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ANNEX F

MINING IN LATIN AMERICA

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## ANNEX F. MINING IN LATIN AMERICA

## INTRODUCTION

Changes in the world production of non-ferrous industrial metals

The present work is confined to an analysis of the fluctuations in the production and consumption of copper, lead, zinc and tin, all of which metals are important to the economy of several Latin-American countries, particularly Chile, Mexico, Peru and Bolivia.

Production and consumption in the world market may be considered as equivalent when it is a question of a long period of years, except in special cases which will be dealt with as they arise. On account of the large amounts involved, tin and copper are generally exported from Latin American ports, as soon as a complete cargo accumulates. On the other hand, when lead and zinc ores are worked, sometimes only one of them may be extracted, the other being left in the tailings for re-treatment only when better market conditions arise. For the purposes of the present work, however, metals accumulated in such tailings will not be considered.

Owing to the fact that new uses have been found for some of the metals at different times, and also to the uneven fluctuations in their price, which have sometimes resulted in the substitution of one for another, consumption has shown quite a different trend. Besides, such substitutions have not been caused by the short and violent fluctuations in price that occur during cycles, but rather are a consequence of variations in the supply and demand of some of these metals. Table I shows the indices of production in the periods of upswing in the last three cycles.

Whereas the consumption of copper showed a steady increase during the peak years of the various cycles, the other metals showed irregular trends, and lower figures were registered for them in 1946/1948 than for some of the former period.

In Chart I the production of the four metals is given in thousands of metric tons. It may be observed that copper consumption increased considerably during the two World Wars; zinc also rose but to a lesser degree; whereas lead and tin were adversely affected by the war; it is

/a fact, however,

a fact, however, that tin supplies from the Far East were discontinued during the last war. It is possible that some of the tin saving procedures and materials developed during the war, may continue to be used in peacetime and thereby, permanently reduce the consumption of the metal.

Copper, and also zinc to a lesser extent are mainly employed in the manufacture of capital goods, whereas lead and tin are chiefly valuable for consumer goods. This causes the first two to behave differently from the last two during cycles. Copper and zinc contract sharply during the downspring while lead is much less affected. The irregular behaviour of tin is due to the accumulation of excessive stocks which reached peak figures after the record production of 1929; in order to dispose of them, output was curtailed and the International Tin Committee organized in 1931. This is one of the cases in which production and consumption have not coincided over a period of years, the former having been excessive.

#### SECTION 1. COPPER

##### I. Changes in the share of the different copper-producing regions in world production

The methods of ore concentration have been improving steadily since the beginning of the century; by the end of the first World War, flotation was added to those based on gravity. It thus became possible to add the exploitation of large deposits of minerals with a low metal content in various parts of the world - especially the United States, Chile, South Africa, Rhodesia, the Belgian Congo and Canada - to that of scarce high-grade minerals which alone could be smelted directly. The high transport costs from remote districts to consumption centres have only exercised an influence of secondary importance, due to the high price fetched by copper.

This technical progress has made it possible to supply the world with large increases in copper production, which are shown in Chart I. At the same time it has caused changes in the relative importance of the various zones of production. The United States, which had the lead in 1913 with 59 per cent of the total copper production of the world, has it still, although it now only contributes 37 per cent. Table 2 shows the

/percentage contributed

Table 1. World production indices of certain non-ferrous metals during selected peak years<sup>a/</sup>

Periods	Copper	Lead <sup>b/</sup>	Zinc	Tin
	(In thousands of metric tons)			
Basic year: 1913	<u>939</u>	<u>1,172</u>	<u>1,010</u>	<u>134</u>
Average 1927/29	180	145	132	131
Average 1935/37	184	128	149	133
Average 1946/48	205	96	147	89

Source: Economic Research Centre, United Nations Economic Commission for Latin America, based on figures given in the Yearbook of the American Bureau of Metal Statistics, 1921/1948.

Notes: a/ Excluding U.S.S.R.

b/ Production on smelting basis(smelter basis)... On the basis of mining production, the increase in the last two periods is less than the figure given here.





percentage contributed by different zones to the world total during the peak years of the various economic cycles.

Table 2. World copper production, excluding U.S.S.R., and percentage distribution by selected production zones

Year	World total (in thousands of metric tons)	Percentages of world production						
		United States	Canada	Chile	Mexico	Rest of Latin America	Africa	Other Countries
1913	939	59	3,7	4,5	5,6	3,8	2,4	21,0
1917	1,417	62	3,6	7,2	3,6	4,2	3,0	16,4
1929	1,381	50	5,8	16,8	4,2	4,0	7,8	11,4
1937	2,174	35	11,3	19,0	2,2	2,4	17,4	12,7
1943	2,565	39	10,4	19,3	1,8	1,9	16,9	10,7
1948 <sup>b/</sup>	2,089	37	10,7	21,3	2,8	1,9	19,3	7,0 <sup>a/</sup>

Source: Economic Commission for Latin America, with data from the yearbook of the Bureau of Metal Statistics.

a/ Excluding Germany and Yugoslavia, which before the war were producing approximately 65,000 metric tons a year.

b/ Estimated.

Chile's copper industry had seen its fullest development before 1929, but it continued to expand even after that date, although at a slower rate. Canada and Africa, on the other hand, developed their industries chiefly during the thirties. If we compare the different years of high production, we find that the United States has managed to increase its tonnage in each of those years. They reached their maximum output in 1943. In spite of this, the United States have reduced their headway, which was so considerable at the beginning of the century. The tonnage of Mexico and the rest of Latin America has increased somewhat since 1913, but now shows a definite drop if we compare their present figures with those of 1929.

## II. The share of Latin American countries in world production

Chart No. 2 compares copper mining in the chief countries of Latin America with that of the world as a whole during the period 1913/1948. The increase of the Latin American countries is due almost entirely to Chile. The chart also demonstrates how close the connection is between the behaviour of copper in Latin America, and that of world copper during

/cyclical fluctuations

cyclical fluctuations. Here, too, this similarity in behaviour is mainly due to Chile, now that Peru almost entirely, and Mexico to some extent, exploit copper from mixed zinc and lead ores, the relative stability of which metals during depressions has already been noted.

Other copper-producing countries in Latin America which do not yield enough to be mentioned in the chart are Cuba, with an output of about 14,000 tons a year; Bolivia, with about 7,000 tons a year of copper in concentrates; and Ecuador and Venezuela, which have exported, albeit intermittently, small quantities of mineral ore or blister bars.

Table No. 3 gives the percentages of the world copper supply contributed by Chile, Mexico and Peru. Chile's figures reveal a continuous, if irregular, increase in its share in world production. Those of Peru and Mexico increased until 1929/30 and then declined. The extraordinary decrease in production shown by the former in 1948 is only temporary, being due to the fact that Cerro de Pasco, its chief producer, was in the course of abandoning its old methods of work and of building an electrolytic refining plant which, together with the equipment of yet another mine belonging to the same company (Yauricocha), including an aerial tramway, represents an investment of 6,000,000 dollars. Even Cerro de Pasco is unlikely to make any contribution of a revolutionary nature to copper production in Latin America in the near future for, as extraction proceeds, it is becoming more and more a lead-zinc mine. A long lawsuit regarding the Tequepala property in southern Peru, has been brought to an end. There is some talk that the owner, a United States Company, is going to work it on a large scale, but so far, this has not been officially confirmed.

Where Mexico is concerned no deposits have been found, beyond those already being mined, whose superficial indications afford any proof of the existence of large quantities of ore. Although there are outcrops in various states, their possible importance can only be determined by means of costly geological surveys, diamond drilling and mining operations. There is no evidence to show that any such surveys have been made in

/the new mining

the new mining properties since the great depression. This situation is often attributed to the taxes which, as almost all those affecting Mexican mining, are levied by unit of production, whether there are any profits or not. In any case, the pattern of prices, costs and taxes is less favourable for the copper industry, than it is for lead and zinc. As a result, one company among several others which has developed Cuban copper mines, has confined itself to investments in lead and zinc in Mexico. The decrease in copper production is due in part to the fact that several medium sized mines discontinued operation during the depression, and partly, also, to the reduction of output in the Boleo mine in Lower California. This was once the largest copper producer in the country, but it is now somewhat depleted, no new ore bodies having been discovered lately in the property, to replace those already mined. The only recent investment in a Mexican copper mine was made in the Cananea mine during the war with a loan from the United States Government. The additional production which this involved was not quite sufficient to equal the record level of the 'twenties, much less to enable Mexico to retain the share in world production that it had had at the beginning of the century. As the copper-bearing regions of this country are quite distinct and separate from those rich in silver, lead, zinc and gold, it follows that mining activities in the copper zones being scanty, the possibility of discovering a large copper deposit accidentally through underground workings, where surface indications are lacking, as often happens in the United States, is accordingly remote.

### III. Ratio between world consumption and production at capacity levels

In spite of the great increase in the world's production capacity, due to the development of mining in certain regions, such as Chile, Canada and Africa in particular - as we have seen in Section 2 - production has nonetheless been inadequate during both world wars. A shortage of copper existed even during the peak years of the economic cycles of 1929, 1937, 1947 and 1948, so much so that producers have

/had to ration

had to ration their clients, and buyers have made bids at higher prices, at least for certain lots, in order to improve their supply.

On the other hand, as was only to be expected, the world's production capacity was not made full use of during the remaining years of each cycle. Chart No. 2 shows world copper production, excluding that of Russia, together with the annual world output at its maximum theoretic capacity. <sup>1/</sup>

The chart shows that in 1930/37 the use made of the capacity of copper production was much lower than in 1919/29, the only exception being 1921, a year in which most mines, but especially those of the United States, reduced their output in order to facilitate the disposal of the enormous copper stocks that remained in Government hands at the end of the war.

If we examine the annual figures, we find that up to 79 per cent of the theoretical production capacity was used during the economic cycle which ended in 1929, and only up to 67.5 per cent during the 'thirties. This surplus potential capacity for copper production, which was not made use of, resulted in the lowering of prices in the second period, i.e. during the 'thirties, as a means of preventing production by some of the submarginal mines. They would have fallen lower still, had not the third copper cartel been formed in 1934, of which the producers of Chile, Rhodesia and Belgian Congo were members, and almost all the other important mines maintained an attitude of friendly cooperation. Its primary purpose was the readjustment of copper exports to world requirements, Russia and the United States not being included. It is

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<sup>1/</sup> The "maximum theoretic production capacity" referred to in the course of the present work consists of the total sum of all the maximum production figures for every country except Russia, during the particular year in question, or in any previous year, whichever is the higher. The appropriate figures have been deducted from the total thus obtained when information has been communicated regarding the exhaustion or the abandonment of any mine. The figures arrived at in this way cannot be said to be mathematically exact, but the verifications submitted by the peak production years of 1929, 1927 and 1942/43 indicate a high degree of accuracy.

/probable that

probable that the main American producers had agreed to maintain U.S. exports under 90,000 metric tons a year. The attitude of this cartel never had any direct bearing on prices, but it adjusted the supply of copper to demand in such a way that price fluctuations were very small and submarginal outsiders not encouraged to operate, except temporarily, during a few months in 1937.

In that year the use made of the theoretic productive capacity appears as only 90 per cent in the chart, although for several months there was a definite shortage of copper. The same was true in 1948, when the figure was 82 per cent, under similar circumstances. This is because several marginal producers who could not operate commercially in face of the pattern of prices and costs prevailing during those years, are part of the world's theoretical capacity.

#### IV. Prices of copper in its different forms

Chart No. 3 shows the average net prices for electrolytic copper sales, at refineries on the Atlantic seaboard of the United States. For the years when the excise tax on foreign copper was levied the export price has been given in the table, which is slightly lower than for copper intended for domestic consumption. This is due to the fact that, being usually a net copper exporter, none of this metal was imported for consumption in the United States, while the excise tax was in force. On the other hand, the copper which was shipped there, was refined whilst in bond, and the Latin American countries only received the amounts corresponding to United States export quotations.

The chart reveals the difference in the current prices in the cycles of the 'twenties and 'thirties, to which reference is made in Section III. It shows too, that prices are high when consumption, and therefore production are high, and vice-versa. This may be due to the fact that it is impossible to produce the quantities of copper required to satisfy the higher demands, without adding the output from submarginal mines or the submarginal ore bodies from operating mines. As long as prices do not rise sufficiently to justify production from such ore bodies, the

/unsatisfied demand

unsatisfied demand tends to increase them.

In 1947 and 1948 prices rose so high that they achieved a peace time record, within 1913/48. This is partly due to the fact that consumption has been considerable, thereby making the production of high cost copper essential, and also to the increase of costs through inflation in almost every producing country.

The chart under reference gives the prices for fine copper contained in 25 per cent ore or concentrates, F.O.B. Chilean ports during the 1925/48 period, and also the quotations for copper wire in New York. A comparison between the three separate graphs gives added proof to the well-known fact that depressions during economic cycles have a greater effect on raw materials - in this case on the ore or concentrate - than on manufactured articles, such as copper wire in this particular case. Ingots of electrolytically refined metal occupy an intermediate position.

Chart No. 4 brings this out even more clearly. It gives the quotations for electrolytic copper and copper wire, both in New York, as percentages of the value of copper contained in concentrates in Chile. The relative value of goods manufactured from refined copper reached its peak in the depression period, from 1931 to 1936.

The international trade of semimanufactures, as for instance wire, bars, tubes and sheets represents only a very small percentage of the world's total copper exports; this is explained by the fact that freight rates on raw ingots are lower, that they do not need any casing, and last but not least, that many countries have raised protective tariffs to assist their own rolling mills in the production of such semimanufactures. Therefore only countries using very small quantities of a long range of different semimanufactures, still import these. Consequently, any Latin American country that attempts to substitute exports of semimanufactures for those of raw ingots of copper, lead or zinc, will probably encounter serious obstacles in the peculiarities of the market.

The tendency to increase the production of electrolytically

/refined copper

refined copper at the expense of blister and gold and silver bearing bullion, (the customary Latin American export products), seems to be a step in the right direction. It is bound to result in a freer choice of markets.

V. Trends in the consumption and supply of copper

Chart No. 5 shows the consumption of copper in the United States, and it may be seen that its volume was smaller in the cycle at the beginning of the 'thirties than it had been in the 'twenties. After the outbreak of war, then again in 1946 and 1948, it reaches record figures. The same chart gives the copper output of the United States, and a comparison between the two curves shows that, except in 1932 and ever since 1940, the country has been a net exporter of copper.

During the war, the United States imported copper from almost every country except the Axis powers; since 1946 their principal source has been Latin America. The chart shows likewise, added to the United States production, the balance of exportable copper from the rest of the Western Hemisphere, i.e. from Canada, Chile, Peru and Mexico, who usually demand dollars for their copper exports.

The chart shows to what extent, owing to the increase of its consumption, the United States has become a net importer instead of a net exporter, and also the proportion in which it is absorbing the exportable balances of the Western Hemisphere. In order to throw light on the prospects that exist for the continuance of this favourable situation where Latin America is concerned, curves have been included representing both the national income at constant prices, and the industrial activity of the United States.

Copper consumption is related more closely to industrial activity than to the national income, and it is therefore interesting to observe that its behaviour is even more cyclical than actual industrial activity. Under these conditions it is possible to forecast that copper consumption in the United States will probably continue to be high, as long as the present level of industrial activity is maintained.

Chart No. 6 shows the production and consumption of copper in the sterling area. The speed at which this area made itself self-sufficient in regard to copper supplies during the 'thirties is remarkable. In the post-war period small imports payable in dollars have been necessary, due on the one hand to the increased demand, and on the other to the slow recovery of mining in British Africa, mainly on account of the poor state of their railways.

If in addition to the information supplied by the chart we bear in mind the enormous copper reserves in Rhodesia, South Africa and the Transvaal, it seems justifiable to conclude that the sterling area is unlikely to provide a market for Latin-American copper in the future.

Chart No. 7 shows the production and consumption of the rest of the world, excluding Russia. The countries of greatest interest are: Belgian Congo, Turkey, Japan and Yugoslavia as producers; Japan and the industrialized countries of Europe as consumers. A steady increase may be observed up to the outbreak of war, in consumption and in production alike. During the post-war period both have dropped considerably.

This group of countries is likely to import larger quantities of copper, unless there should be an unexpected increase in the production of the Belgian Congo (where the only rich reserves of the group are located), in proportion as the devastated countries complete their recovery.

To sum up, world consumption, taken as a whole, shows an uninterrupted increase between cycles in peace-time since 1913, but if individual countries are considered, increases as well as decreases become evident. This is clear from the analysis we have just made. Only in the sterling area has there been a steady rise in copper consumption; but as production has increased more rapidly and this community possesses both the desire and the means to become self-sufficient, the fact is of but little interest from the point of view of possible markets for Latin American countries.

The United States employed considerable amounts of copper during

/the last part



the last part of the 'twenties and has surpassed them substantially in 1946/48, but there was a heavy drop during the first cycle of the 'thirties. The greatest part of consumption during the cycle of the 'twenties was absorbed by the construction of electric cables and telegraph and telephone lines, and it was thought that as a rule, once these basic installations had been established, the amounts of copper to be employed would be greatly reduced, as had happened in the States during the 'thirties. Unfortunately, no figures showing the use made of copper in the United States from 1946 to 1948 have as yet been published officially. There is accordingly some doubt as to whether the present high consumption levels still correspond to uses of copper deferred during the war, or to a new and steadier demand.

In any event, as has already been stated, there is a close relationship between the industrial activity of the United States and its total copper consumption. It is possible, therefore, without going into details as to the present uses of copper, to forecast a great demand for it as long as industrial activity maintains its present high level.

As for the group of countries classified as "the rest of the world", its copper consumption expanded to a considerable extent during the 'thirties. Part of it was probably employed in armaments, some in electric power and communication lines, and the rest for the manufacture of various capital goods. After the war this group's copper consumption decreased considerably, some of the principal consumers of former time, i.e. Germany, Japan and Italy, having suffered devastation. Although copper is not likely to be used again for armaments by this group in the near future, it is very probable that the present figures for consumption will show a rise in line with its economic recovery.

Consequently, if Latin America is to rely on a steady market for copper in the years to come, it is essential that the United States should maintain its present high level of consumption and imports, at least until the countries of Europe are once more in a position to consume copper in reasonable quantities.

/SECTION 2. ZINC

## SECTION 2. ZINC

### I. Changes in the share of the different zinc-producing regions in world production

Before embarking on a study of this subject, it is necessary to emphasize the fact that the refining of zinc, whether by fire or by electrolysis, is not a simple operation; there have accordingly always been refining centres to which the mining countries have exported their ore and concentrates. Although since the 'twenties zinc has been refined in increasing proportion in the countries where the ore originates, there is still a large volume of international trade in zinc concentrates, amounting a much higher percentage than in the case of copper ore.

