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TRANSNATIONAL CORPORATIONS LINKAGES WITH THE TIN INDUSTRY IN BOLIVIA

This paper has been prepared by experts and consultants of the Joint CEPAL/CTC Unit for the Interregional Expert Group Meeting on Bargaining Capacity and Distribution of Gains in Primary Export Commodities (Bangkok, 8-13 October, 1979). The opinions expressed in it are those of the authors and do not necessarily reflect the views of CEPAL.

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/Introductory note

Introductory note

This paper contains the results of the research work conducted by the Joint CEPAL/CTC Unit concerning the linkages of transnational corporations (TNCs) with the tin industry in Bolivia. Part I reviews selected aspects of the international tin industry and particularly, the bargaining capacity of TNCs and host governments of developing countries in the successive stages of mining, smelting and marketing of tin. In Part II the new bargaining situation of Bolivia after the nationalization of large mines in 1952 is analysed, especially with regard to the continuing linkages with TNCs in smelting and marketing.

Throughout the paper, an attempt has been made to underline important aspects of the common research framework of the Interregional CEPAL/ECA/ESCAP Project [1/], such as the increasing sovereignty of developing producer countries over their natural resources through direct government participation in tin mining and smelting, the continuing control of main international tin markets by developed consumer countries, large TNCs and traders and finally, related problems and solutions encountered by Bolivian public enterprises in increasing the vertical integration of the industry and its retained value in favour of the country's economic and social progress.

For various reasons, however—particularly lack of more detailed information and shortage of resources in the Unit—it has not been possible to analise the new aspects of the Bolivian bargaining capacity and resulting distribution of gains in a more coherent and systematic way, as would have been desirable according to the above-mentioned common research framework.

1/ See B. Widyono, Transnational Corporations in Export-Oriented Primary Commodities: A Study of Relative Bargaining Positions and Distribution of Gains, Joint CEPAL/CTC Unit, Working Paper N°6, August, 1977, and the new version prepared by the Joint ESCAP/CTC Unit in September 1978.

/An additional

An additional evaluation of the current achievements and problems encountered by the Bolivian tin industry, particularly in smelting and marketing expansion, will be submitted later, taking advantage of the co-operation kindly supplied by Bolivian Government authorities.

This paper is based on a study by Unit's consultant Mr. Roberto Arce, on an unpublished Report prepared on CEPAL request by the Economist Intelligence Unit and finally, on a synthetic study by B.Widyono, at that time staff member of the Joint CEPAL/CTC Unit and presently Chief of the Joint ESCAP/CTC Unit 1/. Support in the form of valuable comments and new information has been kindly given by the CEPAL Divisions of Natural Resources and Industrial Development (particularly Messrs. R. Sanz-Guerrero, S. Moya and L. Willmore) and the Chief of the Unit A. Núñez del Prado. Any errors and omissions in this paper, however, are the responsibility of the Regional Adviser of the Unit, J. Kñakal, who was in charge of its editing.

Finally, while this paper was prepared solely for use by the Interregional Expert Group Meeting on Bargaining Capacity and Distribution of Gains in Export-Oriented Primary Commodities (Bangkok, 8-13 October 1979), critical comments and complementary information would be particularly welcomed from government officials, experts and academic circles in Bolivia and other Latin American countries in order to assist in the preparation of a definitive CEPAL study for the forthcoming Interregional Seminar of Government Representatives to be held next year in New York.

1/ Roberto Arce, Influencia de las empresas transnacionales en la minería del estaño: El caso de Bolivia, Working Paper Nº 4, Joint CEPAL/CTC Unit, July 1977; The Economist Intelligence Unit Ltd. EIU, Report, prepared for United Nations Economic Commission for Latin America, A Selective Assessment of the World Tin Market, London, January 1977 and B. Widyono, Case Study Nº 1: The Tin Industry in Bolivia, Joint CEPAL/CTC Unit, Working Paper Nº 6, August 1977.

Part I

SELECTED ASPECTS OF THE INTERNATIONAL TIN INDUSTRY AND THE ROLE OF BOLIVIA

1. Commodity characteristics

a) Tin resources

Tin mines of commercial value are confined to a few areas in the world: South-East Asia (Malaysia, Indonesia, Thailand, the People's Republic of China, Burma), the Bolivian Andes, some regions of Africa (Nigeria, Zaire), Australia and, recently, Rondonia in Brazil.

Tin, compared with other basic metals, has a low level of production and a high price. In 1973, 64 times more aluminium was consumed worldly, 41 times more copper, 21 times more zinc and 18 times more lead. In average terms, one ton of this metal costs 3, 6, 9 and 12 times more than one ton of copper, zinc, aluminium and lead, respectively.

The rate of growth of tin consumption and production is lower than that of some other metals. In the past 18 years the comparative cumulative annual percentage growth has been: tin 1.7%, lead 3.5% and copper 4.3%.

The main reason for the relatively slow growth of tin consumption is the scarcity of tin mines and, therefore, the high value of this metal, which has caused the use of tin in manufacturing to be reduced to a minimum and its replacement by other products (aluminium, chromium and plastics).

Up to the 1870s, the main producing country in the world since the times of the Roman Empire was England, with its now depleted tin mines in Cornwall. From 1890 onwards, South-East Asia, particularly Malaysia and Indonesia, were the foremost producers of this metal. Bolivia only started to acquire importance as a tin producer early in this century.

/In South-East

In South-East Asia, most of the tin production is obtained from alluvial tin which is mainly exploited by means of modern dredges or hydraulic methods (monitors for extraction and lanchutes for concentration of tin). In Bolivia, in contrast, the tin mines are found in inhospitable regions of Andes Range, at a height of over 3,000 metres. Costly tunnels must be drilled for the extraction of tin. For example, in the Siglo XX mine there are over 200 kilometers of underground passages and the ore is extracted by means of electric engines. Moreover, tin obtained from veins contain a large quantity of impurities. The process of concentration is much more expensive than that of alluvial tin, with high investment in concentration plants. Despite technological progress, for every ton of tin concentrates produced nearly another ton is lost in the form of residue (colas) left in the concentration plants 1/. For these reasons, Bolivia is a country of high production costs, compared with those exploiting alluvial tin.

b) Tin consumption

Tin plate and solders are the most important applications for tin metal, accounting for 47% and 23% respectively of all tin consumed in developed countries. The slow increase of tin consumption may be partly explained by the fact that tin-free steel, aluminium and plastic have replaced in a high degree tin plate in the production of cans. Secondly, improvements in the technology of tin plate production as a result of heavy R & D expenditures have reduced the amount of tin contained in tin plate. The major tin can corporations have not integrated themselves backward like the aluminium and copper companies. Thus, whereas the aluminium companies

1/ Those will be since 1980s processed in a new smelter for the treatment of low grade tin (see part II, 3. below).

/are continously

are continously advancing the uses of aluminium, the tin can companies have no direct stake in the tin production, probably reflecting their concern over the sensitiveness of supplies. 1/

Of the other end uses, demand of tin for soldering has risen rather slowly, whereas the uses of the metal in bronze and brass has declined in absolute terms. The fastest rising component of demand for tin is for industrial chemicals. But only a minor portion (less than 10%) of total consumption goes to such uses. The above development is reflected in a low income elasticity of demand for tin in industrialized countries. Estimates are between 0.1 to 0.3. World demand for tin has been projected to increase by only 1.5% per annum between 1972/1974 and 1985. 2/

As is the case with most primary commodities, especially minerals and fuels, the major consumers of tin are the developed countries whereas the producers are the developing ones. Tin is in fact an extreme example of this general pattern in that all the major exporters are developing countries, concentrated in Southeast Asia and Bolivia, with other

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1/ Major tin can producers ranked by capacity are: 1. American Can (US); 2. Continental Can (US); 3. Metal Box (UK); 4. Toyo Seikan (Japan); 5. National Can (US); 6. Campbell's (US); 7. Schmallach (W.Germany); 8. Thomassen-Origzer-Verblisa (Netherlands); 9. Carnaud (France). The last three are subsidiaries of American Can or Metal Box. Major tinplate producers ranked by production are: 1. U.S.Steel (US); 2. British Steel (UK); 3. National Steel (US); 4. Bethlehem Steel (US); 5. Nippon Steel (Japan); 6. Rasselstem A.G. (W.Germany); 7. Soc. Lorraine de Laminage Continue (France). (Source: Economist Intelligence Unit, Report to CEPAL on "A Selective Assessment of the World Tin Market", January 1977, unpublished.)

2/ IBRD, Price Prospects for Major Primary Commodities, Report Nº 814/77, June 1977.

/significant producers

significant producers located in Africa (Zaire and Nigeria). Brazil is also a potentially important producer. These countries together account for only 3% of world consumption. Only Australia and socialist countries among the major producers are major consumers as well. The bulk of tin metal is consumed by the United States, Western Europe and Japan (see table 1). 1/

Taking the developing countries as a whole, their combined production of primary tin in 1977 was 170.6 thousand tons or 76% of total world production as compared to 15.1 thousand tons or 7% for the developed market economies and 38.9 thousand tons or 17% for the centrally planned economies. In 1973-1975, consumption of tin metal was distributed as follows: developed countries, 143.8 thousand tons, or 68% of the world total, developing countries, 15.2 thousand tons or 7% and centrally planned economies, 52 thousand tons, or 24% (see tables 1 and 2).

2. Tin mining and reserves

As indicated above, the production of primary tin is concentrated in the developing countries of Asia, Latin America and Africa. In the period since the beginning of 1950s until the second half of 1970s the participation of Asia in world primary tin production decreased from 58% to 52% and that of Africa from 13% to 6%. Asia nonetheless retained its position as the main producing region. Durign the same three decades Australia increased its share from 1% to 4% and the socialist countries (especially Soviet Union and People's Republic of China) more than doubled their share (from 7% to 17%). Latin America recovered during the 1960s and 1970s its production losses from 1950s and in 1977 with a 18% was the second most important tin-producing area (see again table 2). Bolivia accounted, in 1977, for 81% and Brazil for 18% of the total Latin American production.

1/ Reference is always being made to the tables contained in Statistical Annex (see p. 38).

/As to

As to the distribution of world reserves of tin Indonesia accounts for 24%, People's Republic of China 15%, Thailand 12%, Bolivia 10%, Malaysia 8% and USSR and Brazil 6% each (see table 3). The difference in ranking between reserves and present annual production can be explained by different rates of production which are above the world average of 2.3% in the cases of Malaysia (7.9%), Soviet Union (4.8%), Australia (3.1%) and Bolivia (2.8%). These high rates of reserve exploitation illustrate also the above stated scarcity of tin world resources: producer countries will see their tin reserves exhausted in a period of 13 to 36 years unless new ones would be added for future exploitation. 1/

3. Sovereignty of developing countries over their tin resources

In the tin industry ownership and control over resources and production is increasingly being transferred to the governments of developing countries. The nationalization of Bolivia in 1952 2/ has been accompanied or even preceded by similar events in virtually all other major producer countries.

