STATE ENTERPRISE IN INTERNATIONAL MINERAL MARKETS

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ABSTRACT

This study explores the implications for the international non-fuel mineral markets of the rapid growth of state enterprise in the mining and processing of minerals in the less developed countries (LDC).

The first part defines state enterprise, and quantifies its prevalance and growth in LDC mineral industries. The particular characteristics of state enterprises are identified, and the implications of their behavior for international mineral markets are analyzed. In this regard, three hypotheses are formulated and assessed.

1) State enterprises are less flexible than private multinationals in adjusting capacity through the different phases of the business cycle. The increasing importance of state enterprises therefore results in greater price instability in international mineral markets.

2) State enterprises can disregard the political risk of explicit or covert nationalization. Ceteris paribus, the proliferation of state enterprise therefore results in more investment and capacity expansion in mineral rich LDCs that are considered especially "political risky" by the mining multinationals. Over time, this will lead to a closer geographical fit

between geological potential and mineral extraction.

3) Takeovers by state enterprises of mineral activities in LDCs entails a substantial setting-up and learning cost. The widespread nationalizations of the 1960s and 1970s have typically been followed by extended periods of lesser efficiency, characterized by higher cost levels, and inability to operate the installations at full capacity or to establish new capacity. Output has been lower and prices higher during this learning period than they would have been under an uninterrupted private multinational regime.

The second part of the study considers the support for the above hypotheses provided by three detailed case studies of nationalized mineral industries--Indonesian tin, Venezulean iron ore, and Zambian copper. These cases cover a range of experience in terms of minerals, continents, and levels of economic development in host countries.

The third and final part of the study reviews the hypotheses in the light of the empirical work presented. Conclusions are formulated and generalizations derived from other countries and minerals.

FOREWORD

This manuscript on the recent growth of state enterprise in the mineral sector of developing countries and the consequences for world mineral markets is one of five research efforts currently supported by the IIASA Mineral Trade and Markets Project. The author, well known to scholars interested in the economics of mineral industries, is a Senior Research Fellow at the Institute for International Economic Studies of Stockholm University.

This version of the study will serve as the background document for a IIASA workshop on "State Enterprise in the Mineral Sector" to be held in Laxenburg on 17-19 October 1983. Following that meeting it will be revised and then reviewed for publication. Consequently, it should be treated as a preliminary draft, and quoted only after receiving the permission of the author. For the same reason, comments, criticisms, and suggestions for improvement are particularly welcome.

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CHAPTER 1. INTRODUCTION

Over the past few decades there has been an explosive growth of state ownership in developing countries' metal mineral industries. Most of the output of these industries is exported. The purpose of the present book is to explore how the new owner group influences and changes the international metal mineral markets.

The focus provided by the preceding paragraph must be further spelled out. The book is about metal minerals. Mineral fuels like petroleum and coal are left out of consideration. There is a special interest in state enterprises in developing countries. Although public ownership in the mineral industries is in no way limited to the Third World, the attention devoted to such enterprises in other countries is small. The central theme of the book is how the emergent state involvement in the mineral industries affects the functioning of international markets. The goals and behavioral characteristics of state-owned mineral firms are therefore studied with a view to clarify what changes they will bring to such market variables as costs and prices, industry concentration, vertical integration or the overall volume and geographical allocation of investments in new production capacity. State ownership in the mineral industries will obviously have a number of other impacts, nationally and internationally, but these will receive only a cursory treatment or none at all.

The reasons for writing this book are easy to formulate. Although for some time there has been a wide awareness of the fast expansion of state ownership in developing countries' mineral production, through

nationalization of existing capacity and government participation in new ventures, the actual information on the total extent of state involvement has at best been fragmentary. The present book tries to respond to the need for an overall picture of the state enterprise phenomenon. This is done through a detailed discussion of the alternative measures that can be employed to quantify state ownership, and through the compilation of data sets for the major mineral industries, on which the measures are then applied. Furthermore, the current governmental ownership positions are put into a temporal context, showing how they evolved in the past and conjecturing about their likely importance in the future.

A more important reason, however, is that although the growing significance of public ownership in mineral industries is generally admitted, the special behavioral patterns of state enterprises are seldom recognized when worldwide mineral markets are analyzed. Recent standard works on international commodity issues regularly subsume that all market agents behave like private profit maximizers. The conclusions of such works will have doubtful validity if in fact a significant proportion of the suppliers have behavioral characteristics that deviate from that standard. In the few cases where the deviant behavior is noted, its consequences for the functioning of the commodity market studied typically have the form of intuitive hunches without supporting theoretical or empirical analysis. The present book has the ambition to straighten up a few of these deficiencies. Thus, some of the theoretical approaches contained in the general literature on state enterprise are combined with close empirical observations to identify those behavioral features of state-owned mineral firms that distinguish them from the private multinational mining corporations. These insights are then employed for a systematic investigation of the changing cost, price and investment patterns in

international mineral markets where state-owned units account for a substantial proportion of overall supply.

The international mineral markets treated in the following chapters all have an oligopolistic structure on the supply side. As appears from table 1.1, the capacity of the biggest firm in each mineral typically accounts for 10 % or more of the Western World total.[1] In all cases listed, the ten largest firms control more than 50 % of overall capacity. For most minerals, the number of large suppliers is sufficiently small to make each believe (a) that his economic fortunes are perceptibly influenced by the market actions of other individual suppliers, and (b) that these suppliers are in turn affected significantly by his own actions. These are the conditions which, according to Scherer, characterize oligopolistic markets.[2] Oligopolistic market conditions do not necessarily imply high monopolistic prices and profits. For, as Scherer points out, oligopoly does not preclude a sharp rivalry among the suppliers in a market, pushing prices down to the level of marginal cost of the industry.

Given the short-run inelasticity of overall demand for most minerals, a producer accounting for 10 % or more of overall capcity, has substantial possibilities to push up the price by reducing his supply. In the absence of producer coordination, the price improvement will last only until his competitors have expanded their own output to compensate for the initial shortfall. The time required for this to happen will be quite limited in a recession when there is spare capacity that can be employed, but may involve 4-5 years or more when additional output

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1) Western World is used throughout the book to denote the world outside the centrally planned economies of Eastern Europe, Asia and Cuba.

2) F. M. Scherer, Industrial Market Structure and Economic Performance, Rand McNally, Chicago 1980, p. 11.

Table 1.1 Share of Western World Capacity in 1977 for Leading Companies[1] Ranked by Size, Percent

Company rank	Aluminum Mining	Aluminum Smelting	Copper Mining	Copper Refining	Iron ore mining	Lead refining	Nickel, Ferronickel	Tin smelting	Zinc reduction
1	22.0	13.1	11.1	8.3	12.0	7.7	36.8	29.6	12.2
2	13.2	13.0	10.7	7.8	8.7	7.0	15.3	17.1	5.5
3	6.8	9.4	8.5	5.9	8.5	6.9	14.1	10.7	4.8
4	6.6	7.8	7.3	5.4	8.1	6.1	6.6	11.1	4.7
5	6.0	6.8	5.5	5.4	7.7	6.0	5.5	8.5	4.5
6	4.9	5.2	5.5	4.9	7.1	5.3	5.0	6.0	4.3
7	4.9	3.3	3.9	4.8	5.2	4.7	4.9	3.8	3.8
8	4.2	3.3	2.9	3.9	4.8	4.5	3.4	2.1	3.7
9	3.7	3.0	2.7	3.0	4.1	4.4	3.1		3.6
10	1.4	2.7	2.2	3.0	3.2	4.1	2.5		3.5
Sum total companies listed	73.7	67.6	60.3	52.4	69.4	56.7	96.7	88.9	50.6

1) Includes proportional shares of joint ventures.

Source: Mineral Processing in Developing Countries, UNIDO 1980, UN Sales No. E.80.II.B.5.

requires the construction of new capacity. Maintenance of prices above the marginal cost in the industry will be easier with some coordination among producers, though even then the producer gains will be diluted over time through substitution in favor of other materials.

A certain degree of producer coordination has been common in many international mineral markets, with respect to both market supply, and even more to capacity expansion. Expressions of such coordination include the prevalence of producer prices for a number of minerals, and the substantial share of capacity expansion that has the form of joint ventures between many producers. Producer coordination has been temporarily weakened since the mid-1970's by the sharp reduction in demand growth for many minerals. With the ensuing excess capacities that have emerged, there has been much more of a free-for-all, without concern for the industry as a whole, as individual producers have tried to survive through the low-price period.

The oligopolistic structure of mineral markets has been affected by the entry of state-owned enterprises, because the national take-overs have involved changes in the degree of industrial concentration. However, the impact appears to have been both ways, reducing the degree of concentration in some markets, and increasing it in others. The oligopolistic conduct in mineral markets has been weakened by the entry of new and inexperienced state enterprises which needed time to acquaint themselves with and develop relations to their competitors. Once they have done so, however, there is little reason to believe that the state-owned units will have attitudes to producer coordination that differ substantially from those of the private multinational mining firms. Hence the continued analysis is based on the premise that the introduction of state ownership has not caused a permanent change in

the oligopolistic structure or conduct in international mineral markets, and that a degree of producer coordination prevails despite the altered ownership structure.

The book consists of three parts. The first part presents a general perspective to the issues treated. Thus chapter 2 makes heavy use of the general literature on state enterprise in order to define the concept, to explain the emergence of state ownership of industrial enterprise, and to identify the distinguishing characteristics of state-owned corporations. In chapter 3 the vista is narrowed to state enterprises in the mineral sector. After a discussion of alternative approaches to quantifying the extent of state ownership in the mineral industries, a number of statistics are presented to depict the growth and present significance of the state-owned sector in the production of different metal minerals. Chapter 4 is central to the entire study. State mineral enterprises are divided into a few key categories, and the particular behavioral patterns of each are discussed in detail. Based on this discussion, a set of hypotheses about the market impact of the growing importance of state ownership in mineral industries are formulated.

The second part of the book, comprising chapters 5, 6 and 7, consists of detailed case studies of three state-owned mineral industries in developing countries. The purpose of these studies is to provide some empirical evidence in support of the hypotheses put forward in chapter 4.

The third part (chapter 8) pulls the different threads together, and examines the extent to which the empirical findings contained in the case studies are in agreement with the hypotheses about market impact. The results are then generalized, and the likely changes in the international mineral markets, consequent upon the emergence of a significant and increasingly mature state-owned enterprise group are described.

The resources available for carrying out the research that underlies the present book did not suffice for undertaking more than three case studies. A few words need to be said to justify the selection of PT Timah (tin) in Indonesia, Ferrominera (iron ore) in Venezuela, and ZCCM (copper) in Zambia for closer scrutiny. A number of factors contributed to this choice. Thus, I wanted the cases to illustrate a variety of minerals, geographical regions and levels of economic development in the state-owned companies' home countries. I also desired the cases to provide a variation in terms of the length of period of state ownership. To avoid confusing matters, I wanted the cases to involve companies whose activities were dominated by mining and processing of a single mineral and where the state ownership arrangements were reasonably clear-cut. After trying to satisfy all the above factors, the final choice was also influenced by my personal contacts and acquaintances within the mineral industry. The one circumstance that may provide an unrepresentative bias to the case studies sample is that two of the three companies are located in OPEC countries. Both in Indonesia and Venezuela the public sector financial conditions were very relaxed through most of the 1970's. One should keep this in mind when drawing conclusions and generalizations from the case study sample, especially with regard to matters that relate to availability of finance.

Pertinent facts about the companies treated in the three case studies are listed in table 1.2. Timah is the oldest under government ownership. In 1980 it was by far the most profitable one, both in relation to funds employed and to turnover. ZCCM is much larger than the two others. Its capital, turnover and employment are several times the size of Timah and Ferrominera. The Venezuelan iron ore company is the most capital intensive of the three. In 1980 its 4400 employees

Table 1.2 The Three State Mineral Companies Compared. 1980

	P T Timah, Indonesia	Ferrominera, Venezuela	ZCCM Zambia
State owned since	1950	1974	1970
Total capital funds m$	414[1]	419	1850
Sales m$	410	312	1312
Pre-tax profits m$	192	1	284
Employment, number of persons	27650	4440	57750
Total capital funds per employee, $	14980	94370	32030
Sales as a percentage of GDP in home country	0.59	0.52	36.60
Sales as a percentage of exports in home country	1.87	1.52	96.70
Employment in percent of working age population (15-64 years) in home country	0.03	0.05	1.99

1) 1978.

Source: Chapters 5, 6 and 7; World Development Report 1982, The World Bank; Bank of Zambia Annual Report 1981.

had an average of capital assets worth close to US dollars 95,000 each at their disposal.

ZCCM stands out among the three companies in that it dominates the Zambian economy in several respects. This company's sales in 1980 corresponded to one third of Zambia's GDP and accounted for more than 95 % of the country's exports. In contrast, only 2 % of Zambia's working age population was employed in this capital-intensive mining and mineral processing corporation. The corresponding measures for the other two companies show that Timah and Ferrominera are relatively insignificant in all three respects in their national economies.

All three companies are very heavily oriented towards the international market, both in their sales and in their purchases of capital equipment. For this reason, but also because the present study is concerned with international markets, all values relating to the companies, are presented in US dollars obtained by converting the national currencies at actual exchange rates. The use of an international currency creates anomalies in the series of values that are mainly nationally based. Thus, a devaluation of the national currency will tend to result in a discrete reduction of the cost or of the owner capital in the company, when expressed in US dollars. However, these anomalies would usually be of limited duration, since devaluations are typically preceded and/or followed by higher rates of inflation in the currency that is devalued. And in any case, the use of an international currency is necessary for comparisons both among the three companies studied, and in relation to their international competitors.

Where relevant, the current dollar values are converted into constant 1981 dollars. The World Bank's Manufactured Exports Unit Value Index CIF, expressed in US dollars (formerly known as the World Bank Index of International Inflation) is used as the deflator to obtain the constant dollar series. This index is used in preference

to a domestic US series like the US producer price index, because it gives a better measure of the international value of the dollar. For instance, the dollar may appreciate internationally, despite domestic inflation in the US. Its international purchasing power will then rise, despite the fall of its domestic value. And since the international contacts of the companies studied are not restricted to the US, it is the international and not the US domestic purchasing power of the dollar that is relevant. The index (1981=100) is presented in table 1.3 below. It should immediately be added that while the deflator chosen appears appropriate for the purposes of the present study, it is not very meaningful for some other objectives. For example, while a time series of unit labor costs expressed in constant dollars gives one measure of the international competitiveness of the company studied, this series does not say much about the changes in welfare and consumption standards of the labor force. Local currency and local price indices would be needed to obtain the latter. The metric ton is the almost exclusive

Table 1.3 The World Bank's Manufactured Exports Unit Value Index CIF, Expressed in US Dollars, 1981=100

1961	28.9	1966	31.2	1971	35.8	1976	68.0	1981	100.0
62	28.6	67	31.7	72	39.3	77	73.7	82	100.5
63	28.8	68	29.7	73	46.9	78	86.9		
64	29.4	69	29.9	74	58.8	79	97.0		
65	29.5	70	33.1	75	66.8	80	105.0		

Source: World Bank Commodity Trade and Price Trends, 1982/83 edition, updated and revised according to information received from the World Bank in April 1983.

weight measure employed in this study. The only exception is that following the predominant practice of the trade literature, unit prices and costs of tin and copper are given per lb (454 grams).

The present book makes no claim of presenting any definitive treatment of the subject chosen. To avoid exaggerated expectations and disappointments among readers, it is necessary to underline already in this introduction that the findings and conclusions of this study are highly tentative. As will appear in the next chapter, there is at present very little of established theory on state enterprise in general, and the empirical support for the different theses that have been forwarded is typically scattered and unorganized. The above characterization of the state of the art certainly applies to the particular subject of state enterprises in the mineral industries. To my knowledge, work in this wide area is limited to the few contributions by Gillis, Labys, Mikesell and Vernon.[1]

The dearth of earlier research by necessity makes the hypotheses formulated later in the present book highly preliminary. The limited data on state mineral enterprises makes empirical testing difficult. The three state corporate portraits presented in part II provide a

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1) M. Gillis, "Allocative and X-efficiency in State-owned Mining Enterprises", Harvard Institute for International Development, April 1979;

M. Gillis and R.E. Beals, Tax and Investment Policies for Hard Minerals, Public and Multinational Enterprises in Indonesia, Ballinger 1980;

W. Labys, "The Role of State Trading in Mineral Commodity Markets: Copper, Tin, Bauxite and Iron Ore", Les Cahiers du CETAI, No. 79-06, Montreal 1979;

R.F. Mikesell, New Patterns of World Mineral Development, British North American Committee, London 1979;

R. Vernon, "State-owned Enterprises in Latin American Exports", in W. Baer and M. Gillis, Export Diversification and the New Protectionism, University of Illinois Press 1981;

R. Vernon, "Uncertainty in the Resource Industries: The Special Role of State-owned Enterprises", draft, Center for International Affairs, Harvard University, Jan 1982;

R. Vernon and B. Levy, "State-owned Enterprises in the World Economy, The Case of Iron Ore", in L. Jones et al, Public Enterprises in Developing Countries, Oxford University Press 1982.

narrow and not always clearly conclusive support to the hypotheses. Further research in this area is certainly warranted. Such research, based on a wider and longer evidence may well lead to an alteration of some of my findings and conclusions. Until such further research has been completed, however, the results of the present work constitute at least a preliminary step to a better understanding of the consequences of the recently established state ownership positions for international mineral markets.

PART I. THE ISSUES

CHAPTER 2. THE NATURE OF STATE ENTERPRISE

Definition of state enterprise

Economic activity can be pursued by different types of agents. State enterprise is one such agent. The concept 'state enterprise' may mean different things to different people. The loose definition given below follows closely that of Gillis,[1] and identifies state enterprise by three key characteristics. The first one classifies this agent as part of the overall public activity in society. In the second and third, this agent is distinguished from others in the public sector by its enterprise nature:

a. The ownership/control function

The government should be principal owner of the enterprise, or otherwise have the ability to exercise control over the broad policies followed by the enterprise, and have power to appoint and dismiss management. The ownership function unambiguously distinguishes state enterprise from private enterprise. The control function also identifies as state enterprises those operations where the government does not have formal majority ownership but over which it exercises policy and managerial control. Such rights to control, implying a dilution of the private ownership rights, may follow from legislation or from negotiated agreements with the formal owners.

b. The activity function

The enterprise should be engaged in the production of goods and services for sale to the public or to other enterprises. The activity function distinguishes state enterprises from public

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1) M. Gillis, "The Role of State Enterprises in Economic Development", Harvard Institute for International Development, Discussion Paper No. 83, Feb. 1980.

undertakings like courts, police, defence and fire protection, where outputs have far-reaching external effects. This renders them a character of public goods, and makes them unsuitable for direct sale to users.

c) The revenue/cost function.

This characteristic underlines the basically commercial nature of state enterprise. As a matter of policy, the sales revenues of the enterprise should bear a reasonably strong relation to cost. Thus, the postal services, or a subsidized public transport system, which differentiate their charges according to the costs of services rendered, would be classified as state enterprise. On the other hand, a public hospital charging a flat fee from its patients irrespective of the treatment requirements, would not.

The alternative paradigms on state enterprise

Most literature on state enterprise starts out from the standard micro-economic paradigm on profit maximization, and seeks to identify the deviations from that paradigm characteristic of state-owned firms. Two categories of deviations are usually considered.

The first one pertains to goals. State enterprise is often seen to pursue a broader set of goals than strict firm-related profit maximization. This may involve the inclusion of external effects in the objective function. Or else, profit maximization is pursued subject to the attainment of other objectives, e.g. in the fields of employment, income distribution or regional development, or in the rectification of existing market distortions.

The second one pertains to the organizational structure typical of state enterprise. Thus, it is claimed that state enterprise will be less efficient than private enterprise in striving towards whatever goals it has chosen to pursue, because of greater complexity of these goals, of the unclear principal-agent relationship, and of the lower pressure to minimize costs. More on this follows below.

An alternative approach to the study of state enterprise would be to start out at a more basic level and to construct a paradigm specifically for state enterprise, independent of that which applies to the private profit maximizing firm. The literature on political science or on the grants economy[1] might provide the building stones for this alternative construct.

In what follows I propose to simplify my task by adopting the first approach. Thus, I will study state enterprise in terms of its deviations from the standard micro-economic private enterprise paradigm. Apart from the desire to simplify, there are two reasons for this choice. First, the main thrust of the present work is in applied economics and not in the development of new theory that would be required for the establishment of an alternative paradigm. And second, the "deviations from profit maximization approach" appears especially appropriate for the task set out, namely to identify the differences between particular sets of state and private enterprises that operate in a given market.

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1) See for instance K. Boulding, The Economy of Love and Peace: A Preface to Grants Economics, Belmont, Wadsworth, California 1973.

Motivations for the establishment of state enterprise

State ownership of factors of production is the rule in socialist economies. No special motivations are needed to set up state enterprises in such economies. This section, therefore, is relevant only to market economies. In such economies private enterprise is presumed to satisfy the need for production and distribution of goods and services in an economically efficient way. Only where private enterprise fails to accomplish this task, or where non-economic goals must be satisfied in the course of the production process, can there be a motivation to set up state-owned enterprises.

In the following I propose to list and discuss briefly the various reasons used to justify the setting up of state enterprise in general, as discussed in the literature. The motives brought up, while pointing to problems that are not automatically attended to by private enterprise, do not imply that state enterprise provides the first best solution. Nor do they afford any definite assurance that state enterprise will actually function in the beneficial way suggested by theory.

Market failure motivations for state enterprise

When certain circumstances prevail, private enterprise in competitive markets will attain Pareto optimal conditions.[1] Under these conditions it is impossible to improve the utility of any agent in the market without reducing the utility of some other agent. I define market failure as a circumstance where the market when left to itself fails to attain a Pareto optimum. Public action is then

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1) For the necessary preconditions see any standard micro-economic text, e.g. P.R.G. Layard and A.A. Walters, Microeconomic Theory, McGraw Hill, New York 1978.

needed to rectify the detrimental consequences of the failure. The appropriate public action can take different forms. Setting up a state enterprise is one of several alternatives.

Market failure can occur in the static and the dynamic sense. I start out by listing some of the static failures used to motivate the establishment of state enterprise. I then continue by discussing a few dynamic market failures.

One kind of static market failure is where the Pareto optimal conditions are not attained because of uncompetitive market structure. Economies of scale constitute a common cause to oligopolistic or monopolistic market conditions. Other causes of market concentration include appropriable managerial, organizational, technical and natural resources, e.g. an established marketing and distribution system, patents or ownership of rich mineral reserves. Lack of competition may exist among sellers as well as among buyers in a market. The result of the market power may be a restriction of production, with excessive output prices or depressed input prices. Alternatively, the consequence could be internal inefficiency in some firms, resulting either from restricted access to technological, managerial and organizational inputs, or from lacking competitive pressure in the output market.

The government can induce oligopolistic producers to behave competitively by entering the market and announcing that it will react to the private agents' output restrictions by expanding its own output, thereby driving prices to the competitive level. Or else, a more efficiently operating public enterprise can be set up to provide a yardstick for feasible improvements in the operational standards of the private firm. [1)]

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1) F.M. Scherer, Industrial Market Structure and Economic Performance, Rand McNally 1980, p. 486 and 487.

Alternatively, the government may decide to nationalize the entire sector and operate the state enterprises so as to avoid the socially undesirable output restrictions and excessive price and profit levels reaped by private oligopoly or monopoly. Instances of such state intervention are found in the field of utilities, telecommunication, some modes of transport, as well as in natural resource exploitation which derives high rents from rich intramarginal mineral deposits. State enterprise may be a less efficient tool in overcoming the deterimental effects of market failure, where the private monopoly is based on managerial or technical superiority obtained from sources internal to the firm and not available to the government.

Another type of static market failure follows from economic externalities in a given production activity. Private enterprise will not attain the socially desirable output level where there are substantial positive externalities, and will exceed that level in the case of negative externalities. Production under public ownership or control, which takes account of social costs and benefits, can rectify the shortcomings of private enterprise in that case. [1)]

Even where private enterprise can attain Pareto efficiency in the static sense, there may be an argument for the establishment of state enterprise, because of a dynamic market failure, where private firms are unable to realize potential future opportunities.

Perhaps the most important dynamic market failure follows from excessive risk aversion and short-sightedness of private entre-

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1) F.L. Pryor,"Public Ownership: Some Quantitative Dimensions", in W.G. Shepherd, Public Enterprise, Economic Analysis of Theory and Practice, Lexington, London 1976.

preneurs, which prevent them from entering into new activities of which they have no experience, and which take a long time to mature. State involvement in setting up infant industries can be motivated where these circumstances prevail.

Other features characterizing private entrepreneurship can lead to similar dynamic failures. In developing countries, habits may be difficult to change after independence, if, as has been common, the former colonial dominance restricted private national enterprise to the small scale sector only, and prevented it from endeavors in high technology ventures, or compelled the firms involved in exports and imports to trade with the colonial power only. On account of the colonial background, private entrepreneurs in developing countries may lack the international outlook required to locate appropriate sources of technology. Due to their small size and limited experience the entrepreneurs may also fail to strike reasonable bargains with foreign firms about essential input supplies. In such cases, the establishment of new state enterprises, backed up by the government's resources, and less tied down by colonial tradition, may be the fastest, or even the only, way to improve the nation's bargaining position, to establish large-scale or technically sophisticated activities, or to seek remunerative diversifications in the foreign trade relationships.

Political motivations for state enterprise

Even in market economies where private enterprise is seen to manage its tasks reasonably, and where, therefore, there are neither ideological nor economic pressures for wholesale nationalization, a number of cases can be singled out where state enterprise

is established in response to particular political situations or because there is a perceived need for it as a tool in the pursuit of specific political aims.

One such political condition has to do with national economic emancipation from colonial bonds following political independence. By far the most common circumstance in which state enterprise was established in developing countries has been the takeover of foreign ownership, with no obvious national claimant to the assets in the private sector. This circumstance is not exclusive to the developing countries, however. In industrialized countries confiscation of foreign enterprise has taken place on many occasions, and especially after the great wars. In some cases the confiscated assets have remained permanently in government ownership.

A political case for the establishment of state enterprise, both in industrialized and developing countries is often made where the economic activity appears to be so important that decisions taken by private enterprise could compromise the independence and freedom of action of the political system. Frequent examples of industries nationalized for this reason include weapons, airlines, and postal services. Many more examples can be found in developing countries, where individual enterprises in industries with scale economies regularly become so large in relation to the national economy as to constitute a potential political threat. [1)]

Another related political motivation for the establishment of state enterprise is where the government is the major or even the sole buyer of the industry's output. Weapons and pharmaceutical

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1) F.L. Pryor, op.cit.

products are two examples. Here, too, the political rationale is to reduce dependence on private enterprise decisions,[1] but economic arguments based on advantages of vertical integration may add further support to the motivation for state ownership.[2]

In circumstances where for some reason the appropriate set of taxes and subsidies is not feasible, state enterprise is often established to provide a second-best tool for pursuing political and social goals like regional balance, promotion of the interests of suppressed racial groups, employment or redistribution of income.[3] Such goals are related to but broader than the economic externalities discussed under the market failure heading above, and are not automatically attained by profit maximizing private enterprises in competitive markets. Thus, regional policies are pursued in many countries by directing the state-owned railway system to impose below-cost charges for transport in sparsely populated areas. An important aspect of labor market policies in some countries has been to protect the employment of failing private firms by government takeover and continued operations supported by public subsidies.

Characteristic features of state enterprise

Not many generalizations can be made about state enterprise,

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1) F.L. Pryor, op.cit.

2) L. Jones and E.S. Mason, "The Role of Economic Factors in Determining the Size and Structure of the Public Enterprise Sector in Mixed Economy LDCs", in L. Jones et al, Public Enterprises in Developing Countries, Oxford University Press 1982.

3) I.B. Sheahan, "Public Enterprise in Developing Countries", in W.G. Shepherd, editor, Public Enterprise, op.cit.. Also see S. Holland, "State Entrepreneurship and State Intervention", in S. Holland, editor, The State as Entrepreneur, Widenfelt and Nicholson, London 1972.

as distinct from private enterprise. Numerous exceptions are quoted in the literature to most of the statements on typical features of state owned firms. The following set of characteristic conditions under which state enterprises are working, and the ensuing list of behavioral patterns have been set out to provide a clear-cut contrast with private profit maximizing corporations. In the real world it will be found that state enterprises constitute a continuum, with forms quite akin to private corporations at one end, and exhibiting the full characteristics outlined below, at the other extreme.

A common characteristic of state enterprise is that its objectives are less clearly specified than is usual with private enterprise. State-owned firms do not exist solely to maximize profits; they have multiple objectives reflecting conflicting public needs and political pressures. [1] These have already been touched upon in the preceding section and may involve a variety of social responsibilities, including consideration of externalities, concern with enterprise or national employment, income distribution, regional equality and national sovereignty. Existing conflicts and tradeoffs between the goals have usually not been fully sorted out.

Another feature typical of state enterprise is the unclear relationship between top management and the owner. [2] In many

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1) Y. Aharoni, "Managerial Discretion" in R. Vernon and Y. Aharoni, "State-Owned Enterprise in the Western Economies, Croom Helm, London 1981.

2) ibid. Also see D. Coombes, State Enterprise, Business or Politics?, Allen and Unwin, London 1971.

cases, the owner cannot be clearly identified, and certainly does not speak with one voice. The state commonly exerts its ownership rights through a variety of individuals and institutions. Different government departments or even individual politicians may attempt to extract political benefit by pressuring the state enterprise to interpret its objectives in a particular way, and to transact its business accordingly. Power politics in which management takes an active part, rather than corporate constitution, in many cases determine the broad policies pursued by the enterprise.

There is a general tendency for state enterprise to operate under less stringent financial constraints than comparable private units.[1] Access to capital on advantageous terms can take a variety of forms: low cost credit made available by the ministry of finance; government guarantees for loans obtained from private sources; or the permission to issue tax-free bonds. State enterprises also commonly benefit from outright reductions in the normal tax burden and from a low pressure for dividends on equity.[2] Such arrangements obviously increase the cash flow. Simultaneously, the access of state enterprises to the purely commercial markets for risk capital is often restricted. This may result from the statutes under which they are operated, or from the less stringent requirements about returns on the capital that they employ. It follows that in the supply of capital to state enterprises, political factors will play a greater role and commercial considerations a smaller one, as compared to the situation in private profit maximizing corporations.[3]

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1) W.S. Vickery, "Actual and Potential Pricing Practices Under Public and Private Operations", in W. Baumol, editor, Public and Private Enterprise in a Mixed Economy, Macmillan 1980.

2) M. Gillis, "The Role of State Enterprises in Economic Development", op.cit..

3) Ibid.

In the government, state enterprise regularly has a savior of last resort.[1] This constitutes a further distinction from private enterprise. Even if governments have frequently saved large private enterprises from bankruptcy and provided support for their continued life, there has never been any assurance that such support would be forthcoming. State enterprise in distinction, can be reorganized, merged or sold, but is in practice hardly ever allowed to default. Undercapitalization resulting from loss-making operations is regularly remedied through new financial infusions.

Related to the survival assurance for state enterprise is the survival assurance granted to its management. Security of tenure for the top management in publicly owned firms is not absolute, but typically much greater than in private corporations. Contributing to this are the formal conditions providing job security to public servants, the government protection against discontinuation of activities through default, and the great difficulty to establish managerial failure when several goals are pursued at the same time. When managers are sacked, it is usually because they have fallen out of political favor, or broken some formal rules for public employee behavior.

The five features characteristic of state enterprise identified above, viz a complex and blurred goal structure, an unclear relationship between top management and the owner, favorable access to financial supply, a virtual survival guarantee by the government, and managerial security of tenure, permit the derivation of specific state enterprise behavioral patterns in several fields.