The world zinc production up to 1920 has been allocated among the different countries according to the activity of their smelters. After that date, the figures regarding the metallic content of the zinc ores and concentrates in the countries where these are mined, are also available. The totals of the two series do not coincide, and the difference between them is not only due to possible changes in the stocks but in much greater degree to the following facts: - a) the metallurgical process does not recover all the zinc contained in the ores or concentrates; there is always a loss, which used to amount to 12 per cent during the First World War, and which has been gradually reduced to nearly 8 per cent; and b) in spite of the care taken by statisticians at the sources, it has been impossible to prevent the inclusion of some secondary zinc amongst the virgin material, especially in the industrialized countries, showing higher totals than those for metal of recent extraction. <sup>1/</sup>

In this work, preference will be given to the series compiled according to mine basis, over those collected on smeltery basis. In this connection it should be remembered that once metallurgical losses have been discounted, the slab zinc is equivalent to between 88 and 92 per cent of the metal content of concentrates. Some countries report the fine metal content of the ores, and others only the recoverable zinc,

1/ See note b/to Table 1.

/so that the

so that the final series lacks uniformity.

Since the second decade of this century, the separation of zinc contained in complex minerals by means of selective flotation has become widespread. As a result, there was a change in the relative contributions of the various countries to world production. Table No. 3 shows the production of zinc contained in ores mined in the most important zones, as percentages of the world's total, in the peak years of the cycles.

The table allows us to assume that the evolution of zinc production follows very similar lines to that of copper, except that there has been almost no increase in peace-time since 1929. Other points are also worthy of observation:- The United States is the world's largest producer but the margin separating it from other countries has narrowed since 1920. Canada, Mexico and Australia and the group labelled "other countries" have increased their contribution to an appreciable extent; Germany had made great strides in production up to 1943. Now it is highly probable that it will once again improve on the low 1948 figures, but it is unlikely to return to pre-war levels, since it is considered that the subsidized production caused a relative exhaustion of reserves. Since most of the European countries are maintaining their relative output, the growth of production in the new zinc mining countries has reduced the percentage representing United States contribution. Zinc production in the United States reached the record figure of 733,000 metric tons in 1926, considering only those years in which statistics on mine basis are available. After that date it tended to fall at an irregular rate until it dropped 561,000 tons in 1948. The rise to 693,000 tons in 1942 was due to the policy of subsidies on the part of the United States Government, and probably could not have been achieved in any other way, except by a very high rise in prices.

## II. The share of Latin-American countries in world production

Chart No. 8 shows the relation that exists between world production and the contribution made towards it by the chief Latin American countries. Argentina has not been included in the chart on account of its secondary

/importance, for it

importance, for it only began production in 1936; it reached 36,000 tons in 1941, and dropped to 12,000 tons in 1948.

The chart under reference makes it possible to evaluate the influence of the world cyclical fluctuations on Latin American production. This influence is mainly due to Mexico which, as the prime producer, determines the general trend of the curve. A discrepancy may also be observed from 1946 onwards; the tonnage of Latin-American countries is decreasing, while that of the world as a whole is going up. This, too, must be attributed to the shrinking production of Mexico, which is merely accidental and will be discussed in greater detail later on.

Table No. 5 gives the percentage of world production contributed by Bolivia, Mexico and Peru. On the whole, a tendency to rise is apparent, especially in Peru where production was completely paralysed between 1952 and 1954. During this period the Casapalca Mine of Cerro de Pasco was the only producer of zinc concentrates in Peru where a flotation plant had been installed in 1925. Unless concentrated immediately after mining, Casapalca's zinc bearing ores offer special difficulties on account of oxidization. The reduction in the rate of shipping caused accumulations of processed metals and of ores, thereby increasing the problems of concentration. The low prices and the fact that a new hydro-electric plant was then in the course of construction, together with a second zinc concentrating plant; all these circumstances together resulted in bringing the production of zinc concentrates to a temporary standstill. In 1929 there was a considerable decrease in Bolivia as a result of the special efforts made in connection with the tin production drive. This drive succeeded in producing figures never attained before, and caused a shortage of manpower in other branches of mining. In the 1934-1940 period there was a similar labour shortage which is generally attributed to the aftereffects of the Chaco war. Mexico is the biggest producer of Latin America, surpassing by far both Peru and Bolivia, and its contribution towards world output has tended to increase. Great technical improvements were introduced into Mexico between 1922 and 1929, among which selective flotation of complex ores containing lead, silver

/and gold

Table 3. Production of copper in selected  
Latin American countries

Years	World Production in thousands of metric tons	<u>Percentages of world production</u>		
		Chile	Mexico	Peru
1925	1,433	13.5	3.70	2.40
1926	1,474	13.8	3.54	2.97
1927	1,512	15.9	3.80	3.15
1928	1,696	17.1	3.88	3.13
1929	1,881	15.8	4.17	2.89
1930	1,548	14.3	4.42	3.07
1931	1,319	17.1	4.00	3.49
1932	864	15.2	3.94	3.17
1933	988	22.2	4.22	2.64
1934	1,209	21.2	3.81	2.27
1935	1,403	19.1	2.96	2.12
1936	1,594	16.1	2.06	2.10
1937	2,174	19.1	2.16	1.64
1938	1,886	18.7	2.20	1.99
1939	2,054	16.6	2.36	1.73
1940	2,272	16.0	1.80	1.94
1941	2,417	19.4	2.14	1.53
1942	2,556	19.0	2.02	1.47
1943	2,565	19.4	1.80	1.31
1944	2,407	20.7	1.80	1.34
1945	2,024	23.2	3.03	1.58
1946	1,652	21.9	3.56	1.49
1947	2,050	20.8	3.22	1.25
1948	2,080	21.4	2.80	0.87

Source: Research Centre, Economic Commission for Latin America of the United Nations, with figures obtained from the Yearbook of the American Bureau of Metal Statistics.



Table 4. Production of zinc ores in selected countries as a percentage of world production<sup>a/</sup>

Years	World prodac- tion in thou- sands of metric tons	P e r c e n t a g e s								
		United States	Can- da	Mexi- co	Ita- ly	Spain	Ger- ma- ny	Po- land	Aus- tria	Other Coan- tries
1920	746	57.0	2.0	2.0	5.0	5.0	3.0	10.0	4.0	12.0
1929	1,513	41.9	8.5	8.5	5.0	3.3	7.0	7.7	7.8	10.4
1937	1,479	36.8	11.7	8.5	4.3	1.2	9.0	3.9	9.7	15.0
1943	1,925	34.9	14.3	10.7	2.5	2.1	12.3	b/	7.5	15.7
1948	1,555 <sup>c/</sup>	36.1	13.7	11.0	5.1	3.0	1.9	b/	9.7	19.5

Source: United Nations Economic Commission for Latin America, based on information provided by the Yearbooks of the American Bureau of Metal Statistics.

Notes: a/ Excluding U.S.S.R. In certain countries the percentage of zinc recoverable through smelting or electrolysis is given, whilst in others, figures represent the metal content of the ore. The difference between both figures usually fluctuates between 8 per cent and 12 per cent.

b/ Production figures unknown.

c/ Production of Burma and Indo-China, not included before the war they produced approximately 36,000 metric tons. Production of Eastern Germany not included.







Table 5. Production of zinc in selected  
Latin American countries.

Years	World pro- duction in thousands of metric tons	P e r c e n t a g e s		
		Mexico	Bolivia	Peru
1925	1,260	3.6	0.2	-
1926	1,515	5.6	0.5	0.6
1927	1,506	7.6	0.4	0.7
1928	1,467	9.3	0.2	0.4
1929	1,513	8.5	0.1	0.6
1930	1,393	8.2	0.3	0.5
1931	1,146	9.4	1.0	-
1932	826	7.1	1.3	-
1933	990	6.9	1.2	-
1934	1,232	9.1	0.7	-
1935	1,379	8.3	0.5	0.3
1936	1,479	7.9	0.7	1.5
1937	1,645	8.5	0.6	0.9
1938	1,535	10.8	0.5	0.9
1939	1,678	7.9	0.5	1.3
1940	1,744	7.9	0.6	1.0
1941	1,901	7.6	0.5	1.2
1942	1,908	9.3	0.5	1.3
1943	1,925	10.7	0.9	1.8
1944	1,583	12.8	1.0	3.6
1945	1,420	15.6	1.5	4.3
1946	1,396	12.7	1.4	3.8
1947	1,489	12.2	1.0	3.9
1948	1,555	11.0	1.1	3.8

Source: Economic Commission for Latin America, based on information contained in the Yearbooks of the American Bureau of Metal Statistics, of 1928, 1933, 1937, 1946 and 1948.



and gold was the most important. Zinc production in Mexico is mainly in the hands of large American mining companies who introduce every improvement tested in the United States. During the period with which we are concerned, the expansion of the industry has continued thanks to the richness of the Mexican mines and to the increasing world market for zinc. Selective flotation, simultaneously put into practice in many countries, caused a downward trend of prices, except in 1929. This reduction in prices can be dealt with satisfactorily in Mexico, by means of improved technique and by large-scale exploitation, both of which increase the total income of the companies. During the depression many companies closed down, owing to low prices, whereas others reduced their output, so that in 1932 production was only slightly greater than in 1925. Between 1932 and 1938 zinc production made a rapid recovery, its level in 1938 being equal to that of 1929. Mexico's come-back was swift in comparison with that of other countries on account of the idle productive capacity that had existed since 1929, and also because zinc, lead and silver are usually co-existent in Mexican ores, whereas the prices of industrial metals rose extremely slowly after the crisis, silver reached a peak in 1935 with values superior to those of 1929, thus improving in advance the profitability of minerals mixed with lead and zinc.

In spite of the labour problem which was a frequent cause for complaint, the companies made numerous investments. In 1938 for instance, production in Mexico continued to increase, in spite of the fact that there was a depression affecting both prices and quantum of zinc production in the United States, which was at that time already importing substantial amounts of zinc from Mexico. The reason should be sought a) in the fact that, compared with the long period of depression, the average price of the three metals which are found together, i.e. lead, silver and zinc, was not unfavourable; b) in the discovery of the large deposit of El Bote, belonging to the Carnegie Metals; and c) in the devaluation of Mexican currency, which, in spite of the exchange tax partly counteracted the effects of the lowering of prices in the world market.

/The decline

The decline of 1939/40 was almost entirely due to the loss of European markets for Mexican zinc concentrates. On account of the British blockade and the submarine war, large quantities of metal that before the war had gone to Europe to be refined accumulated at the ports. In the second half of 1940, when the United States began to import larger quantities of these metals, these stocks disappeared. Apart from this reason, it is possible that the increase in import duties in the United States in 1938 may have had some effect on the decrease in Mexican exports and, according to the Comité de Afros de México the expropriation of the petroleum industry may also have exercised a negative influence. <sup>1/</sup>

During the war the United States offered a safe market, and Mexico's output of metallic zinc and zinc concentrates increased till it reached its maximum in 1945. At the end of the war, the lapsing of the contracts with the United States Government, and the uncertainty regarding the future of the markets caused a slight fall in production which, despite other unfavourable factors still remains higher than the 1938 maximum.

In 1947 the enormous price fetched by lead produced a considerable increase in Mexico of high-grade lead ore (suitable for immediate smelting) extracted by medium-sized and small companies which had always sold their small normal quotas to the smelteries. As a matter of policy, the smelteries continued to buy these ores, as well as the usual low grade material (for concentration). But as the lead industry had been working at full capacity for some time, it was not in a position to process all this material, which piled up in considerable quantities. As direct smelting of ores for lead involves the loss of any zinc it may contain, there was a decrease in zinc production in 1947, which corresponds to a peak in lead extraction.

This decrease is, of course, purely accidental and is due to the destruction of certain small quantities of zinc. It should come to an end, given either of the following alternative developments:- 1) that industrialists should increase their capacity for concentrating and smelting lead, and 2) that the relation between the prices for lead and

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<sup>1/</sup> Report of the Second Mexican Social Science Congress, Chairman of the Valuation Committee.

those for zinc should change once again in favour of zinc; after having favoured zinc since 1950, it has now been favourable to lead since 1947.

### III. Ratio between world consumption and production at capacity levels.

Chart No. 8 shows the theoretic world capacity of zinc production calculated on the same lines as for copper in Section 4, together with real production. Russia has been excluded in both cases, and the figures are based on the output of the mines.(mine basis).

The chart shows that the zinc industry has been operating at a higher rate than that of copper. A possible explanation for this may be that the United States, the largest consumer, uses 10 per cent of its zinc consumption for containers and other consumer goods; 45 per cent is used for galvanized iron, especially for roofing purposes; and the remaining 45 per cent is used for mechanical equipment, for capital goods, and durable consumer goods. Only this last percentage bears any very close relation to industrial activity, whereas the 10 per cent which is used for consumer goods is relatively inelastic. The remaining 45 per cent which is used for galvanized iron probably occupies an intermediate position.

It has not been possible to draw a chart to represent the theoretical capacity of production before 1920, owing to the lack of statistics of zinc extraction on mine basis. A chart beginning in 1920 would not consider the capacity of production originated by the previous peaks of 1913 and 1917. On the other hand, the data relating to the years between 1929 and 1937 suggest that, whereas 86 per cent of the world capacity to produce zinc was used during the first cycle of the 'thirties, only 67.5 per cent was used in the case of copper.

As a result of this situation during the cycle of the 'thirties, the prices of zinc appear to have dropped less than those of copper by comparison with former years. This was so in spite of the fact that an appreciable amount of zinc is obtained from minerals containing silver and lead, which, other circumstances being equal, would have assured a flow of substantial quantities of zinc into the markets, even at lower prices, since it is merely a by-product or co-metal.

#### IV. Prices of zinc in its different forms

In Chart No. 9 the price of slab zinc in St. Louis is given in cents per pound. It shows that prices have fallen from from an average of 6.34 dollar cents per pound of zinc in the 'twenties, to 4.58 cents in 1930: that is, a drop of 31 per cent.

The great demand for zinc in 1948 caused prices to rise to 13.59 cents, the highest figure of the whole century including 1915, when the record average quotation of 13.04 cents had been attained.

In the same chart the prices for zinc in concentrates in Joplin, (Missouri) are given, and also the average annual quotations for zinc sheet. Chart No. 10 shows this relationship clearer: it gives prices for refined zinc and for zinc sheet as percentage of the price of zinc in concentrates.

A striking feature is the steady relation that exists between the price of slab zinc and zinc in concentrates. The latter fell only very slightly during the depressions of 1921, 1932, 1933 and 1946. The fact that both are United States prices, and that until the last war, a surplus zinc refining capacity obtained in that country, explains this steadiness, which does not exist in the case of copper. The tendency prevailing during 1920-1943 has been to raise the price of ore in comparison with that of refined metal, due more than anything else, to improvements in metallurgy which raised the recovery of zinc in concentrates from 68 to 92 per cent. The same chart gives the average price of zinc sheet in St. Louis as a percentage of the price of zinc in concentrates. Here we find a further example of the well-known fact that during depressions the price of raw materials - zinc in concentrates in this case - falls to a greater extent than manufactured goods. If we compare two periods in which consumption was high - 1927-1929 and 1946-1948 - we shall see that as in the case of zinc ingots the prices for the raw material was relatively higher.

Although the value of zinc in concentrates amounted in 1948 only to 40 per cent of the price of zinc sheet, yet rolling of zinc for export does not seem to be profitable in Latin America, because world trade in zinc of this type is negligible. In 1948, for instance, the United States

/exported only

exported only 5,787 tons of zinc in sheets, strips and so forth.

V. Trends in the consumption and supply of zinc

The United States is at the same time the greatest producer and the greatest consumer of zinc in the world. Chart 11 shows curves representing the consumption and production of this country between 1913 and 1948. In each of the cycles included in the chart, an increase is registered in zinc consumption in the United States, whereas production attained its maximum in 1925 and has never been able to reach it again. As a result, from being a net exporter, which it was until 1936, with a brief intervening period from 1932/1933, the United States has become a net importer.

The chart also gives, super-imposed on the curve showing United States production, the exportable surplus of zinc in the rest of the Western Hemisphere, plus that of China, all of which countries usually sell in dollars.<sup>1/</sup> On account of the increase in zinc production in this group of countries, particularly in Canada and Latin America, they are in a position to supply the present import requirements of the United States and also to maintain a net exportable surplus at prewar levels, for other continents.

Chart 12 gives the production and consumption of zinc in the sterling area. Australia is the largest producer here, providing approximately 30 per cent of the extraction total; it is also responsible for the greatest fluctuations. During the last cycle of the 'twenties, the maximum production took place in 1927, when lead reached its maximum also, and not in 1929 as might have been expected. In the cycle of the 'thirties production was slightly superior to that of 1927: but in 1942, in the middle of the war, the extraction of zinc in the sterling area dropped owing to lack of manpower, and has not succeeded since the war in reaching the values of 1937-42.

Zinc consumption, on the other hand, has increased steadily, so

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<sup>1/</sup> Production in Canada, Latin America and China, minus the consumption of the first two.

/that the sterling

that the sterling area, instead of being a net exporter as had been the case before 1927, became an importer from then onwards. In 1937 about 30,000 tons were imported, rising to 150,000 tons in 1948, as production was unable to satisfy requirements.

Australia is the only country in the sterling area with deposits known to be extensive, greatly superior in fact to those of Mexico and Peru, and is therefore, in a position to expand its production.

Chart 13 gives the consumption and output of zinc in the rest of the world, excepting Russia and Japan.

While production remained fairly steady between 1927 and 1939, a tendency towards an increase in consumption may be observed. After the war zinc mining appears to have decreased, chiefly on account of the lack of data for Poland and Eastern Germany in our statistics.

The industrialized countries of Europe and their colonies, (apart from the United Kingdom), which are the most important among this group of countries, have always been deficient in production. In the past this was compensated by exports from the Western Hemisphere. As the deposits so far discovered in their African colonies are not large, and as some countries, particularly Germany, stepped up production during the 'thirties to the extent of probably almost exhausting their deposits, it is obvious that the recovery of the industrial activity of these countries is bound to result in an increased importation of zinc.

To sum up, it may be stated that zinc consumption has increased all over the world, and in each of the groups of countries that we have studied. The sterling area possesses in Australia the largest zinc deposits yet discovered, and it will be easy for it to increase zinc production to the extent of being able to cease net imports, and even to export. It is possible that, as industrial recovery progresses in Europe, imports will be required there in increasing quantities. Zinc mining in Latin America can under these circumstances rely on a steadily improving market as long as a high level of industrial activity is maintained in the world as a whole. It is probable that in the future

/Australia may



Australia may become a competitor in the world markets. For the moment, however, and as long as the economy of Europe has not fully recovered, it is of the utmost importance for Latin America that the United States should continue to buy part of the zinc she produces, whether refined or in concentrates.

/SECTION III. LEAD

/SECTION III.

### SECTION III. LEAD

#### I. Changes in the share of the different lead producing regions in world production.

Although world consumption of lead reached its maximum in the twenties, production in 1938 was slightly above that of the previous record year, 1929. Table 6 shows the share in peak years of the main lead producing zones in the world's total.