In fact, prior to Bolivia's nationalization in 1952, the important tin mines of China automatically reverted to the government with the establishment of the People's Republic of China in 1949. Furthermore in 1957, Indonesia nationalized the tin enterprises owned by the Dutch TNC Billiton Maatschappij (now a subsidiary of Royal Dutch Shell) and established

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1/ The "other resources" total volume is evaluated to be almost three times higher than that of industrial reserves, with outstanding cases of Brazil, Zaire, Indonesia and Malaysia. The use of these resources obviously depends on the cost of their accessibility and therefore on tin price.

2/ See part II, 1., below.

/a state

a state monopoly for tin, P.T. Timah, which is a fully integrated firm and markets its refined tin directly to consumer countries or through the London Metal Exchange. The state monopoly on ownership of the tin industry has been maintained although the new government of the country in 1967 did invite three TNCs to explore for tin under working contracts with the state enterprise. Even in traditionally private enterprise oriented countries like Malaysia and Thailand, the governments have recently shown active interest in controlling the tin industry. Malaysia, the major tin producing country, gained through the government owned holding company, PERNAS Securities, control of the world's largest TNC in tin - London Tin Corporation-LTC. The company dominate many tin companies in Malaysia, Thailand and Nigeria. Finally, Thailand's government nationalized in 1975 the important offshore concessions owned jointly by Union Carbide of the United States and Dutch Billiton Maatschappik. The new government, which came to power in Thailand in October 1976, upheld the nationalization but invited Billiton back in to operate the concession on behalf of the Offshore Mining Organization owned by the Thai government.

In Zaire, the government participates in tin mining through joint ownership with Belgian interests. This leaves Australia as the only major producer in which private producers have control over mining production.

Table 4 indicates that the four largest tin enterprises in the world are controlled by governments. In both China and Indonesia, the state controls 100% of production. In Bolivia, COMIBOL, the state enterprise, controls 75% of production. Finally, the government of Malaysia controls through its majority owned (71%) Holding Company PERNAS some 24% of tin production in the country and 46% of Nigeria's production.

As in other primary commodities, the government's control over tin resources and their mining should be considered only a first step in

/the developing

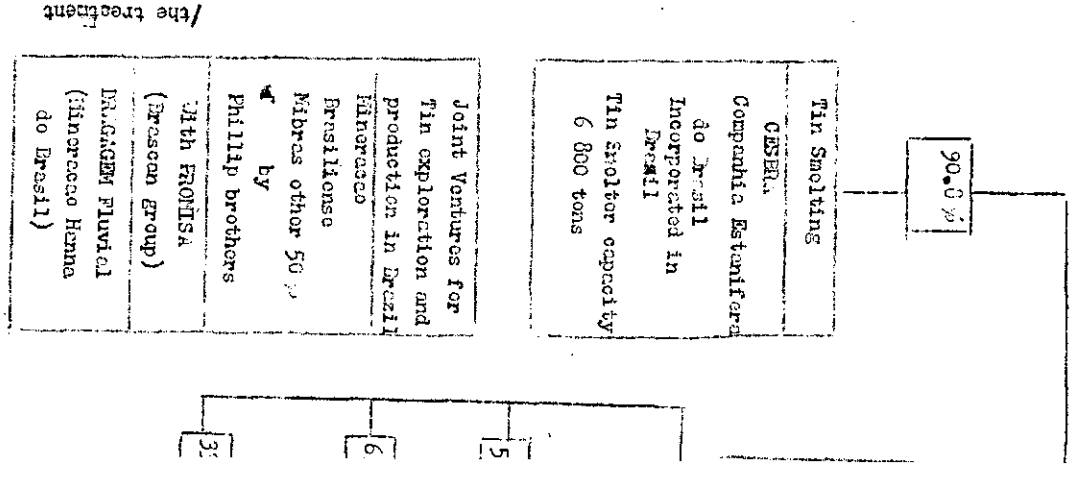
the developing country quest for a larger share of the gains derived from industry activities. The most important barriers to entry lie in the further stages of the process, that is in smelting, marketing and shipping. These issues will be discussed in the following sections.

4. Tin smelting and position of major TNCs

Six developing countries (Bolivia, Indonesia, Malaysia, Nigeria, Thailand and Zaire) accounted for 84% of world production of tin concentrates and almost 70% of the world production of tin metal in the 1971-1975 period as compared with 91% and 41% respectively in the first half of 1950s. (See table 5).

The increasing proportion of tin smelted in producing countries is a reflection of the improving bargaining position of host governments. Prior to 1939, the movement of concentrates to the smelters reflected the colonial links in the industry. All Nigerian and Bolivian and most Indonesian and Zairian (Belgian Congo) concentrates were shipped to British and other Western European smelters. Only Malaysia was an exception where a smelter was established by British interests quite early.

This pattern has changed in the last twenty five years. The Government of Indonesia (P.T. Timah) established a tin smelter in 1967 with a present capacity of 25 000 tons (see table 6). In Nigeria, local pressure forced the Consolidated Tin (Patiño) corporation to set up a tin smelter in 1961



Sources and notes : The percentages
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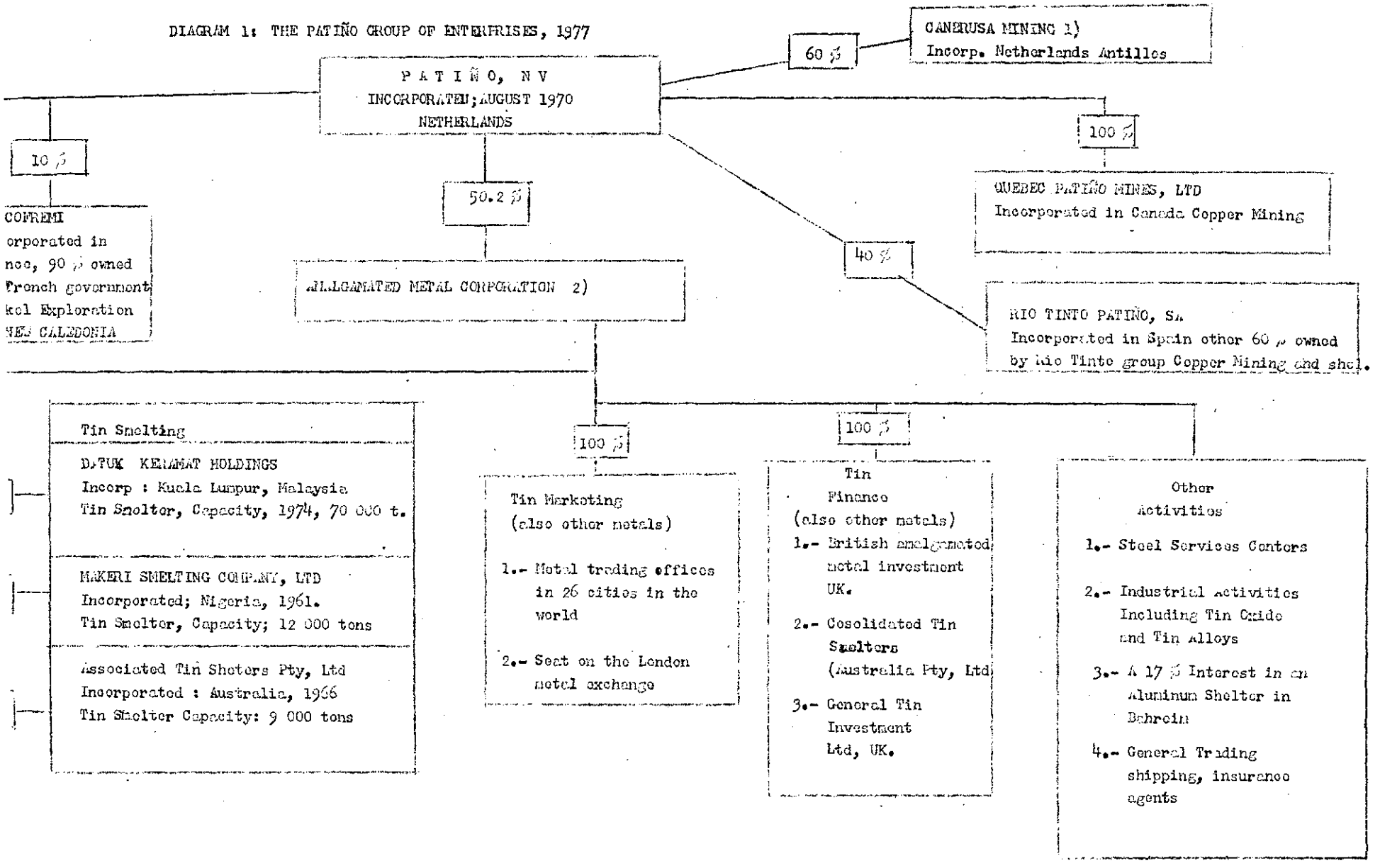
DIAGRAM 1: THE PATIÑO GROUP OF ENTERPRISES, 1977



cate equity ownership.

ning International Yearbook, London 1977

nsolidated Tin shelters and Amalgamated Metal Corporation US bureau of mines, Mineral Yearbook, various issues

formed by the members of management of Patiño N.V. to consolidate control, The Financial Times, June 24, 1977

nsolidated Tin Smelters and Amalgamated Metal Corporation, merger took place in 1976

the treatment of low grade tin with a capacity of approximately 10 000 tons. Thus, by the 1980s, Bolivia will have a tin smelting capacity capable of processing domestically all of its tin production. Among developing countries, Brazil has an important tin smelting industry (partly dominated by the Patiño group) with total capacity of 16 000 tons. 1/

These data on tin smelting indicate that efforts to increase the forward linkage effects by host governments have been quite successful, although the Patiño group still dominates some 26% of the world's smelting capacity, followed by the Singapore Banking Group and Royal Dutch Shell's Billiton Company (16% and 11% of the worldwide capacity respectively).

The Patiño group of companies is still very important in the tin industry, especially in its downstream stages, i.e., smelting, marketing and financing (see diagram 1). Consolidations and mergers continue to take place in this group. For instance, CANBRUSA mining was formed by members of the management, incorporated in Netherlands Antilles and has recently completed the purchase of over 60% of stock owned by Patiño N.V. which is the holding company for the group of companies. An important merger took place in 1975, when Consolidated Tin Smelters, (CTS) established in 1929 to concentrate Patiño's holdings in tin smelters merged with Amalgamated Metal Corporation (also established in 1929) as a holding company for two leading metal marketing companies, the British Metal Corporation and Henry Gardner Company. These two companies in turn continued to operate separately until 1972 when their trading activities were merged into AMC which since then became the principal trading company. Before the AMC-CTS merger, the two companies had already been associated for a long time. Patiño N.V., owned 76% of CTS and CTS owned 61% of AMC. Nevertheless, AMC was left the dominant company after the merger, because it was better known in tin marketing. The companies benefited from common services including a jointly shared London office and common director.

1/ For further details see part II, 3., below.

