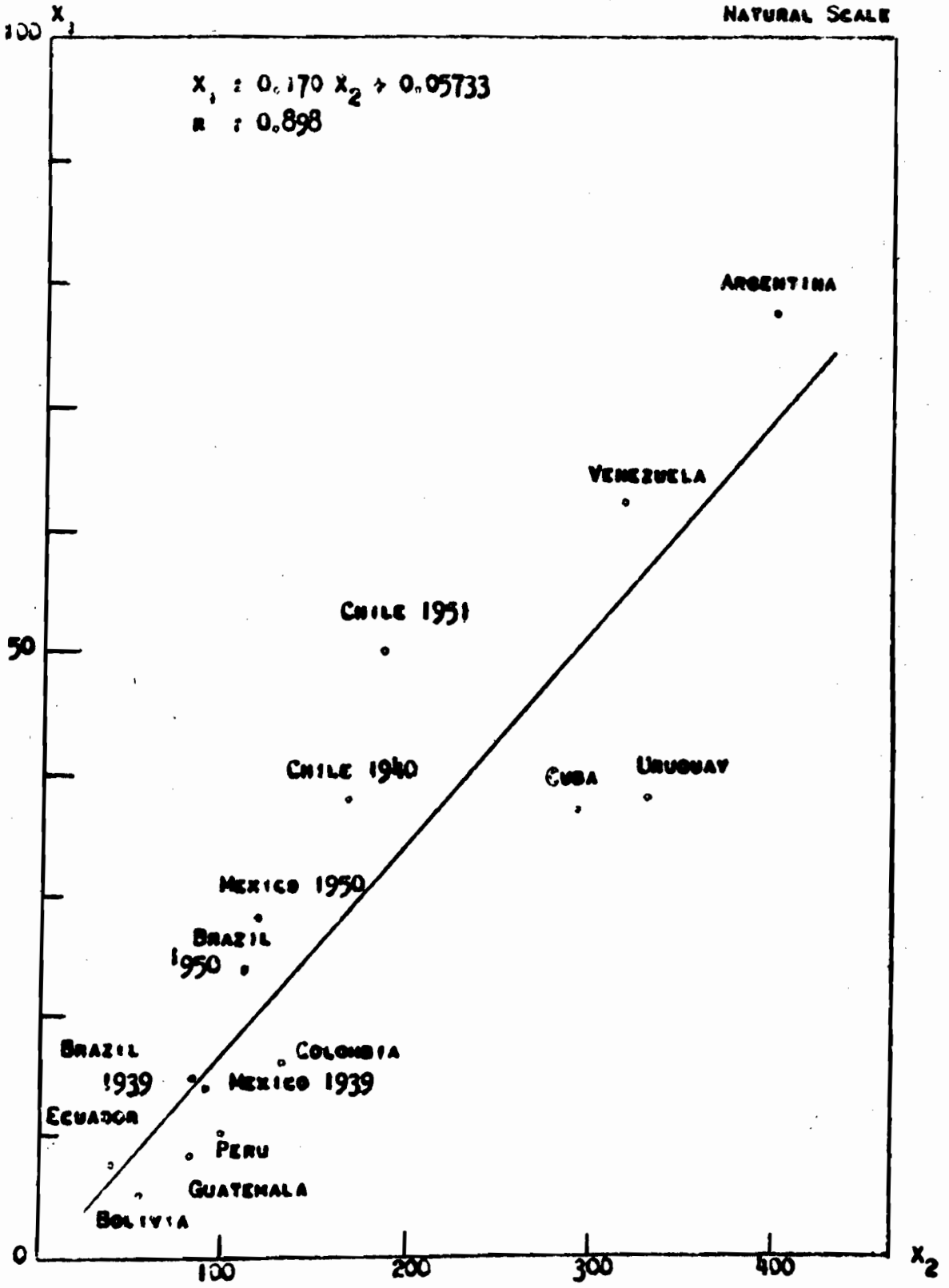
1/ 1949 national income figures have been taken from National and per Capita Income of Seventy Countries, 1949, U.N. Statistical Office, with the exception of Argentina, for which a higher figure was estimated. 1939 figures for Mexico have been prepared by the Economic Commission for Latin America. For Chile, 1940 estimates were based on the changes in the monetary income, population and cost of living index between 1940 and 1949. For Brazil, the changes in the physical volume of production, according to Economic Survey of Latin America, 1949 (Economic Commission for Latin America) were considered.

/The former

CHART 1

RATIO OF PER CAPITA STEEL CONSUMPTION TO INCOME

X_1 : STEEL CONSUMPTION (KILOGRAMMES PER CAPITA)
X_2 : INCOME (1949 DOLLARS PER CAPITA)



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The former have been measured by total imports of capital goods in 1949 dollars per capita, [1] while cement consumption has been considered as representative of building activity. The corresponding figures for the twelve countries are shown in Table 1.

The scatter points for the ratio between steel consumption and imports of capital goods appear in Chart 2, with the corresponding regression line: $X_1 = 1.519\ X_3 + 7.303$, in which X_3 represents the imports of such goods in dollars per capita and X_1, as previously, the per capita steel consumption. The correlation is also quite high, 0.861.

Table 1. Steel Consumption, National Income, Imports of Capital Goods and Cement Consumption, in Selected Latin American Countries

(Kilogrammes and dollars of 1949, per capita)

Country	Period	Steel consumption (kilogrammes) a/	National income (dollars) b/	Imports of capital goods (dollars)	Cement consumption (kilogrammes)
Bolivia	1947-1949	5	55	4	10
Ecuador	1947-1949	8	40	7	17
Guatemala	1947-1949	8	77	5	14
Peru	1947-1949	10	100	7	36
Mexico	1939	15	95	4	22
Brazil	1939	15	90	4	18
Colombia	1947-1949	16	132	12	42
Brazil	1950	24	112	7	34
Mexico	1950	28	121	10	55
Cuba	1947-1949	37	296	13	69
Chile	1940	38	170	13	80
Uruguay	1947-1949	38	331	25	120
Chile	1951	50	190	24	90
Venezuela	1947-1949	62	322	47	133
Argentina	1947-1949	77	404	29	94

a/ In terms of crude steel.

b/ Income figures correspond exclusively to 1949 including in those countries for which imports of capital goods, and consumption of steel and cement are shown by the average 1947-1949.

1/ With the exception of Brazil, Chile and Mexico, figures correspond to the average per capita imports for 1947-1949, expressed as dollars at 1949 value, deflating the other annual data by the United States export price indices.

/This ratio

This ratio provides new elements for analysis, especially so for some of the major deviations which appear in the previous comparison. For instance, in the case of Cuba, where the ratio between steel consumption and national income is below the regression line, it appears in Chart 2 above the regression line, showing that although steel consumption is low if compared with national income, it is high in relation to investments in imported capital goods.

On the other hand, the deviations shown by Argentina and Venezuela are larger than in Chart 1. In Argentina consumption is higher, in Brazil it is lower than the ratios between steel consumption and national income.

In Chart 3 the ratio between steel consumption and consumption of cement (X_1 and X_4 respectively) are shown. The equation for the regression line is $X_1 = 0.467\ X_4 + 2.679$, and the correlation 0.869.

To summarize, a high correlation seems to exist between per capita steel consumption on one hand, and national income, investments in capital goods and building activity on the other. The possibility cannot be discarded that some of these ratios are only apparent and that steel consumption as well as some of these indicators, depend directly upon one of the other factors. Thus, it may be that the correlation shown between steel consumption and investments in capital goods, for instance, may originate in the fact that both of them depend on the income per capita. To investigate this possibility, it becomes necessary to measure the degree of association between steel consumption and each one of the factors, after eliminating the influence of the others. This has been attempted through partial correlation; the coefficients obtained were as follows:

Between steel consumption and income per capita	0.581
Between steel consumption and imports of capital goods per capita	0.343
Between steel consumption and per capita consumption of cement	0.033

The first indicates the degree of correlation between per capita steel consumption and income, if imports of capital goods and cement consumption

/are maintained

CHART 2

LATIN AMERICA

RATIO OF STEEL CONSUMPTION AND IMPORTS OF CAPITAL GOODS

X_1 : STEEL CONSUMPTION (KILOGRAMMES PER CAPITA)

X_3 : IMPORTS OF CAPITAL GOODS (1949 DOLLARS PER CAPITA)

NATURAL SCALE

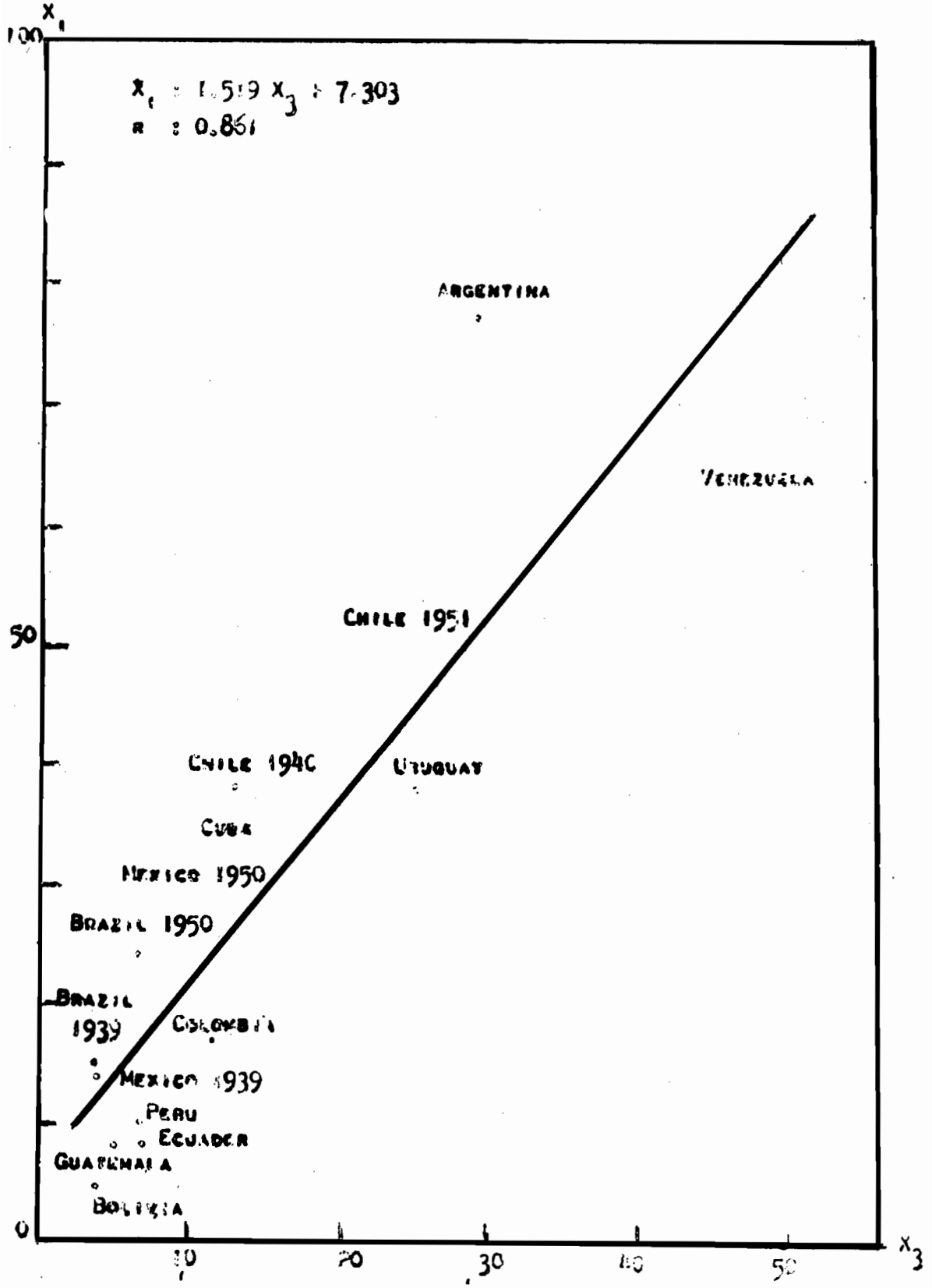

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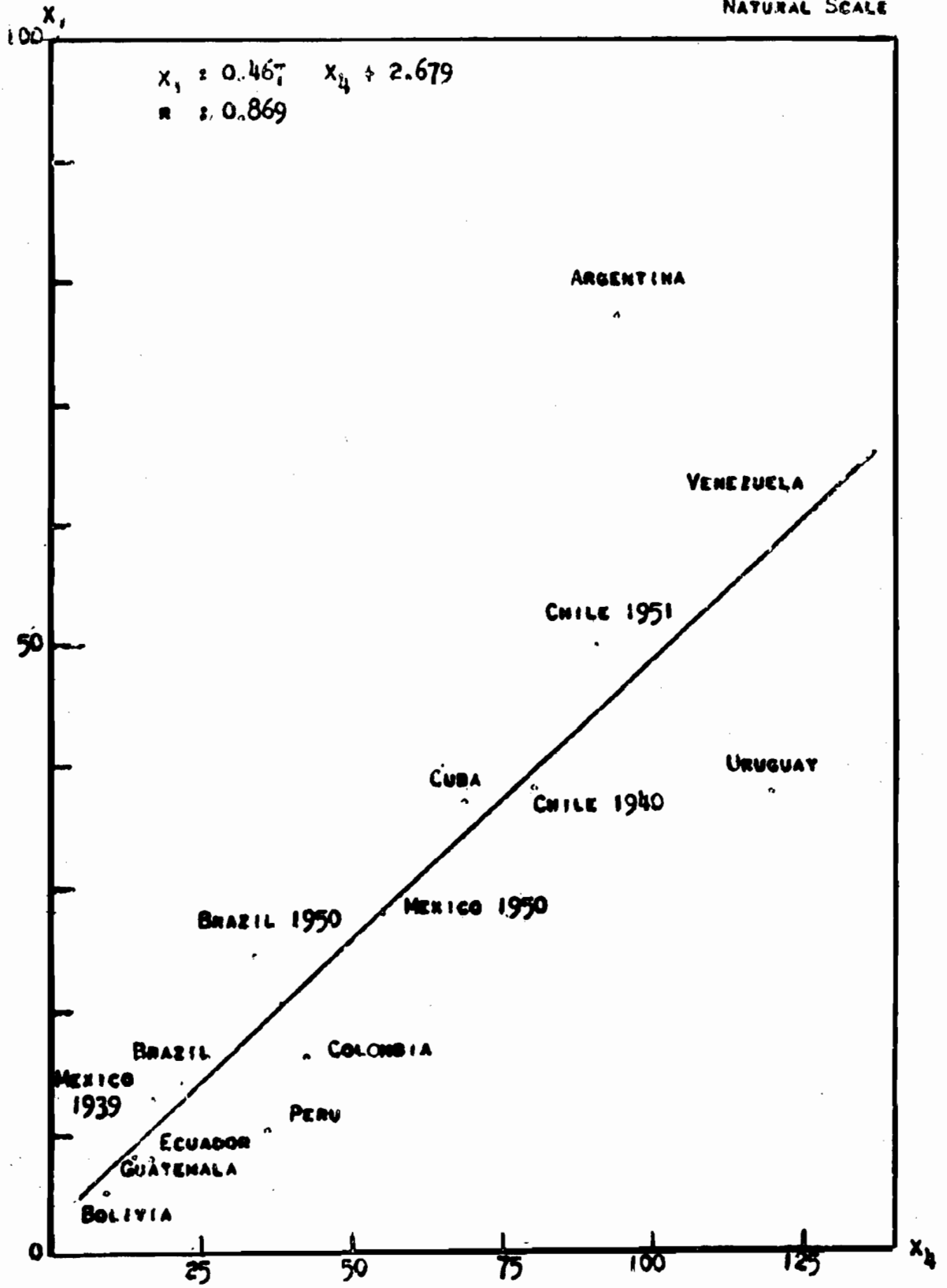
CHART 3

RELATIONSHIP BETWEEN STEEL AND CEMENT CONSUMPTION

X_1 : STEEL CONSUMPTION (KILOGRAMMES PER CAPITA)

X_4 : CEMENT CONSUMPTION (KILOGRAMMES PER CAPITA)

NATURAL SCALE



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are maintained constant. The decrease of the correlation coefficients as compared with those obtained originally, before eliminating the effect of the other factors, indicates that none of the three can individually explain the variations in steel consumption. Income per capita shows the most powerful influence whereas the weakest corresponds to cement consumption. Nevertheless, each one of these three indicators has a certain independent influence. A simultaneous relationship between steel consumption, income, imports of capital goods and consumption of cement, seems to be the most adequate explanation, so far. The correlation coefficient, in this case, is 0.925 and the ratio between steel consumption and the three indicators is expressed by the equation $X_1 = 0.108\ X_2 + 0.622\ X_3 + 0.023\ X_4 + 0.418$ in which the symbols have the same meaning as in the previous cases. 1/

Substitution of the actual figures for income, imports of capital goods and cement consumption in this regression equation, yields the theoretical steel consumption data, shown in Table 2.

Table 2. Actual and Theoretical Crude Steel Consumption

(Kilogrammes per capita and percentages)

Countries	Period	Steel Consumption		Deviation (per cent)
		Actual (kilogrammes)	Theoretical (kilogrammes)	
Brazil	1950	24	18	+ 33.3
Mexico	1950	28	21	+ 33.3
Chile	1951	50	38	+ 31.6
Argentina	1947-1949	77	64	+ 20.3
Venezuela	1947-1949	62	67	- 7.5
Ecuador	1947-1949	8	9	- 11.1
Cuba	1947-1949	37	42	- 11.9
Uruguay	1947-1949	38	54	- 29.6
Colombia	1947-1949	16	23	- 30.4
Guatemala	1947-1949	8	12	- 33.3
Peru	1947-1949	10	16	- 37.5
Bolivia	1947-1949	5	9	- 44.4

1/ The relative influence of the three factors on steel consumption can also be appreciated considering the multiple correlation coefficients for any two of these factors with steel consumption. That of steel consumption with income and imports of capital goods is 0.924; with income and cement consumption 0.914 and with imports of capital goods and cement consumption 0.883. The lines are respectively: $X_1 = 0.1110\ X_3 + 0.6664\ X_4 + 0.5310$; $X_1 = 0.1116\ X_2 + 0.1875\ X_4 - 0.6127$; $X_1 = 0.7022\ X_3 + 0.02711\ X_4 + 3.7153$.