Europe, Russia excepted, used to be the greatest producer of lead, with 47.5 per cent of the total for 1913; but its output had dwindled to 20 per cent in 1937. The steady drop until 1948 does not arise, however, from a similar situation, since data for Eastern Germany, Poland, Roumania, Yugoslavia and Czechoslovakia are not included, as their recent production is not known. On the other hand, in view of the special way in which world statistics of lead production on mine basis are computed, large quantities of lead, as a by product of zinc distillation from imported minerals are often attributed to Europe, particularly to Belgium and Germany.

Duplications appear to a slight extent in world statistics if the lead content of these zinc minerals is reckoned according to the country of origin. It is obvious that this is bound to make the lead output of certain European countries appear out of proportion to their own extraction; but the error is not serious, and as the production drive by means of subsidies and other expedients has drained the deposits of Europe to a considerable degree, it is highly probable that the production of European countries will not be able to regain the levels of the twenties. The United States is the largest individual producer, and has more or less maintained its share in world tonnage, although the amounts extracted have also decreased of late years.

The lack of production in Europe has been compensated by increases in Mexico, Australia, the rest of Latin America, Africa, and though to a lesser degree, Canada. It is important to observe that the increase in Mexico has not really been as spectacular as appears in the table, for the production registered in 1913 was abnormally

/low on account

low on account of the revolution. In 1913, the first year shown in the table, a production of only 68,343 tons is recorded for Mexico, whereas in 1908 the figure reached 127,010 tons. As to the rest of Latin America a notable improvement is shown, although they lack significance in the world markets on account of their small production.

Table 6. Production of lead in selected zones as a percentage of world production, excluding U.S.S.R.

<u>Year</u>	<u>World Production (in thousands of metric tons)</u>	<u>United States</u>	<u>Canada</u>	<u>Mexico</u>	<u>Rest of Latin America</u>	<u>Europe</u>	<u>Australia</u>	<u>Africa &amp; Asia</u>
1913	1,172	33.7	1.5	5.3	0.2	47.5	9.7	- 2.0
1917	1,152	45.7	1.3	4.0	0.3	32.0	12.9	3.5
1929	1,753	35.6	8.2	14.1	1.8	23.7	10.0	6.4
1937	1,669	25.2	13.0	13.0	4.6	20.0	15.0	9.1
1943	1,430	28.8	13.2	16.2	5.4	18.9	13.4	4.9
1948 <sup>a/</sup>	1,141	30.6	17.2	14.7	8.3	10.5 <sup>a/</sup>	18.1	8.6

Source: Yearbook of the American Bureau of Metal Statistics;  
Dirección General de Industrias Extractivas.

<sup>a/</sup> Not including the production of Eastern Germany, Czechoslovakia, Poland, Roumania and Yugoslavia.

## II. The share of Latin American countries in world production.

Chart 14 compares lead mining in the chief lead-producing countries of Latin America and in the world as a whole, Russia excepted. From 1922 onwards, when the output of Latin America exceeded 100,000 metric tons as shown in the chart, it followed on the whole the fluctuations of the world cycle fairly closely. The relatively small decreases in Mexico in 1939-1941 are offset by increases, especially in the Argentine and in Peru. These increases, which continued up to 1948, ensured a much higher share in world production to Latin America than in any former period.

Table 7 gives a clearer illustration of the manner in which the share of the various Latin American countries has evolved. It shows the percentage of their share in world production between 1925 and 1948.

/The quota of

The quota of Mexico, the chief producer, was not much affected during the 1932 depression, but it has only been able to increase it very slowly up to the present. Peru, next in importance, saw a very considerable increase once the effects of the depression were over in 1935, and the same occurred in the Argentine from 1936 onwards, when the "Mina Aguilar" began production on a large scale. Bolivia's output remained about the same until 1947, and then showed a great increase in 1948.

In general, except in 1948, Latin America as a whole shows wide fluctuations which mainly originate in Mexico.

In addition to the countries mentioned in the table, Brazil and Chile mine lead on a small scale.

### III. Ratio between world consumption and production at capacity levels

The method of calculation for arriving at the theoretical world production at capacity level which was employed in the case of zinc and copper cannot be applied to lead. Actually, the partial exhaustion of European deposits since 1913, and of deposits in the United States since 1929, has progressed fairly rapidly causing a practically continuous reduction in the production capacity of those countries in comparison with their record figures in former years. As little is known with regard to the degree of exhaustion, it is not possible to adjust the totals in order to obtain a "theoretical production capacity" which accords more nearly with the facts.

For this reason it has not been possible to present a chart illustrating the position. Nevertheless, if prices are influenced by the relation that exists between production capacity and effective demand, it is only logical to conclude that the former has not been made full use of except during the peak years of the cycles. Actually the quotations for lead have followed cyclical tendencies similar to those of copper, though less violent. Of all industrial metals, the prices of lead show the highest increase in 1947/48, compared with those recorded in former periods, 1927/29 or 1940/46, for instance. This rise has been so high that it has led to a remarkable wastage of

/zinc in Mexico

Table 7. Position of certain Latin American  
countries in the world production of lead

	World production in thousands of metric tons	a/	Percentage of world production			
			Mexico	Argentina	Peru	Bolivia
1925	1,515		12.3	0.5	-	-
1926	1,606		12.5	0.5	-	-
1927	1,685		14.7	0.5	0.2	-
1928	1,670		14.2	0.5	0.9	-
1929	1,753		14.2	0.5	1.1	0.9
1930	1,676		15.0	0.5	0.9	0.7
1931	1,393		15.2	0.3	0.2	0.5
1932	1,187		11.6	0.3	0.4	0.5
1933	1,158		10.3	0.4	0.2	0.7
1934	1,295		12.8	0.2	0.7	0.9
1935	1,363		13.5	0.2	2.1	0.7
1936	1,473		14.6	0.5	2.1	1.0
1937	1,670		13.1	0.9	2.5	1.1
1938	1,772		15.9	1.3	3.3	0.7
1939	1,619		13.5	1.7	2.8	0.9
1940	1,652		14.3	1.8	3.0	0.7
1941	1,581		14.5	1.5	3.2	1.0
1942	1,600		16.0	1.6	2.8	0.8
1943	1,420		14.2	1.3	3.3	0.8
1944	1,102		14.9	1.8	4.7	0.8
1945	1,077		16.9	1.7	5.0	0.9
1946	1,053		17.5	1.7	4.2	0.8
1947	1,171		14.3	1.8	4.7	1.0
1948	1,142		14.7	1.9	4.2	2.2

Source: Economic Commission for Latin America, with figures based on those in the Yearbook of the American Bureau of Metal Statistics, excepting those for Bolivia in 1929 and 1930; these come from the Annual Report for 1948 of the Central Bank of Bolivia, p.116

Note: a/ The 1925/32 figures are not comparable with later years, because the former included certain data on smelting basis in those countries, and in those years, in which it was impossible to give production figures according to the origin of the ore.





zinc in Mexico, in order to increase the output of lead. A number of causes were responsible for the increase, among which some of the most important were: a) the upheavals in the industrial organization of Europe, the largest producer; b) the partial exhaustion of reserves in various countries, especially in the United States and in Europe; and lastly c) because it is not an essential war material, its production was neglected to a certain extent during the war.

#### IV. Prices for lead in its different forms

Chart 15 gives the average price for pig lead in cents per pound in New York. It may be seen from the chart that the prices, which had reached an average of 7.093 cents per pound in the cycle of the twenties, fell to 4.432 in the thirties, which meant a drop of 37 per cent. The ceiling price in the United States was, as may be observed from the chart, 6,500 cents per pound. The great demand of 1948 brought the price up to 18,043 cents, the highest figure of the century and probably of all time.

The chart also gives the price of lead in 80 per cent concentrates, placed in producer bins in Joplin, Missouri, and also that of lead sheet. It is obvious from a glance at the prices of minerals and of pig lead during depressions that these are affected to a much greater extent than sheet and manufactures.

The relationship between them is more clearly brought out in Chart 16, in which the prices for pig lead and sheets are given as percentages of the value of the metal in concentrates, in conditions identical with those represented in Chart 15. The manner in which a high degree of world consumption favours the producers of raw materials, in this case the miners, emerges very clearly from the relative drop of pig lead and sheet prices in 1947/48. In these years the prices of the three forms of lead, attained again the same relation to each other, which they had had in the twenties.

In the case of lead, the relation between the price of the metal contained in concentrates, and the same metal when it has been refined, is much more constant than in the case of copper, but less so than with zinc. The relative depreciation of lead ore in comparison with pig lead which was observable even after the depression of the thirties was over, was undoubtedly due to the decline in consumption within the United States; such a situation did not exist in the case of zinc.

#### /V. Trends in the

## V. Trends in the consumption and supply of lead

The data for lead production in the world as a whole which have been given in the course of the present work are fairly accurate. On the other hand, they are less so for individual countries. The section relating to the share of Latin American countries in world production is slightly affected by such inaccuracies, and their effect is still greater on the relationship between production and consumption in the various parts of the world.

This shortcoming in the statistical series is the result of their being based on data provided by the smelteries, which figures are afterwards allocated according to the source of the minerals. But while in the case of zinc, the raw material for the refinery has to fulfil a certain number of requisites as regards quality and concentration, the problem of lead is much more complicated, for it can be obtained from a great variety of minerals and by-products. For instance; in the zinc refining plants in Europe, lead is produced from the residue of lead-zinc minerals, after the extraction of the latter; the lead obtained in this way has generally been attributed to the country in which it is smelted.

It is a fact that mining countries usually prepare careful statistics of the fine metal content of their ore exports. But these statistics are of little interest to the study of the relationship between production and consumption, as they take no account of metallurgical losses which are considerable in the case of lead-zinc ores.

It is probable, as a result of these inaccuracies, that the production figures for Belgium and Germany appear higher than they really were and those of Latin American, Great Britain and its African Dominions and colonies. The Argentine is an exception to the foregoing rule: its figures usually correspond to the recoverable metal from its ores.

Chart 17, which gives the production and consumption of lead in the United States from 1913 to 1948, shows the increase in consumption up to the peak of the cycle at the end of the twenties, the drop during the thirties, and the high tonnages reached since the war. The chart also serves to illustrate the production of the United States, and a

/comparison between



comparison between the two curves shows that it has usually been a net importer of the metal, except for the short period from 1930 to 1932, when it was a net exporter of very small quantities.

Production has shown a definite tendency to fall since 1929, and this fact, together with the increase in consumption from 1946 to 1948, has resulted in a large volume of imports during that period. Prices, as was observed in the preceding section, were extremely high, and even so the United States was unable to secure an adequate supply to meet the demand. This situation, together with the high prices, caused a change in the structure of lead consumption in the United States. Table 8 gives the total tonnage consumed and the percentage distribution of the purposes to which it is put; the figures cover four years of high prices. For instance, the question arises whether the decrease in the use of lead in paint for which there is a great demand, as may be observed by comparing 1947 with 1948, is due to the impossibility of securing lead, or to the fact that its high price encourages the use of substitutes.

Table 8: Use of Lead in the United States, as percentages of total used.

	1928	1937	1947	1948
Total Tonnage	837,000	617,000	1,055,000	1,017,000
Red and white paint	16.55 %	20.98 %	10.29 %	8.26 %
Storage batteries	23.64	28.17	32.42	33.06
Cable covering	19.34	13.64	13.54	16.32
Building	10.32	6.60	5.60	5.39
Automobiles	1.83	1.76	0.09	0.09
Ammunition	4.26	5.79	3.41	3.76
Foil	3.76	3.18	0.31	0.27
Solder	3.98	3.23	5.03	5.98
Bearing metal	3.44	2.20	3.42	3.68
Type metal	1.82	2.45	2.18	2.54
Other uses	11.06	11.96	23.63	20.65

Source: Yearbook of the American Bureau of Metal Statistics.

The heading "Other uses" includes the consumption of lead as tetraethyl, a product used to increase the octane index of gasoline and which in 1947 accounted for 5.68 per cent of the United States lead

/consumption, and

consumption, and 7.42 per cent in 1948.

In Chart 17 the net exportable balance of the rest of the Western Hemisphere including China, has been superimposed on the curve showing the output of the United States; all these countries usually demand payment in dollars. The high post-war consumption of the United States, together with the gradual decline in its production, are responsible for causing virtual disappearance of the exportable balances of this group of countries.

Chart 18 gives the consumption and production of the sterling area from 1925 to 1948. A gradual increase in consumption may be observed up to 1938, and a sudden drop in post-war years. The output of the sterling area, however, has increased more rapidly than its consumption, so that after being a net importer of small amounts in 1925, it became self-sufficient during the thirties.

- The falling off in production observable since the war is due partly to the fact that the former exports from Burma have not been renewed, and partly to a decline in the output of Australia. The latter is purely accidental, and its causes lie in the lack of manpower and in the excessive deterioration of equipment during the war; these defects are bound to be remedied, as the Australian continent has the largest known lead ore reserves in the world.

Chart 19 gives the consumption and production of lead in the rest of the world in this case including Japan. If we take this vast group of countries as a whole, there has been a decline in production, due mainly to the gradual exhaustion of European deposits.

Consumption, on the other hand, continued to increase until 1937, but declined as a result of the devastations of war.

To sum up, the consumption of lead with the exception of the United States, had increased all over the world before the war, from one cycle to the other. In the United States the use of lead during the thirties was below that of the twenties. Since the war, consumption in this country has reached record figures in spite of a decline in production.

/These two facts

These two facts are together responsible for the absorption by the United States of all the exportable surpluses of the Western Hemisphere, amounting formerly to something between 300,000 and 400,000 tons a year. Unless Canada and Latin America succeed in increasing their output of lead, it is probable that the Western Hemisphere will have to import from other continents, as the known reserves of the United States are rather small. On the other hand, the consumption of the sterling area and of the industrialized countries of Europe is likely to remain so small until their economy returns to normal, that Latin America does at present have to rely entirely on the United States market for the sale of its lead.

Production as well as consumption has declined in the sterling area and in the rest of the world. The former will definitely be able to recover very shortly and even to surpass its former levels of production in view of Australia's large deposits. However, the rest of the world in which the industrialized countries of Europe have an outstanding position both as producers and as consumers of lead, will find it difficult to regain the prewar production figures and once the consumption level has been re-established through recovery of their industrial activity, it will probably be forced to import larger quantities of lead than before the war.

/SECTION IV. TIN

#### SECTION IV. TIN

##### I. Participation of the main tin-producing countries in world production.

There are far fewer deposits of tin in the world than of the other non-ferrous metals we have been studying. The annual output is accordingly much smaller. Further, the amount of tin which goes into the finished products in which it is consumed is always small, so that it exerts but little influence on the final cost of such products.

These are some of the factors that have caused producers in general to adopt a policy of high prices. As a result new producers have appeared in the course of time, and many of the original ones have increased their output, thus maintaining a steady potential supply of tin which is far in excess of demand.

An inter-Governmental agreement was reached in 1931 in order to deal with this situation, and the "International Tin Committee" was organized, the Head Office of which is in The Hague; the Governments of all the main tin-producing countries were directly represented. The Committee fixed production quotas for the affiliated countries, which at the beginning represented nearly 90 per cent of the world's capacity of production. Representatives of the United States and Great Britain, the largest tin consumers, joined the Committee in 1934, but only in an advisory capacity regarding certain matters of interest to consumers to be decided upon at the discretion of the Committee. Prices and tonnages to be produced were not included amongst the matters to be studied by the representatives of the large consumer countries.

As a result of the high prices made possible by the voluntary limitation of output, new mines were developed in countries not represented on the Committee, causing complications for the quota distributions. In 1937 the output of unrestricted producers rose to nearly 15 per cent of the total production.

/After the war had

After the war had broken out in Europe, the production of tin was stopped up to its maximum, in order to accumulate a stockpile, which was considered indispensable in view of the vulnerability of the supplies from the Far East. The results of this policy may be seen in Table 9, which gives the annual production of certain countries. The rapid jump in production to meet stockpile requirements in 1941 suggests the extent of normal under-utilization of capacity, owing to the Committees' restrictive action.

Table 9: Annual Tin production in the largest tin producing countries during certain years

( in tons of 1,016 kilos)

Year	Bolivia	Malaya	Indonesia	Siam	Nigeria	Belgian Congo
1929	46,338	69,366	34,903	9,939	10,734	1,011
Average 1936/39	25,421	60,764	30,986	14,915	9,565	8,427
1941	42,199	78,000	51,000	15,427	12,155	16,190

Source: Various issues of the Yearbook of the American Bureau of Metal Statistics.

The table shows that there was a decline in production in nearly every country in the 1936/39 period in comparison with that of 1929 and then a great increase in 1941. It will be seen that production was higher in Siam and the Belgian Congo in 1936/39 than in 1929; whereas in the case of Siam, the increase of production implies the acknowledgement and acceptance of the higher productivity by the Committee, in that of the Belgian Congo which only became affiliated to it in 1934, it was a matter of accepting the situation prevailing at the time.

Once the war had broken out in the Far East, the Japanese occupation of the various large tin-producing countries, the maritime blockade, and other difficulties engendered by the war, resulted in the limitation of tin free for allied consumption to a mere fraction of what it had been in peace-time. The resultant shortage was felt

/acutely, and the

acutely, and the use of substitutes and tin saving methods and devices was attempted in a number of cases. The manufacture of tin plate took the largest share of the metal's consumption, and in order to reduce it, the United States Government encouraged and financed the development of a process of electrolytic deposition of one or several tin layers on the steel plate instead of the immersion of the hot plate in molten tin. This new method resulted in the saving of 60 per cent of tin on an equal quantity of tin plate.

Table 10: Total production of tin plate in the United States and percentage corresponding to electrolytic deposition and prices.

Year	Total production in thousands of tons	Percentage of electrolytic tin plate	Price in dollars per box of tin plate sheets of 14 x 20 I. C.	
			Immersion (107 lbs. per box.)	Electrolytic tin plate (100 lbs. per box.)
1942	2,473	3	5.58	4.50
1943	1,958	15.3	5.57	4.50
1944	2,401	24.5	5.57	4.50
1945	2,564	31	5.57	4.50
1946	2,457	33	5.57	4.50
1947	3,408	47.12	6.39	5.05
1948	3,628	51.1	7.37	6.00
1949 <sup>a/</sup>	3,065	53.4	-	-

Source: "Metal Statistics, 1949" The American Metal Market, pages 213 and 205

a/ Estimated on a 10 months' basis.

Table 10, which gives the figures for United States production shows with what speed the tin industry has adopted this new method, and the incentive existing in view of the difference in prices.

The substitution of aluminium or of synthetic plastic materials has been even more drastic where other uses of tin are concerned, such as for collapsible tubes, foil, and so forth. This suggests that after the war there will be a smaller market for tin than before, industrial activity being equal. The International Tin Committee

/was dissolved in

was dissolved in March 1941, before the entry of Japan into the war, and at a time when tin production was reaching record figures in almost every country. There remained only a small committee for the distribution of free tin among the consumer countries, and a technical committee for research and statistics. Were the Governments to reach a new agreement, and a new Committee to be formed with the object of regulating production, it would face a much harder task than in the past owing to the probable decrease in the demand for tin which is bound to take place in the next few years compared with that of the pre-war period. Through various unofficial channels, the Bolivian Government has expressed its willingness to participate in such an inter-Governmental agreement for the control of tin, should an adequate basis be found.