/The process

The process of "decolonization" in tin smelting is reflected in the difficulties experienced by smelters in consumer countries. In Arnhem, the Netherlands, the tin smelter stopped operations in 1971 as the Indonesian smelter came on stream and concentrates stopped arriving. The Williams Harvey smelter owned by the Patiño group in the United Kingdom, which formerly smelted all of Bolivia's high grade tin, went into voluntary liquidation in 1973 and the Hoboken smelter in Belgium, with a capacity of 18 000 tons is also experiencing difficulties with the supply of concentrates and in 1976 only produced 4 000 tons.

5. Control over the world tin market

Control over marketing is an important element in the bargaining power of governments. The establishment of tin smelters in producing countries, described above, will not only increase the value added and foreign exchange earned from tin activities, but will also provide a better control over the marketing of tin, as tin metal may be sold directly to final consumers.

This is not the case with concentrates where individual sales contracts vary greatly according to mineral, by-products, parties involved, form of shipment chosen, length of contract, etc. Nevertheless smelting contracts have certain basic features: First, prices are based on quotations at the London Metal Exchange (LME) or New York markets and are adjusted by smelting and refining fees. The fees depend on metal content, cost escalation clauses and penalties for impurities. Secondly, the refinery will choose a quotation period, normally following discharge at port of destination. Thirdly, a provisional payment, 80 to 90% of estimated value, will be made against shipping documents, the rest being paid after finally

/establishing volume

establishing volume and grade. In many cases trading firms act as agents or as principals between the producer and smelting companies.

From the above it is clear that the actual distribution of gains at the market level, depends primarily on two factors: one is the process of price formation in the international markets and the bargaining power of governments in those markets, and the other the negotiations regarding the many discount clauses which can increase or reduce actual gains, given international prices. It is therefore important to understand the working of the international tin markets and the related factors determining the world prices of tin.

There are three principal international markets for tin: the Penang Malaysia, the London Metal Exchange and the New York tin market. Diagram 2 shows clearly that the principal factors determining market prices are the demand of industrialized countries and their stock of tin. Before examining in detail the organization and working of international tin markets other factors affecting them will be shortly reviewed.

a) Factors affecting the tin market: United States and International Tin Council reserves

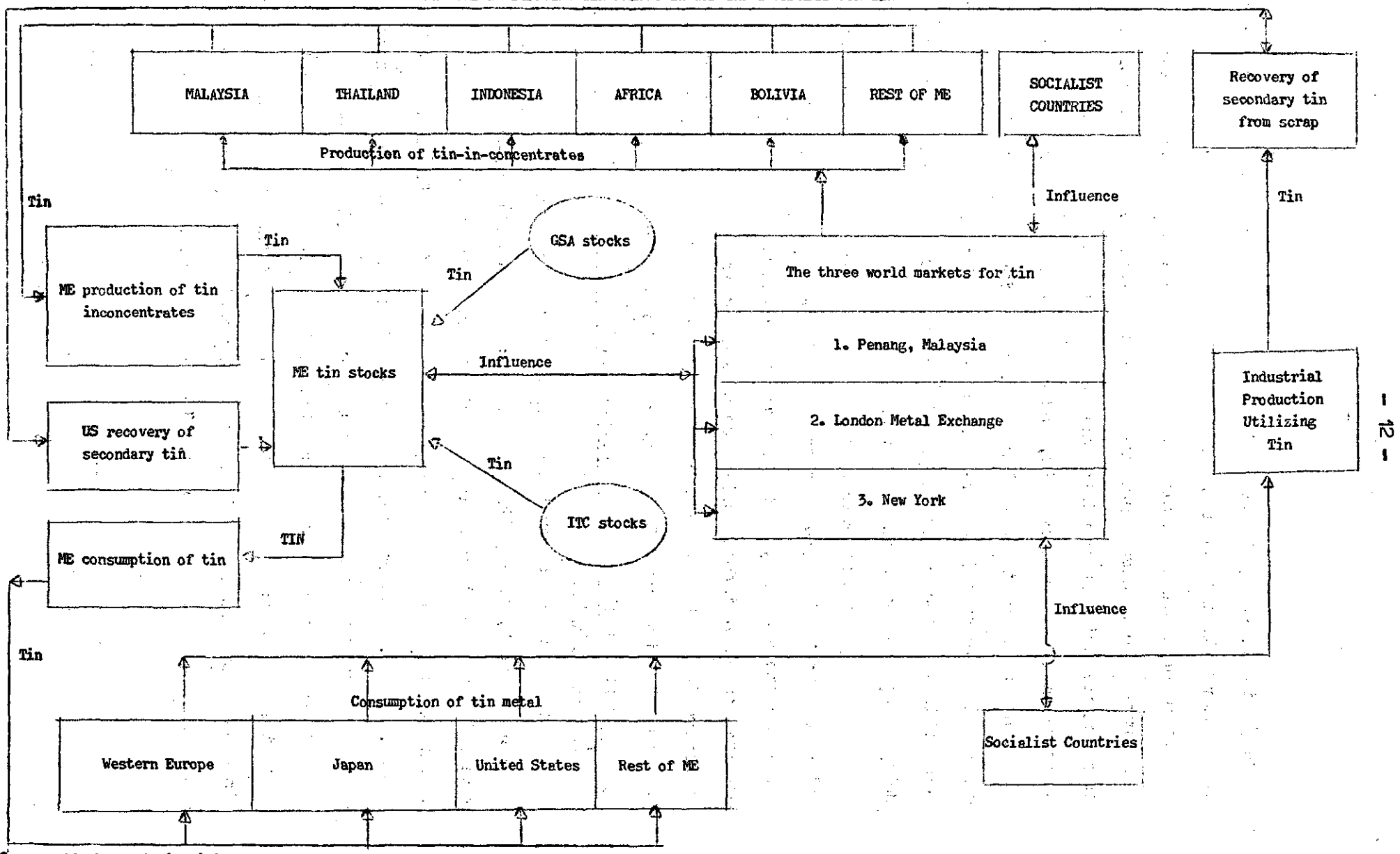
Apart from production tin supplies, stocks held in market economies are determined by two additional factors: the General Services Administration (GSA) which is the United States Government agency in charge of strategic stockpile disposal, and the International Tin Council (ITC) stocks. The U.S. sales from their strategic reserves of tin have been a powerful force in the market in comparison with the ITC leverage.

The events of the war led the United States to establish a strategic stockpile of tin and other metals. The fear of again losing the strategic tin area of Southeast Asia in the cold war period is demostrated by the stated objective of the reserves. This stock, formed mainly in the

/Diagram 2

Diagram 2

FACTORS INFLUENCING TIN PRICES IN THE THREE MARKETS FOR TIN



Sources: Adapted and simplified from the Wharton flow diagram of tin, see Gordon W. Smith and George R. Schink, 1976, op.cit., p. 727.

Notes: ME = market economics, GSA - United States, stockpile agency, ITC = International Tin Council.

/late 1940s

late 1940s and 1950s, was to be of a size sufficient to maintain United States' consumption at normal levels during a four year war in which all foreign sources of the metal were cut off. Although this initial objective was subsequently abandoned, the size of the stock continued to exceed total market economies' annual production of tin from 1952 to 1973 (from more than two times until the second half of 1960s, to 1.2 times in 1973, see table 7). The near absurd size of the stockpile was recognized by the United States in the 1960s. Since then their goal was to reduce stocks in periods of high prices in the international tin markets. This resulted in net sales of about 120 000 tons between 1956 and 1974 which very often had a disruptive effect on tin prices. In fact, sales from the United States' stockpile had a much greater influence on world prices of tin than the bufferstock operations of the International Tin Council, the other important force in the world tin economy. 1/

The main goal of the International Tin Agreement, of which the International Tin Council (ITC) is the executive arm, has been to impart greater stability to world tin markets. Both consumer and producer countries are members of the five successive agreements which had been in force since 1956. Bufferstock operations and export controls have been the two main instruments used by the ITC in its attempt to reduce price fluctuations and contain them within publicly known floor and ceiling levels. However, in relation to the United States stockpile, which was always greater than annual world consumption, the authorized size of the bufferstock (20 000 tons) has been fairly small, ranging between one and two months' consumption over the four tin agreements in force. In 1956-1973 period the total ITC bufferstock purchases, aimed at stabilizing or increasing the tin price, reached 60 000 tons as compared with sales of

1/ See again the excellent paper cited in table 7 on which the major part of this discussion is based.

/150 000 tons

150 000 tons by U.S. GSA in the same period which had opposite effects on international tin markets than the ITC sales (see again table 7). The fifth Tin Agreement, which has come into force in mid-1977, with the recent ratification by Bolivia, should double the ITC stockpile (to 40 000 tons) through voluntary contributions by consumer countries (during the four previous agreements, only producer countries financed the bufferstock).

It is not publicly known to what extent the geopolitical sensitivity of the concentration of tin resources in Southeast Asia has contributed to the enormous amounts spent on Research and Development of tin substitutes by the can industry, especially in the United States. Additionaly, the United States, and other industrialized countries as well, are trying to diminish their dependence on tin imports by increasing the recovery of secondary tin from scrap. The U.S. production of this type of tin reached 15 600 and 18 900 long tons in 1974 and 1975 which is about one third of total tin consumption of that country. 1/

The overview given above shows that the international tin market continues to be dominated by industrialized consumer countries, particularly through the U.S. strategic stockpile operations. The international Tin Agreement has only marginally reduced the inestability of prices and producer incomes. It has endured while other agreements have failed, in part because it has lacked effective power, in the face of the United States strategic stockpile, to make critical price decisions which otherwise would have intensified producer-consumer conflicts. 2/ The predominance of industrialized countries and their TNCs is likewise reflected in the organization and working of the three major world tin markets.

1/ See, Mineral Industry Survey, United States Department of the Interior, Bureau of Mines, 1975.

2/ These conclusions were taken from the study of G.W. Smith and G.R. Schink quoted above which had been confirmed by their simulation exercise of the Wharton EFA world tin model.

/b) International tin

b) International tin markets

Since most of the world's tin is produced in Southeast Asia, one would expect that the marketing of tin produced in that region would be the base of the world's tin markets. To a certain extent, this is true as the Penang market in Malaysia is the most important market in terms of physical volume passing through it. However, as will be seen below, even though the London Metal Exchange (LME) has as its physical basis the relatively small amount of tin smelted in the United Kingdom (10 000 tons in 1976), its influence reaches far beyond this, partly through the existence of hedging operations which increase substantially the amount of "paper" tin transactions 1/ and partly because of colonial tradition. The factors determining the price movements of tin in London are the hedging operations of producing, merchandizing, consuming and investing or speculative purposes. The latter is influenced by the relatively high unit price of tin, in comparison with other metals, and the perspectives of world political conflicts and economic problems, particularly inflationary pressures.

The developing producer countries are anxious to move de facto the marketing centre from London to Penang where part of tin production is located. This drive will probably take years to accomplish but at present a major achievement is that since the floating the pound sterling in the early 1970s, the ITC recognizes the Penang price quoted in Malaysian ringgit rather than the british currency, as the basis for its floor and ceiling prices.

1/ For example, in 1972, the physical basis for LME transactions was the tin smelted in the United Kingdom (22 000 tons). The volume of "paper" transaction in that year reached 143 765 metric tons official plus 26 415 metric tons unofficial ("Kerb") transactions. See ITC, "The International Implications of United States Disposal of Stockpiled Tin", London, 1973.