First, the combination of blurred objectives and unclear ownership roles provides the management with much greater discretion in

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1) M. Gillis, "The Role of State Enterprises in Economic Development", op.cit..

determining enterprise objectives than what is common in the private sector. Given the complexity of goals, and the variety of views among owner representatives on the weights to be attached to each, the management often finds considerable scope for delineating the goals to be pursued by the state-owned enterprise. Managerial discretion is further enhanced by the virtual impossibility of measuring performance, when goals are complex and the desired trade-offs between them remain unidentified.[1]

Second, and consequent on the above, there is typically much less pressure in state enterprise to minimize costs.[2] This follows from the removal of profit maximization as the overriding objective of enterprise activities. The pressure towards cost minimization will be particularly low in the many natural monopolies where state enterprise activity is common. More generally, a blown-up cost level, or even an inability to cover costs with the sum total of sales revenues and politically determined subsidies can always be justified by the pursuit of one or other social objective. If there are both legitimate and illegitimate reasons for the high costs, and no clear-cut way for distinguishing between the two, then an inadequate cost performance can always be excused. The knowledge that in the end almost any losses will be covered by the government budget to assure survival adds to the permissive view on costs in state enterprises.

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1) Y. Aharoni, "The State Owned Enterprise: An Agent Without a Principal", in L. Jones et al, Public Enterprises in Developing Countries, Oxford University Press, 1982.

2) H. Leibenstein, "X-Efficiency and The Analysis of State Enterprise", in L. Jones et al, Public Enterprises in Developing Countries, Oxford University Press 1982.

A third behavioral feature typical of state enterprises is that they operate under bureaucratic systems,[1] where adherence to formal rules becomes more important than goal achievement, maximization of budget support or of operations replaces the maximization of profit,[2] and where decision-making and decision implementation tend to be slow.[3] The bureaucratic characteristics would be most evident in those state enterprises which operate in shielded markets without competition. The emergence of such characteristics can partly be seen as a result of the control and supervision problems experienced by the owners. When measurement of performance is hard or impossible to undertake, there is a tendency to impose bureaucratic rules and procedures to assure that the activity does not go completely astray. The bureaucratic climate tends to lead to a self-selection in the managerial cadres. Efficient managers want to be judged and rewarded on the basis of their performance. When performance is difficult to measure, managerial reward will be based on other criteria, resulting in an exodus of the most efficient among them.[4] Given the corporate climate, the ones who stay will, on average, have a stronger preference for political manipulation, a skill intensively used in state enterprise, and a lesser cost consciousness, than managers in private enterprise.

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1) L. Jones and E.S. Mason, op.cit.

2) W.A. Niskanen, Bureaucracy and Representative Government, Aldine Atherton, Chicago 1971.

3) A. Downs, Inside Bureaucracy, Little Brown, Boston 1967.

4) Y. Aharoni, "The State-Owned Enterprise: An Agent Without a Principal", op.cit.

Considering the above behavioral patterns, the finding that state enterprises are typically less profitable than private enterprises in similar circumstances,[1] should not be surprising. But it needs underlining that the lesser profitability depends on two factors. The first and desirable one is that state enterprises may be performing some useful social function for which they are not fully credited in their accounts. The second and undesirable one is that these enterprises operate, on average, at a lower level of internal efficiency.

A fourth behavioral pattern of state enterprise is that production is commonly carried out at a higher level of capital intensity than in private enterprise.[2] This holds partly because state enterprise tends to be concentrated in capital intensive sectors, where market failures are more common. But even when the same types of activities are compared, the level of capital intensity is typically higher in the state-owned units. The heavy use of capital can be seen as a rational adjustment by state enterprises to the low cost that they are charged for it. In part, however, the high capital intensity can be seen as an attempt by management to increase its discretionary power. The government owners' ability to influence and direct is greatest when the firm requires additional capital infusions to cover operating losses. A high capital intensity, reducing the recurrent cost level, will diminish the likelihood

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1) H.G. Can and G. Dutto, "Financial Performance of Government Owned Corporations in LDCs" IMF Staff Papers, March 1968.

2) M. Gillis, "The Role of State Enterprises in Economic Development", op.cit.

that such losses occur. The need to apply to the government for additional funds will consequently be less frequent. Politicians are often quite willing to play along in this game. Decisions about additional capital allocations to rescue or expand public enterprise activities are easier to take and render more political prestige than the painful and laborious task of assuring a more efficient utilization of the resources already at the state owned firms' disposal.

A fifth and related behavioral feature of state enterprise is that more capacity will be established than in private enterprise under similar circumstances. This follows, again, from the low cost of capital, but also from the bureaucratic tendency of management to maximize the volume of operations rather than profits.

The function regularly assumed by the government as savior of last resort along with the security of tenure of management might lead one to deduce that state enterprise executives would be more willing to take risks than executives in private firms. Even though examples of extreme risk taking can be quoted (for example Pertamina in Indonesia), the bureaucratic tendencies and the ensuing managerial selection process pull in the opposite direction, and make the managements of state enterprise more risk averse. No general conclusion can be drawn about the net impact of these opposing tendencies.[1]

In summary, then, the typical patterns of state enterprise behavior include

1. substantial managerial discretion in delineating enterprise goals;
2. low pressure to minimize enterprise costs;
3. bureaucratic-type organization;
4. high capital intensity in operations; and
5. overinvestment in capacity.

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1) M. Gillis, G.P. Jenkins and D.R. Lessard, "Public Enterprise Finance in Developing Countries: Towards a Synthesis", in L. Jones et al, Public Enterprises in Developing Countries, Oxford University Press 1982.

However, it needs repeating that the characteristic feature of state enterprise, discussed earlier in this section, and the behavioral patterns summarized above, constitute an extreme case. In many instances, state enterprise goals will be strongly focused on profit maximization, cost consciousness will be high and access to capital will be only on commercial terms. At the same time several of the behavioral patterns typical of state enterprise, will tend to emerge also in private corporations in particular circumstances. For instance, the very large and well established private firms, with widespread ownership and substantial power over the markets in which they operate, frequently develop petrified bureaucratic organizational structures. The monopoly power of such firms permits their managements to relax cost control and to pursue objectives other than maximum return on employed capital. This suggests, first, that public ownership many not be the only factor conducive to the development of the traits identified as typical of public enterprise. Second, in the real world, the distinction between public and private firms is unlikely to be as sharp-edged as made out in the above discussion of the state enterprise archetype.

CHAPTER 3. STATE MINERAL ENTERPRISES IN DEVELOPING COUNTRIES: DEFINITIONS AND QUANTITATIVE ASSESSMENT

The last chapter began by providing a broad definition of state enterprise. The present chapter has two related purposes. The first is to narrow down the above definition, and to make it operational for identifying state mineral enterprises in developing countries. The second is to employ that definition in a quantitative assessment of the prevalence and importance of such enterprises.

1. Definition of state mineral enterprise: What is ownership and control?

The definition of state enterprise given at the outset of the preceding chapter had three components. Two of them are quite unambiguous when it comes to state mineral enterprises in developing countries. Without exception, such enterprises are engaged in the production of goods and services for sale to the public or to other enterprises, and their sales revenues do bear a reasonably strong relation to cost. It is in the third component, that of ownership and control, that ambiguities arise.

Take the concept of control first. This is crucial for the task at hand, since control rather than formal ownership is the key to the hypothesized difference in behavior between state and private enterprise. The control concept raises some difficult definitional issues. First, how does one draw the line between that content and degree of policy and managerial control exercised by the state which warrants classification as state mineral enterprise, and that which does not? Most developing country governments have become

more economically interventionist in the past couple of decades. This is particularly true in relation to large resource projects with a heavy weight in the national economy. Does the above economic policy trend imply that all mineral enterprises in the most interventionist developing countries should be reclassified as state enterprises even where they continue to be wholly privately owned? Even if the answer to the above were to be negative, the implications of the general policy change would be to blur the distinction in the behavioral characteristics between state owned and privately owned enterprise.

A second issue related to the concept of control is that the degree of control will be very hard to observe. One must distinguish between the degree of formal control and the extent to which it is exercised in practice. Even where the government has instituted far-reaching rules to assure its influence over the mineral activity, it may be unwilling or lack the ability to exercise that influence in practice. In some cases this would be easily noticeable, for instance where most of the controlling powers have been handed over to a private corporation through a management contract. In most cases, however, the determination of the extent of government control would require in-depth studies of individual mineral enterprises.

For these reasons, a quantitative assessment of state enterprise, primarily based on the concept of control would be quite difficult to undertake. It is therefore not surprising that most such assessments are based on the extent of government equity ownership rather than of control. The presumption is that there exists a close correlation between ownership and control.

The definition of state enterprise on the basis of the government's equity holding, although infinitely simpler than

that based on the concept of control, is not without complications. Owners are not always easily identified. For instance government equity may be held by institutions not unambiguously recognized as part of the state. Another problem arises in the common case where the mineral enterprise is jointly owned by private and public interests. One way to tackle this ambiguity is to define as state enterprise only those firms where government holds more than half of total equity. Another is to allocate capital assets, capacity, employment or production of each enterprise to the state and private sectors respectively, in accordance with the shares of the equity held by each. Depending on the choice of definition, there will be two different measures of the size of the state mineral sector.

While inclusion of only majority-owned firms in the state enterprise category may seem too restrictive, the split-up of enterprises into state and private parts suggested in the preceding paragraph is somewhat unsatisfactory for the purposes of the present study. The basic hypothesis of this book is that there is a difference in the behavioral patterns between state and private enterprises. This hypothesis requires that each enterprise should be clearly identifiable as belonging to either of the two categories.

Yet a third way to use equity ownership for enterprise classification is to include all enterprises with 'significant' government equity interest into the state enterprise category on the assumption that even a minority holding of equity along with the government's powers to design and implement general economic policies assures it of a high degree of influence and control over the enterprise. Even where the government does not use its powers overtly, its ownership involvement is sometimes seen to constitute a signal of interest, and intent to intervene when the need arises. The response of the private equity holders in such cases may be to accommodate the government in order to avoid confrontations that they know they could lose.

The full influence of the government may be completely covert in such cases. An equity holding of 5-10 % and upward is often considered 'significant' in this context.

This method, like the others, encounters problems. Thus, the degree of government involvement in a mineral enterprise where a 'significant' equity position is held by the public authorities, both overt and covert, may vary from complete to none at all, depending on the government's attitudes and competence. The degree of government involvement will also depend crucially on who the other equity holders are. Its ability to control will be greater where the equity is widely disbursed among the general public at home or abroad as compared to a situation where the majority is held by a powerful and experienced multinational mining corporation.

The presumption of a close correlation between public ownership and exercise of control is not always valid. For instance, although the government holds some 20 % of the equity in the Bougainville copper mine in Papua New Guinea, more than one third of the equity in the uranium mines of Niger, and around 50 % of the Lamco iron ore venture in Liberia, in none of these cases have the authorities exercised overtly their ownership powers to influence the policies and operational modes of the three mineral firms. This contrasts with the case of Jamaican bauxite, where the government has been heavily interventionist even with the enterprises in which it holds less than 10 % of the equity. But the difference in government behavior could of course also be due to the fact that the companies' foreign owners have chosen policies of accomodation in the first case, and of confrontation in the second.

The conclusions of the above discussion are easily stated. The appropriate criterion to distinguish between state and private enterprise from the point of view of this study would be the extent of government control. The ambiguities of the government control concept, and the immense measurement problems, make this criterion less suitable for quantitative assessments of state enterprise in the mineral sector. The measurement problem

becomes much simpler when government equity is used as the criterion to distinguish state from private enterprise. Even then, however, alternative approaches can be used for quantitative assessments, and neither of them is free from ambiguities. The size of the state enterprise universe will vary depending on whether it is defined to include (a) only the firms that are 100 % owned by government, (b) those where government holds a majority, (c) all the units in which it has a 'significant' equity position, or (d) the proportions of individual enterprises corresponding to the government equity share in each case.

2. Some quantitative assessments

This section presents quantitative assessments of the significance of state enterprise in a few important mineral markets. Most of the figures provide a snapshot view from a recent year, but there is also some discussion of the growth of state enterprise over time. Only the Western World capacity or production, as the case may be, is considered in the assessments.

Bauxite/alumina/aluminum

Table 3.1 lists all bauxite producing companies with significant government ownership. It will be seen that 45 % of Western World capacity has significant government ownership, but that the share drops to 23 %, if only the enterprises with majority government ownership are included in the state enterprise category.

State ownership is heavily concentrated in the third world. With the exception of Yugoslavia, all the companies listed in

Table 3.1 Significant Government Ownership in Western World Bauxite Capacity 1980

		Total cap. 000 tons	Gov. equity share %	Gov. cap. 000 tons	Cap. with gov. equity above 50 %, 000 tons
Overall Western World Capacity		92500			
(of which in developing countries)		(54000)			
Capacity with significant government equity:					
Country	Company				
Africa					
Ghana	British Al. Co.	300	55	170	300
Guinea	Guinea Baux. Co.	9000	49	4410	
	Friguia	3000	49	1470	
	Kindia Bauxite Office	2500	100	2500	2500
Asia					
India	Bharat Al Co.	400	100	400	400
	India Al. Co.	500	45	230	
	Madras Al. Co.	100	100	100	100
Indonesia	Aneka Tambang	1800	100	1800	1800
Latin & Central America					
Brazil	CBA	500	20	100	
	Mineracao Rio Norte	3400	41	1400	
Guyana	Guymine	5000	100	5000	5000
Jamaica	Jamalcan	2700	7	190	
	Jamalco	1270	6	180	
	Kaiser Bauxite Co.	4200	51	2140	4200
	Reynolds Baux. Co.	3100	51	1580	3100
Europe					
Turkey		600	100	600	600
Yugoslavia		3500	100	3500	3500
Total of above		41870		25670	21500
(of which in developing countries)		(38370)		(22170)	(18000)
Capacity with significant government equity as a share of overall Western World capacity		45.3 %		27.8 %	23.2 %

Source: UNCTAD TD/B/C.1/PSC/19, August 1981

table 3.1 are located in developing countries. Out of total bauxite capacity in the third world (54 million tons) state enterprise accounts for 71 % on the 'significant' ownership basis, 41 % on the equity proportion basis, and 33 % on the majority equity basis.

The importance of state enterprise in the bauxite industry has certainly been growing over time. Two forces have been involved. First, the state-owned sector has been expanded through total or partial government takeovers. Thus, a complete nationalization of bauxite production in Guyana occurred in 1971, while the government takeover of majority shares in Kaiser's and Reynolds' bauxite operations in Jamaica dates back only to the mid-1970's.[1] As late as 1970, the industry was fully privately owned in both countries. The second force explaining the growing importance of state enterprise in bauxite is that several of the countries with state-owned enterprises have had a very fast expansion of the industry. This is particularly true of Guinea whose capacity increased about sixfold from 1972 till 1980, and for Brazil where the Rio Norte project in Trombetas started production as recently as 1979, and is planned to expand capacity from 3.4 million tons in 1980 to 8 million by 1983.

Tables 3.2 and 3.3 list state ownership in the Western World alumina refining and aluminum smelting industries in an analogous manner. In both, the government shares are substantially lower than in bauxite. In contrast to the case of bauxite where state ownership is by and large a developing country phenomenon, one half or more of the state owned capacity in alumina and aluminum is located in industrialized countries.

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1) R. Mikesell, New Patterns of World Mineral Development, British North American Committee, 1979.

Table 3.2 Significant Government Ownership in Western World Alumina Refineries 1980

		Total cap. 000 tons	Gov. equity share %	Gov. cap. 000 tons	Cap. with gov. equity above 50 %, 000 tons
Overall Western World Capacity		30793			
(of which in developing countries)		(6526)			
Capacity with significant government equity:					
Country	Company				
Africa					
Guinea	Friguia	700	49	343	-
Asia					
India	Balco	200	100	200	200
	Indalco	236	45	106	-
	Nalco	50	73	37	50
Latin & Central America					
Brazil	CBA	200	20	40	-
Guyana	Guymine	350	100	350	350
Jamaica	Jamalcan	1100	7	77	-
	Jamalco	550	6	33	-
Europe					
FRG	VAW	600	50	300	-
	VAW	640	100	640	640
Italy	Euroallumina (1)	720	61	439	720
	-"- (2)	200	94	188	200
Turkey	Seydisehir	200	100	200	200
Yugoslavia		1700	100	1700	1700
Total of above		7446		4653	4060
(of which in developing countries)		(3586)		(1376)	(800)
Capacity with significant government equity as a share of overall Western World capacity		24.2 %		15.1 %	13.2 %

Source: UNCTAD TD/B/C.1/PSC/19, August 1981

Table 3.3 Significant Government Ownership in Western World Aluminium Smelters 1980

		Total cap. 000 tons	Gov. equity share %	Gov. cap. 000 tons	Cap. with gov. equity above 50 %, 000 tons
Overall Western World Capacity		14042			
(of which in developing countries)		(2189)			
Capacity with significant government equity:					
Country	Company				
Africa					
Egypt	Egyptalum	100	100	100	100
South Africa	Alusaf	88	66	58	88
Asia					
Bahrain	Alba	125	78	98	125
Dubai	Dubal	135	80	108	135
India	Balco	75	100	75	75
	Indalco	120	45	54	-
	Nalco	25	73	18	25
Iran	Iralco	50	94	47	50
Latin & Central America					
Brazil	CBA	82	20	16	-
Venezuela	Alcasa	120	50	60	-
	Venalum	280	80	224	280
Europe					
Austria	Raushofen	80	100	80	80
FRG	VAW	340	100	340	340
Italy	SAVA	60	50	30	-
	ALSAR	125	100	125	125
	ALUMETAL	100	100	100	100
Norway	ASU	335	100	335	335
	Norsk Hydro	120	75	90	120
	DNN	60	100	60	60
Spain	Endasa	126	58	73	126
	Alugasa	92	26	24	-
	Al Espanol	180	57	103	180
Turkey	Seydisehir	120	100	120	120
Yugoslavia		260	100	260	260
Total of above		3198		2598	2724
(of which in developing countries)		(1320)		(978)	(998)
Capacity with significant government equity as a share of overall Western World capacity		22.8 %		18.5 %	19.4 %

Source: UNCTAD TD/B/C.1/PSC/19, August 1981

The relatively complex technology in alumina refining has permitted the aluminum multinationals to keep a firmer grip over this stage of production as compared to bauxite mining and aluminum smelting.[1] This explains why government ownership is at its lowest at this stage of aluminum production.

In aluminum smelting there is a substantial state ownership in Western Europe. Some of the state involvements in this region, e.g. in the West German VAW, were established in the reconstruction period just after the second world war. In Norway, the government became the owner of the ASU plants in the late 1940's as a result of confiscation of German property. In Italy, on the other hand, state ownership arose only in the early 1970's as a result of industrial reconstruction.[2]

Very substantial locational shifts have occurred in aluminum smelting during the 1970's. The oil price increases have induced this industry to move on a large scale to new locations where cheap energy could be assured for the highly energy intensive installations. Many of the new smelters have been established under government ownership. This is true of the installations in Egypt, South Africa, Bahrain, Dubai, Iran and Turkey, listed in table 3.3. No smelting capacity existed in these countries in 1970. In Venezuela, the large-scale smelting capacity with heavy government participation dates back to 1968 for the first smelter (Alcasa) and to 1978 for the second one (Venalum). Clearly, the state-owned aluminum smelting capacity has experienced a fast growth since the late 1960's.

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1) R.G. Adams, 'Structural Change in the World Aluminum Industry', presentation to the Chase European Aluminum Seminar, Zurich 16 June 1981.

2) Private communication with Arne Axnäs of Gränges Aluminium, Sundsvall, Sweden.

A further boost to state ownership in the bauxite/alumina/aluminum industry occured in 1981, and is not reflected in tables 3.1-3.3. This was the nationalization of Pechiney-Ugine Kuhlman in France, one of the six leading multinational companies in the industry. In 1977, this company owned 4.9 % overall bauxite capacity, 8.6 % of alumina capacity and 6.8 % of aluminum capacity in the Western World. These figures include PUK's proportionate shares of capacity in joint ventures.[1]

Copper

Tables 3.4 through 3.6 provide the state ownership picture at three consecutive stages in Western World copper production. The differences between the alternative measures are much smaller in the case of copper than in aluminum. The state owned sector accounts for roughly one third of copper mining and about one quarter of copper refining,[2] irrespective which of the three measures is used.

In line with conditions in bauxite, but in contrast to the situation in alumina refining and aluminum smelting, state ownership at all stages of copper production is an almost exclusive developing country phenomenon. Finland and Yugoslavia are the only countries outside the developing country group with significant copper production under state ownership. The dominance of developing countries in the state-owned copper sector, in conjunction with the falling importance of the third world at the consecutive stages of copper processing explains the mildly declining share of the industry under government ownership as one moves from mining to smelting and refining.

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1) Mineral Processing in Developing Countries, United Nations, New York 1980, Sales No. E.80.II.B.5.

2) The Yugoslavian copper industry has been classified as state owned, though, strictly speaking, it is owned by its employees.

Table 3.4 Significant Government Ownership in Western World Copper Mining Capacity, end 1981

		Total cap. 000 tons	Gov. equity share %	Gov. cap. 000 tons	Cap. with gov. equity above 50 %, 000 tons
Overall Western World capacity		7824			
(of which in developing countries)		(4118)			
Capacity with significant government equity:					
Country	Company				
Africa					
Botswana	Selibi Pikwe	17	15	3	
Morocco	Various	8	100	8	8
Zaire	Gecamines	662	100	662	662
	Sodimiza	40	15	6	
Zambia	ZCCM	704	60	422	704
Asia					
India	Hindustan Copper	35	100	35	35
Malaysia	Mamut	28	49	14	
Latin America					
Bolivia	Comibol	7	100	7	7
Brazil	Brasiliana de Cobre	30	100	30	30
	Min Sul Vicosa	4	51	2	4
Chile	Codelco	890	100	890	890
	Enami	25	100	25	25
Mexico	Macocosac	11	100	11	11
	Mexicana del Cobre	180	44	79	
	Mina de Cananea	65	52	34	65
Peru	Centromin	34	100	34	34
	Mineroperu	33	100	33	33
Oceania					
Papua New Guinea	Bougainville	165	20	33	
Europe					
Finland	Outokumpu oy	38	81	31	38
Israel	Timna	12	100	12	12
Spain	Apisa	14	100	14	14
Turkey	Black Sea	23	29	7	
	Etibank	19	100	19	19
Yugoslavia	RTB Bor, Kapaonik, RB Bucim	100	100	100	100
Other countries (all developing countries)		26	100	26	26
Total of above		3170		2537	2717
(of which in developing countries)		(3006)		(2380)	(2553)
Capacity with significant government equity as a share of overall Western World capacity		40.5 %		32.4 %	34.7 %

Source: CIPEC

Table 3.5 Significant Government Ownership in Western World Copper Smelting end 1981

		Total cap. 000 tons	Gov. equity share %	Gov. cap. 000 tons	Cap. with gov. equity above 50 %, 000 tons
Overall Western World capacity		8783			
(of which in developing countries)		(3344)			
Capacity with significant government equity:					
Country	Company				
Africa					
Zaire	Gecamines	469	100	469	469
Zambia	ZCCM	816	61	494	816
Asia					
India	Hindustan Copper	48	100	48	48
Latin America					
Chile	Codelco	770	100	770	770
	Enami	190	100	190	190
Mexico	Min. de Cananea	85	26	22	-
	Various	3	100	3	3
Peru	Centromin	58	100	58	58
	Mineroperu	33	100	33	33
Europe					
Finland	Outokumpu oy	60	80.9	49	60
Portugal		7	100	7	7
Turkey	Black Sea	20	100	20	20
	Etibank	20	100	20	20
	- " - Murgul	12	100	12	12
Yugoslavia	RTB Bor	100	100	100	100
Total of above		2691		2295	2606
(of which in developing countries)		(2524)		(2139)	(2439)
Capacity with significant government equity as a share of overall Western World capacity		30.6 %		26.1 %	29.7 %

Source: CIPEC

Table 3.6 Significant Government Ownership in Western World Copper Refineries end 1981

		Total cap. 000 tons	Gov. equity share %	Gov. cap. 000 tons	Cap. with gov. equity above 50 %, 000 tons
Overall Western World capacity		9120			
(of which in developing countries)		(2578)			
Capacity with significant government equity:					
Country	Company				
Africa					
Zaire	Gecamines	151	100	151	151
Zambia	ZCCM	776	61	473	776
Asia					
India	Hindustan Copper	40	100	40	40
Latin America					
Chile	Codelco	620	100	620	620
	Enami	160	100	160	160
Mexico	Colere de Mexico	130	48.3	63	-
	Min de cananea	15	26	4	-
Peru	Centromin	55	100	55	55
	Mineroperu	183	100	183	183
Europe					
Finland	Outokumpu oy	60	80.9	49	60
Yugoslavia	Rudarsko. Bor	175	100	175	175
Total of above		2365		1967	2220
(of which in developing countries)		(2130)		(1743)	(1985)
Capacity with significant government equity as a share of overall Western World capacity		25.9 %		21.6 %	24.3 %

Source: CIPEC

The recency and fast growth of the state owned copper sector is easy to document:

> "At the beginning of the (1960's) copper production in which government held any sort of interest did not amount to more than 100,000 tons per year, or 2.5 per cent of capacity in the so-called 'free world'. By 1970, this total had risen to some 2.25 million tons, or about 43 per cent of capacity. More than a quarter of the world's copper was being produced by mines totally owned by government, 12 per cent by companies in which the State had a majority interest, and 5 per cent by companies in which government had minority interests". 1/

Major features in this change, chronologically arranged, include[2]

(a) the complete nationalization in 1967 of Gecamines in Zaire

(b) the 51 % government takeover in 1969 of the Zambian capacity and of the large mines (Codelco) in Chile

(c) the complete nationalization in 1971 of the large mines (Codelco) in Chile

(d) the nationalization in 1974 of Cerro de Pasco in Peru, subsequently renamed Centromin.

(e) the startup of production in 1977 of Cerro Verde (Mineroperu) a new state owned mine in Peru

(f) the increase in 1979 of the government equity share from 51 % to 60 % in Zambia

(g) the startup of production in 1980 in the La Caridad mine (Mexicana del Cobre) in Mexico, in which the government holds 44 % of total equity.

1/ R. Prain, Copper, the anatomy of an industry, Mining Journal Books Ltd., London, 1975.

2) Based on M. Radetzki, 'Copper Dependent Development', UNCTAD/LDC/11, 12 June 1980; and CIPEC information.

Iron ore

The data on the iron ore industry state ownership that I have been able to find are less detailed than in the case of aluminum and copper. Table 3.7 contains figures on state ownership in the Western World. Only countries with government ownership have been listed. The percentages pertain to the government share of national production in 1981, and do not indicate the government share of equity in individual enterprises. The data therefore do not permit a quantification of production accounted for by units in which governments hold a majority of the equity.

The state-owned proportion accounts for 40 % of the Western World total, if production is apportioned to the governments in accordance with their equity holdings, about the same as in bauxite, but considerably higher than in the case of copper. The state-owned share, measured in the same way, amounts to 62 % when production in developing countries only is considered.

The growth of importance of state owned enterprise in iron ore mining over time is illustrated by table 3.8 reproduced from a recent paper by Vernon and Levy.[1] The focus of this table is on the large and export oriented state owned firms. The Liberian operations have been 50 %-owned by the government since their establishment in the early 1960's. The Latin American and Mauretanian companies listed were transformed into state enterprises through nationalizations in the 1970's. The Brazilian CVRD has strongly expanded its share of world output by more than doubling its capacity in the course of the past decade.

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1) R. Vernon and B. Levy, 'State-owned enterprises in the world economy, the case of iron ore', in L. Jones et al, Public Enterprises in Developing Countries, Oxford University Press 1982.

Table 3.7 Western World Iron Ore Government Ownership 1981

	Production million tons, actual weight	Government ownership, share of national production, %	'Government share' of production, million tons, actual weight
Overall Western World production	543.0		
(of which in developing countries)	(216.9)		
Countries with significant government ownership:			
Africa			
Algeria	3.0	100	3.0
Liberia	18.5	50	9.3
Mauretania	8.0	100	8.0
S. Africa	25.5	90	23.0
Asia			
India	40.0	50	20.0
Latin America			
Brazil	105.2	60	63.1
Chile	8.7	100	8.7
Peru	5.6	100	5.6
Venezuela	14.0	100	14.0
Europe			
France	22.3	85	19.0
Norway	4.1	85	3.5
Austria	3.1	100	3.1
Sweden	22.3	100	22.3
Spain	8.6	40	3.4
Turkey	4.9	100	2.1
Yugoslavia	4.9	100	4.9
Others with state ownership	5.9	75	4.4
(of which in developing countries)	(2.4)	(100)	(2.4)
Sum total of above	301.8		217.4
(of which in developing countries)	(205.4)		(134.1)
Sum total of above as a share of overall Western World production	55.6 %		40.0 %

Source: Malmexport AB, Stockholm

Table 3.8 Principal State-owned Ventures Exporting Iron Ore, actual weight 1978

Country	Name of Establishment	Date Established as State Enterprise	Iron Ore Production, 1978 (in Thousands of Tons)
Brazil	Companhía Vale do Rio Doce (CVRD)	1942	50.574
Sweden	Luossavaara-Kiiru-navaara AB (LKAB)	1907/ 1957 [1/]	23.967
South Africa	South African Iron & Steel Industrial Corporation (ISCOR)	1928	19.796
Liberia	Lamco Joint Venture	1960 [2/]	10.572
	Bong Mining Company	1963 [2/]	7.387
India [3/]	National Mineral Development Corpor-ation (NMDC)	1958	6.909
Venezuela	C.V.G. Ferrominera Orinoco S.A.	1974	12.956
Chile	Compañía de Acero del Pacifico S.A. (C.A.P.)	1971	6.935
Mauritania	Société Nationale Industrielle et Minière (SNIM)	1974	6.336
Peru	Empresa Minera del Peru	1975	4.854

1/ The Swedish government held 50 percent of the company's shares back in 1907; in 1957 the government took over the company entirely.

2/ The Liberian government has not attempted to exercise any control over these projects, which are effectively controlled by foreign partners.

3/ Along with the export operations listed here, iron ore mines captive to state-owned steel companies mine about 12 million tons of ore annually.

Sources: Vernon and Levy, op.cit.

Tin

Even though I have been unable to obtain detailed data on public ownership in the tin producing enterprises, it is clear that state participation in this industry is important and growing. Table 3.9 reveals that four countries since long dominate world production of tin concentrates. These countries' share of Western World output was 81.0 % in 1950 and 77.6 % in 1980.

Table 3.9 Production of Tin Concentrates.

Thousand tons of tin metal.

	1950	1980
Malaysia	58.5	61.4
Thailand	10.5	33.7
Indonesia	32.6	32.5
Bolivia	31.7	27.5
Total, 4 countries	133.3	155.1
Total Western World	164.5	199.8

Source: Metallgesellschaft.

In the former year virtually all production capacity in three of the four countries was in private hands. The exception was Indonesia where the Dutch colonial government was a majority owner of the tin industry. Important structural changes have occurred since that time. First, there was the 1952 nationalization of the three major tin mining groups in Bolivia. Comibol, the state tin company has since then accounted for between two thirds and three quarters of this country's output.[1] In Indonesia, the entire industry was nationalized in the 1950s, and even though some private

1) J. Thoburn, 'Policies for Tin Exporters', Resources Policy June 1981; and J. Thoburn, Multinationals, Mining and Development, A Study of the Tin Industry, Gower Publishing Co., 1981.

enterprises have reemerged in the 1970s, the state tin corporation, P.T. Timah, accounted for 80 % of the national tin output in 1980.[1] In Malaysia the government has taken far-reaching steps in the course of the 1970s to acquire important equity positions in the nation's tin enterprises. According to Thoburn, the Malaysia Mining Corporation, in which the government has a 71 % ownership position, controls over 25 % of the country's tin output.[2] Thoburn also notes that the governments of Nigeria and Zaire have recently acquired large equity stakes in the formerly foreign owned tin mines.[3] These two countries' share of Western World output in 1980 amounted to about 3 %.