/This table

This table shows that even the joint action of the three indicators does not satisfactorily explain the steel consumption of several individual Latin American countries. The theoretical consumption, which corresponds to the average of these three indicators, differs considerably from the figures actually obtained: 1/ in Brazil they are 30 per cent higher than theoretical consumption; in Peru and Bolivia, respectively, 38 and 40 per cent lower.

The only countries showing a steel consumption higher than their theoretical figure are Brazil, Mexico, Chile and Argentina, in other words, precisely those where a steel industry has been operating. The other countries depend almost exclusively on imports and their availability is therefore limited by their foreign exchange holdings.

Thus, jointly with the influence of the factors analysed so far, it appears necessary to consider a limiting factor which prevents the normal necessities for iron and steel, corresponding to high income and investments, from attaining their normal levels. Such a factor has restricted the import possibilities for iron and steel products, which most of the Latin American countries have had to face.

It is not by chance that Venezuela and Cuba show the smallest negative deviations for estimated theoretical consumptions, because they are the Latin American countries which have the highest export figures in dollars per capita, placing them in a highly favoured position to pay for imports.

In Chapter II of this paper, the individual position of six Latin American countries is analysed. Thus, a similar conclusion is obtained through direct comparison of steel consumption with the capacity to

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1/ The theoretical consumptions thus obtained have no other value than permitting comparisons to be made between various Latin American countries. They could not be used to sustain any final conclusion regarding the level of Latin American steel consumption in relation to the indicators, compared with the same relation in non-Latin American countries. The same analysis should be extended to such other countries, but there are considerable statistical difficulties emerging from variations in the definitions of steel consumption. Consumption of flat products has a different meaning in industrialized countries, which have an industry transforming them into consumer goods, equipment, machinery, etc. To obtain a comparable basis in underdeveloped countries, it would be necessary to include the steel contained in such types of goods.

/import.

import. 1/

As mentioned earlier, steel consumption has developed unfavourably in many countries where the per capita income has probably not deteriorated, and where investments, particularly in building and public works, have maintained a more satisfactory level. To some extent, steel consumption, thus failed to keep pace with the increased demand originated by the growth of certain factors influencing it. Conversely, this unfavourable trend in steel consumption has coincided, in most cases, with an equally unfavourable trend in the capacity to import.

The deterioration in the terms of trade has fundamentally been responsible for the reduction or restriction of the growth of the capacity to import. While in comparison with 1925-1929 averages, Latin American countries have in general been able to increase the quantum of their exports, their prices dropped during the thirties to a much higher degree than those of the products imported into the region. This unfavourable situation has disappeared only very recently in the post-war period.

Steel has not been an exception to this generalization. Chart 4 shows that the price of finished steel fell much less during the thirties than the main export products of Latin America (figures from Table 3), having also recuperated at a faster rate. The price ratio, as shown in Chart 5, has been, during the major part of the last twenty-five years, favourable to steel. This means that the countries of the region would have had to export more products in comparison to 1925-1929, in order to maintain the import figures for finished steel. 2/

1/ The index of capacity to import, which has been used in several papers by the Economic Commission for Latin America, is the product of the quantum of exports multiplied by the terms of trade. It reflects, in a certain measure, the quantum of goods which a country can import with the proceeds of its exports.

2/ Supposing that in 1925-1929 a given amount of steel could have been purchased with one ton of certain Latin American export products, in 1935-1939, when the price ratio had already improved notably, it would have been necessary to export the following quantities to pay for the same amount of steel: sugar, 1.1 tons; tin, 1.2 tons; copper or crude oil, 1.4 tons; cotton, 1.8 tons, and coffee, 2.4 tons.

/Table 3.

Table 3 United States Steel Prices and Export Prices of Selected Latin American Products

Years	Steel (U.S.cts. per lb.)	Electrolytic Copper (cts. per lb.)	Tin (cts. per lb.)	Petroleum (US$ per 42 lb. barrel)	Coffee (U.S.cts. per lb.)	Sugar (U.S.cts. per lb.)	Cotton (U.S.cts. per lb.)
1925	2.68	14.042	57.89	1.65		2,565	24.74
1926	2.64	13.795	65.29	192	22,125	2,565	20.53
1927	2.53	12.920	64.35	1.30	18,500	2,948	15.15
1928	2.50	14.570	50.43	1.20	23,000	2,434	20.42
1929	2.54	18.107	45.16	1.25	22,000	1,993	19.73
1930	2.32	12.982	31.69	1.15	12,875	1,471	16.60
1931	2.20	8.116	24.47	0.60	8,625	1,333	10.38
1932	2.15	5.555	21.98	0.80	10,500	0,930	6.34
1933	2.16	7.025	39.12	0.60	9,000	1,220	7.37
1934	2.42	8.428	52.23	0.95	11,125	1,499	11.09
1935	2.44	8.649	50.39	0.95	8,975	2,331	12.44
1936	2.41	9.474	46.42	1.05	9,375	2,694	11.75
1937	2.84	13.169	54.29	1.20	11,000	2,543	12.93
1938	2.78	10.000	42.28	1.15	7,625	2,036	8.75
1939	2.64	10.965	49.11	0.95	7,500	1,905	9.00
1940	2.65	11.296	49.84	0.95	7,000	1,886	10.40
1941	2.65	11.797	52.03	1.10	11,125	2,478	11.55
1942	2.65	11.780	52.00	1.15	13,375	2,988	19.13
1943	2.65	11.780	52.00	1.15	13,375	2,990	21.00
1944	2.65	11.750	52.00	1.15	13,375	2,990	21.30
1945	2.73	11.750	52.00	1.15	13,375	3,422	22.57
1946	3.00	14.040	54.54	1.25	17,375	4,610	26.68
1947	3.42	21.300	77.95	1.80	22,750	5,458	35.45
1948	3.91	22.330	99.25	2.50	22,625	5,045	35.45
1949	4.22	19.510	99.34	2.50	27,375	5,307	32.98
1950	4.40	21.540	95.54	2.50	49,500	5,432	32.68

Source: Statistical Abstract US; Agricultural Statistics US; Cotton Yearbook; Metal Statistics of the American Metal Market; Anuarios Azucareros de Cuba; Relatorios do Banco de Brasil

Notes: The price of "composite finished steel" was used for steel in general. Quotations generally correspond to New York market prices with the exception of petroleum (Kansas and Oklahoma), and copper since 1945 (Connecticut Valley).

/In addition

CHART 4

UNITED STATES STEEL PRICES AND PRICES OF SELECTED LATIN AMERICAN EXPORTS

1. Price of Steel
2. Price of Sugar
3. Price of Copper
4. Price of Tin
5. Price of Crude Petroleum
6. Price of Coffee
7. Price of Cotton

Semi-logarithmic Scale

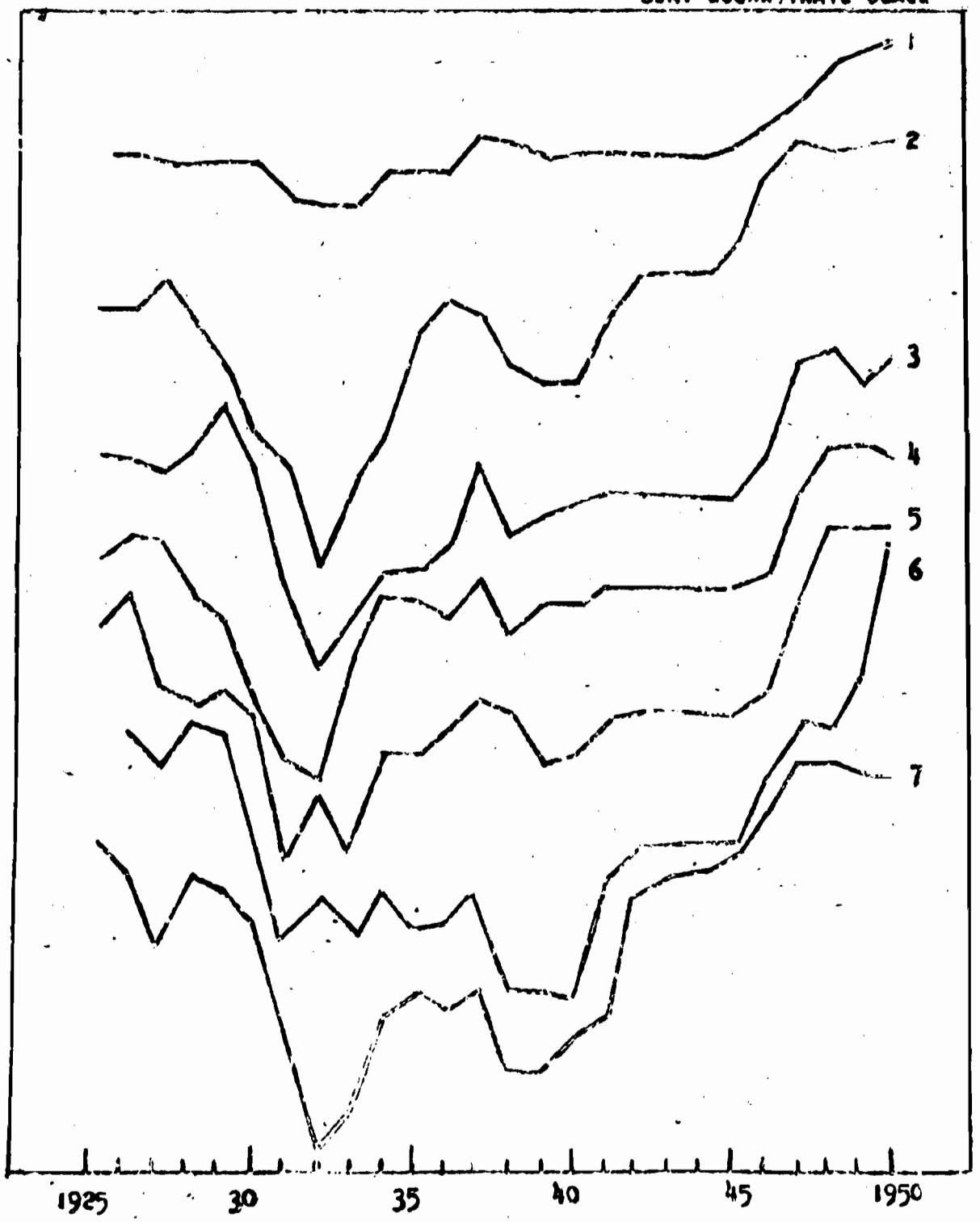
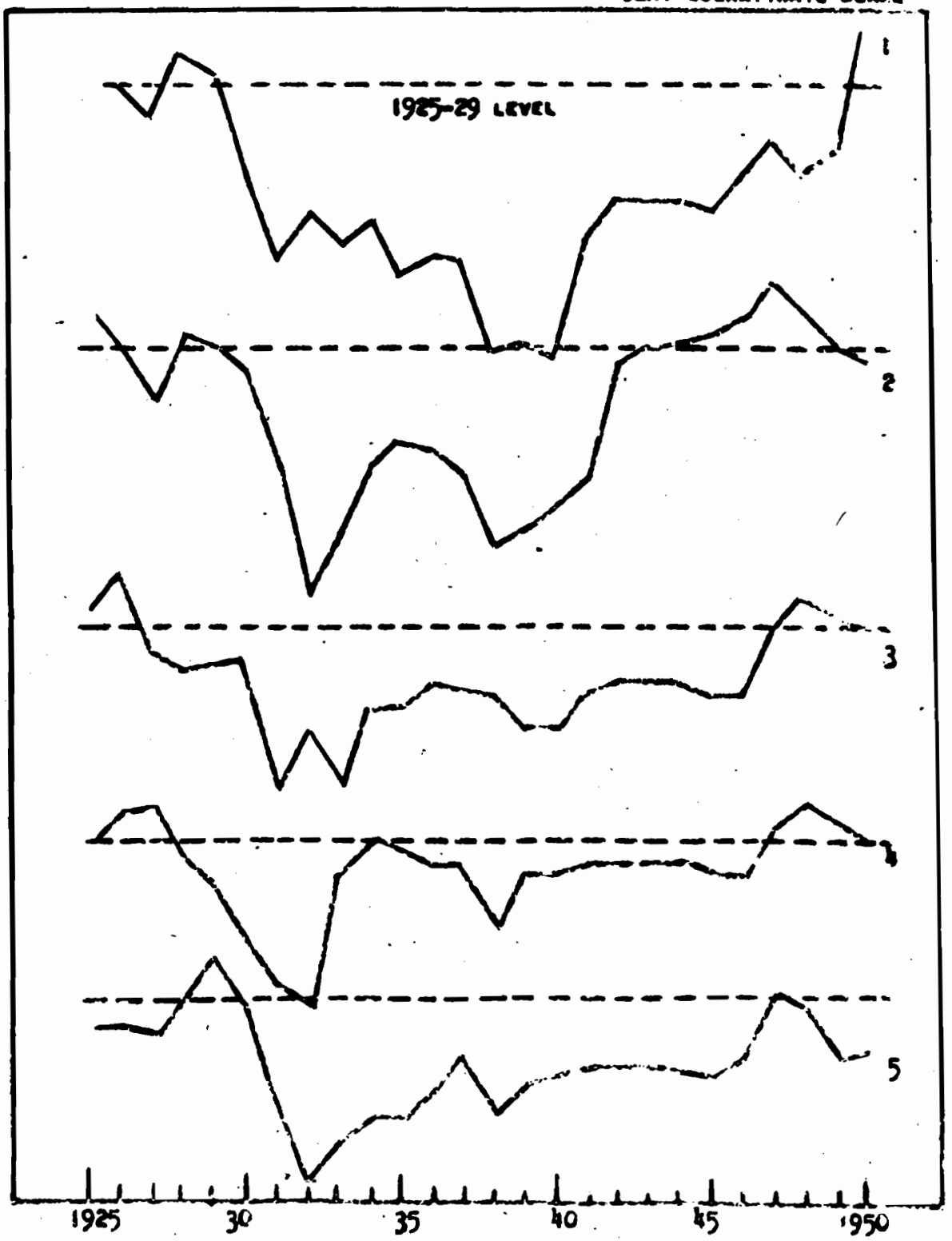


CHART 5

RATIO OF STEEL PRICES TO PRICES OF SELECTED LATIN AMERICAN EXPORTS

1. RATIO OF THE PRICE OF STEEL TO COFFEE
2. RATIO OF THE PRICE OF STEEL TO COTTON
3. RATIO OF THE PRICE OF STEEL TO CRUDE PETROLEUM
4. RATIO OF THE PRICE OF STEEL TO TIN
5. RATIO OF THE PRICE OF STEEL TO COPPER

SEMI-LOGARITHMIC SCALE



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In addition, imports to most of the Latin American countries consist of a high percentage of products having a very inelastic demand: foodstuffs, chemicals, pharmaceutical goods and fuels. They tend to absorb a higher proportion of the foreign exchange availabilities, when these are scarce. The obstacles for maintaining an adequate level of steel imports to satisfy the demand are therefore considerable.

If the results of the preceding analysis are taken jointly with those to be obtained from Chapter II referring to the six countries, the following conclusions can be drawn, which are valid for most Latin American countries:

Steel consumption trends have been unfavourable in the region during the last quarter of the century. In general, their increase has not been higher than that of population and, in many cases, has remained below it. In addition, steel consumption has not varied in accordance with several indicators for demand, thus deferred demand may have accumulated. This will probably necessitate additional quantities of steel, above normal requirements.

Shortages of steel appear to be especially important to the consumption of rails and railway equipment in general. In this sector, since the depression in the thirties, replacement has covered only part of the necessities.

The relationship between steel consumption and manufacturing activity has also deteriorated progressively. This might partially be explained by the recent creation of steel transforming industries and then only in some countries. A certain delay in the growth of consumption of specific steel products can also be noted, for instance, in building activity in general and in food preparation industries.

If statistics for various Latin American countries are compared, a high degree of correlation between steel consumption per capita, national income and investments can be established. Nevertheless, significant individual deviations from theoretical consumptions corresponding to these correlations, appear in some instances. Those countries possessing a local steel industry have usually a higher steel consumption and availability, whereas the countries supplied exclusively by imports, show a lower ratio.

These results, jointly with the appraisal of steel shortages in relation to deferred demand, prove the relevant influence of one limiting factor: the

/capacity to

capacity to import. Its evolution has been very similar to that of consumption, at least to that of steel imports during the last twenty-five years.

The evolution of steel consumption thus shows the trend of the amounts which countries have been in a position to buy, and not the size of the potential demand of the respective markets. This fact is apparent in Latin American countries which have established steel industry of their own. Consumption has not only been able to absorb the increasing domestic production, but has also obliged the maintenance of a certain level of imports.

II. CONSUMPTION OF STEEL IN SIX LATIN AMERICAN COUNTRIES

1. Trends of Steel Consumption since 1925

Although some general conclusions regarding the trend of steel consumption in the region can be established, the position of individual countries may substantially differ from it. A first impression may be obtained from the data in Chart 6, where changes in steel consumption since 1925 are shown for Argentina, Brazil, Chile, Colombia, Cuba and Mexico.

Argentina has until now been the largest steel consumer in the region having exceeded the million ton per year mark on several occasions. Its per capita consumption is also more than double the average prevailing in the region. As regards steel consumption trends, Argentina seems to be a typical example of what has happened to most of those countries depending upon imports for their steel supplies. In Argentina imports show an unfavourable tendency.