/Although normally

Although normally not as important as the LME in determining tin prices, the New York market is important as the purchasing point for the world's largest consuming country of tin, the United States. The New York market is not a separate entity. It refers to the sum of all tin transactions undertaken in New York rather than a specific organization or specific place of business. New York prices are quoted by papers such as the American Metal Market and the Engineering and Mining Journal on the basis of the average of actual physical sales of tin for prompt or forward delivery. The New York Commodity Exchange, an organization trading many commodities, deals in futures but the quantities involved are smaller than the physicial tonnage of the New York market, and can therefore not be compared to the futures market of LME. In the United States, by far the greatest part of tin physically sold is disposed of by brokers or agents for foreign business houses; only a few consumers purchase tin directly from the smelters in foreign countries. Thus the brokers play an all important role in the marketing of tin. More detailed descriptions of the world's two most important markets, LME and Penang are given below.

(i) The London Metal Exchange (LME) 1/

The LME, established in 1882, has been located in the same premises in the City of London ever since. The Metal Market and Exchange Company is the proprietor of the Exchange, and its shareholders are the members (subscribers) of the LME.

The committee of suscribers acts as the executive arm of the market, and has the following responsibilities:

1/ Information based on a above cited report prepared by Economist Intelligence Unit.

/- Maintenance of

- Maintenance of correct discipline and protocol in the Ring (the Ring is where the official trading of the LME is conducted);
- Assessment of daily prices;
- Formulation of new contracts;
- Registration of brands of metal for delivery against an LME contract;
- Approval of official LME warehouses.

Membership. There are three categories of membership:

- Ring-dealing membership;
- Associate membership (i.e., non-Ring-dealing);
- Individual membership (this is a small group of people, among whom is the Buffer Stock Manager of the International Tin Council).

There are 28 Ring-dealing members, about 70 associate members, and 22 individual suscribers.

The qualification common to all classes of membership is the possession of not less than two shares in the Metal Market and Exchange Company. Companies represented in the Ring must satisfy certain financial demands, i.e., a substantial margin of solvency. The company represented may nominate one or more "authorized clerks" to trade in the Ring on its behalf. Approval of these clerks is a matter for the Committee.

Of the present Ring-dealing members, about half correspond to the ownership or control by interests outside the United Kingdom. The companies represented on the LME are typically specialized branches of metal corporations, and particularly of transnational type.

LME brokers/members fall into three categories:

- Members who deal primarily for one particular client (representing usually his parent company);
- Members who are general dealers and have many clients;
- Members who deal mainly for one client, but are also general traders.

/Several major

Several major traders in non-ferrous metals (e.g., Delta Metals, BICC, Pirelli and the Chloride Group) do not trade on the LME via subsidiaries but through several Ring-dealing members, who may change over time.

The four largest and most influential members of the LME are:

Member	Parent Company
Rudolf Wolff and Co., Ltd.	Noranda (Canada)
Metallgesellschaft Ltd.	Metallgesellschaft (W. Germany)
Billiton-Enthoven Metals Ltd.	Royal Dutch Shell (United Kingdom/ Netherlands)
Amalgamated Metal Trading Ltd.	Patiño N.V. (based in the Netherlands)

With reference to the CTS/AMC merger described earlier it is of interest to note that, in 1971, AMC was re-constituted by the merger of two companies—British Metal Corporation (BMC) and Henry Gardner. Both BMC and Henry Gardner were Ring-dealing members of the LME. After the merger both gave up their seats and AMC's wholly owned subsidiary, Amalgamated Metal Trading, gained a seat on the "Ring".

The standard contract at the LME states:

- Geographical location of the commodity (usually LME approved and registered warehouses);
- Date of delivery;
- Quality of the commodity (e.g., 98% tin);
- Quantity of delivery.

There are two main types of dealing associated with the LME:

- Ring-dealing;
- Kerb-dealing and pre-market dealing.

It is upon the comparatively brief Ring-dealing that the whole pricing edifice of the LME is based. Between noon and 1.05 pm there are short sessions of official trading in copper, silver, tin, lead and zinc, on the Ring. Between 3.35 pm and 4.35pm there are a further unofficial short

/sessions of

sessions of trading in the same metals. It is in the first official tradings on the Ring that the LME prices are determined.

The restricted times allowed for official dealings led naturally to members remaining in the Ring after the final bell and continuing to do business amongst themselves. The authorities bowed to the inevitable and set aside a limited period after each official Ring session for "Kerb" trading.

There is also a "pre-market" conducted before noon which enables the authorized clerks to come to the Ring each day with a far more concise and calculated programme before them than would otherwise have been possible.

Because the LME has no clearing house, nor any centralized system of recording or registering all trades done, it is not easy to make an estimate of the proportion of each member's daily turnover which is transacted by way of pre-market and Kerb dealings, but it is safe to say that it represents a considerable proportion.

The LME provides also scope for trading in futures, and consequently opportunities for hedging and speculative activities which are common to all other similar markets. Less common is the LME practise whereby future prices may be quoted for specific days rather than specific months.

Looking towards the future, it now seems likely that the LME will move away from being a "principals" market, and became more of a "clearing house" market. This is to be accomplished by a monitoring system. The LME would establish a credit controller whose duty would be look for possible difficulties in the extent of any one member's overnight open position on the market vis-à-vis his funding, and to report these to a control committee. It is widely accepted that this monitoring system would perhaps hinder speculative activities and be conducive to a more secure market.

/(ii) The Penang

(ii) The Penang tin market

The Penang tin market operates like a "tender system" of marketing, whereby the smelters undertake the smelting, sale and pricing of tin metal on behalf of the miners. However, as stated earlier, it is the world's eminent physical market of tin where tin production from the two Malaysian smelters, Datuk Keramat and Straits Trading is marketed. This amounts to about 40% of world sales of this commodity.

The sellers in the market are the numerous tin miners and buyers are traders and consumers of tin metal and their agents. Thus, the Penang market is a one way market and successful bidders cannot resell the metal in the market. In practise, however, tin warrants can be, and often are, transferred to private purchasers outside the formal market structure. Another feature of the Penang market is the total lack of information about the prices and tonnages offered by miners, the prices and tonnages of the bids, and the amount of stock held by the smelters. The Penang tin market is not a terminal market and it has no facilities for forward transactions nor for futures trading. However, moves are underway to set up a Kuala Lumpur Exchange to deal in tin futures.

In the case that the Kuala Lumpur futures market were a reality, the bargaining position of the producing developing countries would be tremendously enhanced. The Malaysian smelters would play the role of the liquidated William Harvey smelter in United Kingdom 1/ and the still operating U.S. Capper Pass smelter with respect to the LME, i.e., they would hedge all their concentrate purchases. With flexible exchange controls and more specific delivery dates afforded by a futures market, western consumers would have the option of hedging on Kuala Lumpur market.

1/ See part 4. above.

/This would

This would diminish the international trader's role and the LME turnover, as a proportionate amount of consumer hedging could also logically be carried out on Kuala Lumpur. This would automatically increase the bargaining power of Malaysia and other producing countries. Of course, this would not prevent international traders from operating in the Kuala Lumpur market as well. 1/

1/ Syed Hasan Bin Ali and Ahamd Zubeir Bin Haji Noordin, "The Penang Tin Market", in Bank Negara Bulletin, Malaysia, Vol. 8, Nº 3, September 1975. "Workings of Penang", Metal Bulletin Monthly, September 1976

Part II

TIN INDUSTRY IN BOLIVIA AND LINKAGES WITH TNCs

1. Initial period of the industry and its nationalization in 1952

a) Pre-nationalization period

In examining the initial period of Bolivian mining the conclusion is that in the first quarter of this century TNCs did not expand in Bolivian tin mining as in other mineral producing countries of the region. The salient fact of the starting tin-boom in Bolivia is the appropriation of many mines by Chilean and, on a lesser scale, British entrepreneurs who had no direct relation with transnationals in mining.

It was a Bolivian national, Simón I. Patiño, who bought out most of the foreign capital invested in tin mining, thus succeeding in "Bolivianizing" it. On the other hand, he merged later his enterprise with a United States TNC (National Lead Co.) to organize in 1924 the Patiño Mines and Enterprises Consolidated Inc., under the laws of Delaware, United States. Patiño subsequently chose the United Kingdom as a base for his business transactions and organized a large-scale transnational tin mining corporation, which was integrated from the exploitation of mines to the smelting and refining of tin. He possessed mines not only in Bolivia but also in Malaysia and Nigeria, as well as the most important tin smelting plants of the world in Germany, United Kingdom, Malaysia, Nigeria and Australia. Moreover, in order to ensure the transport of ore exploited in Bolivia to smelters in the United Kingdom, he assumed control of the *Compañía Sud Americana de Vapores*. 1/

1/ See the present structure of the Patiño group in figure 2 above.

/During the

During the first two decades of this century, tax revenue obtained from mining was very small, which permitted the building up of large personal fortunes while the State did not receive the proper income. It was in the mining entrepreneurs' interests that this state of affairs should not change; hence their gradually increasing participation in the country's politics. It was not until the beginning of the 1920s that a tax was imposed on mining profits, invested capital and exports.

On the other hand, the Supreme Decree of June 1939 which established that foreign exchange obtained from mineral exports should be handed over to the Central Bank was derogated by the subsequent government in the same year.

b) Nationalization in 1952

The low price of tin during the Second World War 1/ and in the early

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1/ United State's monopsonistic power in Bolivian mining, supported by Patiño's transnational interests, and its implications for the country's economy were severely criticized by several authors, as for example: "During the Second World War Bolivia remained tied to a contract covering the sale of tin for five years, when undertook to sell at 42 US cents per fine pound of tin to the United States and United Kingdom. During the same period, copper, lead and zinc produced in the United States experienced increases of 39%, 74% and 67%, respectively. Tin increased by 55%... It would have sufficed for tin prices to come fairly close to those of the United States production for the country to be able to capitalize... The United States Government was against monopolies; nevertheless, the Reconstruction Finance Corporation, a government agency, was a monopoly which possessed exclusive rights over purchases and price-fixing". (Sergio Almarza, El poder y la caída, see the selective bibliography.) Furthermore, William Fox, former Secretary of the International Tin Council, in his study "Tin, the working of a Commodity Agreement" said: "The fact that the United States should have suddenly suspended its tin purchases in 1951 and then reinitiated them at low prices imposed unilaterally with the objective of establishing its strategic reserve was in the worst hard-handed tradition and came close to actual blackmail". Finally, the Bolivian delegation at the United Nations General Assembly in 1951 protested in the following terms: "The price of tin, which is the backbone of the Bolivian economy, has for many months been subject to the criterion of a single buyer, the United States, against which a weak country like Bolivia is unable to defend itself. This buyer has imposed on Bolivia these exceptionally low prices, using the methods of the strong against the weak, which go beyond the bounds of correct behaviour and the inter-American co-operation which one has a right to expect".