The above figures suggest that state ownership in Western World tin industry increased from close to nil in 1950 to at least 30 % in 1980.

Other minerals

In terms of value, the four minerals treated above represent two thirds or more of the value of all metal minerals in the world economy. Though there is no scope for making the present survey exhaustive, a few indications will be given about the conditions in some additional metal mineral industries.

Cobalt presents an interesting case with a very high share of output accounted for by state owned firms. Western World production in 1978 amounted to 21,800 tons.[4] The four countries

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1) See chapter 5.

2) J. Thorburn, Multinationals, Mining and Development..., 1981, op. cit.

3) J. Thoburn, Policies for Tin Exporters, Resources Policy, June 1981.

4) US Bureau of Mines, Mineral Facts and Problems 1980 edition.

listed in table 3.10, all with majority owned state companies producing the metal, accounted for 80 % of the total. The state owned share was as high as 66 % even when only the firms that are 100 % state owned are included. The exceptionally high state share follows from the unique position of Zaire which accounts for

Table 3.10 Government Ownership in Cobalt Production in Some Countries

	1978 output thousand tons	Government equity percent share
Zaire	13300	100
Zambia	1730	51 (increased to 60 % in 1979)
Finland	1300	81
Morocco	1130	100

Sources: US Bureau of Mines, Mineral Industries of Africa, 1976.
US Bureau of Mines, Mineral Facts and Problems, 1980 edition.
Outokumpu Annual Report, 1981.

more than half of Western World output, all through a single company, Gecamines, that was fully nationalized in 1967.

In lead and zinc state enterprise has been assessed to account for 20-25 % of overall equity.[1] This relatively low state involvement is partly explained by the fact that a very large share of Western World capacity is located in industrialized countries. State ownership is also quite limited in nickel, where about 85 % of Western World output is accounted for by private enterprise. No nationalization has occurred in this industry after the one in Cuba in 1960. About half of the third world's nickel output comes from the French territory New Caledonia, where there is some French

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1) S. Harris, 'The Commodities Problem and the International Economic Order: What Rules of What Game?', in M.P. Oppenheimer, editor, Issues in International Economics, Oriel, London 1980.

government participation. A government enterprise in Indonesia, Aneka Tambang, accounts for about 5 % of total Western World output.[1] Also, governments have taken some equity in a few smaller ventures in developing countries that went into production in the late 1970's. In chromium and molybdenum, likewise, publicly owned production units play a limited role, with private enterprise accounting for about three quarters of overall production in the Western World.[2]

The results summarized

Though highly incomplete and somewhat ambiguous, the data contained in this section clearly point to at least three general conclusions. First, state equity ownership is very substantial in the Western World mineral industries. Second, it appears that state ownership is most prevalent in the developing countries. In several minerals, state enterprises constitute the dominant component of third world capacity. And third, the data show that state ownership has been fast expanding over the past decades. It has grown from relative insignificance in the early 1950's to the important position it holds 30 years later primarily through a combination of nationalizations of existing privately owned firms and substantial government participation in joint ventures with mining multinations in the development of new capacity.

1) R. Mikesell, New Patterns of World Mineral Development, British North American Committee, 1979.

2) Ibid.

CHAPTER 4. STATE ENTERPRISE IN THE MINERAL SECTOR: DISTINGUISHING BEHAVIORAL CHARACTERISTICS AND HYPOTHESES ON MARKET IMPACT

Structure of chapter

The purpose of the present chapter is similar to that of chapter 2, i.e. to delineate the characteristic features of state enterprise. But while chapter 2 dealt with the state enterprise phenomenon in general, the themes to be pursued presently are pinpointed specifically at the state enterprises in the mineral sectors of developing countries.

The chapter proceeds as follows. I start out by briefly discussing the motivations for the establishment of state mineral enterprises. The subsequent section analyzes the behavioral patterns of such enterprises. To provide a reference point, it begins by clarifying some of the key behavioral features of private multinational mining companies. The mature state mineral firms and the new and inexperienced ones are then treated in turn. The results and conclusions of this discussion are used as an input in the last section where some hypotheses on the market impact of the emergence and growth of state ownership in the mineral industry are formulated.

Motivations for establishing state mineral enterprise

Several but not all of the motivations for setting up state enterprisesin market economies, analyzed in chapter 2, are applicable to the emergence of state ownership in the mineral sector in developing countries. These will be presently discussed. It needs repeating that the establishment of state-owned enterprises does not necessarily represent the first-best solution to the problems which initially motivated public action. It must also be underlined that even where the problems

experienced can in principle be tackled with the help of state-owned enterprises, there is no guarantee that public ownership will in pratice lead to the desired solutions.

The size and importance of the mineral sector to the national economy in many cases constituted the major motivation to the wave of nationalizations of mineral enterprises in developing countries in the 1955-1975 period. Frequently, not only the mineral sector, but also the leading enterprises of which it was composed were so large in relation to GNP that foreign ownership and control appeared politically intolerable to the recently established independent governments. Nationalization became a key manifestation of their increasing economic emancipation.

In principle, nationalization could have involved the transfer of foreign ownership into either private or public national hands. In practice, the shift almost invariably involved the setting up of public enterprise to run the nationalized mineral industry. Two factors explain the preference for the public solution. First, at the time of nationalization, the private sector in developing countries regularly lacked the entrepreneurial tradition and experience required to take on the complex tasks of managing the mineral ventures. State ownership was seen to provide better prospects for limiting the technical inefficiencies after takeover. The second factor has to do with political ideologies. Socialist leanings have been quite common among developing country governments during the period. The political goals frequently encompassed the creation of a strong public sector. Public ownership of the nationalized mineral industries, therefore, fitted well into the prevalent political philosophy.

The desire to pursue socio-political goals with the mineral enterprises as instruments has constituted another motivation for state ownership. Nationalization has often been justified by the insensitivity of the private owners to a variety of social needs. Public ownership has been seen as a necessary prerequisite for the pursuit of policies to enhance employment, reduce income inequalities and promote the development of backward regions, because such objectives, though considered of high social benefit, did not enhance the mineral enterprises' profits as traditionally measured. This motivation has been quite important even where the mineral sector has been small in relation to the national economy. For although the national impact of the mineral firms' policies would be limited in such cases, the typical geographical concentration of the mineral ventures makes their policies overwhelmingly important at the regional level.

Uncompetitive market conditions have provided a further motivation for state ownership in developing countries' mineral sectors. Two distinctly different cases of absent competitiveness have been common. The first one pertains to the monopsony power of the firm(s) as buyer of inputs in the domestic market. The importance of the mineral sector in the overall economy and its highly specialized needs have often made it a dominant and sometimes sole buyer of many domestic supplies. The argument applies not only to physical inputs but also to the specialized labor used by the mineral firms. Transfer of ownership into public hands has then been seen as a measure to overcome the depressed input prices that result from the buyers' market power, or alternatively to let the government benefit from the monopsony profits.

The second case is less general and pertains to the absence of competitiveness on the selling side. In the longer run it does not apply to the unintegrated mineral producer who faces a fierce rivalry from other producers of the same commodity in the world market, and from substitute products. In contrast, the output and pricing decisions for mines in developing countries belonging to vertically integrated multinational resource companies are internal to the firms and may run counter to the interests of the nation. Such circumstances provide a rationale for putting the units in the developing countries under public national ownership.

A final motivation for state ownership is that sizable mineral rents frequently arise from mineral exploitation. In principle, the rents could be taxed away from the private owners. In practice such rent appropriation is often difficult and the private owners may use the rent that accrues to them for purposes contrary to the government wishes. State ownership is then seen as a means to assure the government of full control over the use of rent proceeds.

The above discussion has been primarily concerned with the motivations for state takeover of existing foreign-owned mineral enterprises in developing countries. But the same arguments apply in equal measure as motivations for public ownership, exclusively or partially through joint ventures, in the new projects that have been launched since the mid-1960's.

The behavioral patterns of state mineral enterprises in developing countries

The purpose of this section is to identify the major behavioral features that distinguish state-owned mineral enterprises in developing countries from the private mining multinationals. Systematic empirical

evidence on state-owned mineral enterprise is scarce. One of the major purposes of the present book is to provide some such evidence. This is done in the following chapters which contain portraits of three public mineral corporations domiciled in the third world. In anticipation of this material, the present section summarizes my insights and conclusions on the issue at hand, gained both from studying existing literature on the subject, and from close observation over a number of years of the operations of the mineral industry in practice.

To obtain a point of departure for the analysis of the publicly owned units, I start out by briefly describing the key characteristics and operational modes of the private mining multinationals. I then continue by analyzing the behavioral patterns of the mature state mining corporations and of the recently established inexperienced ones, respectively.

Like in chapter 2, the approach adopted in this section is to delineate the archetype of the private and state-owned enterprises respectively, thereby providing a maximum contrast between them. Empirical observation is likely to show that such extremes are uncommon and that numerous mineral enterprises combine traits from both archetypes.

The private multinational mineral firm

The overriding objective of the private multinational mineral firm is long run profit maximization subject to avoidance of excessive risks. This objective is tolerably clear-cut, and can be interpreted in operational terms without undue difficulty.

The lines of command and the relationships between management and owners in the multinational mining corporations are commonly reasonably straightforward. The management is hired to ensure that

the firm's objectives are attained. Remuneration of managerial personnel and its security of tenure is related to profit performance. This assures a downward pressure on costs. The firm typically has acquired considerable experience in mining and mineral processing long before it developed into a multinational. Its personnel cadres include the expertise required for the efficient development of mines, running of mineral production operations and world-wide marketing of the output. For these reasons, inefficiencies internal to the firm would usually be limited, and most of the feasible mineral rent would emerge as before-tax profit. However, the multinational nature of the enterprise offers considerable scope for a geographical separation between the profits and the activity from which they are derived.

The objective of profit maximization implies capacity utilization up to the level where marginal cost equals price. Capacity utilization will be high during booms when prices are elevated, but will be reduced during recession in consequence of falling prices. The higher the proportion of variable cost, the greater will be the optimal output reduction in response to a fall in price.[1] Quite frequently, the structure of the mineral industry is oligopolistic, and there is some tacit understanding among major producers that all will benefit from production cuts during recessions. In such cases, the multinational mining firm would adjust output even further downward, to the level where marginal cost equals a notional marginal revenue derived on the assumption that its major rivals adjust output in a coordinated way.

Curtailed capacity utilization involves a proportional reduction in all variable costs, except where the recession is deemed to be temporary, and the startup costs of certain functions are so high

1) F. M. Scherer, Industrial Market Structure and Economic Performance, Rand McNally 1980, pp. 205-209.

that it is more economical to keep them operational throughout the recession. For instance, unskilled workers will be more readily dismissed, but skilled personnel may be maintained in view of the spending on their training, and the risk that they may not return once they have been fired.

The flexibility of the multinational firm to adjust capacity utilization in response to variations in demand may be reduced by government legislation that restricts the freedom to lay off workers or by selective government subsidies provided to keep the capacity fully operational. Such government measures will be most common where the mineral activity weighs heavily in the region of its location.

The firm's investments are constrained by its financial capacity. A heavy investment program will strain the financial resources, increase the debt-equity ratio, and raise the cost of obtaining additional debt financing. Apart from this rise in the cost of finance, there will be a reluctance internal to the firm, to allow the debt-equity ratio to increase above some threshold level because of the mounting risk of financial failure involved in high debt-gearing.

Potential mineral investment ventures with expected after-tax discounted cash flow (DCF) rates of return on equity above some "normal" return on capital in industrialized countries, will be ranked according to their respective return levels. Priority will be given to the ones with the highest after-tax return, with some side-conditions to satisfy the avoidance-of-risk criterion. For instance, in calculating the rate of return for individual ventures, the company may adjust downwards the anticipated revenue from projects in developing countries, to account for the political risk of nationalization, of a sudden and drastic change in the fiscal regime or of other political measures

that reduce its production and supply capability. To reduce the detrimental implications to itself of such political risk, the firm will favor a wide geographical spread of its investments in developing countries. In a ranking of potential ventures, the downward adjustment of anticipated revenues is likely to be especially large for those located in developing countries where taxes are high, political conditions are deemed unstable, and where the company already has substantial investment involvements. Similarly, the company would tend to make an upward adjustment in the anticipated revenues from projects that increase the extent of its vertical integration. This is because such integration is seen to involve the benefit of securing downstream markets, and hence of reducing the commercial risk of marketing. This may explain the prevalence of vertical integration in multinational mining firms.

In oligopolistic international mineral markets, the multinational firm will as a rule also be constrained in its investment programs by a tacit understanding that its competitors are similarly constrained in a joint effort to restrict long-run supply to a level at which prices cover costs and provide an adequate return on equity to the marginal venture. This, of course, does not preclude aggressive behavior by individual firms in the process of expanding their market shares.

Even where such tacit understanding is absent, the expansion of the industry as a whole will be constrained by the financial institutions concerned about problems of debt repayment in a situation of oversupply and low price.

The mature state mineral firm

This sub-section discusses the seasoned state mineral firm that has been in business for a long period of time and that does not suffer from inefficiency due to inexperience. Examples of mature state-owned mineral corporations include CVRD in Brazil, Codelco in Chile and PT Timah in Indonesia. The newly set up state companies with limited experience in the mineral business are discussed in the following sub-section.

Like the private multinational, the experienced state owned corporation would have built up an in-house availability of technological and managerial competence for the operation of existing mineral projects and for the development of new ones. The availability of such competence, however, does not assure a degree of efficiency within the firm, equal to that found in private enterprises. On the contrary, features considered typical of state mineral firms, like the blurred goal structure, the security of tenure of managerial personnel and the unclear relationship between the owners and the management are often claimed to result in a lower performance efficiency as compared to that accomplished by the private multinational mining corporations. Why this may be so, is explored in the following paragraphs.

Starting out from the reasonable assumption that economic and social progress is the overriding goal of the national government, one could envisage one of two alternative ways in which it utilized the control over the mineral firms under its ownership. One approach would be to require the firms simply to maximize their profits. The government could then spend the revenues from the mineral sectors to accomplish its social benefit goal in ways it thought most fit. An alternative approach would be to require the mineral firms to deviate from the simple profit maximization objective in order to make a greater

direct contribution to economic and social progress. The rationality of the latter approach is impingent upon the suitability and efficiency of the mineral firms as instruments to pursue the broader objectives.

In practice, the governments in developing countries almost invariably choose the latter approach. Judging from official statements, the state-owned mineral firms are required to pursue the profit objective, but simultaneously also to give special consideration to the direct and indirect contribution from their operations to the nation's foreign exchange income, to national value added, to employment and skill creation, to technological proficiency and to general industrialization in the national economy.

A casual observer might get the impression that the objective of the state mining firms is an inconsistent pursuit of maximization of these goals all at the same time. On further reflection it is clear that a multi-goal set of this kind can at least ideally be fully consistent with the single objective of maximizing the social rate of return on the nation's capital outlays for the mineral activity. Thus, maximization of the profit of the firm may be taken as a first approximation of the social benefit objective. But since the shadow price of foreign exchange is commonly higher and the shadow wage for labor lower than the rates charged in the market, the pursuit of national social benefit will require that greater importance should be attached to the earnings of foreign currency and to employment than when the goal pursued is simple profit maximization. The concern about creation of skills and technological proficiency even beyond what can be motivated by profit maximization is warranted by the positive externalities of these factors. And the insistence on local inputs or domestic processing even when privately unprofitable, may be a rational approach in the

dynamic pursuit of social benefit, since it will speed up the establishment of a broad and diversified industrial base in the nation. In principle, all the above considerations could be caught in a dynamic programming model that would specify the operational modes needed for maximizing the social rate of return from the company's operations. In practice, the more pedestrian approach where several goals are simultaneously pursued, and where the tradeoffs between them are not specified in detail, is typically adopted.

The rational pursuit of social benefit maximization as described here, would imply that the state company forgoes some private profit opportunities in order to attain a higher social rate of return from the nation's capital outlay on minerals. Hence, it would be wrong to judge the company's performance solely on the basis of the private profit criterion.

The above obviously is an idealized picture. A number of problems and complications will cause reality to differ from this ideal, and will reduce the efficiency of the state-owned mineral firm, both in terms of social benefit and of private profitability. First, the government can choose between a number of policy measures for inducing or forcing the state-owned mineral enterprise to behave socially, and some of them will be less efficient than others in attaining the desired objectives. Commonly used general controls, e.g. a prohibition to sack workers, or a quantitative allocation of foreign exchange would typically involve a loss in efficiency because the inflexibility of these controls would prevent the company from adjusting to the socially optimal position. Taxes and subsidies affecting the costs and prices of the company would be superior in this respect.

A second problem will be experienced when government policies are not purposeful for the pursuit of national social benefit, and hence provide faulty signals to the state-owned mineral firms. Examples involve provision of inputs, e.g. capital or energy to publicly owned units at rates that are far below their social opportunity cost.[1] The interesting, almost philosophical question then arises whether the state-owned companies should disregard the signals resulting from misdirected public policies, and work instead towards what they perceive as the "true" social goals.

A third problem is due to the fact that the social benefits resulting from the state-owned companies' activities, are exceedingly difficult to quantify. This too has important efficiency implications.

Thus, the very complex goal of social benefit maximization lends itself to differing interpretations. The ensuing unclarity of company goals makes it generally difficult to judge managerial performance. Efficiency of management is also affected by the policies of recruitment and dismissal. Recruitment is often restricted to the national market. International managerial talent would then typically be unavailable to the state-owned mineral firm. Security of tenure for managerial personnel is commonly greater than in private enterprise. This would tend to attract the less enterprising, more security-conscious managers. Since dismissal of managers is less common, the state-owned firm would experience greater difficulty in getting rid of inefficient or unsuitable staff. Survival of the firm is more assured, because the government regularly assumes the role of savior of last resort in cases of threatened bankruptcy. These factors in combination seriously reduce the pressure on management to minimize costs.

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1) For instructive examples see M. Gillis, "Allocative and X-Efficiency in State-owned Mining Enterprises", Harvard Institute for International Development, April 1979.

Similar effects follow from the diffused ownership structure commonly found in state-owned mineral enterprises. Different ownership interests, e.g. individual ministers, provincial governors etc., often can impose their will on the enterprise and deflect its preoccupation from national social benefit proper.

The inefficiencies discussed here can take a variety of forms. Both the management and the owners can get away with policies aimed at increasing their own private benefit by alluding that such policies are in fact needed to maximize the state firm's contribution to social welfare. Leisure facilities for all employees, but in practice used predominantly by the top management belong to this category. The excessive use of the company for regional development promotion can be presented as having a valuable social objective, while the major purpose of the actions may be to create a political power base for local party bosses. Unnecessarily large labor force or capital installations can add to the managerial ease, but the multiplicity of goals would make it difficult to pin down what the socially optimal levels should be. Inefficiencies of this kind are likely to be most frequently found in projects with particularly large mineral rent potential, whose profitability will be deemed acceptable even after management and owner interests have taken their due.

The discussion so far can be summarized in two points. First, because of the lesser pressure on management, and of the blurred principal-agent relationship, inefficiencies and organizational slack would be common in state-owned mineral enterprises, irrespective whether performance is measured in terms of private profits or of a broad set of social objectives. Second, on account of their broader goals, one would expect the private profitability of state mining firms to be lower

than that of similar operations carried on by private multinationals, even in the absence of the above inefficiencies.

Inefficiencies apart, one important market consequence of the broader goals for the operating modes of state-owned mineral firms is a lesser degree of flexibility in terms of capacity utilization. Some costs that are clearly variable to the firm in isolation, will prove to be by and large fixed when social benefit rather than private profit is the objective. This may for instance be true of the cost of labor where alternative jobs are not available. With a lower share of costs in the variable category, the state-owned enterprise will be less amenable to reducing its capacity utilization when prices fall, since the remaining variable costs will be covered even at very low prices. Where the shadow rate of foreign exchange lies above the private rate, the social revenue from export sales will be higher than the private revenue, and for this reason the state-owned firm may find it rational to continue full capacity operations where the private multinational would not. In the common case where the state-owned mineral firm is a dominant foreign exchange earner, a decline in demand and price will tend to raise the differential between the shadow and official rate of exchange, reducing the price at which capacity reductions become socially warranted even further. The implicit or explicit consideration of externalities, irrespective whether government imposed or due to managerial decision, will thus tend to make state-owned mineral firms less willing to reduce capacity utilization in consequence of declining demand and price.

Apart from the dissimilarity in deriving the marginal revenue and marginal cost schedules under private and social evaluation respectively, there is no reason to postulate any difference in the behavior between the experienced state-owned firm on the one hand, and a private multi-

national corporation on the other, when it comes to adjustment of operations to the oligopolistic conditions in the world market where the output is sold. Like the private corporations, the state-owned one will appreciate the downward-sloping demand for its output, resulting from interdependence and from the ensuing tacit collusion among suppliers in the world market. In this circumstance, and abstracting from ideological inhibitions, its goals will require that marginal cost be equated with marginal revenue when determining the volume of output, even though the marginal schedules of the state-owned firm are derived on the basis of social rather than private criteria.

Turning from operations of existing installations to capacity expansion, it should first be noted that the broader goals and the inefficiencies discussed above apply equally to the choice and execution of investment projects. However, there are two further issues that require additional exploration. First, are there important ways in which state ownership affects project selection, and hence the long run structure of the industry worldwide? And second, does state ownership result in more or less capacity expansion than private ownership?

Potential mineral investment projects in developing countries will be differently evaluated and ranked in the investment programs of private multinational firms and state mineral enterprises respectively. The former, as already noted, will be guided by the after tax DCF rate of return on equity, subject to a reduction in anticipated revenues to account for political risk, and with a cutoff rate reflecting some notional "normal" return on capital in the industrialized countries where they are domiciled.

In contrast, where the mineral industry is run by the state, ranking of potential projects would in principle be based on their expected social DCF rate of return, with the entire (social) revenue

before tax considered as a benefit, i.e. with no downward adjustment for tax or political risk, and with the cutoff rate reflecting national capital scarcity.[1]

Consideration of the social instead of private rate of return is unlikely to make an important difference in practice. It will slightly improve the ranking of projects that are more labor intensive, that can be implemented with a larger proportion of domestic inputs and that have smaller negative environmental consequences than the average of projects under scrutiny.

Consideration of the entire revenue without deduction for tax purposes or to account for political risk, is likely to increase substantially the rate of return, and will therefore augment the number of projects with expected rates of return above any given cutoff rate. The increase of the rate of return would be especially strong in the case of projects with high potential profitability where, as is common, the fiscal levies are imposed on profits; and in the case of countries where private multinationals experience a high degree of political risk.

The cutoff rate of potential return applied by state mineral corporations should in principle be higher than that of the multinationals, to account for the capital scarcity of developing countries. In practice, the state enterprise may be justified in applying a rate similar to that used by the multinationals (for instance the going international rate of interest) because investment finance tied to mineral projects is ordinarily obtained in the international market at such rates.

Like in the case of the private multinational firm, the state-owned mineral company's investment program will be constrained by its

1) Raymond Mikesell has suggested that this may be the approach used by state-owned mineral firms. See his The World Copper Industry, Johns Hopkins 1979.

capacity to obtain finance. Hence, not all potential projects with rates of return above the cut-off will be developed. The resources of national financial institutions are usually quite small as compared to the needs in modern, large-scale mineral projects.[1] The governments of developing countries are commonly unable or unwilling to make sufficient reallocations in their budgets so as to meet the state company's investment needs. Hence, state-owned firms, like the private ones, have to make heavy recourse to financial sources in the international market, to procure a large proportion of the required investment funds. Even though a state mineral company may find it easier to incur heavy indebtedness where its owner, the national government, is considered credit-worthy, and is prepared to guarantee the loans, on the whole, the limitations and constraints on the availability of investment finance would tend to affect the private multinational and the state mining company quite similarly. This statement is based on the realistic presumption that foreign lending is not exposed to the political risk of non-repayment akin to nationalization of foreign direct investments. When the commercial risks look alike, therefore, the lender would be, by and large, indifferent between the private multinational and the experienced state mineral enterprise. The observation that state enterprise in general has a superior access to finance, appears to have limited validity in a comparison of state firms and private multinationals operating in the minerals field in developing countries.

The investment behavior of the mature state mining firm operating in an oligopolistic world market, like that of a private multinational, is likely to be constrained by a tacit understanding among suppliers that price will become unremunerative if production capacity is expanded

1) See M. Radetzki and S. Zorn, Financing Mining Projects in Developing Countries, Mining Journal Books Ltd, London 1979.

in an uncoordinated manner. State-owned firms, like private multinationals, may of course have periods of aggressive behavior, during which they expand their capacity and market share without much consideration for the global consequences to the industry, provided they are able to find the required finance.

While oligopolistic coordination is probable, the national character of the state-owned firms in developing countries would create some inhibitions against direct foreign investments in a large way. Hence, both horizontal and vertical integration on an international scale would be less common than under a private regime.

The tentative conclusion that follows from this analysis of investment behavior is that the proliferation of state mineral firms in developing countries will change the structure of mineral investment patterns. Relatively more investments will be allocated to the mineral rich developing countries which were out of favor with the multinationals on account of their severe fiscal regimes or perceived 'political instability'. This will reduce the globally uneconomical bias against mineral activities in certain developing countries with favorable geological potential, that would have followed from a continued dominance of the private multinationals in global mineral activities.

While the arguments suggest that investments will rise in certain countries in consequence of the proliferation of state enterprise, there is much less reason to believe that the global level of investments will increase. Given the interdependence typical of mineral industries, expanded investments in certain developing countries will tend to induce corresponding reductions elsewhere, unless investors in the marginal projects are prepared to accept a lower rate of return on their engagements. Furthermore, the financiers would be reluctant to extend loans for expanded global investment programs that would reduce mineral prices and hence the ability of the new projects to service their loans.

The new and inexperienced state mineral firm

Data presented in chapter 3 have shown that state enterprise on a wide scale in developing countries' mineral industries is a relatively recent phenomenon. Most of the existing governmental ownership positions were built up only since the late 1950's. One can distinguish between two types or generations of state-owned mineral firms in developing countries. The first, and until the early 1980's by far the most important one, was set up on response to the needs to manage existing mineral ventures at the time of nationalization. The transfer of managerial responsibilities from the private multinationals to such firms has had profound implications for the industry. The following discussion deals almost exclusively with this type of state-owned firm. For completeness the second generation which emerged mainly in the 1970's in developing countries with little previous mineral experience, will be mentioned briefly at the end of the section.

The rationale for devoting ample space to the analysis of the inexperienced state-owned mineral firms follows from the extended period of between 10 and 20 years that it takes for such firms to transform into mature corporations, and from their peculiar behavioral features during this interim period. Given the recency of their establishment, there are as yet relatively few state-owned firms that have attained the stage of maturity. Through the 1960's and 1970's a majority of all public mineral enterprises in developing countries have belonged to the inexperienced category.

In the ensuing paragraphs I discuss the ways in which the behavior of new and inexperienced state mineral enterprises deviates from that of the mature ones. It is hypothesized throughout that the new state mineral firm behaves like the experienced one in other respects than

those discussed below. It is also hypothesized that the deviations from the behavior of the mature state-owned corporations will be reduced over time as the new firm gains experience and builds up its own assets of managerial and technical competence.

As noted, the first-generation state mineral enterprises were set up to manage existing nationalized operations. The firms usually had a difficult start. The former owners in many cases felt dissatisfied with the compensation they were offered, and were reluctant in providing the managerial assistance and technology needed by the new national entities. The state firms were therefore typically required to take on wide-ranging responsibilities long before they had had time to acquire the necessary expertise for the tasks at hand. A succinct way of describing the transition period during which these enterprises are being transformed into mature and experienced state mineral corporations is that it is characterized by substantial and drawn-out setting-up costs.

There are great differences in the degree of complexity between the activities to which mineral corporations normally attend. The greater the complexity of the task, the longer will be the time required to establish the expertise to handle it efficiently. Observations of the real world suggest that it is usually takes less time to acquire the skills needed for commercial than for technical operations. On the technical side, it is easier to handle simple open-pit operations than the more complex underground ones. Management of investments to develop new projects, especially on a large scale, seems to be the most difficult task of all. Very few state mineral enterprises in developing countries have yet acquired the competence to carry out such tasks efficiently.

When the newly set up and inexperienced state-owned firm is

suddenly put into a position of overall responsibility, the result is almost invariably a more or less severe disruption of operations. The resulting inefficiency must be distinguished from the organizational slack in the mature state-owned firms, as discussed in the preceding sub-section. The latter arises from the fact that management or some owner interests deflect the firm's operations towards other goals than the ones against which efficiency is measured. The present problem follows from the fact that the appropriable results of the firm, i.e. the residual after normal payment for factor inputs, is reduced by lacking managerial competence. Hence, less satisfaction can be accomplished, irrespective whether the results are used to promote private profit, social benefit, managerial convenience or the vested interests of some influential group.

In the period immediately after takeover, disruption will tend to affect all key aspects of the state mineral firm's operations. Thus, commercial relations with customers and competitors are frequently upset. This may be especially severe where the state takeover ruptures a chain of vertical integration thereby depriving the nationalized unit of its captive markets. The inexperienced management is often unable to maintain production at full capacity levels. Input requirements per unit of output tend to increase. Capacity expansion comes to a standstill.

However, with time the new management gains experience, order is gradually restored and the inefficiency losses reduced. Commercial operations are regularly the first to be normalized, though often along different patterns than before nationalization. Arms-length relations are developed in place of the former transactions internal to the firm in cases where the nationalized units formed part of vertically

integrated private multinationals. Full capacity utilization is eventually restored. The excessive cost levels are reduced. Production capacity remains stagnant for an especially extended period of time. The duration and gravity of the disruption will be related to the economic development of the country. It will be most severe in the least developed countries where the foreign owned mineral activity had been carried on within an enclave with limited spillovers on the rest of the economy.

The initial disruption of commercial relations with competitors commonly includes a disregard for the oligopolistic collaboration which may have restrained global output and capacity expansion. However, this disregard is usually of no practical consequence. The initial inefficiences of the state firm commonly impose a more binding constraint on its capacity utilization and capacity expansion than would any tacit or overt collaboration with members of a world oligopoly. By the time the new state firm becomes a mature and experienced corporation, it is likely to have overcome its inhibitions or inability to participate in any oligopolistic coordination that may exist in the international market.

Several factors explain why the state-owned firm would not venture into the development of new mineral projects during its early life.[1] First, its inexperience during that period would lead to a substantial increase in investment costs which could turn even very rich mineral deposits into privately and socially unprofitable operations. Second, the international credit institutions that provide finance for mineral investment would be reluctant to extend loans out of fear that the inexperienced state mineral company might fail in completing the development task successfully. And third, all the resources of the company are likely to be so absorbed in mastering the operational intricacies of the

1) The Iranian government's decision to manage the development of the Sar Cheshmeh copper mine without any direct multinational involvement is an exception. The effort ran quite successfully until the fall of the Shah, at which time further work to complete the project was arrested.

nationalized units, that for a long time there will be little willingness to undertake new and demanding tasks of which the management has no prior experience. For these reasons, the firm would typically defer capacity expansion until after it had acquired enough experience for smooth and efficient running of the nationalized operations. Only at that time would it ordinarily feel in a position to take on the complex task of investing in new projects.

