Pierre Paquette
Department of Economics
McGill University

Master of Arts

Thesis Abstract

THE MINING INDUSTRY AND ITS CONTRIBUTION TO THE ECONOMIC DEVELOPMENT OF QUEBEC.

The growth of the mining industry in Quebec has been generated by external demand forces and by technological change in the extraction and processing of minerals in general.The staple model of growth complemented by the linkage apparatus is useful in examining the industry's growth and contribution to the economic development of the province.In retrospect,this contribution has been minimal relative to the benefits which could have accrued to the province as a whole.This notion holds whether one refers to backward,forward or final demand linkage.Three principal factors have been responsible for the lack of significant linkages with other sectors of the Quebec economy:the increasing capital intensity within the industry,the absence of adequate domestic (private and public)entrepreunerial initiatives,and of more importance,the industry's non-resident ownership nature.In the past.the role of government has been such as to prevent the mining industry's greater contribution to the overall Quebec economy.In a significant way however,solutions to the difficulties created by the industry's growth lie in the hands of the government sector it-

self,solutions which could provide the province as a whole with greater benefits from the exploitation of its mineral resources.

THE MINING INDUSTRY AND THE ECONOMIC DEVELOPMENT OF QUEBEC.

THE MINING INDUSTRY AND ITS CONTRIBUTION TO THE ECONOMIC DEVELOPMENT OF QUEBEC

BY

PIERRE PAQUETTE

A thesis submitted to the Faculty of Graduate Studies and Research, McGill University, in partial fulfilment of the requirements for the degree of Master of Arts in Economics.

Department of Economics
McGill University
Montreal, Quebec

April 1971

PREFACE

In the preparation of this thesis my principal debt of gratitude is to Professor Sidney Ingerman for his interest, encouragement and valuable comments. Thanks are also due to fellow graduate students, in particular to Mr. G. Wells for various comments on earlier drafts. Finally, I would like to thank Miss Dianne Clifford for efficiently typing the final draft and Mlle. Claire Legault for the typing of earlier drafts.

Pierre Paquette

McGill University, May 1971

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INTRODUCTION

This thesis deals with the Quebec mining industry. In particular, it isolates the factors which have been important in shaping the growth of the industry, and then evaluates its contribution to the overall development of the province. The relation of the growth of the mining industry to the development of Quebec as a whole is examined within the framework provided by the staple model of growth.

The mining industry holds an important place in the Quebec economy. In 1969, the total value of mineral production approached $800 million, this figure represented about 28 percent of Quebec's total primary production. In the area of employment, the industry provided jobs for about 25,000 workers.[1]

The main body of the thesis is presented in six principal parts. Chapter 1 traces the evolution of the industry within the North American environment. Chapter 2 presents the theory of the staple model of growth as originally formulated by H.A. Innis and W.A. MacKintosh and subsequently reformulated by M.H. Watkins and G.W. Bertram.

Chapter 3 evaluates the contribution of the industry to the overall economic development of Quebec. In so doing, use is made of the linkage concepts as formalized by A.O. Hirschman and employed by Bertram and Watkins in reformulating the staple growth model. Chapter 4 explores the question of non-resident ownership of the Quebec mining industry and the problems the latter has created for the Quebec economy.

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[1]The figures quoted are those for 1969; sources: Canadian Mining Journal, January 1970 and La Situation Economique, Ministère de l'Industrie et du Commerce, Québec, 1970.

In conclusion, Chapter 5 examines the role of government in the area of mineral resource development as it manifested itself in the past and could manifest itself in the future. In particular, it asks whether the granting of large mining concessions unaccompanied by properly specified industrial policies and economic goals, is the most effective method to use in attempting to accelerate the economic growth of Quebec through mineral resource exploitation.

A few problems were encountered during the writing of the thesis. These mainly concerned the unavailability of accurate and up-to-date statistics regarding various aspects of the linkage concepts as applied to the Quebec mining industry. Because of this, a second best solution was arrived at by using Canadian data, which in most cases adequately described the Quebec situation. Where up-to-date figures were unavailable, use was made of the most recently published data. It is hoped that the reader will keep these comments in mind while proceeding through the work.

CHAPTER 1

THE EVOLUTION OF THE QUEBEC MINING INDUSTRY

A. A Brief Historical Perspective

It has been suggested that the industrial revolution occurred on the North American continent in two related phases.[1] From a technological point of view, the first period, that of the nineteenth century, was characterized by the use of coal as principal source of energy and that of steel as the principal material used in construction. The Quebec region, due mainly to locational factors, was not endowed with these two resources. Coal was totally absent within the province and the most accessible deposits were located at too great distances. Although iron ores were present in abundance, they were unfavorably located given the transportation systems which existed.

The second period of the industrial revolution,that of the twentieth century, allowed many new regions to industrialize. In particular, this meant the development of industries based on iron and steel. The improvement and extension of transportation networks, permitted these regions to procure for themselves and under better conditions, the needed primary materials which had become strategic to the process of industrialization. The development of sophisticated tools for use in mineral resource exploration, combined with the emergence of new capital intensive reduction processes, significantly increased the availability of these primary materials, many of which had previously

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[1] See Mario Dumas, L'Evolution Economique du Québec: 1940-1965, in Economie Québécoise, Les Presses de L'Université du Québec, 1969, pp. 225-226.

been confined to marginal uses. Within this changing environment, the abundance of natural resources in Quebec provided greater opportunities for the industrialization of the province. Due however to the absence of a significant entrepreneurial and managerial class among the population, which was accompanied by the scarcity of capital funds and little scientific research, the Quebec economy was not able on its own to seize the opportunities open to it with regard to the development of its natural resources.

In the last half of the nineteenth and early beginning of the twentieth century, the structure of the Quebec economy was characterized by the growth of labor oriented industries (or what are also called the light industries). Over this period, the province had been faced with a rapid growth of its population; the latter coupled with some declining industries (e.g. wood, fur) created a surplus of labor which was absorbed mainly into the agricultural sector.[1] In the early years of the twentieth century, agriculture contributed about 65 percent of the total value of Quebec's production, while forestry and manufacturing contributed 25 and 4 percent respectively.[2] The type of agriculture which existed at this time provided little production surplus and for this reason, it was not favourable to the overall growth of the province.

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[1]The abolition of the system of imperial preferences in 1850 was the principle factor responsible for the decline in those industries which previously had assured Quebec relative prosperity. The production of wheat and timber for exports, for example, were adversely affected by the system's abolition. See A. Faucher and M. Lamontagne, in French Canadian Society, by M. Rioux and Y. Martin, McClelland and Stewart, Carleton Library, #18, (Toronto 1968) pp. 257-271.

[2]Figures from J.C. Falardeau, ed., Essais sur le Quebec Contemporain, Les Presses de L'Université Laval (Quebec) 1953, p. 28.

In manufacturing, the major part of that sector's work force was concentrated in the light industries; these have usually been characterized by many low paid workers and little mechanization.

Over the next few decades, the industrial structure of Quebec underwent notable changes. By 1920, agriculture had receeded in importance, contributing 37 percent to the total of Quebec's production; the manufacturing sector contributed 38 percent, while forestry and mining contributed 15 and 3 percent respectively. These trends gradually strengthened such that in 1940, the respective positions of these groups were as follows: agriculture 10 percent, manufacturing 64 percent, forestry 11 percent and mining 9 percent.[1] In the manufacturing sector, the light industries were again the most important as a percentage of total manufacturing activity. These industries included the following: clothing, leather, food and beverage, tobacco products and knitting mills. The heavy industries, those relatively more capital intensive, were concentrated mainly in activities related to primary manufacturing (e.g. pulp and paper).[2]

Over this period, the Quebec economy was quite lethargic compared with that of Ontario;[3] the latter seemed to follow much more closely the overall pattern of industrialization which had developed in the Great Lake's region on both sides of the U.S.-Canadian border. This pattern was one in which the more capital intensive industries had significantly grown in size and importance. Thus the Quebec region, up to the mid 1930's had not participated to any significant extent in what we

[1] Falardeau, op. cit., p. 33.

[2] For elaborations on the early structure of Quebec's manufacturing activity, see Economie Québécoise, op. cit., pp. 152-159.

[3] This is not to quibble with A. Raynauld's view, but mainly to emphasize the different growth patterns which occurred in the two provinces. For Raynauld's contribution see Croissance et Structure Economiques de la Province de Québec; Québec, 1961

previously referred to as the second period of industrial revolution.

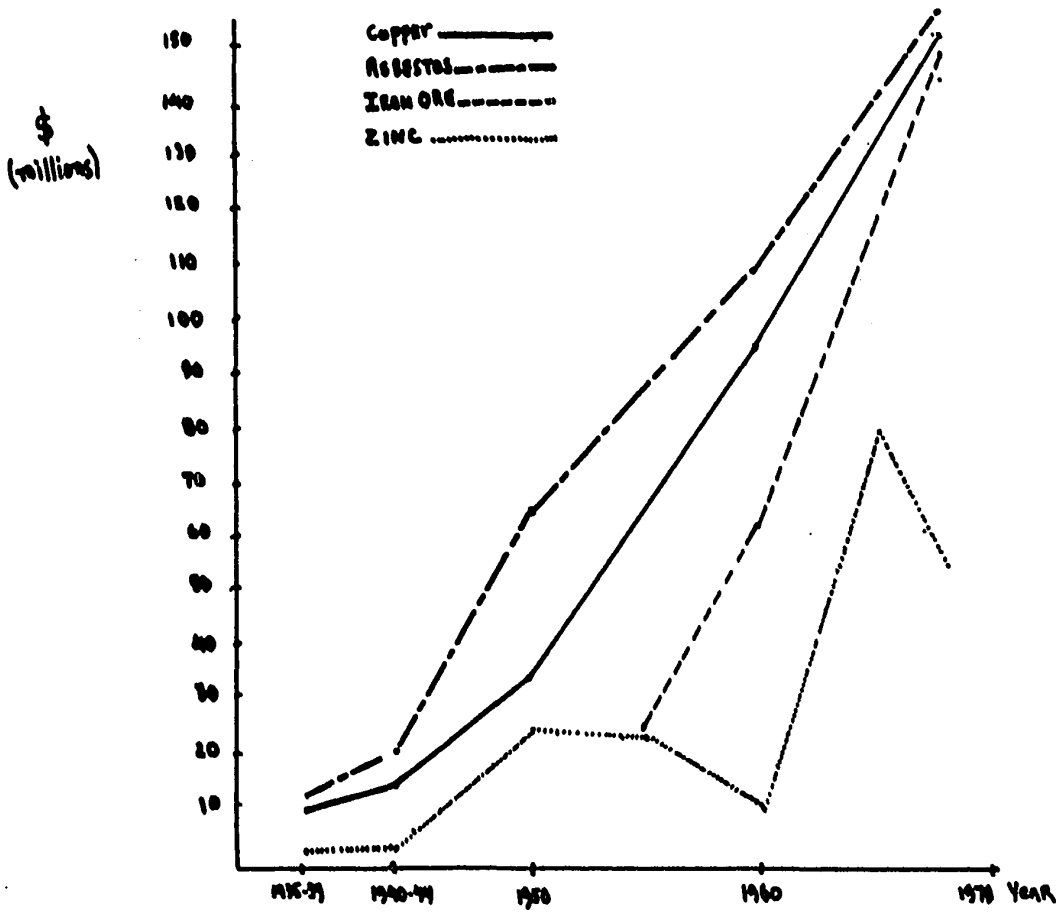
B. The Growth of the Quebec Mining Industry

The end of the nineteenth century saw the beginnings of the Quebec mining industry. It was characterized by many small operations using primitive extraction processes to meet purely local demands. In its early period therefore, the industry was of no great significance to the Quebec economy although the vastness of the region's mineral wealth was well known.

Quebec's participation in the North American industrial revolution began in the late 1930's and was characterized by developments related to its natural resources. Between the world wars, a rapid increase in the level of mineral exploration activity occurred in the province; this search for lucrative sources of supply was due to the increasing use of minerals in the modern economies and in particular, to the partial depletion and short supply of many minerals in the United States and eastern Ontario. The role of Quebec in this wider economic framework became that of a supplier of raw materials to the more industrialized regions of North America. Figure 2 shows the trend in the total value of mineral production in Quebec since 1900; it indicates that after 1940, there occurred a substantial accelaration in overall mineral exploitation. Figure 1 indicates that the principle minerals responsible for this rapid advance in production were iron ore, asbestos and copper.[1] The growth in the consumption of these three

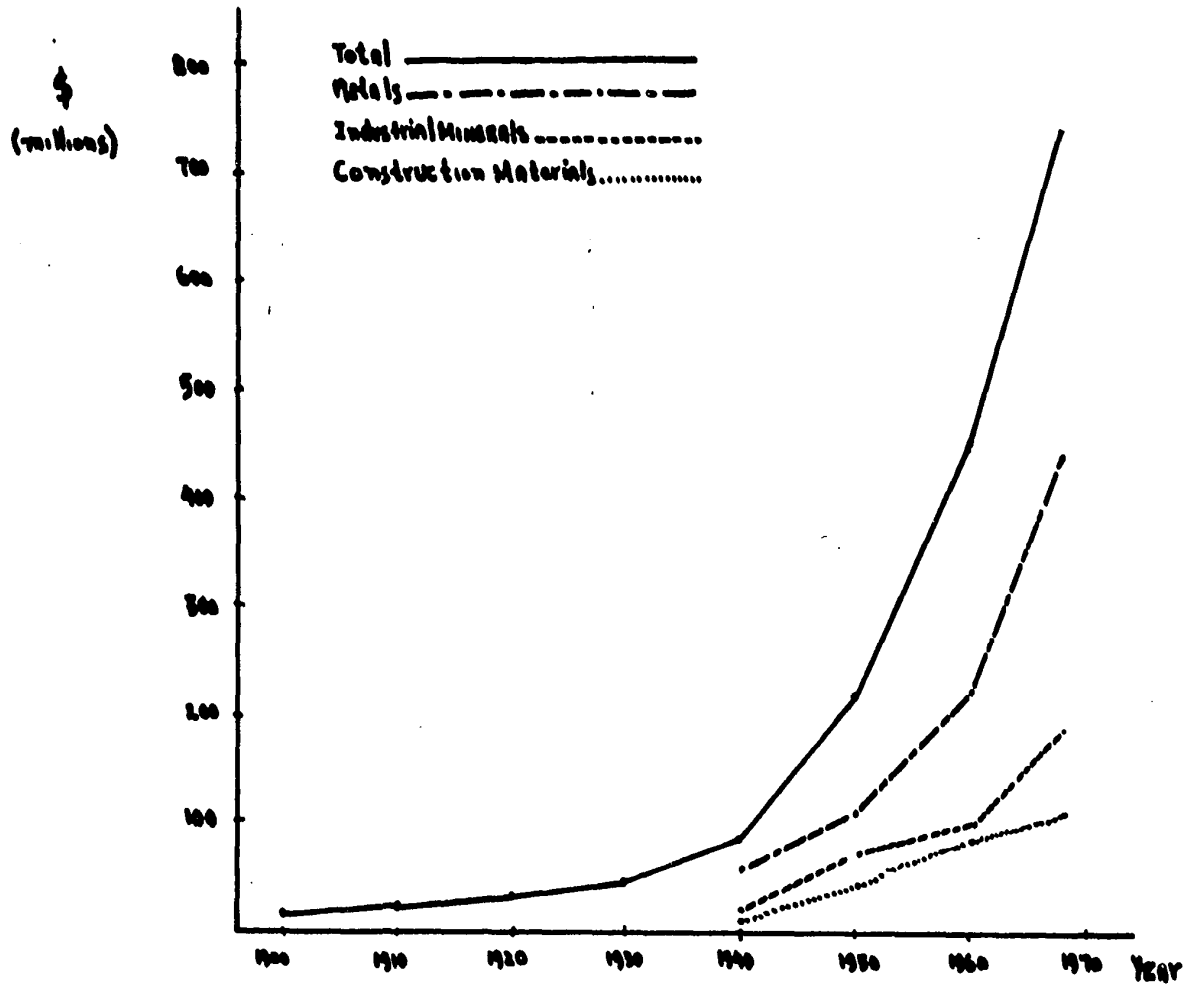
[1]It should be noted here that an important supply determinant responsible for the rapid increase in mineral production was the increasing sophistication of mining technology, which allowed large scale projects to be undertaken in new and established areas. The opening up of new areas did not follow a gradual progression, but rather took place by succeeding booms related to mineral discoveries.

FIGURE I : Value of Mineral Production, Selected Minerals, Quebec; 1936-1970.



Source: Statistical Year Book, Quebec 1956-57 ; Quebec Year Book, 1970.

FIGURE 2 : Value of Mineral Production, Quebec, 1900-1968.



Source: Statistical Yearbook, Quebec, 1956-1957 ; Quebec Year Book, 1970.

minerals over the period 1925-1955 is shown in Table 1; it indicates that in 1955 the North American consumption of these minerals was about four times the 1935 consumption level.