/post-war

post-war years, social disputes and the transnational expansion of the Patiño group on the basis of Bolivia's mining wealth continued to mobilize the country's public opinion increasingly against Patiño and the other two "tin barons" (Hochschild and Aramayo). The mining entrepreneurs even tried to impose their own presidential candidate in the 1951 elections. After the new Government of the Nationalist Revolutionary Movement assumed in April 1952 it nationalized large-scale mining by a decree of October that year.

The economic importance of the three large mining groups nationalized in 1952 may be appreciated in the light of their production of metallic tin in 1941 and 1951, and in comparison with the medium-and small-scale mining of the many individual entrepreneurs:

	1941		1951	
	Metric tons	Percentage	Metric tons	Percentage
Patiño	20 013	46.8	14 998	44.5
Hochschild	10 829	25.2	6 812	20.0
Aramayo	2 647	6.0	2 692	8.0
Total large-scale mining	33 489	78.0	24 502	72.5
Medium-scale mining	5 707	13.5	3 598	11.0
Small-scale mining	3 544	8.5	5 564	16.5
Total Bolivia	42 740	100.0	33 664	100.0

The three large-scale mining groups represented over 70% and of these the Patiño Group represented over 44% of the country's total production. 1/

The nationalized mining groups which had failed in their legal attempt to embargo Bolivia's mining exports abroad, cunningly took advantage of the

1/ In 1975 the nationalized mines in large-scale mining reduced their share in favour of medium-scale mining (18%).

/fact that

fact that nearly all the tin concentrates would be arriving at the British Williams Harvey and Co. smelter, controlled by the Patiño group. They imposed on the Government of Bolivia a compulsory discount of 10% on the gross value of the ore smelted in the Patiño owned smelters. This discount was being retained as an advance on the compensation which the Bolivian Government should pay for the value of the nationalized mines. The following payments were made under this head from April 1953 to August 1961:

To the Patiño group	US$ 9,164,897
To the Hochschild group	7,431,190
To the Aramayo group	3,260,058
	US$ 19,856,145

The total indemnity which the Bolivian Government was to pay to these three groups was never fixed. The discounts made by the Williams Harvey smelter ended with the introduction of the Triangular Plan for reconditioning the nationalized mines (see section 2).

2. National control over tin mining and achievements of COMIBOL

a) The post-nationalization problems

In 1952, after nationalizing the three largest mining enterprises in the country the Bolivian Government created the Corporación Minera de Bolivia (COMIBOL) to run the mines. 1/ After having experienced an initial decline in production during its first ten years of operations, COMIBOL succeeded in boosting production and labour productivity steadily since 1961. In fact, since then, all indicators such as export earnings and payments to the government have shown significant upward trends. The production of tin

1/ It should be noted that COMIBOL is diversified enterprise producing zinc, tungsten, copper, lead and other minerals, in addition to tin.

/declined from

declined from 31 700 tons in 1950 to 19 7000 tons in 1960, or by 4.6% in yearly average, but then recovered in 1970 to 30 100 tons surpassing the prenationalization level in 1977 (32 600 tons). Bolivia retained in this way its highly predominant position in the region (81.5% of the total) although the production of tin in Brazil (Rondonia) expanded from 1 300 tons in 1960 to 6 400 tons in 1977, reaching 16% of Latin American tin production (see table 8).

The number of employees of COMIBOL rose from 29 000 in 1952 to a high of 37 000 in 1956 after which it declined steadily to 25 000 in 1975. In conformity with the rise of production, the production of tin per worker, after experiencing a decline from 944 kilogrammes in 1952 to 526 kilogrammes at the beginning of 1960s, rose significantly and reached 841 kilogrammes in 1975.

The decline in tin production after the nationalization can be attributed to several main factors. In the first place, it was a continuation of the declining trend from the alltime peak Bolivian production reached during the Second World War, aggravated furthermore by the contraction in tin consumption during 1950s. At the war time, Bolivia's mines were exploited almost beyond capacity to supply the western defense industry substituting the resources of South East Asia. Thus, in 1945 Bolivian tin production reached 42 000 tons declining abruptly to 31 700 tons in 1950 (see again table 8).

Secondly and due partly to a lack of exploration activities before nationalization and the wartime over exploitation, the quality of the ground mined deteriorated causing a decline in the tin content of the ore. Thirdly, there was an exodus of 170 of the 200 foreign engineers after nationalization. Serious management problems—common to all newly nationalized firms—had been aggravated by the fact that COMIBOL took over some 17 plants belonging

/to the

to the three nationalized enterprises and being of varying size, quality of ore, obsoletness of equipment and infrastructure, profitability, etc. Finally, among external factors contributing to the decline in production were the marketing problems linked with TNCs domination, the termination of United States stockpile purchases around 1958, followed by the export controls imposed by the International Tin Council during 1958-1960. 1/

The downfall in production, coupled by an increase in the labour force mentioned earlier, contributed to the losses in accounting terms suffered by COMIBOL during its initial years of operation. However, if gains are defined as retained value of exports, the internalization of gains in the country as a consequence of nationalization is definitely a positive factor, regardless of accounting losses suffered by the state enterprise. 2/

b) The upturn of the industry since 1960s and its importance in the economy of Bolivia

The upturn of Bolivian tin industry in 1960s was facilitated by the improvement in the international climate in favour of developing countries. Once the international community has accepted the idea that nationalization is not a radical move to be punished, but rather a reflection of the desire of countries to gain sovereignity over their natural resources and to maximize the benefits derived from them, a new working relationship can be established in which industrialized countries and transnational corporations should still play a major role, in the various new forms of partnership with state enterprises.

An expression of this new international climate and changing attitudes towards the nationalized tin industry of Bolivia was a Triangular Plan

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1/ See part I.5. a) above.

2/ For detail on factors explaining the losses see: William Fox, Tin: The Workings of a Commodity Agreement, Mining Journal Books, London, 1974, p. 65.

/introduced in

introduced in 1961 and involving the Governments of Bolivia, the United States, the Federal Republic of Germany and the Inter-American Development Bank. This plan, worth of U.S.$31 million and covering the 1961-1971 period, envisaged the recapitalization of COMIBOL through external loans, the strengthening of management and a substantial reduction of surplus labour. The steady increase in production and productivity since 1961 was partly due to this plan and made it possible to repay the external loans until 1976. At the same time, this plan contributed to the final settlement with nationalized TNCs and ended the compensation payments in 1961 (see section 1. above).

During the 1970s the tin industry maintained its leading role in the economy of Bolivia. From the overview of main indicators in table 9 can be concluded that export incomes of the industry increased from US$ millions 107.0 in 1970 to 171.4 in 1975 and to 373.7 in 1978, or three and half times more than at the beginning of the decade. This substantial increase was due to the coming on stream of the new smelter and particularly to the dramatic increase of the tin prices (3.3 times), related with the world inflation. The strategic importance of tin for the economic and social development of Bolivia is therefore more adequately reflected in its role in total export and public budget incomes (52% and 18% in 1978) than in relatively low shares of GNP and employment (5% and 3.5%). 1/

With regard to the surplus component of COMIBOL's operations, it is difficult to compare the performance of a state enterprise which has national development functions to perform, with that of private enterprise whose main aim is to earn profits. Throughout its 15 years of operations,

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1/ The shares in public budget incomes (royalties) and GNP include other minerals as well.

/net retained

net retained value of exports has definitely been larger than would have been the case without nationalization. As table 10 shows COMIBOL has been reaching continous profit and increasing net income throughout the 1965-1975 period. COMIBOL also contributes to the state budget paying a variety of taxes to the government, that is royalties, 1/ export taxes (since 1972), import duties and income taxes. Total taxes paid by COMIBOL in 1974 amounted to Bolivian Peso 873 million in comparison with 37 million in 1965 and 387 and 221 millions paid in 1974 by medium and small mining enterprises, respectively (see table 11). The economic achievements of COMIBOL have been positively influenced by the substantial increase of world prices, described above. On the other hand, the enterprise had to bear increasing costs caused by sharp inflationary process without any change in the exchange rate of U.S.$ which had been maintained since the devaluation of Bolivian Peso in 1972.

Not all of COMIBOL's production is exported. An increasing proportion is being delivered to the state owned Empresa Nacional de Fundiciones (ENAF) tin smelter at Vinto, which started production in 1971, reflecting another important progress in increasing the gains from tin industry through forward linkage activities. The ENAF refinery at present refines more than a half of Bolivia's tin in concentrates and expansion plans are underway to boost smelting capacity and production in order to eventually smelt all of Bolivia's tin, as will be discussed in point 3 below.

1/ Although royalties are normally paid by a foreign enterprise for the extraction of a natural resource, COMIBOL has paid similar taxes to the government, based on the rate of production.

3. National development of tin smelting

At the time of nationalization in 1952, the bulk of Bolivian tin concentrates went to the Williams Harvey smelter in the United Kingdom owned by the group of Patiño (Consolidated Tin Smelters). Williams Harvey was established by Patiño in 1929 as a holding company to consolidate his smelting interests in the United Kingdom and Malaysia. Patiño had no interest in building a smelter in Bolivia and preferred to utilize the country solely as a source of mineral resources for his integrated transnational activities. This may be illustrated by the following statement contained in the Annual Report of Patiño Mines and Enterprises Consolidated Inc. for 1938:

"Our Bolivian concentrates and, practically all minerals of high metal content, are smelted and refined in the United Kingdom purely for economic reasons. Our experience, and recent studies made by our technical experts show that it is cheaper to smelt and refine tin in the plants of Williams Harvey and Co. in Bootle, near Liverpool, than anywhere else. In addition to the local conditions at Bootle, a determining factor is the long and unequalled experience of Williams Harvey in the treatment of the complex Bolivian ores in which they have specialized for over 25 years. Thus our Company, and in general all enterprises in Bolivia, are able to obtain the lowest possible rate for smelting and refining our tin concentrates. This represents valuable co-operation in the development of tin mining in Bolivia which, as is well known, is affected by some adverse factors".

Although according to the short-term commercial criterion of transnational corporations, Patiño's position was justified, the fact is that not even the successive governments of Bolivia have had the long-term vision to exert pressure for the establishment of a tin smelter in the country. As noted earlier, 1/ Malaysia's experience was different since the establishment of tin smelters at the beginning of the century was

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1/ See Part I, section 4.

/stimulated by

stimulated by an additional tax on exports of concentrates. Bolivia failed to take effective steps towards the installation of a tin smelter until the mid-1960s. After nationalization, however, it did break the monopoly of the Williams Harvey smelter, concluding a contract in 1962 for the smelting of part of its tin output in the Texas plant then controlled by the Wah-Chang Corporation.

In the 1960s the Government of Bolivia came to the conclusion that the country should build its own tin smelters, not only to earn additional foreign exchange from forward linkage operations but also to be less dependent on specific foreign smelters and by implication, foreign markets. In 1965, negotiations started with a German engineering group and in 1966 the State enterprise Empresa Nacional de Fundiciones, ENAF, was established obtaining a monopoly of producing and exporting of refined metal. Construction of a tin smelter began in that year and in January 1971, ENAF put on stream the refinery at Vinto, with an initial capacity of 7,500 tons. 1/ The plant was constructed with German suppliers' credits by Kloekner Humbolt Deutch, a metal and engineering group which also constructed the refinery for the Indonesian Peltim smelter at Muntok.