Annex 1 shows that Argentine imports of finished steel were, in 1925-1929, approximately 900 thousand tons; they dropped in 1930-1934 to about 500 thousand. Improvement of the economic position in the late thirties increased imports to only 660 thousand tons in 1935-1939, again followed by a serious contraction during the war years, when they averaged 240 thousand per year. In the post-war period, 1945-1949, imports reached only an average of 560 thousand tons, although in 1951 they again exceeded 800 thousand. 1/

1/ All consumption figures used in this paper are obtained by arithmetic addition of the tonnages of the various products, ignoring the influence which changes in the assortment may have in terms of crude steel.

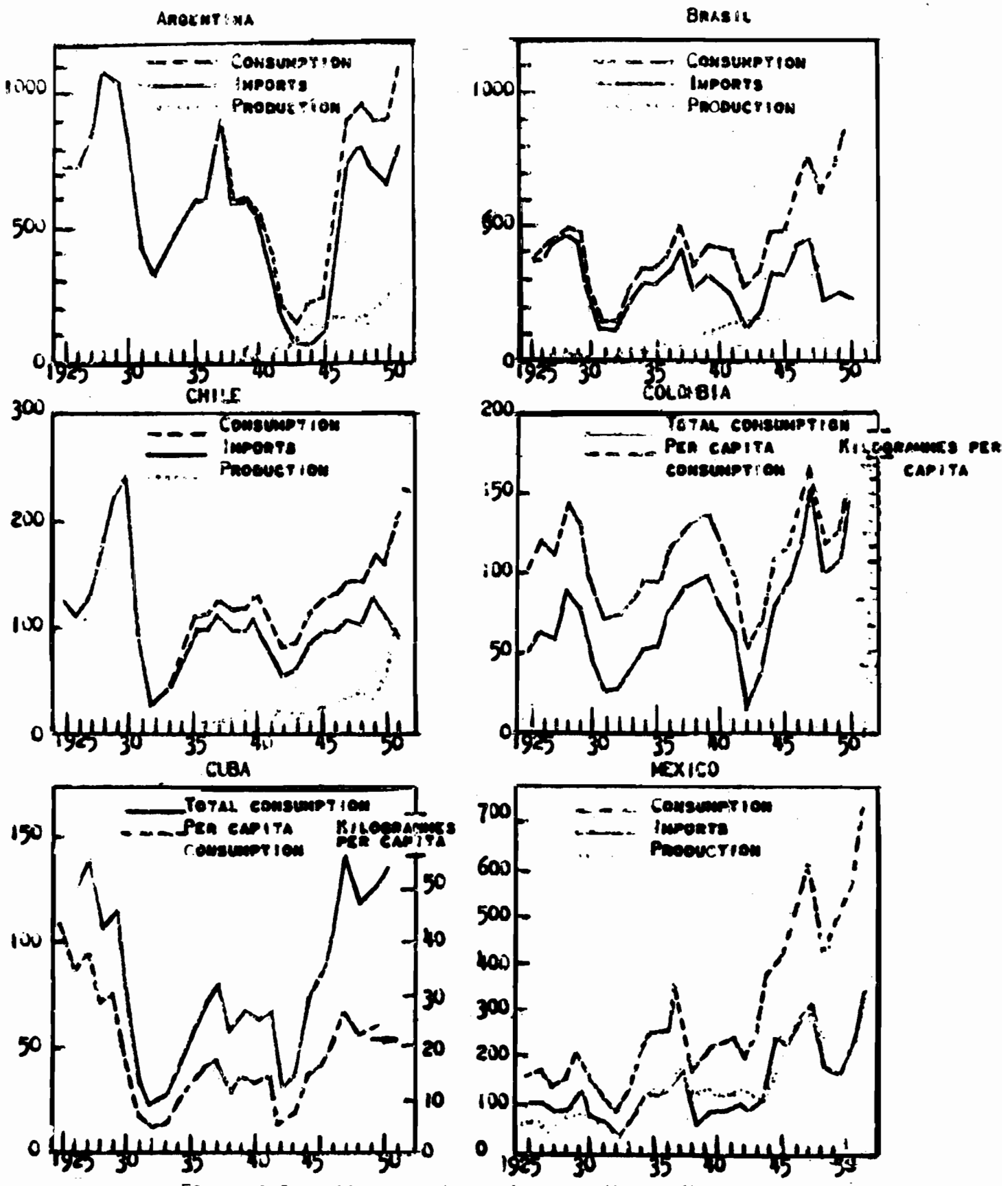
/This unfavourable

CHART 6

APPARENT IRON AND STEEL CONSUMPTION

THOUSANDS OF TONS

NATURAL SCALE



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This unfavourable import development has only partially been balanced by domestic production. Argentina possesses, since 1938, various re-rolling mills, which had a very small early output, but gradually increased capacity to around 300 thousand tons in 1950-1951. Domestic production, added to relatively high imports, brought the 1951 consumption, for the first time, to higher levels than 1928-1929.

If the increase in population is considered, the trend of steel consumption appears even more unfavourable. Per capita consumption decreased from 81.0 kilogrammes, for the average of 1925-1929, to 47.9 and 45.0 kilogrammes in 1935-1939 and 1945-1949 respectively. In 1950 - 1951, the figure was slightly under 60 kilogrammes. Moreover, the high 1925-1929 figures are not abnormal compared to the tonnages imported since the beginning of the century. The reduction in iron and steel per capita consumption since 1900 can be observed in the following table.

Periods	Iron and Steel Consumption (Yearly averages, kilogrammes per capita)
1900-1904	45 a/
1905-1909	107 a/
1910-1914	96 a/
1915-1919	25 a/
1920-1924	50 a/
1925-1929	81
1930-1934	42
1935-1939	48
1940-1944	21
1945-1949	45
1950-1951	58

a/ Approximate value

In Brazil the situation has been more favourable. Imports have remained, in spite of strong fluctuations, more or less stationary. Substantial reductions, firstly during the depression and later during the Second World War, have been followed by a rapid recovery, after which imports were only slightly lower than those for 1925-1929.

The main difference between both countries emerges from the development of a domestic steel industry. Production grew almost continuously since the first half of the twenties, finding, in the unsatisfied demand accumulated

/during the

during the earlier periods, an additional stimulus for its development. Its participation in the supply, increases from 18.4 per cent in 1935-1939 to about 40 per cent in 1940-1944; during the latter period absolute production figures continued to improve. In the post-war period, with a more normal level of imports, output covered 48 per cent of consumption, rising to 71 per cent in 1950.

Apparent consumption appears thus influenced by variations in imports and the increasing volume of domestic production, as may be seen from the following figures.

Iron and Steel Consumption

(Yearly averages in thousands of tons)

1925-1929	447.5
1930-1934	239.5
1935-1939	406.3
1940-1944	386.5
1945-1949	662.0
1950	874.9

Consumption growth between 1925-1929 and 1950 represents a 3 per cent cumulative rate annually, whereas between 1935-1939 and 1950 the rate is higher than 6 per cent. Analysis of the per capita consumption shows similar fluctuations, although the figures for 1925-1929 are not exceeded in 1945-1949, having been lower during the whole period. In 1950 for the first time a consumption per capita substantially higher than that of 1925-1929 was attained.

In Chile, availability of steel has depended to a higher degree upon imports than in Brazil, resulting in a consumption trend similar to that for Argentina. Although the first attempts to produce iron date from the beginning of the century, 1/ only since 1935 has domestic output been of any importance, having contributed 10 per cent to the total consumption; its relative importance increased to 25 per cent in 1945-1949. The beginning of operations at Huachipato increased the relative importance of domestic

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1/ The Corral plant was built in 1906, but had to suspend activities due to limitations of the market and to the uneconomical use of wood instead of charcoal.

/production to

production to 32 per cent in 1950, and 55 per cent in 1951.

If consumption figures for 1925-1929 are again taken as a basis, domestic production, even in 1951, has not been sufficient to compensate for the reduction of imports. In 1925-1929, average annual consumption was approximately 153 thousand tons; in 1932 it dropped to 28 thousand tons, increasing gradually to an average of 120 thousand in 1934-1939. War restrictions brought the average figures back to 100 thousand tons for 1940-1944, to attain in 1945-1949 the average level of 1925-1929. The 1951 figure, with a substantial amount of domestic steel, has still not exceeded the record 1929 and 1930 figures (225 and 245 thousand tons respectively, against 206 thousand tons in 1951).

Naturally, if steel consumption is related to the increase in population, a substantial reduction in per capita values appears: 37.7 kilogrammes in 1925-1929 against 28.9 kilogrammes in 1947-1951.

Colombia is one of the very few countries of the region showing a firm upward trend in steel consumption, despite its present dependency on imports. The decrease caused by the depression of the thirties, is followed by a rapid recovery, raising consumption in 1934-1939 to higher figures than those prevailing in 1925-1929. For the earlier period, imports averaged 77 thousand tons a year, while in 1934-1939 they reached 86 thousand. Wartime supply restrictions brought consumption below the depression figures. Immediately after the war, accumulated unsatisfied demand resulted in an increase of imports to 164 thousand tons in 1947.

Although in subsequent years a decline is shown, the average for 1945-1949 is around 117 thousand tons, that is 52.8 per cent above the 1925-1929 figure. In 1950 imports rose again, to around 150 thousand tons. Although these increases are high in absolute value, fluctuations in relation to population growth have been different. Per capita consumption drops slightly from 1925-1929 to 1935-1939 (from 10 to 9.8 kilogrammes), while high post-war imports raise it to only 11.1 kilogrammes in 1945-1949 and to 13.5 kilogrammes in 1950.

Cuba, like Colombia, depends exclusively upon imports for its steel supplies. The decrease during the depression was more intense than in most of the other countries, the reduction being from 129 thousand tons in 1925-1929

/to only

to only 38 thousand in 1930-1934. The subsequent recovery raised the average to 68 thousand tons, after which a new fall is apparent during the war. The pressure of deferred demand raised the average from 56 thousand tons, in 1940-1944, to 127 thousand in 1946-1950, but was still below 1925-1929. The highest post-war imports correspond to 1947 (146 thousand tons) still inferior to the 1925 figure (151 thousand tons).

Due to this unfavourable import trend, reduction of consumption per capita has been drastic; from 35.8 kilogrammes per capita in 1925 to 24.8 in 1946.

Mexico appears in an exceptional position within this general picture. Three Latin American countries, Argentina, Chile and Cuba show a considerably decreased per capita consumption, while two others - Brazil and Colombia - have only been able to increase their capita consumption slightly since 1925-1929. Perhaps the 1925-1929 average for Mexico was still somewhat affected by the revolution, and thus cannot be considered as a good comparative basis. But, since 1925, there has been an upward trend both in steel imports and domestic production.

Mexican imports increased from an average of 107 thousand tons in 1925-1929 to 116 thousand in 1935-1939 and 234 thousand in 1945-1949. In 1951 the tonnage stood at 342 thousand, or higher than any previous year since 1925.

An even faster growth has been attained by domestic production. Mexico possesses one of the oldest steel industries in Latin America, although its progress was slight in the first quarter of the century. In 1925-1929 average annual production was 67 thousand tons. Since then, domestic output increased rapidly, almost doubling its tonnage every decade: in 1935-1939, 138 thousand tons annually and in 1945-1949, 271 thousand. In 1950-1951, output exceeded 350 thousand tons.

Imports and domestic production have maintained almost similar proportions since 1935. The latter increased from 39 per cent in 1925-1929 to 54 per cent in 1935-1939 and 53 per cent in 1945-1949. In 1950 it rose considerably, because of reduced imports, but again reached 53 per cent in 1951.

/Total consumption

Total consumption grew from 174 thousand tons in 1925-1929 to 253 thousand in 1935-1939, and exceeded half a million tons in 1945-1949. In 1951, which shows the highest import and production records, consumption rose to about 740 thousand tons of finished steel. Steel consumption increased faster than the population increment, especially in the last few years. It represented 11.1, 13.5 and 21.4 kilogrammes per capita in each of the five-year periods mentioned above. In 1951 steel consumption per capita was 28 kilogrammes.

The tables in Annex II show the changes in composition of consumption for each of the six countries. Within the limits permitted by definitions which do not always coincide, the products have been united in a few groups as homogeneous as possible, to permit analysis and to maintain a higher degree of comparability.

The table shows that in each of the countries different factors have caused considerable variations in the structure of consumption changing the proportions of various types. In Argentina for instance,a comparison of 1945-1949 figures with those for 1925-1929 shows that the more significant decrease corresponds to rails and accessories. Their relative importance within the total consumption of finished steel products decreases from 15.6 per cent to 5.7 per cent within that period. Consumption of bars, shapes and structures has remained almost stationary, whereas an increase is visible in wire and wire products, tinplate and piping. Consumption of plate and sheet, after a long depression, finally attained, in 1951, the same figures as in 1925-1929.

In Brazil also, the most important decrease corresponds to rails and accessories. Their relative importance was great in 1925-1929, with 27 per cent of the total. It declined to 15 per cent in 1945-1949, and to only 8 per cent in 1950. Consumption of bars, shapes and structures shows the largest relative increase, from 24 per cent in 1925-1929, to 37 per cent in 1945-1949. This increase is almost entirely due to domestic production since imports have never regained the pre-depression figures. Imports of plate, sheet and tinplate increased until 1947, when they lost some ground through the entry into production of Volta Redonda, the

/contribution of

contribution of which has considerably increased the rate of growth. Thus, the relative importance of flat products, within the total, increased from 10.5 per cent in 1925-1929 to 15.7 per cent in 1945-1949 and 17.6 per cent in 1950. For tinplate they are respectively 6.0, 9.5 and 9.8 per cent. Finally consumption of wire and piping has grown in a smaller proportion.

In Chile, only two groups show an increase: tinplate and bars, and shapes and structures. Considerable decreases appear in the consumption of rails and accessories and also, although in a smaller degree, in plates, wires and piping.

In Colombia, the main increase corresponds to pipe, bars, shapes and structures, while the increment in wire and tinplate is smaller. Consumption of plate and sheet has been stationary. Rails and accessories have appreciably declined, the proportion within the total market dropping from 26.8 per cent, in 1925-1929, to 5.5 per cent in 1945-1949.

A major contraction is shown by bars, shapes and structures in Cuba, which in 1925-1929 represented 50 per cent of the total consumption, whereas in 1945-1949 they contributed 34 per cent. Plate and sheet consumption has not altered, while wire shows a small increase. Tinplate has risen from 4.6 per cent in 1925-1929 to 14 per cent in 1945-1949, thus showing the highest percentage for this type among the countries analysed here.

Finally, in Mexico, the rise in total consumption results from a parallel increase in most of the groups, including rails. Nevertheless, consumption of bars, shapes and structures and of wire and wire products has risen a littler faster than those of the other types, probably because, within these groups, there is a higher percentage of local production.

The following figures show, in greater detail, the structure of consumption in these countries during 1945-1949.

/Table 4.

Table 4. Consumption of Steel Products by Groups

(percentages)

Groups	Countries					
	Argentina	Brazil	Chile	Colombia	Cuba	Mexico
Rails, ties and accessories	5.7	14.1	11.5	5.5	9.2	12.8
Bars, shapes and structures	42.9	37.3	44.8	34.6	33.9	42.1
Wire and wire products	15.7	15.5	13.7	17.5	17.3	12.6
Plate and sheet	17.9	15.7	11.8	10.4	14.1	18.8
Tinplate	7.1	9.5	5.8	3.4	14.0	3.4
Pipe and tubes	9.9	7.2	9.3	28.6	10.5	10.3
Other products	0.8	0.7	3.1	-	1.0	-
Total	100.0	100.0	100.0	100.0	100.0	100.0

2. Factors Influencing Iron and Steel Consumption

The foregoing analysis has indicated that, although there are differences from one country to another, iron and steel consumption in Latin America has had a tendency to remain stationary, at least during the last twenty-five years. This naturally implies a drop in the per capita consumption. In the following chapter an analysis will be made of the obstacles which hindered a more favourable development.

Lack of statistical data regarding several indices and indicators in the countries of the region complicates this analysis. But there are factors of difficult quantitative evaluation, as, for instance, restrictions imposed upon the exporting markets or shortages in foreign exchange to pay for imports. The problem is further complicated by the varying effect with which such factors influence consumption of the different types of steel.

It was therefore attempted to make a distinction between factors which probably influence total steel consumption and factors which influence consumption of specific products. Among the former a distinction can further be made between factors such as the national income, investment activity or manufacturing activity which operate upon the demand, increasing or decreasing it, and the factors which operate on the availability, among which domestic production and the capacity to import are the most important.

/a) Factors

a) Factors which Influence Demand

i) Fluctuations in national income. Available data regarding national income unfortunately cover either inadequate periods or are not sufficiently representative of income. Nevertheless, some comparison can be made, using indices, which are partially related to income and are indicative of its changes.

In the case of Argentina, for example, there are strong probabilities that national income during the last twenty-five years has increased, in real terms, faster than population, whereas steel per capita consumption has decreased. The value of domestic production, at constant prices, increased by 70.3 per cent between 1925-1929 and 1945-1949, and available goods by 78.5 per cent, against an increase in population of about 50 per cent within this period. 1/

In Brazil, where only the value of available goods can be taken as an indication for the changes in real income, its increase has been about 70 per cent between 1925-1929 and 1945-1949. Consumption of finished steel alone has risen by 50 per cent, although if figures for 1950 are used, the increase is more than 90 per cent. In spite of variations in the trends of the two series, it appears that the low level of income explains to a substantial degree the reason for a very low level of per capita steel consumption in relation to that obtained by other Latin American countries. The Brazilian figure is less than half of that for Chile, and about one-third for that of Argentina. This proportion also corresponds approximately to the respective per capita incomes: it has been estimated that in 1949 they were of 400 dollars per inhabitant in Argentina, 190 in Chile and only 112 in Brazil.