Table 11 gives the world output of tin since 1913, and also the percentage of it which has been supplied by various producers. It reveals the decline of production in China and in the "other countries" group by contrast with the irregular increase of Africa, Indonesia and Siam in the first instance, and of Malaya and Bolivia to a lesser degree. The Belgian Congo and Nigeria are the main African producers; the former produced over 17,000 gross tons during the war, its production since then being an average of 14,000 tons, which figure should be compared with an average of 8,000 tons a year in the 1935/39 period. Nigeria is now producing approximately 9,000 tons, as compared with 12,500 during the war and an average of 9,300 tons in the 1935/39 period. Bolivia, the other large producer whose output went up during the war, has been producing about 35,000 in the last few years, having reached a maximum of 42,489 during the war, and an average of 25,431 from 1935 to 1939. During the war these three countries all supplied tin to the allies in quantities superior to their average production. On account of natural causes, aggravated by the production drive, together with the lack of prospecting for new deposits, the average grade of tin ore in these countries has declined in comparison with

/with the ore

with the ore which was mined in the 1935/39 period.

Malaya, Indonesia and Thailand, which normally together account for the production of about 60 per cent of the world output of tin, have maintained the same percentage contribution as in 1913/1915, except during the last war. The Japanese invaded their territory and the tin-mines were partially destroyed and production discontinued except for small quantities of concentrates that were smelted in Japan. As world output has increased from approximately 130,000 tons to a maximum of 240,000 in 1940/41, during the period under reference, these countries should increase their production to a corresponding extent if they are to preserve their percentage contributions. The output of Malaya, the most important of them, fell from 55,440 tons in 1935/39 to 8,430 in 1946; in 1947 it rose to 27,030, and to 44,820 in 1948, and production was continuing at the rate of 54,700 tons a year in the first eleven months of 1949; in other words, Malaya is well on the way towards the recovery of its former production capacity. The average output in Indonesia, next in importance in this group, was 29,050 tons in 1935/39; it only reached 6,420 tons in 1946; then 15,915 in 1947, 30,562 in 1948, and during the first eleven months of 1949, was producing at the annual rate of 29,140 tons. As several deep mines which were found to have been flooded at the end of the Japanese occupation are still not operating, it can be expected that the output of this country will rise, especially now that the political problems, which probably had a negative influence on would-be investors, have been solved. In Thailand (Siam) recovery has been very slow, due chiefly to the delay in reaching an agreement between the Government and the mining companies in regard to compensation for war damage. Such an agreement was signed in 1948. The figures for Thailand are as follows: average production in 1935/39 - 14,140 tons; 1946 - 1,056; 1947 - 1,401 tons; 1948 - 4,240 tons; and in the first eleven months of 1949 the annual rate was 7,500 tons.

The fact that Malaya, as well as Indonesia, both of which countries have succeeded in reaching once again their average 1935/39 production, are still far from their 1942 output, and also the fact that the tin-mining industry is showing a fairly rapid rate of recovery in these

/countries, make



Table 11. World production of tin and its distribution among the main tin-producing countries. (Tin in concentrates)

Years	World production in tons of 2,240 lb.	Percentages of world production					
		Bolivia	Malaya	Indonesia and Siam	Africa	China	Other countries
1913	135,940	19.4	38.4	15.6	---	6.2	20.4
1914	125,981	17.7	40.8	21.0	3.5	5.6	11.2
1915	129,743	16.8	39.0	22.7	3.9	6.2	12.5
1916	128,117	16.5	37.4	24.3	4.6	5.9	11.2
1917	131,870	21.1	33.0	22.6	4.6	8.9	9.6
1918	125,984	23.2	32.3	23.1	4.9	6.7	9.7
1919	123,240	22.2	32.3	24.1	4.8	7.2	9.3
1920	124,256	23.8	30.2	22.7	4.5	8.6	10.1
1921	117,551	24.6	31.3	27.2	4.9	5.5	6.4
1922	124,561	22.6	30.4	29.8	4.9	7.4	5.0
1923	127,503	24.4	31.4	26.0	5.4	6.3	6.5
1924	143,764	22.3	33.1	27.8	5.1	4.9	6.8
1925	148,437	22.5	33.0	26.8	5.1	6.1	7.1
1926	145,694	21.0	33.3	27.1	6.0	4.5	8.1
1927	161,442	22.5	34.2	25.9	5.7	3.9	7.8
1928	180,746	23.3	36.3	24.0	5.5	3.9	6.9
1929	195,781	24.1	36.0	22.6	6.1	3.5	7.6
1930	178,816	21.7	36.3	26.1	5.4	3.7	6.8
1931	151,282	20.6	36.9	26.9	5.3	2.3	8.0
1932	100,787	20.7	30.0	25.1	5.0	2.0	17.1
1933	92,456	16.2	27.4	27.1	6.5	10.4	12.3
1934	117,043	17.9	29.6	25.4	8.3	5.5	12.8
1935	149,323	18.5	31.3	23.5	9.0	6.5	11.4
1936	182,295	13.3	36.6	24.6	9.3	5.8	10.2
1937	211,511	12.0	37.2	27.0	9.3	5.0	9.3
1938	151,027	17.1	29.1	23.2	9.8	7.4	13.4
1939	185,722	14.9	30.6	26.5	11.2	6.0	10.8
1940	244,973	15.7	35.4	25.7	10.2	4.1	8.8
1941	245,445	17.4	32.3	27.4	11.7	2.9	8.2
1942	121,292	32.0	13.2	14.7	24.1	3.7	12.0
1943	141,538	29.8	18.7	16.9	21.7	3.2	9.6
1944	101,227	38.9	9.3	10.1	30.1	2.2	9.4
1945	89,771	48.1	3.6	2.3	32.0	2.3	11.0
1946	91,931	41.6	9.3	8.3	27.0	2.8	11.0
1947	116,134	29.1	23.6	15.1	20.6	3.5	8.1
1948	155,346	24.4	29.3	22.9	15.2	1.7	6.6
1949 a/	162,483	21.3	34.3	22.8	14.3	2.6	5.7

Source: For 1913 to 1934, from Metal Statistics 1949, American Metal Market, page 411. For 1935 to 1948, Yearbook of the American Bureau of Metal Statistics. For 1949, from the International Tin Study Group, Statistical Bulletin, January 1940.

a/ Based on production over 11 months.



countries, make it appear very probable that the next few years will see an increase in world output, and that it is from these two countries that most of the increase will come.

#### II. Share of the Latin American countries in world production.

There are a few countries in Latin America producing tin apart from Bolivia, the Argentine, Mexico and Peru, but in such small quantities that it is unnecessary to take them into consideration.

Chart No. 20 shows the relation that has existed between world production and that of Bolivia between 1925 and 1949. It will be noted that up to 1935 inclusive the output of Bolivia was almost perfectly adjusted to the fluctuations of the cycle. Between 1936 and 1939 it moved independently and did not reach the maximum of 1937, the peak year of the cycle. It is not that the restrictions imposed by the Tin Committee have kept down Bolivian production, for it was unable to produce the amounts allocated to it by the Committee's quotas, which also appear as a curve on the chart. The causes for this falling-off in production are of a complex nature. It is unanimously agreed that one of the main factors has been the lack of manpower, which at one time was so serious that laws were passed making labour in the mines compulsory for the physically able veterans from the Chaco war.

Table No. 12 brings out more clearly Bolivia's share in the world production. Taking 1929 as base year, it shows an index of the percentage of its annual contribution. The drop registered between 1935 and 1940 corresponds to the period when the output fell below the quotas assigned to Bolivia by the International Tin Committee. The increase in 1942 and the following years was the result of the situation created by the war and there has been a tendency to revert to normal since it terminated.

#### III. The relation between world output and total capacity.

Chart No. 20 gives the theoretical capacity of the world to produce tin, in addition to the actual output of Bolivia and that of the world, which have been considered in the foregoing section. It has been calculated on the same basis as in the case of zinc and copper.

/Tin is a

Tin is a metal, the productive capacity of which far exceeds normal consumption. Actual extraction has varied between these limits, influenced by the decisions taken by the Committee, in order to keep stocks and prices under control. The instability of the whole position would have been brought out even more strongly, had world consumption also been indicated on the chart. Now, production was restricted during nearly the whole decade of the thirties, so that many industrialists took no measures to increase productivity and reduce their costs; this was true of nearly every country. It is obvious that, had the restrictive action of the International Tin Committee not intervened, the capacity for production would have been very different, although part of the tin mining industry in Bolivia would probably have discontinued operation on account of its high costs.

The part of the chart which relates to the period from 1913 to 1931 gives a picture of the situation at this time, when the production and exportation of tin and its minerals were unrestricted. The section that follows, comprising the 1931 to 1942 period, corresponds to the time when restrictions were imposed by the Committee, which can be seen to have had considerable importance. Lastly, from 1942 onwards, the chart illustrates the situation created by the war and its subsequent results. No adjustment has been made in order to subtract the production of countries invaded by the Japanese, because several of them did keep up production to a certain extent. The minerals extracted under these conditions were mostly processed in Japan and subsequently used there. The amount of this small-scale production is known, and has been included in the curve showing the actual production figures.

During the war certain countries such as Bolivia, Nigeria and the Belgian Congo increased their production to beyond their pre-war output; after the war, however, they were unable to maintain it on account of deterioration both of the average grade of the minerals and also of the equipment; there had moreover been but little prospecting, exploration and preparatory work done during the war years, when the mines had to operate with a shortage of manpower and of equipment and spare parts.

/The resultant

Table 12. World production, Production in Bolivia, and indices of the contribution of Bolivia to the world output of tin

Year	World production	Production in Bolivia	Percentage of Bolivian production	Index of the Bolivian contribution 1929 = 100
1925	148,437	32,740	22.5	94
1926	145,894	30,542	21.0	87
1927	161,442	36,381	22.5	94
1928	180,746	42,066	23.3	97
1929	195,681	47,079	24.1	100
1930	178,816	38,756	21.7	90
1931	151,282	31,234	20.6	85
1932	100,787	20,912	20.7	86
1933	92,456	14,961	16.2	67
1934	117,043	20,964	17.9	74
1935	149,323	27,603	18.5	77
1936	182,295	24,459	13.3	55
1937	211,511	25,424	12.0	50
1938	151,027	25,777	17.1	71
1939	185,722	27,650	14.9	62
1940	244,973	38,547	15.7	61
1941	245,445	42,874	17.4	72
1942	121,292	38,904	32.0	133
1943	141,538	42,187	29.8	124
1944	101,227	39,339	38.9	162
1945	89,771	43,169	48.1	200
1946	91,931	38,221	41.6	173
1947	116,134	33,791	29.1	121
1948	155,346	37,906	24.4	102
1949 <sup>a/</sup>	162,488	34,646	21.3	89

Source: From 1925 to 1934, Metal Statistics, 1949, American Metal Market, page 411. From 1935 to 1947, Yearbook of the American Bureau of Metal Statistics. From 1948 onwards: International Tin Study Group, Statistical Bulletin, January 1950.

<sup>a/</sup> Based on the production of 11 months.





The resultant decline in the productive capacity of these three countries has not reduced the figures for theoretical capacity, because the situation is only temporary in all three cases and measures are being taken to correct it.

#### IV. Prices of tin

Chart No. 21 gives the prices of refined tin in New York in dollar cents per pound. It may be observed that the highest price in the cycle of the twenties was reached in 1926, at 65.28 cents per pound, and that in 1929, the peak year of the cycle, the price had dropped to 45.15 cents. The minimum price during the depression was recorded in 1932 at 22.01 cents, and from then onwards it rose rapidly, thanks to restrictions on production, and maintained an almost steady level up to the outbreak of war.

In 1947 and 1948 prices rose swiftly, the metal being even rationed and subjected to consumption quotas, on account of the rise in costs in nearly every country and the short supply.

The same chart gives the prices of tin plate, for which tin is chiefly used. The violent fluctuation in the price of tin during the depression was accompanied by only a very small drop in that of tin plate, although production had been considerably affected by the depression, having fallen in 1932 to 55% of its 1929 tonnage. This phenomenon can be accounted for by the fact that only a very small quantity of tin is used in the manufacture of tin plate. In fact 100 kilos of tin plate were produced at that time with only 1.5 to 1.6 kilos of tin. It follows that the fluctuations in the price of tin plate, which constitutes the chief purpose for which tin is used in the world, has been and is affected rather by fluctuations in the price of steel than in the price of the tin with which it is coated.

#### V. Trends in the consumption and supply of tin

Table No. 13 shows the world production of virgin tin from 1925 onwards, together with its consumption. It is necessary to point out that these series 1/ have been taken from statistics published by the International Tin Research and Development Council, after a number of corrections had been made, which were particularly necessary from 1935

1/ Metal Statistics 1948, American Metal Market, New York, p.433.

/onwards.

onwards. After all these almost continuous adjustments of the figures, those which may now be found in older issues of the Yearbook of the American Bureau of Metal Statistics as a rule show small variations amongst themselves, which do not greatly affect the fundamental facts.

In addition to this information, Table No. 13 also contains a balance of unconsumed tin, arrived at by the simple method of comparing consumption with production starting from the amount of tin available in 1936, which consisted of 44,907 metric tons. An examination of these figures goes to prove certain facts already mentioned in various parts of the present work, such as a) that world output exceeded consumption in 1948 and 1949; b) that the latter has been stabilized at approximately 140,000 tons, at least if judging by the first eleven months of 1949; c) that during the period when the Tin Committee was in action, i.e. 1931/1940, world stocks were low at first, and then were maintained at the minimum safe levels; d) that world production has recently attained figures out of all proportion to world consumption, from the moment when the United States decided to buy large amounts of tin for a stockpile; e) that the tonnage in the possession of the United States Government, which has never been divulged, must be so great as to be able to influence prices substantially, should that country decide to sell.

This would however require special legislation on the part of Congress, so that it is but a remote contingency. The question is rather whether these reserves are going to be amplified yet further by the purchase of surpluses which, according to all indications, are likely to be produced.

The International Tin Study Group publishes in the statistical bulletin the figures representing the stocks declared for purposes of trade. According to this authority, the world stocks amounted to 136,300 in December 1948, and it is important to compare this figure with the 239,500 which appears in our chart. The difference, which exceeds 100,000 tons, plus the quantities which may have been recovered from scrap must have been absorbed into the stockpile. According to

/confirmed



Table 13. World consumption, production and accumulated surpluses  
of tin and New York prices

Year	Production (Metric tons)	Consumption (Metric tons)	Accumulated surpluses (Metric tons)	Price per lb. in New York
1925	148,437	—	—	57.90
1926	145,694	—	—	65.30
1927	161,442	153,314	54,253	64.37
1928	180,746	173,329	61,670	50.46
1929	195,681	186,537	70,814	45.19
1930	178,816	170,688	78,942	31.70
1931	151,282	142,748	87,476	24.46
1932	100,787	106,273	81,990	22.01
1933	92,456	134,620	39,826	39.12
1934	117,043	125,069	31,800	52.16
1935	140,208	151,587	20,421	50.39
1936	181,864	157,378	44,907	46.42
1937	210,820	188,163	67,564	54.24
1938	162,560	150,977	79,147	42.26
1939	169,672	160,629	88,190	50.18
1940	235,204	160,731	163,023	49.82
1941	242,824	172,110	233,737	52.01
1942	121,412	116,738	238,411	52.0
1943	140,716	103,124	276,003	52.0
1944	102,616	102,717	275,902	52.0
1945	91,948	99,273	268,577	52.0
1946	90,424	111,048	247,953	54.58
1947	116,332	139,090	225,195	77.94
1948	155,346	140,716	239,825	99.25
1949	162,488	140,000	—	99.34

Source: Up to 1948 inclusive, Metal Statistics 1949, American Metal Market, page 433. Data for 1949: International Tin Study Group, Statistical Bulletin, January 1st, 1950

- a/ Difference between production and consumption, without subtracting the quantities which may have been withdrawn for stock piling, starting from 44,907 metric tons as being the stock in 1934.
- b/ Estimated production calculated on an eleven months' basis; consumption for those of the first 6-month period.





confirmed statements, purchases of this nature continued at least up to August 1949. The apparent stocks of tin amounted to 131,500 at the end of November 1949, or, in other words, they have decreased to a slight extent compared with those of December 1948, owing to the aforesaid purchases for the stockpile.

The picture which these figures help to depict is not a very promising one for the tin-producing countries, especially not for those which do not belong to the Far East, i.e. Bolivia, Nigeria and the Belgian Congo, where costs are higher, and where the average grade of the minerals has deteriorated. The majority of the tin-producing countries are planning improvements in their mining plants in order to deal with this situation. Bolivia, for example, has asked for a credit of four million dollars from the Export-Import Bank of the United States in order to construct a modern concentrating plant in Oruro; the cost will be borne by the Banco Minero de Bolivia (the Mining Bank of Bolivia). The fundamental problem in the Belgian Congo consists in the limited amount of electrical power available, and the Geo-Mines and Symetain Companies are planning to treble the power installations within a very few years. In Nigeria an extra hydro-electric plant is likewise in the course of construction, and large sums are being invested in drilling through the layer of basalt of which the plateau is formed, in order to discover new deposits.

Once these programmes have been carried out, and the tin-producing countries of the Far East have completed their recovery, the present problem of over-production will become even more acute, unless the lifting of Government controls at the end of 1949, results in an increase of consumption. For instance, thicker layers of tin might be applied on tin plate made by electrolytic deposition, and yet another alternative, which cannot be altogether ignored, would consist in new applications for tin plate or in the consumption of a higher proportion of canned food, so that the world consumption of tinned foods might increase, or so that new uses of tin might be discovered.

## SECTION 5. THE STRUCTURE OF LATIN AMERICAN MINING AND SMALL-SCALE MINING IN CHILE

In all the Latin American countries exporting mineral products, a distinction is made between three types of organization, which are classified as "large", "medium-sized" and "small" mining concerns. The line of demarcation between small and medium-sized is fairly definite: small mining organizations are those that confine themselves exclusively to the extraction of ores and possess no concentrating plant of their own. As the cost of transport is much higher per unit of metal for the usual ores than for concentrates,<sup>1/</sup> only those concerns whose output and capital are insufficient to justify the acquisition of a concentrating plant are included in the category of "small".

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1/ The following definitions of the various forms and stages relating to the production and sale of copper occur so frequently in the course of the present work that they are listed below:

Ores: this is applied to minerals in the form in which they are found, without any processing other than, if necessary, hand picking; copper ores need a minimum metal content of 8 per cent in order to qualify for export.

Concentrates: this is applied to a product of concentration plants in which the metal content of minerals of a grade inferior to export requirements, has been raised by grinding and by flotation or gravity concentration. The metal content of concentrates varies from 15 to 60 per cent Regulus or Matte, a semi-metallic product with from 25 to 55 per cent of copper.