In 1975, Bolivia was still highly depended on foreign smelters for refining its tin concentrates. Only one quarter of the total sales of concentrates had been processed in the national ENAF smelter in Vinto. The remainder was exported to different foreign smelters particularly in the U.S., United Kingdom, Spain and Brazil (see table 12). The foreign smelters refining Bolivian tin concentrates are mainly large and integrated TNCs with world-wide marketing of tin metal, as may be seen from table 13 and the following overview:

1/ Information in this part is based on: Carlos Alcoreza Melgarejo, La Corporación Minera de Bolivia y su influencia en la economía nacional, COMIBOL, La Paz, 1976; International Tin Council, Notes on Tin, various issues; IBRD, Report Nº 1251a-BO, Present Position and Prospects of the Mining and Metallurgical Sector of Bolivia, November 1976 and various issues of ENAF annual reports.

/The Long Horn

The Long Horn smelter established by the United States Government through Billiton Co., during the Second World War was subsequently purchased by Wah-Chang Corp. and then sold to the Gulf Resources and Chemical Corp. Gulf Resources also controls Bunker Hill Co., which owns important silver, lead and zinc mines in Idaho. Its principal office is in Kellog-Idaho. This melter processed 31% of the Bolivian Mining Corporation's 1975 tin production.

The major smelter in the United Kingdom at present is that of Capper Pass and Son Ltd. in North Humberside, Yorkshire, which mainly processes ore with a low metal content. It is completely controlled by the Rio Tinto Zinc Corporation Ltd., a holding company with interest in Australia, Canada, the Netherlands, the Netherlands Antilles, Papua, New Guinea, South Africa, the United Kingdom and the United States. In 1975 the Capper Pass smelter processed 24% of the tin output of the Bolivian Mining Corporation.

The Federal Republic of Germany has the Berzelius Metallhutten Gesellschaft m.b.h. smelter in Duisburg, which is owned by the Metallgesellschaft A.G., an important firm with a long tradition in the field of minerals and non-ferrous metals, covering the production, smelting, refining and marketing stages. A number of medium-scale miners in Bolivia send their concentrates to this smelter.

Brazil has three smelters: Volta Redonda, controlled by Consolidated Tin Smelters (Patiño); Mamore Smelting, owned by the Iacombe construction group; and an independent smelter in Rio de Janeiro. These smelters mainly process the ore produced in Rondonia, Brazil, where active exploration activities are going on. Twelve mining groups are working there, particularly in the Cadeias river basin. Small quantities of Bolivian concentrates have been smelted in Volta Redonda.

/Presently the

Presently the tin smelter in Vinto which exported 16 000 tons in 1978 is being expanded to a capacity of 20 000 tons per year. The expansion of refining capacities entailed large scale investment of some US$75 million, the bulk of which was financed by credits from West Germany and socialist countries. While the first Vinto smelter has been designed for the treatment of high grade tin, a new plant is being constructed at the same site for the treatment of low grade tin with a capacity of approximately 10 000 tons. 1/ Both the expansion of the existing smelter and the construction of the new one are being undertaken by Kloeckner Industries, the second one in conjunction with Paul Bergsoe of Denmark. Thus, by the beginning of 1980s Bolivia will have a tin smelting capacity of some 30 000 tons, capable of smelting domestically all of its tin concentrates production.

The expansion of tin smelter's capacity throughout the 1970s made it possible to increase the output of tin metal from 700 tons in 1970 to 16 000 tons in 1978 accounting for more than a half of total production of tin in concentrates (see table 14). About two thirds of ENAF's tin is supplied by COMIBOL and the rest by medium mines. The small mines supply little to ENAF due to low tin content of their concentrates.

In spite of these encouraging developments, ENAF encountered with accounting losses and problems during the initial years of its operations (see table 15). One of the problems was that although the smelter's capacity has been still in expansion, infrastructure had been built for the final capacity of 20 000 tons causing this way large overhead costs. Also

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1/ Mining Magazine, March 1977. There is discussion of the possibility of USSR Machino Export Enterprise participation in the construction of the second smelter. In this case the new smelter would provide an interesting example of joint venture; the State enterprise ENAF co-operating with private companies in Germany and Denmark, and with the USSR state enterprise.

/the inflationary

the inflationary process since 1972, mentioned above in relation with COMIBOL, had negative effects on the enterprise costs.

As in the case of COMIBOL's operations, it is important to realize that forward linkage corresponding to ENAF smelting is important not only for gains in a narrow sense (profits), but particularly for internalization of incomes originated in the tin industry. In this manner, the retained value is definitely enhanced by increasing the local value added, even if accounting-wise the smelter suffers losses. 1/ In addition, the smelting of tin domestically may lead in the future to further forward linkage effects such as fabrication of tin based products. Finally, local smelting would increase the negotiating capacity of the government vis-à-vis tin TNCs and their still strong marketing power.

On the other hand, sales of tin metal rather than concentrates would not automatically release the country from the control of international metal traders. It was shown above that the marketing operations are still controlled by powerful traders at the LME. The issues related with tin marketing in Bolivia are overviewed in the following and final section of this paper.

4. TNCs control over marketing of Bolivian tin 2/

Control over marketing is an important element in the bargaining balance between governments and TNCs. The establishment of tin smelters in producing countries described above would not only increase the foreign exchange earned from tin activities but also provide a better control over the marketing of tin metal and the possibility to sell it directly to final consumers.

1/ Of course, this assertion does not deny the importance of public enterprise efforts to decrease production and other costs contributing thus more to the country's development.

2/ This part will be completed and updated by Mr. Alfonso Versalovic, the Bolivian expert participating in the Bangkok Interregional Meeting.

/The present

The present problems of tin marketing in Bolivia are largely associated with the low grade and not easily marketable tin concentrates proceeding mainly from small mines. Their sales are limited to the foreign refineries specializing in low grade processing, such as the Texas smelter in the United States. As shown earlier, the present ENAF operated smelter can only process relatively high grade (around 45 per cent) tin concentrates. Any lasting improvement in the market position of the Bolivian tin industry will have to await the completion of the new low grade smelter mentioned in the part 3. above.

The State owned mining bank Banco Minero (BAMIN), was established as the principal credit, marketing and technical assistance institution, including provision of equipment and current inputs for the private and especially small mines. BAMIN extends working capital loans and loans for investment. As a marketing entity, it buys tin concentrates from small mines and co-operatives (except those producing for COMIBOL). BAMIN mainly undertakes spot sales for relatively small individual shipments. Apart from its shipments to the low grade smelters in Europe, other shipments by BAMIN are almost entirely taken up by metal traders which tend to make it subject to collusion on part of its purchasers. International trading firms act as principals, thus excluding mineral suppliers from decisions over timing and destination of sales. While trading firms generally pay immediately after delivery, their commission could be as much as 20% of the sales price. 1/

The international trading firms which are most active in Bolivia are: Phillip Brothers, C. Tennat and Sons, Metal Traders and Sud Americana de Minerales y Metales, all important traders in the LME.

1/ See again IBRD, Report N° 1251a-BO, op.cit., p. 11. The following discussion draws heavily on this source unless otherwise indicated.

Phillip Brothers is a subsidiary of Engelhard Minerals and Chemicals Corporation based in New York and with agencies in 25 countries all over the world. Other subsidiaries of this company are Engelhard Industries Division which refines, fabricates and markets precious metals and the Minerals and Chemical Division, which exploits minerals like bauxite, etc. As indicated above, Phillip Brothers are engaged in Brazil in a joint venture with the Patiño owned CESBRA company for tin exploration and mining. Phillip Brothers has also exclusive marketing of the tin concentrates from mines pertaining previously to Grace and Co. (Estalsa, International Mining and Avicaya) which represent approximately one half of private Medium Mines production.

C. Tennant and Son Co. is a subsidiary of Consolidated Gold Fields, with interests in South Africa, Australia, Canada, New Zeland, Norway, the United Kingdom and the United States. Metal Traders Inc. is based in New York and maintains subsidiaries among other in London and La Paz. It is a much smaller company than the two previously cited. Finally Sud Americana de Minerales y Metales is a subsidiary of Amalgamated Metal Corporation, controlled by Patiño, N.V. As indicated earlier, Patiño's smelting interests are linked to its marketing companies.

The above overview shows that marketing of Bolivian tin is still largely controlled by the powerful traders which dominate the LME. The success of Bolivia in achieving shortly selfsufficiency in smelting will automatically have favourable repercussions on the marketing as well. However, a structural improvement in marketing can only be achieved through the training of cadres in this sophisticated but crucial field which ultimately determines the gains through price formation.

The actual distribution of gains at the market level, depends primarily on two factors: first, the process of price formation in international

/markets and

markets and the importance of the bargaining power of governments in those markets, and second, the negotiations regarding the many discount clauses which can increase or reduce actual gains, given international prices. Although COMIBOL, ENAF and BAMIN combined have a sales volume large enough to exert a powerful bargaining position in the international markets, the government has to strengthen a co-ordinated marketing approach and the knowledge about international minerals and freight markets and particularly the forward price movements on the London Metal Exchange. In this sense a rather positive factor is that the tin sales are geographically diversified corresponding in 1975 to western european countries 41%, United States 24%, Latin American countries 10% and socialist countries 13% of the total export volume (see table 16).

/STATISTICAL ANNEX

STATISTICAL ANNEX

/Table 1

Table 1

WORLD PRODUCTION OF TIN IN CONCENTRATES, TIN METAL AND CONSUMPTION OF TIN METAL

(1973-1975 AVERAGES)

	Production of tin in concentrates		Production of tin metal		Consumption of tin metal	
	Thousands of tons	Percentage of world total	Thousands of tons	Percentage of world total	Thousands of tons	Percentage of world total
Major tin in concentrates producers						
Australia	10.3	4.8	6.8	3.0	4.3	1.8
Bolivia	28.5	13.2	7.1	3.1	-	-
China	22.9	10.6	22.9	10.1	14.0	5.8
Indonesia	24.0	11.2	15.8	6.9	0.4	0.2
Malaysia	68.3	31.7	83.3	36.6	-	-
Nigeria	5.3	2.5	5.4	2.4	-	-
Thailand	19.2	8.9	19.8	8.7	-	-
Zaire	4.8	2.2	0.7	0.3	-	-
Major tin consumers						
France	-	-	-	-	11.0	4.6
Germany	-	-	-	-	15.2	6.3
Italy	-	-	-	-	8.6	3.6
Japan	0.7	0.3	1.3	0.6	33.5	13.9
United Kingdom	3.6	1.7	18.4	8.1	16.5	6.8
United States of America	-	-	6.8	3.0	56.7	23.5
Soviet Union	13.7	6.4	14.0	6.2	19.3	8.0
Other market economies	13.0	6.0	23.6	10.4	44.9	18.6
Other socialist countries	1.1	0.5	1.3	0.6	16.7	6.9
World total	215.4	100.0	227.2	100.0	241.1	100.0

Source: World Metal Statistics, May 1977.