One common way to reduce the inefficiency losses after nationalization has been to hire a management team either from the former owners, if they were forthcoming in this respect, or from another multinational mining firm. From the government's point of view there are several drawbacks with a management contract arrangement. First, there is an element of monopoly in the supply of managerial services. Compensation of the management team therefore regularly absorbs part of the mineral rent. Second, even though in principle the ultimate control remains with the government, so long as there is no technically competent counter-weight in the nation, there is a serious risk that an experienced management team hired from a multinational company will take advantage of the situation by attaching less importance to the social benefit goals of the government, and by looking after its own interests instead. Some of the advantages of nationalization are lost as a result. And third, if foreign management is employed in a comprehensive way, the state mineral company's activities will be reduced to a holding operation. By reducing the exposure of nationals to the mineral business proper, this has sometimes slowed down the process of building up national competence in the mineral field. The above explains the governments' ambivalent attitudes to management contract arrangements. Management teams have frequently been hired to prevent a collapse in existing operations, but the governments have been very restrictive with regard to coverage and duration of the hired teams' responsibilities, except as instructors and trainers of a national management cadre.

The tentative conclusions to be derived from the above can be summarized as follows. The establishment of state enterprise to manage nationalized mineral ventures typically involves a substantial setting-up cost extended over a long period of time. This cost is likely to be most pronounced in the least developed countries. It will be expressed through disruptions leading to breaks in commercial relations with customers and competitors, reduced production levels, increased input requirements per unit of output, and an inability to expand production capacity. As the state-owned company gains experience, conditions will gradually normalize, and the cost will be reduced. The inability to expand capacity will usually take longest to overcome. Management contract arrangements can help to reduce the initial disruption after nationalization, but they may also slow down the process of building up national competence, and so defer the time when the state-owned company reaches maturity.

The emergence of the second generation of state mineral enterprises took place predominantly in the 1970's and in very different and much more relaxed circumstances. The role that these enterprises have played so far in influencing behavior and modes of operation in the mineral industry, has been very limited.

The establishment of the second generation type of firms did not involve a transfer of responsibilities for running existing operations, since none existed when the firms were created. Instead, the firms have been set up as a result of decisions to develop virgin mineral deposits into large-scale mining operations. The form under which they have usually been established is a joint venture with one or several multinational mining companies, in which the government holds a

significant or majority share of the equity, but where the entire management function is entrusted to one of the private partners. Examples include the Companie des Bauxites de Guinee in Guinea with a government equity of 49% which became operational in 1973,[1] and the uranium mining companies Somair and Cominak in Niger, operating since 1971 and 1978 respectively, and in which the government holds 33% and 31% of the equity.[2]

The governmental influence over this type of companies has been limited, and their behavior has not deviated significantly from that of ordinary private enterprises. With time, however, as the government administrations gain experience of how mineral enterprises are run, they can be expected to use it for influencing an increasing number of functions, and for gradually changing the goals and operating modes of the mineral activity towards the patterns typical of the experienced state-owned mineral firm. The shift would typically be gradual and smooth. Thus, the emancipation of this second generation of state mineral firms in developing countries is likely to cause far less disruption in marketing, production and investment activity, and hence involve a much smaller setting-up cost than in the case of the first-generation state-owned mineral companies.

Hypotheses on market impact from state enterprise proliferation

The hypotheses that will now be formulated are all founded on the conclusions about state enterprise behavior, derived from the analysis in the preceding section. Each of the hypotheses states the

1) M. Radetzki and S. Zorn, Financing Mining Projects in Developing Countries, Mining Journal Books Ltd., London 1979.

2) S. Koutoubi and L.W. Koch, 'Uranium in Niger', in Uranium and Nuclear Energy, Mining Journal Books Ltd., London 1980.

difference of a market situation where state enterprises account for a significant share of supply, as compared to one where private firms have a complete dominance. Each of the hypotheses is justified by a restatement of the relevant conclusions from the earlier analysis.

(a) The widespread nationalizations of mineral activities in developing countries over the past decades have temporarily resulted in lower output and higher prices than what would have prevailed under an uninterrupted private multinational regime. Takeovers by state enterprises have regularly involved substantial setting-up and learning costs, expressed through reduced efficiency, increased cost levels, and inability to operate existing installations at full capacity or to establish new capacity. This market impact is of a transient nature. It will be reduced as the state owned firms gain experience and mature. The transition process is quite extended, however, and may take 10-20 years in each individual case.

(b) The proliferation of state mineral enterprise will result in permanently higher production costs and in some cases also mineral prices. This follows from the additional costs incurred by mature state firms in their pursuit of non-profit objectives, and from the generally lesser pressure to minimize costs in such firms. The higher costs will normally absorb part of the mineral rent in the intramarginal firms. Where state enterprises operate marginal ventures, and both demand and supply are inelastic, their inflated costs may exert an upward push on mineral prices.

(c) The increasing importance of state enterprise will result in greater price instability in most international mineral markets. This follows from the lesser flexibility of state mineral firms to adjust capacity utilization to variations in demand.

(d) The establishment of state enterprises has frequently broken up multinational chains of vertical integration. In industries like iron ore and bauxite the entry of state owned firms has significantly expanded the formerly narrow non-captive markets, thereby contributing to price stability in such markets.

(e) The increasing importance of state mineral enterprise will gradually result in a globally more economical allocation of mineral investments. Private multinational corporations have tended to avoid involvements in high tax areas and politically risky environments. A state owned enterprise, in contrast, can include tax payments in the flow of benefits that their activities give rise to, and can disregard the political risk of explicit or covert nationalization, so long as it operates within its own national territory. The proliferation of state enterprises will therefore result in greater capacity expansion in the low-cost deposits of mineral rich developing countries that have high taxes or that are considered especially politically risky by the mining multinationals.

PART II. THE CASES

CHAPTER 5. THE STATE TIN INDUSTRY IN INDONESIA [1]

History and structure of Indonesia's tin industry

Tin mining in Indonesia was initiated by the Dutch in the early part of the 18th century.[2] In the years immediately following the second world war, the colonial government of the Netherlands East Indies was the sole owner of the largest production center, and held majority equity positions in the remaining two production units. All three were operated under long-run management contracts by Billiton, a private Dutch company named after one of the tin producing islands of Indonesia. Billiton also had some equity in the two latter units. In 1950, at independence, the equity positions held by the colonial administration were taken over by the national government. In 1958, the government also acquired Billiton's equity. From that year and until 1973, when Koba Tin started production, the ownership and management of Indonesia's tin industry remained completely in the national government's hands.[3]

To begin with, the three existing production units were operated

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1) The data upon which the analysis is based have been obtained from material published in Indonesia and elsewhere, as quoted, and, above all from a series of personal interviews with officials of the ministries of Mines and Energy and Finance, with managers of the tin enterprises and others, conducted during a two-week visit to Jakarta in October 1981. A list of my interviewees is given in Appendix 5.1.

2) Tin in Indonesia, undated brochure published by the Public Relations Division of PT Timah, the state tin corporation, circa 1977.

3) W. Fox. Tin, The Working of a Commodity Agreement, Mining Journal Books Ltd, London 1974, and interviews with retired officials of the Ministry of Mines.

as separate companies. In 1961, the government established "The General Managing Committee of the State Mining Companies", which acted as a unifying umbrella for the tin industry. In 1968, all production operations were merged into a single State Enterprise (PN) under the name of PN Tambang Timah. The responsibilities of this firm encompassed, on a nearly exclusive basis, the whole range of activities of the tin industry from exploration, mining, processing and smelting through to final marketing. Finally, in 1976, the company was reorganized into a Limited Liability Company (PT), 100 % owned by the government, with considerably expanded commercial independence.[1] The present state owned company, PT Tambang Timah, as well as its predecessor PN Tambang Timah will be referred to in what follows simply as Timah.

An important policy change with regard to the tin industry, introduced in 1967 by the incoming administration of President Soeharto was the opening up of Indonesia's mining sector to foreign investments.[2] Three new tin ventures with foreign involvements have been established as a result. PT Koba Tin, 75 % owned by Australian interests, and with a 25 % equity holding by Timah, started its exploration program in 1971, and went into production in 1973. In 1980 this company's production reached 5260 tons of tin in concentrates, 16 % of the overall national figure. In that year, Koba Tin had about 2,200 employees on its payroll, of whom 24 were expatriates.[3]

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1) Tin in Indonesia, op.cit..

2) S. Sigit, Ministry of Mines and Energy, "Mineral Resources for the 21 century, challenges and opportunities, an Indonesian viewpoint", contribution to the US Geological Survey International Centennial Symposium, Oct 1979.

3) Indonesia Development News, No. 7, 1981.

The entire output was sold to Timah, which smelted and marketed it along with its own produce. PT Riau Tin Mining, the second foreign tin venture, was initiated by Billiton, since many years a subsidiary of the Shell Oil Company. Timah holds 10 % of the equity in Riau Tin and a further 15 % is to be offered to the Indonesian public. Thus, like in Koba Tin, the final foreign equity involvement will amount to 75 %. Production started on a small scale in 1979, and the 1980 output amounted to 630 tons of tin in concentrates. The level of production is expected to rise to 1000 tons, as full capacity is reached in the early 1980's. In 1980, Riau Tin had 320 employees. The concentrate output was smelted by Timah on a toll basis, and the tin metal was subsequently marketed by Riau Tin itself.[1] PT Broken Hill Proprietory Indonesia, (BHP Indonesia), is the third foreign venture, owned 100 % by Australian interests. The property of this company consists of a rehabilitated underground mine abandoned in 1941 at the time of the Japanese invasion. Production operations started in 1975. By 1980, output had reached the level of 520 tons of tin in concentrates. Full capacity of about 1000 tons was expected to be attained in the early 1980's after completion of further investments. In 1980 BHP Indonesia employed 450 persons, of whom some 20 were expatriates. The company is itself responsible for marketing its output internationally after toll smelting in the UK and Malaysia.[2] Smelting is undertaken outside Indonesia because the particular chemical compo-

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1) Information from interview with General Manager of Riau Tin.

2) Information from interview with Public Relations Department of BHP Indonesia.

sition of the concentrates makes them less suitable as feed in the Timah smelter.[1]

Table 5.1 depicts the development of Indonesia's tin output since 1950, and compares it with the world total. After reconstruction in the immediate postwar period, a production peak of 36.400 tons (18 % of world output) was attained in 1954. Production fell continuously in the following 12 years, to reach a minimum of 12.800 tons (6 % of world output) in 1966. There was a turnaround in that year, and production has been rising steadily thereafter. In 1980, output reached 32.500 tons, almost the level of 1950, but representing no more than 14 % of the world total. In table 5.2. details are given of the different companies' production in the 1975-1980 period. Timah's share of the total declined from

Table 5.1 Indonesian and World Mine Production of Tin

	1950	1955	1960	1965	1970	1975	1980	1981	1982
Indonesia, thousand tons	32.6	33.9	23.0	14.9	19.1	25.3	32.5	35.3	
World, thousand tons	176.9	194.0	188.8	203.7	217.1	218.1	235.0	237.1	
Indonesia, share of world, %	18	17	12	7	9	12	14	15	

Source: Metallgesellschaft

100 % in the early 1970's to 96 % in 1975 and 80 % in 1980, as the foreign ventures brought their units into production. Timah's share

1) Information from interview with Timah.

may fall somewhat further in the 1980's, as these ventures attain their full capacity output. But since no further foreign ventures

Table 5.2. Indonesian Production of Tin by Company, Tons.

	1975	1976	1977	1978	1979	1980	1981	1982
Riau Tin					95	630		
BHP Indonesia	79	210	296	433	469	500		
Koba Tin	867	1,022	1,610	2,914	3,807	5,260		
Timah	24,391	22,203	24,021	24,064	25,164	26,110		
Total	25,337	23,435	25,927	27,411	29,535	32,500		
Share of Timah, %	96	95	93	88	85	80		

Source: Indonesian Mining Yearbook 1979 for 1975 through 1979; Company information and Metallgesellschaft for 1980.

are planned, and since private Indonesian enterprise is prohibited from entry into the tin industry,[1] Timah will continue to dominate Indonesia's tin, both by its high share of mine output and by its complete control of domestic tin smelting.

After this brief historical account of Indonesia's tin industry, as a whole, the rest of the chapter is devoted entirely to the activities, problems and characteristics of Timah, the tin enterprise wholly owned by the government.

The year of 1967, marking the establishment of President Soeharto's "New Order" government, constitutes a clear-cut dividing line in Indonesia's state enterprising in tin. Most importantly, the new administration

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1) Information from Timah.

introduced very profound changes in government policy towards the tin sector. In addition, it was not until the late 1960's that the national management team of the state tin enterprise had acquired the experience needed for running the operations with reasonable efficiency. For these reasons it seems appropriate to subdivide the discussion and analysis accordingly. Thus, the next section deals with the Soekarno era, starting at independence and ending in 1966. The section that follows focuses attention on the state tin industry from 1967 and onwards.

State enterprise - the early period

The nationalization of the tin industry followed a somewhat unusual pattern. Prior to independence, majority ownership was not in private foreign hands, but was held by the colonial government. State enterprising did not begin with the birth of the new nation. Transfer of the colonial power's equity positions did not involve a takeover by purchase or confiscation. At independence, the assets were simply transferred to the national administration, in much the same way as, for instance, the railways, the postal service system, and other facilities run by the public colonial authorities. In 1958, agreement was also reached with Billiton about a swap in which the government took over the private company's remaining tin involvements in the country, and transferred to Billiton all its tin-related corporate assets outside Indonesia.[1]

The existing management contracts held by Billiton, were allowed to continue until their expiry, in 1953 in one production

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1) Interview with Mr M. Subroto, former Director General in the Ministry of Mines and Energy.

center, and in 1958 in the other two. The animosity resulting from the independence struggle led the Indonesian government to decide about a complete nationalization of the management functions, when the contracts with Billiton expired, despite the paucity of Indonesians with technical and administrative qualifications.

The period from the latter half of the 1950's and until 1966 was a difficult one, not only for the tin industry, but for Indonesia's economy as a whole. The task of nation building, involving unification of a geographically dispersed area with wide ethnic and cultural differences took priority over economic management.

The fall in tin production, from 36,400 tons in 1954 to 12,700 tons in 1966, or from 18 % to 6 % of world output, has two major explanations. The first one is the inexperience of the national management cadre which took over when the Dutch were sent off. In the Dutch management period, all higher level positions in the tin companies were held by non-Indonesians. The first batches of Indonesian engineering and geology graduates emerging from the universities only in the late 1950's, were put in charge of the installations, despite their complete lack of practical experience. This clearly reduced the efficiency of operations. The managerial inattention to planning and maintenance of installations was particularly detrimental for long-run output trends. In the view of one seasoned Indonesian observer, it took until the early 1970's for the national management teams to acquire technical, administrative and commercial proficiencies of an international standard, and to overcome the deficiencies caused by managerial neglect in earlier years.[1] The problems caused by

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1) Interview with Soetaryo Sigit, Secretary General, Ministry of Mines and Energy.

lacking managerial experience could certainly have been overcome in some measure by reinforcing the national teams with foreign expertise. In the strongly nationalistic mood that characterized the country at that time, such measures were considered politically inopportune.

The second reason for the drastic reduction in output was that the government drained the industry of funds, in a general effort to maximize the immediate resource availability for the political task of nationbuilding. Politics came first during that period, while economic and social development was considered a secondary issue. Most of the state tin companies' records from this period are unavailable. Hence, precise statements of how the government treated the industry are difficult to make. At times, only one quarter of the tin export proceeds were credited to the producing enterprises. Furthermore, these credits were made in a strongly overvalued local currency.[1] The consequences for the tin industry were highly detrimental. Not only were financial resources lacking for investments in expanded production capacity; the government appropriated such a large share of the net cash flow of the tin mining enterprises that little was left even for the maintenance of existing facilities, or for financing exploration to replace depleted deposits with new ones.[2] A number of high cost units had to be closed down for cannibalization of equipment, and to limit the financial drain, and so to permit continued operation of the remaining installations.

This period saw only one major new investment venture in Indonesia's

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1) Interview with Mr M. Subroto

2) M. Gillis and R.E. Beals, Tax and Investment Policies for Hard Minerals; Public and Multinational Enterprises in Indonesia, Ballinger 1980.

tin industry, and in that case too, the decision to go ahead was taken on political rather than economic grounds. In an effort to reduce its dependence on the Netherlands, where most of the tin concentrate output was sent for smelting, a decision was taken in 1959 to establish a tin smelter in Indonesia. The political appropriateness of this decision was confirmed by the emergent conflict with the Netherlands about Irian Jaya, resulting in a shift of concentrate exports towards the US and Malaysia, and again by the conflict with Malaysia in 1963, which forced a new redirection of exports, from Malaysia back to the Netherlands.[1]

In 1961, a contract was signed with the Klockner Industries of West Germany, to install a smelter of a new design with a capacity of 25,000 tons of metal/year, at a cost of US$ 3.6 million. Most of this capital was provided as supplier credit. Construction was completed in 1967. Technically the venture must be considerd a failure. By 1970, after 3 years' trial runs, the annual output did not exceed 5,000 tons. After considerable technical alterations, output reached about 15,000 tons in 1973.[2] The relative inexperience of the technical personnel in the Indonesian tin industry at that time undoubtedly contributed to the failure. In all likelihood there were also serious problems with the technical design offered by Klockner. Similar difficulties emerged in Bolivia where a Klockner tin smelter using the same technology was established at about the same time.[3]

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1) W. Fox., op.cit..

2) K.A. Batubara, "Tin Smelting in Indonesia", Paper presented at the Indonesian Mining Association Symposium in Jakarta, June 1977.

3) Private communication with Malcolm Gillis.

Ironically, the smelter proved profitable to Timah, despite the technical difficulties that were encountered. This was because the government itself underwrote the obligations for the supplier credit, and simultaneously extended a low interest local currency loan to the company, to enable it to finance the investment. Ensuing devaluations virtually wiped out the value of this loan. Most of the cost for the investment has therefore been incurred by the government.[1]

It is difficult to establish what were the general patterns and rules for the operations of the tin industry during this traumatic period. Quite clearly, the government intervened very heavily in the operations of the tin enterprises on an ad hoc basis. Production of tin was seen as a tool for promoting the government's political goals. Little consideration was given to the long run consequences for the industry following from the interventions.

State enterprise since 1967

The activities of Timah are far easier to record and quantify in the period from 1967 and onwards. Hence, the present section can provide a much more detailed analysis, although it must be mentioned that data on Timah have proved more difficult to extract than in the case of the state owned mineral companies in Venezuela and Zambia. In October 1981, during my visit to Jakarta, the latest annual reports available for Timah was that for 1978.

The present section starts by scrutinizing the mechanisms used by the government to control and direct Timah and at the goals and objectives of the state owned tin industry. It then turns to an analysis of the company's progress in terms of production, sales, costs

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1) Interview with Mr M. Subroto.

profitability and fiscal contributions. The section ends by a brief discussion of the record of investments and policies for capacity expansion.

Direction and goals

Subject to the current order of Indonesia's President, the Ministers of Mines and Energy and of Finance share the oversight responsibilities over Timah on behalf of the shareholder (government). After hearing recommendations, the President appoints the Board of Commissioners (3 in number) that supervises the activities of the enterprise; and the Board of Directors (one president and four members, each responsible for a technical function) that manages Timah on a day-to-day basis. The government's formal control responsibility includes the scrutiny and approval both by the Board of Commissioners and by the two ministers, of the annual budgets that the Board of Directors prepares. Timah's accounts, financial dispositions and investment expenditures are also scrutinized by special public bodies set up to control all public enterprises in these respects.

Possibly as a result of the devastating experiences of excessive government involvement in the earlier years, the administration has abstained by and large, in the period studied from direct intervention in the operations of Timah. For instance, the Board of Directors' annual budget proposals on investments, production and disposition of funds are usually accepted without amendments by the two responsible ministers.

Neither the government nor the company itself have ever defined the objectives, or outlined the long-term strategy to be followed by the publicly owned tin industry, in a clear-cut way. Discussions with

officials in the Ministry of Mines and Energy and with the managers of Timah suggest that the firm pursues a long-run profit maximization goal, subject to the fulfilment of a variety of social obligations, self-imposed by the management or decreed by the government. As an example of the latter, the government has asked the tin corporation to provide employment to groups of retired army officers. Expansion of the company's activities appears to have been determined by short-term considerations on an ad hoc basis.

In a reorganization undertaken in 1976, the profit orientation of Timah was given more emphasis, and the company was accorded greater freedom in taking up profitable activities even outside the tin industry. Also, from that year onwards, inducements have been provided to the management and employees, with the purpose of improving the company's profit performance. Thus in 1976 and 1977, 20 % and 15 % of the after tax profits respectively have been spent on bonuses to management and on additional salaries to all other employees. (Prior to 1976 bonuses to management and employees were added to the costs of the company, and were not related to profits).

Despite these developments the management expresses the view that pressures of public accountability restrict the corporate flexibility, and slow down decision making. This results in opportunity losses and makes the managerial tasks more unwieldy as compared with conditions in private enterprises. Timah's internal organization is bureaucratic and centralized. All important decisions are referred to the directors in charge, and the department heads have quite limited freedom for independent action. This feature, in some degree

at least a result of state ownership, also contributes to the inflexibility of the enterprise.

The record of production and sales

Table 5.3 provides the production and export figures for Timah. In the first eight years of President Soeharto's "New Order", the company's output almost doubled, as worn down installations were rehabilitated, and new facilities were established. From 1974 onwards, however, output has varied from year to year, but there has not been any upward trend. No more than 5 % of Timah's production is domestically consumed. All the rest is exported. Membership in the International Tin Council has prevented Indonesia from exporting freely at all times. While full technical capacity utilization has been

Table 5.3 Timah, Mine Production and Exports of Tin, Tons

	Mine production	Exports
1967	13827	10551
68	16939	17960
69	17416	17210
70	19091	17588
1971	19765	18874
72	21765	20603
73	22491	20969
74	25023	22983
75	24391	22011
1976	22203	24111
77	24021	24914
78	24064	25549
79	25164	25736
80 [1]	26110	30785

1) Preliminary figures

Source: 1966-1975, Tin in Indonesia, op.cit..
1976-1980, Statistics released by Timah in February 1981, as reported by the Embassy of Canada in Jakarta.

maintained through the period covered by the table, part of the production has been added to inventories in years when export restrictions were imposed by the Council. The excess of exports over mine production in the late 1970's is explained by Timah's marketing of increasing amounts of tin mined by Koba Tin.

The prices received by tin producers throughout the world are based on the Penang market quotation.[1] But while the major share of output from Malaysia, Thailand and Bolivia, is sold either directly in Penang or through dealers, Timah has developed a sophisticated system of marketing most of its tin directly to the final consumers.[2] The contractual arrangements with customers are oriented towards the long run profit maximization goal, and subordinate short run benefits to such objectives as long run stability, diversification and convenience in supplying the material to the customer.

Price developments for tin in constant money since 1960 are depicted in chart 5.1. The trend has been quite favorable from the producers' point of view, both by itself and in comparison with most other raw materials. For instance, while the index of nominal dollar prices for tin (1960-64 = 100) had reached 400 in the 1976-1980 period, that for all minerals, ores and metals (fuel minerals not included) had only attained 260.[3] Over this period, Timah has certainly had an easier time in terms of prices than the iron ore and copper producers analyzed in the following two chapters.

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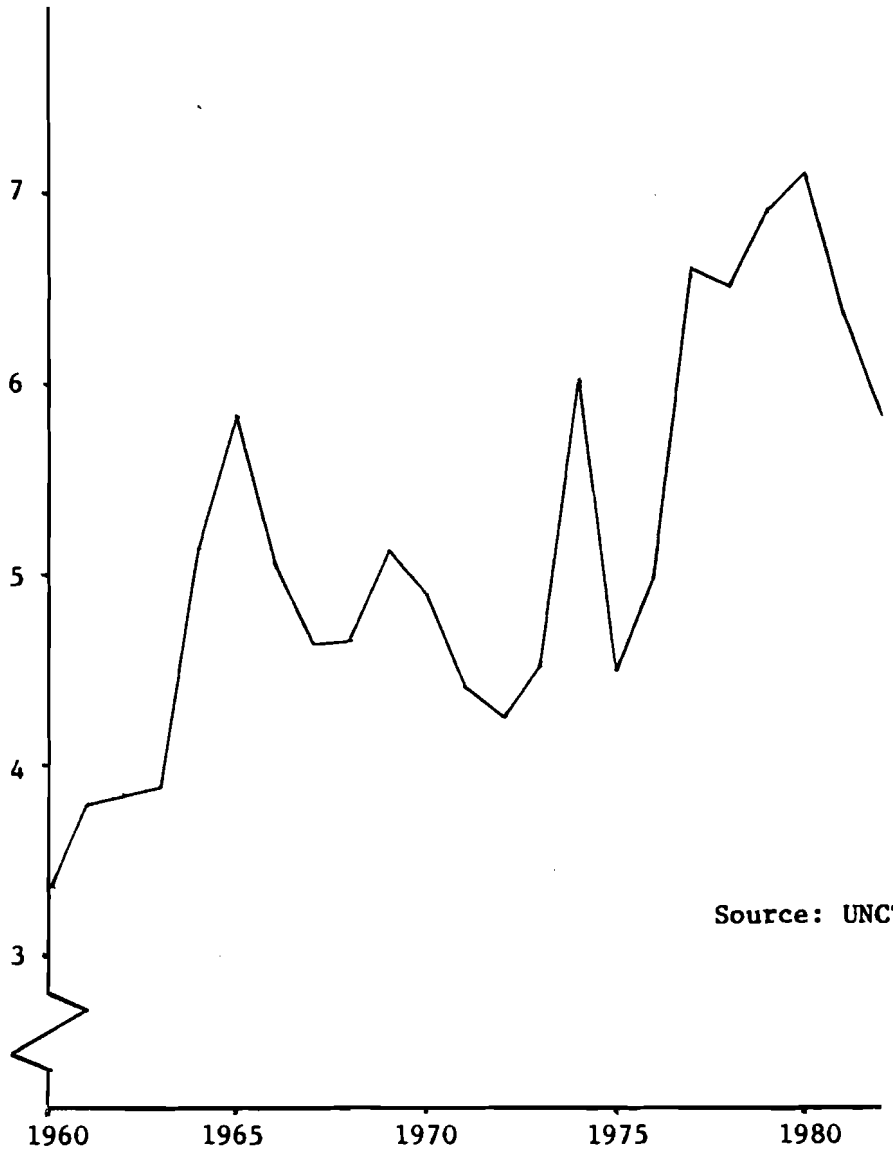
1) W. Labys, Market Structure Bargaining Power and Resource Price Formation, Lexington Books 1980, p. 125.

2) Ibid and information from interview with Timah.

3) UNCTAD, Monthly Commodity Price Bulletin, 1960-1980 Supplement, April 1981.

Chart 5.1 **Tin prices, constant 1981 US dollars per lb**
(Penang Market, annual averages)



Source: UNCTAD

Costs and financial results of Timah's operations

Table 5.4 provides a rough outline of the changes in Timah's capital structure in the 10-year period 1969-1978. Although the debt-equity ratio has risen somewhat, the company's solidity has remained quite strong, with loans never constituting more than 30 % of total funds employed. Most of the loans are of short duration. The company's long-term debt is insignificant.

Timah has been a socially highly profitable operation through the 1969-1978 period for which full data are available. An export levy amounting to about 10 % of sales revenue has been added to cost, and the profit that emerged thereafter has been subject to company income tax at about 45 %. The after-tax profit, $ 198 million in all, corresponded to an average return of 10.7 % on owners' capital. Around 20 % of after tax profits has been used to provide dividends to the shareholder. What remained was more than adequate to finance overall gross investments, even without making use of the cash flow from depreciation. The amounts of total depreciation in the years under scrutiny have been unobtainable.

The financial returns to Indonesia from Timah's activities should rightly include the profit before tax plus the export levy. As may be computed from table 5.5, the total of these amounts sums up to almost $ 500 million in the ten years and equals an average return of just above 28 % on shareholders' funds.

The favorable social return realized by Timah does not necessarily imply that the company was run in a cost-efficient way. A major proportion of Indonesia's tin output is extracted from some of the world's most economical deposits,[1] and this alone should enable the operations

1) Interview with Soetario Sigit, Secretary General, Ministry of Mines and Energy.

Table 5.4 Timah. Debt and Own Capital, $ million

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978[1]
Short term debt	20	22	34	44	45	52	89	66	72	122
Long term debt								12	11	7
Own capital	112	116	108	110	119	134	140	170	227	285
Total funds employed	132	138	142	154	164	186	229	248	310	414

1) On Nov 15 1978, Indonesia's currency was devalued by 50 %, but the Annual Report from which the figures are taken provides the dollar amounts calculated on the basis of pre-devaluation exchange rates.

Source: PT Timah, Annual Reports.

Table 5.5. Timah. Summary Profit and Loss Account, $ million

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978[1]	1979	1980[2]
Sales proceeds	62.7	65.3	65.3	72.8	100.6	174.1	166.6	188.3	249.6	353.2	398.4	410
Total cost	50.2	49.4	47.7	63.0	84.0	148.6	150.7	151.4	178.5	225.5	227.4	218
of which												
production and marketing	41.5	41.6	n.a.	54.5	66.7	105.3	109.6	132.9	137.7	158.4		
Export tax	8.2	6.7	5.9	7.1	8.8	17.2	17.1	16.0	24.3	33.8		
Profit before income tax	12.5	15.9	17.6	9.8	16.6	25.5	15.9	36.9	71.1	127.7	171.0	192
Income tax	0.7	6.8	7.1	4.0	8.4	13.3	8.3	17.7	31.6	53.4		
Profit after income tax	11.8	9.1	10.5	5.8	8.2	12.2	7.6	19.2	39.5	74.3		

1) On Nov 15, 1978, Indonesia's currency was devalued by 50 %, but the Annual Report from which the figures are taken provides the dollar amounts calculated on the basis of pre-devaluation exchange rates.

2) Preliminary figures.

Source: 1969-1976 from M. Gillis and R. Beals 1980, op.cit..

1977-1978 from Timah Annual Report 1978.

1979-1980 statistics released by Timah in February 1981, as reported by the Embassy of Canada in Jakarta.

to reap substantial mineral rents. To determine the cost efficiency, it is therefore necessary to probe deeper into the company's activities. Before venturing into that exercise, it may be instructive to make a comparison of Indonesian (national) cost levels with those of other tin producing countries. Table 5.6, mainly based on data released by the International Tin Council, provides such a comparison. The table basically contains three series of figures, all expressed in US cents/lb of tin. The first one is the average annual tin price in the Penang market. The second compares the production costs in Indonesia with an average for all producing member countries in the International Tin Council, as reported by each country to the Council. It should be noted that from 1973 the Indonesian figure is a weighted average of Timah and the foreign operations, even though the state company dominates the total throughout the period. The third series provides the average cost of producing and marketing tin in Timah, recalculated from table 5.5, and originally obtained from this company's accounts. It has not been possible to clarify the details of costs included to explain the difference between this cost series and that reported to the ITC. All figures are expressed in current as well as in constant 1981 dollars.

Table 5.6 shows that until 1979 Indonesia's production cost was about the average for all producing member countries of the Tin Council. This suggests that the ability of Timah to pay high taxes and yet to declare high profits is in no way exceptional. A comparison of Indonesian cost levels with those in Malaysia, the largest tin producer, is revealing. Malaysian average costs have persistently been lower, despite the fact that its mines are much deeper and the

Table 5.6 Tin Prices and Average Production Costs US cents/lb.

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Current dollars												
Tin price, Penang US cts/lb [1]	153	162	157	168	212	354	302	338	485	567	672	744
Costs excluding royalty and export tax, as reported to ITC, US cts/lb [2]												
Indonesia			132	128	154	251	227	249	330	370	326	424
Weighted average for producing members of ITC			114	120	138	195	219	229	283	334	370	456
Timah, Production and marketing costs, US cents/lb [3]	90	90	108	114	135	191	196	258	244	262		
1981 constant dollars												
Tin price, Penang US cts/lb [1]	512	489	439	427	452	602	452	497	658	652	692	709
Costs excluding royalty and export tax, as reported to ITC, US cts/lb [2]												
Indonesia			369	326	328	427	340	366	448	426	336	404
Weighted average for producing members of ITC			318	305	294	332	328	337	384	384	381	434
Timah, Production and marketing costs, US cents/lb [3]	301	272	302	290	288	325	293	379	331	302		

1) UNCTAD, Monthly Commodity Price Bulletin 1960-1982 Supplement, April 1983.