Tables 4 to 7 indicate the extent to which Quebec's mineral production has been exported in recent years; Table 4 shows that in 1962, over 95 percent of the iron ore and asbestos mined in Quebec was exported outside of Canada; the situation for copper was similar since in the same year, the exports of copper represented about 70 percent of Quebec's total copper production. This high proportion of exports to total production has not significantly changed since 1935. Table 8, for example, indicates that the high percentage of the Canadian production of asbestos and iron ore which has been exported has remained relatively constant since 1935; this can be taken as closely approximating the situation for Quebec since the province is an important producer of these minerals.[1]

The United States, being the principal North American consumer of minerals, has been the principal recipient of Quebec's mineral exports. Tables 5, 6 and 7 indicate that the largest proportion of asbestos, iron ore and copper exports have in the past been shipped to this country. Of significant interest in this regard is the fact that since the 1940's, the U.S. has been relying more heavily on mineral imports to satisfy her consumption needs.

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[1] In 1969, Quebec's share in the Canadian production of asbestos was 95 percent; for iron ore, the figure was about 55 percent; these percentages were calculated from data in Canadian Mining Journal, January 1970.

Table I : Consumption of Various Mineral Substances, Canada, North America, World; 1925-1955.

(in thousands of short tons)

	Canada	North America	World
Iron Ore			
1925	1.1	64.5	143.3
1935	1.1	36.6	127.9
1945	2.8	91.0	156.0
1955	5.6	129.5	340.4
Asbestos			
1925	-	-	-
1935	11	186	305
1945	26	404	557
1955	53	780	1543
Copper			
1925	13	714	1649
1935	43	484	1647
1945	90	1505	2373
1955	137	1583	3383

Source: Final Report, Royal Commission on Canada's Economic Prospects, Queen's Printer, Ottawa, 1957, Appendix E, tables XIV, XIX, XXV.

Table 2 : Potential Annual Supply of Iron Ore for the United States from Various Ore Producing Areas.

(in millions of long tons)

Ore Producing Area	1950-55	1955-65	1965-75[1]
Lake Superior	5	15	20
Labrador-Quebec	10	20	40
Venezuela	4	25	40

1. In 1968 the Quebec-Labrador area produced about 34 million long tons, most of which was shipped to the U.S.; data from Canadian Minerals Yearbook, 1968.

Table source: Based on data in Resources for Freedom, op.cit. volume #1, page 25.

Table 3 : Changes in Demand and in Trade Patterns Within North America for Various Minerals, Estimates to 1980.

	Increase in Demand 1955-57 to 1980 (% increase)	Change in Trade Patterns by 1980
Iron Ore		
North America	110	Moderate increase in imports
Canada	162	Very large increase in exports
U.S.A.	108	Large increase in imports
Copper		
North America	75	Large increase in imports
Canada	94	Large increase in exports
U.S.A.	73	Very large increase in imports
Asbestos		
North America	86	Moderate increase in exports
Canada	157	Very large increase in exports
U.S.A.	81	Very large increase in imports

Source: The Future of Industrial Raw Materials in North America, by W.G.Fritz, National Planning Association and Private Planning Association of Canada, 1960.

Table 4 : Estimate of the Quebec Production of Various Minerals absorbed by the Canadian Market 1960-62.

Mineral	Percentage
Copper	30-35
Iron Ore	4-5
Asbestos	Less than 5

Table 5 : Destination of Quebec Iron Ore Shipments Outside of Canada, 1962.

Country	Percentage
U.S.A.	92.5
England	3.5
Germany	3.1

Table 6 : Destination of Zinc and Lead Shipments from Quebec Outside of Canada, 1960-62.
(in percentages)

Country	Lead	Zinc
France	13.5	0.5
Germany	-	0.2
U.S.A.	76.4	94.6

Table 7 : Destination of Canadian Exports of Copper and Asbestos, 1952-59 Averages.
(in percentages)

Country	Copper	Asbestos
England	34.7	6.7
U.S.A.	48.7	65.8
Common Market	8.6	12.7

Sources for Tables 4-7 : P.E.Grenier, Le Développement Minier au Québec, Mimeographed paper, Department of Natural Resources, Quebec, 1967.

Table 8 : Canadian Exports of Various Minerals in Percentages of their Production, 1925-1965.

Year	Copper	Asbestos	Iron Ore
1925	100	100	-
1935	84	95	-
1945	62	94	70
1955	56	95	90
1965		95	86

Sources: Final Report, Royal Commission on Canada's Economic Prospects, op.cit., Appendix E, tables XIV, XIX, XXv, and Canadian Minerals Yearbook, 1968.

> "Until fairly recently, the growth in United States demand for metals was primarily met by increasing domestic production . . . Since the end of World War II, however, there has been a rapidly increasing reliance on imports, so that today the United States has become a net importer of the basic metals and their ores."[1]

By 1960, for example, the imports of iron ore, due to their higher grades[2], accounted for nearly 35 percent of U.S. consumption, those of copper about 45 percent and those of zinc about 60 percent.[3]

The role of Quebec in supplying these needed raw materials is also indicated by the fact that the most important sectors of the Quebec mining industry (i.e. iron ore, asbestos) are wholly or substantially integrated with manufacturing industries located in the United States.[4] This in turn, has been due to the shortage of U.S. domestic supplies of basic raw minerals. A report published in 1952 indicated substantial concern was being shown for the U.S. iron and steel industry, due mainly to the gradual exhaustion of the high grade iron ore supplies of the Mesabi mine range.[5] Since Quebec possesses relatively high

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[1] H.H. Landsberg, Natural Resources for U.S. Growth, published by Resources for the Future Inc., by the Johns Hopkins Press, Baltimore, 1964, p. 200.

[2] The grade of a mineral deposit may be defined as the actual metal content of one ton of mined ore; it is usually expressed in percentage terms.

[3] Figures from Landsberg, op. cit., p. 201.

[4] This situation is examined more closely in Chapter 3.

[5] Resources for Freedom (A Report to the President by the President's Materials Policy Commission), Washington, D.C., June 1952, Vol I, p. 25.

grade iron ore deposits, the report indicated that Quebec would become one of the major suppliers of iron ore to the United States. As Table 2 indicates, the report predicted that by 1975, about 40 percent of the U.S. supply of iron ore will originate from the Quebec-Labrador area.

Table 3 summarizes estimates of trade pattern changes for those minerals which Quebec is an important supplier. In most instances very large increases in exports have been forecast for 1980. Despite the lack of accurate trade figures, Table 3 does indicate that the export oriented nature of the Quebec mining industry is most likely to endure.

The Quebec mining industry has therefore evolved as a complement to industrialization occurring outside its political boundaries. Suitably located relative to water routes, railway systems and large industrial centers, the industry quickly developed into an export oriented activity, based mainly on U.S. raw material needs for defence production and durable goods consumption. In retrospect, it is this character of the Quebec mining industry which has been its principal weakness. Before elaborating on this view however, the following section presents the theory of the staple growth model.

CHAPTER 2

THE STAPLE GROWTH MODEL

The staple approach to the study of economic growth was innovated by the late Harold Innis who in his historical studies of the Canadian economy laid the foundations upon which this model was developed.[1] The staple theory of growth is essentially a theory of regional growth within the framework of an international or continental economy. It stipulates that the production of staple products mainly for exports is the leading force through which economic growth takes place. These staple products are identified as those obtained from agricultural and extractive industries which do not require elaborate processing before being exported. Innis concluded that the staple approach provides an appropriate framework to explain Canadian economic growth.

> "Canada has participated in the industrial growth of the United States, becoming the gateway of that country to the markets of the British Empire. She has continued, however, chiefly as a producer of staples for the industrial centers of the United States even more than of Great Britain making her own contribution to the industrial revolution of North America and Europe and being in turn tremendously influenced thereby."[2]

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[1] See his The Fur Trade in Canada: An Introduction to Canadian Economic History, University of Toronto Press, 1956; for many of his writings see Essays in Canadian Economic History, University of Toronto Press, 1956.

[2] H.A. Innis, The Fur Trade in Canada, op.cit., p. 386.

W.A. MacKintosh, another early exponent of the staple theory, concludes in a similar way:

> "The prime requisite of colonial prosperity is the colonial staple. Other factors connected with the staple industry may turn it to advantage or disadvantage, but the staple in itself is the basis of prosperity. The colonies of North America were fortunate in being capable of producing staples which for the most part found ready markets in foreign trade."[1]

The staple model, as articulated by these two Canadian economists however was not a theory of economic growth as we know it today, it was more a theory of economic history. The task remained therefore of linking economic history to the more modern theories of economic growth.

More recently, M.Watkins and E.W. Bertram, relying on the work done by many of their collegues in the fields of economic growth and development, have "reformulated" the staple model in more elaborate economic theory in attempting to accomplish the above task.[2]

Watkins takes the staple model as being a special case of a more general model, articulated by Kindleberger, where foreign trade is a leading sector of the economy.[3] In the leading model, it is held that autonomous foreign demand, typically accompanied by technological change

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[1] W.A. MacKintosh, Economic Factors in Canadian History, the Canadian Historical Review, Vol IV, No. 1, March 1923, p. 15.

[2] G.W. Bertram, Economic Growth in Canadian Industry, 1870-1915: The Staple Model and the Take-Off Hypothesis, Canadian Journal of Economic and Political Science, Vol. XXIX, No. 2, May 1963 and M.H. Watkins, A Staple Theory of Economic Growth, the same journal, Vol. XXIX, No. 2, May 1963.

[3] This model is one of three relating foreign trade and economic development. The other two are those where foreign trade is a lagging and a balancing sector; see A. Kindleberger, Economic Development, McGraw-Hill, 1965, pp. 304-313.

in the developing country induces the large scale production of export staples; this in turn may lead to industrial diversification around the export base. Three main assumptions are implicit in this last idea. First, the domestic market for the export staples must initially be limited. Second, the developing region must be properly endowed with the staple resources, such as to give it a comparative advantage in staple exports. Third, the resources themselves must be suitably located relative to their final destination; this means that transportation systems if not in existence must be capable of being built at costs which do not become prohibitive. Thus the necessary and sufficient conditions for use of the staple model are the presence of a sound resource base and large scale production oriented to export markets.

The growth of the Quebec mining industry fits well in the theoretical framework provided by the staple growth model. That the first necessary and sufficient condition is satisfied is unquestionable. Quebec has an exceptional abundance of mineral wealth; with the exception of bauxite which is imported for aluminum fabrication, the province possesses large reserves of almost all the common or rare metals. In all, about forty mineral substances are mined in the province. A good indication of the size of Quebec's resource base is given by estimates of known reserves. The latter do not indicate full potential but rather estimate the minimum amount of ore known to be commercially available at a given time.[1]

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[1] Estimates of potential ore reserves would be much higher than those for known reserves; potential reserves would include the latter as well as deposits the mining of which depends on better prices, advances in technology and lower transport costs.

The Gordon Report[1], for example, estimated that at 1955 production levels, Canadian reserves of asbestos would yield a 50 year supply, reserves for iron ore a 250 year supply and reserves of titanium would yield a 400 year supply.[2] Since Quebec produces most of Canada's asbestos (95 percent) and possesses the largest known iron ore deposits, as well as being the sole Canadian producer of titanium dioxide, the estimates given by the Gordon Report represent an adequate picture of Quebec's mineral wealth. A further indication of this can be gathered from Appendix 1 which contains a list of the province's principle mining operations together with their productive capacity. The second condition for the use of the staple model stipulates that the staple producing industries must be export oriented. Chapter 1 has shown that this condition is satisfied.

The success of the export staple as a growth inducing factor ultimately depends on its own characteristics. This point was made by Innis and was articulated by C.R. Fay as follows:

> ". . . the emphasis is on the commodity itself, its significance for policy; the tying in of one activity with another; the way in which a basic commodity sets the general pace, creates new activities . . ."[3]

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[1]See Royal Commission on Canada's Economic Prospects; Mining and Mineral Processing in Canada, by John Davis, Queen's Printer, Ottawa 1957, p.252-272.

[2]More recent estimates are substantially below those of the Gordon Report; in 1963 reserves of iron ore were estimated to provide a 125 years supply at 1963 production rates, those of asbestos, a 40 year supply. Source: Studies of the Royal Commission on Taxation, #8, The Taxation of Mineral Extraction, Queen's Printer, Ottawa 1966, p. 99.

[3]C.R. Fay, The Toronto School of Economic History, Economic History, III, January 1934, pp. 168-171.

Given the proper demand and supply conditions for the staple goods, the nature of the staple itself will broadly define the nature of the productive factors needed for its production (i.e. the types and quantities of needed inputs). Thus the basic determinant of required factor inputs is the export staple's production function. The production function summarizes the physical relations existing between inputs of productive factors and their related outputs. Given the staple demand and the usual assumptions regarding relative factor prices, the production function will specify the demand for those factor inputs. The information thus given by the production function also gives some insight regarding the income shares accruing to the staple's factors of production. For example, the use of a capital intensive technique of production implies that labor's share in the total income generated by the staple's production is smaller relative to that yielded by the use of a labor intensive technique. The nature of the staple product itself is further important for it determines the possibility of its further processing. The farming of wheat and the mining of iron ore for example, impart different conclusions regarding their possibilities of primary and secondary transformation.

Some staples due to their inherent nature are not growth inducing.

> "With regard to inputs, some export staples like the fur trade were not conducive to inflows of labor and consequent settlement; other staples such as timber and wheat had more favourable effects in encouraging labor inflow."[1]

Since the production of minerals provides an important element in contemporary industrialization, it may be suggested that the potential of the mineral industries for inducing overall growth is substantial. This potential will of course vary among minerals; the mining of iron ore for example, would likely have much greater potential for industrialization than the mining of soapstone or nepheline syenite.

The export staple's production function and the information it yields will therefore determine the potential degree of diversification around the export base or the potential range of domestic investment opportunities. Albert Hirschman has formalized three theoretical concepts which permit the potential inducement to domestic investment (resulting from the increased activity of the export sector) to be broken down into three spread or linkage effects. These are termed backward linkage, forward linkage and final demand linkage.[2]

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[1]Bertram, op. cit., p. 163, R.E. Baldwin, also makes this point when contrasting the different patterns of income distribution provided by different export staples, see Patterns of Development in Newly Settled Regions, Manchester School, XXIV, May 1956, pp. 161-179.

[2]See A.O. Hirschman, The Strategy of Economic Development; Yale University Press Inc., 1958, Chapter 6.

Backward linkage, to use Watkin's definition is a measure of the potential inducement to invest in the home production of inputs (which includes capital goods) for the expanding export sector. The export staple's production function, as mentioned, will determine the types and magnitudes of these inputs. Due to relative factor prices, the use of a labor intensive technique of production for example results in the use of less capital equipment per worker and therefore less capital investment per man compared to the use of a capital intensive production process. The use of the latter will therefore create greater incentives for investment in the capital goods producing industries. However if the required inputs are continuously imported, actual backward linkage will correspondingly be weakened.

Forward linkage is a measure of the potential inducement to invest in those industries which use the output of the export industry as an input. The main determinants of this second spread effect will be the extent of the foreign and domestic markets for the products of those industries created through forward linkage.[1]

Final demand linkage is a measure of the potential inducement to invest in domestic industries producing consumer goods for factors in the export sector. The main determinant of this third spread effect is the level of income (total and average) and its distribution, which in turn depend in part on the number of workers producing the export staples. Final demand linkage will be weakened to the extent that part

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[1]Given a limited domestic market, the nature of foreign tariffs may be such as to limit the economic possibilities of further processing in the domestic economy.

of the income accrues to non-resident factors (e.g. dividends paid to non-resident investors) rather than domestic factors; this however will be reduced to the extent that the former is taxed.[1] Watkins has noted other elements which tend to weaken actual final demand linkage, in particular he points out the expenditures incurred for capital imports:

> "Primary producers are notoriously susceptible to indebtedness, and the burden will be greater the more capital intensive the staple. Leakage can also result from wages paid to migratory labor and from immigrants remittances."[2]

On the positive side however, two forces tending to increase this third linkage are first, a more equal distribution of income, which by increasing the economy's propensity to consume, tends to create widely based domestic markets for the mass consumption of goods[3], and second, a low marginal propensity to import.

Up to now, we have seen that the potential strength of the linkage effects will crucially depend on the nature of the staple product. Furthermore, we have noted that many factors may prevent this potential from being realized, and thus many creative opportunities for domestic economic development may fail to materialize. Such would be the case in the absence of an adequate supply of domestic factors of production. Watkins has emphasized that an adequate supply of domestic entrepreneurship, both private and public, is crucial to the growth process.[4]

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[1] J.V. Levin makes this point in The Export Economies: Their Pattern of Development in Historical Perspective, Cambridge, Mass., 1960.