In Chile, the net value of domestic production, at constant prices, increased between 1925-1929 and 1945-1949 in a considerably higher proportion than the population, while the volume of available goods per inhabitant hardly varies. Conversely, per capita consumption of steel drops considerably. For Colombia and Cuba no figures are available permitting an appreciation of the changes in national income compared with 1925-1929. Some estimates have been made for Colombia deflating the monetary income. Accordingly, real

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1/ Economic Survey of Latin America 1949 by the Economic Commission for Latin America.

income would have increased by about 68 per cent between 1939-1950, whereas steel consumption has risen only by 50 per cent.

Finally Mexico, where steel consumption has increased exceptionally, also shows a substantial growth of its real income, measured through changes in available goods. 1/ In this way, the ratio between the two series improves for steel consumption between 1925-1929 and 1935-1939, but no variation is shown between the latter period and the earlier post-war years. If the trends in steel consumption are compared with what presumably have been the changes in real income, the growth of steel consumption does not appear exaggerated.

Thus trends in iron and steel consumption in Latin America during the last quarter of the century, have been substantially less favourable than the trends of real income. Steel consumption per capita has not kept pace with the improvement in the standard of living of the population, remaining relatively below the increased demand which might be expected from such improvement.

ii) Variations in investment activity. As larger proportions of iron and steel are used in producing capital goods, investment activity is another factor which may have an important bearing upon their consumption. A substantial part of the high consumption attained in 1925-1929, seems to have coincided with large investments, mostly financed with foreign capital, and intended for the development of export industries. Since then, foreign investments have decreased, exports have risen in a small proportion only and the terms of trade have deteriorated. Thus it became difficult to

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1/ Figures related to the monetary income are available for Mexico since 1929, but it is difficult to select an index of prices to appreciate adequately the changes in real terms. A wholesale price index, a retail price index and an index of cost of living for workers in Mexico City, are officially compiled. The results obtained using one or the other to deflate the monetary income, differ substantially in certain periods. The series of available goods to which reference is made here, has been published in the aforementioned Economic Survey of the Economic Commission for Latin America.

maintan the level of essential imports, and the purpose of investments had to be changed, mainly focussing it towards production of goods intended to satisfy domestic demand. In this way, investment activity has decreased, staying closer to levels imposed by the countries' saving capacity.

No figures are available to reflect these changes in investment activity adequately, as no indices exist to represent actual capitalization. To obtain an approximate indication, the trends in imports of capital goods at constant prices have been used.

In comparison with 1925-1929, steel consumption shows slightly more favourable trends than the imports of capital goods. Consumption shows a greater inelasticity faced by restrictions of total imports, and has been supplemented, in several countries, by domestic steel production. If instead of 1925-1929, the years 1935-1939 are used as a basis for comparison, the results are slightly different. Imports of capital goods at constant prices have risen faster in the post-war years, compared with 1935-1939, than has steel consumption. This was the case for Argentina, Brazil, Chile, Cuba and Mexico, where figures were available.

It should be noted that this deterioration of the ratio between steel consumption and imports of capital goods appears in some countries, such as Brazil and Mexico, which show the highest increases in steel consumption, and where domestic production has developed very rapidly.

The evolution of this ratio in each of the five countries can be seen in Chart 7, which has been prepared using the following figures:

/Table 5.

CHART 7

RATIO OF STEEL CONSUMPTION TO THE QUANTUM OF IMPORTS OF OTHER CAPITAL GOODS

1. ARGENTINA
2. BRAZIL
3. CHILE
4. MEXICO
5. CUBA

(BASIS OF INDICES : 1935 - 39 = 100)

NATURAL SCALE

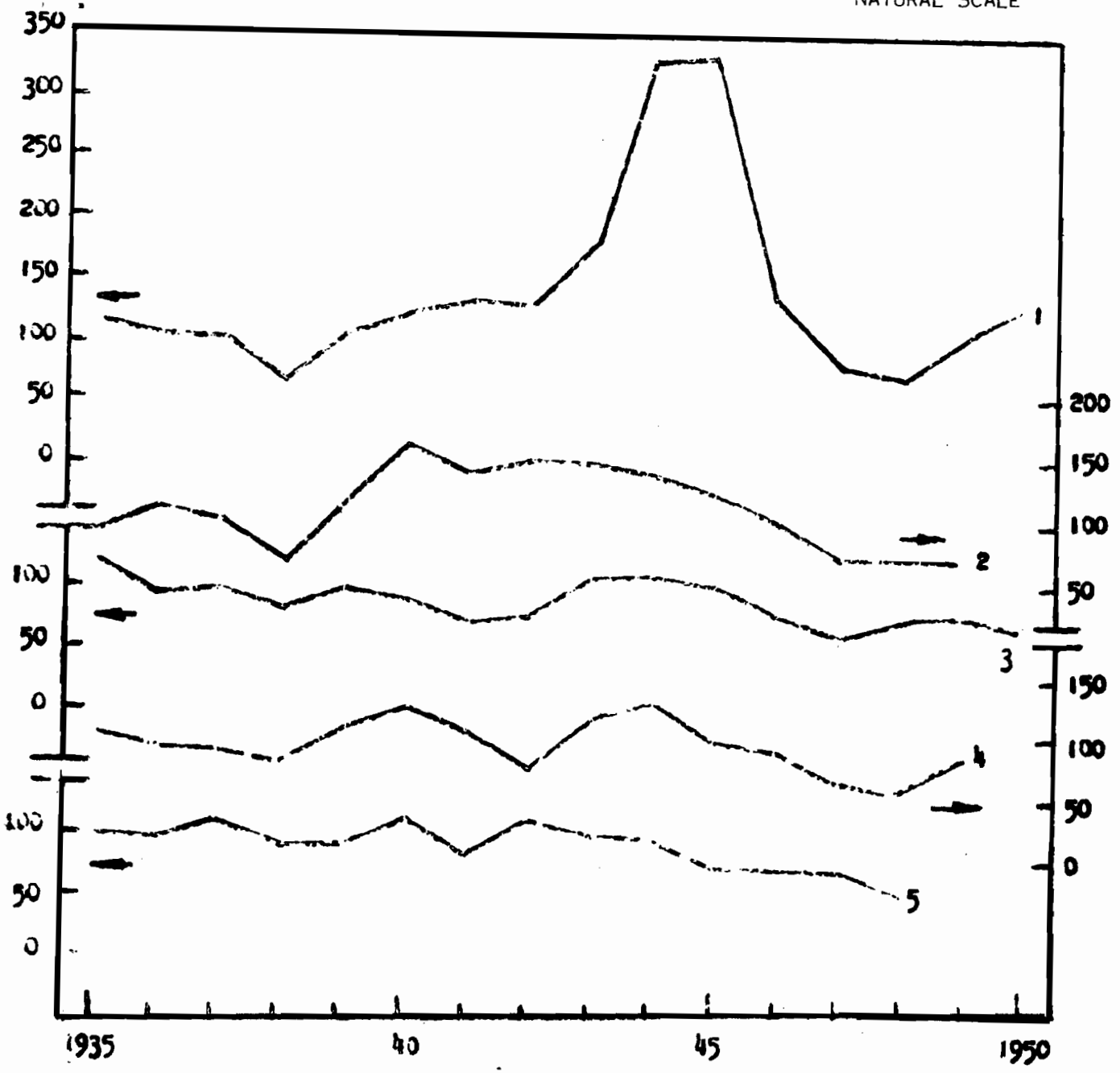

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Table 5. Ratio Between Steel Consumption and Imports of Other Capital Goods at Constant Prices a/

(Indices, 1935-1939 = 100)

Year	Argentina	Brazil	Chile	Cuba	Mexico
1935	115.1	98.5	121.8	108.5	100.4
1936	105.1	112.1	96.2	97.9	98.0
1937	104.2	103.7	98.5	95.5	114.5
1938	68.3	71.1	83.4	85.7	94.5
1939	107.3	114.6	100.1	112.4	92.6
1940	124.3	166.0	90.2	130.4	115.4
1941	135.2	143.9	73.9	110.9	84.9
1942	129.7	154.2	77.4	79.8	111.3
1943	178.5	150.7	107.4	120.0	99.3
1944	330.4	142.6	107.4	132.9	97.8
1945	332.2	127.2	100.7	100.5	70.9
1946	136.8	104.8	78.0	92.7	69.8
1947	80.6	75.4	62.6	67.6	69.7
1948	69.6	73.0	74.5	60.5	52.3
1949	101.4	72.5	77.2	84.3	-
1950	128.4	-	67.5	-	-

a/ Data on steel consumption have been taken from Annex I; imports of other capital goods at constant prices mainly from Economic Survey of Latin America, 1949, Economic Commission for Latin America.

Imports of capital goods continue to be the main expression of the Latin American capitalization effort, although some of the countries have recently developed an incipient industry producing capital goods. If the output of the latter was taken into account, investments would, of course, show a slightly more favourable trend. In the case of Argentina, for instance, value added in mechanical and steel transforming industries, shows an increase of 370 per cent between 1935 and 1947, whereas imports of capital goods at constant prices have risen by less than 160 per cent in that period.

If indices of investments could consider both imported and domestically produced capital goods, it would probably show that steel consumption increases with considerable delay in respect to changes in investments; at least, if the comparison is based on pre-war years.

iii) Development of manufacturing output. A third factor which might have an important bearing on steel consumption trends is the development of manufacturing.

/Chart 8

Chart 8 compares the fluctuations of both series in four countries, 1/ figures having been obtained from Annex 3.

Correlation, in general, does not seem to be very close, especially in the cases of Brazil and Chile from 1925 to 1935. Manufacturing output maintained, during this period, a fairly constant upward trend, while steel consumption, affected by the depression, decreases considerably. Whatever industry existed in those years, with the exception of cement, was mainly producing consumer goods (textiles, foodstuffs, etc.) and did not therefore imply any major steel consumption.

Beginning in 1935, manufacturing output rose more rapidly, and steel consumption also showed a more favourable trend. Nevertheless, even if the war years are excluded, with the sole exception of Mexico, steel consumption grew at a slower rate than manufacturing output. Physical volume of industrial production increased, between 1935-1939 and 1945-1949, by 68 per cent in Argentina, 86 per cent in Brazil and 56 per cent in Chile, whereas steel consumption rose by 9.5, 63.0 and 26.0 per cent respectively. In Mexico manufacturing output grew only by 58 per cent, compared with a 98 per cent increase in steel consumption.

A relative delay in the growth of steel consumption is thus apparent in respect to that of manufacturing output. Considering that, in the period under analysis, the industrial structure has changed, the situation appears even worse. Iron and steel transforming industries were created in the later years, showing a faster growth than the average for the previous existing industry. In Argentina, for instance, the growth of total manufacturing output, between 1937-1939 and 1948-1950, is about 69 per cent, the indices for the manufacture of transport vehicles and equipment on one hand, and electrical equipment on the other, increased by 85 and 172 per cent respectively.

In some of these countries, creation of steel transforming industries has been one of the consequences of the installation of steel producing industries. Regular availability of steel independent of fluctuations in

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1/ No indices of the quantum of manufacturing output are available for Colombia and Cuba. Argentine figures begin in 1935.

CHART 8

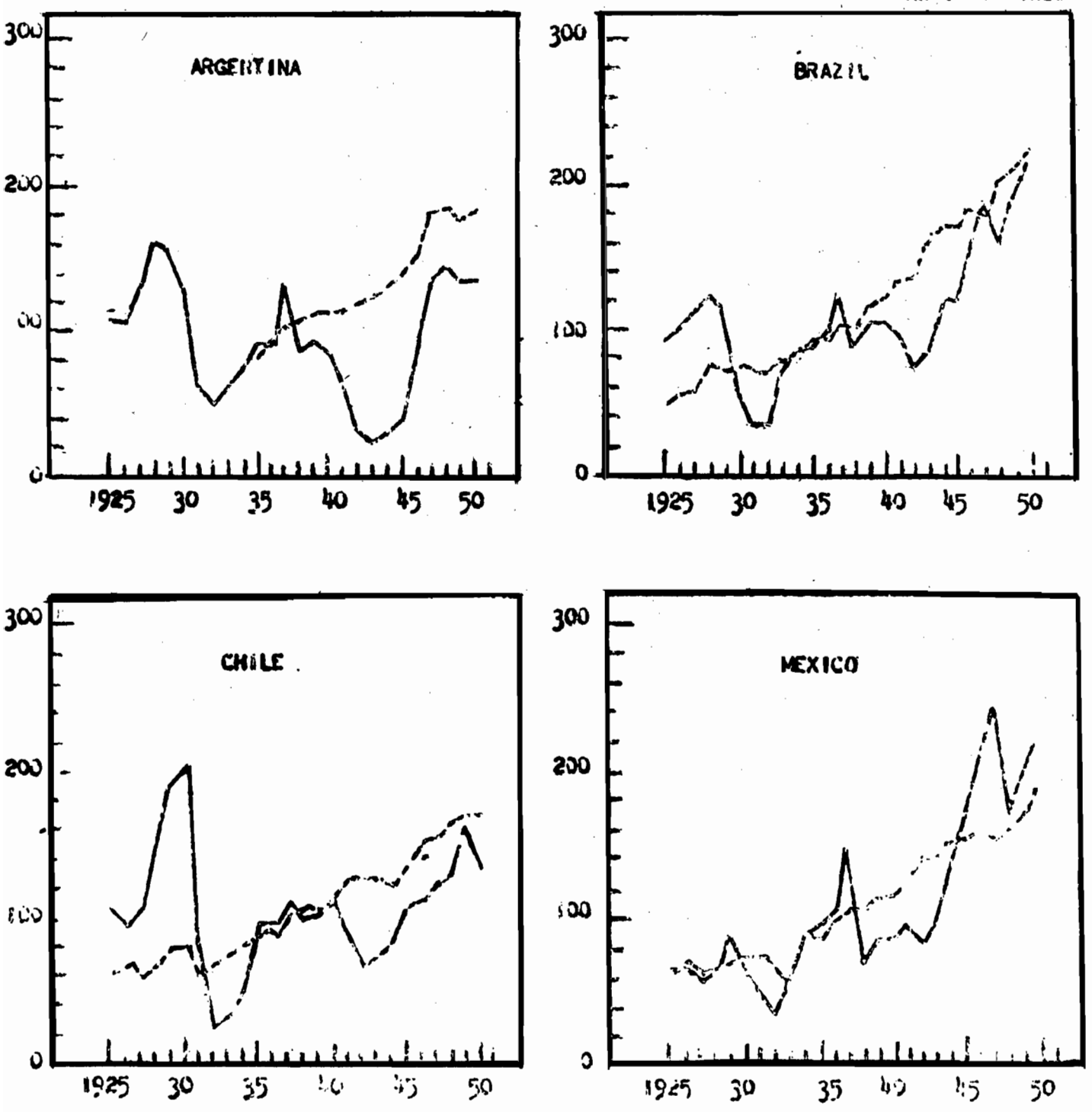
RATIO OF STEEL CONSUMPTION TO MANUFACTURING OUTPUT

——— STEEL CONSUMPTION INDICES

- - - - - - - - QUANTUM INDICES OF INDUSTRIAL PRODUCTION

(BASIS OF INDICES : 1935 - 39 =100)

NATURAL SCALE



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foreign exchange holdings, have been an important stimulus for the development of steel transforming industries.

In Argentina, the manufacture of some types of machinery, motors and spare parts, grew rapidly; shipyards devoted partly to repairs and partly to the building of small craft reached, in 1947, a four-fold capacity compared with pre-war figures, while electrical equipment tripled between 1937-1939 and 1950.

Something similar has happened in Brazil, where steel transforming industries are helping to solve the serious transport problem. Railway material had not previously been replaced when necessary, as a consequence of shortages in iron and steel products. 1/ During the war many railway material manufacturing plants were established or expanded. This activity gained an additional impetus when raw material from Volta Redonda became available; in 1950 four large enterprises had an annual capacity of 10 thousand wagons a year, sufficient to cover the necessities of the domestic market, plus some margin for export. Assembly and manufacture of steam, Diesel and Diesel electric locomotives up to about 1,000 HP, has been undertaken. Manufacture of rails has also advanced. But progress has not been limited to the production of railway materials as there has been some activity in the assembly of cars and trucks and manufacture of parts of motor vehicles.

Domestic production of other engineering and mechanical equipment has also been undertaken during the last years: machinery and spare parts for the textile, sugar, alcohol, paper, vegetable oils, and chemical products industries; farming and electrical equipment, plus other goods for domestic

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1/ The following data obtained from Economic Survey of Latin America 1949 and Recent Developments and Trends in the Brazilian Economy, 1950, throw some light on the importance of this problem: while the passenger-kilometres increased by 119 per cent and ton-kilometres by 101 per cent between 1934 and 1945, extension of the railway lines increased only by 6.6 per cent, the number of locomotives by 8.6 and the number of the freight cars by 23.7 per cent. At the end of the war 54,294 freight cars were available and the immediate additional necessities were estimated at 29,408 new units. There were 3,698 locomotives in operation, mostly under repair or old models.

use (one General Motors plant has a capacity for 20 thousand refrigerators a year); tanks and drums for storage and transportation of liquids or grains, etc.

In the case of Mexico, it may well be that these changes in the structure of industry are responsible for a faster growth of steel consumption than of total manufacturing output. The development of steel transforming industries producing capital goods or durable consumer goods, has been impressive. The rate of growth of some of these activities can be appreciated through the following figures which refer to the period between 1939 and 1950. 1/

Refrigerators	151 %
Heaters	1,398 %
Irons	122 %
Coolers	556 %
Washing machines	255 %
Transformers	632 %
Switches	495 %
Electric metres	1,295 %

Imports of many of these products have decreased considerably, saving foreign exchange which the country needs to pay for other imports. Imports of refrigerators, for instance, are now almost inexistant, after having reached more than 2 thousand metric tons in 1941; the capacity of domestic industry today has been estimated at 60 thousand units a year. Washing machines are in a similar position: 1947 imports stood at 15 thousand units, but from 1948 to 1950 about 100 have been imported annually. In 1948 two plants began operation with an annual capacity of 17 thousand units.

Many of these industries, as occurred in Brazil, have been created in order to solve some of the major problems of the country; transportation and low productivity in agriculture.