2) 1971-1975 from W. Labys, Market Structure Bargaining Power and Resource Price Formation, Lexington Books 1980, p. 113. 1976-1980 from data prepared by International Tin Council, obtained from Timah.

3) 1969-1977 from M. Gillis and R.E. Beals, op.cit., p. 82; 1978 from Timah Annual Report.

ore grades under exploitation much lower than in Indonesia.[1] This would suggest that Timah, the dominant Indonesian producer, is not as efficient in minimizing its production costs as its Malaysian competitors.

The response of Timah's management to this allegation is that the elevated Indonesian cost level arises mainly from the social obligations which the company has voluntarily taken, or has been forced to take upon itself. These social obligations pertain mainly to its labor force, to community development and to regional policy.

Total employment in the company rose from 25,000 in 1966 to 27,000 in 1968,[2] and has varied between 27,000 and 28,000 up to 1980. Output per employee increased from 0.5 tons in 1966 to 0.9 tons in 1975 and almost 1 ton in 1980. Even in the last year, Timah's labor productivity is much lower than in the private tin operations in Indonesia. The management of the state corporation readily admits that the company has more employees than required. For instance, out of a labor force of 27,652 persons in December 1975, 675 were classed as "honorary personnel", and 3,904 as "excessive".[3] While wages are lower than those offered for similar jobs in the private sector, the workers benefit from a variety of costly welfare programs far in excess of standard customs in the country. Other considerations are also taken to the employees. For instance, special inducements are

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1) J. Thoburn, Multinationals, Mining and Development, op.cit., chapters 5 and 6.

2) Tin in Indonesia, op.cit..

3) Ibid.

provided for movement of labor to new mine sites. Downward adjustments of the labor force are hampered by very far-reaching rules for job security, and by the extremely low labor turnover of about 2 % per year. In 1980, labor costs constituted about 20 % of total production and marketing costs.[1]

Timah feels responsible for providing community development services in the areas of its operation, even in the absence of legal obligations for it to do so. For example, the company supplements the local public authorities in financing housing projects, in supplying medical and educational services, in repairing roads and subsidizing household electricity. The company's support of the national government's regional policies involves maintenance of unprofitable operations in areas with little alternative economic potential, and consideration of regional development issues along with expected profitability in ranking potential investment projects.

The social obligations are costly to Timah. In the management's view, the company's costs might be reduced by about 15 %, if it did not accept social obligations beyond what is mandatory for a private corporation operating in the country.[2]

An interesting development in Timah's operations is the engagement of local entrepreneurs contracted to operate small deposits located away from the major production centers. Some 10-15 % of total output originates from such operations. The management claims that the rationale for employing private contractors who operate for a profit, is that

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1) Interviews with management of Timah.

2) Ibid.

such an arrangement simplifies and reduces the need for control in Timah. It can also be seen as a measure to avoid part of the social costs discussed above, and as a means of increasing the flexibility of overall operations, for instance in terms of labor mobility or production techniques. An additional reason may be to take advantage of Chinese mining expertise, since ethnic Chinese cannot be directly employed by Timah.[1]

While managerial inexperience and lacking technical competence are unlikely to be a contributory factor to Timah's elevated cost levels, a lax approach to cost control could explain, along with the expensive social obligations, why the company comes out so unfavorably in an international comparison. One reason for the easy-going attitude to cost minimization may be the very considerable job security enjoyed by the managers. All of the half-dozen persons with whom I held interviews, had been with the company for 20 years or more. Another likely reason might be that with the high profits generated by the company the government has not been sufficiently insistent on maximum feasible cost reductions. Finally, control of costs will be more difficult with the unclearly defined multi-purpose objective function pursued by Timah.

Table 5.6 also permits a scrutiny of the development of costs over time, as distinct from the cost level at each time. Restricting attention for a moment to the 1971-1978 period, it may be noted that the production costs in Indonesia as reported to the ITC rose by no more than 15 % in real terms, as compared to a 21 % increase for

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1) Private communication with John Thoburn.

the international average. Timah's costs, as reported in its own accounts do not appear to have risen at all in that period. The above-average performance in terms of cost change over time is explained in considerable measure by a large-scale shift of production in the course of the 1970's from on-shore to off-shore installations. An additional explanation could be that at least in the early 1970's the company was still recovering ground lost in the upsetting period after national takeover.

1979 and 1980 have been exceptional with regard to cost developments. In 1979, the Indonesian cost levels as reported to the ITC fell in absolute terms, and remained below the international average both in that and the following year. Two factors outside Timah's control explain this favorable development. First, the Indonesian currency was devalued by 50 % in November 1978. And second, domestic fuel prices were not permitted to rise in 1979 and 1980 in consequence of the sharp increase in international petroleum prices. In these two years therefore, Timah's international competitiveness was significantly improved by an increase of the implicit fuel subsidies. In 1980, the company's costs might have been 7-8 % higher, if it had paid the international price for the fuel it used.[1]

The cost data discussed in the preceding paragraphs do not permit a confirmation that Timah's policy of full capacity utilization has been rational in terms of the profit maximization objective. Average total costs excluding the export tax have remained substantially below prices throughout the 1970's. Variable costs in the short run are

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1) Interview with management of Timah.

assessed by the management at less than 40 % of total average costs excluding the export tax. Labor costs are considered a fixed item. And the export tax, although varying with output, should not be included in costs for the purpose of determining capacity utilization when the tax receiving government is the owner. In 1972, tin prices at 427 cents/lb in constant 1981 dollars were at their lowest for the decade studied. In that year, average variable costs in Indonesia, taken at 40 % of total average cost as reported to the ITC, were only 130 cents/lb in constant 1981 dollars. It is possible that marginal production units within Timah had variable costs above price, but they could not have accounted for a significant share of output. Hence, at least during the 1970's the policy of utilizing full capacity cannot have deviated much from a rational pursuit of profit maximization by the government.

Investments and capacity expansion

As noted earlier in this section, there has not been any clear-cut policy with regard to investments and expansion of Timah's capacity. Overall gross investments in the 10-year period 1969-1978 have been quite small. At $ 134 million, they were only two thirds as large as the after tax profit in the period. On average gross investments amounted to 7 % of the overall funds employed by Timah, and could therefore not have greatly exceeded the amount of depreciation. Hence, the expansion of the company's production must have consisted in the main of the rehabilitation of existing but inactive installations. In the Indonesian National 5-year plan which ends in 1984, expansion of Timah's output has been set at 4 % per year.

Indonesia has a very favorable potential for further growth of the tin industry. While its share of world output in 1980 was only 14 %, the country's reserves constituted close to 25 % of the world total.[1] Given the industry's ability to make sizable fiscal contributions and yet to generate quite substantial returns on the invested capital, one may wonder why the government and its company have not pursued a more aggressive investment policy to expand Timah's production even faster. Such a policy would certainly have contributed to a better attainment of the company's long run profit maximization objective.

The public ownership of Timah may provide an explanation to the relatively slow growth of this corporation, despite its impressive record in terms of fiscal contributions and profits. Thus, in an effort to bring about economic diversification or a better satisfaction of basic needs, the government may have desired to restrict the growth of the tin and oil sectors, in favor of manufacturing and agriculture, despite the lower returns on investments in the latter activities. The high petroleum income earned through most of the 1970's would have permitted the government to afford such policies.

Another explanation has to do with the slow growth of tin demand and the geographical concentration of its production. Thus, there may exist a tacit understanding among the four major producing countries to keep output in line with demand growth, in a joint effort to maintain the favorable tin prices.

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1) P.C.F. Crowson, Non-fuel Minerals Data Base, Royal Institute of International Affairs, London 1980.

The distinguishing features of Indonesia's state-owned tin industry

The experiences of Timah and its state-owned predecessors since 1950 do provide some support to the hypotheses about state-enterprises in international mineral markets, formulated at the end of the preceding chapter.

The above account of what happened to Indonesian tin in the first 17 years of nationhood provides a clear-cut illustration of the thesis that nationalization involves a heavy setting-up and learning cost. The managerial deficiences of that period and the inability to expand or even maintain capacity would be typical of the inexperienced state enterprise discussed in chapter 4. However, the extreme financial drain of the industry by the government would appear somewhat exceptional in an international context. So would the brave effort to launch a technically complex venture of forward integration long before the managerial and technical resources had been consolidated.

The operations of Timah in the 1970's also support the hypothesis that state enterprises operate at higher cost levels than would private firms in similar circumstances. The excessive number of employees and the far-reaching social obligations pursued by this enterprise, along with the relatively lax attitude of management and government with regard to cost minimization provide an ample illustration of the point.

Though costs appear elevated in relation to the minimum attainable, they are quite low in comparison with tin prices. This is mainly a reflection of Indonesia'a very favorable resource base with regard

to this material. In all likelihood, the marginal cost of Timah's operations has not exceeded price for any length of time during the period since 1969, for which cost data are available. Hence, the policy of maximum feasible utilization of capacity pursued by this company has probably been rational in terms of the profit maximization objective. Circumstances of the Indonesian case study have therefore not been conducive to testing the hypothesis that state enterprises are less flexible than private firms in adjusting capacity utilization to price and market demand.

Nationalization of Indonesia's tin did indeed break up existing chains of vertical integration with Dutch processing units, and so, for a time at least, expanded the arms-length sales of tin concentrates. The establishment of a smelter in the country in the late 1960's reestablished the vertical integration of the Indonesian tin industry, at least part of the way. But while the former Dutch operations included some tin-related fabricating and manufacturing activities, processing within Timah does not proceed beyond smelting.

The hypothesis that state ownership will reallocate investments and capacity growth to countries with particularly favorable resource potential is not borne out by the story of Timah. The reason may be either that Indonesia's oil riches in the 1970's have permitted the government to neglect the earnings potential of tin, or that investment in capacity growth has been restricted by a tacit inter-governmental agreement between the four leading producing countries, the objective being to maintain the favorable tin prices.

Appendix 5.1

Persons interviewed in Indonesia

PT Tambang Timah

Ir. M. Simatupang, Director Research and Development

Mr. Kantakusumah Kusyaman, Head Marketing Division

Mr. Karim Latief, Head Training Division

Mr. Asyik Ramly, Head Mining Division

Iman Mohammed Ismu, Head Research and Planning Division

PT Riau Tin Mining

Mr. C.B.C. Valk, General Manager

PT Broken Hill Proprietory Indonesia

Mr. C. Mirach, Publich Relations Manager

Ministry of Mines and Energy

Dr. Soetaryo Sigit, Secretary General

Dr. J.A. Katili, Director General

Ministry of Finance

Dr. Dono Iskandar, Head Bureau of Planning

Other

Prof. Mohd Sadli, Former Minister of Mines and Energy

Mr. M. Subroto, Director General Ministry Mines and Energy, retired since 1973.

Dr. Ralph Beals, Harvard Unit, Advisor to Minister of Finance

Mr. H. Roden, IMF Resident Representative

CHAPTER 6. THE STATE IRON ORE INDUSTRY IN VENEZUELA [1)]

The antecedents to nationalization

Iron ore has been mined in Venezuela since the early 1950's. The opening of the Venezuelan production units constituted one of the first instances in a wholesale locational shift of the world iron ore industry in the 1950's and 1960's from the depleting iron ore deposits in the U.S. and Western Europe, to the much richer resources of Latin America, Western Africa and Australia that had become economically accessible in that period as a result of revolutionary developments in bulk transport techniques. The mines are located in the Guayana region, close to Puerto Ordaz at the confluence of the Orinoco and Caroni rivers. At the time of their establishment, this was an undeveloped and sparsely populated area. The foreign investors, in collaboration with the government, had to build up extensive infrastructural facilities for the iron ore operations.

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1) The data upon which the analysis is based have been obtained from material published in Venezuela and elsewhere, as quoted, and, above all from a series of personal interviews which included a number of office holders in the Ministries of Planning (Cordiplan) and Energy and Mines and in Ferrominera, the state iron ore enterprise, conducted during a two-week visit to Venezuela in November 1982. Appendix 6.1 lists the persons interviewed. A particularly valuable source is a detailed memorandum on the state owned iron ore company, prepared by Janet Kelly Escobar, and entitled "Ferrominera Orinoco", Stencil, Dec., 1979.

To attract workers to this "frontier" area, the companies had to provide housing, commissaries, schools and hospitals, and to offer salaries substantially above the average in other parts of Venezuela.

The mines were run as two separate enterprises, owned by U.S. Steel and Bethlehem Steel (of the U.S.) respectively. Their establishment had been motivated by a desire to secure the steel companies' raw material supply. In their early life, the Venezuelan units functioned as "captive" mines, with practically the entire output consumed within each of the firms. The expansion of production in the late 1950's led to an increase in arms-length sales. In the 1960's, about a third of the output came to be sold to other steel companies, predominantly in Europe.[1]

It is difficult to establish the genuine profitability of the iron ore mining activities in Venezuela during the period of foreign ownership. Until the mid-1960's the declared profits of the two firms were determined by the administered prices that were applied to their internal sales. In the subsequent decade, profitability was dependent upon the reference prices established by the government in an effort to assure Venezuela of its "proper" share of the mineral rent.[2] According to Gomez, the declared profits after tax varied between 10.2 and 40.2 percent on capital investment in the years between 1957 and 1968, with an unweighted average equal to 22 percent.

In 1975, the iron ore mines were nationalized, and have been run since 1976 by a single state-owned enterprise, CVG Ferrominera Orinoco CA.

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1) H. Gomez, "Venezuela's Iron Ore Industry", in R.F. Mikesell et al, Foreign Investment in the Petroleum and Mineral Industries, Johns Hopkins 1971.

2) Gomez, op.cit.

Table 6.1 provides data for Venezuela's production and exports from 1955, when the industry had acquired significance, and until the present.[1] Venezuela's share of the world total is also given.

The immediate impulse to nationalize the iron ore industry was given by the euphoria following the Opec price increases in 1973/1974 and the simultaneous general commodity price boom. The more basic reasons were internal to Venezuela, and had to do with arrangements in the petroleum industry.

After renegotiations undertaken in the 1940's, the major petroleum concessions in Venezuela were timed to expire in 1983.[2] The uncertainty about the government's intentions after that date resulted in an increasing reluctance among the private petroleum companies, from the early 1970's onwards, to maintain existing installations, or to commit funds to create new capacity. Unwilling to accept a gradual dismantling of the country's petroleum capacity, the government decided that the industry had to be nationalized even before the expiry of the concessions in force.

The petroleum industry is vital to the Venezuelan economy. To minimize the risk of costly mistakes in the nationalization procedure, it was decided that the iron ore industry should be nationalized first. In this way the government would gain some of the experience needed for an efficient takeover of petroleum. As things turned out, the intention to nationalize the two iron ore producers was announced in 1974, and the actual takeover was completed by January 1975. The petroleum industry was nationalized in the following year. The officially stated goals to nationalize the iron ore industry included a desire to appropriate the full mineral rent, to place Venezuelan nationals in the highest managerial positions, to increase national value added by forward processing of the ore into pellets or briquettes and to assure the raw material supply to the nascent domestic steel industry.[3]

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1) Except where specially indicated, all tonnages in this chapter refer to actual weight.

2) This and the next paragraph are based on an interview with Argenis Gamboa, retired president of Corporacion Venezolana de Guayana, which is the formal owner of CVG Ferrominera. Gamboa was the person mainly responsible for carrying out the iron ore nationalization.

3) J. Kelly Escobar, "Ferrominera Orinoco", Stencil, Dec., 1979.

Table 6.1 Venezuela in the World Iron Ore Industry

Million tons

	Iron ore production			Iron ore exports		
	World	Venezuela	V's share %	World	Venezuela	V's share %
1955	378	8.4	2.2	89.9	7.8	8.7
1960	512	19.5	3.8	151.6	19.3	12.7
1965	624	17.5	2.8	211.7	17.0	8.0
1970	774	21.9	2.8	323	21.1	6.5
1971	781	20.2	2.6	318	19.2	6.0
1972	781	18.3	2.3	311	16.5	5.3
1973	853	22.9	2.7	375	21.9	5.8
1974	899	26.4	2.9	409	26.6	6.5
1975	884	27.0	3.1	389	19.9	5.1
1976	900	18.7	2.1	380	15.7	4.1
1977	848	14.4	1.7	356	11.9	3.3
1978	853	13.6	1.6	335	12.9	3.9
1979	911	16.3	1.8	390	13.0	3.3
1980	887	16.0	1.8	385	11.2	2.9
1981	863	15.5	1.8	364	12.0	2.7

Sources: 1955-1975 from UNCTAD, 'Iron Ore: features of the world market, Statistical Annex', TD/B/IPC/IRON ORE 12/Add.1, 8 Aug 1977.
1976-1981 from Mining Annual Review, several issues.

Though they held exploitation concessions valid for many years into the future, the foreign companies did not contest legally the government's right to nationalize. Negotiations were held to establish the foreign owners' compensation as well as other terms in connection with the government's takeover.

The Corporacion Venezolana de Guayana (CVG), a public regional development corporation, was to take over the assets, and was made responsible for conducting the negotiations. The agreement finally reached based compensation payments on the net book value of assets, to be paid with interest not exceeding 7 % per annum, over the ten years following nationalization.

The negotiations also led to the establishment of several other agreements with the foreign owners, viz:

(a) a three-year management and technical assistance contract, assuring the continued presence of practically all key foreign personnel for a period after takeover, and including a training component to speed up the transition to a fully Venezuelan management,

(b) an agreement with U.S. Steel to assist with equipment purchases and with ore marketing in Europe,

(c) long run delivery contracts to the former principals, of virtually unchanged quantities of iron ore for several years following nationalization. Thus, U.S. Steel agreed to take about 11 million tons per year over the 7-year period 1975-1981. Bethlehem Steel committed itself to purchase about 3.3 million tons annually over the 3-year period 1975-1977. Prices in these contracts were set equal to the price for Mesabi non-Bessemer ore delivered in Pittsburgh or Lower Lake Erie, subject to an agreed minimum.[1]

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1) The Mesabi price is a CIF quotation reflecting the special conditions that characterize the U.S. iron ore market. A combination of transfer pricing decisions internal to the U.S. Steel companies, and of the structure of the U.S. tax system has kept this price at levels substantially above the import prices in Europe (Kelly Escobar op. cit.).

Contributing to the speedy and smooth completion of the takeover negotiations was the fact that in 1974, the year when they took place, the world steel industry was experiencing a strong boom, of which no end was perceived. The primary concern of the U.S. steel companies at the time was to secure their raw material supply from Venezuela. Maintenance of their ownership position was a secondary consideration. Having satisfied their supply needs through the long-run delivery contracts discussed above, they were less unwilling to agree to the other terms of the nationalization sought by the Venezuelan government.

The far-reaching collaboration between the old and new owners in the managerial, technical and marketing fields aroused some political criticism. It was felt that the continued foreign presence and involvement diluted national control, one of the key aims of nationalization. The response of CVG was that close collaboration with the former owners was of key importance, to prevent a loss in output and productivity in the period following the ownership transfer.

The establishment and operations of Ferrominera

After a one-year interim period, responsibility for the state owned iron ore activities was shifted from CVG itself to a fully owned subsididary, CVG Ferrominera Orinoco CA, established for this purpose in December 1975. The present section analyzes Ferrominera and its operations from the time it was set up until the present. The discussion begins by looking at the mechanisms through which the owners can control and influence Ferrominera's performance and at the goals that the company is supposed to pursue. I then study Ferrominera's record in terms of production and sales. Finally, I scrutinize its results, tax payments and investment performance.

Direction, control and goals

As noted, Ferrominera is a fully owned subsidiary of CVG. The latter is a public regional development corporation. Apart from

iron ore operations, CVG's subsidiaries include steel, aluminum, hydroelectricity and other activities. Formally, all responsibilities for Ferrominera are entrusted with CVG which constitutes the shareholders' assembly and appoints the president and board in the iron ore enterprise. In reality, the lines of overall direction are more complex. For instance the Ministry of energy and mines is entrusted with the task of ensuring that Ferrominera adheres to the provisions of Venezuela's mining law. The Ministry of Planning (Cordiplan) is responsible for integrating the iron ore activities with the national development plan. Long run policies and major investments of Ferrominera are determined in regular meetings between the president and management of this enterprise on the one hand, and representatives of the two Ministries on the other. Were disagreements to arise, it is envisaged that they would be settled by the Ministry of the Secretary of the Presidency, the formal principal of CVG. Still other public bodies would be involved if Ferrominera required external capital additions, which it has not so far. In practice, it seems that the political involvement in Ferrominera's day-to-day activities has been quite limited. The company's president along with the top management appear to have been left in peace in running the company since the time of its establishment. The non-involvement of politicians may be explained by the manipulating skills of the company's presidents, enabling them to pursue their own ideas by playing off the different political interests against each other. But it could also be because of unanimity between the management and the political institutions concerned with regard to the goals and policies that the company should pursue.

A unanimity of opinions on the goals to be pursued by Ferrominera does indeed emerge from my interviews. Thus, it is invariably stated, both by the managers in the enterprise and by the responsible Ministry officials, that profit maximization is not a goal of the company. There is general consensus on the need to avoid losses, and to earn some profits, possibly so as to cover the company's own investment requirements. Over and above that, however, there is no urge to generate surpluses.

A second goal on which there appears to be universal agreement is assurance of raw material supply to the domestic steel industry. This goal, presumably meaning that deliveries to satisfy domestic needs should have priority over export deliveries, has not had any practical implications so far. In all years since nationalization, the company's capacity has been more than sufficient to satisfy both the internal and export market demand without any constraint.

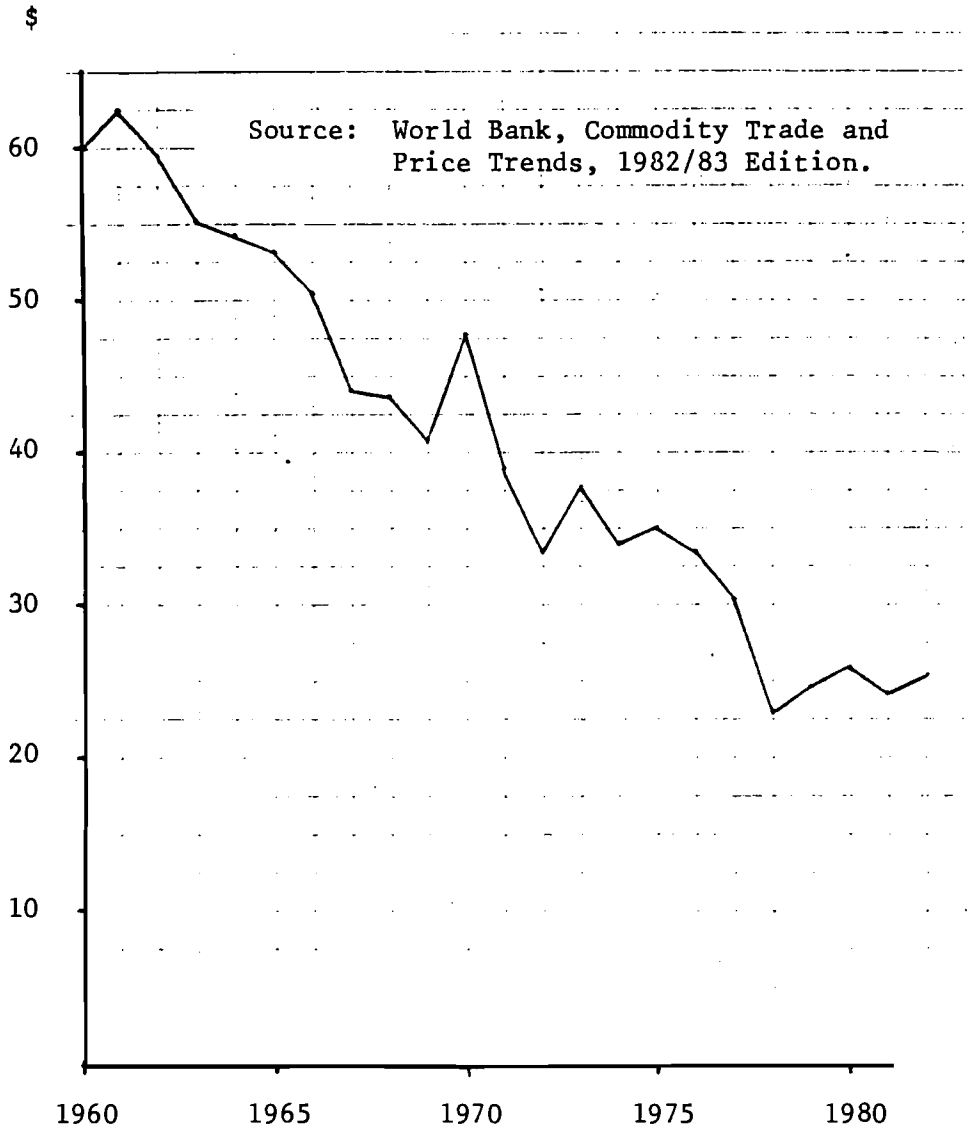
A third goal for Ferrominera, widely professed by the persons interviewed is that of promoting regional development in the Guayana region. The foreign-owned iron ore companies took upon themselves important regional development tasks both out of necessity, because a buildup of infrastructure and social facilities was an indispensable requirement for efficient iron ore extraction, and because they wanted to appear as 'good corporate citizens'. In the 1970's and 1980's, the Guayana region is reasonably well endowed in these respects. Hence, continued regional development endeavors are less of a pressing prerequisite for iron ore production. However, the transfer of ownership to CVG, the regional development corporation, has greatly added to the importance of such endeavors in the company's preoccupations, even when they do not improve the efficiency of iron ore operations. One of the managers pointed out that since the ultimate purpose of Ferrominera's profits over and above the company's own financial needs is precisely regional development, it did not really matter much whether the development expenditure was financed by the profits declared by the company or was included as part of the overall costs incurred by the company.

The record of production and sales

Chart 6.1 provides a general background to the world iron ore market in which Ferrominera has been operating. Iron ore prices in international trade, when measured in constant dollars, have been falling persistently since the late 1950's. The weak development in the 1960's is primarily explained by the introduction of large-scale and low-cost supply from Latin America, Western Africa and Australia. The further sharp fall in the latter half of the 1970's has been due

to a depression in demand caused by the worldwide crisis in the steel industry.

Chart 6.1 Iron Ore Prices, constant 1981 US dollars per ton
(Brazilian deliveries CIF North Sea Ports, 68 % Fe)



As appears from table 6.1, production as well as exports of iron ore in Venezuela reached their peak in the 1970's, and have settled substantially lower in subsequent years. To an important extent, this is the consequence of the exceedingly weak international iron ore market after the mid-1970's. The figures show that world production and world exports, too, have declined since that time. However,

a closer scrutiny of the numbers reveals that Venezuela's output and sales fell by much more, with a consequent decline in the country's share in world production and exports. It is contended in the following discussion that the loss in shares is strongly related to the change in ownership that occurred in 1975.

Table 6.2 providing the details of Venezuelan iron ore deliveries, is an instructive background to this discussion. It is immediately clear from the table that the important market loss occurred in the U.S. where practically all sales have been based on the long run contractual agreements with U.S. Steel and Bethlehem Steel. It will

Table 6.2 Ferrominera, Iron Ore Deliveries, million tons

	1974	1975	1976	1977	1978	1979	1980	1981	1982
U.S.	15.5	11.2	9.8	6.3	6.2	4.8	3.9	5.4	1.2
Europe	10.8	8.2	7.5	5.5	6.6	8.2	7.7	7.0	5.4
Total exports	26.3	19.4	17.3	11.8	12.8	13.0	11.6	12.4	6.6
Venezuela	0.2	0.2	0.1	0.2	0.5	0.7	2.8	2.9	3.9
Total	26.5	19.6	17.4	12.0	13.3	13.7	14.4	15.3	10.5

Notes: (1) Sales for 1974 and 1975 pertain to the predecessors of Ferrominera, and are given for comparison.

(2) The European figure includes insignificant amounts exported to Latin America.

(3) The difference in the figures of tables 6.1 and 6.2 is partly due to the use of international and national statistical sources respectively. Production in table 6.1 relates to crude ore output at the mine; deliveries in table 6.2 refer to final products sold. The processing to obtain the latter will regularly involve some loss in weight.

Sources: 1974 and 1975, Hierro y Otros Datos Estadisticos Mineros, Ano 1980, Ministry of Energy and Mines, Caracas.

1976-1982, figures provided by Ferrominera's accounts department.

be recalled that in 1974 these two companies had made commitments to buy about 14 million tons of ore per year between 1975 and 1977 and around 11 million tons from 1978 till 1981. As the world steel depression became apparent, the former owners coerced Ferrominera to renegotiate the purchase contracts. The new agreements involved a lowering of the prices to equal the average U.S. East Coast competitive import price, and a substantial reduction of volumes. Thus, from 1977 onwards, the quantities bought by the U.S. were less than half of those envisaged in the original contracts. 1982 was an extremely difficult year for the world iron ore industry. In that year, the first after the expiry of the contracts, Venezuelan sales to the U.S. fell to the disastrously low figure of 1.2 million tons.

In 1982, negotiations were in process to establish a new long run contract with U.S. Steel, covering possibly a period of 12 years. with annual deliveries of around 5 million tons. Bethlehem Steel has declined the Venezuelan offers of continued supply pointing to the low utilization of its steel capacity and to commitments to purchase iron ore from Canada and Liberia.

There are strong reasons for the claim that the reduced U.S. interest in Venezuelan supply is largely explained by the nationalization. As appears from table 6.3, imports of ore from Venezuela to the U.S. declined sharply after nationalization, not only in absolute amounts, but also in relation to total demand in and total imports into the U.S. There is little doubt that with continued U.S. ownership, Venezuelan iron ore would have been afforded a substantially higher priority in the U.S. market.

The negative impact of ownership change is confirmed by the comparatively much better performance in the European market. Venezuela's share of sea-borneimports into Western Europe was 7.3 % in 1970 and 5.4 % in 1979.[1] Only in the short run did European sales suffer more severely from nationalization, and this was importantly due to a

1) J. Husgen, "Sea Transport and Handling of Iron Ore", paper delivered at Third Bulk Handling and Transport Conference, Amsterdam, May 1981.

Table 6.3 Demand and Supply of Iron Ore in the U.S.
Million tons of Fe content

	1974	1978
Demand	90.8	80.9
Supply		
Domestic	59.0	60.1
Imported net	31.8	20.8
(of which Venezuela)	(10.3)	(4.2)
Venezuela's share, percent of		
Demand	11.3	5.2
Net imported supply	32.4	20.2

Source: U.S. Bureau of Mines, Minerals in the U.S. Economy, several issues.

statement by the President of the country that in the long run the national enterprise would not export at all. The management of Ferrominera eventually succeeded in convincing the President that continued competition in international markets was essential to assure domestic supply at low cost over time. However, the uncertainty about longer run availability of Venezuelan ore, initially created by this statement, caused a reluctance among European customers to continue their purchases, and it took some persuasion by the company's marketing arm before this reluctance had been overcome.

Around half of the Venezuelan sales to Europe has been delivered under annually renewable contracts. Most of the remaining quantities have been sold under contracts specifying quantities for between 5-7 years, with prices renegotiated each year. In practice, there is little difference between these two contractual forms, since the annual contracts are regularly renewed. Some small quantities have been sold in the European spot market. There are no plans to change the current marketing arrangements in Europe.