[2] Watkins, op. cit., p. 146.

[3] It is assumed here, that initially, the marginal propensity to consume is higher for low income groups.

[4] Watkins, op. cit., page 146.

Hirschman has also emphasized this necessity in permitting the general diffusion of entrepreneurial activity. In the case of the Quebec mining industry, these entrepreneurial functions have in the past been undertaken by non-residents. It may be suggested that without these non-resident contributions, the industry would not have developed to the extent that it has in the past. But as Hirschman points out, the non-resident domination of entrepreneurship may lead to the establishment of "enclave export industries" which may have "trouble breaking out of the enclave situation".[1] This means that the creative opportunities for domestic industrialization may be frustrated by the absence of indigenous entrepreneurship. Thus the effectiveness of non-resident entrepreneurship in exploiting domestic opportunities is questioned, but even if domestic entrepreneurship is forthcoming, it may not be effective due to a lack of complementary factors (i.e. labor and capital, both domestic and foreign).

Another factor which may mitigate against the promotion of domestic industrialization is what W.T. Easterbrook calls an "inhibiting export mentality" which results in an overconcentration of efforts in the export sector;[2] H.W. Singer has articulated this point as follows:

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[1] Hirschman, op. cit., pp.110-115.

[2] See W.T. Easterbrook, Uncertainty and Economic Change, Journal of Economic History, XIV, Autumn, 1954, pp. 346-360; and The Climate of Enterprise, American Economic Review, XXXIX, May 1949, pp. 322-335.

> "Good prices for their primary goods, specially if coupled with a rise in quantities sold give the necessary means for importing capital goods and financing industrial development, yet at the same time they take away the incentive to do so, and investment is directed into an expansion of primary goods production . . . when prices and sales fall off, the desire for industrialization is sharpened. Yet, at the same time, the means for carrying it out are sharply reduced."[1]

Given that these pitfalls are avoided, growth in the long term will depend, to use Kindleberger's term, on the region's "capacity to transform" (i.e. enough innovation to delay diminishing returns and resource mobility to permit shifts into new export and/or domestic markets).

We have seen in this section that it is possible to apply the staple model of growth to the Quebec mining industry since the model's initial conditions have been satisfied. Given that the character of the staple is growth inducing, the model stipulates that the production of export staples can potentially lead to overall industrialization. Further, we noted that the linkage apparatus is a useful theoretical construct for classifying the areas where industrial diversification can potentially occur. Finally, we noted that although a potential for industrialization may exist, its realization crucially depends on the absence of inhibiting factors. The theory of the staple model complemented by the linkage apparatus is used in what follows in evaluating the contribution of Quebec mining industry to the industrialization of the province.

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[1] H.W. Singer, The Distribution of Gains Between Investing and Borrowing Countries; American Economic Review, Volume XL, May 1950, p. 482.

CHAPTER 3

THE CONTRIBUTION OF THE MINING INDUSTRY TO THE ECONOMIC DEVELOPMENT OF QUEBEC

The inducement to industrialization provided by the emergence of an export oriented staple industry depend on the potential strength of the industry's linkage effects. The nature of the staple product itself (i.e. its production function in particular) is fundamental in determining the range of investment opportunities through which these spread effects manifest themselves. This section assesses the contribution of the mining industry to the economic growth of Quebec. First, the potential linkage effects, as dictated by the nature of the product (i.e. mineral resources) will be discussed and secondly an attempt will be made to evaluate whether or not this potential has been achieved.

It may be mentioned before proceeding, that it is difficult to accurately quantify these spread effects since in many instances cause-effect relationships are difficult if not impossible to establish. I refer here to the multiplier - accelerator mechanism implicit in Hirschman's linkage concept.[1] The fact that spread effects may occur simultaneously is another aspect of this problem to which a solution is difficult; linkage effects should therefore be seen as theoretical constructs useful in understanding the growth process and not as concepts amenable to accurate measurement.

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[1] For a discussion of this aspect of the problem see K. Buckley, The Role of Staple Industries in Canada's Economic Development, Journal of Economic History, XVIII, Dec. 1958, pp.429-450.

The growth of the Quebec mining industry, as seen in Chapter 1, has been conditioned, on the demand side, mainly by external or non-resident needs for Quebec's mineral resources; on the supply side, technological change within the industry has been the principal conditioning factor. Caves and Holton, in their study of the Canadian economy, conclude that the growth of mining in Canada provides a clear case of "the joint work of the forces of technology and rising demand".[1] The present discussion relating to technology will mainly emphasize its role in delimiting the linkage effects of mineral production, rather than emphasize its role in supply creation. The story of the input requirements of various staple producing industries, as determined by the latter's production functions, provides a clear picture of the relation between these production functions to general patterns of economic development, as determined by the relative strength of our three linkage effects.[2] In this way, we can look at the technology of modern mining and acquire some knowledge as to the potential linkage effects which could have occurred and then compare these to historical realities.

A. Backward Linkage

The potential strength of backward linkage depends on the magnitude of investment opportunities in the domestic production of inputs for the expanding export sector. Generally speaking, backward linkage will tend to be strong where the input requirements of the

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[1] Richard E. Caves, Richard H. Holton, The Canadian Economy: Prospect and Retrospect; Harvard University Press, 1961, Chapter 2.

[2] See R.E. Baldwin, op. cit., pp. 161-179.

industry involve resources and technology which allow their domestic production. Before elaborating on the extent of backward linkage with respect to the capital and labor requirements of the Quebec mining industry, a brief discussion on the changing nature of mining technology is presented.

The capital and labor requirements of mining technology have undergone significant changes over the years. Mining technology today is quite capital intensive compared to other industries,[1] but this has not always been so. The techniques of production first used in mining operations were largely labor intensive, but with the gradual transition from selective to non-selective mining, which itself resulted from the visions of increasing returns to scale, the technology of mineral resource exploitation became increasingly capital intensive. This transition involved a change of emphasis, for it replaced the selective picking of mineral ores by the individual miner with non-selective mechanized mining methods. This in turn could be accomplished because the newer large scale processing techniques were designed to account for either the chemical or physical properties of the desired metal. These new processing techniques allowed the mineral ores, with all their impurities and waste rock, to be fed directly into the processing machinery without losing any of the final product. The earlier processing methods had mainly relied on the skill of the miner himself in selecting only those rocks which seemed to have a high mineral content. Gradually, however,

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[1] In the Quebec mining industry today, it is necessary to invest about $100,000 to create one job, compared to an average of $50,000 in manufacturing; source: Le Développement du Nord du Québec, La Chambre de Commerce de la Province de Québec, 18 mars 1970, p. 25.

as greater emphasis became placed on the processing facilities, the miner himself became less important to the whole mining and extraction process.

The trend of output per unit of labor input has become a conventional way of showing the impact of changes in technology over time. Table 1, which presents the principal statistics of the Quebec mining industry since 1935, can be used to illustrate the increasing capital intensity of mining operations. Using employment figures as a proxy for labor input and value of production in constant prices as a proxy for output, we have calculated that output per unit of labor input increased by a multiple of six between 1935-1968. Thus it would be reasonable to conclude that the principal force behind these significant productivity increases (i.e. increasing output per unit of labor input) was the application of capital intensive mining technology (i.e. an increasing use of capital per unit of output). Another factor, although less important, which also allowed these significant productivity gains, was the more extensive application of improved exploration technology. The latter allowed the discovery and subsequent mining of higher quality mineral deposits.

It should be noted that increasing productivity has, in the past, been a more notable characteristic in the growth of resource industries than other areas of economic activity. Between 1926-1955 for example, productivity increases in the Canadian economy ranged from a high of 143 percent in resource industries to a low of 27 percent in the trade sector;

Table I : Principal Statistics of the Quebec Mining Industry, I935-68.

Year	Employment	Salaries and Wages (millions$) (includes milling)	Value Production (millions$,I935-39 prices).(I).	Output/Man (constant dollars)	Value Output (current millions$)
I935	I0,573	II.I	29.I	2,754	27.9
I940	I8,20I	24.0	82.7	4,546	87.7
I945	I6,I40	27.I	80.I	4,965	9I.5
I947	I8,727	36.9	84.7		II6.0
I948	20,232	45.2	94.5		I52.2
I949	I9,299	47.0	98.9		I65.I
I950	20,770	54.I	I24.6	6,002	220.6
I954	22,887	77.8	I36.7		278.9
I955	24,428	87.7	I84.3	7,544	357.5
I960	22,256	97.7	2I6.8	9,735	446.6
I963	22,689	II9.I	255.0		544.2
I965	23,587	I29.6	3I9.5	I3,645	7I5.9
I966	24,398	I42.0	33I.7		763.9
I968	23,564	I54.4	298.5	I2,7I3	73I.3

Sources:Annuaire Statistique duQuebec,I970;General Review of the Minerals Industry,I963,D.B.S.Cat.#26-20I;Employment and Average Weekly Wages and Salaries,I955-68,D.B.S.Cat.#72-002;Croissance et Structure Economique du Québec,Department of Industry and Commerce, Quebec,I96I.
(I).Wholesale price index numbers for iron,non-ferrous metals and non metallic mineral products were used to get value of production in real terms.D.B.S.,Price Indexes,I936-68,Cat.#62-50I and 62-20I were consulted in this regard.

Table 2 : Wage Earners on Surface,Underground and Mill:Metal Mines,Quebec,Canada;I939-65.

Year	Surface		Underground		Mill	
	Quebec	Canada	Quebec	Canada	Quebec	Canada
I939	4442	23,0I8	4267	26,530	6I5	3750
I94I	n.a.	25,940	n.a.	28,388	n.a.	4I98
I945	2039	9,837	3288	I5,750	5572(I)	I7,073(I)
I95I	2395	n.a.	5628	n.a.	803I(I)	n.a.
I955	3592	I5,540	5427	26,522	I0,748(I)	4564
I960	4I24	I6,039	5208	30,774	I464	6I64
I962	4255	I5,I97	5I40	27,959	2054	6504
I965	3708	I4,562	5253	26,055	2I4I	8433

Source:General Review of the Mining Industry,various years, D.B.S.Cat.#26-20I.
(I).Includes non ferrous smelters and refineries.
n.a.:not available.

over the same period, productivity in the manufacturing sector increased by 97 percent while in the services sector, it increased by about 57 percent.[1]

(1) backward linkage: capital input requirements

In its earlier period, the Quebec mining industry exerted relatively strong backward linkage since it required and secured the services of relatively large quantities of domestic labor complemented with light equipment. These spread effects however, were not conducive to industrialization since they provided few opportunities to develop capital goods industries (i.e. heavy industries). With the transition to non-selective mining methods, Quebec's potential for industrialization had become significantly greater since the use of capital intensive mining techniques created the need for capital intensive industries to produce heavy machinery and equipment for use in mining operations. This greater potential for industrialization was not realized however, owing to the environment within which the industry developed.

The Quebec mining industry evolved largely as a result of non-resident entrepreneurship and capital. Appendix I, for example, indicates that the largest mining operations in Quebec are undertaken by non-residents; included in these are the Canadian Johns-Manville Corporation and the Iron Ore Company of Canada. The reasons why the inflow of non-resident factors occurred are of secondary importance in the present discussion, but what is important is the effect non-resident factors had in establishing the present pattern of mineral resource exploitation. Since non-resident factors promoted the

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[1] Figures from H.D. Woods and S. Ostry, Labour Policy and Labour Economics in Canada, Toronto; 1962, p. 403.

growth of the industry, it was quite natural that the inflow of entrepreneurship and capital bring with it the inflow of technology. Thus the pattern of mineral resource exploitation which developed in Quebec during the inter-war period, has been one in which the importation of capital goods for use in mining operations, prevented any significant backward linkage in the area of domestic capital input production.

> "Canadian mining technology drew very heavily on the United States since 1890; American skills in the manufacture of heavy machinery plus American experience in mining a wide variety of materials has produced a continuous stream of improvements most of which were adapted to domestic use."[1]

It has been estimated that in the early 1950's, the import content of machinery, equipment and construction materials for the average Canadian mining project stood at about 25 percent of total outlays on such goods.[2] Although accurate data on this matter is unavailable, the corresponding figure for the Quebec mining industry would be significantly higher due principally to the following factors. First, Quebec has always occupied a marginal position relative to Ontario, for example, in the production of machinery and equipment. In 1966, total employment in machinery industries, excluding those producing agricultural implements was 39,913 in Ontario, while in Quebec the figure reached 13,761.[3]

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[1] Caves and Holton, op. cit., p. 37.

[2] Davis, op. cit., p. 319.

[3] Source: Manufacturing Industries of Canada, D.B.S. cat. #31-205, 31-206; 1966.

Second, the Quebec mining industry is significantly more non-resident owned than the Canadian average.[1] Finally, it has also been recognized that non-residents have a greater tendency to import needed equipment and supplies than resident owned mining establishments. Tending to support the latter view is a recent study which indicated that U.S. subsidiaries in the Canadian mining industry obtained about 80 percent of their imports from U.S. parent companies.[2]

Three more general factors may also be noted here in explaining the existence of barriers to entry in the capital goods industries. First, is the lack of a well developed domestic capital market; this factor has prevented the pooling of sufficient domestic capital for use in the domestic economy by domestic residents.[3] Second, and perhaps most important, is the lack of domestic entrepreneurship, both private and public. The third, is the U.S. tariff structure which has been biased against U.S. imports of capital goods; this structure, by reducing the extent of domestic manufacturing markets has prevented the achievement of economies of scale in the domestic production of capital goods.

Since mining establishments are relatively more capital intensive than those in other industries, they correspondingly have greater tendency to undertake expenditures for the acquisition of capital goods. Over the period 1950-54, outlays on capital goods represented

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[1] For estimates and some discussion, see below page 64.

[2] Kari Levitt, Silent Surrender, MacMillan of Canada, Toronto, 1970; p. 119.

[3] An excellent discussion of this point can be found in Québec-Presse, December 20, 1970, pp. 2B and 3B, which examines a study by Rosaire Morin, member of the Conseil d'Expansion Economique du Québec.

about 16 percent of net value of production for the Canadian mining industry as a whole. For the total of Canadian manufacturing, the comparable figure was 11 percent.[1] If we use this figure, such expenditures for the Quebec mining industry amounted to $43 million in 1950 and $72 million in 1967. The previous discussion would tend to indicate that a substantial proportion of these outlays, between 25 and 80 percent but probably much closer to the latter, have resulted in leakages from the domestic income stream and have therefore contributed to weaken the strength of backward linkage.

> " . . . because of the rapid expansion of the resource industries with high capital requirements, Canada is at least as dependent on imported machinery and equipment today as she was in the boom of the twenties."[2]

The benefits of backward linkage, as far as the production of capital goods is concerned, have therefore not accrued to the Quebec region but in great part have benefitted the U.S. economy, which produces and exports those capital goods.

(2) backward linkage: labor input requirements

Preceding the transition to non-selective mining methods, labor needs were relatively high; thus increasing mineral exploitation meant increasing employment opportunities for the surplus labor originating from the declining and marginally productive industries (e.g. shipbuilding and agriculture). Over the years, however, the labor requirements of the mining industry have gradually decreased. This trend

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[1] Davis, op. cit., p. 321.

[2] J.D. Gibson, The Changing Influence of the United States on the Canadian Economy, Canadian Journal of Economics and Political Science; Vol. 22, No. 4, Nov. 1956.

can be observed more closely by looking at output and employment figures in Table 1. Between 1945-1968, employment in the Quebec mining industry increased by 46 percent while output per man increased by 256 percent. The period 1955-1968 coincided with the rapid emergence of the iron ore industry. The growth of this sector has significantly contributed to that of the mining industry as a whole.[1] Looking at this later period, Table 1 indicates that total employment in the mining industry remained relatively constant, while output per man increased by 168 percent. These figures therefore, tend to indicate that the direct employment creating effects of the mining industry have gradually declined, owing mainly to the increasing capital intensity of mining operations.

The fact that total employment over the last decade had remained relatively constant means that the employment opportunities provided by the industry's more rapidly growing sectors (e.g. iron ore) equalled the opportunities lost from the more stagnant sectors (e.g. gold). In order to determine direct employment potential for the future, it is of interest to examine more closely the industry's most dynamic sector (i.e. iron ore), which began producing in 1954 and, in terms of production value, has grown rapidly ever since. Table 3 summarizes employment and output data for the iron ore industry of Canada;[2] using these figures, we have calculated that between 1956-1966 employment in

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[1]The reader may refer back to Figures 1 and 2 in Chapter 1, which illustrate the contribution of Quebec's iron ore sector to that of the province's total mining activity.

[2]Since we will deal here with percentage figures and not absolute magnitudes, the percentages mentioned can be taken as corresponding closely to those of the Quebec iron ore industry which contributes about 50 percent to Canada's total iron ore industry. Actual employment in Quebec's iron ore sector would therefore be about half the figures shown in Table 3.