Table 2

PRODUCTION OF PRIMARY TIN BY REGIONS, 1950-1977

(Thousands of tons, percentage of world total and acumulated average annual rate of growth)

	Africa	Asia	Australia and Oceania	Western Europe	Latin America	CPE a/	World total
1950	23.3	103.5	1.9	2.7	33.1	12.4	176.9
Participation in percentage	13.2	58.5	1.1	1.5	18.7	7.0	100.0
1960	20.7	90.4	2.2	2.2	22.1	31.2	168.8
Participation in percentage	12.3	53.5	1.3	1.3	13.1	18.5	100.0
Growth rate, 1950-1960	-1.2	-1.3	1.5	-2.0	-4.0	9.7	-0.5
1970	19.6	116.5	8.8	2.8	36.4	33.1	217.2
Participation in percentage	9.0	53.6	4.1	1.3	16.8	15.2	100.0
Growth rate, 1960-1970	-0.5	2.6	14.9	2.4	5.1	0.6	2.6
1975	14.7	113.8	9.6	4.5	38.5	38.6	219.7
Participation in percentage	6.7	51.8	4.4	2.0	17.5	17.6	100.0
Growth rate, 1950-1975	-1.8	0.4	6.7	2.1	0.6	4.6	0.9
1977	12.9	117.7	10.0	5.1	40.0	38.9	224.6
Participation in percentage	5.7	52.4	4.5	2.3	17.8	17.3	100.0
Growth rate, 1970-1977	-5.8	0.1	1.8	8.9	1.4	2.3	0.5

Source: Metal Statistics, 1950-1959, 1957-1966, 1965-1975, Metallgesellschaft A.g., Frankfurt am Main.

a/ Centrally planned economies (particularly People's Republic of China and Soviet Union.

Table 3

PRODUCTION OF TIN IN RELATION TO RESERVES

(1975-1976 averages)

Major producing countries	Production (000 metric tons) (A)	Reserves (000 metric tons) (B)	Rate of production (percentage) (A)/(B)
Australia	10.34	330	3.1
Bolivia	27.87	1 000	2.8
Brazil a/	5.45	610	0.9
China	22.00	1 500	1.5
Indonesia	24.19	2 400	1.0
Malaysia	65.18	830	7.9
Nigeria	4.32	280	1.5
Thailand	18.70	1 200	1.6
Soviet Union	30.00	620	4.8
Zaire	4.08	200	2.0
World total b/	227.90	10 160	2.3

Source: United States Department of the Interior, Bureau of Mines "Commodity Data Summaries 1977".

a/ From: United States Bureau of Mines, "Tin", in Mineral Facts and Problems, 1975.
b/ Including other producers.

Table 4

CONTROL OVER THE WORLD'S TIN PRODUCTION: RANKING OF THE WORLD'S LARGEST COMPANIES, 1976

Ultimate owners a/	Name of company a/	Recent production figures b/ (1975)				Remarks
		Country of production	In metric tons	Percentage of country's production	Percentage of world production	
1. Government of Indonesia	P.T. Timah	Indonesia	24 400	100.0	11.7	Vertically integrated state monopoly although three foreign companies received exploration rights under contracts
2. Government of the people's Republic of China	State Tin Enterprise	P.R. China	23 000	100.0	11.1	Vertically integrated state monopoly
3. Government of Bolivia	Corporación Minera de Bolivia (COMIBOL)	Bolivia	21 225c/	75.0c/	10.2c/	Horizontally integrated state enterprise. Other minerals produced: Zinc, antimony, tungsten, copper, lead, silver, etc.
4. Pernas (Holding company owned by Government of Malaysia; 71.35% and charter consolidated; 28.65%)	New Tradewinds Holding Company	Malaysia Nigeria Thailand	15 456d/ 2 502(1974) e/	24.0d/ 45.8 e/	7.4d/ 1.1 e/	Controls production of 14 companies in London tin group and 6 companies in charter consolidated, in addition, its subsidiaries in Nigeria and Thailand own siseable-shares of production in these two countries. See Diagram 3 on pernas control over tin companies

a/ Sources used for the recent ownership details of companies were:
Far Eastern Economic Review, April 1, 1977.
Asian Finance, April/May 1977.
International Tin Council, Notes on Tin, various issues.
United States Bureau of Mines, "Tin", Chapter from Mineral Facts and Problems 1975, Bulletin 667, Washington, 1976.
Mineral Yearbook, 1974, Volume I, Washington, 1976.
Walter Skinner, Mining International Yearbook, The Financial Times, London, 1976 and 1977 editions.

b/ Production data taken from World Metal Statistics, May 1977. World Production of tin-in-concentrates including the socialist countries, is estimated at 207 500 metric tons.

c/ COMIBOL's production is estimated at 75% of production figure from World Metal Statistics. The 75% is taken from COMIBOL statistics for 1973 and 1974.

d/ Malysia's tin dredges accounted for 31.6% of total production. The Pernas Group, consisting of the 14 London tin group companies and the 6 Charter Consolidated companies accounted for 76% of this total, or 24% of total Malaysian production. The Wall Street Journal, November 9, 1976. Also International Tin Council, Monthly Statistical Bulletin which shows that the bulk of Malaysian production comes from small Malaysian Chinese firms operating grave pumps hydraulic and open cast mines, accounting for more than 60% of total Malaysian production in recent years.

e/ Quantities produced by two subsidiaries of the London tin group in Thailand not known.

Table 5

TIN MINING AND SMELTING BY PRINCIPAL PRODUCER COUNTRIES

(Thousands of tons of tin metal content and percentage of world total, annual averages of 1951-1955 and 1971-1975 periods)

	1951-1955				1971-1975			
	Mining	Percentage	Smelting	Percentage	Mining	Percentage	Smelting	Percentage
Malaysia	59.5	34.4	67.7	38.6	71.4	38.4	85.6	44.2
Indonesia	34.4	19.9	0.9	0.5	23.0	12.4	13.7	7.1
Bolivia	31.9	18.4	0.2	0.1	29.8	16.1	7.0	3.6
Zaire	12.8	7.4	2.9	1.7	5.4	2.9	1.0	0.5
Thailand	10.1	5.8	-	-	20.3	10.9	20.7	10.7
Nigeria	8.4	4.9	-	-	6.0	3.2	6.1	3.2
Australia	1.8	1.0	1.8	1.0	10.5	5.7	6.9	3.6
Subtotal main producers	158.9	91.8	73.5	41.9	166.4	89.6	141.0	72.9
World total a/	173.1	100.0	175.3	100.0	185.8	100.0	193.5	100.0

Source: International Tin Council, Statistical Yearbook, various issues and Tin Statistics, various issues.

a/ Excluding centrally planned economics.

Table 6

CONTROL OVER THE WORLD'S TIN REFINING AND SMELTING CAPACITIES: RANKING OF THE WORLD'S LARGEST COMPANIES, 1976

Ultimate, owners[a]	Parent company[a]	Company[a]	Plant location	Production capacity[b]		Production in 1975[c]			Remarks
				In tons	As percentage of world	In thousand tons	As percentage of country	As percentage of world	
1. Patiño, NV, (Holding Company)	Amalgamated Metal Corporation (53.2% owned by Patiño NV, in 1977)[b]	Datuk keramat Smelting Sendirian Berhad (50.5% owned by AMC)[b]	Penang, Malaysia	70 000	19.0	[d]	[d]	[d]	See Diagram № on the Patiño's tin activities, 1977, Amalgamated Metal Corporation is a merger between Amalgamated Metal Corporation, active in tin marketing and consolidated tin smelters both subsidiaries of Patiño, NV.
		Makery Smelting Company (62.5% owned by AMC)[c]	JOS, Nigeria	12 000	3.3	4.7	100.0	2.1	
		Associated Tin Smelters [c]	Alexandria, N,S,W,	9 000	2.4	5.7	100.0	2.5	
	Companhia Estanifera do Brasil (Cesbra)[c] (90.8% owned by Patiño, NV, in 1977)	Cesbra	Volta Redonda, Brazil	6 800	1.8	3.6[e]	64.3[e]	1.6[e]	
		Total Patiño Group		97 800	26.5				
2. Overseas Chinese Banking Group of Singapore	Straits Trading Company	Straits Trading Company	Butterworth, Malaysia	60 000	16.3	[d]	[d]	[d]	
3. Royal Dutch Shell	Billiton Maatschappij	Thailand Smelting and Refining Company (Thai sarco)	Phuket, Thailand	40 000	10.8[f]	16.6	100.0	8.3	
4. Government of the Soviet Union	Same	Same	Novosibirsk, Podolsk, Pjtkyarante E Gekhaya, Soviet Union	39 000	10.5	15.0	100.0	6.6	
5. Government of PR China	Same	Yunan Tin Corporation[b]	Kochiu, Yunan, China	25 000	6.7	23.0	100.0	10.1	
		Pingkwei Mining Association [c]	Papu, Ho-Hsien, Kwangsi	10 000	2.7				
			Total China	35 000	9.4				
6. Government of Indonesia	P.T. Timah	Peltim	Muntok, Bangka Island, Indonesia	25 000[g]	6.8	17.8	100.0	4.8	
7. Government of Bolivia	Same	ENAF	Vinto, Bolivia	16 000[h]	4.5	15.5	53.5	6.8	

a/ Information on ownership of companies, most of it reflecting the latest developments, up to 1977, are from: Walter Skinner, Mining International Yearbook, 1977 edition. Trevor Tarring, ed., Non Ferrous Metal Works of the World, 1974, London, Metal Bulletin Books. United States Bureau of Mines Publications (see notes 5 and 6 above). International Tin Council (see note 1 above). b/ Capacities of tin smelters are for 1974, taken from: International Tin Council, 1976, Trade in Tin, 1964-1974, London. Total world capacity is estimated at 368 400 metric tons. c/ From: World Metal Statistics, May 1977. d/ Malaysia's tin metal production at the two smelters, Datuk Keramat and Straits Trading Company, was 83 100 tons in 1975 or 36.6% of the world's total. Breakdown by smelters is not available. e/ Production figure for Brazil from Walter Skinner, Mining International Yearbook, 1975 edition. f/ Thailand's capacity is taken from United States Bureau of Mines, Mineral Facts and Problems, 1975, Chapter on tin. g/ Indonesia's capacity is taken from Metal Bulletin, 28 November 1975. h/ In 1978, an expansion to 20 000 tons.