Like its foreign-owned predecessors, Ferrominera has been a price taker in the European market. Since many years, the CIF price level

in Europe has been determined annually through the outcome of German negotiations, first with Sweden and more recently with Brazil, after that country took over the former Swedish role as leading ore exporter to Europe. Acceptance of this price level has assured Venezuela of a share in the market even in periods of low demand, since the buyers have been interested in diversifying their sources of supply. The buyers' urge to diversify would weaken if some sources of supply were cheaper than others. Hence, a unilateral Venezuelan price increase would involve Ferrominera in a severe risk of losing sales. In a competitive market, Ferrominera might have considered accepting lower prices to assure fuller capacity utilization. This could have been a rational profit maximizing policy given the very low variable costs of operation, fluctuating between $ 1.8 and 2.4 per ton (17-25 % of total cost) during the 1977-1981 period. However, with the oligopolistic structure that has characterized the international iron ore market, such a policy would have been self-defeating since other producers would undoubtedly have responded by matching price reductions.

The period covered by table 6.2 records the emergence of a large domestic market for Ferrominera. Deliveries to the national steel industry were insignificant until 1978, because through that period, the country's major steel producer, Sidor, was itself operating a smaller iron ore mine (Cerro San Isidoro). In 1980 and 1981, sales in Venezuela attained close to 3 million tons per year, and rose further to almost 4 million tons in 1982.

Prices for domestic sales have been determined at negotiations between Ferrominera and Sidor, the state-owned steel enterprise. The two firms are sister companies, both owned by CVG,[1] and with several interlocking directorships. Sidor is in close proximity of Ferrominera's port facilities. Hence, the costs for transport from the port are insignificant. Initially, the price levels for deliveries to Sidor were set close to the FOB price received by Ferrominera for sales to Europe. In more recent years, Sidor has paid somewhat more than the European FOB price. Given the high transport cost to Europe, the delivered domestic price was substantially below the delivered price to Europe.

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1) Sidor is part-owned by Fondo de Inversiones de Venezuela, FIV, an investment finance agency of the government.

Table 6.4 Prices for Venezuelan Iron Ore Deliveries
U.S. dollars per ton

		1976	1977	1978	1979	1980	1981	Est. 1982
CIF	U.S.	22.0	20.9	18.9	20.7	24.8	26.9	25.9
	Europe	17.9	17.7	16.0	17.4	22.8	25.0	25.2
FOB	U.S.	17.8	16.5	14.5	15.5	18.2	19.2	16.7
	Europe	11.4	11.5	9.0	9.5	11.0	11.2	13.5
Sidor		11.7	12.2	11.3	11.1	13.7	14.4	14.4
Weighted average price received excluding ocean shipping		14.8	14.0	11.6	11.7	13.2	14.5	14.0

Source: Ferrominera.

The company's capital structure, costs and results

Ferrominera has been fortunate in starting its life with own capital constituting a very large proportion of its total balance, and virtual absence of long run debt to outsiders. The company's capital structure appears in table 6.5. A very large part of the long run debt consists of loans from the employees' provident fund.

Table 6.5 A Summary of Ferrominera's Capital Structure
Million U.S. dollars

	1976	1978	1980	1982 (Sept.)
Short run debt	68	84	145	138
Long run debt	32	39	64	74
Own capital	214	218	210	232
Total balance	314	341	419	444

Source: Ferrominera.

As is evident from table 6.6, Ferrominera has been persistently successful in attaining one of its goals, namely to generate some profits. In 1976, profits before tax provided a return of 4.5% on the company's own capital. The return fell to below 3 % in 1977, and was quite insignificant in the following years. The major reason behind the weak and deteriorating profitability is the world-wide depression in the iron ore industry, resulting in low capacity utilization and low, and falling, real price levels. Ferrominera's ability to avoid losses since its establishment has been greatly facilitated by its favorable capital structure and low interest payments.

Table 6.6 Ferrominera, Summary Profit and Loss Account
Million U.S. dollars

	1976	1977	1978	1979	1980	1981	1982
Gross sales	351.7	232.6	228.7	250.0	311.7	361.7	224.4
Minus transport charges	98.1	67.4	86.2	104.8	130.0	153.4	83.9
Net sales	253.6	165.2	142.5	145.2	181.7	208.3	140.5
Costs: Personnel	77.0	47.4	47.9	54.3	81.3	86.6	62.0
Materials & services	43.0	36.2	42.7	42.2	49.8	55.0	55.1
Depreciation	10.4	10.9	9.7	11.4	13.1	15.0	12.9
Interest paid	0	0.4	4.7	8.7	11.8	15.6	11.8
Other costs, net	26.5	11.2	5.2	7.9	25.0	33.1	(6.8)
Total costs	156.9	106.1	110.2	124.5	181.0	205.3	135.0
Profits before tax	96.7	59.1	32.3	20.7	0.7	3.0	5.5
Profits tax payments	56.3	34.9	19.6	14.8	0.6	1.7	4.2
Profits after tax	40.4	24.2	12.7	5.9	0.1	1.3	1.3
Dividends	0	0	13.8	14.0	0	0	0

Source: Ferrominera.

The cost figures require several comments and some elaboration. The sharp variation in the 'other costs' item is primarily due to the losses incurred by Ferrominera through its part-ownership in a high-iron briquette plant, where briquettes containing 85 % Fe were produced through a natural-gas based direct reduction process. This plant, the first of its kind worldwide, has been a perennial loss-maker since it started operating in 1971. The unfavorable results have been primarily due to technical problems that prevented the plant from attaining anywhere near its designed capacity. The installations were closed down in 1977 for redesigning and opened again in 1980, only to be permanently closed in 1982. The net losses incurred by Ferrominera on the operations of the briquette plant were $20.1 million in 1976, $3.7 million in 1979, $10.3 million in 1980 and $12.4 million in 1981.

The exceptionally high personnel expenditure in 1976 is explained in the main by the expensive management contracts with the former owners and can be seen as a temporary setting-up cost that was overcome in the following year.

While 1976 was exceptional in terms of personnel costs, the level of these costs throughout the period studied, at more than 40 % of total cost, has been very high for a mining operation. To some extent this is a legacy from the time when the mines were established. As noted earlier, at that time labor had to be attracted to Guyana by high wages and a miscellany of company-provided social facilities. Once introduced, these special benefits have continued both under private-foreign and public-national ownership, despite the infrastructural and social developments in the Guayana region. After nationalization, CVG has pressured Ferrominera to reduce wages and other employee benefits to levels more in line with those offered by its other subsidiaries, e.g. the steel and aluminum companies. Ferrominera's profitability and the other companies' losses explain why these pressures have not had much impact so far. In 1981, Ferrominera's costs for providing fringe benefits like subsidized housing, hospitals, schools and a commissary to its employees amounted to $ 17.5 million, 20 % of overall personal costs, and almost six times the net profit declared in that year.

Table 6.7 Labor Productivity in Venezuelan Iron Ore Mining

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Est. 1982
No. of employees in iron ore mining	3248	3335	3372	3657	3868	4012	3814	3814	4222	4440	3809	3300
Tons produced per employee	6219	5547	6850	7219	6411	4661	3592	3540	3624	3626	4069	3606
Labor productivity Index 1971-73=100	100	89	110	116	103	75	58	57	58	58	66	58

Source: Hierro y otros datos, op.cit. and Table 6.1.

Another explanation to the high labor cost has been the sharp fall in labor productivity after the nationalization. The developments depicted in Table 6.7 are less related to the inexperience of the new management that took over after the departure of the foreign owners, than to the combination of falling output on the one hand, and social and legal pressures against reductions of the labor force so long as the company generated profits, on the other.

Company officials claim that the fall in labor productivity depicted in Table 6.7 is exaggerated by the transfer of responsibility for river dredging operations to Ferrominera in 1976. By adding some 200 employees to the company's payroll, this decision expanded its total labor force to just above 4000.

The profit squeeze experienced by Ferrominera since 1980 has led to forceful actions to trim costs. As mentioned above, the Briquette plant was closed in 1982, reducing the labor force by about 300. In the same year, the dredging operations were transferred out of the company, reducing employment by another 200, and relieving Ferrominera of an excessive proportion of the total costs for keeping the river navigable.

Along with efforts to cut out organizational slack in other areas, the management succeeded in reducing the total labor force from 4440 at the end of 1980 to 3300 late in 1982. The cost reductions enabled the company to almost break even in the latter year. But the sharp curtailment in volume produced kept labor productivity low, despite the sizable reduction in labor force.

Ferrominera is liable to a royalty equal to 1 % of the value of production at the mine, and, like other companies in Venezuela, to a 60 % profits tax. The royalty is included in the operating costs. Following the legacy established during the time of foreign ownership, the profits for the purpose of profits tax are determined on the basis of a posted price for iron ore, set by the government each year. Since nationalization, however, the government has followed the recommendations of Ferrominera in setting the posted price, and there is little difference between accounting profits and taxable profits. The amounts of profits tax paid by Ferrominera also appear in Table 6.6.

No clear-cut dividends policy has been followed. Dividends have been declared only twice, but the payments of dividends constituted pure accounting transactions aimed at reducing the claims of Ferrominera on CVG, that arose from indemnifications of former owners, initially charged to the iron ore company.

Investment performance and production capacity

Ferrominera has undertaken a very small volume of investments during its existence. Gross investments in the 6-year period 1976-1981 amounted to $ 94 million, only marginally above the $ 83 million depreciated in the corresponding years. The investment costs over and above the amounts depreciated were financed from retained profits.

Two major investment projects have been completed. The first consisted in the establishment of crushing and screening facilities at the harbor in Puerto Ordaz, aimed at satisfying the product requirements of the European customers. The second was the construction of railway transport facilities between the harbor and the nearby steelworks of Sidor, in response to the increase in domestic deliveries.

There have been no investments to increase Ferrominera's production capacity, and the level of current capacity is under some dispute. With the low levels of output, there has been a gradual reduction of equipment at the mines, instituted by not replacing worn-out

items. The average age of the equipment in use is quite high. Output could certainly be raised substantially by increasing the number of hours worked. But major and time-consuming investments in new equipment would be required to attain the peak production of 26-27 million tons per year, that was reached in 1974 and 1975.

With the wholesale shift in export market orientation, away from the US and towards Europe, mine production at the earlier peak levels would be pointless without additional processing facilities. For while the former US owners continue to buy the crude mine product, and have it undergo further treatment in their own processing installations, the European customers have over time become increasingly discriminant in their demand for graded material like fines or lumps of detailed specification. The growing importance of the European market along with the exacting requirements for product quality in that market provides the rationale for Ferrominera's investment in the crushing and screening facilities discussed above. The theoretical capacity of these facilities is about 20 million tons, and may be lower in practice, since full capacity utilization has never been tested. The capacity to process, rather than the capacity to mine, may therefore come to constitute the effective constraint in Ferrominera, when the market for iron ore recovers from its present depression.

A striking feature emerging from the interviews with the government officials is the absence of ambition to assure a continuing important role for Ferrominera in the international iron ore market, and the management of the company seems to have resigned to accepting this view. There is certainly a desire that the market should recover, and permit a fuller utilization of existing capacity. But there are no plans envisaged for expanding, or even modernizing the exporting capacity. Yet, investments in modernization appear indispensable to maintain Ferrominera's international competitiveness. This comes out most clearly in a comparison of the company's ocean shipping facilities with those of CVRD, the state owned Brazilian iron ore giant.

Venezuelan iron ore is transported by rail to the harbor at Puerto Ordaz, which is located 340 kilometers inland along the Orinoco river. There it is transferred onto ocean-going vessels for transport to North American and European harbors. River conditions permit the entry of ore ships no greater than 60-80,000 tons. These can be fully loaded only in high waters during the rainy season. In the dry season the ships have to leave Puerto Ordaz half-full in order to get through the shallow passages of the river.

In the 1950's, the typical ships used by the world iron ore industry had a capacity of 10-15,000 tons. At that time, the newly established bulk transport facilities in Venezuela were well ahead of the rest of the world in terms of scale and efficiency. But while the rest of the world experienced revolutionary changes in these fields in the decades that followed, the basic design of the Venezuelan installations has remained the same. In 1980, more than one quarter of Brazilian iron ore exports to Europe was transported on ships above 200,000 tons. Three quarters of the total were shipped on carriers of 100,000 tons or more, loaded and unloaded in tailor-made harbor installations on both sides of the Atlantic.[1] Ferrominera's non-participation in the ongoing technological revolution has gradually weakened its international competitiveness. To avoid uneconomic head-on competition with the Brazilian exporter, Ferrominera has been increasingly concentrating its sales in Europe to ports in the UK, Belgium or Italy that have not yet been rebuilt to receive the giant ore carriers. As Brazil continues an aggressive policy of expanding and modernizing its iron ore delivery capacity, and as further ports in Europe and North America are equipped with modern unloading facilities, continued inaction on the part of Ferrominera will inevitably lead to its gradual fade-out from the international market.

Large-scale investments in an ocean harbor and in a railway connecting the harbor, with the mines are urgently required if Ferrominera is to play a significant and lasting role in the international iron ore

1) J. Husgen, "Sea Transport and Handling of Iron Ore", paper delivered at Third Bulk Handling and Transport Conference, Amsterdam, May 1981. The U.S. East Coast is lagging behind Western Europe in building harbors that can receive the biggest bulk carriers.

market. Mining and processing capacity would probably also have to be expanded, to warrant such infrastructural expenditure. Additional investments in marketing would then also be needed to enable the company to sell the increasing volumes.

No such plans are in sight. The management appears to be resigned to a future in which deliveries to the domestic steel industry become Ferrominera's main business, and where exports assume an increasingly marginal role.

The motivations to the lacking international ambitions have not been clearly formulated. One frequently expressed argument is that the country's iron ore should be saved for future national needs. Given the size of Venezuela's proved ore reserves and the virtual certainty that the reserve base will increase in response to future exploration efforts, this argument does not sound particularly convincing. Current estimates put reserves at over 2.100 million tons with an average Fe content of around 60 %.[1] This is enough for 80 years' exploitation at the present full capacity, and for 50 years if capacity is increased to 40 million tons per year. A more sophisticated version of the same argument is that exploitation for the benefit of foreigners of a wasting resource like iron ore is not worthwhile at the price levels that have prevailed in the late 1970's and early 1980's. Underlying this proposition may be some notion of an intrinsic value of the ore in the ground which is not fully paid for by current prices, or, more pragmatically, that at present prices it does not pay to invest in expanded capacity. Those who argue along this line apparently disregard the likelihood of rising demand and price, once the steel depression has been overcome.

In my opinion, the major explanation behind the unambitious attitudes to Ferrominera's future international role has to be sought at a higher national level. The petroleum sector has provided the government with huge profits and export earnings. The potential of iron ore in these respects is incomparably smaller. In distinction from Brazil, which lacks oil export revenues, the Venezuelan government can afford to neglect the iron ore export potential. This along with

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1) Hierro y Otros Datos, op.cit.

the insufficiency of Ferrominera's own earnings to cover the costs of a thorough infrastructural overhaul and expansion seem to me to be the main reasons for the company's defensive attitude with regard to its future role in export markets.

The distinguishing features of iron ore mining under state ownership

This concluding section draws together the material presented in the present chapter, so as to bring out in a succinct way those consequences of state takeover and those distinguishing features emergent under state ownership that, if common in many nationalized iron ore enterprises, will have an important impact on the international market. The establishment of state ownership has been coincidental with the start of a prolonged depression in the world iron ore market. In discussing what happened with Ferrominera, one must be cautious in distinguishing between the developments due to state takeover and those caused by the slack in world demand.

Nationalization usually involves a setting-up and learning cost. The size of this cost depends, among other things, on the economic sophistication of the nationalizing country and on the arrangements under which the takeover takes place. Venezuela belongs to the economically most advanced countries in the third world. In the 1970's its per capita income and educational attainment measured by enrollment in tertiary training institutions, were about twice as high as in Brazil and Mexico.[1] The foreign iron ore miners had promoted a number of Venezuelans into high level managerial positions. For these reasons the qualified manpower availability was less of a constraint than in many other nationalizations of mineral activities in developing countries. Great care was taken at the time of takeover to assure a smooth transfer of the managerial responsibility by elaborate management contract arrangements with the former owners. The ability to produce iron ore was not significantly affected by the ownership transfer. The temporary additional cost of running the operations with the help of a management contract was noted earlier in the text. I conclude that the losses in efficiency due to managerial inexperience were small and of short duration.

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1) World Bank, World Development Report 1982.

Typically of a state enterprise, Ferrominera has adopted a mixed set of goals with no clear-cut trade-offs among them. Those of the company's managers who joined the industry while it was still foreign-owned, point out that decision-making has been slowed down after nationalization because the various controlling organs require more complex procedures and implicitly threaten to expose the management to public accountability for the decisions taken. The implication of demoting profit maximization and promoting social and regional development as corporate goals, along with the new decision-making procedures and arrangements for public control, is less cost efficiency and higher cost levels than would normally occur under private ownership.

Nationalization involved a rupture of the security of captive markets enjoyed by Venezuelan iron ore in the U.S. market. The drastic cut in the U.S. demand for deliveries from Venezuela was partly a result of the worldwide steel depression, but in large measure also due to a lower priority afforded to the Venezuelan supply by the U.S. steel companies. The rupture, while painful to Ferrominera, widened the potential non-captive supply, thereby contributing in some limited measure to the price stability in the formerly extremely narrow non-captive market.[1]

Although its marginal costs have remained far below the prices received, Ferrominera has sharply cut its capacity utilization in response to the decline in U.S. demand. No attempt has been made to increase the company's European market share through aggressive pricing. A price cut by one seller would have led to matching price cuts by all others with everybody worse off than before. A warning example is the attempt by Canadian Quebec Cartier in the late 1970's to double its sales to Germany to 2 million tons by cutting the price. After signing the contract, the German buyers first used the agreement as a bargaining point with other sellers, to obtain lower prices. Having succeeded in that task, they refused to accept the increased volume of deliveries from the Canadian mine.[2] It is probable that a private profit maximizing company would have behaved no different from Ferrominera in the oligo-

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1) For a further discussion of this point see chapter 8.

2) Information from Ferrominera's sales division, confirmed by Malmexport AB.

polistic conditions characterizing the European iron ore supply. Ferrominera's unwillingness to increase sales by lower prices was reinforced by the government's conception of iron ore as a valuable resource that should be saved for national needs and not wasted on low-priced exports.

Alternative explanations can be offered for the absence of investments to increase Ferrominera's production capacity. The most straightforward one, equally applicable to public and private enterprises, is that when capacity is underutilized due to a slack in demand, investments will be directed towards reduction of costs, and not towards capacity expansion. In both types of enterprises, investments also tend to decline when profits are low. An alternative explanation is that the investment performance has resulted from the government's desire to integrate Ferrominera vertically with the national economy while reducing its role as exporter. The investment in transport facilities for domestic deliveries and the absence of investments in expanding or modernizing the export capacity fit this explanation. The present interpretation of the investment behavior, if correct, would be somewhat unusual for state mineral enterprises. It presupposes a national balance of payments that is strong enough to permit the government to neglect the export potential of its mineral enterprise. It is too early to judge which of the explanations presented here has the greatest validity. Only after a period of strong international iron ore demand and higher prices will it be possible to determine the driving forces behind Ferrominera's investment policies.

Appendix 6.1

Persons interviewed in Venezuela

Ferrominera:

Garnet Sankarsingh, Manager Administration
Gabriel Medialdea, Manger Operations
Diogenes Chollett, Deputy Manager, Sales
Cesar Alvarez, Superintendent of Mines, Piar Division
Eduardo Boccardo, Public Relations Department

Ministry of Planning (Cordiplan):

Maritza Izaguirre, Minister of State
Carlos Vargas, Director of Planning

Ministry of Energy and Mines:

Concepcion de Moreno, Director of Planning
Carlos J. Salaverria, Advisor Mining Department
Rafaelo Borghes, Mining Department, Projects Division

Other:

Argenis Gamboa, Private Consultant, Former President of CVG
Janet Kelly Escobar, Professor, Instituto de Estudios Superiores de Administracion
George Kastner, - " -
Enrique Viloria, Advisor, Petroven de Venezuela

CHAPTER 7. THE STATE COPPER INDUSTRY IN ZAMBIA[1]

A brief history of Zambian copper

The geographical area that now constitutes Zambia has been a very important copper producer since the early 1930's, when production started on a large scale. Over the past 50-year period, Zambian copper output has constituted, on average, about one tenth of the world total. Conversely, from 1932 onwards, the economy of Zambia has been completely dominated by the copper industry. For instance, between 1964 and 1970, this industry's contribution to GDP, government revenue and export proceeds averaged 44 %, 59 % and 95 % respectively. With the lower real copper prices that prevailed between 1971 and 1980, the average contribution of the copper firms fell to 20 %, 16 % and 93 % respectively.[2] Even at these lower levels, the dominance of copper and its byproduct cobalt in the national economy is overwhelming. In an international perspective the Zambian dependence on one industry and one product is quite extreme.

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1) The data upon which the following analysis is based have been obtained from material published in Zambia and elsewhere, as quoted, and, above all from a series of personal interviews during a two-week visit to Zambia in January 1983. These included representatives of the National Commission for Development Planning; the Ministry of Mines; ZIMCO, the state industrial holding company; and a number of members of the management team in the Zambia Consolidated Copper Mines (ZCCM), the 60 % state-owned sole copper producing company in the country. Appendix 7.1 lists the persons interviewed.

2) Zambian Mining Yearbook, 1973, 1980.

The early developments of Zambian copper have been described in detail elsewhere,[1] and will not be discussed here. At the time of Zambia's independence in 1964, the country's copper industry was controlled by British, South African and US interests, and managed by two groups, the Anglo American Corporation Group and the Rhodesian Selection Trust Group.[2]

Copper prices rose sharply about the time of independence, and remained high for almost ten years (see chart 7.1). In 1965, Rhodesia went ahead with its Unilateral Declaration of Independence. This led to a closure of the border with Zambia, and the copper industry experienced very severe transport difficulties for several years until the Tanzanian railway had been completed at the end of the decade. To assure uninterrupted operations, inventories in the companies were astronomically increased, and over a period copper had to be air-lifted to Dar-es-Salaam. Despite the ensuing higher costs, the years after independence were very profitable to the industry, and its contributions to government revenue were quite high.

Beginning in 1969, the government took several steps which have gradually extended its ownership and control over the copper industry. Two major motivations lay behind the desire to nationalize:

(a) Public ownership of the means of production was in line with the socialist political philosophy generally pursued by the government.

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1) See for instance S. Cunningham, The Copper Industry in Zambia; Foreign Mining Companies in a Developing Country, Praeger 1981.

2) A.D. McMahon, Copper, A Materials Survey, US Bureau of Mines, Washington DC 1965.

Table 7.1. Zambia in the World Copper Industry

	Mine production of copper		
	World thousand tons	Zambia thousand tons	Zambia's share of world, per cent
1935	1467	146	10.0
1940	1992	265	13.3
1945	2170	199	9.2
1950	2530	298	11.8
1955	3130	359	11.5
1960	4242	576	13.6
1965	5070	696	13.7
1969	5935	755	12.7
1970	6335	677	10.7
1971	6477	636	9.8
1972	7063	701	9.9
1973	7513	683	9.1
1974	7670	710	9.3
1975	7317	648	8.9
1976	7843	712	9.1
1977	7965	659	8.3
1978	7846	654	8.3
1979	7925	584	7.4
1980	7862	611	7.8
1981	8310	568	6.8
1982		614[1]	

1) Preliminary

Source: Zambian production 1969-1982 from ZCCM;
Other figures from Metallgesellschaft, Metal Statistics (Annual)

(b) The copper sector was so important to the national economy that foreign ownership and control was considered politically intolerable. National control of the copper industry was seen as a necessary prerequisite for genuine economic and political independence.

Subsidiary motivations for an expanded state involvement included the desire to increase the Zambian share of the mineral rent generated by the copper industry, to expand the opportunities for Zambians in the management of the copper companies, and to make the industry more responsive to national needs.

The following have been the main steps in the nationalization process:[1]

In 1970, the government acquired 51 % of the equity in the copper industry. The takeover involved a reorganization of the industry into two corporations, viz Nchanga Consolidated Copper Mines Ltd (NCCM) and Roan Consolidated Copper Mines Ltd (RCM). The government equity was ultimately held through the Zambia Industrial and Mining Corporation (ZIMCO), a 100 % government owned holding company entrusted with the responsibility of coordinating the government ownership interests in the industry. Payment for the acquisition had the form of interest bearing bonds. The former owners, Anglo American Corporation and Roan Selection Trust Ltd (RST) remained minority shareholders, and were entrusted with the managerial responsibility for continued operations, through elaborate management contract arrangements.

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1) Government of Zambia, Third National Development Plan 1979-1983, Lusaka, Oct. 1979; Zambia Mining Yearbook 1980; and ZCCM Annual Report 1982.

In 1974, after a premature redemption of the bonds issued in payment for the initial equity takeover, the government cancelled the management contracts with Anglo American and RST. As a result, NCCM and RCM became self-managing companies, with the chief executives appointed by the government. About the same time, the government also established the Metal Marketing Corporation of Zambia Ltd (MEMACO), 100 % owned by ZIMCO, and entrusted with the responsibility of marketing the entire output of NCCM and RCM.

In 1979, the government increased its equity share in NCCM and RCM from 51 % to just above 60 %. This came about as a result of a conversion into equity of government loans extended to the companies, to permit continued operations in the difficult period of low copper prices since 1975. In compliance with the companies' articles of association, the private foreign equity holders were given the offer, but declined, to contribute additional capital to keep their equity share unchanged.[1]

In 1982, finally, the government merged the two companies into a single corporation, Zambia Consolidated Copper Mines Ltd (ZCCM), in which it retained a 60 % equity holding. The last step did not involve any increase in government ownership or control of the copper industry.

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1) Interview with J. Mapoma, Director General of Zimco.

The operations of Zambia's copper industry since 1970

The present section analyzes in some detail the operations of Zambia's copper industry since the government took over majority ownership. I start by looking briefly at the way the government exercises its majority rights in controlling the industry and in setting its goals. Some of the causes of the stagnant production and sales since 1970 are then examined. The end of the section is devoted to a scrutiny of the industry's record with regard to capital composition, costs, profitability and investments.

Direction and professed goals

The direction and goals of the Zambian copper industry in the post-nationalization period have been shaped to a considerable degree by three intertwined circumstances. First, as already discussed, the industry is of overwhelming importance to the national economy. Second, in 1964, when the country gained its independence, qualified Zambian manpower was virtually non-existent. At that time, there was a total of 89 nationals with university degrees. Out of these, only three were employed in the copper industry.[1] Even in 1970, when the government took over the majority of the equity, the dearth of educated and experienced Zambians was so pronounced that a reasonable functioning of the industry was totally dependent on large-scale expatriate managerial and technical inputs. And third, in distinction from the Indonesian and Venezuelan cases, nationalization was not 100 %, and since the continued presence of the minority owners was seen as essential, the direction and goals of the industry had to give due consideration to their interests.

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1) Interview with D.A.R. Phiri, former Managing Director of RCM.

Thus, the decisions in 1970 to nationalize only partially, to seek an amicable agreement with the foreign owners who were asked to cede part of their rights, and to request them to continue their management responsibility must be seen against the importance of the industry to the national economy. The experienced foreigners had to stay in order to avoid the risk of wrecking the boat. The first step in the nationalization process had a limited impact on the fundamental policies of the industry. For this reason it may be appropriate to study the direction and goals of the copper industry as they have evolved after 1974, when the management contracts were discontinued and two Zambian managing directors were appointed by the government. Even in the post-1974 period, however, the three circumstances spelled out in the preceding paragraph, continue to exert a heavy influence on Zambian policy formulation in this field.

Since their establishment, the copper companies have formally been subsidiaries to ZIMCO, the state owned industrial holding company. In reality, the ownership rights have usually been exercised directly by the government. The three government bodies most immediately involved have been the Ministry of Mines, the Ministry of Finance and, to some extent, the National Commission for Development Planning, with the first probably playing the most important role. Thus, during a number of years, the Minister of Mines and his permanent secretary were chairman and member respectively, on the two companies' boards. Even though at times there has been less than full accord between the three government bodies involved, for instance in terms of production expansion plans, or tax versus dividend policy, the overall coordination has been assured by

the implicit participation of the President of the country in the formulation of key policies, or in board and top-level managerial appointments for the copper sector. Involvement in the industry's affairs by the highest political authority is not surprising, given the importance of copper in the national economy.

In practice, the size of the enterprises, the presidential support enjoyed by their chief executives and the technical competence of their staff, has given the copper industry a considerable independence and freedom of action not only in day-to-day affairs, but also in longer-term policy decisions.

The goals of the nationalized copper sector have never been spelled out in a full-fledged manner. From discussions with representatives of ZCCM and the government, it appears that although profit maximization is a key goal, due consideration is also given to employment. However, none of my interviewees was able to explain the operational meaning of the employment objective. One reasonable interpretation is that the industry has not been permitted to introduce labor-saving innovations, or to close down installations that would result in large-scale labor redundancies, unless it could provide alternative employment opportunities. The greater importance afforded to profit maximization as compared to PT Timah and Ferrominera, can be seen as a direct consequence of the desire to maintain a foreign ownership involvement in the industry. The foreign equity holders could hardly be induced to stay on, if the profit goal were subordinated to other objectives.

Other objectives receiving attention, but not clearly spelled out in operational terms, include Zambianization of managerial and skilled personnel cadres, and maximization of the industry's (presumably net) foreign exchange earnings.

The loose definition of the goals other than profit maximization, and the absence of well-defined trade-offs between them obviously leaves the management of the industry with very wide discretionary powers.

The record of production and exports

Even though copper dominates the output, it is not the sole product of the Zambian copper industry. ZCCM operates a lead and zinc mine (formerly owned by NCCM), and several byproduct metals including cobalt, selenium, gold and silver are extracted in the copper operations. Cobalt is by far the most important among the byproducts. Zambia's production of this metal in recent years has accounted for around 10 % of the world total. Table 7.2 gives a summary of the volume and value of the different products in recent years. 1979 and 1980 have not been included because the exceptionally high cobalt prices in these two years give a distorted picture of this metal's importance in total sales. It will be seen that copper normally accounts for 90 % or more of overall production value. Given the dominance of copper, the following account is heavily concentrated on this metal.

Domestic consumption of refined copper in Zambia is very small. It reached a maximum of 4000 tons in 1974, and has hovered between 2000 and 3000 tons per year in the late 1970's. This corresponds to 0.5 % or less of output.[1] Except for inventory variations, therefore, there cannot be any significant difference between production and exports in the Zambian copper industry.

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1) Metallgesellschaft, Metal Statistics 1982.

Table 7.2 The Zambian Copper Industry: Output and Sales Value of Metals

	Annual average 1974-78		Year ending March 1981		March 1982	
	000 tons	Share of value[1] per cent	000 tons	Share of value[1] per cent	000 tons	Share of value[1] per cent
Copper	674	92	598	89	570	89
Cobalt	1.7	3	1.3	5	2.3	6
Lead and zinc	62	4	44	2	45	3
Other metals	-	1	-	4	-	2
Total	-	100	-	100	-	100

1) Based on current selling prices

Source: Republic of Zambia Monthly Digest of Statistics January/March 1982.
ZCCM, Annual Report 1982.

As is apparent from table 7.1, production of copper in Zambia rose from 300,000 tons in 1950 to a peak of 755,000 tons in 1969, when the decision to nationalize was taken. This was in parallel with world output. At the time of takeover, the prospects for continued output expansion were viewed quite optimistically. A long-term projection published in Zambia's First National Development Plan (1966-1970) arrived at a production level in 1976 of 1.2 million tons. The Second National Development Plan, published in 1972, set the 1976 production objective at 900,000 tons, 30 % higher than actual output in 1972. This more detailed forecast was arrived at after consultations with the foreign managements of the two copper companies, and taking the planned investments in the copper sector into account.

In actual fact, the 1969 production peak was never again attained. The absolute output levels since that year show a falling trend. The result has been a significant decline in Zambia's share of world output.