The exclusive manufacture of transport spare parts domestically (springs, wheels, etc.) was considered insufficient and the construction of a plant producing one thousand freight cars per year, has been envisaged. As regards motor vehicles, several assembly plants exist in the country, as well as the manufacture of spare parts and of truck, bus and car bodies.

1/ Figures from Informe a la Decimoseptima Asamblea General Ordinaria de Accionistas, Nacional Financiera S.A., 1951.

/In agriculture

In agriculture the prevailing low productivity has been attributed to a shortage of equipment and machinery. 1/ Industrial development has, to a certain degree, contributed to solving this problem by producing some machinery and equipment. But there is still a wide field for further growth of this activity.

b) Specific factors

The aforementioned factors have probably had a general influence on all steel consumption, although manufacturing output has probably had more influence on the consumption of flat products. A lack of uniformity in the development of consumption of different steel products points to the existence of other factors which exclusively influence consumption of specific types of steel.

In the following paragraph, the evolution of each of the groups of products into which total consumption has been classified, will be analysed in relation to some such specific factors.

i) Bars, shapes and structures. These products generally make up a substantial percentage of total consumption. They range from 34 per cent in Colombia and Cuba to about 45 per cent in Chile. In general, demand for these types of steels is closely linked to the building activity, which not only influences consumption of concrete bars, but also of many other steel products.

No series of indices exists reflecting the trends of building activity during sufficiently long periods in the six countries. Nevertheless, in some of them - especially Argentina and Chile - a close correlation has been established between building activity and cement consumption. A similar correlation has been assumed to be valid for the rest of the countries. Comparisons have, therefore, been established between consumption of bars, shapes and structures with cement consumption. The results are shown in Annex IV and in Chart 9. With the exception of the depression and war years

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1/ According to estimates, productivity of workers for 1946 was in agriculture equivalent to one-seventh of the figure attained in manufacture and only one-eighteenth of that in mining (Industrial Development of Mexico, Economic Commission for Latin America, document E/CN.12/164, Annex K, 1949).

/there is

there is generally a close similarity in the fluctuations of both series. Although cement consumption remained more or less stable, steel consumption dropped considerably during the war and depression years. Apparently this was because domestically produced cement has not been subject to the export restrictions during the war or the import difficulties during the depression.

Excepting Chile, the relationship between cement and steel consumption has reached a much higher level in recent years, compared with the pre-war period. Thus a definite reduction in consumption of steel bars and shapes can generally be noted.

Argentina is one of the extreme examples. Bar and shape consumption increased between 1925-1929 and 1935-1939 by about 10 per cent, while cement consumption grew by more than 70 per cent. Between 1935-1939 and 1945-1949 consumption of steel bars remained practically stable, whereas cement increased by 30 per cent. Consumption of bars, shapes and structures per ton of cement was, therefore, in the later five years about half 1925-1929 and 75 per cent of the 1935-1939 averages.

In Brazil the relationship between consumption of both products remained about constant from 1925 to 1946. Starting from 1947, consumption of cement tended to increase faster than that of steel bars. The ratio has dropped from 243 kilogrammes of steel per ton of cement in 1935-1939, to 132 kilogrammes in 1948-1949, and 190 kilogrammes in 1950.

Something similar has occured in Colombia and Cuba, where high imports immediately after the war maintained a similar ratio to 1925-1929 and 1935-1939. Stabilization, and even a decrease, in steel imports since 1947 have tended to make this relationship even worse.

Although Mexico is the country in which consumption of finished steel increased at the most rapid rate, since the pre-war period, consumption of bars, shapes and structures has been growing at a slower rate than that of cement. The deterioration of the ratio between the two series is substantially more important than in any other country. Consumption of these types of steel per ton of cement dropped by 50 per cent between 1935-1939 and 1948-1950.

In Chile a similar situation prevailed until 1948. Since then, a substantial increase in consumption of bars, shapes and structures on one

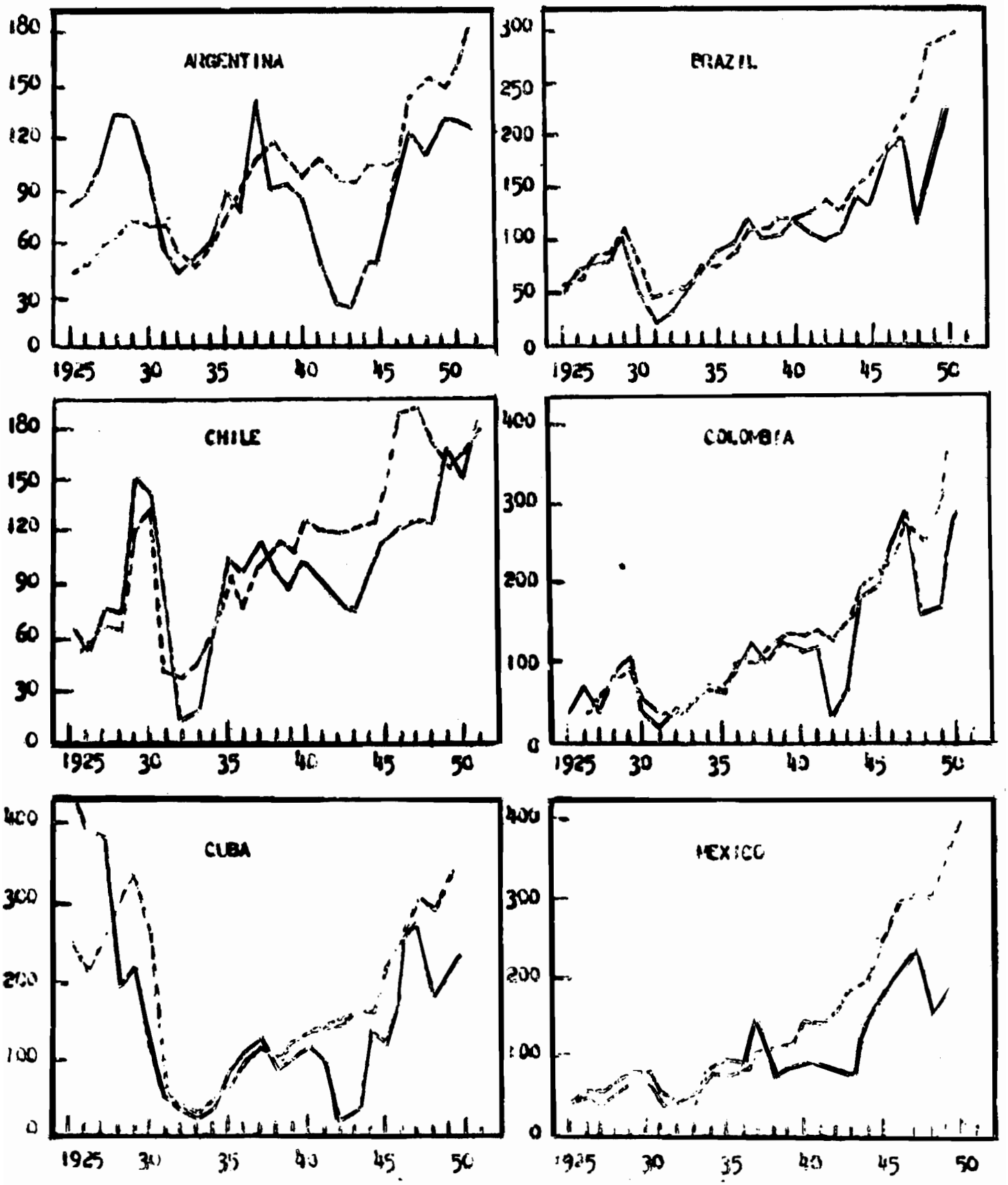
/hand, and

CHART 9

RATIO OF CONSUMPTION OF BARS AND SHAPES TO CEMENT CONSUMPTION

(BASIS OF INDICES : 1935 - 39 = 100)

_____ STEEL BARS AND SHAPES CONSUMPTION ---------- CEMENT CONSUMPTION



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hand, and a reduction in that of cement on the other, have tended to re-establish the ratio of the twenties.

The above data appear to indicate that there has been a certain delay in the upward trend of steel products consumption, compared with that of the building activity. It is possible that the relatively larger cement consumption can be otherwise explained, for instance, through public works programmes using more cement, such as highways. Also there might be technological changes in building, reducing the amount of steel to cement, such a trend being possibly aided by relative changes in prices. In some cases, investments in public works have been considerable. In Mexico for instance, cement consumption for irrigation and highways may have absorbed 30 per cent of total production between 1944 and 1946. From 1939 to 1951 the highway network increased from 8,800 kilometres to almost 22,000 kilometres. Conversely, some parts of the products included in this group have been used in steel transforming industries. This has become important, especially during the last few years, and the growth of these industries has been faster than that of building activity. Therefore, if the consumption of steel actually used in building could be isolated, the ratio between steel and cement consumption would be even more adverse.

A shortage of bars, shapes and structures undoubtedly exists and with more favourable supply conditions consumption of these types of steel would increase. This conclusion seems important when the prospects of Latin American markets are investigated. If more steel were available, an increased potential market would therefore result from an improvement of the ratio between bars and shapes and cement consumption. It would also originate in the indispensable expansion of the building industry. The building industry cannot be expected to attend exclusively to replacement and to the natural increase of population. In most cases, Latin America faces an actual shortage of housing, to which the fast urban rate of growth must be added.

In Argentina the 1914 and 1947 census give the percentage of population living in rural areas, or in towns of under two thousand inhabitans, as 52.7 and 38.6 respectively. In Colombia, similarly, it has been estimated [1]

1/ Bases de un Programa de Fomento para Colombia, Report of a mission from the International Bank for Reconstruction and Development, headed by Lauchlin Currie.

/that while

that while the average yearly growth of population in the country has been 2.1 per cent between 1938 and 1950, the more important towns show much higher rates (Bogota, 4.2; Medellin, 3.8; Barranquila, 4.4; Cali, 4.1). The average number of persons per house was estimated at 6.3, and as a result it appeared urgent that 160 thousand houses were either built or considerably repaired. In Mexico, the number of cities with more than 100 thousand inhabitants increased from 4 in 1940 to 10 in 1950, while public buildings in Mexico City increased from 3 thousand in 1939 to 10 thousand in 1945. Similar figures prevail in the other countries.

ii) Plate and sheet. Part of the consumption of sheet is linked to the building industry, in the form of galvanized roofing. In several countries there has been an increasing trend to replace steel plate by asbesto-cement plate. Supply shortages of the former, or relative price variations, seem to be responsible for this change.

A more important part of plate and sheet consumption, may be influenced by manufacturing output in general and especially by the steel transforming industries. These products are a basic raw material for production of many durable consumer goods (kitchen stoves, refrigerators, metallic furniture, etc.) and also of some capital goods' manufacturing industries (shipyards, tanks, machinery and farm implements, motor vehicle bodies, etc.).

This explains why the recent growth of consumption has been considerable, coinciding with expansion or creation of steel transforming industries. The relative importance of this group is larger in countries having attained more progress in such industries. As shown in the tables, plate and sheet consumption represented, in 1945-1949, about 19 per cent of total steel consumption in Mexico, 18 per cent in Argentina and 16 per cent in Brazil. In the three remaining countries - Chile, Colombia and Cuba - it fluctuated between 10 and 14 per cent.

The analysis of the influence of manufacturing output on consumption of finished steel, seems, therefore, particularly applicable to the consumption of plate and sheet. The same is true for the prospective future demand. Any quantitative appreciation of the future consumption of these products, is difficult, in view of the large field available for their application to

steel transforming industries. This is the same, even in countries like Mexico and Brazil, where the recent growth of plate and sheet consumption has been considerable. In both countries, demand grew even faster making some kind of rationing indispensable. 1/

iii) Tinplate. While steel plate consumption has remained stationary during the larger part of the last quarter of the century, growing rapidly only in recent years, tinplate consumption has continued to increase regularly. This is true, even in countries like Chile, where consumption of other steel products has considerably decreased. Tinplate consumption was also affected, to a lesser degree, by the contraction of steel consumption during the war, when Latin American countries obtained reasonable export quotas from the United States.

The fact that tinplate is mainly used in food processing industries, and that these are no new development for Latin America, may explain the different behaviour. Conversely, steel transforming industries which are the main consumers for plate and sheet, have only recently appeared.

Nevertheless, tinplate consumption has not maintained the same general trend shown by the food processing industries. Chart 10 shows (in logarithmic scale in order to make the series comparable) the changes in tinplate consumption and some of the food processing industries in Chile and Mexico. While in Chile, tinplate consumption increased between 1947 and 1948 by less than 50 per cent, production of preserved foodstuffs increased 53 per cent; biscuits, 71 per cent; fish product, 104 per cent; condensed milk, 258 per cent, and powdered milk, 287 per cent. In Mexico, tinplate consumption increased, between 1937 and 1950, by about 30 per cent and by almost 100 per cent between 1939 and 1951. Food processing industries have increased by some 300 per cent during the latter period. Something similar seems to have occurred in Cuba, where the tonnage of exported preserved food increased from an average of 3,500 tons between 1935-1939 to 25,000 tons between 1947-1949. 2/

1/ In Mexico, for instance, the Secretaria de Economia has assigned monthly quotas to the steel transforming industries.

2/ Figures regarding the domestic supply of Cuban processed foodstuffs are not available. Over two-thirds of the exports are canned pineapples, the rest being vegetables, fish, shellfish and occasionally some condensed milk.

The slight increase in tinplate thus seems surprising. It may be that some technological factors have compensated for part of the apparent shortage: use of thinner tinplate, of larger containers, or other improvements. The most important restrictive factor, however, seems to be a progressive substitution of tinplate by other materials: cardboard, wood, glass, etc. In this way a larger proportion of limited tinplate supplies may have been reserved for industries such as canned fish, shellfish and condensed milk, which cannot use other materials.

Insufficient growth of tinplate consumption, against factors which obviously determine its demand have unfavourably influenced the development of food processing industries. Their rate of growth would probably have been still faster if sufficient containers had been available. This fact should be considered when the prospects of the food processing industries are analysed. 1/

iv) Wire and wire products. Nails, bolts, screws, nuts, rivets and wire net have been included in this group, in addition to wire. Although they are not direct rolling mill products, a relatively simple and highly mechanized transformation is required.

It is possible that the consumption figures regarding these products given in Annex II are not entirely accurate. This is due to classification problems and because complete information regarding domestic production is lacking.

The heterogeneous character of this group complicates its correlation with some specific factors. The group is used in agriculture (fencing wires, wire netting, etc), in the manufacturing industry (special wires, bolts,

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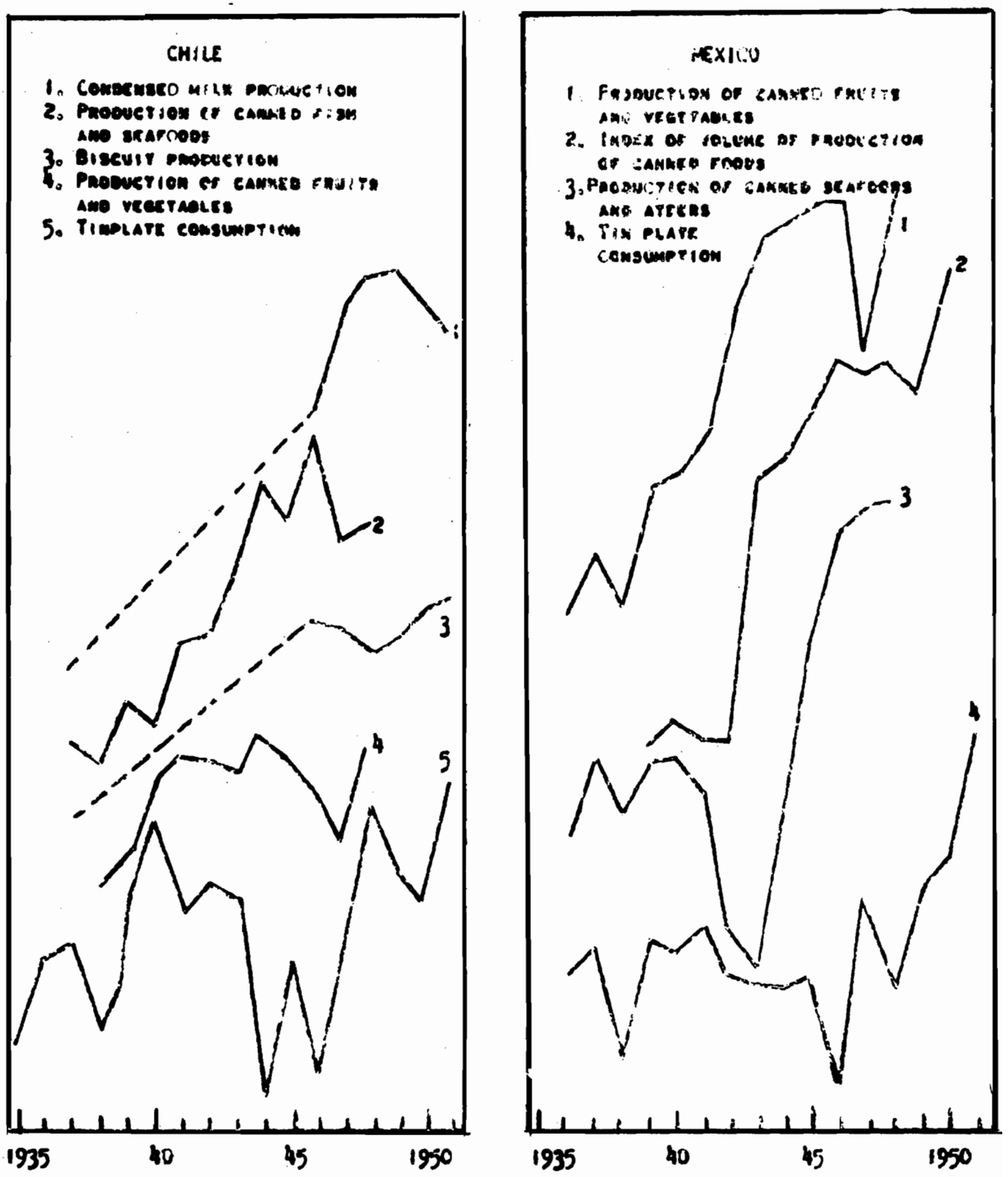
1/ Naturally the prospects for growth in tinplate consumption depend on specific conditions in each country. It is probable that in Argentina, with a long established food processing industry, the rate of growth will be smaller than in Colombia, where such industry is incipient. Tinplate consumption of Colombia is quite small: 4,600 tons in 1946-1950. In contrast, 8,600 and 18,000 tons were used respectively in Chile and Cuba, countries with a considerably smaller population than Colombia.