Standard or Blister bars: these terms designate any bar with more than 94 per cent of copper and often containing some gold and silver. In addition, in the trade, blister bars, smelted in Chile and with more than 95 per cent of copper are called "Chile-Bars".

Electrolytic copper: this is applied to bars refined by the electrolytic process, or obtained by direct electrolysis of the ores. They have to contain more than 99.93 per cent of refined metal and their conductivity must be above 103 per cent.

Cathode bars: these are bars of refined copper from the electrolytic tanks, usually in the form of irregularly-shaped plates measuring 60 by 90 centimetres in area.

/On the other

On the other hand the distinction between medium-sized and large mining organizations is less definite and varies somewhat, according to the type of mineral, and also from one country to another. Generally speaking, the large mining organizations consist of the important companies that have attained a high standard of mechanization.

All large mining organizations in Latin America have been financed by foreign capital, mainly by the leading United States producers. Bolivian tin and Chilean coal are the only noteworthy exceptions. The organizations in this category possess the following distinguishing features:

- a) organization is carried to a high degree of efficiency, permitting production at an optimum cost; and
- b) the amounts of capital invested and their close relationship with their American principals, give these companies an unusually strong position in the cartels where production quotas and world markets are allocated.

The small and medium-sized copper mines in Chile, lacking a domestic market and for the most part without concentrating plants depend on foreign markets wherein the policy of trade limitation of the big corporations makes itself felt. Their costs remain high on account of their low degree of mechanization, and as a result some of them are run at a loss, such profits as they make being dependent on the prevailing pattern of prices, costs and taxes.

In Latin American many small and medium-sized mining companies perform a useful function in spite of their small profitability not only because they bring in foreign exchange, but because they are the only buyers of agricultural products in isolated regions. In Chile, for instance, many writers consider governmental assistance granted to this type of mining to be justified, in view of the aforesaid reasons and of the unstable situation caused by inflation.<sup>1/</sup>

In Bolivia, the large mining concerns were formed by capital which may have been Bolivian originally but which has now been considered

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<sup>1/</sup> See Ing. César Fuenzalida Correa: "El Problema Minero: Antecedentes y Soluciones". (The Mining Problem: background and solution"), Santiago, 1949.

international over a long period. On account of the peculiar characteristics of the tin cartel which is based on an inter-governmental agreement, it is the Government of Bolivia that represents the joint production of the country at international organizations.

As an illustration of the differences between the large-scale, medium and small mining organizations, we may take the production of copper in Chile. Table 9 gives the production in metric tons of refined copper for 1948, in every company, both large and medium-sized. The largest of the medium-sized mines barely produce 6.5 per cent of that produced by the smallest of the large mines. The three large mines produce 95.62 per cent of all the copper in the country; the seven medium-sized ones, together with the plants which concentrate the mixed ores of the small precious-metal mines, produce a total of 3.25 per cent of the copper in Chile, and the 368 companies that go to form the small copper-mining industry produce jointly less than 1 per cent. (See Table 9).

Where output is concerned, large mining companies demand an average of 11.60 working days per ton to produce electrolytic or blister copper from the ores; the medium-sized mines, not including the precious metal concentrators, require an average of 46.35 working days per ton of fine copper in concentrates. "The Departamento de Minas y Petróleo de Chile" (The Department of Mining and Petroleum in Chile) has estimated that the small mining companies demand 146.1 working days per ton of fine copper in 6.52 per cent ores; but this estimate cannot be considered even approximately accurate.

The two aspects under discussion, total production and output per workers, provide the best gauge for the quality of the deposit and of its organization.

The figures available concerning the total amount of capital required per ton of copper produced in any of the three types of organization, for whereas the data relating to large concerns include installations for smelting and refining, the medium-sized Chilean mining companies lack such assets but possess concentration mills. It can only be stated that for equivalent stages of processing, the expenditure of power per ton of refined copper produced by large companies is greatly inferior.

"Potrerillos",

Table 9: Production, productivity of labour and consumption of electric power in large, medium and small copper-mining enterprises in Chile in 1948

Company	Fine copper metric tons	Man days per ton	KWH per ton
<u>Large Mining Companies</u>			
Chile Copper Co. (Chucucamata) <u>a/</u>	207,929	(10.69)	( 142) <u>e/</u>
Andes Copper Co. (Petrocerillos) <u>a/</u>	67,930	(12.73)	(2,889) <u>e/</u>
Braden Copper Co. (El Teniente) <u>a/</u>	149,005	(12.34)	( 313)
	424,864	(11.60)	( 641)
<u>Medium-sized Mining companies</u>			
Mining Company Tocopilla	1,809	83.11	2,129
" " S. Hochschild (La Patagua)	751	39.27	994
" " Cerro Negro	982	63.93	3,062
" " M'Du Zaita-Soldado	3,967	29.23	1,626
" " " " Cerrado	919	37.52	1,292
L. Rochefort (Los Maquis)	213	54.04	3,746
Mining Company Disputada (Las Condes)	4,313	45.54	<u>b/</u>
Concentration Plants	1,516	- -	- -
	14,470 <u>g/</u>	46.35 <u>c/</u>	- -
<u>Small Mining Companies</u>			
368 Companies	3,218 <u>f/</u>	(90.7) <u>d/</u>	

a/ The degree of processing in the large and in the medium-sized mining companies is not comparable. The former produces blister or electrolytic bars, and the latter concentrates. If medium-sized companies are to attain to the same degree of processing, even more manpower and more electric power per ton will be required.

b/ The mine owns a hydraulic turbine, and provides no information regarding its consumption of electric power.

c/ Does not include production from concentration plants which merely buy minerals and do not own a mine.

d/ Estimated by the Departamento de Minas y Petróleo, on the assumption that an average of 60 per cent of the price is spent on wages.

e/ For reasons of comparability the power consumed by direct electrolysis of the ores in these two mines is not included.

f/ In minerals with an average grade of 6.25 per cent.

g/ In concentrates of variable grade.

"Potrerillos", belonging to the Andes Copper Company, is an exception to the above; but this is a mine extremely difficult to exploit and with a very low grade ore. It contains both oxidized and sulphide ores, as in the medium-sized "Cerro Negro" mine; but whereas the latter loses the oxides and only recovers the sulphides which amount to some 50 per cent of the copper content of the ore, the Andes Copper Company possess separate plants for the extraction of both oxide and sulphur.

When under these difficult conditions, the mining company was first formed in 1927, capital expenditure and mechanization were carried to the utmost lengths, with the object of facilitating production at a cost sufficiently low to compete with success in the world markets. Since then the grade of the mineral has deteriorated, the world price has dropped, and costs have increased, together with taxation due to the application of differential rates of exchange; as a result, the company scarcely makes any profits at 1949 prices.

Later on we shall consider the multiple exchange rate system applicable in Chile to large mining companies on the one hand, and to medium-sized and small ones on the other. Both have an effect of a different kind on the profitability of the copper industries to which they apply, but as there is a great deal of variation, in view of such factors as the nature of the mineral deposits, the size and organization of each concern, etc., it may be of interest to tabulate the costs of production for each company in 1948.

Table 10 makes it possible to compare the average costs of the large copper mining companies in Chile in 1948 with those of each medium-size company in Chile. In view of the essentially secret nature of this type of information, the companies are not mentioned by name. The table shows the great diversity which exists between the comparative costs of the various companies. The three large mining companies whose average costs amount to 14,462 cents (tax included) also show an appreciable difference amongst themselves.

/Table 10:



Table A9: Cost of electrolytic copper produced from Chilean ores, in dollar cents per pound.

(Average from June to December 1948) <sup>a/</sup>

Company				Costs in cents per pound	Sale price
Average, large companies				14,462 <sup>b/</sup>	22,038
Medium-sized companies A				11,424	"
"	"	"	B	13,719	"
"	"	"	C	14,759	"
"	"	"	D	15,238	"
"	"	"	E	16,621	"
"	"	"	F	16,727	"
"	"	"	G	20,706	"

Source: Based on original declarations of the mines to the Departamento de Minas y Petr leo de Chile.

- <sup>a/</sup> Provision is made for transport and smelting costs abroad. The cost includes the usual amortization, but no reserves for depletion nor for any taxes.
- <sup>b/</sup> There is a slight difference between these costs and those which the Banco Central publishes in its balance of payments. They are due to the fact that the two series of figures do not cover the same period and that certain expenses of the Head Offices abroad are not taken into account by the Departamento de Minas y Petr leos.

It is estimated that in 1949 costs increased by approximately 10 per cent on account of the further reduction of the purchasing power of the peso and on the other hand prices, which averaged 22,038 cents in 1948, dropped to about 18 1/2 cents, at which figure they have remained during most of the year.

Under these conditions, the mine labelled G could not operate profitably, and so discontinued operations while awaiting a more favourable rate of exchange. Mines E and F are in operation, their costs of production, of their copper being practically equal to the selling price, but they were able to improve their position slightly by the gold and silver content of the ore.

As regards the foreign exchange earnings of large mining companies on the one hand and medium-sized and small ones on the other they are

/ affected

affected by different systems of returning them to Chile, as follows:

Medium-sized and small mining companies, both being financed by Chilean capital, are obliged to hand in the whole amount of the foreign exchange obtained from their exports, and to put it at the disposition of the Chilean Exchange Control at a fixed rate, which during 1948 and 1949 was 43 pesos to the dollar. These rates correspond to the f.o.b. price of mineral products at Chilean ports, whether concentrates, matte, precipitates, or in the form of blister copper smelted in Chile, and therefore do not include expenses incurred abroad, such as refining, freights, sales cost, taxation outside the country, etc. Consequently, these mines have to request import permits for their requirements together with the foreign exchange for such imports at the current rates for each class of product.

On the other hand, the large American mining companies merely return sufficient money to cover exploitation costs and taxation. The dollars thus returned are converted into Chilean currency at the rate of 19.37 pesos to the dollar, in accordance with the regulations in force since 1934, and the Chilean Government sells part or all of this foreign exchange at a lower rate (more pesos to the dollar), incorporating the difference into the country's budget. In this way, whereas the basic rate of 19.37 pesos to the dollar does not change, the system under reference constitutes a tax applied only to such organizations and that becomes heavier in proportion to the devaluation of Chilean currency, with the resultant increase of internal prices and wages.

On the other hand, these mines are authorized to use the foreign exchange derived from their sale to import into Chile the materials, spare parts and articles required for production and living facilities in the mining camps. The funds required for purposes of amortization, servicing of loans, taxes and dividends are also kept abroad.

Both systems have their advantages and their drawbacks. The large mining companies have to convert part of their profits at the rate of 19.37, which in point of fact constitutes a tax on production. On the other hand they can import supplies freely, and can give preference to

/United States

United States materials which have undergone a slower process of inflation than those produced in Chile.

In Chile there is no other direct tax worthy of mention on copper production; but the tax on profits is heavy and has reached an average of 14 per cent on Chilean owned mines, and since 1942, 50 per cent in the American owned copper mines. Income tax on the latter has been gradually rising, and a similar process has been going on automatically in regard to the tax derived from the fixing of the rate of exchange at 19.37, owing to the devaluation of the currency. By these means, the amount of Chilean foreign exchange earnings from the operations of the large mining interests has increased both in total value as well as per pound of copper. These foreign exchange earnings fluctuated between 2,580 and 4,458 cents per pound during the thirties and between 3,890 and 6,633 during the war, only to rise to over 11 cents in 1947/48.

Despite these increases, Chile's foreign exchange earnings per pound of fine copper have remained inferior in the case of the big mines, as compared with small and medium-size mining, whether engaged in exporting ores, concentrates or blister bars.

Table 11 illustrates this position. In the years 1947 and 1948, for instance, the large mining companies only contributed 71 per cent and 80 per cent respectively of the foreign exchange earned per pound of exported copper by the medium-sized and small companies. But this drawback from the country's viewpoint, whereby fewer dollars are obtained in return for its natural resources, are more than compensated by the greater advantages taken of the supply of manpower. In effect, a worker employed by the large companies brought US\$ 21.64 dollars to the country per working day in 1948, as against 6.99 produced by the miner in the medium-sized companies. As for the miner in the small companies, his dollar earnings are still lower, but cannot be expressed in figures for lack of precise data.

Finally, in making a comparison between the advantages and drawbacks of both kinds of mining concerns, the one financed from abroad and the other with Chilean capital, it is important to remember that the latter must have recourse to savings originating within the country whereas the

/ other is

Table 11: Contribution of foreign exchange made by large, medium-sized and small copper mining enterprises to the economy of Chile, in cents per pound of fine copper a/

Year	Price of electrolytic copper in New York b/	Cents per pound of fine copper		
		Large companies f/	Chilean companies c/	
			Blister copper	Minerals or concentrates
1928	14,570	3,207	10,775	9,183
1929	18,107	2,219	13,706	12,221
1930	12,982	2,810	9,595	8,239
1931	8,116	2,419	5,536	3,724
1932	5,555	2,473	3,235	2,077
1933	6,730	1,684	4,330	2,746
1934	7,270	1,682	4,807	3,314
1935	7,570	1,769	5,116	3,576
1936	9,230	2,439	6,668	5,007
1937	13,020	3,386	9,992	7,962
1938	9,700	3,904	6,950	5,498
1939	10,720	3,983	7,252	9,630 d/
1940	10,770	4,381	8,801	6,594
1941	10,901	4,451	9,135	7,102
1942	11,684	5,903	8,774	8,677
1943	11,700	6,374	8,756	8,645
1944	11,700	6,452	8,725	7,996
1945	11,700	6,161	8,772	7,992
1946 e/	13,820	7,917	--	7,995
1947 e/	20,758	9,578	--	13,769
1948 e/	22,038	12,327	--	14,674
1949				

Source: Prices quoted in the Engineer and Mining Journal of New York: prices of blister copper and of minerals according to the Annual Mining Reports of the Dirección General de Estadística de Chile, (Statistical Office); percentages of the coverage contributions according to information supplied by the companies and to the researches of the Central Bank, made by Raúl Simón and Fernando Illanes.

a/ Excludes foreign exchange spent on imported supplies.

b/ During the years in which the excise tax was levied in the United States, copper export prices have been taken as a basis.

c/ Includes the copper produced from ore containing gold and silver.

d/ The price is abnormally high on account of purchases from Japan.

e/ Blister copper was not produced by the small mining companies during these years.

f/ Taxes on profits have been allocated in the years in which they originated, not in those in which they were paid.

other is organized without any assistance from the country other than that provided by manpower and the concession of deposits.

Table 11 helps to demonstrate the gradual reduction in the margin between the dollar price in Chile of copper in blister bars or in concentrates. The costs in the country, in their turn, having risen because of inflation, the two latter small copper smelteries were compelled to cease operation in 1946.

## SECTION 6. THE COPPER MINING INDUSTRY IN RELATION TO CHILE'S ECONOMY

### I. Chile's share in the total copper production of the small, medium and large producers.

Between the years 1850 and 1880, Chile was the greatest copper producing country in the world, the annual rate of extraction averaging 24,290 tons in the fifties and rising in the seventies to 51,254 tons. Chile's share in world production amounted to 32 per cent in 1850/60, 44 per cent in 1860/70, and 36 per cent in 1870/80. From this period until the advent of the so-called large mining industry in the present century, the production in tons remained fairly steady, so that Chile's share in world tonnage began to decrease on account of the high production attained in other producing countries.

The chief reason for the initial production drive of the last century lay in all probability in the geographical configuration of the country, which offered easy access to the sea. From 1880 onwards the exhaustion of the richest ores coincided with the fact that the interest of most of the domestic capital was being diverted towards the saltpetre industry so that production dwindled as no new mines were set up to replace those abandoned.

The production of the United States only attained importance in the sixties of the past century, when it held the third place in world production with an annual average of 10,344 tons, as against 50,570 produced in Chile. From then onwards production in the United States attained high levels, particularly so after the Western and Mid-western states had been entirely settled. In the eighties the United States produced an average of 79,634 tons, against 39,817 tons produced in Chile.

Meanwhile copper production had begun in Mexico, in the nineties of last century, when it reached 12,760 tons. By 1905 it had already attained 65,449 tons, a figure much higher than that of Chile for the same period; but whereas the latter went on to produce a much higher tonnage thanks to the contributions of the large mining companies, the Mexican /mining industry

mining industry did not make much subsequent progress.

All this early production in Chile was dealt with by a type of mining concern similar to the medium-sized and small concerns already described. There were some 50 smelteries in the country that produced blister copper, and that were located either at the mine-site, or at such central points as the coal mines of Lota and Coronel.

The large-scale mining industry began in 1911, in which year the Braden Copper Company produced 4,523 tons of refined copper at "El Teniente". In 1915 the Chile Exploration Company began operations at Chuquicamata, and the Andes Copper Company at Potrerillos in 1927.

Since then the large mining companies have shown steady development, though influenced by cyclical fluctuations. On the other hand, the mining companies financed by Chilean capital have steadily declined over the past few decades, due chiefly to their inability to obtain the enormous capital necessary for economic production in view of the present pattern of prices and costs of copper. During the thirties a new type of activity came into being which gave an impetus to the Chilean mining companies; this consisted in the exploitation of ores mixed with gold and silver, an undertaking which proved profitable thanks to the relative rises in the price of precious metals. (See Table 12).

Table 12 presents data which serve to illustrate the change undergone by the structure of the Chilean mining industry as regards exports during the period 1913-1943. The large-scale mining industry increased its production from 8,170 metric tons and 19 per cent of the total for 1913, to 474,023 tons in 1943, or 96 per cent of the total. Since then there has been a slight falling off in quantity, chiefly due to lack of incentive during the war and to the technical problems which now beset the Andes Copper Company on account of the deterioration in the grade of its ore. The mining of mixed minerals was started on an appreciable large scale in the thirties and slackened during the war because precious metals were not

/ essential to the

Table 12. Production of fine copper in Chile according to the various types of mining organizations

Years	Small & medium -sized copper- mining companies	<u>Metric tons of fine metal content</u>		% of large scale mining industry
		Small & medium- si- zed mining industry for minerals mixed with gold & silver	Large-scale mining industry	
1913	33.777	332	8.170	19,3
1914	30.173	491	12.742	29,3
1915	31.226	256	20.860	39,8
1916	31.393	437	39.458	55,3
1917	33.612	35	68.868	67,1
1918	21.034	34	85.754	80,0
1919	21.706	14	57.859	72,6
1920	25.233	47	79.757	76,0
1921	23.484	235	36.691	60,7
1922	21.937	1.324	106.388	82,4
1923	25.173	1.410	155.911	85,5
1924	22.259	574	170.839	88,6
1925	22.842	181	169.436	88,6
1926	19.975	785	182.051	90,0
1927	24.002	948	217.684	89,8
1928	16.676	917	266.467	93,7
1929	26.696	1.629	290.091	91,2
1930	20.807	219	196.670	89,5
1931	14.010	157	209.361	94,0
1932	10.452	349	92.370	89,8
1933	8.076	4.217	151.149	92,5
1934	12.461	7.473	236.763	92,5
1935	13.980	5.282	247.811	92,7
1936	15.073	10.232	231.907	90,5
1937	17.305	14.968	381.008	92,4
1938	15.016	13.162	323.142	92,0
1939	14.699	13.231	312.905	92,0
1940	14.836	14.821	333.348	92,0
1941	13.291	11.737	443.032	94,7
1942	13.600	7.142	463.605	95,8
1943	17.169	6.010	474.023	95,6
1944	19.124	4.431	474.966	95,6
1945	14.881	4.193	451.104	96,0
1946	1.198	2.186	358.600	99,5
1947		1.240	408.800	95,6
1948	12.438		424.864	95,6
1949		6.646		

Sources: Annual Mining Reports of the Dirección General de Estadística de Chile.



essential to the war effort; since then it has revived to some extent. At the present time the copper extracted by these types of mine attains a value very near to that of the small and medium-sized mines exclusively producing copper, although the two together do not succeed in producing 5 per cent of the total.