Table 3 : Selected Data of the Canadian Iron Ore Industry, Various Years.

Year	Tonnage Mined	Total Employment	Tonnage per Man Year
1956	4568	3352	1363
1957	6410	4304	1489
1958	9457	4032	2349
1960	13957	6315	2210
1962	33776	8114	4163
1963	50523	7787	6462
1964	69188	8053	8592
1965	84019	7680	10689
1966	100097	9816	10197

Source: Manpower Requirements of the Canadian Mineral Industry, September 1967; by The Canadian Institute of Mining and Metallurgy; Appendix #2 page II.

Table 4 : Relationship of Current Requirements for Additional Manpower to Employment, Quebec Mining Industry, 1966.

	Added Requirements	Employment	Requirements as a % of employment
Mining Engineers	50	289	17
Geoscientists	26	97	27
Metallurgists	42	92	46
Other Engineers and Scientists	31	345	9
Other Professionals	192	521	37
Semi-Professionals	442	3225	13
Non-Professionals	1150	22734	5
Total	1933	27160	7

Source: Manpower Requirements of the Canadian Mineral Industry, op.cit.page 60.

that sector increased by 263 percent while tonnage per man year, which is used here as a proxy for output per man, increased by 748 percent. These figures however need to be interpreted with care. The first years of the interval, (1956-1960), coincide with the industry's initial construction phase. Correspondingly, employment over those years nearly doubled while tonnage per man year increased by only 60 percent. Over the later years of the interval however (1962-66), after production facilities had been installed, employment rose by merely 20 percent while tonnage per man year more than doubled. Thus, in breaking down the original time period, as has been done here, it is observed that an increasing labor force has not been primarily responsible for increasing production levels. On the basis of these figures therefore, we are led to suggest that in the future, increasing production levels in the industry's most rapidly growing sectors should be accompanied by less than proportional increases in employment opportunities. Tending to support this view is the fact that total employment in Quebec' metal mines, which includes iron ore, has not significantly changed since 1939. Table 2 presents employment data relating to Quebec's metal mines. In 1939, the total number of wage earners employed stood at 9,324; by 1965 this figure had increased by 1,778 to reach a total of 11,102. Thus over the period 1939-1965, the average number of new jobs created in this important sector of the industry was about 65 per year; between 1960-1965, the corresponding figure was 61 jobs per year. This discussion is meant to emphasize once more that the direct employment creating effect of mining activities have not been substantial in the recent past and should not be substantial in the future due mainly to the greater mechanization within the industry.

Backward linkage with respect to labor inputs, although declining in magnitude over the years, has in the past been relatively strong, in the sense that the greater part of the industry's labor force has been composed of domestic residents. The aggregation of employment figures conceals the changing structure of the mining industry's labor force and owing to the increasing technological sophistication within the industry, a larger percentage of the industry's new manpower needs have comprised professionals and semi-professionals. This can be observed from Table 4, which summarizes data relating manpower requirements in the Quebec mining industry to actual employment in 1966. The last column of the table shows the requirements for additional manpower as a percentage of employment for various job categories. The highest percentages are obtained in the categories which comprise metallurgists (46 percent) and other professionals (37 percent). The lowest percentage is obtained in the category comprising non-professionals (5 percent). This changing character of the mining industry's labor force is important when seen in the context of non-resident ownership. Since non-resident factors have primarily been responsible for the growth of the Quebec mining industry, it is natural again for these factors to include in their ranks many professionals (i.e. executives, engineers, etc.) and semi-professionals which could be recruited from the domestic labor force. To the extent that this occurs then, the actual effects of backward linkage are weakened compared with their potential.

An important element of backward linkage is the erection of transportation systems and auxilliary activities serving the industry. Expenditures on maintenance and repairs are examples of the latter, these usually have a high domestic content; it has been estimated that such activities account for about 11 percent of the net value added in the mining industry.[1]

The erection of transport systems (e.g. railroads) for the collection and transportation of mineral ores, was an important factor responsible for the widening of mineral resource exploitation in the province. These systems, by permitting the establishment of new mining ventures, allowed the development of small mining communities, and thus enabled Quebec's "frontier" to be pushed further north (i.e. New-Quebec, Temiscaminque-Abitibi). Table 5 shows the growth in the population of Quebec's principal mining communities. These small cities are associated with the mining of three principal minerals, although many other minerals are also obtained as by-products. Thus the cities of Chibougamau, Malartic, Matagami, Murdochville, Noranda and Rouyn are mainly associated with copper mining, those of Sept Iles and Shefferville with iron ore mining and that of Asbestos with the mining of asbestos. Most of these communities have remained rather small and isolated settlements, mainly because of the fact that their mining activities have not led to the establishment of complementary manufacturing industries integrated with the mineral producing stage - somewhat of an impossibility given their location. Indeed, most of these regions' mineral production has been

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[1] Davis, op. cit., p. 321.

Table 5 : Population Growth in Quebec's Mining Communities,I92I-66.

Township	I92I	I93I	I94I	I95I	I954	I96I	I966
Asbestos	2I89	4396	57II	-	9474	II083	I0534
Chibougamau	-	-	-	-	-	4765	8902
Malartic	-	-	2885	-	-	6998	6606
Matagami(I)	-	-	-	-	-	-	2500
Murdochville	-	-	-	-	I8I8	295I	-
Noranda	-	2246	4576	9672	-	II477	II52I
Rouyn	-	3225	8808	I4633	-	I87I6	I858I
Sept Iles	867	I00I	I305	I866	-	I4I96	I8950
Shefferville(2)	-	-	-	I632	-	3I78	-

I.Incorporated in I963
2.Incorporated in I955
Source : Quebec Yearbook,I966,68;Quebec Statistical Yearbook,I944,55.

exported from the province in either raw or semi-processed form. Thus, the infrastructure which has developed for raw material production, has been so specialized in character and location as to be of little use to the rest of the domestic economy.

In summary fashion, it may be concluded that the impact of the Quebec mining industry, in terms of backward linkage, has not been substantial, due mainly to the capital intensity of the industry, which has reduced the extent of direct employment creation, and secondly to the inability of the domestic economy to produce the industry's required capital goods.

B. Forward Linkage

The magnitude of forward linkage can be evaluated by first considering the extent to which the mined ores are further treated within the domestic economy and secondly, by the extent to which those processed minerals have supported the development of the mineral-using industries. Attention will be focussed here on three minerals: iron ore, asbestos and copper. These are the most important in terms of production value.[1]

1. Iron Ore

The pattern of iron ore deposit ownership and exploitation in North America has had a distinct bearing on the character of the iron ore industry. Only a small amount of iron ore is traded on the free market.

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[1] In 1968, out of total mineral production valued at $730 million, the total contributed by iron ore, asbestos and copper, was $450 million. Furthermore, asbestos comprises about three quarters of the industrial minerals group; in the metallic minerals group, iron ore and copper contribute about 38 percent and 32 percent each to that group's total value production. Figures from Quebec Year Book 1969.

The consuming North American iron and steel companies own wholly, or in part, their own sources of supply; either that or they engage in long term contracts with merchant companies. Also, technological change has been such that it is only the large companies or consortiums that can finance new developments. The iron and steel companies, therefore, in trying to ensure themselves a long term supply of ores, have participated in these consortiums, and as participants, they receive annual iron ore shipments on the basis of their stock participation in the consortium. The requirements of the iron and steel producing companies are such that whole or partial ownership is desired. Thus it is not surprising to observe an increasing control and ownership of raw material sources by expanding primary iron and steel producers.

The Quebec iron ore mining industry is an important part of the North American pattern of iron ore deposit ownership and exploitation. The four principal producers of iron ore in Quebec are either subsidiaries of U.S. steel companies, or are owned by consortiums of American and to some extent of Ontario based iron and steel companies. The largest iron ore mining company in Quebec, the Iron Ore Company of Canada, is owned and operated by seven U.S. steel producers; the second largest, the Quebec Cartier Mining Company is wholly owned by the United States Steel Corporation.[1] The product of Quebec's iron ore mines, be it in the form of concentrates or pellets, is shipped outside of Quebec to the large steel producing areas of the U.S. and Ontario. It was noted

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[1] Appendix I, page 96, outlines the ownership characteristics of Quebec's iron ore mines, together with their capacity of production.

in Chapter 2 that since 1954 over 95 percent of Quebec iron ore has been exported from the province. Table 6 shows the principal areas which received iron ore shipments from Quebec in 1967. It indicates that the United States has been the principal recipient of these exports. Thus, it would seem that the direct beneficiaries of the mining of iron ore in Quebec have been the iron and steel producers operating outside of Quebec. Although the province of Quebec does possess a steel industry, it is relatively small in size compared to that of Ontario, and of course, it is not vertically integrated with the earliest production stage (i.e. iron ore mining) while those of Ontario and the U.S. are so integrated. In these respects, forward linkage emanating from the Quebec iron ore industry has been weak. This is shown more explicitly in the following description of the Quebec iron and steel industry.

The steel industry is theoretically divided into two sectors: primary iron and steel and steel products fabrication. The former is further divided into three distinct production stages. The first stage results in the production of pig iron from coke, iron ore and limestone in the blast furnace. In Quebec, the production of pig iron from iron ores is non-existent; however a special kind of pig iron called "Sorelmetal" is produced from ilmenite ores by the Quebec Iron and Titanium Company. The productive capacity of the latter represented about five percent of Canadian pig iron productive capacity in 1967 (see Table 8).[1] By contrast, Ontario's share in the Canadian output reached 94 percent in 1966, in 1946 its share stood at 77 percent.

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[1]This special type of pig iron is exported to the U.S. market.

Table 6 : Iron Ore Shipments to U.S. and Ontario from Quebec Ports in 1967.(in cargo tons).

Port	Destination	Tonnage	Destination	Tonnage
Port Cartier	Gary ,Ind.	3,666,002	Indiana Harbour	53,142
	Conneault,Ohio	3,147,264	Forain,Ohio	103,411
	Mobile,Al.	583,444	Philadelphia	883,464
	Hamilton,Ont.	5,916	Prescott,Ont.	1,072
	Toronto,Ont.	535		
Sept Isles	Chicago	83,684	Conneault	47,930
	Indiana Harbour	171,968	Erie,Pa.	51,045
	Detroit	791,166	Huron,Ohio	98,900
	Buffalo	38,107	Toledo,Ohio	70,014
	Ashtabula,Ohio	506,756	Baltimore,Md.	3,962,844
	Cleveland	2,772,972	Houston	412,798
	Mobile,Al.	107,196	Newport News,Pa.	229,815
	Philadelphia	1,060,710	Sidney,N.S.	372,427
	Hamilton	325,820	Port Colborne,Ont.	25,860
Pointe Noire	Chicago	137,951	Ashtabula	387,659
	Indiana Harbour	794,186	Buffalo	227,116
	Baltimore,Md.	138,126	Toledo	112,880
	Halmilton	2,456,271	Philadelphia	50,385
Havre St-Pierre	Mobile,Al.	19,000	Savannah,Ga.	6,432
	Sorel,Quebec	1,761,155		
Contrecoeur	Chicago	13,764	Cleveland	210,040
	Indiana Harbour	16,208	Buffalo	29,964
	Ashtabula,Ohio	3,472	Welland,Ont.	10,245

Source: Shipping Report,1967,Part 5,D.B.S. Cat.# 54-207

Table 7 : Production of Steel Ingots and Castings,Quebec, Ontario,Canada,1946-1967.

(in thousands of net tons)

Year	(1) Quebec	(2) Canada	(3) Ontario	(1)/(2)	(3)/(2)
1946	63	2327	1781	2.6%	76%
1955	99	4534	3715	2.1%	81%
1960	169	5809	4609	2.9%	79%
1967	278	9718	8364	2.8%	86%

Table source:See below table 10.

Table 8 : Pig Iron Production,Quebec ,Ontario,Canada,1946-1967.

(in thousands of net tons)

Year	(1) Quebec	(2) Ontario	(3) Canada	(1)/(3)	(2)/(3)
1946	-	1089	1405	-	77%
1955	-	2812	3215	-	87%
1967	403(1)	6851	7275	5%	94%

1.From the smelting of ilmenite ores by Quebec Iron and Titanium Co,

Table source:See below ,table 10.

The second stage of the primary iron and steel industry is that of the steel furnace, where pig iron is an input for the production of steel ingots and steel castings. The output of this second stage then becomes the input of the third stage, that of the rolling mills. In this last stage, the steel ingots are used to produce blooms, billets and slabs (also called semis), which can be further transformed into bars, wire rods, plates, sheets, strips and structurals for sale to the steel products fabricators. In Quebec, the second and third stages of primary iron and steel production are in large part integrated within the same establishments.

Quebec's position relative to that of Ontario in the production of steel ingots and castings is similar to that of pig iron production. Table 7 shows that since the end of World War II, Quebec's contribution to Canada's total production of steel ingots and castings has remained constant at about three percent. Ontario's share on the other hand, has increased over the same period, passing from 76 percent in 1946 to 86 percent in 1967. It may be noted here that the steel furnaces in Quebec use almost exclusively scrap iron (98 percent) in their production processes, while pig iron is used in the proportion of 59 percent in other parts of Canada. This would explain the decreasing consumption of pig iron in Quebec which has been observed since 1946. This seems to be quite abnormal in view of the fact that Quebec possesses large iron ore resources. It is also interesting to note that while Ontario steel makers are increasingly using Quebec iron ore in their production processes, the steel furnace plants in Quebec increasingly use scrap iron, which is mainly for the production of specialized steel. The absence of vertical

integration with earlier stages (i.e. mining and pig iron production) seems in greater part to be responsible for this.

The productive capacity of steel furnace plants in Quebec is about five percent of the total Canadian capacity of production; this relatively weak position results in imports from Ontario and Nova Scotia of many primary iron products (i.e. blooms, billets and slabs) for use in Quebec's rolling mills, which themselves do not satisfy Quebec's requirements. In the 1960's, Quebec's share in the Canadian consumption of rolled steel products was about 20 percent, and of this total, about one third consisted of imports from other areas. These imports comprised mainly steel bars and structurals; imports of steel bars accounted for 27 percent of Quebec's consumption in 1965 while those of structurals accounted for about 56 percent of Quebec's consumption.[1]

The principal statistics of Quebec's and Ontario's total primary iron and steel industry is presented in Table 9. As may be expected from our previous discussion, it shows that significant differences exist between the two provinces. Thus, in 1954, Quebec's share in the Canadian gross value of production(see row 4: Q/C in Table 9) was about 10 percent while that of Ontario was about eight times higher. In 1966, Quebec's share had declined slightly to 9 percent, while Ontario's share had increased to 85 percent.

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[1]Figures from Quebec's Industries: A Short Survey, Bulletin #10, Quebec Department of Industry and Commerce, 1967. The import figures quoted do not include quantities purchased from other Canadian provinces.

Table 9 : Statistics of Quebec's and Ontario's Primary Iron and Steel Industry,I954-I966.

Year	(I) Establisments	(2) Employees	(3) Value Added (millions$)	(4) Value Production (millions$)	(4):Q/C	(4):O/C	(4):O/Q
I954							7.4
Quebec	I5	3509	25.4	4I.5	I0%		
Ontario	I9	20I66	I68.3	295		80%	
I955							7.7
Quebec	I5	3689	34	53.5	I0%		
Ontario	I8	23369	228	4I2		80%	
I966							8.8
Quebec	I2	4235	47	II4.4	9%		
Ontario	I6	353I3	549	I0I7.9		85%	

Table source:See below,table Io.

The number of establishments in Quebec's primary iron and steel industry is about the same as that in Ontario, but the productive capacity of Quebec's establishments is much smaller compared to that of its western rivals. Of notable interest here, is the fact that contrary to Ontario, nearly all of Quebec's establishments are wholly owned or controlled by outside interests; in 1968 for example, 9 of the 11 plants listed in Quebec's industry were owned or controlled by non-residents, mainly U.S. and British interests.[1] This may partly be the reason why Quebec's primary iron and steel industry is so underdeveloped compared to that of Ontario.[2]

The second sector of the steel industry, that of the metal products fabricators, has been of more significance to the Quebec economy. Most new establishments in Quebec's iron and steel industry have been created in the industry's second sector. In this regard, Table 10, which presents the principal statistics of Quebec's and Ontario's iron and steel products manufacturers, may be compared with Table 9. Thus between 1954 and 1966, net gains in employment in Quebec's primary sector were in the order of 700 while in the secondary sector, net gains amounted to 4,100. Starting from a much higher base, comparative figures in Ontario were 15,000 for the primary sector and 10,000 in the industry's secondary sector.

In comparing the differences in the size of the industry's two sectors in both provinces, one notes that the discrepancy is much larger

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[1]For an outline of the ownership characteristics of these establishments, see Appendix I, pp. 97,98.

[2]The question of non-resident ownership is discussed in Chapter 4.