CHART 10

RATIO OF TIN PLATE CONSUMPTION TO OUTPUT OF FOOD PROCESSING INDUSTRIES

SEMI-LOGARITHMIC SCALE



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nuts, rivets, etc.) and in the building industry (wire, wire rod, nails, etc.). Consequently many of the conclusions obtained in the previous sections are also partly applicable to these products.

v) Pipes and tubes. The same statistical reservations mentioned above apply to tubes and pipes, as well as to the respective figures contained in Annex II.

In most cases the building industry and urban public services have been the main factor influencing consumption of pipes and tubes. The manufacturing industry has lately been using this type of product to a growing extent, but still to much lesser degree than for construction and public works. In addition, in some of the countries, the main consumer is the petroleum industry.

Under these circumstances, it is almost impossible to trace the individual factors which have influenced consumption in the past and even less to make estimates for future consumption. In many cases, the availability of these products has not been sufficient to satisfy demand, and many other products have been used as substitutes, such as asbesto-cement.

vi) Rails and accessories. These products show the most unfavourable evolution during the last twenty-five years. In Argentina, imports were, in 1945-1949, less than one-third of those for 1925-1929, whereas in the intermediate years even larger reductions took place. Thus, aggregate imports, for 1930-1951, have been 706 thousand tons of rails and accessories, almost equal to those of 1925-1929. Conversely, about 5 thousand kilometres of new railway lines were laid during those twenty-two years, while in the previous five years the increase was just under 4 thousand kilometres. 1/ This

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1/ The following figures represent total length of railway lines in kilometres:

1880	2,516	1925	34,468
1890	9,432	1930	38,634
1900	16,563	1935	40,587
1910	27,994	1941	42,889
1920	33,907	1947	43,666

/comparison suggests

comparison suggests that rail imports, since 1930, have been mainly used for the new extensions, leaving almost no margin for replacement.

In Brazil, rails and their accessories are the only group of steel products showing a decrease since 1925-1929. They have never again attained the 1925-1929 figures, and in many periods were less than half. When it is remarked that the increase in railway mileages was small in 1925-1929, it is apparent that the relatively high consumption in those years must have been used for replacement purposes. The recent decrease in imports has therefore probably resulted in insufficient supplies to cover such replacement necessities. The situation has been aggravated by traffic increases and by the enlargement of the railway system. 1/ In 1945 it was estimated 2/ that the accumulated requirements for postponed replacement had resulted in the immediate need to renew about 40 per cent of the rails. The requirements were estimated at more than one million tons.

Something similar has happened in Chile. A detailed investigation of the market by the Chilean steel plant, in collaboration with railway officials in 1948, 3/ indicated that normal replacement necessities for the country amounted to 19,665 tons. At that time, about 80 thousand tons of obsolete rails were still in use, because no steel was available to replace them. If this accumulated shortage was to be eliminated in twenty years, the requirements for rails and accessories for replacement would total 23,966 tons annually. Finally new lines were under construction, demanding an additional 2,750 tons of new rails each year. Total requirements for the next twenty years were thus estimated at 26,415 tons annually.

1/ The extension has been 32,478 kilometres in 1930, 33,330 in 1935, 34,252 in 1940, 35,280 in 1945 and 36,681 in 1950. The additions were thefore more than 4 thousand kilometres in the twenty year period.

2/ Information taken from the Plan Salte by the Economic Commission for Latin America in the Economic Survey of Latin America, 1949.

3/ Mimeographed report of limited circulation entitled Mercado Nacional de Productos de Fierro y Acero, Compañía de Acero del Pacífico, 1949.

/The only

The only year after 1930 in which such a figure has been attained was 1951 (imports of 28 thousand tons of rails and accessories). Average consumption between 1935 and 1951 has been less than 50 per cent of such requirements.

In Colombia also, excluding sporadic imports such as those of 1947, the availability of rails has been very low since the depression of the thirties. The total length of railways is small in Colombia (about 3,000 kilometres), and replacement requirements are therefore also small, but several new railway lines are planned. Law N° 26, of 1945, authorized the construction of 1,800 kilometres, for which about 110 thousand tons of rails are necessary. This figure alone is greater than total rail imports since 1930.

In Cuba, rail imports have amounted to about 60 thousand tons during the last twenty years (14,600 tons alone in 1947); the annual average is thus 3 thousand tons. The situation in Cuba compares with that of Chile, where 10 thousand railway kilometres require 20 thousand tons of rail replacements a year. The need should be higher in Cuba, which has about 18 thousand kilometres of railway. 1/

Since the depression of the thirties, Mexico has been faced by serious transport problems for the improvement of some railway lines, to make them available for heavier traffic and higher speeds. Mexico, thus, needs rails for these purposes as well as for the probable replacement requirements, dating from the thirties.

To summarize, inadequate replacement of rails and the accumulated shortage seems to be general in all Latin American countries. To these, the necessity for railway expansion must be added, which in many instances has also been postponed, due to the unavailability of steel.

c) Factors influencing availability of iron and steel products

From the analysis so far, the conclusion emerges that steel consumption in Latin America has not kept pace with the progress of some factors which should influence its demand. This conclusion is valid even for Mexico, which shows the highest rate of increase in consumption.

1/ This comparison can only be taken in a limited sense, because a considerable part of the Cuban lines belong to the sugar industry.

/If the

If the present ratio between steel consumption and some of these factors is compared with the ratio prevailing before the depression or the Second World War, it becomes evident that steel consumption has not increased correspondingly. This is true if it is compared with real income. If the comparison is made with investments, represented solely by imports of capital goods, both trends are more or less equal, but if domestic production of capital goods is added, steel consumption trends appear to be lower than the trends of investments. The comparison is also unfavourable with manufacturing output, especially with industries producing durable consumer goods, machinery and equipment. Consumption of certain special types of steel products also falls considerably behind the evolution of some specific factors to which they should be linked. Consumption of bars, shapes and structures increases less than building activity; consumption of steel plate less than food processing industries and, finally, consumption of rails is usually inadequate to fill the normal requirements for replacement.

These comparisons suggest that the present consumption figures cannot be considered representative of demand. An additional factor must have hindered the demand from appearing fully. Unavailability of steel products could be such a limiting factor.

Steel supply has been based, in some of the countries, exclusively on imports, in others these have been supplemented by some domestic production. An analysis of the influence on steel consumption, both of local production and of the capacity to import, will be made in the following pages.

i) Capacity to import. Of the six countries included in this study, the steel supply of Colombia and Cuba has been based exclusively on imports; Argentina and Chile have since the late thirties a limited contribution from domestic production for specific types of steel, but imports have been the major contribution to the supply; finally, Brazil and Mexico, although possessing older steel industries, have also had to resort to substantial imports. Thus, the capacity to purchase steel on foreign markets must have greatly influenced consumption.

Evaluating the purchasing power through indices for the capacity to import, it may be seen that iron and steel imports show a very close correlation to it during the last quarter of the century. Chart 11 shows

/the relationship

CHART III

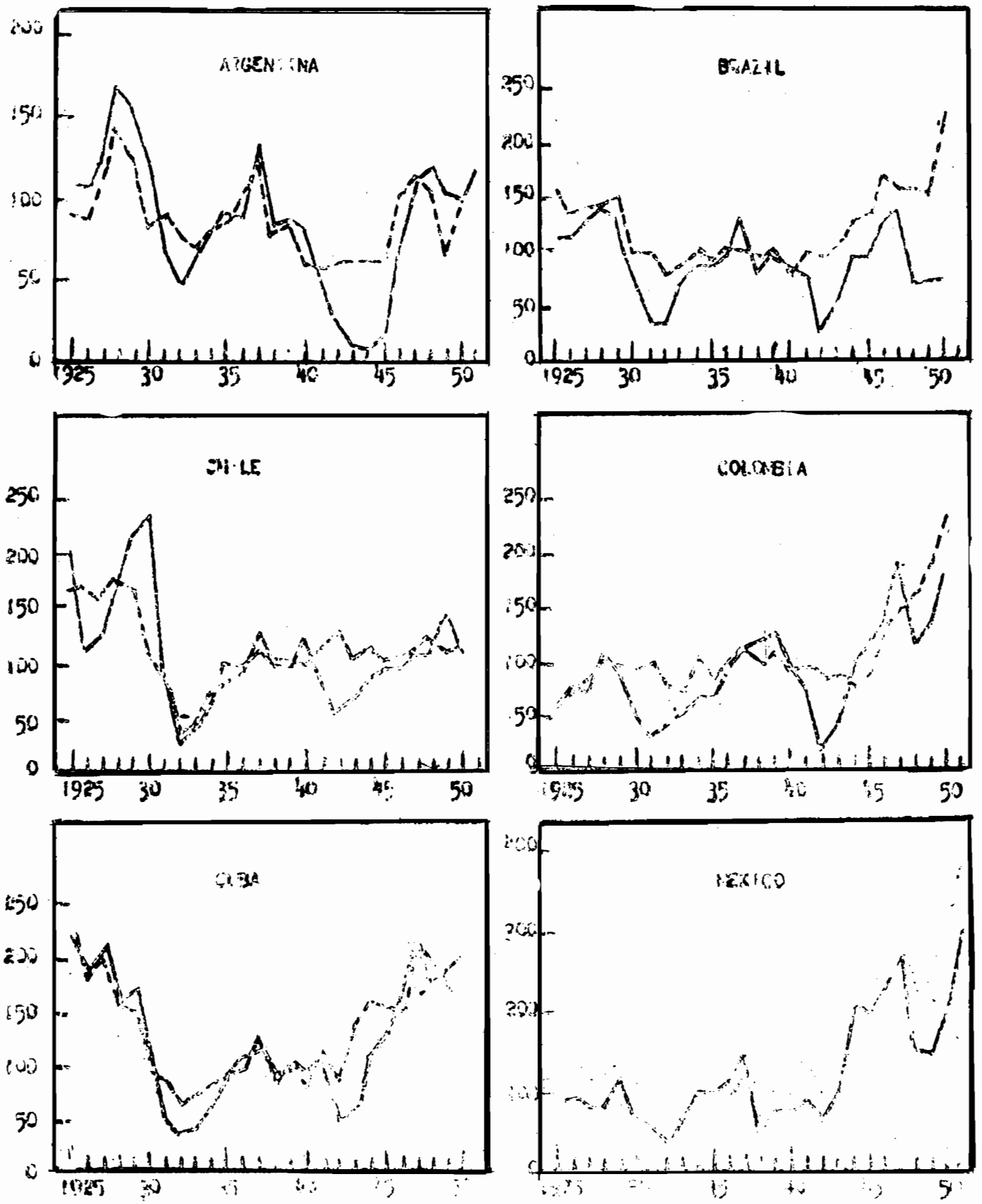
RATIO OF IRON AND STEEL IMPORTS TO CAPACITY TO IMPORT

——— IRON AND STEEL IMPORTS

.....CAPACITY TO IMPORT

.....QUANTUM OF TOTAL IMPORTS

(BASIS OF INDICES 1935 - 39 = 100) NATURAL SCALE



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the relationship between the two series, based on the figures contained in Annex V.

In Argentina the unfavourable import trend of finished steel coincided with an equal trend of the capacity to import. The only differences appear during the depression and during the Second World War. The first is due to the greater inelasticity of other import groups, tending to use a larger proportion of the scarce exchange availability. The second is due to restrictions imposed on steel exports in the producer markets.

In the case of Brazil, correlation between both series is also good until the war, naturally excluding the depression period. In the early post-war years, imports of steel grew rapidly, until they reached, in 1947, a level close to the capacity to import. The development of domestic industry, especially Volta Redonda, has permitted the substitution of part of the imported steels, liberating foreign exchange for other necessities.

In Chile, where dependency upon imports has been stronger than in Brazil, the correlation is also closer. Capacity to import shows a deep contraction during the depression, stabilizing afterwards at a lower level than had been attained in 1925-1929. Iron and steel imports follow very closely the variation of the former.

In Colombia the capacity to import has had a more favourable tendency, 1/ permitting increased imports of iron and steel. The correlation between the two series has been relatively close with the exception of the depression and the war. Steel imports grew faster than the capacity to import in the years immediately after the war. This was probably motivated by accumulated deferred demand. The highest figures were attained in 1947 and, since then, steel imports have been below what the capacity to import would have permitted.

In Cuba, comparison of the variations between the two series shows how closely linked they are together. Linear coefficient of correlation based

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1/ It has not been possible to prepare indices of the capacity to import along the same lines used for other countries, because of lack of data. An estimate has been made deflating an index of the dollar value of exports by the index of export prices from the United States.

/on all

on all the annual figures 1945-1949, even including the depression and the war, is equivalent to 0.914.

Mexico shows a much smaller correlation than the other countries. In Mexico some other factors, in addition to the capacity to import, as determined here, influence the availability of foreign exchange. 1/ Among these other factors, income from tourist revenue is outstanding. In the immediate post-war era they represented 90 million dollars per year and have reached 156 million in 1950. For this reason the capacity to import has been substituted by indices of total imports in Chart 11. As in Brazil, the correlation is close until the early post-war years, and onwards, imports of iron and steel remained below the capacity to import, probably due to the considerable increase in domestic production.

Capacity to import seems, therefore, to establish specific limits in each country, above which iron and steel imports have risen only occasionally. No matter how strong the pressure of internal demand for greater quantities of steel products, there have been no available means to purchase them abroad. Additional imports of steel could have been obtained only by using a higher proportion of the available foreign exchange; but the main obstacle is the structure of imports, which hardly permits limiting purchases of other products. A substantial percentage of imports consists of extremely inelastic products: mainly foodstuffs in Chile; fuel, lubricants and basic chemical products in Argentina and Brazil. In addition it should be noted that imports of capital goods, including iron and steel, have been fairly high in some of the countries; up to 40 per cent of the value of total imports in Brazil in 1947. 2/

1/ The index of the capacity to import considers exclusively the changes related to the physical volume or exports and their terms of trade. It does not consider other items of the balance of payments. If the additions maintain a certain relation with foreign trade, this problem is of no importance, but in Mexico these other sources of foreign exchange have attained a growing importance within the balance of payments.

2/ A better idea for the inelasticity in some of these products, can be obtained from the following data for Chile, in which the following coefficients of elasticity for import products in relation to total imports prevail: foodstuffs, 0.36; chemical products, 0.70; fuel, 0.73; textiles, 0.77; and capital goods, 1.48.

ii) Local steel production. Insufficient increases, or even decreases, of the capacity to import are responsible for the relatively small steel consumption, faced with the trend of the factors linked to its demand. In this way, deferred demand has accumulated, becoming in some cases an obstacle to economic development. Under such conditions, the possibility of domestic supplies becomes very important. It provides a more regular availability, independent of foreign exchange problems or of restrictions on export markets.

In Brazil and Mexico, the influence which local steel industries have had on their consumption trends has been substantial. It is probable that if, in the first of these countries, availability of iron and steel could have been determined exclusively by the capacity to import, in 1945-1947, a considerable decrease in total consumption would have taken place; from an average of 430 thousand tons in 1925-1929 to an average of 406 thousand in 1945-1947. 1/ In the case of Mexico, in 1945-1948, it has been estimated that in order to equal, exclusively through imports, the steel supply at that time, such imports would have represented 13.4 per cent of the value of total imports, instead of 5.8 per cent.

Although on a smaller scale, the influence of domestic production upon the trend of steel consumption has been considerable in Argentina and Chile. Especially so in the former country, where, during the war years, domestic production reduced the effects of the drastic reduction in imports. In Chile, the influence becomes apparent in recent years, since steel consumption increased considerably from the opening of the Huachipato plant.

It should be noted that in those Latin American countries where domestic steelmaking industries are fairly developed, production of steel does not primarily aim at the substitution of imports. Increased domestic demand absorbs the greater availability, without reducing the pressure on certain purchases from abroad, thus obliging the maintenance of a variable level of

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1/ Here, of course, the possibility that the investments used in the steel industry could have been applied to increase production of export products, has not been considered. The possibility may exist that by thus increasing the capacity to import, higher imports of iron and steel could have been reached. In analysing such a possibility, it would become necessary to investigate the existence of export markets for such additional products.

imports. This is, probably, additional proof of the existence of a considerable unsatisfied potential demand, which cannot be evaluated on the basis of historical consumption trends.

To the above reasoning, the reciprocal influence of availability and demand for steel products, must be added. Regularity of supply tends to develop transforming industries, which soon establish industrial centres originating in the steelmaking industry. They again represent a new factor which increases demand.

These findings help to explain why those countries having steel industries are periodically compelled to plan extensions. In Brazil, in 1951, for instance, Volta Redonda produced over 340 thousand tons of finished steel, this being the limit of its capacity. The importance of immediate plans can be appreciated from the following fragments of the 1951 Report of the Board of Directors of the Companhia Siderurgica Nacional:

> "The inevitable delay in completing the first expansion of the plant (to raise steel ingot production to 680 thousand tons, or about 460 thousand tons of finished products), and the growing rate of increase for the market's requirements, due to the progressive industrialization of the country, have led the Board of Directors of the Companhia Siderurgica Nacional to the conclusion that when the new enlargements are finished, the production capacity of all facilities will already be unsatisfactory.
>
> Under these conditions, the necessary steps to meet the growth of the market have been studied.
>
> These early studies led to the conclusion that production at Volta Redonda should be raised to a million tons capacity of steel ingot annually (about 750 thousand tons of finished steel), within the present production lines and while the first expansion of the blast furnace proceeds".