## II. Dollar earnings of copper mining in relation to Chilean economy

The increase of copper mining in Chile and the large quantity of foreign exchange that it brings to the country have coincided with the decline of the nitrate industry. In 1948 copper mining, including small and medium-sized concerns, brought in 55.8 per cent of the total foreign exchange derived from exports, whereas the nitrate industry only brought in 20.3 per cent.

The fact that the amount of foreign exchange and therefore the country's capacity to import depends on a product as sensitive as copper to cyclical fluctuations, with low prices invariably coinciding with a dwindling rate of production, results in the creation of an extraordinary economic instability.

For the sake of clarity, let us take the "nominal value of Chilean copper" to be that which it attains in New York once it has been refined. Owing to the variations in price and quantity, these values have been approximately the same in 1929, 1937 and during the war, from 1942 to 1945, having oscillated during those years around the figure of 120 million dollars. From 1947 onwards prices have been rising, and as the quantities remain high, the nominal value of copper exports has risen to 197 million dollars and 216 million dollars in 1948.

The amount of dollars entering Chile as a result of copper exportation has, on the other hand, shown a steady rise except during the depression of the thirties.

If we exclude the sums paid for the importation of supplies for the copper companies, i.e. excluding expansions, but including spare parts, fuel, etc., food and consumer goods for the mining camps, then what may be called the net amount of foreign exchange entering the country has been as follows: 22 million dollars in 1929, 37 millions in 1937, and approximately 70 millions annually during the war. In 1947 it went up to 98 millions, and in 1948 to 122. The figures in Table 13 give a picture of this situation, showing the

/annual variations;

annual variations; the figures for the imports under reference are shown in separate columns:

Table 13. Dollar contributions by the copper mining industry to the economy of Chile, and necessary imports for the industry  
in 000 dollars

Year	A	B	C	D	E
	Large mining companies Net contributions	Imports of supplies for the mining companies a/	Small and medium-sized mining companies Net contributions	Imports of supplies for the mining companies b/	Gross contribution from all sources A/E/C/D/
1928	18,846	6,720	3,740	491	29,797
1929	14,195	5,090	7,934	1,065	28,284
1930	12,184	4,292	4,076	572	21,124
1931	11,168	5,315	1,408	205	18,096
1932	5,036	2,425	622	93	8,176
1933	5,611	3,590	944	141	10,286
1934	8,636	4,404	3,189	426	16,655
1935	9,667	5,852	3,543	473	19,535
1936	12,745	5,453	4,462	624	23,284
1937	28,450	10,703	9,096	1,235	49,484
1938	27,810	7,446	4,573	652	40,481
1939	27,476	5,586	6,064	829	39,955
1940	32,194	6,999	4,996	724	44,913
1941	44,048	10,770	4,601	683	60,102
1942	60,331	19,739	3,998	614	84,682
1943	66,612	17,056	4,454	679	88,801
1944	67,562	15,588	4,394	677	88,221
1945	61,278	13,172	3,550	525	78,525
1946	62,492	12,006	774	36	75,308
1947	93,291	20,371	5,537	627	119,826
1948	115,459	26,897	6,704	745	149,805
1949					

a/ Between 1940 and 1948, data from the Balance of Payments; for the preceding years the works of Don Raul Simon and Don Fernando Illanes have been consulted added to information supplied by the companies themselves.

b/ Estimates based on figures given by various companies and on statistical statements made to the Departamento de Minas y Petróleo of the Ministerio de Economía (Ministry of Economics)

The increase in dollar earnings is due to the larger tonnage of copper

/exported by the

exported by the large mining companies, and also the rise in both direct and indirect taxation. On the other hand, the small and medium-sized mining companies have been affected during this period by violent fluctuations; their foreign exchange contribution obtained exclusively from copper mining, amounted to 7,943,000 dollars in 1929, and fell to 6,704,000 in 1948.

This situation is shown graphically in Chart 32. It shows the nominal value (as defined above) of copper exports from all three types of mining industries in Chile, and also the net contributions, minus their own imports, of the large, medium-sized and small mines during the period from 1928 to 1948. The way in which foreign exchange returns to Chile have increased in both relative and absolute value may be seen from the chart. Lastly, it shows in addition the net returns of the large mining companies only, so that it may be realized that the curve is influenced mainly by their fluctuations.

In Table 13 mentioned above we see the total contributions made by the copper industry to Chile year by year, from 1928 to 1948. Those of the large companies are shown in a separate column on the one side, and those of the small and medium-sized companies on the other, giving the total amount of imports of supplies for each of the three types of organization, thus forming what might be called the gross contributions of foreign exchange.

The gross exchange contribution of the copper mining industry dropped from the approximate figure of 30 million dollars, which it reached in 1928/29, to 8 millions in 1932, when the depression was at its worst. From this it rose gradually until it became stabilized during the war at about 80 millions, and finally rose to 150 millions in 1948, owing to the rise in prices.

### III. Distribution of the proceeds of copper exported by the large mining enterprises.

In the preceding pages reference has been made to the gradual rise in taxation and production costs in Chile. It is clear that this state of affairs, although it has been responsible for causing the Andes Copper Company to operate almost at a loss with a production of 67,930 tons in 1948, has increased the contribution of foreign exchange to the country per unit of copper. The average net contribution during the period 1928/30 amounted to 2.744 cents per pound of copper, and in 1947/48 it rose to /10.952 for the

10.952 for the same amount.

The profits, including the sums required for payment of interest, the amortization of debts, and reserves against depletion (which Chilean taxation regulations do not recognise as part of the costs), have risen from 3.426 cents per pound in 1928/30 to 3.964 in 1947/48; having dropped to the minimum figure of 1.302 in 1931/35 during which period several years closed with a net loss.

The item called "expenditure abroad" has decreased to a considerable extent over the years, a decrease which has been balanced by a proportionate increase in foreign exchange contributions; this item includes freight, handling, storage, cost of sales and of refining of the blister copper which some of these companies export. This reduction in expenditure is due, not to actual reduction of costs, but to the changes made by the Dirección de Impuestos en Chile (Taxation Department) in regard to the definitions of profits and expenses respectively. For instance, the reserves against depletion, the exhaustion of the mineral deposits and the servicing of loans, which in other countries are considered part of the costs, form part of the profits, on account of the standards regarding taxable assets which are current in Chile at the present time. It is important to point out that in this series the item "expenditure abroad" includes the differences, whether favourable or otherwise, between the average official price for copper published in the Engineering and Mining Journal, and the average prices obtained by the enterprises according to their statements in Chile. If we take it in this sense, "expenditure abroad" has dropped from an average of 8.037 in 1928/30 to 2.555 cents per pound in 1946/48, having passed through an average minimum figure of 1.727 during the war and 1945, when they were subject to the ceiling prices and subsidies in the United States.

In Table 14 we see some of the factors which go to make up the nominal value of copper between 1928 and 1948. The percentage of net returns has risen from 22 per cent in 1928/30 to 57 per cent in 1926, to drop again in 1947/48 to 51 per cent on account of the larger profits accruing from the higher prices. (See Table 14).

/Lastly, Chart 33

Table 14: Breakdown of the price of refined copper in New York obtained by the large mining companies of Chile, in cents per pound.

Years	"Legal" cost in Chile	Taxation in Chile a/	Net foreign exchange contributions to Chile b/	Costs abroad c/	Profits, interest and depletion	Percentages of foreign exchange contribution in relation to the nominal value in New York
1928	2,200	1,007	3,208	6,919	4,442	22
1929						
1930	2,268	0,541	2,810	7,876	2,295	22
1931	2,324	0,095	2,419	5,695	0,455	30
1932	2,185	0,288	2,473	3,703	0,621	45
1933	1,417	0,267	1,684	5,217	0,171	25
1934	1,489	0,194	1,682	4,612	0,974	23
1935	1,532	0,237	1,769	4,312	1,492	23
1936	1,836	0,657	2,493	3,581	3,156	27
1937	1,982	1,404	3,386	3,484	6,148	26
1938	2,603	1,301	3,904	3,070	2,727	37
1939	2,589	1,394	3,983	2,893	3,844	37
1940	2,790	1,591	4,381	3,259	3,129	41
1941	2,668	1,783	4,451	2,887	3,562	42
1942	3,420	2,483	5,904	3,491	2,289	50
1943	4,191	2,183	6,374	3,139	2,186	54
1944	4,272	2,180	6,452	3,588	1,660	56
1945	4,336	1,825	6,161	4,392	1,144	53
1946	5,375	2,542	7,917	3,156	2,742	57
1947	5,539	4,039	9,578	7,375	3,997	46
1948	6,662	5,665	12,327	4,567	5,153	56
1949						

Source : Statements from the Central Bank; research made by Raúl Simon, Fernando Illanes and Ignacio Aliaga Ibar, supplemented by reports and data from the balance sheets of the companies.

- a/ Taxation on profits appears against the years in which it was first levied, and not against those in which it was paid.  
b/ Excluding imports of regular supplies and of new investments.  
c/ Including imports into Chile paid for with the foreign exchange held by the companies themselves.

Lastly, Chart 33 shows how the price of copper has varied from one year to another between 1928 and 1948. The almost continuous tendency towards an increase in monetary costs in Chile (excluding imports) may be observed, starting from 2,200 cents per pound in 1928 and reaching 6.662 cents in 1948. Taxation is included in the chart, over and above the total of expenditure, and consists almost exclusively of the tax on profits. It has risen from 1.007 cents per pound in 1928 to 5.319 cents in 1948, having amounted to scarcely anything at all in the years 1931 to 1935.

To the total of costs and taxes in Chile has been added the amount of expenditure incurred abroad, including amortization and imports made by the company for the development of their concerns in Chile. These expenses have decreased from 8.783 cents per pound in 1928 to 4.567 cents in 1948.

If we add the profits accruing abroad to the amounts obtained in this manner, we arrive at the sale price for electrolytic copper in New York. From the chart it appears that the total costs in 1932 and 1933, including taxation in Chile, were higher than the sale price. Those years saw losses in the copper mines of Chile. Although the chart does not indicate the same situation for 1931 and 1934, the owners suffered losses in those years also, for the space in the chart reserved for showing profits contains the sums devoted to the servicing of loans. The fraction of a cent per pound, which represents the gross profits in those years, did not suffice for the payment of interest and other expenses.

#### IV. Labour productivity in large-scale copper mining

The rise in costs which is apparent from the sum of the figures in Columns A and B of the previous table (14) is a complex matter, for it has taken place in spite of an appreciable increase in productivity per worker in all three mines.

For instance, the average production of fine copper per worker in the three organizations, including mines, preparation and metallurgical plants, has risen from 14.51 tons in 1925/29 to 26.81 tons in 1947/48. Table 15 gives certain facts relating to the annual yields at different

/times in the history

Table 15: Average productivity in tons of electrolytic copper per man year in the large mining companies of Chile, as compared to the total copper mining industry of the United States a/

Year	Tons per man per year in the large mining companies of Chile	Tons per man per year in the copper mining industry in the United States
1925	11,349	
1926	16,019	
1927	12,876	
1928	15,739	
1929	16,052	
1930	12,432	
1931	15,208	
1932	12,443	
1933	20,955	
1934	21,289	19,423
1935	19,120	24,519
1936	18,605	29,481
1937	22,664	28,020
1938	18,174	22,940
1939	19,587	28,546
1940	20,440	32,202
1941	24,681	32,220
1942	24,947	33,172
1943	25,282	32,819
1944	26,008	24,228
1945	27,914	22,823
1946	24,702	18,504
1947	26,307	
1948	27,310	
1949		

Source: Based on: figures for Chile in the Annual Mining Reports of the Dirección General de Estadística up to 1946 inclusive. After 1947 figures were obtained from the Departamento de Minas y Petróleos. The figures for the United States were taken from the Yearbook of the American Bureau of Metal Statistics for 1945. For 1946/47 they come from the Minerals Yearbook of the Bureau of Mines.

a/ In both the United States and Chile "man" includes all labour occupied in mines, preparation and metallurgical plants, transportation and auxiliary shops.

times in the history of large-scale mining in Chile and in the joint production of the copper industry of the United States, both under similar conditions. In 1934-40 the yield of the United States was 31 per cent higher than that of Chile; by 1941-45, the difference had been reduced to 11 per cent in favour of the United States mines. The 1946 figures, in which the Chilean efficiency is greater, must be considered abnormal in view of the sudden drop in production, and to the many strikes that took place in both countries during that year.

Chart 34 shows the comparative productivity per worker in Chile and in the United States year by year. In the case of Chile the increase is almost a continuous one, interrupted by periods of decrease in years when a low output followed a high tonnage in the previous year. This is due to the fact that the large copper mines are among the organizations that pay the highest wages in Chile. As a result, the workmen do their utmost not to lose their jobs, even in cases where a falling-off in production makes them redundant, and they exert the fullest pressure of their syndicates and all the influence that they can bring to bear for the achievement of this object. It follows that the reduction in the number of workers does not keep step with the drop in production, and therefore, the yield of the remaining labour force is lower.

Where the United States is concerned, a similar tendency is observable up to 1943, whereas in 1944 and 1945 the decrease in productivity, due mainly to the extreme shortage of manpower on account of the war, made efficient operation impossible in a number of mines. The reason for the drop in 1946 has already been given.

The increase in productivity in the copper mines of Chile has been due to periodic investments, among which some of the most recent have been loans from the United States Government, with the object of increasing its copper supply. The mechanical equipment required for these developments is not covered by the sums set aside for "imports of supplies with their own foreign exchange" mentioned in several parts of the present work, for such types of import only include articles for current use in actual production and in the mining camps.

The investment of 130 million dollars (over a ten-year period) which  
/is at present



is at present being made by the Chile Copper Company, a subsidiary of the Anaconda, is primarily intended to provide a plant to work sulphide ores, substituting the present oxidized ore plants. Oxides, which are closer to the surface, will be exhausted in a few years, whereas the sulphide deposit of Chuquicamata constitutes the largest individual copper reserve known in the world.

V. Distribution of the increased income derived from the higher productivity of copper mining.

During the 'thirties the price of copper dropped violently. In the United States only those mines which could reduce their costs by all kinds of technical improvements were able to survive. Most of these improvements have been introduced in Chile with excellent results, as has already been seen.

It is interesting therefore to investigate the use made of the amounts thus obtained, not in Chilean pesos but in dollars. Since no data are available for the period prior to 1928, Table 16 shows productivity in dollars per man working year.

In Table 16 we may see the annual output per worker given in nominal dollars, or, as defined previously. This product was worth 4,946.20 U.S. dollars in 1928/30; it fell to 2,764 in the first five years of the thirties, in order to rise slowly from then on. In 1947/48, thanks to the great rise in the price, it amounted to 12,705 dollars.

Fifteen per cent of these amounts corresponds to the "legal cost" in 1928, which expression, as defined by the Chilean Taxation system includes all expenditure in Chile, except profit taxes and new investments; in other words: wages and salaries, miscellaneous taxation, domestic supplies, rail transport, stevedoring, etc. Under all these headings, wages and salaries form the most important item. The legal cost rose to 38.9 per cent of the value of copper in 1946, and dropped to 28.3 per cent in 1947/48, due likewise to the high price. These figures enable us to state that the workman employed in the copper mining industry has received (in terms of dollars) a substantial part of the benefits resulting from greater productivity and the rise in prices.

The table also shows the amount of the profits tax in Chile as a

/percentage of the

Table 16: Annual output in dollars per worker, and percentage distribution of the sale price in cents per pound.

Years	Annual output in dollars per worker	Percentage of the sale price <sup>a/</sup>		
		Legal cost in Chile	Taxation in Chile <sup>b/</sup>	Profits and other sums not returned to Chile
1925	3,513.30	-	-	-
1926	4,871.77	-	-	-
1927	3,667.52	-	-	-
1928	5,055.53	15	7	70
1929	6,407.75	-	-	-
1930	3,558.05	18	4	70
1931	2,721.09	29	1	56
1932	1,523.84	40	5	34
1933	3,099.38	21	4	60
1934	3,412.08	21	3	65
1935	3,190.89	20	3	62
1936	3,785.83	20	7	61
1937	6,505.45	15	11	64
1938	3,886.44	27	13	49
1939	4,629.05	24	13	55
1940	4,853.17	26	15	51
1941	5,931.43	24	16	49
1942	6,425.97	29	21	33
1943	6,521.19	36	19	32
1944	6,708.46	37	19	32
1945	7,200.08	38	16	36
1946	7,526.09	39	14	32
1947	12,154.88	27	18	44
1948	13,268.55	30	24	31
1949				

Source: See Table 14.

a/ The balance arises from the sums spent on the importation of supplies.

b/ The data for the different years are not entirely uniform. In some cases, customs duties on imports themselves have been included; in some others income tax for employees has been computed, and in other again, no extras have been added.

percentage of the value of copper. With the exception of the slump experienced in years showing a deficit, it has risen gradually from 5.2 per cent of the value of copper in 1928/30 to 21 per cent in 1947/48. It follows that the Chilean exchequer has gained appreciably from its increasing share in the output of the copper industry. Nevertheless, the different years of this series are not completely comparable with each other, i.e. in certain years the tariff on the imports of supplies is included, in some the income tax of the officers of the company has been added, while usually only the profit tax of the companies themselves have been considered.

This rise is due to successive increases in the rate of the income tax. This was initiated by Law 3996 of the 1st of January 1924, and has been subject to frequent modifications. The original rate for the exploitation of a mine was 12 per cent on profits, plus an extra 6 per cent is correct. The joint rate of 18 per cent remained in force until 1937 inclusive. In 1938 the tax on profits amounted to 23 per cent, in 1939 to 33 per cent, and from 1941 onwards to 50 per cent.

But not only has the rate been increased in the period under reference: the Dirección de Impuestos Internos (Inland Revenue) has been narrowing the definition of "legitimate" costs from the point of view of the Chilean Government - expenditure which is tax free. Various items formerly regarded as "expenditure abroad" are now regarded as profits. For this reason the percentage of expenditure abroad has shown a progressive decrease, as has already been described.