Table IO : Iron and Steel Products Production,Quebec,Ontario,Various Statistics,I949-I966.

Year	(I) Establishments	(2) Employees	(3) Value Added (millions$)	(4) Value Production (millions$)	(4):O/Q
I949					
Quebec	528	3554I	-	266	3.7I
Ontario	I20I	I06576	-	987	
1954					
Quebec	62I	42863	-	42I	3.04
Ontario	I439	II0050	-	I280	
I956					
Quebec	704	44593	30I	566	3.2I
Ontario	I497	I23365	940	I82I	
I966					
Quebec	935	47764	444	972	3.32
Ontario	I86I	I35I73	I560	3232	

Note 1:The figures include those for primary iron and steel.
Note 2:(4);O/Q simply compares Quebec's production value with that of Ontario,the figures are obtained by dividing Ontario's production value with that of Quebec.
Sources for Tables 7-IO: Primary Iron and Steel Industry,1955.D.B.S.Cat.#4I-203;Iron and Steel Mills,I967,D.B.S.Cat.#4I-203;Manufacturing Industries in Canada,I956,1966,D.B.S.Cat.#3I-205,3I-206.

in the primary sector. In 1966 for example, Ontario's primary steel industry was about nine times larger than that of Quebec, while its secondary sector was only about three times the size of Quebec's counterpart. The larger discrepancies observed in the primary sector of the steel industry is again in large part due to the absence of vertically integrated steel makers in Quebec. In Ontario, Algoma, Stelco and Dofasco are all vertically integrated concerns, and together produce the bulk of Canada's consumption of iron and steel products. Furthermore, these three companies possess wholly or in part their needed natural resource supplies, some of which originate from the province of Quebec.[1] It would seem therefore that the smallness of Quebec's iron and steel industry, and more particularly its primary sector, is due to two related causes; first, is the absence of forward linkage emanating from iron ore mining which may be due to its ownership nature, and second, is the inability of the province of Quebec to develop integrated steel making operations which has resulted in expanded markets from the Ontario producer's position.[2]

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[1]The Steel Company of Canada for example, which is Canada's largest steel producer, owns 50 percent of Hilton Mines Limited, located in Quebec. This establishment mined 3.8 million tons of iron ore in 1968. Data from Appendix I.

[2]Chapter 4 will elaborate further on these points.

2. Asbestos

The pattern of asbestos mineral deposit ownership and exploitation is quite similar to that of iron ore. It was noted above that all the iron ore mining establishments in Quebec are vertically integrated with iron and steel producers operating outside of the Quebec region. In the case of asbestos, seven out of the eight asbestos mining companies in Quebec are vertically integrated with asbestos products manufacturers located mainly in the United States; these seven are also subsidiaries of U.S. parent companies.[1] The other asbestos mining operation is Canadian owned; this company is engaged mainly in mining and exploration activities and sells about 98 percent of its output of asbestos fibres to foreign countries, mainly to England. Asbestos mining in Quebec differs in one major aspect from that of iron ore mining in that all asbestos mining operations usually process the asbestos ores into asbestos fibres. The purpose of this technically simple operation is to reduce output to its most transportable form. It has been suggested that this expansion of operations beyond the mining stage in the province has been due to the financial rewards consequent upon the more intensive recovery of lower grade asbestos ores.[2] This situation is not encountered in the Quebec iron ore mining industry where the high grade of the ores mined, which usually allows the raw materials to be shipped directly, provides little economic incentive, aside from non-resident considerations, conducive to primary processing close to the actual mining site.

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[1]For a list and ownership characteristics of Quebec's asbestos mining companies, see Appendix I, p. 100.

[2]See Davis, op. cit., Chapter 5.

Forward linkage, emanating from the Quebec asbestos mining industry has been relatively weak. This can be seen by observing Tables 11 and 12. Table 11 summarizes relevant data for the asbestos products manufacturers while Table 12 does the same with respect to asbestos mineral exploitation. The mining of asbestos in Quebec has not supported in any significant way the establishment of asbestos products manufacturing establishments. In looking at employment figures, which have remained relatively constant and at low levels over the period 1954-1968, it has been calculated that the creation of six employment opportunities in the mining sector has corresponded to the creation of at least one such position of employment in the related manufacturing sector. Asbestos manufacturing activity therefore has been significantly less important than the actual mining of the ores themselves. The marked discrepancy between these two sectors of economic activity is explained by the high exports of milled asbestos to other industrialized areas.[1]

The economic possibilities of the further processing of asbestos fibres have been much more limited compared to the further processing of iron ores. One reason for this limitation resides in the nature of the uses made of asbestos fibres. In contrast to iron ore which is used to produce one principal final product (i.e. steel), asbestos fibres are used to produce a multiplicity of finished goods. About 50 percent of asbestos fibres used in the world today are devoted to the production

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[1] As noted in Chapter 1 (Table 8), about 95 percent of the asbestos output has been exported since 1955. Furthermore, Quebec currently accounts for about 35 percent of the world's asbestos production and some 70 percent of the world's exports of asbestos fibres; see Asbestos, W.G. Jeffery, Department of Energy, Mines and Resources, Ottawa, 1968, p. 1.

Table II : Principal Statistics,Asbestos Products Manufacturers,Quebec,1954-1968.(I)

Year	Establishments	Employees	Value Added (millions$)	Wages and Salaries (millions$)	Value of Shipments (millions$)
1954	5	1259	5.5	4.2	12.78
1955	5	1325	7.3	4.5	15.47
1967	4	1199	12.02	7.4	18.79
1968	4	1218	12.91	7.9	20.84

1.Includes establishments engaged in manufacturing asbestos textiles,packings,brake linings, gaskets,asbestos building materials and other goods composed partly of asbestos.Data was derived from Canadian aggregates;multiplicator used was Quebec's percentage in the total value of Canadian production.Source:Asbestos Products Manufacturers,D.B.S.Cat.#44-203,1955,1968.

Table 12 : Principal Statistics,Asbestos Mining Industry,Quebec,1955-1968.(1)

Year	Establishments	Employees	Wages and Salaries (millions$)	Value Added (millions$)	Value of Production (millions$)
1955	11	6256	26	69.3	90.6
1964	8	6086	35	112.4	139.8
1968	8	6658	49	133.5	171.6

1.Includes the milling of the ores.Source: Asbestos Mining Industry,D.B.S. Cat.#26-205,1955,1968.

of asbestos cement products and other construction materials for use in residential and industrial construction. The domestic demand of asbestos emanating from the construction industry is quite small relative to the production of asbestos fibres, so that one would not expect this domestic source of demand to have increased significantly enough to absorb a large part of domestic asbestos production. The automobile manufacturing industries are the second most important user of asbestos fibres, they currently account for about 30 percent of asbestos consumption.[1] The auto industry however is not firmly established in Quebec, and since it is mainly a branch plant assembly type of activity with material supply sources originating outside of Quebec, the production of asbestos brake linings and similar products in Quebec is rather limited in scope.

A second reason for the limited extent of asbestos fibre processing within the Quebec economy, centres around the foreign ownership nature of the asbestos mining industry. Indeed, a large part of manufactured asbestos goods[2] have been imported by establishments which supply their parent companies, located mainly in the United States, with asbestos raw materials. In the 1950's, the imports of such goods into Canada exceeded their exports by a ratio of about three to one.[3] Thus, given the two principal factors noted above, forward linkage from the mining of asbestos has been weak, and consequently most of Quebec's asbestos production has been exported.

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[1]Figures from Asbestos, W.G. Jeffery, op. cit., pp. 7-8

[2]These manufactured goods include asbestos cloth, packings, safety clothing.

[3]Davis, op. cit., p. 221.

3. Copper

The Quebec copper industry can structurally be divided into four related stages: mining and milling, smelting, refining,and fabricating. All four of these production stages are undertaken in Quebec. The production of copper is obtained from five distinct copper districts where 25 mining establishments are located. The districts are the following: - Gaspé Peninsula (2 producers), Eastern Townships (2 producers), Chibougamau - Chapais (10 producers), Mattagami - Joutel (6 producers), and Val d'Or - Noranda (5 producers). Most of these mining centres possess their own milling facilities. As far as smelting is concerned, two of these districts possess smelters, and most of the concentrates produced in the districts mentioned are further smelted at those establishments. Incidentally, of the six smelters located in Canada, two are in Quebec, the larger one being at Noranda. Quebec also possesses the more important of the two refining plants in Canada; the Quebec plant is located in Montreal and is owned and operated by Noranda Mines Limited. In 1966 about 63 percent of the Canadian production capacity of refined copper was located in the province. It should be noted that since copper refining has to be done on a large scale in order to be profitable, the refining plants are less numerous but larger than the smelters. Quebec's position as an important refiner makes her occupy an important place in the copper rolling, casting and extruding branch of the industry. The principal products of the related manufacturing industry include copper rods, electrical wires, tubes and pipes. The principal characteristics of the copper mines and processing facilities in Quebec are included in Appendix I.

From this brief description, it can be gathered that in sharp contrast to the iron and steel industry described earlier, the province possesses a truly integrated copper production system. This system is dominated by one large Ontario based company with very diversified activities stretching from the mining phase to the refining and fabricating phases.

The copper mining industry in Quebec currently represents about 33 percent of total Canadian copper production; in contrast, Ontario's share in the same year (i.e. 1966) was 40 percent and both shares have remained relatively stable since the 1950's. In 1955, (see Table 13), employment in the copper mining industry stood at about 2,790 while in 1966 it had increased to about 4,115. Over the same period actual volume of production increased from about 100,000 tons to close to 200,000 tons. The magnitude of this increase is only outdone by the iron ore sector which was in its infancy in the early 1950's. In contrast to the latter however, the copper mining industry processes much of its raw material output. In 1968, over 80 percent of the Canadian copper output was refined in Canada; for Quebec the figure is probably somewhat higher since the province's copper system is more integrated than the Canadian average. Furthermore, the province refines some of the copper extracted in other areas of Canada. In 1966, Quebec disposed of 65 percent of Canadian copper refining capacity while it mined only 33 percent of the country's copper. Table 14 summarizes relevant data for the copper and alloy rolling, casting and extruding branch of the industry. Employment in this branch in 1957 stood at 1,100 and increased slightly in the following

Table I3 : Principal Statistics of Copper Mining,Quebec,I955-66.

Year	Employment	Wages and Salaries (millions$)	Value of Production (millions$)
I955	2790	II.6	44.9
I966	4II5	24.2	I34.6

Source: General Review of the Mining Industry,I955,I966,D.B.S.Cat.#26-20I.

Table I4 : Principal Statistics of the Copper and Alloy Rolling , Casting and Extruding Industry,Ontario,Quebec ,Canada, I957-I968.

Year	Establishments	Employment	Value Added (millions$)	Value of Shipments (millions$)
I957				
Quebec	2I	II20	-	48
Ontario	40	I9I6	-	57
Canada	75	3I70	-	I07
I958				
Quebec	22	I636	I4.5	52
Ontario	36	20I6	I5.3	55
Canada	69	3775	30.4	I08
I960				
Quebec	2I	I090	9.2	46
Ontario	36	2068	I6.I	63
Canada	69	3483	29.8	II7
I968				
Quebec	I2	I424	2I.2	II4
Ontario	34	23I3	36.4	I55
Canada	52	3947	59.I	274

Source:Copper and Alloy Rolling,Casting and Extruding; D.B.S.cat.#4I-224,I960,I96I,I969.

decade, reaching 1,400 in 1968; this slight increase is due mainly to technological change and to the operation of refining plants closer to full capacity of production in the 1960's. Relative to Ontario, Quebec's position in this branch of the industry has remained unchanged since the mid 1950's.

The physical properties of copper make its use universal in the electrical, construction, plumbing and automotive industries. Over one half of all copper consumed in North America is for electrical applications, including power transmission, electronics and electrical equipment and transportation. Another 15 percent of copper is used for building materials and construction (e.g. shipbuilding), while the remaining part of copper production is consumed in those industries producing machinery and equipment (13 percent) and motor vehicles (12 percent).[1]

The principal copper fabricating activities in Quebec concern themselves with the manufacturing of electric wires and cables and with the production of copper refinery shapes (e.g. bars, rods, ingots, plates). In 1966, the manufacturing of electric wire and cable provided employment for close to 4,000 workers and the total value of shipments stood at about $160 million. Furthermore, the Quebec manufacturers of electric wire and cable consumed over 36 percent of the copper consumed in Canada for that purpose. The principal establishments in this industry were Pirelli Cables Limited and Northern Electric Limited; the latter is also Quebec's principal manufacturer of electrical industrial equipment, and

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[1] Figures from Copper, A.F. Killin, Department of Energy, Mines and Resources, Ottawa, 1968, p. 22.

in this activity it employed close to 3,000 workers in 1966, producing some $60 million worth of output. Relative to Ontario, the Quebec production of electric wire and cable compares quite favourably, in 1966, Ontario employed about 4,700 workers in this activity; as concerns the manufacturing of industrial electrical equipment, Ontario's industry is over five times larger than Quebec's, if we rely merely on 1966 employment figures. Other important users of copper concern themselves with the manufacturing of car radiators, air conditioning units and commercial refrigerators. The use of copper in these industries is negligible in Quebec, in 1966 for example, they employed less than 1,000 workers; by contrast, Ontario, being Canada's largest producer of motor vehicle parts, commercial refrigerators and air conditioning equipment (these activities employed 36,000 in 1966), consumes the bulk of the copper devoted to these uses.[1] In these last cases, therefore, the historical picture drawn in Chapter 1 concerning the location of the heavy industries in Ontario reappears. Despite this, Quebec is still one of the major markets for refined copper produced in Canada. In 1966 for example, its copper mills accounted for nearly 30 percent of Canadian shipments of copper pipe and tubing and for over 25 percent of Canadian shipments of flat copper products.[2]

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[1] Employment figures from Manufacturing Industries of Canada, D.B.S. cat. #31-205, 31-206, 1966.

[2] Figures from Quebec Industries: A Short Survey, Bulletin #10, Department of Commerce, Quebec, 1967.

From the above it can be gathered that the Quebec consumption of copper is substantial when compared to that of ironcore and asbestos. For Canada as a whole, the proportion of copper production consumed in 1967 was 35 percent; for Quebec the figure was somewhat lower and for Ontario somewhat higher since a greater proportion of copper using industries are located in the latter. In the absence however of a sufficiently large domestic market, much of the copper refined in Canada is exported abroad. In 1967 for example, one half of the copper refined in Canada was exported abroad, and this mainly to the U.S. (about 50 percent of copper exports) in the form of refinery shapes. The copper output which is not refined (about 20 percent in 1967) is exported mainly to Japan in the form of ores and concentrates.[1] The proportion of refined and fabricated copper which is exported from Quebec is somewhat higher than the Canadian average (i.e. over 50 percent) since again the proportion of the Quebec production of copper which is consumed in Quebec is lower than the Canadian average.

Forward linkage emanating from this sector of the Quebec mining industry, again in sharp contrast to iron ore and asbestos, is relatively strong. The refining of copper from its mines and its fabrication into shapes is an important activity and is firmly established in this province despite the fact that much of that output is exported. The copper using industries in Quebec also contribute to the strength of forward linkage but its magnitude is much less compared to that of Ontario.

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[1]Figures derived from data in Canadian Minerals Yearbook, 1968.

A conservative estimate would indicate that in 1966, each worker in the mining of copper supported about three workers in the refining, fabricating and production of copper goods;[1] by comparison to both iron ore and asbestos, which were described earlier as providing little forward linkage, the mining of copper contributes in a significant way to the overall economy of the province.

C. Final Demand Linkage

Final demand linkage is a measure of the inducement to invest in domestic industries producing consumer goods for factors in the export sector. Its principal determinants are the level of income (both in aggregate and average terms) in the export industry, and the distribution of that income among the industry's contributing factors of production. It is implied in the theoretical analysis that if the size of the export sector is large and if the remuneration to the factors of production is adequate, domestic markets will gradually develop and thus provide strong incentives to the establishment of domestic industries producing consumer goods for the factors employed in the export sector.

The mining industry in Quebec has never comprised a significant part of the Quebec economy. In the early years of its development, the mining industry accounted for less than 5 percent of the province's gross national product; in 1940 it reached 9 percent and in 1966 it stood again at 5 percent of total Quebec production. Due to its relative smallness therefore, the mining industry and the employment opportunities it has created have not played any particular role in the growth of domestic

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[1] For Ontario, by way of comparison, the ratio is at least 1 to 5; these ratios are based on employment figures noted above.

consumer goods industries. Its contribution in the formation of these industries has rather been part of that contributed by all of Quebec's industrial sectors. Despite this fact, it may still be interesting to discuss final demand linkage in the context of the mining industry in attempting to determine whether this linkage effect has been maximized. It will be maximized where the incomes paid out to the industry's human factors of production are adequate, and where incomes paid to other factors do not constitute substantial leakage from the domestic income stream.