These enlargement plans for Volta Redonda appear entirely compatible with the capacity expansions of other smaller companies - like Belgo Mineira, second in importance - which are also considering enlargements to their facilities. In addition, several major projects are being built or are in the blueprint stage: two plants in Sao Paulo, one in Santos and one in Bello Horizonte, each with a capacity above 250 thousand tons.

The existence of considerable potential demand and the increase in demand resulting from domestic steel industries, are factors which make

estimates of future domestic markets extremely difficult. This is particularly important to those countries which are planning to build steel industries. Quite often, in such cases, the consumption figures for the most recent years have alone been used. 1/

1/ Colombia is probably one of the most interesting examples of the difficulty to appreciate correctly the size of the domestic market. Possessing very valuable, well located natural resources for a steel industry, the possibility of their utilization was discussed on the basis of the smallness of demand. Some appreciations, based exclusively on import figures corresponding to definite periods, were frankly discouraging. Armco International Corporation, for instance, estimated in 1944 domestic demand at 25 thousand tons of finished steel, probably based on imports for the immediately preceding years. Nevertheless, consumption had already been close to 100 thousand tons in 1937-1939. Immediately after the war, in 1947, imports were 164 thousand tons. The initial capacity for the plant at present being constructed is 105 thousand tons per year of bars, shapes and derived products, to the exclusion of flat products.

ANNEX I

Apparent Consumption of Iron and Steel

A) Argentina

Years	Imports (Thousands of tons)	Production a/ (Thousands of tons)	Consumption (Thousands of tons)	Population (Thousands of inhabitants)	Per capita consumption (Kgs. per inhabitant)
1925	734.4		734.4	10,429	70.4
1926	728.2		728.2	10,691	68.1
1927	850.9		850.9	10,954	77 7
1928	1,091.4		1,091.4	11,231	97.2
1929	1,054.0		1,054.0	11,510	91.6
1930	848.1		858.1	11,804	72.7
1931	437.7		437.7	12,098	36.2
1932	321.9		321.9	12,400	26.0
1933	416.1		416.1	12,710	32.7
1934	520.7		520.7	13,028	40.0
1935	612.9		612.9	13,354	45.9
1936	606.1		606.1	13,688	44.3
1937	916.7		916.7	14,093	65.0
1938	581.7	5	586.7	14,202	41.3
1939	603.5	18	621.5	14,397	43.2
1940	553.5	24	577.5	14,591	39.6
1941	356.7	45	401.7	14,796	27.1
1942	164.2	55	219.2	15,004	14.6
1943	74.6	70	144.6	15,216	9.5
1944	69.5	150	219.5	15,441	14.2
1945	105.3	150	255.3	15,674	16.3
1946	437.3	170	607.3	15,912	38.2
1947	744.9	170	914.9	16,109	56.8
1948	803.8	170	973.8	16,420	59.3
1949	712.6	200	912.6	16,818	54.3
1950	671.0	240	911.0	17,196	53.0
1951	811.7	300	1,111.7	17,641	63.0

a/ Figures for the years 1938-48 taken from El problema Siderúrgico Argentino by Ingeniero Militar Coronel Pedro J. Maristany, Buenos Aires, 1950. Figures for the years 1949-51 are estimates.

ANNEX I

Apparent Consumption of Iron and Steel

B) Brasil

Years	Production (Thousands of tons)	Imports (Thousands of tons)	Consumption (Thousands of tons)	Population (Thousands of inhabitants)	Per capita consumption (Kgs. per inhabitant.)
1925	0.3	380.9	381.2	32,813	11.6
1926	16.0	393.0	409.0	33,223	12.3
1927	16.6	442.2	458.8	33,638	13.6
1928	26.2	473.9	500.1	34,058	14.7
1929	30.0	458.3	488.3	34,484	14.2
1930	25.9	247.9	273.8	34,915	7.8
1931	18.9	125.5	144.4	35,351	4.1
1932	29.5	125.6	155.1	35,793	4.3
1933	42.4	237.8	280.2	36,240	7.7
1934	48.7	295.2	343.9	36,693	9.4
1935	52.3	297.1	349.4	37,152	9.4
1936	62.9	324.8	387.7	37,616	10.3
1937	71.4	435.1	506.5	38,550	13.1
1938	85.7	272.2	357.9	39,477	9.1
1939	101.0	329.0	430.0	40,286	10.7
1940	135.3	291.0	426.3	41,100	10.4
1941	149.9	249.8	399.7	42,088	9.5
1942	155.1	119.4	274.5	43,100	6.4
1943	157.6	182.0	339.6	44,137	7.7
1944	166.5	325.8	492.3	45,198	10.9
1945	165.8	316.5	482.3	46,285	10.4
1946	230.2	431.4	661.6	47,398	14.0
1947	296.7	476.5	773.2	48,537	15.9
1948	403.5	236.3	639.8	49,704	12.9
1949	505.5	247.6	753.1	50,900	14.8
1950	623.2	251.7	874.9	52,124	16.8

ANNEX I

Apparent Consumption of Iron and Steel

C) Chile

Years	Imports	Domestic production (thousands of tons)	Total consumption	Population (thousands of inhabitants)	Per capita consumption (Kgs.per inhabitant)
1925	126.1	-	126.1	3,929	32.1
1926	113.0	-	113.0	3,977	28.4
1927	129.1	-	129.1	4,034	32.0
1928	174.8	-	174.8	4,118	42.4
1929	224.5	-	224.5	4,199	53.5
1930	245.6	-	245.6	4,287	57.3
1931	92.3	-	92.3	4,323	21.4
1932	27.6	-	27.6	4,391	6.3
1933	40.4	-	40.4	4,461	9.1
1934	61.8	-	61.8	4,534	13.6
1935	103.1	10	113.1	4,605	24.6
1936	102.2	12	114.2	4,697	24.3
1937	113.2	15	128.2	4,754	27.0
1938	103.2	18	121.2	4,831	25.1
1939	100.6	22	122.6	4,907	25.0
1940	112.5	23	135.5	4,985	27.2
1941	84.6	22	106.6	5,057	21.1
1942	56.6	26	82.6	5,130	16.1
1943	67.7	22	89.7	5,199	17.2
1944	86.0	25	111.0	5,273	21.0
1945	99.4	28	127.4	5,349	23.8
1946	101.7	33	134.7	5,430	24.8
1947	109.5	36	145.5	5,525	26.3
1948	105.5 a/	40	145.4	5,620	25.9
1949	130.4 a/	37	167.4	5,709	29.3
1950	111.5	53 b/	164.5	5,809	28.3
1951	93.2	113 b/	206.2	5,920	34.8

a/ Excluding some imports intended for assembling the Huachipato plant.
b/ Production for domestic consumption, excluding exports.

ANNEX I

Apparent Consumption of Iron and Steel

D) Colombia

Years	Imports (Thousands of tons)	Population (Thousands of inhabitants)	Per capita consumption (Kgs.per inhabitant)
1925	50.4	6,687	7.5
1926	65.8	6,832	9.6
1927	61.3	6,972	8.8
1928	89.1	7,111	12.5
1929	77.6	7,262	10.7
1930	45.4	7,412	6.1
1931	27.7	7,563	3.7
1932	30.0	7,726	3.9
1933	40.9	7,880	5.2
1934	53.4	8,038	6.6
1935	53.6	8,199	6.5
1936	75.4	8,363	9.0
1937	90.9	8,531	10.6
1938	98.6	8,702	11.3
1939	102.4	8,886	11.5
1940	80.5	9,076	8.9
1941	60.9	9,269	6.6
1942	12.0	9,469	1.3
1943	35.5	9,673	3.7
1944	78.8	9,883	8.0
1945	94.4	10,098	9.3
1946	120.2	10,318	11.6
1947	164.0	10,545	15.5
1948	98.6	10,777	9.1
1949	109.8	11,015	10.0
1950	152.2	11,260	13.5

ANNEX I

Apparent Consumption of Iron and Steel

E) Cuba

Years.	Imports of iron and steel (Thousands of tons)	Population (Thousands of inhabitants)	Per capita consumption (Kgs.per inhabitant)
1925	151	3,431	44.0
1926	126	3,519	35,8
1927	142	3,606	39.4
1928	107	3,692	29.0
1929	117	3,778	31.0
1930	70	3,886	18.0
1931	31	3,946	7.8
1932	24	4,028	6.0
1933	28	4,108	6.8
1934	38	4,187	9.1
1935	57	4,264	13.4
1936	71	4,339	16.4
1937	83	4,411	18.8
1938	58	4,480	12.9
1939	69	4,547	15.2
1940	65	4,611	14.1
1941	72	4,671	15.4
1942	31	4,728	6.6
1943	39	4,782	8.2
1944	74	4,851	15.2
1945	86	4,923	17.5
1946	105	4,995	21.0
1947	146	5,065	28.8
1948	121	5,135	23.6
1949	128	5,204	24.6
1950	136	5,276	25.8

ANNEX I

Apparent Consumption of Iron and Steel

F) México

Years	Production (Thousands of tons)	Imports (Thousands of tons)	Consumption (Thousands of tons)	Population (Thousands of inhabitants)	Per capita consumption (Kgs.per inhabitant)
1925	61.3	104.6	165.9	15,232	10.9
1926	65.1	104.0	169.1	15,465	10.9
1927	54.9	94.4	149.3	15,702	9.5
1928	69.2	92.0	161.2	15,942	10.1
1929	86.9	137.8	224.7	16,186	13.9
1930	88.8	79.1	167.9	16,553	10.1
1931	62.0	66.5	128.5	16,841	7.6
1932	48.7	44.6	93.3	17,134	5.4
1933	64.7	71.8	136.5	17,432	7.8
1934	114.0	114.7	228.7	17,735	12.9
1935	134.3	114.1	248.4	18,044	13.8
1936	129.5	131.1	260.6	18,852	13.8
1937	185.1	182.6	367.7	18,737	19.6
1938	108.1	66.4	174.5	19,071	9.1
1939	131.6	85.0	216.6	19,413	11.2
1940	130.1	92.0	222.1	19,763	11.2
1941	131.7	102.9	234.6	20,208	11.6
1942	132.5	73.4	205.9	20,657	10.0
1943	126.0	119.7	245.7	21,165	11.6
1944	142.5	232.6	375.1	21,674	17.3
1945	203.9	226.7	430.6	22,233	19.4
1946	268.3	270.6	538.9	22,779	23.7
1947	300.2	314.0	614.2	23,440	26.2
1948	249.1	173.7	422.8	24,129	17.5
1949	334.6 a/	167.1	501.7	24,825	20.2
1950	348.2 a/	226.8	575.0	25,706	22.4
1951	394.7 a/	342.3	737.0	26,332	28.0

a/ Estimates.

ANNEX II

Estimated Steel Consumption by Groups of Products

(Thousands of tons)

A) Argentina

Years	Total	Rails and accessories	Bars, strip, shapes and structural steel	Wire and wire products	Sheet	Tinplate	Tubes	Other products
1925	734.4	73.5	245.2	123.8	175.1	31.2	75.4	10.2
1926	728.3	89.4	274.9	104.4	147.8	30.4	70.2	11.1
1927	850.9	127.7	321.4	118.3	141.2	50.8	78.6	12.9
1928	1,091.4	222.2	411.7	155.2	178.9	40.8	81.4	1.2
1929	1,054.0	182.9	413.9	134.2	175.2	47.8	99.2	0.8
1930	858.1	162.8	334.1	103.7	129.0	39.6	88.2	0.7
1931	437.7	20.9	182.8	60.7	84.1	33.4	54.9	0.9
1932	321.9	4.6	137.5	51.8	59.0	37.4	30.7	0.9
1933	416.1	10.7	162.6	62.0	100.1	46.3	33.6	0.8
1934	520.7	56.0	188.3	75.8	80.5	66.2	52.7	1.2
1935	612.9	35.1	277.6	87.5	115.4	53.3	42.8	1.2
1936	606.1	42.6	241.7	85.8	117.6	63.7	53.9	0.8
1937	916.7	46.2	434.1	111.8	173.8	81.1	68.1	1.6
1938	586.7	30.1	280.5	66.5	87.9	55.9	64.2	1.6
1939	621.5	20.9	289.5	63.1	120.0	68.6	57.7	1.7
1940	577.5	6.6	266.5	45.2	117.6	90.6	47 7	3.3
1941	401.7	4.2	148.5	55.3	68.4	92.1	30.8	2.4
1942	219.2	1.3	84.1	20.3	29.3	60.2	20.7	3.3
1943	144.6	1.5	77.8	15.7	7.1	30.8	9.8	1.9
1944	219.5	0.4	152.4	19.0	6.2	32.2	6.7	2.6
1945	255.3	1.4	153.1	29.5	20.6	33.7	14.8	2.2
1946	607.3	20.2	300.7	94.8	106.3	37.3	42.5	5.5
1947	914.9	43.7	374.4	158.2	165.5	78.0	87.2	7.9
1948	973.8	89.5	338.6	147.3	210.5	77.4	105.8	4.7
1949	912.6	55.8	405.5	146.0	152.2	35.0	113.5	4.6
1950	911.0	17.6	399.4	146.2	144.1	58.7	138.8	6.2
1951	1,111.7	34.3	386.9	152.6	284.1	85.4	154.5	13.9

ANNEX II

Estimated Steel Consumption by Groups of Products
(Tousands of tons)

B) Brazil

Years	Total	Rails and accessories	Bars, strip, shapes and structural steel	Wire and wire products a/	Sheet	Tinplate	Tubes b/	Other products c/
1925	381.2	120.6	65.1	78.0	35.7	25.5	43.3	13.0
1926	409.0	146.0	101.2	56.5	35.0	16.3	40.2	13.8
1927	458.8	115.0	112.2	71.7	60.0	32.3	39.7	27.9
1928	500.1	122.1	121.5	88.9	54.4	33.6	56.2	23.4
1929	488.3	94.8	148.7	83.4	50.7	25.8	55.0	29.9
1930	273.8	60.0	75.8	45.6	28.1	24.2	22.5	17.6
1931	144.4	22.7	32.4	30.5	19.9	23.3	9.4	6.2
1932	155.1	15.8	45.5	29.0	22.0	23.8	13.8	5.2
1933	280.2	59.1	72.9	46.1	42.6	33.0	20.6	5.9
1934	343.9	94.4	101.0	50.3	38.2	30.0	21.8	8.2
1935	349.4	62.1	125.8	53.5	42.7	31.8	28.8	4.7
1936	387.7	62.6	138.1	59.2	48.9	42.9	33.4	2.6
1937	506.5	94.5	173.6	66.5	62.0	56.4	50.5	3.0
1938	357.9	48.2	154.2	45.4	41.8	38.7	27.1	2.5
1939	430.0	82.8	157.2	53.0	52.3	51.0	31.9	1.8
1940	426.3	55.4	172.2	45.6	53.1	66.7	31.7	1.6
1941	399.7	56.4	159.4	47.0	42.2	59.5	29.2	6.0
1942	274.5	19.1	146.7	39.0	16.7	42.4	9.3	1.3
1943	339.6	70.2	151.9	36.0	24.8	42.3	12.8	1.6
1944	492.3	77.7	209.8	54.6	68.1	51.7	27.3	3.1
1945	482.3	103.6	193.8	54.5	51.4	52.2	24.8	2.0
1946	661.6	127.6	273.9	92.9	81.4	40.8	41.5	3.5
1947	773.2	95.2	301.6	129.5	112.9	77.9	52.5	3.6
1948	639.8	89.4	198.0	87.3	134.1	74.0	43.1	13.9
1949	753.1	45.6	262.0	147.1	153.1	66.2	76.8	2.3
1950	874.9	65.6	340.1	164.4	154.2	85.6	65.0	..

a/ Until 1939, imports only. After 1940 the production of the Companhia Siderurgica Belgo-Mineira was added.

b/ Until 1946, imports only. After 1947 the production of the Companhia Siderurgica Belgo-Mineira was added. There was no information on other companies.

c/ Includes: special steels and iron and steel in various unspecified forms.