The casual observer might conclude that there was a causal relationship between nationalization on the one hand, and the sharp turnaround in the output growth trend on the other, especially since the prospects for future production expansion looked so favorable. In all likelihood such a relationship does exist. A closer scrutiny, however, reveals several factors, completely unrelated to the national takeover, which contributed to the sharp deterioration in output performance. These will be presently analyzed.

The first factor was the serious accident at the Mufulira mine in September 1970, which reduced production in the short run by almost 100,000 tons per year. Prior to the accident, there were advanced plans to increase this mine's capacity from 165,000 tons per year, attained in 1969, to 190,000 tons by 1973. The accident resulted in a change of mining methods, and the former capacity expansion plans had to be revised on technical grounds. A result of this change was that by 1976-1977, when rehabilitation had been completed, output did not exceed 142,000 tons.

The second factor restraining output expansion, was a gradual realization, in the course of the 1970's, that the geology of the Zambian copperbelt was not conducive to economic copper exploitation at much above the 700,000-ton level.[1] Expansion beyond this level would result in fast increasing investment costs per ton of additional production capacity. The intricately shaped underground

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1) Interview with C. Belshaw, Consulting Mining Engineer and P. Freeman, Consulting Geologist with ZCCM.

ore bodies could not be exploited much above current rates without large-scale new investments to create additional access routes. Also, the faster depletion of the discrete ore formations would result in an uneconomically high rate of depreciation of the capital expenditure. According to my interviewees, the large capacity expansions projected in the first and second national development plans must have subsumed the discovery of new ore bodies and the development of new mines. For instance, the high production forecasts of both development plans included the anticipated output from the Lumwana deposit off the copper belt, containing upward of 1 billion tons of ore with about 0.9 % copper content. In fact no large-scale economic copper deposits have been identified in the 1970's, and no new copper mines have been opened. On closer scrutiny, the Lumwana deposit proved uneconomical, especially because of its very heavy infrastructural investment requirements. Retrospectively, therefore, the projections made in the development plans appear as grossly overoptimistic.

The third factor has had to do with the weakness in the copper market and the low price levels that have prevailed after 1974. Chart 7.1 depicts the development of copper prices in real terms since Zambia's independence. It will be seen that the average price level after 1974 has been less than one half of the average attained in the preceding ten years. The predominant contractual form under which copper from Zambia is sold is a one-year contract with prices closely related to those of the London Metal Exchange. Even though the demand for copper from Zambia has never constituted a binding constraint, (additional

quantities of the high quality Zambian output could always have been sold at the going price on the LME) the willingness and ability to expand supply was severly dampened after 1974 by the low price levels which reduced profitability and the cash flow required for investments. Thus, actual capital expenditure in the 1972-1976 period turned out to be almost 20 % below plan.[1]

Sharp reductions in the investment plans in the copper industry were not isolated to Zambia, but occurred worldwide. In 1974, the copper mining capacity of the entire Western World was projected to increase from an actual figure of 6.7 million tons in 1973 to 9.1 million in 1978, or by 6.2 % per year. The factual 1978 achievement was 7.5 million tons, implying an annual growth of no more than 2.5 %.[2]

The factors discussed above obviously explain part of the discrepancy between production plans and actual achievements in the Zambian copper industry, as well as of the country's falling share in Western World output. But other factors, related both directly to nationalization and to increasing bureaucratic constraints in independent Zambia also contributed to these detrimental developments. The latter factors will be further explored both in the present and in the following section. Already at this stage, however, my inability to assign relative weights to the factors considered should be admitted.

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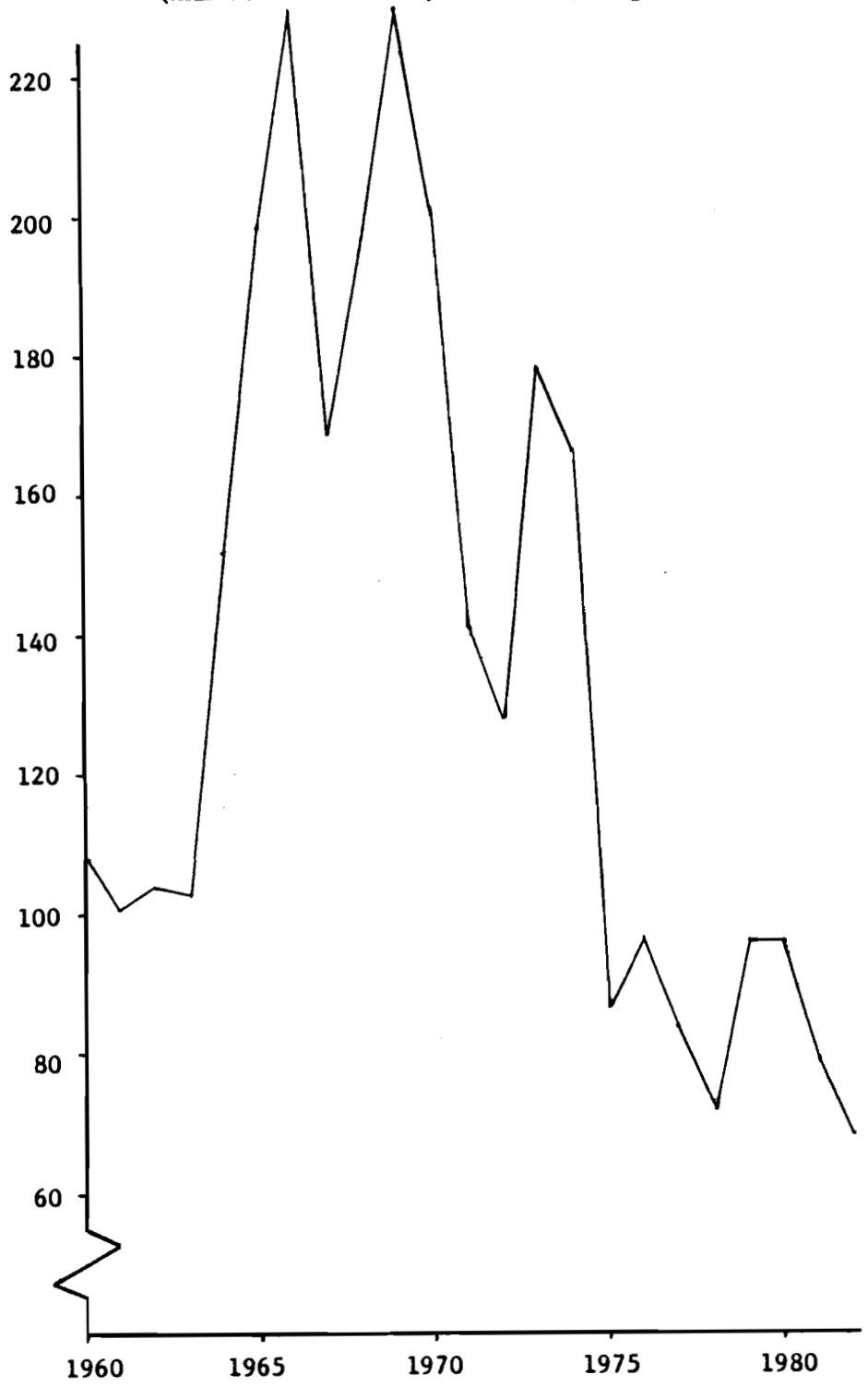
1) Government of Zambia, Third National Development Plan, op. cit.

2) M. Radetzki and C. Van Duyne, "The Response of Mining Investment to a Decline in Economic Growth: The Case of Copper in the 1970's", Journal of Development Economics (forthcoming).

Chart 7.1 **Copper prices, constant 1981 US cents per lb**
(LME Wirebars cash, annual averages)



Source: World Bank, Commodity Trade and Price Trends, 1982/83 Edition

The capital structure, profitability and cost developments in the copper industry

Most of the data that will be presented in this sub-section have been worked out in response to my requests, by the accounts department of ZCCM. The 1981 and 1982 figures are based on the ZCCM annual report for 1982, and refer to the accounting years ending 31 March. A majority of the figures for earlier years have been obtained by adding together the accounts of NCCM and RCM, whose accounting years ended on 31 March and 30 June, respectively. For simplicity I refer in the following to the accounting years as ending in March, the terminal accounting month for the bigger of the two companies. The figures, expressed in Zambian kwacha, have been converted to US dollars at the official exchange rates that prevailed on 31 March when accounting years are used, and on 31 December when calendar years are used. The World Bank's US dollar Manufacturing Unit Value Index CIF has been used as deflator to obtain constant 1981 dollars.[1]

The first set of data, displayed in table 7.3, provides information on the Zambian copper industry's capital structure. It will be seen that the state-owned enterprises started their existence in a very solid position, with no short term debt, and the long-term indebtedness representing less than 10 % of total funds employed. The solidity remained high through the high price period, but beginning in 1975 the companies started to borrow heavily to compensate for the sharply reduced cash flow consequent upon the fall in prices. While before 1975 practically all the loans were with credit institutions in Zambia, from then onwards substantial amounts have been borrowed abroad. Foreign borrowing amounted to $ 375 million in 1976 and to $ 412 million in 1982.

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1) See chapter 1.

Table 7.3 A Summary of the Zambian Copper Industry's Capital Structure.
Accounting years ending March; Million Dollars

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Short term debt	0	0	0	0	0	99	291	286	182	212	167	166	179
Long term debt	46	50	111	153	183	285	360	314	244	267	234	337	502
Own capital	585	707	771	942	1034	1113	1099	911	870	1209	1314	1349	1033
Total funds employed	631	757	882	1095	1217	1497	1750	1511	1296	1688	1715	1852	1714

Source: ZCCM

Table 7.4 presents a summary profit and loss account for the copper industry. It has not been possible to subdivide the aggregated "cost of sales" item into all its major components. Furthermore, there is a lack of consistency over time with regard to depreciation. From 1978 and onwards, depreciation has been charged against the operating results in accordance with standard procedures in the international mining industry. Until that time, however, expenditure on replacement of fixed assets was included in its entirety in the cost of sales for the year in which it was incurred. The impact of inflation should be noted when studying the figures. The values of the early 1970's have to be divided by a factor of 2-2.5, to make them comparable with the values of the early 1980's.

The copper industry's profitability has been closely correlated with copper prices. Until 1975 (March) the pretax profits yielded a return on shareholders' funds of between 25 % and 75 %. Since then, profits have been depressed or negative most of the time. The exception is 1980, when exploding cobalt prices enabled the companies to attain a pre-tax yield on shareholders' funds at 22 %.

Tax payments over the 12-year period covered by the table amounted to a total of $ 978 million. This constituted 46 % of net pre-tax profits, considerably below the nominal 73.05 per cent derived by a combination of Zambia's mineral tax and corporate income tax, often quoted in the literature.[1] Restitution of taxes during years of losses has resulted in total net tax

1) See for instance S. Cunningham, The Copper Industry in Zambia, Foreign Mining Companies in a Developing Economy, Praeger 1981, p. 192.

Table 7.4 Summary Profit and Loss Account of the Zambian Copper Industry. Accounting years ending in March; Million Dollars

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Gross sales	935	755	936	1493	1161	859	1028	807	1116	1329	1312	1061
Cost of sales	531	531	651	718	884	949	945	882	990	1045	1270	1247
of which:												
Depreciation	-	-	-	-	-	-	-	45	63	63	77	89
Interest payment, net	1	3	9	11	12	39	42	40	48	39	50	72
Devaluation loss	-	-	-	-	-	-	68	33	-	-	-	-
Profit before tax	404	224	285	775	277	- 90	83	- 75	126	284	42	-186
Tax paid (or recovered)	200	60	81	477	136	- 84	54	- 48	13	112	- 26	3
Profit after tax	204	164	204	452	141	- 6	29	- 26	113	172	68	-189
Dividend	102	80	105	172	37	0	0	0	6	29	11	0

Source: ZCCM

payments in the 1976-1982 period of no more than $24 million (equal to 13 % of net pre-tax profits over that period). After-tax profits, net, for the 12 years covered by the table amounted to $1326 million, of which $542 million (41 %) was distributed as dividend to equity holders. The share of dividends in after-tax profits declined from 43 % in the high profit period 1971-1975, to 29 % in the low profit period 1976-1982.

Given its aggregate nature, the summary profit and loss account presented in table 7.4 does not permit much analysis with regard to development of costs. However, the companies have for a long time separated out the costs attributable to copper, and subdivided them by stage of production. Presumably, these costs do not include company administration at headquarters, central services functions, sales commissions to MEMACO and interest charges.[1] The details of the data given, converted into current US cents/lb are presented in table 7.5. Summary series, expressed in constant 1981 US cents/lb are also given.

In the judgment of ZCCM's accounting division, about two-thirds of the free on rail costs are fixed in a one-year time perspective. It follows that variable costs, constituting one-third of free on rail costs plus the cost of transport, have been substantially below the LME prices over the period covered in table 7.5. On their own, the companies have not had any economic reason to reduce production below the technical capacity limit. At mid-year 1982, i.e. in the 1983 accounting year, not shown in the table, copper prices deteriorated further and stayed at a historically extremely low level for about half a year.

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1) World Bank, "Zambia - A Basic Economic Report, Annex I: Mining Sector Review", October 14, 1977.

Table 7.5 The Cost of Producing Zambian Copper.
Accounting years ending in March

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Copper output 000 tons	745	644	719	690	697	666	689	648	624	537	588	592
Current US cents/lb												
Mining	14.4	15.6	16.7	19.4	24.1	25.8	23.5	25.1	26.7	31.7	37.6	34.6
Concentrating	2.7	3.0	3.6	3.9	5.0	5.6	4.3	5.2	5.8	8.6	9.2	13.2
Smelting, leaching & refining	4.6	5.4	6.5	7.0	8.9	9.9	9.2	8.5	11.7	13.9	16.3	18.6
Administration and general	4.5	4.7	5.0	6.7	7.5	7.7	7.2	8.8	9.3	11.3	12.6	11.2
Total cost free on rail	26.2	28.7	31.8	37.0	45.5	49.0	44.2	47.6	53.5	65.5	75.7	77.6
Transport costs (preceding calendar year)	4.0	4.1	4.8	4.8	5.5	6.1	4.9	4.7	5.6	6.0	7.5	n.a.
Total costs CIF	30.2	32.8	36.6	41.8	51.0	55.1	49.1	52.3	59.1	71.5	83.2	
Constant 1981 US cents/lb												
Total cost free on rail	72.8	73.6	67.7	62.7	68.9	72.0	60.5	54.7	55.2	62.4	75.7	77.2
Transport costs (preceding calendar year)	11.1	10.5	10.2	8.1	8.3	9.0	6.7	5.4	5.7	5.7	7.5	
Total costs CIF	83.9	84.1	77.9	70.8	77.2	81.0	67.2	60.1	60.9	68.1	83.2	

Source: ZCCM; Zambia Mining Yearbook

Though the variable costs for copper production in ZCCM as a whole remained below average revenue in that period, the price proved insufficient to cover the variable costs of some of the producing units in the company. Production was continued at full technical capacity, however, both due to the social concern for employment, and because the economics of output reduction were uncertain, given the expenditure that had to be incurred for closing and reopening the high cost units, and the expected short duration of the extreme price trough.

The incompleteness of the data makes it difficult to draw any far-reaching conclusions on the development of costs. The low cost levels in 1977 through 1980 are explained primarily by a devaluation of the Zambian currency in mid-1976. The items included in the total cost free on rail, when measured in constant dollar terms, increased by less than 5 % from 1971-72 to 1981-82. At first glance, this appears to be an impressive achievement, given the continuous decline in the ore grades mined and the increasing depths from which the ores were extracted, even though the devaluation was of help in containing the dollar-denominated cost increase.

A point heavily stressed by many of my interviewees that may have contributed to the apparently favorable cost development is the gradual neglect over the period of low copper prices of maintenance and development expenditure in mines and plants. To limit the fall in declared profits or to reduce emergent losses, the companies have tended to cut those costs that, although indispensable in the longer term, could be deferred without impairing current production. Added to the problem of keeping up maintenance and development expenditure have been the restrictions of the Central Bank in allocating the foreign exchange

needed by the copper firms. Since 1975, therefore, the industry operates with an increasing pent-up spending need to make up for the accumulated negligence of earlier years. Even though it has not been possible to quantify the amounts involved, there is bound to be a significant jump in the cost level when that negligence is rectified.

The bureaucratic control of foreign exchange is also asserted to have led to an immediate reduction in efficiency. Allocations of foreign currency have not only been restricted but also delayed, thereby causing operational disruptions, for instance through the unavailability of spare parts. On many occasions the Central Bank directed the companies' imports to specific countries by providing only a particular type of currency. The use of exchange controls in this way to discourage imports from South Africa has forced the companies to redirect their purchases to higher-cost sources in other more distant countries. Apart from the direct increase in purchase costs, the Central Bank policy has resulted in longer delivery times and a greater diversity of equipment used. This has increased the cost of spare parts inventories, since the assortment needed to keep the equipment operational has been widened, and the more distant sources of supply have necessitated larger stocks of each item.

Both independence and nationalization have involved substantial changes in the labor situation in the copper industry. One key issue has pertained to Zambianization. Another has been that of simultaneous substantial declines both in labor productivity and in the real wage bill.

Table 7.6. Labor Force in the Copper Mines

	Local terms	Expatriate terms	Total
1965	39680	7040	46720
1970	44090	4380[1)]	48470
1975	52990	4500	57490
1980	55260	2490	57750
1982	54230	2050	56280

1) This figure is somewhat out of line. Both in 1969 and 1971 the number of expatriates was about 4750.

Source: Zambia Mining Yearbooks, several issues.

The Zambian government and the national management teams that took charge of the two copper companies in 1974, have had an ambivalent attitude to the expatriates working in the industry. On the one hand, the indispensibility of the skills and experience of the foreigners to assure efficient operation has always been admitted. On the other, there has been a continuous urge to reduce the dependence on foreign manpower, and to Zambianize at the fastest possible rate. At times efforts have been launched to slow down a foreign exodus that was considered too fast. At other times, the national and corporate policies have consciously aimed at speeding up the process. On some occasions, both aims have been pursued simultaneously.

Expatriates have been departing in large numbers ever since independence. Initially, the exodus was primarily motivated by the political uncertainty the foreigners felt about their own long-term role in independent Zambia. Later, the main reason became the gradual deterioration in their contract and living conditions. Under the circumstances, recruitment of new professionals to replace the ones leaving became difficult, and the

experience and quality of the ones that could be attracted, gradually declined. The desire to Zambianize explains the absence of clear-cut efforts to reassure the foreigners and to stop the deterioration in the remuneration packages offered to them.

By the early 1970's the reduced availability of suitably experienced expatriates started to affect production in an important way. The problem has been most severe at the very low managerial level of supervisors and skilled craftsmen. The versatile departing expatriates have been replaced by young Zambians with little practical experience, just out from crash training programs that equipped them with a very narrow range of skills. To manage the work routines, supervisory positions had to be doubled or trebled in many cases. Additional supervisory layers have also been established. Another consequence of the change has been a deterioration of the standards of equipment maintenance, resulting in increasing cost levels to keep the equipment working. The difficulties just described are said to continue in the early 1980's. Both Zambian and expatriate interviewees contend that a period of 20-25 years may be needed to bring up a generation of skilled and efficient Zambian craftsmen, supervisors and technicians.

The problems of Zambianization have not been as serious at higher technical levels, mainly because relatively few positions in these categories have been Zambianized. On the other hand, Zambianization of high level commercial, administrative and personnel functions has been quite common, and does not appear to have had detrimental consequences for operating efficiency.

The top management of ZCCM expresses a desire to stabilize the number of expatriates working with the company at about the current level. To limit a further exodus, the contracts

offered to expatriates were considerably improved in 1982, thus increasing the relative international attractiveness of employment opportunities in Zambia, for the personnel categories needed.

The reduction in labor productivity is shown in table 7.7. It results from a combination of increased labor force and stagnant or falling production. Interestingly, the large expansion in the number of employees occurred in 1973 and 1974 when the high copper prices undoubtedly reduced the pressures to contain costs. After 1974, the employment figure has remained within a narrow range. Productivity fell from 14.2 tons of copper per man year in 1969-1971 to 10.4 tons in 1980-82, or by 27 %. Three factors explain the fall. First is the lowering in ore grades, necessitating the treatment of larger volumes of material per ton of metal. In 1969 43 tons of ore were treated per ton of finished copper. In 1981, the figure had risen to 52 tons,[1] but the impact of this change should have been countered to a substantial extent by improved equipment and increasing mechanization. Second is the impact of Zambianization discussed in the preceding paragraphs. Third is the strong social and political pressure on the industry against labor force reductions. The high value attached to maintenance of employment in the goal hierarchy of the company is clearly reflected in my interview with one of the chief executives of ZCCM who stated that precisely because of the importance afforded to employment, he was not seriously concerned about the falling productivity in the copper industry since national takeover.

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1) Zambia mining yearbooks and ZCCM Annual Report 1982.

Table 7.7 Labor Productivity and Labor Costs in the Zambian Copper Industry

Calendar years

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Total employment 000	48.2	48.5	49.8	50.9	52.8	56.1	57.5	57.1	59.1	56.7	55.5	57.7	58.2	56.3
Labor productivity: Output of copper per employee, tons	15.7	14.0	12.8	13.8	12.9	12.7	11.3	12.5	11.2	11.5	10.5	10.6	9.8	10.9
Total employee earnings														
current dollars million	127	132	143	157	190	217	220	222	229	221	241	278		
constant 1981 dollars million	425	399	399	399	405	369	329	326	310	254	249	265		
constant 1981 dollars, index 1972 = 100	107	100	100	100	102	93	83	82	78	64	62	66		
Average employee earnings														
all employees, current dollars				3120	3690	3720	3600	5040	4640	3640	3930			
Zambian employees, current dollars				2240	2630	2640	2290	3510	3270	2880	3320			
all employees, constant dollars, Index 1972=100				100	99	80	68	93	79	53	51			
Zambian employees, constant dollars, Index 1972=100				100	97	78	60	90	78	58	60			

Source: Zambia Mining Yearbook, several issues; Zambia Monthly Digest of Statistics, Jan. 1977 and Jan.-March 1982; ZCCM.

While the labor force was increased over the period considered, the direct cost of labor has been substantially lowered, both in absolute amounts, when expressed in constant money values, and as a share of total cost. Measured in constant dollars, the total employee earnings in 1978-1980 were 37 % lower than in 1969-1971. The direct labor costs work out at about 27 % of total cost of sales in the 1972 accounting year. In the 1981 accounting year the figure is only around 22 %.

Table 7.7 also depicts the development of average employee earnings between 1972 and 1979. The figures show that the fall in labor cost is explained only to a minor degree by the substitution of Zambians for expatriates. The unit cost to the companies expressed in constant dollars, for hiring both Zambian and expatriate labor, fell by 49 % over the 7-year span covered by this series of data, and by 40 % if only Zambians are considered.

The employee earnings, like other cost figures for the copper industry have all been expressed in dollars. This appears to be the relevant approach so long as I look at the problem from the point of view of an industry whose entire earnings and most costs are incurred in covertible foreign currencies. What the figures say is that in one important respect the international cost competitiveness of Zambia's copper industry was substantially improved.

What counts from the employees' point of view, obviously, is the real earnings in local currency. Though the numbers differ somewhat, all the above conclusions remain unchanged. For instance, average earnings of all employees in the copper industry expressed in constant kwacha, fell by 35 % between 1972 and 1979.

The reduction in average real wages was not an isolated phenomenon for the Zambian copper industry, even though it was more dramatic there than in other activities. The average earnings of all employees in all industries fell by 21 % between 1972 and 1979, when measured in constant kwacha.

The substantial reductions in average real earnings of all employees in Zambia reflect the dominance of copper in the national economy. Mainly as a result of the lower copper prices since the mid-1970's, the country's real per capita GDP declined by 21 % between 1972 and 1979. This provides the major explanation to the downward adjustment in wages and salaries, not only of those working in the copper industry, but of the entire monetary sector labor force in Zambia.

The investment performance

The gross capital expenditures in the Zambian copper industry appear in table 7.8. One way of judging whether they are high or low is by relating them to the total funds employed by the industry. This is done in the table for the period of state ownership. The unsurprising finding is that investments were large in the period of high copper prices and profits, but that they fell to roughly half the earlier level after the price declined. Insufficiency of investments in the latter half of the 1970's may explain the upturn in the early 1980's. Maintenance of production may have necessitated expanded investments. Hence the recovery, despite continued low price and profit levels.

While my investment series stretches back to 1961, the one on capital funds employed does not go beyond 1970. To get an impression of the relative investment effort from the early 1960's,

the last column assesses the gross investment in constant money per ton of copper produced in each year. According to this measure it appears that investments were quite low until 1964, reasonably high in 1965-1970 and 1976-1980, and very high in 1971-1975 and 1981-1982.

A number of factors determine the volume of investment. The most important, both in private and publicly owned enterprises is probably the level of profits. The 1965 upward shift in the investments in Zambian copper is undoubtedly explained in the main by the sharp upward move in copper price levels in mid 1964, even though part of it might have been due to adjustments necessitated by the border closure with Rhodesia, following the latter country's unilateral declaration of independence. A similar coincidental movement between prices and investment levels, but in a downward direction, can be observed in the mid-1970's. However, the data also appear to lend some support to two hypotheses about state enterprise, formulated in earlier chapters.

Table 7.8. Investment Performance in the Zambian Copper Industry. Accounting years

	Gross investments current dollars million	Gross investments constant 1981 dollars million	Gross investments as a proportion of total funds employed, per cent	Gross investments, constant 1981 dollars per ton copper produced
1961	22	76		134
1962	25	87		153
1963	18	63		115
1964	14	48		83
1965	60	203		315
1966	53	170		248
1967	46	145		247
1968	22	74		120
1969	45	151		229
1970	69	208	10.9	275
1971	104	291	13.7	391
1972	111	282	12.6	437
1973	147	313	13.4	435
1974	158	269	13.0	390
1975	164	246	11.0	353
1976	132	194	7.5	291
1977	105	142	6.9	206
1978	123	141	9.5	218
1979	96	99	5.7	159
1980	110	105	6.4	196
1981	200	200	10.8	340
1982	273	272	15.9	459

Source: ZCCM

First, the increase in investments about the time of nationalization can be seen as a consequence of the disappearance of political risk which until then may have reduced the willingness of the private foreign owners to commit investment funds. And second, the failure to expand output in the years following nationalization, despite very substantial increases of both capital and labor reflects the cost of setting up the state enterprise, and of giving it the opportunity to gain the experience needed for efficient operations.

The distinguishing features of the Zambian copper industry under state ownership

In this section I explore whether the earlier parts of the present chapter provide support for the hypotheses about state mineral enterprise behavior, formulated in chapter 4.

Would a private multinational enterprise have behaved more flexibly with regard to capacity utilization than did the state-owned Zambian copper industry? There is only one instance of a clear-cut reduction in utilization of the technical capacity to produce copper in Zambia since nationalization. This happened in 1975, in response to the CIPEC decision of a 15 % production cut from the preceding year, to reverse the very sharp price fall that occurred in the latter half of 1974. The implementation of the decision was not particularly effective. In 1975, Zambia's output was 3 % lower than in 1974. The predominantly state-owned industries in Chile and Zaire, two other CIPEC members, reduced output by 8 % and 1 % respectively. The privately-owned copper producers in the US-Canada and Australia, responded individually to the price fall, without national or international

collaboration, by cutting their 1975 outputs by an average of 11 % and 13 % respectively.

Production in Zambia recovered in 1976, and full capacity utilization has been maintained since that time. The declining output in the late 1970's, therefore, was not due to restricted capacity utilization, but resulted from a reduction in the technical production capacity. Even in the latter half of 1982, when real prices fell to the lowest levels recorded since the Great Depression, and 25 % of Western World mine capacity had been moth-balled,[1] the Zambian industry continued to produce at the maximum technically feasible rates. The low level of variable costs, explained to a considerable degree by the fixed nature of labor costs, provides an economic rationale for the Zambian industry's behavior.

While the hypothesis of lesser flexibility in rates of capacity utilization is certainly confirmed when the state-owned copper industry in Zambia is compared with private enterprise in North America or Australia, one can only speculate about the behavior in Zambia, had the copper firms remained in private foreign hands. Given the industry's overwhelming importance to the national economy, it is quite conceivable that the government would have introduced labor legislation making labor virtually a fixed cost also to a private copper producer. Alternatively, to avoid the social and political strain of capacity shut-down, the government could have offered selective subsidies to the owners, to alleviate the risk of impending mine closures. Selective subsidies and tax exemptions are used precisely for this purpose

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1) Anthony Bird Associates, "Copper Analysis", London, June 1983.

by the government of South Africa in the 1980's, to keep the privately owned Anglo-American gold mines in uninterrupted operation when gold prices fall.[1] Similar government action might well have coerced or induced a privately owned copper industry in Zambia to maintain production at full capacity levels throughout the period of low prices.

The figures on capital expenditure presented in the preceding section do lend some support to the hypothesis that investments will be higher under state ownership than under private foreign ownership in a situation where the foreign owners feel exposed to political risk. However, the importance of this factor is difficult to determine with the data that are available. In the Zambian case, the copper price certainly appears as a far more important determinant of investment levels than the distinction between private foreign and public national ownership.

The analyses of the preceding pages are also consonant with the hypothesis that takeovers by state enterprise involve a substantial setting-up and learning cost which may have to be incurred over quite an extended period of time. The widely admitted loss of efficiency due to Zambianization that followed nationalization, and the coincidence of stagnant or falling production on the one hand and increased labor and capital inputs on the other, point in that direction.

Higher cost levels in state enterprise are not only a temporary phenomenon, according to the literature on the subject that was surveyed in earlier chapters. The mixture and unclarity

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1) Interview with C. Belshaw and P. Freeman of ZCCM.

of goals in state-owned industries typically result in permanently less pressure to minimize costs, as compared to private profit-maximizing units. Concern about employment and about providing social amenities to the employees and to the communities where they live is strongly emphasized by the management of the Zambian copper industry. Logically, profits ought to have been higher if the industry had not taken these social objectives upon itself. There need be nothing anti-social in a pure profit-maximizing goal for the Zambian copper operations. The higher profits that would emerge in the absence of wide social responsibilities could be spent in their entirety by the government to promote social development in the way it thought most useful. In fact, the copper industry does not appear as a particularly appropriate tool for employment creation, given its high capital intensity. Yet it continues to be entrusted with (or takes upon itself) social objectives apart from the profit maximization goal. In one executive's opinion, the reason for this pursuit of broader goals is that although not an appropriate tool, the industry may nevertheless be a more efficient instrument than the government itself, in accomplishing some of the social objectives.

It would follow from the above arguments that state ownership has resulted in higher costs in the production of copper, temporarily because of the costs of setting up the state enterprise and of giving it the opportunity to learn and gain experience; permanently because the wider goals lessen the profit maximization/cost minimization focus. While the features leading logically to higher cost levels can all be inferred from the earlier analyses, it is not possible to show in a clear-cut way that costs have actually increased in the period since the government took a

majority ownership position in the industry. But then, the available cost data are rough and incomplete. Furthermore, one could argue that the extended period of high copper prices just preceding nationalization led to a substantial organizational slack that would have been suppressed in the low price period, had the private owners remained, but that was not under the new less cost-conscious ownership.

All the conclusions formulated above, while reasonably supported by the data and arguments presented in this chapter, remain uncertain. I end the section with a further caveat to the hypothesized distinctions between state and private enterprise. The table below compares the progress of the Zambian copper industry in the period of state ownership with that of Phelps Dodge, a leading copper producer in the US. The reason for choosing Phelps Dodge among US copper producing firms is that Anaconda and Kennecott have been merged with petroleum corporations while in other potential candidates copper accounts for a relatively limited share of total turnover.[1] In many readers' view, the proposed comparison may seem far-fetched. The two firms differ considerably from each other in many respects. Most importantly, while copper mining, smelting and refining dominates completely in the Zambian industry, almost one half of Phelps Doge's sales stem from manufacturing. Yet, as the table shows, the similarities in terms of sales and share-holders' funds are striking.