In 1967, wages and salaries paid in the mining industry (excluding processing) represented about 34 percent of total value added, in 1951 the percentage stood at about 20. In absolute terms, these amounted to $56 million in 1951 and $153 million in 1967.[1] These factor payments have contributed in a significant way to the relative magnitude of final demand linkage.[2]

A second type of income payment is that accruing to the owners of enterprise in the form of dividend payments. Table 15 summarizes data relating to dividend payments from the Quebec mining industry between 1950-1968. In 1950, dividend payments totalled $30 million and represented about 13 percent of the industry's gross production value;

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[1] Among the industry's sectors, the iron ore branch paid the highest wages, this mainly being due to the fact that it is an isolated activity compared to the industry's other branches. Figures above are from data in General Review of the Mineral Industry, D.B.S. No. 26-201, 1951, 1967.

[2] In 1967, the average weekly wage paid in the mining industry was $112, this compares with $107 paid in the forestry sector. Source: P.E. Grenier, Le Développement Minier du Québec, Dept. of Natural Resources, Quebec 1967, p. 12.

Table I5 : Dividend Payments,Quebec Mining Industry ,I950-68.

Year	Dividends Paid (millions$)
I950	30
I96I	4I
I962	45
I964	58
I966	77
I968	8I

Source: Estimates based on data compiled by Bongard and Leslie and Co.,stockbrokers,in "La Bourse Fut Plus Irrégulière, Sur Le Milieu De I970,Qu'àLa Fin.I970 Serait Plus Favorable Aux Investisseurs A La Fin Qu'au Début." by M.Clement, in LE DEVOIR,3I December,I970,page 20.

Table I6 : Gross Profits and Income Taxes Paid by the Canadian Mining and Manufacturing Sectors,I926-54.

(as percentage of gross production value)

	I926-30	I936-40	I946-49	I950-54
Mining				
(a) Gross Profits	4I	52	37	33
(b) Income Tax	-	-	7	9
Manufacturing				
(a) Gross Profits	6	8	9	8
(b) Income Tax	-	-	3	4

Source: From Davis op.cit.,page 322.

in 1967, dividends paid totalled $77 million and represented 11 percent of gross production value. Although accurate figures are unavailable, the metal mines sector (e.g. iron ore, copper) probably accounts for the bulk of the industry's total dividend payments, since the sector includes the industry's largest establishments and also produces the greater part of the industry's total output. In 1958 for example, the output of Quebec's metal mines represented about 48 percent of the industry's total output, while in 1968, the figure reached 59 percent. It has been estimated that between 1930 and 1964, this sector of the industry paid out dividends totalling $673 million, most of which probably accrued during the later years of the period, since the sector as a whole progressed rapidly after 1950.[1]

A large part of the industry's dividend payments may be considered as leakages from the domestic income stream for a substantial part of the Quebec mining industry is owned by non-residents. In 1963, 62 percent of the Canadian mining and smelting industry was owned by non-residents, 54 percent by U.S. residents. The figures for the Quebec mining industry are significantly higher in both respects. In 1968, for example, over 95 percent of the producing metal mines located in Quebec were owned by non-resident interests. These non-resident owned mines accounted for most of the output from Quebec's metal mines, and as noted above, the metal mines sector accounted for about 60 percent of the mining industry's total output in 1968. All iron ore mines in Quebec are currently owned by U.S. residents. In the industrial

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[1]Figures from P.E. Grenier, op.cit., p. 13.

minerals branch, which in 1968 represented 25 percent of total mining activity (e.g. asbestos, silica), nearly all firms were owned by non-residents; these firms produced about 75 percent of that sector's total output.[1]

Among the mining firms in Quebec which have regularly paid out dividends to their shareholders, two are noticeable by the magnitude of their dividend payments compared to other smaller establishments. The Iron Ore Company of Canada Limited (U.S. owned), established in the mid 1950's, has paid out over $15 million in dividends per year since 1962; thus between 1962, when dividends were first paid, to 1969, a total of $136 million in dividends was received by the company's shareholders. Noranda Mines Limited, which is owned by Ontario interests and which has the bulk of its operations located in Quebec, paid out in dividends a total of $370 million over the period 1930-1969.[2] The greater part of these dividends probably accrued after 1950, when copper mining progressed rapidly. A conservative estimate would put total accumulated dividend leakages from Quebec since 1950 at over $500 million. This represents a substantive amount of accumulated purchasing power, and assuming that the dividends would not have been saved if distributed to domestic residents, these leakages have contributed to weaken the

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[1]Ownership characteristics were derived from Appendix I.

[2]Dividend figures for these two firms up to 1965 was derived from data in Canadian Mines Handbook, Northern Miner Press, Toronto, 1965, and extrapolated to 1969.

strength of final demand linkage.[1] As a consequence, they have diminished the benefits accruing to Quebec from the development of its natural resources. It may be mentioned that dividends, as well as interest and other categories of investment income accruing to non-resident Canadians are subject to a flat rate withholding tax not exceeding 15 percent. A higher tax rate, it is held, would discourage non-Canadians from investing in Canada.[2] It is doubtful however whether this is true in the case of the mineral industries. The U.S. steel companies for example, are heavily dependent on Quebec for their raw material supplies; indeed, it has been estimated that the U.S. will become increasingly dependent on these outside sources due primarily to the high grade of the ores currently being mined, and also because of their unavailability from other areas except perhaps from Venezuela.

Another source of leakage from the domestic income stream is that due to outlays on imported capital equipment for use in mining. This has previously been discussed in the context of backward linkage and the reader is referred back to that section.[3]

Gross profits as a percentage of gross value of sales in the Canadian mining industry stood at an average of 33 percent over the period 1950-54. Table 16 indicates the trend of this variable since the 1920's,

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[1] If we assume that dividends, if distributed to domestic residents are saved, then final demand linkage is not affected. However, they do increase the domestic savings supply; thus dividend leakages in this case tend to reduce the domestic supply of investment funds and are thus adverse to domestic growth.

[2] Non-resident iron ore producers are exempted from this tax.

[3] See above page 30.

it shows that by comparison to the total manufacturing activity in Canada, gross profits in the mining sector as a percentage of gross production value have been markedly higher. The table also shows that the taxes paid by the mining industry are less as a proportion of gross profits than those paid by other sectors of the economy, such as manufacturing for example. The reason behind this lies in special depletion and other tax allowances which benefit the mining sector but not the others. Thus over the period 1950-54, taxes paid by the Canadian mining industry represented about one quarter of gross profits while in the manufacturing industries, they represented about one half of gross profits before taxes (see Table 16).[1] The result of those special taxation privileges has therefore been to increase net profits accruing to the mining establishments concerned. They have subsequently allowed larger amounts of dividends to be paid out to the industry's shareholders than they would have received in the absence of such privileges. As such, they have indirectly contributed to increase those leakages from the domestic income stream. In the case of resident-owned mining establishments which pursue processing activities, it is widely known that these privileges have led such integrated producers to attempt to minimize the profit position of their smelting and refining operations (which do not benefit from special tax treatment) by pricing their ores and concentrates

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[1] It may be mentioned here that the most commonly assessed tax on the mining industry (and by far the largest in money terms) is that on profit income. Royalties payable on the volume of ore removed are relatively insignificant since it is believed that these would discourage the extraction of low grade materials.

at a maximum. To the extent that this has occurred, the benefits of the domestic economy have been biased in favour of mining relative to mineral processing. Regarding foreign-owned mines which do not process their mined ores domestically, as in the case of Quebec iron ore, it is usually to the advantage of the parent company or companies to undervalue the raw materials imported by them. The main reason would be due to the fear of increased taxation by the local government. Regarding this matter, a recent study concludes that:

> "Considerations of corporate security thus point toward pricing policies which provide the parent companies with cheap inputs."[1]

Non-resident owned enterprise is also responsible for another sort of leakage from the domestic income stream. Such a source would arise from payments for the maintenance of head offices, engineering facilities and market research facilities not located within the confines of the domestic economy. To the extent these occur, and it would not be pretentious to assume that they do, total leakages would be correspondingly higher.

Finally, as concerns retained earnings, we have estimated that these represented about 11 percent of gross production value in 1950 and 13 percent in 1967, or $25 million and $95 million respectively.[2] If we assume that retained earnings are reinvested domestically, as a recent publication implied,[3] we would conclude that leakage from this

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[1] Kari Levitt, Silent Surrender, Macmillan of Canada, Toronto, 1970; p. 85.

[2] These were calculated using data in Tables 15 and 16.

[3] See Levitt, op. cit., p. 180.

source, due to further income remittance to parent companies located outside of Quebec, have not been significant. The special taxation privileges noted earlier have resulted in higher retained earnings (and higher dividends) than would normally accrue. In effect, these special privileges have amounted to direct subsidization of the mining industry by the local government; this has been justified because of the apparent risks which mining ventures are burdened with.[1]

Summary

This chapter has assessed the contribution of the Quebec mining industry to the economic development of the province. Using the staple growth model as a point of departure, we distinguished three different types of potential spread effects resulting from increased activity within the industry. Generally, it was found that the actual benefits accruing to the Quebec economy from the growth of its mining industry have been less than those indicated by potential linkage or spread effects. We noted that because of a high import content of mining machinery and equipment, backward linkage has been weakened. This was further confirmed in the chapter's second section where it was established that the mineral using industries, with the exception of copper, are a relatively small part of Quebec's economic structure. In particular, the growth of the iron ore mining industry has been unaccompanied by the establishment and growth of an integrated iron and steel industry commensurate with Quebec's needs. This is especially important in view of

[1] The results of the existing tax concessions for the mining industry are explained more fully in Chapter 5.

the fact that modern industrialization demands to be based on efficiency and growth in the production of iron and steel for use in what are termed the heavy industries. In arriving at this conclusion, successive comparisons were made between the manufacturing industries of Ontario with those of Quebec. Similar but less important conclusions were reached regarding the asbestos mining industry.

In attempting to isolate the factors which may have prevented the realization of potential spread effects within the domestic economy, we particularly noted that important sectors of the Quebec mining industry, as well as important sectors of Quebec's iron and steel industry, are owned by non-resident interests. This point was further brought out in the chapter's final section where it was found that significant leakages, mainly in the form of dividends, occur from the domestic income stream. These leakages have reduced potential final demand linkage.

These remarks are not meant to suggest that the Quebec economy has not benefitted from the growth of its mining industry, rather they point to the existence of factors inhibiting its greater contribution. To these possible factors we now turn.

CHAPTER 4

THE CONTRIBUTION OF "NON-RESIDENT OWNERSHIP"

It was generally concluded in the previous discussion that the development and growth of the Quebec mining industry has not been conducive to significant linkages with other sectors of the Quebec economy. It was also suggested that the nature of the industry's ownership may have militated against the diffusion of those benefits such as to import it with an 'export enclave' appearance.[1] These characteristics apply in particular to the iron ore and asbestos mining sectors of the industry. The following elaborates on these views.

The Benefits and Costs of Non-Resident Ownership

Non-resident ownership is the result of non-resident direct investment in the local or domestic economy.[2] Such direct investment has a potential to contribute to economic growth in the domestic economy since it typically brings with it the technology, the capital, the entrepreneurship and the access to markets which are important to the growth process, and which the domestic economy may not supply in sufficient amount.

It may plausibly be stated that the Quebec mining industry would not have developed to the extent that it has, were it not for the role played by non-residents through the process of direct investment. This

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[1] This is due primarily to the ability of mineral products to leave its producing area in raw form without leaving much of a trace in the rest of the economy.

[2] The principal difference between direct and indirect investment is that in the former, ownership and/or control rests with the lender, while in the latter, it rests with the borrower.

process occurred in the past due to the profitability inherent in the ownership and control of raw material supplies by non-resident manufacturers. The first benefit then said to accrue to the domestic economy is the establishment of permanent trade patterns through assured foreign markets for raw materials (e.g. iron ore, asbestos). This alleged benefit however has resulted, as was previously seen, in little forward linkage emanating from the province's mining establishments. This view may be open to the criticism that the domestic economy by itself offers a market which is too small to justify, on economic grounds, the domestic production of intermediate and basic commodities; the minimum economic size for many of the industries producing these goods may be such that in small markets, a variety of user industries need to be established before their combined demand justifies domestic production.[1] If so, then the exports of raw materials will enable the financing of imports of such producer goods which can thereafter become powerful agents for development. These views perhaps accurately describe the situation which faced the Quebec economy up to the late 1940's; since then the domestic production threshold for many producer goods, which are currently being imported, has been reached or surpassed. This situation is particularly so in the case of those industries directly related to iron ore mining. One study done in 1956,

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[1] In more elaborate jargon, the idea is that forward linkage can never occur in pure form, but must be accompanied by backward linkage resulting from demand pressures.

suggested that at that time, the establishment of an integrated iron and steel complex in the province of Quebec was justifiable on economic grounds;[1] a similar work, this one published in 1961, arrived at similar conclusions.[2] This fact takes on greater importance when viewed alongside a study done in 1956 which indicated that the industry yielding the highest combined linkage (i.e. forward and backward) was the iron and steel industry.[3] In this case, it may be suggested with some assurance, that the corporate relations existing in this most important sector of the Quebec mining industry has been such as to minimize the realization of the many opportunities for linkage with other sectors of the Quebec economy. Similar comments would also apply to the Quebec asbestos mining industry.

Another benefit said to accrue to the domestic economy from non-resident investment is that caused by the inflow of superior technology.[4] These inflows are beneficial if they lead to greater productivity increases than would otherwise occur. The importation of mining technology developed in other countries, has in the past been an important factor in assuring the growth of the Quebec mining industry. The important point here, in terms of benefits to the domestic economy,

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[1] The Canadian Primary Iron and Steel Industry, study undertaken for the Royal Commission on Canada's Economic Prospects, Ottawa, 1956.

[2] A. Raynault, Croissance et Structure Economique du Québec, Dept. Industrie et Commerce, Quebec, 1961.

[3] Chenery and Watanabe, International Comparisons of the Structure of Production, paper presented at the annual meeting of the Econometric Society, December 1956.

[4] It is assumed here that such technology cannot be obtained domestically.

is whether or not its results get outside the industry, and have more general effects in increasing incomes and tax revenue, or are simply reflected mainly in profits accruing to the industry in question. The fruits of technical progress are usually distributed either to producers in the form of rising incomes or to consumers in the form of lower prices. In a closed economy, consumers and producers can be considered as identical and thus the two ways of distributing the results of technical progress are merely two different ways of increasing real incomes. This however changes when we consider an open economy which exports its raw materials to other countries. In this case the consumers are non-residents, and in the important sectors of the Quebec mining industry, these consumers are identical with the producers of domestic raw materials; Quebec's iron ore industry for example, is largely owned and operated by U.S. steel companies. These non-resident consumers of Quebec's raw materials are at the same time manufacturers of finished products in their own countries. Furthermore, since they operate in large part in oligopolistic type industries, they have a natural aversion for price competition and consequently, these manufacturers attempt to increase profit levels by lowering their costs of production.[1] Thus where mining is directly integrated with manufacturing, technological change at the mining level results in lower raw material prices, since lower input prices allows the manufacturers to earn greater profits.

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[1]This behavior is typical of steel producers in Canada and the United States, for an excellent exposition see D.P. De Melto, The Effect of Foreign Competition on the Canadian Primary Steel Industry: 1950-1966, Ph.D. dissertation, McGill University, June 1970, pp. 39-52.

H.W. Singer, in his study of the impact of U.S. direct investment on less developed countries, concluded as follows on this point:

> " . . . we may say that technical progress in manufacturing industries showed in a rise in incomes while technical progress in the production of food and raw materials showed in a fall in prices."[1]

That the fruits of technological progress, in the case of non-resident owned mining sectors, permit the parent company to earn greater profits is also suggested by the following statement made by a representative of a large U.S. steel company:

> " . . . through either full or partial production of raw materials, we have been able to deliver these materials to our plant at a lower cost than if we purchased them on the open market. If we had not produced or transported any of our raw materials in 1955, we estimate that our profit before taxes would have been lower by $10 million."[2]

This statement indicates that if the secondary industries located elsewhere had not developed their own captive sources of supplies they would not have grown to be as profitable as they are today. It further suggests that decisions taken which aim at protecting the raw material supply position of such industries, or designed to facilitate their growth and expansion, may well be detrimental to the long-run economic interests of the raw material supplying economy. The integration of non-resident owned mining establishments with non-resident manufacturing companies also invites the criticism that there is no clearly established

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[1] H.W. Singer, op. cit., p. 478.