Table 7

ANNUAL WESTERN WORLD PRIMARY TIN CONSUMPTION AND STOCK SALES (+) OR PURCHASES (-) BY THE INTERNATIONAL TIN COUNCIL AND UNITED STATES GENERAL SERVICES ADMINISTRATION

(Thousands of metric tons)

Year	ITC	Consumption	GSA	Total GSA stock (end of year)
1956	0.0	153.7	-19.5	347.0
1957	-15.5	150.4	-4.0	351.0
1958	-8.2	143.1	0.0	351.0
1959	13.5	149.9	-1.8	352.8
1960	0.0	159.7	-5.2	357.8
1961	10.2	158.8	2.8	355.1
1962	-3.3	163.3	2.2	352.9
1963	3.3	166.9	10.0	342.8
1964	0.0	172.3	29.1	313.7
1965	0.0	171.5	24.4	289.3
1966	0.0	172.7	16.4	272.9
1967	-4.8	172.2	7.4	265.5
1968	-6.6	175.5	3.6	261.9
1969	6.8	183.5	1.7	260.2
1970	3.5	183.4	3.5	256.7
1971	-5.4	185.7	1.8	254.9
1972	-5.8	186.4	0.2	254.7
1973	11.5	202.4	19.6	235.1
1974	...	...	27.7	207.4

Source: Gordon W. Smith and George R. Schink, "The International Tin Agreement: A Reassement", Economic Journal, December, 1976, based on Metallgesellschaft A.G., Metal Statistics; International Tin Council; GSA; Bureau of Mines, "Mineral Industry Surveys: Tin".

Table 8

LATIN AMERICA: PRODUCTION OF TIN BY COUNTRIES, 1950-1977

(Thousands of tons, percentage of regional total and acumulated average annual rates of growth)

	Argentina	Bolivia	Brasil	Latin America
1950	0.3	31.7	0.1	33.1
Participation in percentage	0.9	95.8	0.3	100.0
1960	0.1	19.7	1.3	22.1
Participation in percentage	0.5	89.1	5.9	100.0
Growth rate, 1950-1960	-10.4	-4.6	29.2	-4.0
1970	1.2	30.1	4.3	36.4
Participation in percentage	3.3	82.7	11.8	100.0
Growth rate, 1960-1970	28.2	4.3	12.7	5.1
1975	0.5	32.0	5.0	38.5
Participation	1.3	83.1	13.0	100.0
Growth rates: 1970-1975	-11.8	1.1	5.8	1.4
1950-1975	1.9	0.1	16.7	0.7
1977	0.5	32.6	6.4	40.0
Participation in percentage	1.2	81.5	16.1	100.0

Source: Metal Statistics, 1959-1960, 1957-1966, 1965-1975, Metallgesellschaft, A.G., Frankfurt am Main.

Table 9

MAIN INDICATORS OF THE ROLE OF TIN INDUSTRY IN BOLIVIAN ECONOMY

		1970	1975	1978
1. Exports of tin				
a) Concentrates	thousands of tons	27.8	17.4	13.8
	U.S.$ millions	107.0	120.0	172.7
b) Metal	thousands of tons	-	7.5	15.9
	U.S.$ millions	-	51.4	201.0
c) Unit value	U.S.$	3.845	6.891	12.498
d) Quoted official price	U.S.$/lb.	1.68	3.11	5.72
2. Indexes (1970=100)				
a) Volume of tin exports	%	100	90	107
b) Value of tin exports	%	100	160	349
c) Unit value	%	100	179	327
3. Tin industry shares of				
a) Total exports	%	45	29	52
b) Public budget current incomes a/	%	16	8	18
c) GNP b/	%	6	7	5
d) Employment	%	"	3.5	"

Sources: "Boletín Estadístico", Nº 232, Banco Central de Bolivia, December 1978 and "Bolivia", Separata of Economic Survey of Latin America, 1978, CEPAL, 1979.

a/ Mining royalties.

b/ Mining (excluding oil).

Table 10

COMIBOL PROFITS AND LOSS ACCOUNT, 1965-1975

(Thousands of dollars)

	1965	1970	1972	1974	1975a/
Income	80 287	99 713	128 018	238 424	198 773
Sale of minerals	78 569	97 458	127 289	237 380	197 792
Expenditures	76 170	90 665	124 056	222 198	194 023
Operating profit or loss	4 117	9 048	3 962	16 226	4 750
Less:	1 995	3 998	2 976	7 374	3 637
Worker profit sharing	1 599	3 796	2 372	6 454	2 827
Income tax b/	396	202	604	920	810
Net profit or loss	2 122	5 050	986	8 852	1 113

Source: COMIBOL; IMF; Mission estimates. Quoted in IBRD, Report No 1251a-BO, op.cit.

a/ Estimated.

b/ Paid on behalf of employees.

Table 11

MINING TAXATION, 1965-1974

(Million of pesos bolivianos)

	1965	1970	1974
COMIBOL	37.4	129.3	873.1
Royalties	37.4	100.8	531.9
Export taxes	-	-	283.2
Import duties	-	28.5	58.0
Medium Mining	20.8	146.7	387.1
Royalties	20.8	118.2	228.2
Export taxes	-	-	106.7
Import duties	-	28.5	52.2
Small Mining (Bamin)	30.2	56.0	221.1
Royalties	30.2	56.0	129.7
Export taxes	-	-	91.4

Source: Institute for International Development, Harvard University. Quoted in IBRD, Report Nº 1251 a-BO, op.cit..

Table 12

BOLIVIA: SALES OF TIN CONCENTRATES TO DIFFERENT SMELTERS AND THEIR CHARACTERISTICS, 1975

(In percentage of total sales)

Importing company	Parent company or owners	Percentage
Gulf Resources and Chemical and Metallurgical Corporation, Long Horn, United States	Gulf Resources and Chemical Corporation Kellog, Idaho, United States	31.4
ENAF Vinto, Bolivia	State Enterprise of Bolivia	24.7
Capper Pass & Son, Ltd. Yorkshire, United Kingdom	Río Tinto Zinc Corporation, London, United Kingdom	23.6
MENSA (Metalúrgica del Noroeste), Villagarcía de Arosa, Spain	MENSA, Madrid, Spain	7.8
CESBRA (Companhia Estañífera do Brazil), Volta Redonda, Brazil	Patiño, NV., Netherlands	4.3
Berzelius Metalhütten Gesellshaft, Duisburg, Wanheim, Western Germany	Metallgesellschaft, A.G. Frankfurt, Western Germany	5.1
Raznoimport, Moscow, Soviet Union	State Enterprise of Soviet Union	2.9

Sources: COMIBOL, Departamento de Venta de Minerales, La Paz, Bolivia.
Trevor Tarring, Non Ferrous Metal Works of the World, 1974, 2nd Edition, Metal Bulletin Books, London.

Table 13

OUTPUT OF BOLIVIAN TIN-IN-CONCENTRATES AND THE QUANTITIES SMELTED BY VARIOUS COMPANIES, 1960-1975

(Tonnes)

Year	Bolivian output	ENAF	Pero, Metabol and Hormet	Williams Harvey	Capper Pass	Long Horn (Gulf Chemical)	Associated Metals and Minerals	Berze-lius	Spain	Brazil	Soviet Union
1960	20 543	-	1 103	10 757	5 792	-	119	812	-	-	-
1961	21 333	-	2 081	10 078	5 426	-	266	958	-	-	-
1962	22 150	-	2 055	10 606	5 711	-	945	1 216	-	-	-
1963	22 603	-	2 666	9 591	5 165	-	1 517	1 020	-	-	-
1964	24 982	-	3 669	8 735	4 703	-	5 230	920	-	-	-
1965	24 164	-	3 470	8 410	4 529	-	4 356	953	-	-	-
1966	25 932	-	1 100	11 103	5 979	-	4 417	895	-	-	-
1967	28 166	-	1 076	13 637	7 343	-	3 299	1 279	-	-	-
1968	29 568	-	60	14 260	7 024	-	2 836	963	-	-	-
1969	30 047	-	86	18 635	5 566	-	-	907	-	-	-
1970	30 100	-	300	12 599	6 490	4 741	-	1 178	-	-	-
1971	30 290	6 820	-	9 871	4 862	3 059	-	1 253	-	-	1 933
1972	32 405	6 528	-	7 680	5 562	4 283	-	1 125	117	-	162
1973	28 568	7 038	-	4 002	7 115	4 536	-	1 758	230	1 141	2 916
1974	29 151	7 042	-	-	7 490	5 970	-	1 479	1 430	-	1 355
1975	28 324	7 500	-	-	7 750	6 415	-	1 822	865	-	-

Source: ITC statistics and estimates of Economist Intelligence Unit.

Table 14

BOLIVIA: EXPANSION OF TIN SMELTING, 1960-1978

(Thousands of tons of tin metal content and percentage of smelting)

Year	Volume			Percentage smelted
	Concentrates	Smelted	Total	
1960	18.6	1.1	19.7	5.6
1970	29.4	0.7	30.1	2.3
1975	24.4	7.6	32.0	23.8
1977	19.3	13.3	32.6	40.8
1978a/	13.8	15.9	29.7	53.5

Sources: Metal Statistics, 1950-1959, 1957-1966, 1965-1975, Metallgesellschaft A.G., Frankfurt am Maim and Boletín Estadístico, Nº 232, Banco Central de Bolivia, December, 1978.

a/ Exports.

Table 15

INVESTMENT AND OPERATING COSTS IN VINTO TIN SMELTER IN THE SECOND HALF OF 1970

	Stage 1 (1974)	Stage 2 (1976)	Stage 3 (final)
A. Expansion of smelter's capacity			
Fixed investment (thousand of dollars)	13 000	5 500	23 500
Working capital (thousand of dollars)	7 000	2 800	11 200
Production (thousand of tons)	7 100	11 000	20 000
Total employment	620	640	880
B. Operating costs (thousand of dollars)			
Materials			
Miscellaneous (flux, acids, etc.)	100	...	...
Fuel oil	685	...	...
Electricity	144	...	...
Charcoal	403	...	...
Total materials	1 332	2 040	3 700
Direct costs			
Labour including overhead	1 860	1 910	2 640
Maintenance (3% of fixed capital)	390	550	1 260
Total direct costs	3 582	4 500	7 600
Costs			
Depreciation	1 300	1 850	4 200
Interest on investment (8%)	1 600	2 260	5 040
Transportation, marketing and insurance	1 090	1 700	3 100
Total costs	7 472	10 310	19 940
Contract incomes a/	3 672	7 960	21 090
Probable operating profit(loss)	(3 800)	(2 350)	(1 150)

Source: Estimates on base of ENAF data and above quoted IBRD, report Nº 1, 251a-BO.

a/ The estimation of contract incomes costs for smelting and refining are based on the Texas City and European smelter costs.

Table 16

BOLIVIA: EXPORTS OF TIN BY COUNTRIES OF DESTINY

(Thousands of tons of metal content and percentage of total exports)

Country	1974	Percentage	1975	Percentage
1. United Kingdom	7 681	27	6 781	27
2. United States	7 418	26	5 915	24
3. Federal Republic of Germany	2 884	10	1 862	7
4. Brazil	2 349	8	1 184	5
5. Soviet Union	1 859	6	1 970	8
6. Argentina	1 228	4	929	4
7. Checoslovakia	898	3	1 200	5
8. Netherlands	519	2	1 832	7
9. Colombia	356	1	108	0.6
10. Japan	305	1	60	0.4
11. Others	3 457	12	3 074	12
Total	28 954	100	24 915	100

Source: Memoria Anual del Banco Central de Bolivia, Gestión 1976.

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1/ Various issues published in the 1970s.