Lastly, as an illustration of the influence which these changes have had on the economic situation of the country, the table shows a series of percentages of the price of copper which correspond to "sums not returned". This includes the amortization of machinery, ocean freights, insurance, handling, storage and sales costs, refining if any, service of loans, depletion, taxes and profits. This item has dropped from 70 per cent of the nominal value of copper in 1928 to 35.6 per cent in 1947/48. Profits as declared by the Companies and according to commercial standards, have decreased only to a small extent, except for the depression years.

/In spite of this,

In spite of this, it is clear that both the actual and the relative shares of the investors in the product of their industry has shown a substantial decrease in view of the fact that refining and sales take place in the United States through affiliated companies.

As we have seen, the fluctuations in the "legal cost", of which wages and salaries form the most considerable part, indicate a great rise in the amount of dollars the companies have to pay for wages. It remains to be seen to what extent wages have improved.

The devaluation of Chilean currency has caused an almost continuous rise in wages paid in pesos, except during such a brief period of financial stability as existed from 1925 to 1930. On the whole, however, real wages remained comparatively steady up to 1935. From that year onwards, in proportion to the greater productivity of the mines and the higher price of copper, real wages increased sharply up to 1947, when they reached the index number of 163, with 1913 equalling 100. In 1948 there was a slight decline, which will certainly be shown to have become more accentuated in 1949, as wages have hardly risen, whilst the cost of living increased considerably.

Chart 35 shows the nominal and real wages in the large copper mining companies together with the cost of living and wholesale prices (basis 1913 = 100).

In this chart each depression between 1913 and 1935 is reflected in a drop in real wages below that of 1913. It occurred, for instance, during the period of reduction in imports in 1914 and 1915 which accompanied the outbreak of the First World War, and again in the period of readjustment which followed; and yet again during the great depression of the thirties.

On the other hand, it draws attention to the fact that workers did not share at all in the profits derived from the periods of prosperity, such as 1916-18. Various hypotheses are advanced to account for this: one is that, in view of the scarcity of factories in those days and the primitive condition of agriculture, there were large reserves of manpower available earning extremely little for work in the fields and ready to take up any other occupation that might offer; this situation in great measure prevented strikes. The workers' movement was directed

/rather towards

rather towards opposition to mechanization of every branch of activity with all its negative consequences for the progress of the country. As has been said, it was only from 1935 onwards, when the price of copper began to rise and the unemployment caused by the reorganization of the nitrate industry began to disappear, that workers in the copper companies benefited from the improved situation of the industry. This was undoubtedly due to the force organized labour had acquired in the meantime.

In order to understand the figures given, it is necessary to remember that average daily wages include payment in money, an average family allowance, holidays paid for by the companies, attendance bonuses and the difference carried by the companies between market prices of food and clothing and the prices at which they are sold to employees; in fact all direct payments, whether in cash or in kind. No provision has been made in these figures for the value of the housing they receive free, but as this has always been the case although the total value of their emoluments appears lower than in reality; this, however, has no bearing on trends of the indices. Nor has any account been taken of the following items in assessing wages, for although workers benefit from them, they cannot be properly considered as wages: social insurance, maintenance of the camps, medical attention, hospitals and accident insurances.

As a result it can be seen from these averages that the position of the workers has improved. This improvement is greater in the mines that are in a sound economic position and less in the Andes Copper Company, where costs have risen far too much.

Nevertheless, the increases in the real wages under consideration cannot alone account for the considerable rise under the heading of "legal cost". For this it would be necessary to study the effect of the stabilization of the exchange at 19.37 pesos to the dollar. The chart includes a curve representing the amount which the "legal cost" would have reached if the large mining enterprises had been subject to the same exchange rate as the companies financed by Chilean capital.

Reference has been made in the foregoing pages to the fact that the laws 5107 and 5185 of 1932 have been applied to the large saltpetre

/and copper mining

and copper mining companies and also to the iron mine of the Bethlehem Steel Company; according to these laws, these companies are bound to give up the whole of the foreign exchange equivalent to their production costs in Chile at a rate of 19.37 pesos to the dollar.

The Government has retained part of these dollars for its own use, and has sold part at 25.00, 31.60 and 43.00 pesos to the dollar, according to the dates of the transactions and to the type of imports for which the exchange was intended. The difference, which is absorbed by the exchequer, constitutes as a result a special kind of tax. The companies that pay it find themselves obliged in their turn to expend a larger sum in dollars in order to cover exploitation costs in Chile, which are added up under the heading of "legal cost".

The dollars thus obtained at the rate of 19.37 pesos are sold at the aforementioned rates which are greatly inferior to the average rate prevailing in the country, with the object of covering the importation of certain essential requirements such as sugar, petrol, gasoline, vegetable oils, coffee, tea, etc. in order to avoid a further rise in the cost of living.

This type of tax may be assessed according to two different standards: a) the calculation of the amount which the Government receives directly as a result of the differences between the rates of exchange when selling and buying them and b) the amount representing the difference between the sums which the companies have to pay in dollars under the present system, and those which they would have to pay on the assumption that they were doing so at the same rate as the other mining concerns in Chile.

The sums entering the exchequer as a result of these differences have been increasing in proportion to the legal cost, and also in proportion to the increase in the margin between 19.37 pesos to the dollar and the rate at which the exchange was sold. Unfortunately various government offices have been concerned in the handling of these sums so that it is impossible to ascertain their exact amount and use; but in 1948 it was over 530 million pesos.

It is easier however to investigate the amount produced by this  
/tax according

Table 17: Effects in costs of the exchange rate of 19.37 pesos to the dollar for expenditure in Chile, and the amount of invisible taxation which it represents

Year	Peso/dollar rate of exchange for medium-sized companies a/	Dollars representing the legal cost in the big mines (in thousands) b/	Excess dollar expenditure due to the 19.37 peso to dollar rate of exchange	Total in 000 dollars	Cents per pound	Legal cost in cents per pound at rate of exchange for medium-sized companies
1928	8,356	12,929	-	-	-	-
1929	8,356	8,835	-	-	-	-
1930	8,356	9,836	-	-	-	-
1931	8,356	10,731	-	-	-	-
1932	10,720	4,449	-	-	-	-
1933	14,193	4,720	-	-	-	-
1934	13,330	7,640	-	-	-	1,188
1935	25,00	8,370	1,884	0,344	-	1,423
1936	25,00	9,335	2,113	0,413	-	1,536
1937	25,00	15,650	3,749	0,446	-	2,117
1938	25,00	18,545	4,176	0,586	-	2,006
1939	25,00	17,860	4,022	0,583	-	1,758
1940	30,75	20,505	7,586	1,032	-	1,668
1941	31,00	26,057	9,774	1,000	-	2,137
1942	31,00	34,351	13,110	1,283	-	2,619
1943	31,00	43,799	16,429	1,572	-	2,670
1944	31,00	44,730	16,778	1,602	-	2,700
1945	31,00	43,130	16,178	1,627	-	3,359
1946	31,00	42,425	15,913	2,016	-	2,753
1947	39,00	49,875	25,087	2,786	-	3,002
1948	43,00	62,400	34,288	3,660	-	-

a/ Annual Reports of the Central Bank of Chile and Annual Reports on finance, banking and social security departments (Cajas Sociales) from the Dirección General de Estadística.

b/ Figures given in other tables appearing in the present work.

tax according to the standard of calculation described under b) above, that is, the sum which, under the heading of "legal cost", represents the difference between the current rate of exchange and those fixed by the small and medium-sized mining companies.

In 1935, the first year in which this difference is observable, the copper mining companies were obliged to pay 1,884,000 dollars more than if they had converted them at the rate of 25 pesos, as the Chilean mining companies were doing. In 1948 this excess expenditure had reached the figure of 34,288,000 dollars, the rate for the small and medium-sized companies being 43 Chilean pesos, and that of the large ones being 19.37. The legal cost, which in 1935 had been 1.532 cents per pound, increased by 0.344 cents. In 1948 the figures were 6.662 and 3.660 cents respectively. This means that in 1948 55 per cent of the amount shown as "legal cost" corresponded to this special form of taxation.

Table 17 shows the amounts connected with this tax. The average rate of exchange in force where Chilean mining companies were concerned are also shown. In order to make it easier to draw the necessary conclusions from these figures, the total amount of dollars paid annually into the country by the large mining companies in order to cover their expenditure there, is also given. From these two sets of figures the amount of excess dollar expenditure paid by the companies has been tabulated, in comparison with what it would have amounted to, had the rate of exchange been the same as for the Chilean companies.

The amount of the extra charge and the legal cost have both been reckoned on the basis of the above figures, in cents per pound and on the same assumptions.

If we relate the actual legal cost as shown in Table 14 to the hypothetical position shown in Table 17, we obtain the average legal cost; in 1923/30 this was 1.949 cents and it would not have exceeded 3.002 cents in 1948 at the rate of exchange which has been under consideration as an alternative.

Finally, in connection with this same subject, it is necessary to take into account the curious figures showing the sum-total paid in wages, as a result of the 19.37 rate of exchange. The average daily  
/wage in 1948,



wage in 1948, excluding the value represented by housing and medical attention, amounted in effect to 141.00 pesos, which represents an average of 7.28 U.S. dollars at 19.37. This is the wage which the company does actually pay.

But as the purchasing power of the peso is very far from amounting to 19.37 to the dollar, in reality the workman receives a much smaller sum. If the rate of exchange is fixed at one of the many alternative rates, that of 43 pesos current in the Chilean mining companies, for instance, the average wage only amounts to 3.28 U.S. dollars. The difference between this figure and the 7.28 pesos which the Company pays the worker in theory represents the Government's share in the increase in productivity and in the price of copper. This share consists partly of the sums going into the exchequer as a result of the difference in rates for the exchange sold to cover the legal costs, and partly of the sums of which the Chilean consumer takes advantage by buying goods imported at a reduced rate of exchange. In spite of these arrangements, the worker in the copper mines is among those who are best off in Chile, especially if working in the prosperous mines.

**Table 18: Distribution of the sums due to increased productivity and higher prices, on the assumption that dollars are exchanged at the rate in force in the small mining companies**

Year	Nominal dollars produced annually per worker	Percentage of the price of copper in New York				
		Sums not returning to Chile a/	Share of the Chilean government	Elements composing Governmental share		Amount represented by legal cost c/
				Profits tax	Charges arising from rates of exchange b/	
1928	5,055.53	70	7	7	-	15
1929	- -	-	-	-	-	-
1930	3,558.05	70	4	4	-	18
1931	2,721.09	56	1	1	-	29
1932	1,523.84	34	5	5	-	40
1933	3,099.38	60	4	4	-	21
1934	3,412.08	65	3	3	-	21
1935	3,190.89	62	7.5	3	4.5	15.5
1936	3,785.83	61	11.4	7	4.4	15.6
1937	6,505.45	64	14.4	11	3.4	11.6
1938	3,386.44	49	19.1	13	6.1	20.9
1939	4,629.05	55	18.4	13	5.4	18.6
1940	4,853.17	51	24.6	15	9.6	15.4
1941	5,931.43	49	25.0	16	9.0	15.0
1942	6,425.97	33	31.8	21	10.8	18.2
1943	6,521.19	32	32.5	19	13.5	22.5
1944	6,708.46	32	32.9	19	13.9	23.1
1945	7,200.08	36	30.3	16	14.3	23.7
1946	7,526.09	32	28.6	14	14.6	24.4
1947	12,154.88	44	31.5	18	13.5	13.5
1948	13,268.55	31	40.4	24	16.4	13.6
1949	9,954.54					

Source: See preceding tables.

- a/ This item includes imports into Chile for production purposes, expenses abroad, amortizations, financial services abroad, profits and depletion.
- b/ Difference between the legal cost at the exchange rate of 19.37 and the legal cost resulting from the rate used in the periods stipulated by the small mining companies. Part of these sums go to the Government for sale at higher rates, and part to reduce importation costs of certain essential items.
- c/ Includes wages and other expenses. The first heading composes the most important part of this item, at the rate of exchange of small and medium mining.

Financial year ending 31 December	1942	1943	1944	1945	1946	1947	1948
<b>3. <u>Agricultural Development</u> (National Agricultural Council, National Fruit and Vegetable Markets and others)</b>							
Expenditure	10.9	9.2	11.4	31.8	39.0	61.0	127.7
Receipts	.	.	45.0	42.1	46.7	65.4	108.1
Balance (+) or (-)	.	.	+33.6	+10.3	+7.7	+4.4	+119.6
<b>4. <u>Industrial Development</u> (Argentine Corporation of Domestic Weaving, National Corporation of Olive Growers and others)</b>							
Expenditure	242.6	313.4	379.0	422.5	414.4	553.0	649.6
Receipts	.	.	409.4	410.0	455.5	535.9	1024.9
Balance (+) or (-)	.	.	+30.4	-12.5	+41.1	-17.1	+375.3
<b>5. <u>Public Works and Services</u> (General Administration of State Railways, Administration of State Merchant Marine and others)</b>							
Expenditure	267.4	284.6	392.7	357.4	440.8	670.7	1026.7
Receipts	.	.	545.8	527.8	611.5	777.3	999.1
Balance (+) or (-)	.	.	+153.1	+170.4	+170.7	+106.6	-28.6
<b>6. <u>Universities</u></b>							
Expenditure	34.5	39.6	40.8	43.2	46.0	79.5	192.7
Receipts	.	.	42.0	44.0	46.9	95.9	212.5
Balance (+) or (-)	.	.	+1.2	+0.8	+0.9	+16.4	+19.8

/7. Other Agencies

Financial year ending 31 December	1942	1943	1944	1945	1946	1947	1948
<u>7. Other Agencies</u>							
Expenditure	1.7	3.2	4.7	8.5	18.2	0.5	7.6
Receipts	.	.	4.8	8.8	23.4	0.9	11.5
Balance (+) or (-)	.	.	+0.1	+0.3	+5.2	+0.4	+3.9
Grand Total Expenditure	581.0	709.6	895.4	965.8	1082.8	1594.6	2332.9
Grand Total Receipts	.	.	1425.7	1744.7	2606.6	3203.3	5013.6
Balance (+) or (-)	.	.	+530.3	+778.9	+1523.8	+1708.7	+2680.7

The Central Government collects taxes on wine, on "yerba mate", on transport of cattle, on apprenticeship, on fuel and lubricants and other miscellaneous taxes. Proceeds from these taxes are as follows: 1/

<u>Receipts</u> <u>collected by</u> <u>the Central</u> <u>Government for</u> <u>Autonomous</u> <u>Governmental</u> <u>Agencies:</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>
	(millions of pesos)										
Tax on Wine	6.8	7.1	7.1	7.5	7.5	8.3	9.1	8.6	8.1	9.8	10.6
Tax on Yerba Mate	5.7	6.5	5.9	5.9	7.1	6.5	6.7	6.9	7.3	6.8	7.8
Tax on Transport of Cattle	-	-	-	-	-	15.0	19.0	17.4	20.3	28.5	29.6
Tax on Apprenticeship	-	-	-	-	-	-	-	-	7.8	14.7	14.4
Tax on Fuel and Lubricants	59.4	65.1	80.0	87.3	86.4	80.2	104.5	101.5	145.7	165.6	195.1
Others	3.1	2.6	2.1	2.0	1.6	6.8	9.9	5.9	4.0	2.3	3.0
Total	75.0	81.3	95.1	102.7	102.6	116.8	159.2	140.3	193.2	227.7	260.5

1/ It should be noted that these taxes, together with those collected on behalf of the Provinces and of the Municipality of Buenos Aires, were included in the total revenue figures in order to obtain the percentages of total revenue in relation to national income and exports.

The Central Government has also contributed sometimes with revenue of the general fund, the disbursements being included in the expenditure of the different ministries.

The importance of IAPI in government financing, in Argentina must be considered separately. Furthermore, in the tables above, IAPI has not been included.

Although IAPI has been operating as a State Trade Monopoly since 1946, its balance sheet and the profit and loss account were published for the first time in September 1948, and only referred to 1947. In July 1949, the balance sheet for 1948 was published.

Since IAPI performs a great many operations of different kinds, it is impossible to find the source of the reported 1,900 million pesos profits on trading operations for 1948. As for subsidies on bread, sugar, meat, milk, edible oil, soap, etc., the only amount appearing in the statement for 1948 is one of 319.2 million pesos, plus another 163.6 million to cover compensation for the sugar industry. The net profit for the financial year of 1947 was 1,238 million pesos, while for 1948 it was 561 million pesos. (In Public Finance statistics, the tendency is to include only the net balance of trading agencies in the general budget, and is, therefore, sufficient for our purposes.)

It is known, however, that the main source of income of the State Trade Monopoly resulted from the practice of paying low prices to the producers and selling at high prices to the buyers. The IAPI used this income, in part, to finance the Five Year Plan and to subsidize both certain necessities and some industries. Subsidies, however, were practically discontinued in the second half of 1949.

The operations of IAPI have been effected outside the general budget, in which there appear no expenditure for subsidies, 1/ nor any receipts from the above mentioned price differential.

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1/ The 1950 Draft Budget appropriates for the first time the sum of 400 million pesos to subsidize wheat. In any case, subsidies are transfer payments and, as such, a mere redistribution of resources between the different sectors of the community. Their exclusion from the central budget is correct, as otherwise they would inflate government expenditure figures and distort their real burden.

Because of the lack of statistics regarding the full extent of this monopoly's operations and the deficiency of the available data, it is impossible to ascertain whether the beneficial results of the income redistribution implied in the operations of the State Trade Monopoly have been cancelled out by the very considerable increase in the means of payments created by IAPI's operations.

In 1948, a budget reform was adopted, giving more unity and universality to the budget. Since then, income statements of all the independent agencies (labelled "Decentralized Organs") are included in the central government budget, except that of IAPI.

2. Autonomous agencies were also created in Brazil during the 'thirties, mainly due to the central government's intervention in numerous activities, especially in the economic field. In 1947 the reports of the Ministry of Finance showed the existence of 87 agencies. In 1945, when their number was only 72, they were classified in five groups: 16 were public credit institutes, 8 were public enterprises, 9 were institutions of economic intervention and 39 were institutions of Social Insurance and Pensions.

Although the Federal Accounts' Court has tried to publish statistics for these agencies, it has never been successful in getting financial reports from all of them. In the last "Balancos Gerais da Uniao" published, that of the fiscal year 1947, bitter complaints from this Court are levelled against the different independent agencies for their failure to comply with the President of the Republic's circular (No. 13 of 2 October 1947), ordering the Ministries to submit the accounts of the agencies individually dependent on them. In 1945, when the first efforts were made to consolidate all the accounts of independent agencies, the Court was quite successful, and only 9 failed to present reports. In 1946 and 1947 the situation became worse, and of 87 agencies, only 41 presented their balances.

The different systems of accountancy and reporting — made necessary by the nature of the various agencies — constitute a serious obstacle to the consolidation of whatever data are available.