[2] Quoted from the Vice-President in charge of raw materials for Inland Steel (U.S.), Annual Meeting, April 25, 1956; reproduced in Davis op. cit., p. 328.

mechanism for determining the prices of raw materials exported. In these cases, the conversion of market transactions into corporate allocative decisions has rendered difficult a proper determination of the true benefits, especially in terms of taxation revenue, that has accrued to Quebec. Furthermore, because of these intra-company transfers, whether the benefits to the domestic economy are appropriate is left largely to the reasonableness of the parent company's executives and accountants.[1]

The diffusion of the benefits of imported superior mining technology to other sectors of the Quebec economy has therefore been minimal since the technology, in the case of exported raw materials, has mainly contributed to lower production costs to the non-resident final users of these materials. The main benefit to the domestic economy has accrued to the mining industry's labor force, through increased productivity and specialization.

A further disadvantage to the domestic economy resulting from the perpetuation of these conditions concerns the terms of trade between primary and manufactured products. It has been recognized that in the long run, these have tended to move against those areas which mainly export primary products. Canada, for example, which may be classified as a primary exporting country, has seen her commodity terms of trade decline from 101 in 1954 to 97 in 1965; the deterioration for all underdeveloped

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[1]The large integrated U.S. steel producers controlling as they do the markets and the terms of sale of raw materials have considerably reduced the scope for local independent initiatives in iron ore mining, and to the extent that local initiatives manifest themselves, they are usually confined to drilling, prospecting and exploration activities.

countries over the same period was from 109 to 97. In effect, this means that in 1965, less manufactured imports were obtained per unit of primary resource exports relative to the earlier period. In the case of those economies which export mainly manufactured products, the terms of trade over the same period showed the contrary tendencies, increasing from 96 to 104.[1] Thus when taking a long run perspective, the advantages to the domestic economy's growth due to the exchange of primary products for needed manufactured products (e.g. technology) should somewhat be qualified. This fact may be one of the underlying considerations which has led many primary producing areas in the world today to exercise an increasing influence in those primary sectors, mainly mining, which are subject to non-resident ownership and control.

A most important consideration which has led successive Quebec governments to encourage non-resident direct investment, is the belief that the latter has allowed Quebec to acquire entrepreneurship as well as capital funds which are deemed of prime importance to the growth process. This is supposed to compensate for the weakness of private domestic entrepreneurship as well as the insufficient availability of capital funds from domestic sources. Many estimates have been made of the contribution of non-resident direct investment to the growth in domestic per capita real income. R.G. Penner, estimated that over the

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[1] Figures from Levitt, op. cit., p. 85. For elaborations on these points see Raoul Prebish, the originator of the 'centerperiphery' thesis, in G. Meier, Leading Issues in Development Economics, Oxford University Press, 1964.

period 1950-56, it accounted for at least 8 percent of the growth in Canada's per capita real income; these estimates were based on figures of net capital inflows into Canada, after deducting Canadian foreign investment and include both portfolio and direct investment, the latter taking up the larger part of the totals.[1] A more recent study by K. Levitt considerably minimized the crucial role traditionally ascribed to non-resident direct investment as a significant contributing factor to Canadian growth. Levitt's study traced the sources of capital funds used to finance direct U.S. investment in Canada over the period 1957-1964. Table 1 provides a breakdown of these sources for the Canadian manufacturing, mining and petroleum industries. It indicates that in 1964, only 5 percent of U.S. direct investment in these industries consisted of direct U.S. inflows. The bulk of the funds which made up these direct investments originated mainly from the local profits of U.S. subsidiaries and branch plants and from the borrowing of Canadian funds. Table 2 provides similar data for three sectors of the Canadian economy over the period 1963-65. It indicates that over this period, less than 2 percent of the funds of U.S. subsidiaries in Canadian mining and smelting consisted in new capital inflows; this figure is substantially less than those for manufacturing and petroleum. These figures tend to indicate that the traditional belief regarding the insufficient availability of domestic funds does

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[1] R.G. Penner, The Benefits of Foreign Investment in Canada, Canadian Journal of Economics and Political Science, May 1966.

Table I : Sources of Funds of Direct U.S. Investment in Canadian Manufacturing, Mining and Petroleum.

(in percentages)

	1957	1960	1962	1964
Funds from U.S.A.	26	21	10	5
Reinvested Profits	35	45	43	49
Depreciation	26	35	32	30
Funds from Canada	13	-1	15	17
	100	100	100	100

Source: U.S.Survey of Current Business, various issues; quoted from Levitt op.cit. page 155.

Table 2 : Source of Funds of U.S. Foreign Subsidiaries in Canada, 1963-65.

(in percentages)

	New Capital Inflows	Retained Profits	Depreciation	Local Borrowing	Total
Mining and Smelting	1.6	57.6	24.9	15.9	100
Petroleum	19.2	33.7	32.4	14.7	100
Manufacturing	10.9	41.8	27.5	19.8	100

Source : U.S.Survey of Current Business, January 1967; quoted from Levitt op.cit. page 180.

not fully concur with recent history. The financial flows from the domestic operations of the subsidiaries and branch plants themselves, while representing returns on original investments, have constituted the primary source of finance capital for the undertaking of additional investments in the mining industries.

> " . . . there is no conclusive case for the view that foreign direct investment constitutes the only way in which sufficient savings can be mobilized nor can a convincing case be made for the view that foreign direct investment is necessary because entrepreneurial opportunities cannot be exploited without it."[1]

In a wider framework, Levitt also suggests that the non-resident ownership of many sectors of the Canadian economy has yielded negative benefits to the country, in the sense that it has drained to the U.S. a substantial amount of Canadian generated business savings. Over the period 1950-1967 for example, the net capital account balance (i.e. remitted income to the U.S. less capital inflows from the U.S.) for the total of U.S. direct investment in the Canadian economy, has markedly been in favour of the non-resident owners. The same conclusion emerges when considering the total of U.S. foreign direct investment in mining establishments.[2] Although the corresponding figures for U.S. direct investment in Quebec mining are not available, it may be suggested

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[1] Levitt, op. cit., p. 137. The Watkins Report has also suggested that the structure of ownership and control of the Canadian economy has erected barriers to the flow of Canadian savings to finance new Canadian enterprises. See Foreign Ownership and the Structure of Canadian Industry, Report of the Task Force on the Structure of the Canadian Economy, Privy Counsel Office, Ottawa 1968, pp. 267-295.

[2] The net capital account balance for the total of U.S. foreign direct investments in mining and smelting was $6,160 million in favour of the U.S. over the period 1950-1967; over the same period, the net capital account balance for total U.S. direct investments in Canada was $536 million in favour of the U.S. Figures from Levitt, op. cit., pp. 168-169.

that the observed patterns noted above have also been similar. This observation is strengthened when considering other advantages which have accrued to the non-resident owners of the Quebec mining industry. These advantages consist mainly of the following: first, the accrual of the benefits of technical progress in primary production, which has resulted in the availability of raw materials on favourable terms; second, the enjoyment of the interval economies associated with expansion in the markets for finished products (e.g. machinery and capital equipment); and third, the increase in the book value of foreign assets due to the reinvestment of profits in the non-resident owned sector of the domestic economy.[1] In the light of these considerations, and others noted in Chapter 3, it may be concluded that the principal multiplier effects which the economic textbook tell us to expect from investment, have not taken place in the Quebec economy but rather they occurred where the original entrepreneurial initiatives came from.

A meaningful explanation for the lack of significant secondary multifplier effects originating from the Quebec mining industry, and in particular from iron ore and asbestos mining, centers around the implications non-resident ownership have had in the area of economic decision making. It is increasingly being recognized that there exists a conflict between the economic interests of the domestic economy and those of non-residents who own parts of the domestic economy. This has traditionally been so in the mining industry and it may explain the absence of significant linkage with other sectors of the domestic economy.

[1] This has greatly been facilitated by the generous tax exemptions provided to the industry; this is further discussed in the next chapter.

Direct investment provides the investor with direct ownership or property rights, and from these rights flows the power to make decisions regarding the uses in which the productive assets are channelled. In the case of direct investments in mining establishments, property rights have included the right to set prices, the right to determine the timing and extent of economic expansions and the right to use and distribute the net returns to enterprise as the owners of enterprise see fit. Where direct investments are non-resident, the decisions flowing from these property rights have been taken by parent companies located outside the province, and their objective has been to make the totality of the parent company's operations profitable undertakings. That the decisions reached with respect to the terms of sale of raw materials may go against the interests of the domestic economy was discussed above. The second area of the parent company's decision making, concerns the right to undertake production operations. In the last analysis it is the parent company's executives and not the managers of the domestic mining establishments which determine the course which is to be taken regarding the rate and method of mineral exploitation. Again, such decisions are based on conditions which are internal to the parent company's whole operations. In this regard, the most important cost to the domestic economy would result from the gradual depletion of its mineral resource deposits. In the United States, for example, the depletion of high grade iron ore depostis has led the large U.S. steel companies to exercise control over iron ore deposits located in Quebec.

The availability of these high grade materials at low cost has taken away much of the incentives toward developing production techniques which could profitably be applied to the mining of low grade deposits which the U.S. possesses in abundance. In the long run, these conditions may lead to the depletion of Quebec's most lucrative iron ore deposits.[1] To the extent that this occurs, the incentive for Quebec to establish large scale integrated iron and steel operations may in large part be dissipated.

The use and distribution of the internal savings of non-resident owned mining establishments is the third area of decision making which in the past has been left wholly in the hands of the non-resident owners. The internal savings of corporations are usually made up of capital consumption allowances and retained earnings. These sums are part of total private domestic savings whether or not they are generated by non-resident owned firms. The savings of non-resident firms however can be considered as a drainage from the domestically generated supply of investment funds, since non-resident firms are normally required to remit all earnings in excess of working capital requirements to their parent companies located abroad.[2] These leakages have decreased the

[1] Estimates of the life of Quebec's iron ore reserves are unavailable, but as noted in Chapter 2, The Gordon Report estimated that at 1955 production levels, Canadian reserves of iron ore would yield a 250-year supply, those of asbestos a 50-year supply. Production levels however have markedly increased since these estimates were made, and in 1963, reserves of iron ore were estimated to last 125 years and those of asbestos, 40 years; figures from Bucovetsky, The Taxation of Mineral Extraction, Study for the Royal Commission on Taxation, Ottawa, 1967, p. 99.

[2] If we use figures derived in Chapter 3, in the section on final demand linkage, we estimate that in 1967, retained earnings for the Quebec mining industry as a whole approached $100 million. It may be assumed that the bulk of these accrued to the largest mining firms, most of which are non-resident owned. The discussion above suggests that most of this amount was remitted to non-resident parent companies. To this amount must also be added dividend payments accruing to non-resident shareholders; in this regard, Chapter 3 concluded that a substantial amount leaks out of Quebec each year.

supply of investment funds which could have gone into other sectors of the domestic economy, and to the extent that this occurs the domestic economy's growth potential is correspondingly reduced. This situation is minimized however, to the extent that the internal savings are re-invested back into the domestic economy. But even here, the final decisions will be based on non-resident needs and considerations, and in a final analysis, the reinvestment may only lead to increases in mining's production capacity which could be considered, from the domestic economy's position, as over-investment in its export sector. Thus in this case, the final result may be to deprive the more domestically oriented sectors of needed domestic savings for growth.

That there exists a conflict of interest between the domestic economy and the non-resident owners of domestic mining establishments is also indicated by the unwillingness of some of these firms to contribute tradeable equity stock in the domestic capital market. For reasons of corporate security, as the following statement indicates, these firms have been unwilling to allow domestic minority shareholding of their enterprises. Some years ago, a survey was undertaken among foreign owned affiliates and branch plants to find reasons why they did not issue their equity stock on the Canadian capital market; among the replies was the following from a U.S. steel producer operating an iron ore mining establishment in Quebec:

> "If we had minority stockholders, thereby owning only part of the mine, we would have two conflicing interests within the company regarding a single integrated process. This fact has always caused us to reject the idea of selling a minority interest."[1]

This resistance to the domestic participation in the operations of non-resident owned mining establishments in the form of minority shareholding, may be partly construed as a defence against demand's for the establishment of local processing facilities, and also as a defence against the domestic distribution of locally generated profits in the form of dividends.

In one of his many works E.S. Mason discussed the many factors which have presented increasing problems to U.S. foreign investments in the field of mineral exploitation.[2] The enumeration of these factors tends to support the view held here that conflicts of interest do exist. Mason isolated six principle obstacles to U.S. foreign investment in resource development; the first of these is that caused by the legal uncertainties concerning the status of foreign owned entreprise; the second, which we have mentioned above, concerns the possible requirements for local participation in management; thirdly are the potential limitations which could be imposed on the scope and direction of operations located in foreign areas; fourth are excessive domestic requirements concerning the numbers to be employed and the continuity of operations

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[1] Eric Kierans, The Economic Effects of Guidelines, an address to the Toronto Society of Financial Analysts, Appendix B; reproduced in Levitt, op. cit., pp. 84-85.

[2] See Edward S. Mason, Economic Concentration and the Monopoly Problem, Harvard University Press, Cambridge Mass., 1957, pp. 248-249, see also chapters 11, 12, 13.

(the latter is presumably an attempt by local governments to prevent over-rapid depletion); the fifth obstacle is that caused by the administration by local governments of export and import controls and the last is due to possible limitations on the repatriation of affiliate and branch plant savings and profits. It may be noted here that an increasing number of primary producing countries have sought to minimize or eliminate many of the costs associated with the foreign ownership of primary mining sectors, by building what non-residents owners would consider as obstacles to their profit maximizing operations.

That the benefits of non-resident direct investments in mining establishments located in Quebec have not been substantial and indeed that the overall costs may have outweighed the gains is thereby strongly suggested. The pattern of mineral resource exploitation described throughout this work has resulted to a large extent in the compartmentalization of Quebec's mining sector. The industry's linkage with other domestic sectors and the latter's subsequent extensions have been rather limited. This is particularly true of the mining industry's iron ore branch. Furthermore, the claim that these direct investments have stimulated domestic private entrepreneurial initiatives in related sectors of the Quebec economy is again largely discounted, since the pattern of mineral resource exploitation in Quebec has and still is being directly shaped by non-resident interests. Rather, it may be suggested that the traditional dependence on non-resident entrepreneurial initiatives in these areas has in the past resulted in domestic complacency, such as to weaken the basis upon which domestic entrepreneurial initiatives could have developed.

Conventional economic textbooks would construe non-resident investments, with their implied cumulative and multiplier effects, as being beneficial to its recipients. This work however has indicated that such a view is much less clearly established than might initially be conjectured. The discussion of non-resident investment (as well as that of its implied opportunity costs) leads to the more plausible view that a significant portion of these investments in Quebec's mineral wealth have never become part of the economic structure of the province, except perhaps in a purely physical sense. Indeed, the very differences between the growth and productivity gains in the Quebec mining industry relative to those of other more domestically oriented sectors (e.g. iron and steel) are indicative of this very notion. Non-resident direct investments will contribute more significantly to domestic industrialization only if they are integrated to a greater extent with the needs of the domestic economy. This will likely require that complementary domestic investments be generated. More importantly, it will require that domestic public initiatives assert themselves in order to accomplish these tasks, such a role however has in the past been denied by public enterprise.

CHAPTER 5: CONCLUSION

THE ROLE OF GOVERNMENT

The role of government in the development of the present pattern of mineral resource exploitation is being shaped by a tradition of dependence on non-resident direct investments in the mining industry. This tradition is translated in policies which aim at favouring as much as possible the non-resident investor. In the short run, the benefits gained from these non-resident investments are mainly in the creation of jobs for a rapidly expanding labour force. This of course does not assume that opportunities for employment cannot be created in other areas of economic activity. In the long run, on the other hand, the extent of benefits accruing to the domestic economy depends on two principal considerations. First, is the extent to which non-resident investment induces general multiplier-accelerator effects on other sectors of the domestic economy. Second, is the extent to which government public policy, in the absence of these general effects and the extent they are perceived, succeeds in appropriating a reasonable part of the benefits enjoyed by the non-resident owners of domestic enterprise. The outcome significantly depends on government attitudes regarding the various public policy instruments it has at its disposal.

The core of this work has been concerned with analysing the long run implications of investments in Quebec's mineral wealth, and in particular the long run effects of non-resident direct investments in the Quebec mining industry. It concludes that the latter's long term effects have yielded a minimum amount of benefits to the Quebec economy

while at the same time generating significant costs. Long run benefits have accrued mainly to non-residents, principally in the form of high quality, low priced and secured supplies of raw materials. Domestic long run benefits on the other hand, have consisted largely of general taxes imposed on these mining establishments.

Public taxation and expenditure policy, if properly used, can be considered as powerful tools by means of which the growth and structure of an economy can be shaped and guided. While it is not our intention here to embark on the road of policy recommendations or goals regarding the Quebec mining industry, certain aspects of the existing policy should be noted.