ANNEX II

Estimated Steel Consumption by Groups of Products
(Thousands of tons)

C) Chile

Years	Total	Rails and accessories	Bars, strip, shapes and structural steel	Wire and wire products	Sheet	Tinplate	Tubes	Other products
1925	126.1	19.6	36.3	19.9	26.5	6.4	17.4	-
1926	113.0	23.3	27.7	16.7	19.3	8.0	18.0	-
1927	129.1	28.0	42.3	18.8	22.8	5.5	11.7	-
1928	174.8	57.2	40.2	23.7	27.6	6.8	19.3	-
1929	224.5	41.0	81.9	30.8	35.2	8.6	27.0	-
1930	245.6	57.9	78.0	24.2	35.7	9.6	40.2	-
1931	92.3	9.8	34.3	9.9	16.4	4.0	17.9	-
1932	27.6	1.0	9.1	6.1	5.4	2.1	3.9	-
1933	40.4	7.7	12.0	8.2	4.8	2.4	5.0	0.3
1934	61.8	2.2	30.8	11.2	7.6	4.7	4.8	0.5
1935	113.1	10.7	56.0	17.6	12.5	5.8	9.5	1.0
1936	114.2	15.9	52.5	13.8	15.9	7.4	7.2	1.5
1937	129.2	4.0	61.1	18.6	18.8	7.9	15.5	2.3
1938	121.2	18.6	52.9	13.9	15.6	5.8	12.1	2.3
1939	122.6	10.0	48.5	20.3	20.6	9.0	11.7	2.5
1940	135.5	7.3	61.5	19.3	22.6	11.3	11.7	1.8
1941	106.6	5.3	48.9	17.8	14.3	8.4	11.4	0.5
1942	82.6	5.5	43.2	7.7	7.0	9.3	9.0	0.9
1943	89.7	11.4	42.1	8.1	9.1	9.0	8.9	1.1
1944	111.0	10.0	50.9	19.4	14.4	4.6	10.5	1.2
1945	127.4	15.1	62.7	22.1	11.9	7.3	6.8	1.5
1946	134.7	17.8	66.5	19.8	14.9	4.8	10.0	0.9
1947	145.5	24.4	67.8	16.3	15.7	7.9	9.0	4.4
1948	153.9	14.3	67.5	18.4	19.3	11.8	15.1	7.5
1949	192.5	11.9	92.3	21.1	23.2	9.8	26.7	7.5
1950	164.5	6.3	81.2	20.2	19.5	8.6	23.9	4.8
1951	206.2	28.2	100.9	6.9	27.1	13.5	19.3	10.3

ANNEX II

Estimated Steel Consumption by Groups of Products
(Thousands of tons)

D) Colombia

Years	Total	Rails and accessories	Bars, strip shapes and structural steel	Wire and wire products	Sheet	Tinplate	Tubes
1925	50.4	17.6	7.3	12.3	10.1	1.5	1.6
1926	65.8	23.4	13.3	13.7	10.6	3,2	1.6
1927	61.3	12.2	6,9	17.9	17.6	3.8	2.9
1928	89.1	27.0	17.7	16,6	21.2	3.2	3,4
1929	77.6	11,9	20.4	19,0	21.8	1,2	3.3
1930	45.4	15,3	6.7	10.8	9,7	1.5	1.4
1931	27.7	5.6	3,2	10,7	6.3	0.6	1.3
1932	30,0	1.9	7.9	10.1	7.7	1.0	1,4
1933	40.9	3.6	7.5	11.4	7.5	2.3	8,6
1934	53.4	7,3	13.4	14,3	8,8	3.2	6,4
1935	53.6	4.0	12,7	12.7	12,5	2.5	9.2
1936	75.4	5.1	17,3	17.1	17.7	3.4	14.8
1937	90,9	6.0	23.9	16.8	14.9	4.4	24.9
1938	98.6	2.1	19.1	12,4	15.0	2.8	47.2
1939	102.4	2,2	23,6	20.8	18.0	6,0	31.8
1940	80.5	4.5	22.6	14.2	12.5	5.0	21.7
1941	60.9	3,2	23,6	12.4	4,6	4,0	13.1
1942	12,0	0.2	2.9	2.3	1,3	1.2	4,1
1943	35,5	0,5	12.2	6.7	3,8	4,1	8,2
1944	78,8	1.5	33.8	10.0	5,2	1.4	26.9
1945	94.4	0,8	36.4	12.0	9,5	2.6	22.1
1946	120,2	7.8	48,3	17,7	13.7	1.9	30.8
1947	164,0	16.0	57.4	26.7	16.1	4.7	43,1
1948	98,6	6.0	29.6	22.1	10,4	6.5	24,0
1949	109.8	1.9	31.6	24,1	11,2	4.4	36.6
1950a/	152,2	0,4	55.5	39.8	22.0	5,5	29.0

a/ Provisional figures, as several minor products have not been included.

ANNEX II

Estimated Steel Consumption by Gropus of Products
(Thousands of tons)

E) Cuba

Years	Bars a/ shapes, strip and structural steel	Wire and wire products	Sheet	Tinplate	Tubes	Other products b/	Total
1925	85.3	17.4	18.2	7.2	11.8	11.2	151.1
1926	76.0	14.3	14.3	4.0	9.7	8.2	126.5
1927	74.1	18.5	19.4	6.5	11.6	11.5	141.6
1928	37.0	19.7	14.2	5.2	22.5	8.0	106.6
1929	43.3	20.0	12.7	7.0	21.7	12.5	117.2
1930	24.9	13.0	9.0	6.2	7.3	9.1	69.5
1931	10.3	8.0	4.1	3.9	3.3	1.8	31.4
1932	6.1	7.7	3.8	3.6	1.7	0.9	23.8
1933	4.8	9.2	3.9	5.0	2.5	2.2	27.6
1934	7.4	11.9	6.8	6.7	2.6	3.0	38.4
1935	15.1	16.0	9.1	7.4	4.9	4.1	56.6
1936	20.7	16.4	10.6	9.9	6.2	7.2	71.0
1937	24.2	19.3	14.0	12.8	9.0	3.7	83.0
1938	16.7	14.0	7.2	9.9	5.8	4.7	58.3
1939	19.8	16.8	8.0	13.5	7.5	3.7	69.3
1940	23.3	11.6	10.1	11.2	6.2	2.3	64.7
1941	19.2	14.7	6.2	19.8	9.2	3.0	72.1
1942	2.9	4.4	4.4	14.9	2.5	1.5	30.6
1943	6.4	5.1	5.2	13.1	2.6	6.8	39.2
1944	26.3	13.4	12.5	11.6	5.0	4.9	73.7
1945	23.3	13.8	14.7	12.7	13.0	8.1	85.6
1946	49.4	12.5	11.8	16.9	7.1	7.0	104.7
1947	52.2	26.1	19.4	17.4	7.8	22.8	145.7
1948	32.6	23.5	18.7	22.1	11.2	12.6	120.7
1949	40.3	25.2	17.9	12.8	22.4	8.9	127.5
1950	47.9	25.4	20.1	20.8	15.9	5.8	135.9

a/ Includes the group "Other Iron and Steel Manufactures" for 1925 and 1927 covering products which in later years were broken down in detail.

b/ Includes rails and railway accessories, special steels and other smaller headings.

ANNEX II

Estimated Steel Consumption by Groups of Products
(Thousands of tons)

F) México

Years	Total	Rails and accessories	Bars, strip, shapes and structural steel	Wire and wire products	Sheet	Tinplate	Tubes
1925	165.9	24,7	50.0	21.3	14.1	12,1	43,7
1926	169.1	32.5	54,2	23.2	15.6	15.1	28,5
1927	149.3	36.1	41,5	20,4	14,1	11,4	25.8
1928	161.2	31,3	55.5	21.7	16.6	13,1	23.0
1929	224,7	32.7	70.5	26.7	35,0	19.7	40,1
1930	167.9	31,0	72.6	22.0	9,9	9.4	24.0
1931	128.5	24.4	47.3	13.1	12.1	12.0	19.6
1932	93.3	15.0	34.6	9.9	14.4	9.4	10.0
1933	136.5	21.9	43.3	15.7	23.7	10.9	21,0
1934	228.7	27.3	94.1	20.3	34,2	13,4	39,4
1935	248.4	33,6	104,7	24.1	28.5	11.1	46,4
1936	260,6	37,4	101,4	27,1	34.1	16.6	44,0
1937	367.7	43,3	163,6	30,2	40.6	18.0	72.0
1938	174.5	33,0	72,5	23,0	16.1	11,9	18,0
1939	216,6	31,2	95,4	24,6	29.7	18,2	17.5
1940	222.1	22,7	102.3	28.4	32,0	17.7	19,0
1941	234,6	21.2	103.8	34.4	30.4	19,6	25.6
1942	205,9	26.9	88,7	33.1	21,0	16.7	19.5
1943	245.7	24.2	78.2	36,2	45.1	16,1	35.9
1944	375.1	37.6	153.5	60,7	67.3	15.8	40,2
1945	430.6	33.3	198.3	57.9	80,2	16,5	44.4
1946	538.9	62,5	239.4	69,8	100.4	11,2	55,6
1947	614,2	105,3	257.6	68.1	93,0	21.3	68.9
1948	422,8	59,7	165,6	57.3	88.7	15.3	41.3
1949	506.7	62.5	198.2	64,8	111.1	21.8	48,3
1950	575,0	105,1	205,3	61,4	111,2	23,8	68,1
1951	737.0	158.1	290.9	68,1	127.8	36,2	55,9

ANNEX III

Relationship Between Iron and Steel Consumption and the Development of Industrial Production

(Indices 1935-39 = 100)

Years	Argentina		Brasil		Chile		México	
	Steel consumption	Industrial production	Steel consumption	Industrial production	Steel consumption	Industrial production	Steel consumption	Industrial production
1925	109,8	--	93,8	49.2	105,2	61,4	65,4	60.7
1926	108.9	--	100,7	53.5	94,3	66,4	66,6	68.9
1927	127.2	--	112,9	59,3	107.7	59,8	58,8	62.3
1928	163.2	--	123.1	77.5	145.8	65,9	63,5	65.4
1929	157.6	--	120,2	73.4	187.3	80,4	88,5	69,3
1930	128.2	--	67,4	71,4	204,9	80,4	66.2	72,9
1931	65,4	--	35.5	72,4	77,0	59,8	50,6	72.8
1932	48,1	--	38,2	69.4	23,0	68,2	36.8	62,9
1933	62,2	--	69,0	75,5	33.7	75,0	53,8	58,2
1934	77.8	--	84,6	79,4	51,6	81,7	90,1	86.9
1935	91.6	83.7	86.0	93,5	94.4	94,2	97,9	84.6
1936	90,7	93.7	95,4	92.5	95,3	93,4	102.8	97.3
1937	137,0	103.2	124,7	100,5	107.0	101.0	144.9	102,0
1938	87.7	107.8	88.1	100,4	101.0	108,6	68,9	105,0
1939	93,0	111,6	105,8	113,1	102,3	102,8	85,5	111,1
1940	86,3	--	104,9	119,7	113,0	115,0	87,5	114.5
1941	60,0	115,9	98,4	130,5	88,9	126,2	92,4	124,6
1942	32,7	--	67.6	137.0	68,9	124,0	81.1	138,6
1943	21,6	123.2	83,6	157.1	74,8	123.4	96,8	140.1
1944	32,8	--	121,2	170,4	92.6	121,9	147.8	147.1
1945	38.1	140,6	118,7	169,4	106,2	136,4	169.7	154.5
1946	90.8	150,8	162.8	180,2	112,4	151,9	212,4	155,3
1947	136,8	182,9	190,3	174,2	121,4	157,3	242,0	151.3
1948	145.6	184.9	157,5	200,4	128,4	164,7	166,6	158.7
1949	136.4	178,1	185,4	206,4	160,6	172,0	197,7	168.3
1950	136.2	181.1	215,3	219.0	137,2	171,5	226,6	192.7

ANNEX IV

Relationship between the Consumption of Steel Bars and Shapes and Cement Consumption

(Index 1935-39 = 100)

Years	Argentina		Brazil		Chile		Colombia		Cuba		México	
	Bars and shapes	Cement consumption	Bars and shapes	Cement consumption	Bars and shapes	Cement consumption	Bars and shapes	Cement consumption	Bars and shapes	Cement consumption	Bars and shapes	Cement consumption
1925	80.5	43.0	43.5	54.1	67.0	43.6	37.8		444.1	254.1	46.5	45.1
1926	90.3	51.0	67.6	65.9	51.1	56.8	68.8	37.3	394.7	213.1	50.4	51.0
1927	105.5	58.2	74.9	80.1	78.0	68.7	35.7		384.9	254.1	38.6	54.2
1928	135.1	64.8	81.1	87.6	74.2	65.9	91.6	81.9	194.1	303.3	51.6	67.9
1929	135.8	76.2	99.3	101.6	151.1	123.2	105.6	92.4	227.0	341.5	65.6	76.2
1930	109.6	73.1	50.6	75.9	143.9	131.8	34.7	50.8	128.3	259.6	67.5	72.2
1931	60.0	162.1	21.6	45.3	63.3	42.3	16.6	38.2	52.6	54.6	44.0	49.7
1932	45.1	56.9	30.4	49.8	16.8	38.8	40.9	39.6	32.9	43.7	32.2	42.4
1933	53.4	51.3	48.7	54.8	22.1	43.6	38.8	44.7	26.3	35.5	40.3	53.3
1934	61.8	58.7	67.4	72.5	56.8	63.7	69.4	58.8	39.5	49.2	87.5	82.1
1935	91.1	72.8	84.0	77.3	103.3	95.3	65.7	61.9	78.9	68.3	97.4	77.8
1936	79.3	86.4	92.2	90.7	96.9	79.3	89.5	95.6	108.5	98.4	94.3	85.2
1937	142.5	107.4	115.9	104.7	112.7	99.9	123.7	98.0	125.0	112.0	152.2	103.7
1938	92.1	121.4	103.0	108.2	97.6	116.5	98.9	118.9	85.5	101.1	67.4	112.7
1939	95.0	112.0	104.9	119.1	89.5	109.0	122.2	125.6	102.0	120.2	88.7	120.6
1940	87.5	101.6	115.0	123.1	113.5	127.0	117.0	124.7	121.7	136.6	95.1	142.2
1941	48.7	109.2	106.4	126.6	90.2	124.5	122.2	132.0	98.7	139.3	96.5	157.7
1942	27.6	101.7	97.9	131.6	79.7	121.2	15.0	127.9	13.2	147.5	82.5	165.0
1943	25.5	92.9	101.4	122.4	77.7	122.4	63.1	155.4	32.9	158.5	72.7	186.2
1944	50.0	104.4	140.1	146.9	93.9	126.4	174.9	190.0	138.2	158.5	142.8	201.8
1945	50.2	105.0	129.4	165.7	115.7	146.1	188.4	206.2	121.7	221.3	184.4	267.1
1946	98.7	108.5	182.9	189.6	122.7	186.3	250.0	243.3	256.6	256.8	222.6	301.1
1947	122.9	143.4	201.4	203.1	125.1	191.2	297.1	283.9	273.0	306.0	239.6	311.8
1948	111.1	154.3	112.2	237.3	124.5	172.0	153.2	249.4	171.0	297.8	153.9	305.7
1949	133.1	148.9	174.9	279.5	170.3	157.9	163.6	309.6	210.5	344.3	184.3	352.0
1950	131.1	164.6a/	227.1	288.3	149.8	163.4	287.3	363.3	250.0	..	190.9	404.2
1951	127.0	184.0a/	..	..	186.2	176.8	..	..	..	..	270.5	..

a/ Estimated figures.

ANNEX V

Relationship between Iron and Steel Imports and the Capacity to Import

(Index 1935-39 = 100)

Years	Argentina		Brazil		Chile		Colombia		Cuba		México		Total imports
	Iron and steel imports	Capacity to import	Iron and steel imports	Capacity to import	Iron and steel imports	Capacity to import	Iron and steel imports	Capacity to import	Iron and steel imports	Capacity to import	Iron and steel imports	Capacity to import	
1925	110.6	92.1	114.8	162.7	207.1	164.7	59.9	59.8	223.3	233.3	90.3	161.8	153.5
1926	109.6	92.4	118.5	140.5	108.2	166.7	78.2	78.1	187.0	177.8	89.8	178.0	141.4
1927	128.1	118.7	133.2	133.1	123.6	157.7	72.8	83.8	209.9	203.7	81.5	172.7	117.7
1928	164.3	147.6	142.9	149.4	167.3	176.4	105.8	104.3	158.4	157.4	79.4	162.0	125.2
1929	158.7	133.3	138.2	153.8	214.9	167.7	92.2	92.9	173.7	151.8	119.0	150.7	132.9
1930	129.2	85.0	74.7	105.0	235.2	116.0	54.1	92.4	103.0	94.4	68.3	95.2	108.4
1931	65.9	88.7	37.8	102.1	88.4	88.3	32.9	100.0	45.8	85.2	57.4	78.8	68.9
1932	48.5	81.1	37.8	84.3	26.4	34.6	35.6	77.2	34.4	64.8	38.5	50.0	52.9
1933	62.6	74.4	71.6	88.8	38.6	44.2	48.6	71.2	40.1	72.2	62.0	55.0	62.6
1934	78.4	78.6	89.0	105.0	59.2	73.6	63.6	104.7	57.2	81.5	99.0	88.4	74.3
1935	92.3	90.4	89.5	91.7	98.8	79.7	83.7	88.5	84.0	88.9	98.5	110.8	83.9
1936	91.2	104.5	97.9	102.1	97.8	87.8	89.5	98.4	105.0	105.6	113.2	102.7	97.7
1937	138.0	136.3	131.2	103.5	108.4	127.7	107.3	108.3	122.1	116.7	157.6	116.8	121.1
1938	87.6	82.2	82.2	97.6	98.7	105.1	117.2	96.8	85.9	90.7	57.3	82.0	102.8
1939	90.9	86.7	99.2	105.1	96.3	99.7	121.7	108.0	103.0	98.1	73.4	87.7	94.5
1940	83.3	60.8	87.7	81.4	119.6	101.8	95.6	93.9	95.4	79.6	79.4	81.0	89.1
1941	53.7	56.8	75.2	99.1	81.0	116.0	72.5	95.7	106.9	118.5	88.8	69.4	130.6
1942	24.7	57.6	36.0	97.6	54.2	126.8	14.2	84.2	45.8	81.5	63.4	71.4	95.5
1943	11.2	63.1	54.9	110.9	64.8	103.1	42.2	87.2	57.2	138.9	103.3	92.5	112.0
1944	10.5	62.7	98.2	131.6	82.3	110.7	93.6	77.2	108.8	159.2	200.8	87.1	173.5
1945	15.8	64.4	95.5	136.1	95.1	103.6	112.1	83.8	126.0	153.7	195.7	101.0	200.6
1946	65.8	101.5	130.0	173.1	97.3	103.6	142.8	137.3	154.6	150.0	233.6	107.4	267.4
1947	112.1	115.0	143.6	164.2	104.8	108.2	194.8	146.7	215.6	213.0	271.1	121.0	274.0
1948	121.0	106.8	71.2	162.7	100.9	123.2	117.0	160.7	179.4	192.6	150.0	136.4	220.2
1949	107.3	66.0	74.6	156.8	124.8	108.7	130.4	185.2	188.9	174.1	144.3	..	260.3a/
1950	101.0	99.5	75.9	227.8	106.7	114.5	180.8	233.7	202.3	..	195.8	..	301.4a/
1951	122.2	..	..	..	..	..	..	..	..	..	295.5	..	389.7a/

a/ Estimated figures.