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1) T.T. Tomimatsu, The US Copper Industry: A Perspective of Financial Health, US Bureau of Mines IC 8836, 1980, Table 9.

The period under scrutiny is divided in the table into the high-price period, ending in 1974, and the low-price period covering the subsequent years. If it is true that efficiency in the state-owned copper industry in Zambia has suffered from the temporary setting-up costs following national takeover of equity and management, and from the permanently reduced pressure to minimize costs, then the Zambian firms should have experienced a more severe relative profit deterioration than Phelps Dodge from the early to the late 1970's.

A first scrutiny of the figures does indeed suggest that this was the case. Zambian sales increased much less and the profit before tax deteriorated much more than in Phelps Dodge. In the early period the Zambian industry's pre-tax return on shareholders' funds was twice as high as in Phelps Dodge, but in the latter years the Zambian copper companies ended up with a return on equity much below that recorded by the US firm.

The argument so far has abstracted from the fact that Zambian copper is sold at LME quotations, while that of Phelps Dodge is typically transacted at domestic US prices over which producers have had a considerable leverage. The average levels for the LME prices and for the US producer delivered prices as reported by Metals Week (reproduced in Phelps Dodge's Annual Report) are given in the table. It will be seen that when measured in real terms, the LME price has experienced a much sharper deterioration than the US price.

In the three bottom rows of the table I adjust for the difference in the prices received, by recalculating the Zambian sales, profits before tax and profit rates, on the hypothetical assumption that all costs remained as they were, but that all copper

Table 7.9 A Comparison of the Zambian Copper Industry with Phelps Dodge

	Zambian Copper Industry accounting years ending March		Phelps Dodge calendar years	
	1971-75	1976-82	1970-74	1975-81
Shareholders funds at the end of each period, million dollars	1113	1033	892	1137
Sales, million dollars	5280	7511	4174	7850
Profit before tax, million dollars	1965	184	755	476
Average annual profit before tax for the period in per cent of shareholders' funds at end of period	35	3	17	6
Tax payments million dollars	954	24	254	81
Tax payments as % of profit	49	13	34	17
Profit after tax million dollars	1011	160	501	395
Average annual profit after tax for the period in per cent of shareholders' funds at the end of period	18	2	11	5
Average price, LME (Zambia) and US producer delivered price (Phelps Dodge), cts/lb				
current dollars	67.2	72.7	59.0	77.4
1981 constant dollars	163.0	87.3	145.8	93.5
Hypothetical figures for Zambian industry, assuming sales at US prices;				
Sales, million dollars	4636	7997		
Profit before tax, million dollars	1320	670		
Average annual profits before tax for the period in per cent of shareholders' funds at end of period	24	9		

Source: ZCCM; Phelps Dodge Annual Reports 1979 and 1981.

sales had been made at the average prices received by US producers. The picture that then emerges suggests quite similar sales growth for the subjects under study, and a reduction by two thirds in the before tax rate of profit from the high-price to the low-price period for the Zambian industry as well as for Phelps Dodge. The results may be regarded as an indication that the Zambian state-owned firms did not experience a loss in efficiency over the period under study, in relation to the developments in a leading US-based private copper multinational.

APPENDIX 7.1: Persons interviewed in Zambia

National Commission for Development Planning

Mr. L. Nkhata, Investment Policy Department
Mr. G. Chivunga, Mineral Economist, Sectoral Planning Department

Ministry of Mines

Dr. E.H.B. Mwanagonze, Permanent Secretary

Zimco

Mr. J. Mapoma, Chairman

Memaco

Mr. L.C. Mutakasha, Managing Director

University of Zambia

Dr. C. Chibaye, Dean Humanities Department
Dr. C. Mpaisha, Professor Public Administration
Dr. M. Kaniki, Professor Economic History

Other

Mr. D.A.R. Phiri, Zambian Ambassador to Sweden, former Managing Director of Roan Consolidated Mines Ltd.

ZCCM

Lusaka Head Office:

Mr. F.H. Kaunda, Chairman and Chief Executive

Mr. J.D. Chileshe, Director Industrial Relations
Mr. M.D. Sichula, Director Manpower Development and Planning
Mr. J.F. Godsall, Drector Corporate Planning
Mr. B.G. Moyo, Director Administration

Dr. E. Koloko, Deputy Director Corporate Planning
Mr. C. Belshaw, Consulting Mining Engineer
Dr. P. Freeman, Consulting Geologist

Copperbelt:

Mr. J.R. Hoatson, General Manager Nchanga Division
Mr. I.S. Blair, " " Mufulira Division
Mr. W.B. Eastwood, " " Nkana Division
Mr. J.C. Vergeer, " " Centralized Services Division

Mr. D.A. Lendrum, Mine Manager Nkana Division
Mr. E. McGuiness, Geologist, " "
Mr. A. Nelson, Accounts Manager, Centralized Services Division
Mr. L. Hewagama, Chief Accountant, " " "
Mr. G. Cutler, Manager Purchases, " " "

PART III. CONCLUSIONS

CHAPTER 8 CONCLUSIONS, GENERALIZATIONS AND PROSPECTS

This concluding chapter draws togehter the various arguments developed earlier in the book. The major findings are summarized, the hypotheses are reiterated and confronted with the empirical evidence contained in the case studies, and tentative conclusions are formulated. Though the empirical base supporting the conclusions is narrow and not always strong, an attempt is made to generalize the findings beyond the empirical ground covered, to encompass world mineral markets in general. The vista is also extended in time. Thus, past trends are combined with the hypotheses and conclusions about the present in an effort to derive some insights about the future prospects for international mineral markets in which an important state enterprise presence has become a permanent feature.

The growth of state enterprise

Work on the present book was started on the premise that state enterprise had become an important factor in developing countries' mineral industries. While bits and pieces of evidence to support the claim of a fast growing state owned mineral sector abound, I was unable to find any systematic and reasonably general evidence to support the above premise.

The detailed data presented in chapter 3 constitute my own attempt to measure the extent and growth of state ownership in the mineral sector. Table 8.1 provides a summary of the present status

in the three most important non-fuel mineral industries.

An important conclusion that emerges from the analyses of chapter 3 is the blurred nature of the state enterprise concept. The features that characterize state enterprises are the result of state control over the corporate activity. However, the degree of control is far from always uniformly related to the extent of state ownership. Given the difficulties in defining the concept and establishing the degree of control, empirical measurements of the size of the state enterprise sector are invariably based on the magnitude of the governments' equity ownership. Even with this simplification, the prevalence of state enterprise can be measured in at least three different ways, i.e. (a) as all production capacity in which the government has significant equity ownership; or (b) in which government has majority ownership; or (c) as that production capacity which is proportional to the government equity holding in each production unit. Table 8.1 demonstrates that the differences between the three measures can be quite substantial.

State enterprise in the mineral industries of the Western World is much more prevalent in developing than in industrialized countries, even though the latter have significant ownership positions in some minerals, e.g. aluminum and iron ore/steel. When state enterprise is measured as the capacity proportional to the government equity holding, the figures suggest that roughly one half of the non-fuel mineral industries in developing countries are government owned. The figure falls to about one third when the entire Western World is considered. These measurements clearly indicate that state owned enterprises constitute a very important factor in world mineral markets.

Public ownership of the mineral industries on a large scale in the Western World is a new phenomenon. As recently as the

Table 8.1 A Summary of Government Ownership Positions in Three Major Mineral Industries 1981[1]

	Aluminum (actual weight)			Copper (metal content)			Iron ore (actual weight)[2]
	Mining	Refining	Smelting	Mining	Smelting	Refining	
Western World							
Total capacity 000 tons, of which	92,500	30,790	14,040	7,820	8,780	9,120	543,000
Capacity with significant govt. ownership %	45.3	24.2	22.8	40.5	30.6	25.9	55.6
Capacity with majority govt. ownership %	23.2	13.2	19.4	34.7	29.7	24.3	n.a.
Capacity proportional to govt. equity holding %	27.8	15.1	18.5	32.4	26.1	21.6	40.0
Developing Countries							
Total capacity 000 tons, of which	54,000	6,530	2,190	4,120	3,340	2,580	216,900
Capacity with significant govt. ownership %	71.1	54.9	60.3	73.0	75.5	82.6	94.7
Capacity with majority govt. ownership %	33.3	12.3	45.6	62.0	72.9	77.0	n.a.
Capacity proportional to govt. equity holding %	41.1	21.1	44.7	57.8	64.0	67.6	61.8

1) Figures for aluminum refer to 1980.
2) The figures for iron ore are based on production and not on capacity.

Source: Tables 3.1 through 3.7.

mid-1950's, state involvement in this sector outside the Socialist countries was insignificant. At that time, the mineral industries of Africa, Asia and Latin America were completely dominated by privately owned multinationals from the leading industrialized market economies. The emergence and growth of state enterprise has been prompted by a variety of factors, but a major one has been the political independence and economic emancipation of the third world. Between 1960 and 1975 a substantial proportion of the total mineral industry in developing countries was nationalized. The motivations for takeover included claims that the colonial arrangements with the private multinationals left little benefit to the newly independent nations; convictions that economic independence was impingent upon government control of key economic sectors like minerals; and widespread socialist political philosophies according to which the major means of production should be publicly owned. Viewed in this light, the emergence of the state owned mineral sector in developing countries can to a large extent be seen as a one-time adjustment in the wake of economic independence.

My analysis suggests that the phase of fast growth has now ended, and that the proportion of state ownership in Western World mineral activity will not expand much above current levels. Several factors are supportive of this conclusion. First, as just noted, the adjustment to rectify the former unfavorable colonial conditions that prevailed in developing countries has probably come to an end. Relationships between governments of developing countries and multinational mining firms in the early 1980's appear much less conflict-ridden than 10 or 20 years earlier. The governments are anxious to maintain their involvements in the mineral activities, but not necessarily

to expand them above present levels. New projects are typically launched as joint ventures with one or several multinationals, with the government holding an important equity position, but not necessarily a majority one. Second, it would appear that in the 1980's socialism is less in vogue in the developing countries than it was in the late 1950's and 1960's, immediately after a majority of the countries in Africa and Asia gained independence. Over time ideology has come to play a lesser role and the ability to deliver the desired results has attained increased importance in the choice of ownership forms in the mineral industries. A third factor is the increasing sophistication of the private sector entrepreneurship and management in developing countries. The second and third factors in combination can be expected to lead to a greater role for private national enterprises in the continued expansion of the mineral sector activity in developing countries whose governments continue to have inhibitions to foreign ownership in base industries. The governments of industrialized countries appear disillusioned about the weak profit performance of the mineral industries that they already own. Fighting their swelling budget deficits, they would be reluctant to expand their ownership positions, both because of the expenditure that further acquisitions would involve, and to restrict their obligations to provide subsidies for future losses. In industrialized countries too, large scale expansion of state ownership in minerals is unlikely.

The above does not imply that the public ownership positions in mineral industries in industrialized and developing countries will be dismantled. But even though some limited expansion in the Western World state owned share may take place as a result of the continuing shift of mining and mineral processing towards developing countries,[1] the arguments suggest that the

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1) For evidence of such a shift see M. Radetzki, "Has political risk scared mineral investments away from developing countries?", World Development No. 1, 1982.

fast growth of the state-owned share is now over. The tentative conclusion is that in the 1980's and 1990's the expansion of state enterprise in Western World mineral industries will not be much different from the overall growth of the mineral sector. Hence, the functioning of the international mineral markets will continue to be conditioned by the presence of an increasingly mature group of state-owned mineral producers representing a substantial but relatively static share of world supply.

The difficulty of hypothesis testing

The basic premise of this book is that the emergence and growth of state enterprise does affect the international mineral markets in important ways. The major objective for undertaking the work has been to clarify what will happen to such market variables as supply, cost, price and investment, when state enterprise is introduced on a large scale.

A number of hypothetical conclusions about the market impact of state enterprises have been formulated in earlier chapters. They will be reiterated again and further discussed in the following section. Before doing so, however, I want to emphasize the tentative nature of most of these conclusions, and point to the severe difficulties in undertaking unequivocal empirical tests of their validity under present circumstances.

The subject matter of the present study is seriously underresearched. This is clearly apparent from recent works on international commodity markets. The presence of state enterprises is certainly admitted in such works, but the particular behavioral features of these enterprises are typically neglected. Thus, the

analyses of price and international supply regularly assume unmodified profit maximization behavior among all agents.[1]

One consequence of lacking earlier research in this area is that there is a serious dearth of data on state mineral enterprises in developing countries. Such data are required to confirm or refute the tentative conclusions about these enterprises' behavioral characteristics. The case studies presented earlier in the book provide a very narrow sample which is hardly adequate for formal testing, and quite weak as a base for informal generalizations. Many more similar studies would be needed to provide a firmer ground for the conclusions. It should be noted that a mere multiplication of case studies would not overcome one difficulty that emerged in my own work. In many cases, company records have not been properly kept during the period of serious operational disruption that has often followed nationalization. Among the cases presented here, this is most evident from the Indonesian study, where most operational data for the state owned tin enterprise prior to 1966 are simply not available. This difficulty will remain even if the number of case studies is multiplied.

The tentative conclusions about market impact subsume a clear-cut distinction in the behavioral characteristics between private and state-owned firms. But as noted in chapter 3 and in the preceding section, reality is much more blurred. A large part of the enterprises classified as state-owned will neither

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1) See for instance D.L. McNicol, Commodity Agreements and Price Stabilization, Lexington 1978; F.G. Adams and S.A. Klein, editors Stabilizing World Commodity Markets, Lexington 1978; and B.P. Bosworth and R.Z. Lawrence, Commodity Prices and the New Inflation, Brookings 1982.

be fully controlled nor fully owned by governments, and their behavior is likely to be somewhere between the two extremes posited in chapter 4. In addition, there is the problem that the growth of the state mineral enterprise universe has been coincidental with important changes in many countries of the social environment in which the private multinationals live and act. These changes have had an influence on the behavior of the private firms. In all likelihood the behavioral characteristics of private corporations have been shifted in some respects towards those of the state firms. This is certainly true of the employment policies. The freedom of the private multinational mining companies to fire workers in developing countries is much more circumscribed in the 1980's than it was in the 1950's. For these reasons, the distinction between the state-owned and private multinational firms will be much less sharp than would appear from the archetype discussions in chapter 4.

Finally, there is the difficulty that follows from the dynamics in the emergence of the state enterprise phenomenon. The tentative conclusions on market impact are based on the premise that state mineral enterprises can be divided into the mature and the inexperienced category, each with its own behavioral characteristics, and that the inexperienced firms undergo a maturing process at a speed that is difficult to determine. Given the recency of the wave of nationalizations through which a majority of the present state mineral enterprises were set up, a large part of this enterprise universe is still involved in the transition process towards

maturity. In this circumstance, it will be problematic to determine the fluid and changing behavioral characteristics of the aggregate state mineral enterprise universe at each point in time.

All the ambiguities in behavioral patterns described in the preceding paragraph make empirical tests of market impacts much more complex and uncertain than would appear from the analysis of chapter 4, where three categories of mineral firms each with a clear cut set of characteristics were identified, viz. (i) the private; (ii) the mature state owned; and (iii) the inexperienced state owned. While this simple categorization was instructive in bringing out the major implications of the emergence and growth of state enterprise, it should be clear that the real world developments are less distinct and determinant.

The market impact of state enterprise proliferation

Below I present a set of tentative conclusions on the market impact of the spread and growth of state-owned mineral enterprises. Though these conclusions follow logically and unambiguously from the behavioral assumptions about state enterprise, their nature remains tentative until formal empirical tests of their validity can be performed. More research and data collection are a necessary but not always sufficient condition for undertaking such tests. The empirical support for the conclusions that is presently available has an informal and qualitative character.

The first conclusion is that the establishment of state mineral enterprises has temporarily led to lower output levels

and higher prices than what would have prevailed with the old ownership patterns.

The setting up and learning costs after nationalization appear starkly in the portrait of the Indonesian tin industry (chapter 5), and are apparent also in the Zambian copper case (chapter 7). The loss of world market share is clearly evident in all three case studies contained in the book. The problems in maintaining full capacity utilization in the years after nationalization, and the difficulties to expand capacity, lasting for a decade or more following state takeover, are probably quite general phenomena in the mineral industries of developing countries. The logical consequence of this development is clear. Since the nationalizations and their consequences were by and large unexpected by the industry,[1] and given the long gestation period for new investments in the mineral sector, the shortfall in supply after the state enterprises were set up, could not be immediately compensated by the private industry. Hence prices must have attained higher levels than they would have in the absence of the nationalizations, until such compensation became possible or the nationalized firms acquired the ability to undertake investments in capacity expansion. With time, as the new state enterprises gained experience and improved the efficiency of their operation, costs would have declined and capacity expansion would be resumed. However, even the mature state mineral corporations have costs that are higher than the private multinational mining firms in similar circumstances.

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1) R. Vernon, Two Hungry Giants, The US and Japan in the Quest for Oil and Ores, Harvard University Press 1983.

The empirical verification of the temporary price consequences of nationalization is difficult because state takeover has been spread in time and because of the many other price affecting factors that may have been simultaneously at work. However, the exceptionally high copper prices in the 1964-1974 period, can be ascribed in some degree to the inability of Chile, Peru, Zaire and Zambia to expand capacity after partial or total nationalizations of their industries, and the ensuing conflicts between the four governments and the mining multinationals.[1] The average copper price in the 1964-1974 period was $ 1.85/lb (constant 1981 dollars), 60% above the $ 1.15/lb average that prevailed in the preceding 11 years. As argued in the work just quoted, the shift to the higher price was related to the fact that the four CIPEC countries' annual average output expansion between 1960 and 1974 was reduced to 2.7%, from an annual 6.2% in the 1950-1960 period (Western World output rose by an annual average of 4.7% between 1950 and 1960, and by 4.0% between 1960 and 1974).

The second conclusion is that the emergence of state enterprises has permanently stabilized output and destabilized prices in mineral markets. While the rationale for the state mineral firms' unwillingness to reduce capacity utilization in response to falling demand has been explored in some detail in chapter 4, the three case studies do not provide a clear-cut confirmation for the conclusion. The Indonesian tin deposits are low-cost, and

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1) For a discussion see M Radetzki, Long Term Copper Production Options of the Developing Countries, Natural Resources Forum No 1, 1977

the tin prices have been so high throughout the period of state ownership that full capacity utilization would in all probability have been rational even if the industry had been operated by private interests. The Venezuelan iron ore producer did contract capacity utilization after 1975, but this development was more due to the market disruptions following nationalization than a conscious measure aimed at maximizing profits in the wake of falling prices. Only the Zambian case provides some support for the thesis that state firms are less flexible than private ones in terms of downward adjustments of capacity utilization. The case study shows that Zambian copper output in 1975 fell much less than in several countries with predominantly private ownership.

Formal testing of the conclusion is difficult to perform. Defining output instability as the percentage deviation in output from its five-year moving average, L S Powers concludes that developing countries have on average had a somewhat lesser instability than industrialized countries for copper, aluminum, tin and iron/steel in the 1950-1977 period.[1] She hypothesises that this difference might have to do with the greater state involvement in these industries in developing countries. However, the Powers analysis is far too general to catch the issue presently in focus. First, there is no attempt to pick out the countries and periods during which the respective mineral industries were under public ownership. Second, the output instability

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1) L.S. Powers, "Instability in the Copper, Aluminum, Tin and Iron and Steel Markets", Materials and Society, No. 3, 1981.

measure provides an aggregate reflection of all the forces that induce output changes, and does not isolate the impact of price variations on output. And third, as admitted by Powers, the method used yields a high measure of instability for countries which have experienced a fast step-wise output increase, as new projects have gone into production. This instability obviously has nothing to do with the ability to adjust existing capacity to changing market circumstances.

Ideally, a test to verify the thesis that state mineral enterprises are less flexible than private firms in terms of downward capacity adjustments to falling demand would require detailed sets of data on capacity for individual firms or at least individual countries at each point in time. This would permit a determination of the extent of variation in capacity utilization over time. Though capacity is a vague and fluid concept, there are occasional studies of mineral industries that provide detailed capacity figures for an individual year. Such studies enabled me to construct tables 3.1-3.6 in chapter 3. But to my knowledge, comprehensive data of this kind, covering a long period of time have not been published.

My own, not very successful attempt at verification of the hypothesis, therefore, like that of Powers, relies on variations in output. In table 8.2 I compare six copper producing countries where the industry is predominantly publicly owned, with six others in which ownership is almost exclusively in private hands. The countries included accounted for over 80 % of Western World copper mine production in recent

years. Only the period from 1974 and onwards is covered. In the 1964-1974 decade, copper prices were so high that hardly any mines failed in covering their variable costs. In addition, the recency of many nationalizations would cause problems with the state-owned country group if the period of analysis were extended back far beyond 1974.

The table shows percentage decreases of output over the preceding year for each country. Unweighted averages of the decreases for each country group are also given. Increases in output are ignored on the presumption that they are dominated by expansion of capacity which is not a concern in the present investigation.

The average annual downward adjustment for the whole period is indeed greater in the private group (- 3.0%) than in the public group (- 2.4%). On the other hand, the public group shows larger downward adjustments in four out of the nine years. A closer scrutiny of the figures reveals Zaire and Zambia as the two countries in the public group that contributed most to the downward adjustment figures over the period studied. Further analysis demonstrates that demand and price conditions played a minor role for the output reductions in these two countries. Political upheavals in the Shaba province provide the main explanation for the recorded output reductions in Zaire. And, as noted in chapter 7, the almost persistent negative figures for Zambia reflect a falling trend in production capacity.

A study of negative deviations from trend instead of downward adjustments from the preceding year will solve the Zambian

Table 8.2 Downward Adjustment in Copper Mine Production; percentage change over preceding year

Countries with predominant public ownership	1974	1975	1976	1977	1978	1979	1980	1981	1982
Chile		-8.2			-2.8				
Finland	-3.9					-12.2	-10.5		
Mexico		-5.1			-2.8				
Yugoslavia				-3.2		-9.7		-5.0	
Zaire		-1.0	-10.1		-12.0	-5.4			-2.0
Zambia	-1.2	-3.0		-7.5	-2.8	-8.6		-1.4	-9.8
Unweighted average	-0.9	-2.9	-1.7	-1.8	-3.4	-6.0	-1.8	-1.1	-2.0
Countries with predominant private ownership									
Australia		-12.8						-8.2	
Canada		-10.7	-0.4		-13.2	-3.5			-10.0
Philippines					-3.7			-0.7	-5.9
South Africa					-3.1			-0.6	-1.6
Sweden	-9.4					-3.3	-6.6		
U S	-7.1	-11.5		-6.3			-18.2		-26.2
Unweighted average	-2.8	-5.8	-0.1	-1.1	-3.3	-1.1	-4.1	-1.6	-7.3
Copper prices constant 1981 US cents/lb	166.2	87.1	97.0	83.5	73.5	95.6	95.6	79.0	67.5

Source: Metallgesellschaft

problem just noted, but will instead introduce two other complications. First, this alternative method runs into the difficulty experienced by Powers, where high step-wise output growth gives rise to negative trend deviations. In my material this comes out most starkly in the case of Mexico. Output in that country jumped upward in 1980 when the large La Caridad mine went into production. As a result Mexico experienced sizable negative deviations from trend output in the 1975-1979 period, which obviously had little to do with demand and price in the international market. The use of deviations from trend also hits against the difficulty that in five out of the twelve countries studied, the computed trends over the period in focus (obtained on the basis of least square deviation) are not significant. The significance of trends might be improved by deriving them from data for a longer period of time. This too appears to be problematic, given the sharp and sudden deceleration in world economic growth about 1974, and the ensuing kink in the trend expansion of copper demand and supply.

Some of the problems discussed here could be overcome by concentrating attention on the years of significant price falls, the rationale being that downward output adjustments in other years cannot have been caused by falling demand and price. The price series given in table 8.2 shows 1975, 1978, 1981 and 1982 as the years that warrant special attention. Even then, the complications of political upheaval in Zaire and falling trend in Zambia remain. Furthermore there is the three-year cycle of labor negotiations in the US, which caused strikes and sizable output reductions in 1974, 1977 and 1980. In all certainty the downward adjustment of

output in the US to the fall in prices in 1975 would have been much stronger in the absence of the strike-induced contraction of 1974. Similarly, the downward adjustments in response to the price falls of 1978 and 1981 appear to have been implemented beforehand, by the strikes of 1977 and 1980. Finally, even when one concentrates on the years when prices fell, a key factor in the inter-country variation in downward adjustments of output will be the level of variable costs in each country's copper industry. Thus, the low costs in Australia as compared to Canada probably provide the major explanation to the lesser output adjustments in the former country. Cost levels probably also explain the variation in Chile's experience. Production was cut in 1975 and 1978 but not in 1981 and 1982 because dollar costs had been substantially reduced in the latter years by exchange rate adjustments. While instances of this kind can be provided, it is hardly feasible to isolate the impact of cost levels on the flexibility of capacity adjustments in each country, because of the deficient quality of the data on cost levels.

The above discussion shows some of the intricacies that will be encountered as one tries to verify the difference in output flexibility between state-owned and private mineral enterprises. There is a near-certainty that formal aggregate measurements of this difference will be heavily distorted by the circumstances explored in the preceding paragraphs.

The difficulties of verifying and quantifying the impact of state enterprise proliferation on output flexibility over the business cycle point to the even greater difficulty in formally establishing the relationship between the emergence of state

enterprises and price instability. The logic in support of such a relationship is clear. But the empirical data and the analytical tools available at the present time are not conducive to the establishment of a definitive proof that the proliferation of state mineral enterprises on a large scale has destabilized international mineral markets. Hence, my conclusion in this respect remains tentative.

The third conclusion is that the emergence of state mineral enterprises has permanently reduced the extent of vertical integration. This in turn has substantially widened and stabilized some formerly very thin arms-length markets, e.g. those for iron ore and bauxite.

Examples of nationalizations leading to broken vertical integration chains abound. Such breaks have been the rule in all cases where the nationalized units belonged to vertically integrated multinationals whose forward mineral processing facilities were located in their home countries. The Indonesian and Venezuelan cases provide clear-cut instances of such breaks. New mineral projects in developing countries, set up as joint ventures between the government and one or several multinationals, initially typically involve only mining. Even when the crude product is exported to one of the joint venturers, the vertical link with the foreign processing plant will be incomplete, since the other part owners will want a say in the commercial arrangements, and market-related prices have to be used to establish the 'true' profitability of the venture.

The conclusion that a widening of formerly narrow arms-length markets will stabilize the prices in such markets follows from general economic reasoning. Both buyer and seller can accept extreme

price levels without endangering the viability of their operations, so long as the volume of transactions at these prices constitutes a very small share of their total market exposure. But the price swings will be subdued as the arms-length market is expanded, since buyers as well as sellers will endanger their very existence by the price extremes when the transactions involve a sizable share of total trade. Hence, they will become increasingly reluctant to accept the full range of price variations.

Reduced price instability in an expanding arms-length market does not necessarily imply a greater sales price stability for an individual mineral producer. For while the price swings in the arms-length market subdue, they may nevertheless vary much more than the price movements under the captive market arrangements. The instability of the prices that a producer receives may therefore well increase as he transacts a growing share of his output in the arms-length market.

Formal verifications of the conclusion that price stability improves as marginal arms-length methods are widened, suffer from problems similiar to those discussed earlier in the section. It is quite possible that there has in fact been an increase in instability in such markets despite the stabilizing impact of market widening. This could come about because factors like the more complete synchronization of the international business cycle in the 1970's, or the lesser willingness of the growing state-owned sector to cut capacity utilization in response to falls in demand have had a stronger impact on price variations than the stabilizing consequences of market widening. A further problem is that the price movements in marginal arms length markets in the period

prior to the vertical integration ruptures are incompletely documented. There is very little systematic evidence of market prices for internationally traded iron ore before 1960, apart from the series for Swedish sales to Western Europe, which is somewhat special because of the close and long standing relationship between the supplier and the buyers. In the case of bauxite even in the early 1980's there is only scattered evidence of arms-length pricing. Thus, the two bauxite price series compiled by the World Bank in 1982 are (a) the US import price, which must presumably mainly reflect the accounting prices of the US aluminum multinationals and (b) a series derived from Jamaican production and transport costs, which strictly speaking is not a price series at all.[1]

The conclusion that the emergence of state mineral enterprises in developing countries will lead to a permanent reduction of vertical integration must be further justified. The rationale for this conclusion is that although the ruptured international vertical integration will be replaced to some degree by more forward processing undertaken by the state mineral company in the home country, the extent of this national vertical integration is unlikely to match the former levels attained under the multinational arrangements. This is primarily because of the strong commercial advantages in locating certain stages of mineral-cum-metal production close to the final consumers in industrialized countries. There have been some instances of the state mineral enterprises in developing countries going multinational by investing in processing facilities abroad.

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1) World Bank, 'Price Prospects for Major Primary Commodities' Report No 814/82, July 1982, For official use only

Examples include Codelco in Chile, Gecamines in Zaire and ZCCM in Zambia which have acquired important ownership positions in French and West German copper fabricating plants. These instances notwithstanding, the social roles that state mineral enterprises in developing countries are regularly given to play, would tend to make them more nationally oriented and hence less prone to go multinational than the large private mining concerns. These arguments provide a justification for the claim that the reduced degree of vertical integration caused by the establishment of state enterprises will remain a permanent feature.

The fourth and final conclusion is that the emergence of a state enterprise sector will lead to a relocation of investments in favor of mineral rich developing countries which for various reasons have been out of favor with the mining multinationals. In the longer run this should lead to a more economical global allocation of mining activities worlwide, and to a lowering of average and marginal costs of production. However the lowering of costs postulated here will be decimated or possibly even nullified by the additional costs incurred by mature state mineral firms in their pursuit of non-profit objectives, and by the generally lesser pressure to minimize costs in such firms.

The market impact implied in this conclusion will probably take the longest to work itself out. The relocation of investments will start to occur only after the state mineral firms have matured and developed a capacity to carry out investments. As noted before, this stage may not be reached until 10-20 years after nationalization in each case. Hence, it will probably take until the

1990's, before the market impact implied in this conclusion will become visible.

The four tentative conclusions about market impact follow generally from the behavioral assumptions for state mineral enterprises derived from the analyses in earlier chapters. Obviously there will be other, less general market impacts from the proliferation of state enterprises. Two examples may suffice as illustrations. First it can be reasonably hypothesized that the very high corporate concentration that prevailed in the bauxite/aluminum industry under the multinational regime will be reduced when state enterprises take over a significant share of the market. However, for minerals where country concentration happens to be greater than the initial corporate concentration, the introduction of state ownership, encompassing all the units operating in a country, would have the reverse impact. Second, in some cases nationalization of a mineral industry in selected countries could create enmities with the remaining private corporations that would effectively hinder international cartel action for a long time, while in others state involvement could constitute the very trigger for cartelization.

It may be instructive to end by summarizing the general implications for international mineral markets from the recent emergence and growth of state mineral enterprise in developing countries. The tentative conclusions formulated above suggest the following market consequences. There will be a period of higher costs and prices as the newly set-up state owned industries learn and acquire experience. The lesser flexibility of state mineral enterprises to adjust capacity utilization to shifts in demand will generally stabilize output and destabilize prices over the business

cycle. The establishment of the state owned sector will reduce the extent of vertical integration in mineral industries worldwide, thereby widening some formerly narrow arms-length markets, and stabilizing prices in such markets. After the state owned mineral firms have matured and acquired the competence to invest in new capacity, there will be a gradual relocation of global investments in the direction of mineral rich developing countries that have been out of favor with the private multinationals on fiscal or political grounds. The favorable cost impact of this investment shift will be decimated or nullified by the generally lower production cost efficiency in state-owned mineral enterprises.

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