/The magnitude of

The magnitude of the finances of these agencies can be judged from data for 1945 and 1947 shown in the table below:

Brazil: Autonomous Institutions and Enterprises (Autarquias)

(Millions of Cruzeiros)

	<u>1945</u>	<u>1947</u>
	Closed Accounts	
<u>Group 1. Public Credit Institutions</u> (Autarquias de Economia Popular)		
Operating Expenditure	293.5 <u>a/</u>	178.0 <u>e/</u>
Operating Receipts	<u>343.7</u> <u>a/</u>	<u>197.1</u> <u>e/</u>
Balance (+ or -)	+ 50.2	+ 19.1
<u>Group 2. Public Enterprises</u> (Autarquias de Exploracao Industrial)		
Operating Expenditure	1,040.2 <u>b/</u>	2,305.0 <u>f/</u>
Operating Receipts	<u>1,317.4</u> <u>b/</u>	<u>3,193.2</u> <u>f/</u>
Balance (+ or -)	+ 277.2	+ 888.2
<u>Group 3. Institutions of Economic Intervention</u> (Autarquias de Intervengao Economica)		
Operating Expenditure	1,024.4 <u>c/</u>	773.2 <u>g/</u>
Operating Receipts	<u>1,682.3</u> <u>c/</u>	<u>829.1</u> <u>g/</u>
Balance (+ or -)	+ 657.9	+ 55.9
<u>Group 4. Social Insurance Institutions</u> (Autarquias de Previdencia Social)		
Operating Expenditure	1,175.1 <u>d/</u>	1,038.6 <u>h/</u>
Operating Receipts	<u>2,562.6</u> <u>d/</u>	<u>2,353.3</u> <u>h/</u>
Balance (+ or -)	+ 1,387.5	+ 1,314.7
<u>Total of 4 groups: Receipts</u>	5,906.0	6,512.7
Expenditure	3,533.0	4,094.8

a/ Covers only seven of the sixteen institutions in this group.

b/ Covers only six of the eight enterprises in this group.

c/ Covers only seven of the nine institutions in this group.

d/ Covers only thirty-three of the thirty-eight institutions in this group.

e/ Covers only four.

g/ Covers only six.

f/ Covers only five.

h/ Covers only twenty-seven.

Note: As indicated in the above table, only operating expenditure and receipts are shown, not including capital transactions such as investments, purchases of equipment, receipts from sale of property and proceeds of loans. It has not been possible to present a complete picture of the financial operations of these institutions because no data are available.

Source: Public Finance Data, United Nations Document.

3. The Mexican independent agencies began to grow under the Cárdenas administration, i.e., since 1934, when agrarian and agricultural development credits and other measures related to land redistribution and land tenure were enacted and their execution given to autonomous bodies. All of them were and are organized as corporations with government capital. Up to 1948, the Mexican autonomous agencies were given complete independence (the Secretary of Finance obtained information about them through the Department of Credit) and there were no compulsory measures as to publication of their accounts. At the beginning of 1948, the Central Government issued a decree regulating, among other things, the relation of those agencies with the government. 1/ Besides requiring a majority share of their capital to be held by the Central Government, the National Investments Commission was created in January 1948 2/ with the aim of supervising the activities of these agencies. Presentation of balances was, of course, required (those with banking functions are subject to the banking law and are required to publish their balances by statute). In spite of the Central Government's requirement, the autonomous agencies

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1/ "Ley para el control por parte del Gobierno Federal de los Organismos Descentralizados y Empresas de Participación Estatal". Diario Oficial, 31 December 1947.

2/ Diario Oficial, 31 January 1948. In the information that the Banco de México furnished to the International Bank for Reconstruction and Development, the Mexican independent agencies were classified as follows: 1. Credit institutions: a) Nacional Financiera, S.A.; b) Banco Nacional de Crédito Agrícola; c) Banco Nacional de Crédito Ejidal; d) Banco Nacional de Fomento Cooperativo; e) Banco Nacional de Comercio Exterior; f) Banco Nacional Hipotecario Urbano de Obras Públicas; g) Banco del Pequeño Comercio. 2. Production institutions: a) Petróleos Mexicanos; b) Productora e Importadora de papel, S. A.; c) Talleres Gráficos de la Nación. 3. Transport institutions: a) Ferrocarriles Nacionales de México; b) Ferrocarril del Río Mayo; c) Líneas Ferreas de México (en liquidación). 4. Promotion institutions: a) Almacenes Generales de Depósito S.A.; b) Nacional Distribuidora y Reguladora, S.A.; c) Comisión Federal de Electricidad; d) Comisión Nacional de Irrigación (subsequently called Secretaría de Recursos Hidráulicos); e) Comisión Nacional de Fomento Industrial. 5. Miscellaneous: a) National Lottery; b) Banco de México; c) Comisión del Papaloapan; d) Comisión de Tepalcatepec. (The latter two have both been created for the development of a river valley).



have refused, in many instances, to co-operate with the National Investments Commission. Since many of them receive funds from the Central Government's budget, one of the measures taken to achieve compliance of the requisite has been the threat of cutting off that source of revenue. Figures for all of the agencies are therefore not available even for the Government controlling agency, and furthermore, this controlling agency does not publish those that are available.

The exact number of autonomous agencies today is generally not known. The decree of January 31, 1948, creating the National Investments Commission, enumerated the agencies and gave a total of seventy-two. This list, however, is not up to date, since after the creation of the Commission which has controlling, supervisory and co-ordinatory powers upon the autonomous agencies, some of those listed have been dissolved and new ones added.

4. The Chilean budget is somewhat complicated because of the existence of several important independent agencies and special accounts which, though having separate budgets, are, nevertheless, inter-related by means of the contributions from the ordinary budget. This situation is being remedied somewhat by Law No. 8918 which stipulated that beginning with the fiscal year 1948 the central budget is to present a consolidated picture. Though the accounts are now easier to understand there are still a number of items outside the central budget.

The independent agencies outside the budget have been classified as follows: eight development institutions, such as the Development Corporation, Agricultural Credit Institute, Mining Credit Institute, etc; ten Social Security Institutions, such as the Compulsory Insurance Institute, Private Employee Insurance Institute, and seven smaller ones; the autonomous agencies performing banking functions which comprise the Central Bank, three mortgage banks and two saving banks; finally, the agencies connected with the securities market of which the Autonomous Amortization Fund is by far the most important. Each of these agencies has its own receipts from taxes and fees and sometimes receives contributions from the ordinary budget.

/It has not yet

It has not yet been possible to express in monetary terms the inter-relationship of the budgets of the independent agencies with the central budget as well as among themselves. For this reason it is impossible to present a table, even for one year, of their financial status. 1/

The Chilean Developmental Corporation, which is the most important of all the agencies, has been financed since its creation as follows: 2/

	<u>Government contribution</u>	<u>Own resources</u>
	(In million pesos)	
1939	105	-
1940	176	4
1941	239	109
1942	157	195
1943	148	240
1944	155	195
1945	203	249
1946	94	246
1947	466	210
1948	<u>707</u>	<u>155</u>
	2,449	1,606

In addition, the Corporation received funds from credit operations with the Export-Import Bank and the International Bank for Reconstruction and Development.

A study made by the Developmental Corporation points out that in 1946 only 65 per cent of total tax collections went to the central budget, the rest being used to finance the independent agencies and special funds.

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1/ Even a comprehensive study of the International Monetary Fund (Jorge del Canto, Economic Development and Financial Institutions in Chile, February 15, 1949) does not present a consolidated statement of their operations.

2/ According to the budget law of 1949 no taxes were to be earmarked for the Corporation since that year. The Government contribution has not always been totally included in the budget.

5. In Ecuador it has been possible to combine almost all the Government accounts: the ordinary and extraordinary budgets as well as all the special accounts, funds and independent agencies.

Receipts and expenditure of the special accounts were as follows (in millions of sucres):

	<u>1938</u>	<u>39</u>	<u>40</u>	<u>41</u>	<u>42</u>	<u>43</u>	<u>44</u>	<u>45</u>	<u>46</u>	<u>47</u>	<u>48</u>
Receipts	7	9	7	25	19	42	79	52	76	145	133
Expenditure	8	13	10	30	21	40	49	75	102	166	153

The latest independent agencies created in 1948 were the National Development Corporation and the National Development Bank (merely a new name for the Development Bank and the branch system of provincial banks already in existence). The National Development Corporation has tax receipts earmarked to cover its expenses. In addition there exists a Pension Fund and a Social Insurance Fund with separate budgets.

6. In Peru the financial relations of the Government with the corporations (Peruvian Guano Corporation, Santa River Corporation, Amazon River Corporation, Civil Aeronautics Corporation, Peruvian Shipping Corporation, and the four banks for agriculture, mortgage, industry and mining) are expressed by the fact that their dividends are included among receipts in the central budget while the contributions made to them by the government appear among expenditures. Some other government enterprises such as railroads, petroleum exploitation, docks and several others are also included in the budget.

7. Finally, in Venezuela there are fourteen independent agencies, most of which have been created in recent years. Their relationship with the central government finances is well defined.

Their functioning is regulated by the law or decree by means of which they were established as well as by the Organic Law of Finance. The latter stipulates that a special law or decree can provide that a certain official institution (scientific, charitable, financial or industrial) enjoy complete autonomy, independent of the Treasury. Their receipts and expenditure are not considered as government receipts and government expenditure. Their finances are not subject to the

/budget norms

budget norms of the central government. In the central budget there appear on the revenue side only the net amounts that the agencies transfer to the government, if any, and on the expenditure side those amounts that the Treasury contributes either for their establishment or for their operation.

The Venezuelan independent agencies can be classified as follows: four are of an industrial character; three are banking institutions; two are of a broader economic nature; one is a social insurance institute and four are miscellaneous.

8. In short, of the seven countries described above, three, i.e., Argentina, Brazil and Chile, have independent agencies, the accounts of which are completely outside the budget and such data are not available, especially in the case of Brazil and Chile.

In two countries, Peru and Venezuela, the relationship of the agencies with the central government budget is clearly defined and no problems of proper coverage of all central government finances arise. Ecuador is an intermediary case where the most important agencies handle large sums, have receipts of their own and receive shares of taxes that have been earmarked for them. A few accounts are still outside the central government budget.

## APPENDIX III

Notes on Exchange Profits and Taxes  
on Exchange Operations 1/

The introduction of exchange control in the 'thirties has made possible the creation of a new source of revenue. It has taken the form of an exchange tax, such as exists in Brazil, Ecuador and Colombia, or of profits received by the governments from foreign exchange operations. The difference between the price which the government pays for foreign exchange derived, for instance, from the export of commodities, and the price charged when it is resold to importers is kept as profit by the government. This occurs not only with respect to commodity trade but also to all foreign exchange transactions.

In general, countries where a multiple exchange rate system has been introduced have derived substantial revenues from this source, using multiple import rates or multiple export rates, or both. Argentina, which has applied this device extensively since 1933, and later Uruguay, Chile, Venezuela and Bolivia introduced legislation aimed at deriving a profit from exchange operations. While Argentina is not a member of the International Monetary Fund and, therefore, is not bound to unify her exchange rates, the other countries mentioned above have maintained multiple exchange rates by taking advantage of the time limit permitted by the Articles of Agreement of the Fund and of its lenient policy on the subject. In any case, should the Fund request compliance of its clauses the levy could easily be transformed into an exchange tax such as already exists in Brazil, Ecuador and Colombia.

The extent to which proceeds of this nature can be considered as hidden taxation depends on whether they are included in the budget. The treatment given to this source of receipt in the accounts of the countries has taken several forms. In Bolivia, Chile 2/ and Ecuador

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1/ These notes are not concerned with the tax on remittances abroad.

2/ Decree 5523 of December 13, 1947, provided that exchange margins be transferred in their full amount to the general budget. Furthermore, the sums deposited in the special account "Fondo Fomento Minero" were also transferred to the general budget.

/they are included

they are included in the budget of the central government. In Venezuela, the 0.26 spread is shared between the Treasury and the Central Bank after deduction of subsidies to agriculture has been made. Another treatment has been the creation of a special account, outside or connected with the general budget, such as the Argentine Exchange Margin Fund. From this account funds are transferred to the general budget for the payment of differences in exchange arisen from the public debt service or payments to Argentine officials abroad, or as contribution to the expenditure of the Exchange Control Office, or for public works purposes such as the construction of grain elevators, harbours, etc. In Brazil the tax on foreign exchange transactions was not included in the general budget until 1945 because originally it had been created as one of the sources of income for the Public Works Plan. When the Plan was incorporated into the general budget in 1946 the tax was also automatically included.

The following table shows the proceeds derived from foreign exchange transactions:

Profits and Taxes on Foreign Exchange Transactions  
(In millions of national currency)

	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>
<u>ARGENTINA</u> a/ Gross proceeds of Exchange Margin Fund:	73	113	201	215	90	43	84	107	120	676	635	..
Of which the following amounts were transferred to the general budget:	31	33	31	32	79	87	43	..	234	400	486	..

a/ Proceeds for earlier years were as follows (in million pesos):  
1933 = 0.6; 1934 = 113; 1935 = 118; 1936 = 88; 1937 = 65. Of which  
the following were transferred to the budget: 1933 = 0.5; 1934 = 25;  
1935 = 60; 1936 = 35; 1937 = 125. For 1947 the Presidential Message,  
Buenos Aires, 1948, shows only 39 million.

Source: Memoria de Hacienda, Volume I, 1938-1945. For 1947 and 1948  
figures published by the Ministry of Finance on June 8, 1949, as quoted  
by "Business Conditions in Argentina", July-August 1949. Data for 1946  
are estimated.

/Profits and

Profits and Taxes on Foreign Exchange Transactions  
(In millions of national currency)

	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>
<u>BRAZIL a/</u> Tax on foreign exchange transactions	-	279	317	364	352	376	556	629	120	..	350	700
<u>CHILE b/</u> Foreign exchange operations	-	-	-	-	62	16	36	384	292	258	739	..
<u>COLOMBIA c/</u> Stamp tax on exchange control operations	-	-	-	-	-	-	-	-	-	-	-	25
Exchange control receipts	3	-	-	-	-	-	-	9	-	5	..	4
<u>ECUADOR d/</u> Foreign exchange tax	-	-	-	-	-	-	-	13	26	45	44	..
<u>URUGUAY e/</u> Exchange profits	..	..	14	12	13	11	7	11	18	34	41	..
<u>VENEZUELA f/</u> Exchange control profits	-	-	6	2	3	-	-	4	11	76	87	70

a/ Public Finance Data, Document E/CN.8/31/Annex 25, page 15. For 1947 no information is available and data for 1948-49 are budget estimates.

b/ Memoria de la Contraloría General de la República.

c/ and d/ Mineograph, Public Finance Data, Fiscal Division, United Nations.

e/ Informativo, Boletín del Ministerio de Hacienda, Montevideo, 1949.

f/ Figures for 1940-47 are from the answer to the Fiscal Division questionnaire sent by the Venezuelan Government. For 1947 and 1948 taken from Revista de Hacienda, July 1949.

Notes: All figures have been rounded.  
.. not available.

/Next to the

Next to the income tax and the excess profits tax, the exchange margin is, perhaps, one of the most flexible sources of governmental revenue and has proved to be a receipt which can be easily channeled into economic development or subsidy programmes. 1/ Very often proceeds from this source are criticized because of their repercussions upon inflation and cost of living. There is no doubt that exchange margins can result in an increase in the cost of living to the extent that import goods are sold at higher prices and to the extent that investment in public works such as highways, government buildings and other non-reproductive assets contribute towards inflation. The danger is not so great in the cases under examination, especially when the multiple exchange rate system is so devised as to yield subsidies for productive purposes, as is being done, for instance, to stimulate agriculture in Venezuela. 2/ With respect to the expenditure side, it could be said that all expenditure, no matter what the source, generates inflation, but less so when parts of the proceeds are used for public debt redemption such as in Argentina. More important than these considerations is to know on whom the incidence of the revenue falls:

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1/ A shrinkage of foreign exchange receipts could automatically result in smaller proceeds unless the spread between the buying and selling rates is widened since the size of the revenue from this source has depended on the existence of a seller's market for the country's export and on the spread between the rates.

2/ In Venezuela, where agricultural activities are promoted by the administration, the exporters of agricultural products receive a greater amount for the sale of their foreign exchange than the exporters of petroleum. Undoubtedly the measure does not cause an increase in the cost of living but only reduces the proceeds of the petroleum companies.

In Chile and Bolivia, where different purchase rates are applied to the large, medium and small mining enterprises as well as to agriculture, the levy has as its main purpose to subsidize agriculture, medium and small mining at the expense of the great mining corporations.

In the three countries, Venezuela, Chile and Bolivia, certain allowances to retain a part of the foreign exchange for expenditures abroad is permitted. In this way the levy is not inflationary in any of the two aspects, namely, receipts by increasing the cost of the product and expenditure by raising the level of government expenditure.



The exchange profits and exchange tax can be considered as a tax on exports and imports, its incidence depending on the world demand for a country's export products and on the world supply of such commodities. Assuming that the government establishes a higher rate for the importers buying foreign exchange, and should there be no other controls, the impact will be to reduce temporarily their profits. They will be able, however, to ask higher prices for the products and shift the tax to the consumer.

In countries where multiple exchange rates exist together with other controls such as import permits and exchange permits, those receiving the full benefits will be the ones who obtain such permits since they are able to transfer the whole amount of the tax to the consumer. Considering that both import permits and exchange permits are granted to buy "essential", "useful" and "luxury" goods, the tax is paid by consumers on a scale corresponding to that classification. Permits for "essential" imports are granted a favourable exchange rate, the incidence of the tax being hardest, therefore, on consumers of non-essentials. By means of this device the cost of living is kept down while imports are restricted.

In the case of exporters, a favourable rate for exporters will result in greater profits to them. This situation has been utilized for the granting of favourable rates to exporters of products which the government intends to foster.

In the case of Argentina where there exists a State trade monopoly all profits — those obtained as an importer and as an exporter — are collected by the State. In this case a real redistribution of income is involved because the difference in the form of exchange profit is passed to the general public as public revenue and is sometimes channeled to direct subsidies and public works.

Another question raised is whether the income of export producers and import consumers is the best source of taxation. Experience has shown them to be an excellent source of revenue and in countries where the income tax is being increasingly important the existence of what

/can be considered

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can be considered an ad valorem customs duty seems to have given favourable results. In addition, it can be used to evade tight commercial treaties and international obligations regarding international trade.

In the same way that a tariff comprises most favourable and less favourable rates together with maximum and minimum columns, the essentiality of the various imports as a test of granting a certain exchange rate to imports performs the same role as the tariff. In fact it is more advantageous because tariff changes are difficult while inclusion of goods in one or the other category requires only a regulation from the exchange authorities. Besides, encouragement of certain marginal exports can be given by granting a favourable rate to exporters and as part of a programme for diversification of production.

There are no drawbacks in the utilisation of differential exchange rates for revenue purposes. Disadvantages arise when the exchange control in itself is not intelligently and honestly enforced by the administrative authorities.