Taxation policy as applied to the mining industry has been quite favourable to say the least. Since the early 1900's the industry has benefitted from special tax privileges unavailable to other industries. Further, these privileges have been applied irrespective of ownership status. At the federal level, three principal tax concessions are given to mining companies.[1] The first is the 33 percent depletion allowance, this concession enables the operator of a mine to deduct one third off his net profits in arriving at taxable profits.[2] The income which is permitted such a reduction is only that derived from the operation of the mine itself. The Carter Report estimates that in 1964, eight of the larger mining companies in Canada claimed over three quarters of the

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[1]The tax provisions noted are a summary from Summary Review, Federal Taxation and Legislation Affecting the Canadian Mineral Industry, Mineral Information Bulletin #82, Department of Mines and Technical Surveys, Ottawa, 1966.

[2]This reduces the corporation tax rate from 52 percent to about 33 percent.

$150 million claimed in depletion allowances by the total Canadian mining industry.[1] The second concession is the three year tax exemption applied to the income earned from the operation of a new mine. In this regard, the Carter Report notes that between 1955-1965, five of the largest Canadian mining firms reported 70 percent of the total income exempted under this provision; in 1964, three of the larger mining companies claimed $117 million in tax free income.[2] The third principal tax provision enables a company engaged in either the mining, refining or fabricating of mineral products, to immediately deduct from gross income all costs incurred in the exploration for and /or development of mineral deposits. At the provincial level, concessions take the form of a three year income tax exemption for new mines.[3] A special provision is also granted at the federal level to non-resident owners of iron ore mines in Canada; under this provision, dividends paid abroad from the operations of these mines are exempted from the 15 percent withholding tax usually levied on such dividend outflows. All of these tax concessions are simultaneously available to firms within the industry. Furthermore, they have mainly benefitted the non-resident investors since a

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[1] Report of the Royal Commission on Taxation, Queen's Printer, Ottawa, 1967, Volume 4, p. 329. The percentage of the amount claimed by Quebec mining companies is unavailable.

[2] Ibid., p. 331.

[3] The Quebec corporation tax rate is currently 12 percent; in 1961, the last year in which disaggregated figures were published, the Quebec mining industry as a whole contributed about .9 percent to Quebec's total tax revenues, or $6.3 million; Source: Outline of Taxation in Quebec, Department of Revenue, Quebec, 1964.

significant part of the industry is owned by non-residents.[1] Many different arguments have been formulated both by government and industry representatives in defence of these tax privileges. Most of them point to the industry's meaningful contribution to domestic economic growth.[2] The Carter Report however convincingly argues that the present tax concessions are both overly generous and ineffective; they are overly generous because they are divorced from individual firm performance and thus benefit mainly the integrated (and non-resident owned) mining establishments, those who probably need it least; they are inefficient because they result in a wasteful misallocation of resources in the sense that they allow normally unprofitable marginal mining projects to be undertaken. In these ways, the existing concessions can be regarded as subsidies to mineral producers, subsidies which are both unnecessary and costly from the domestic economy's point of view.

> ". . . because of the probable insensibility of foreign direct investment in the Canadian mining and petroleum industries to changes in after tax rates of return, the net economic benefit to Canada from such investments could be increased by the withdrawals of the concessions."[3]

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[1] It has been estimated that in 1964, 80 percent of the increase in tax revenues caused by repeal of the special mining tax concessions, would have been borne by non-resident owned mining establishments. For Canada as a whole, the increase in tax revenues would have been in the order of $133 million. Figures from Report of the Royal Commission on Taxation, Volume 6, p. 97.

[2] An elaboration of these arguments can be found in Report of the Royal Commission on Taxation, Volume 4, pp. 306-325.

[3] Report of the Royal Commission on Taxation, Volume 4, p. 371.

Over and above the equity and efficiency aspects of the present tax concessions, the view that the growth of the mining industry as a whole should be further promoted as at present is unjustified. Such a counter view emerges in the light of our conclusions regarding the limited impact of the non-resident owned sectors of the industry on the Quebec economy. The tax concessions noted above result in significant tax savings to the non-resident owned firms and are divorced from these firms' long run impact on the domestic economy. In the case of iron ore and asbestos mining the tax concessions amount to subsidies given to the U.S. and Ontario steel producers and to U.S. asbestos products manufacturers. Successive Quebec governments by identifying non-resident privileges and interests with domestic interests, have been led to promote non-resident investments and furthermore, to grant them 'subsidies' (in the form of tax concessions) unaccompanied by policies designed to increase the non-resident contribution to the growth and industrializtion of the domestic economy. Previous governments may therefore be criticized for not having shown more insight with regard to the long run implications and effects of non-resident ownership and control, and in particular, for not having devised policies appropriate to counteract the negative aspects which have been embodied in non-resident direct investment in Quebec's mineral resources. It may also be suggested that the traditional emphasis placed on the role of non-resident entrepreneurial initiatives in developing these resources, has led to an overconcentration of government efforts in attracting non-resident direct investment to this sector of the economy. In so doing, successive governments have neglected the

role which public entrepreneurial initiatives could have played not only in the mining sector, but more importantly in developing, to the extent feasible, the manufacturing industries related to the mining industries. Thus in the absence of domestic private entrepreneurial efforts, government attitudes have in the past been such as to prevent the development of these more domestic oriented industries from which the domestic economy would surely have benefitted.[1]

More recently, Quebec governments have come to recognize the lack of benefits accruing to the province from the exploitation of its mineral wealth. In particular, it has been recognized that ". . . the weakness of our mining industry results from the fact that most of the mineral substances mined in Quebec are exported as concentrates. This means that its creative opportunities in our general economy risk remaining almost negligible, since our ores will not, for the most part, be refined and much less be transformed in Quebec into finished products."[2]

In 1965, the Quebec government, partly reacting to this situation, established la Société Québécoise d'Exploitation Minière (SOQUEM). Its principal function however has been in the field of exploration activity and it is basically designed to assist private mineral resource exploiters. Of more importance was the creation in 1968 of la Sidérurgie du Québec (SIDBEC) through the nationalization of a previously established

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[1]The Watkins Report provides a detailed analysis of the political and economic effects of non-resident ownership in general, and it has recommended various policies aimed at minimizing the costs and increasing the benefits which foreign direct investments bring with them; see Foreign Ownership and the Structure of Canadian Industry, op.cit., pp. 355-414.

[2]Annual Report, 1967-68, Quebec Department of Natural Resources, Quebec, p.13.

private steel company which had been experiencing financial difficulties. The primary aim of SIDBEC is the establishment of Quebec's first fully integrated iron and steel complex. To attain this goal, the company envisages significant investments in new installations which will permit the local production of primary steel from locally mined iron ore. In the past, the absence of such integration necessitated the importation of primary steel from outside the province, and due to these imports' transportation costs, the secondary sector of Quebec's steel industry has been retarded. In the opinion of SIDBEC's president, the company " . . . will become an important factor in the economic development of the province", furthermore, domestic steel users " . . . will find it advantageous to obtain our (SIDBEC's) products locally and at competitive prices, which was not the case in the past. It seems evident to us that secondary industry, in the metallurgy sector, will thus be able to develop at much more rapid pace than in the past".[1]

While the creation of SIDBEC marks the first genuine attempt on the part of government to develop those manufacturing industries which are naturally related to Quebec's mineral wealth, many of the difficulties discussed in this work still remain and the future may see a greater concentration of public efforts on their solution. Possible future areas of research include for example, a more detailed identification and evaluation of raw material exports; an evaluation of the legal arrangements by which mineral concessions have in the past

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[1]Quoted from SIDBEC's 1969 annual report.

been granted to private entrepreneurs; the examation of the state of internal, and external markets for raw material concentrates as finished products; the desirability of inducing the appropriate type of established enterprise or of creating new ones, to transform locally those mineral ores, and concentrates into finished or manufactured products; the feasibility of various policies which could be undertaken by government to appropriate for the domestic economy a greater share of the returns accruing to the non-resident owned mining establishments, and steps which should be taken to increase local participation in their operations. This work has shown that Quebec's mining industry has not contributed as much as it could have to the development of Quebec's economy. It has not been suprising to observe that the non-resident ownership of important sectors of the industry has created significant problems for the domestic economy. In effect, the objective of any investment, be it resident or non-resident, is to generate as great a return as possible on the original expenditures. Thus the problems which have become associated with non-resident direct investment in Quebec's mining industry have often been of the domestic government's own making and the solution to these problems lie in significant part in their own hands.

APPENDIX I

IRON ORE MINES IN QUEBEC(I)

	Production Capacity	Remarks
Hilton Mines Ltd.	3.8 million tons beneficiated per year.	Owned by the Steel Company of Canada and Pickands Mather and Co., and Jones and Laughlin Corporation, both U.S..
Quebec Cartier Mining Co.	8 million tons of concentrates per year.	Subsidiary of U.S.Steel Corporation.
Quebec Iron and Titanium Corporation.	1.2 million tons of ilmenite ores per year, from which 415,000 tons of pig iron are derived at Sorel.	Owned by Kennecott Copper Corporation and the New Jersey Zinc Co., both U.S.
Iron Ore Company of Canada	10 million tons mined annually.	Owned by Hollinger Consolidated Gold Mines (21 per cent), Hanna Mining Co., (27 per cent), Labrador Mining and Exploration Co., Hollinger North Shore Co., Armco Steel Corp., Wheeling Steel Corp., Youngstown Sheet and Tube Co., National Steel Corp., Republic Steel Corp., Bethlehem Steel Corp..
Wabush Mines Co.	Iron ore mined in Labrador, shipped to Pointe Noire in Quebec where pellets are derived at 16,000 tons per day.	Owned by Pickands Mather and Co., the Steel Company of Canada, Youngstown Sheet and Tube Co., Interlake Iron Co., Inlands Steel Co., Pittsburg Steel Co., Dominion Steel and Foundries Co..

(I). Represents about 40 per cent of Canadian production capacity.

APPENDIX 1 (continued)

STEEL FURNACE PLANTS IN QUEBEC(2)	Product	Capacity (annual net tons)	Remarks
Abex Industries of Canada Ltd.	Steel and ingot castings.	32,700	Controlled by Abex Corporation,U.S.
Atlas Steels Company	Steel ingots	70,000	Division of Rio Algom Mines Ltd., controlled by Rio Tinto Zinc U.K.
Canadian Steel Foundries	Alloy steel and carbon castings	145,800	Division of Hawker Sidley Canada Ltd., subsidiary of U.K.parent,Hawker Sidley Holdings Ltd..
Canadian Steel Wheel Ltd.	Ingot and forged steel railway and industrial wheels	102,000	Owned by English Steel Corp, and Hawker Sidley Canada Ltd..
Crucible Steel of Canada Ltd.	Alloy,stainless and tool steels, slabs,billets.	48,000	Owned by Crucible Steel of America.
Dominion Engineering Works Ltd.	Alloy steel castings	15,000	Owned by Canadian General Electric in turn owned by General Electric Co. and General Electric Overseas Capital Corp.,both U.S.
Dosco Limited	Steel billets	156,000	Controlled by La Siderurgie du Quebec
Griffin Steel Foundries Ltd.	Cast steel Freight car wheels	52,500	Owned by Armstead Industries Inc,U.S.
Sorel Steel Foundries Ltd.	Abrasion resistant alloy steel castings	24,000	Owned by La Compagnie de Charlevoix Limitée and Tracadie Invesment Ltd.

(2).Represents about 5 per cent of Canadian production capacity.

APPENDIX I (continued)

STEEL ROLLING MILLS IN QUEBEC	Product	Remarks
Atlas Steel Company	Stainless steel sheet and strip	See above.
Crucible Steel of Canada Limited	Stainless steel sheet and strip	Products in coils are rolled at parent mill, Crucible Steel of America.
Dosco Limited	Bars, nuts, bolts, track, spikes, rods in coils, rolled sheet and strip	2 plants, both controlled by la Siderurgie du Quebec.
The Steel Company of Canada Ltd.	Pipe and hollow structural tubing, light structural shapes	Subsidiary of Ontario based company.

STEEL PIPE AND TUBE WORKS IN QUEBEC (3)	Product	Capacity (annual net tons)	Remarks
Dosco Limited	Standard and structural steel pipe and tubing	55,000	Controlled by la Siderurgie du Quebec
Standard Tube of Canada Ltd.	Steel tubing	4,000	Owned by Tube Investments Ltd., U.K.
The Steel Company of Canada Limited	See above	143,000	See above

(3). Represents about 7.9 per cent of Canadian production capacity.

APPENDIX I (continued)

STEEL, CONTINUOUS CASTING PLANTS IN QUEBEC(4)	Product	Capacity (annual net tons)	Remarks
Atlas Steel Company	Carbon and alloy steel slabs	75,000	See above
Dosco Limited	Carbon and low alloy billets and blooms	150,000	Controlled by La Sidérurgie du Québec.

FERROALLOY PLANTS IN QUEBEC(5)	Product	Capacity (annual net tons)	Remarks
Chicoutimi Silicon Ltd.	Ferrosilicon	25,000	Owned by The Aluminum Company of Canada (25 per cent), Union Carbide of Canada Ltd. (61 per cent) which is a subsidiary of Union Carbide Corporation Ltd., U.S..
Chromium Mining and Smelting Corporation Ltd.	Ferrosilicon, ferromanganese, silico-manganese	50,000	Owned by Timmins N.A. Ltd(1938) which is owned by Timmins Investments Ltd..
Electric Reduction Company of Canada Ltd.	Ferro-phosphorus and phosphorus	45 million pounds per year	Owned by Albright and Wilson Ltd., U.K.
Simonds Canada Abrasive Company Ltd.	By-product ferrosilicon	500	Owned by Wallace Murray Corporation, U.S..
Union Carbide Canada Ltd.	Ferrosilicon, other ferro-alloys	70,000	Owned by Union Carbide Corporation, U.S.

(4). Represents about 11 per cent of Canadian production capacity.
(5). Represents about 48 per cent of Canadian production capacity.

APPENDIX I (continued)

ASBESTOS MINES AND MILLING PLANTS IN QUEBEC.(6)	Capacity (mill capacity, short tons per day)	Remarks
Nicolet Asbestos Mines Ltd.	2,500	Wholly owned by Nicolet Industries of Florham, N.J.
Carey Canadian Mines Ltd.	4,000	Subsidiary of Philip Carey Manufacturing Co., Ohio.
Asbestos Corporation Ltd.	24,100	Canadian owned.
Bell Asbestos Mines Ltd.	3,000	Subsidiary of Turner and Newall Ltd., U.K.
Flinktoke Mines Ltd.	2,000	Subsidiary of Flinktoke Co., New York.
Lake Asbestos of Quebec	6,000	Subsidiary of American Smelting and Refinery Co., New York.
National Asbestos Mines Ltd.	3,000	Subsidiary of National Gypsum Ltd., Buffalo .
Canadian Johns Manville Co.	20,000	Subsidiary of Johns Manville Corporation, New York.

COPPER MINES AND MILLS IN QUEBEC (7)	Mill or Mine Capacity. (tons per day)	Ore Produced 1967 . (short tons)	Remarks
Cambell Chibougamau Mines Ltd.	3,500 ton mill	980,536	Controlled by Chibougamau Mining and Smelting Co.
Cupra Mines Ltd.	1,500 ton mill	308,347	Controlled by Hastings Mining and Development Co., Ontario based.
Gaspé Copper Mines Ltd.	7,500 ton mill	2,763,085	Owned by Noranda Mines Ltd.

(6), Represents about 82 per cent of Canadian capacity in the mining and extraction of fibres.

APPENDIX I(continued)

Icon Syndicate Ltd.	600 ton mine	82,I29	
Joutel Copper Mines Ltd.	700 ton mine	I86,786	Owned by Kerr Addison Mines Ltd.,of which Noranda Mines has controlling interest.
Lake Duffault Mines Ltd.	I,300 ton mill	492,938	Controlled by Falconbridge Nickel Mines Ltd.
Manitou Barrom Mines Ltd.	I,300 ton mill	294,640	Owned by Quebec Manitou Mines Ltd.(I5 per cent) and Bantor Co.Ltd.(I2 per cent).
Mattagami Lake Mines Ltd.	3,850 ton mill	I,4I4,000	Owned by Noranda Mines Ltd. (29½per cent) and Placer Development Ltd.(25 per cent).
New Hosco Mines Ltd.	900 ton mill	33I,228	
Noranda Mines Ltd.	3,200 ton mill	855,534	Ontario based company.
Normetal Mining Corporation	I,000 ton mill	348,440	Controlled by Noranda Mines Ltd.
Opemiska Copper Mines Ltd.	2,000 ton mill	737,272	Controlled by Falconbridge Nickel Mines Ltd.
Orchan Mines Ltd.	I,900 ton mill	375,I35	Controlled by Noranda Mines Ltd.
Patino Mining Corporation	2,000 ton mill	680,379	Controlled by Companis de Bonos Acciones Y Negocios Industriales.
Quemont Mines Ltd.	2,400 ton mill	443,774	Controlled by Noranda Mines Ltd.
Mines de Poirier Ltd.	2,500 ton mill	63I,000	Owned by Rio Algom Mines Ltd.
Solbec Copper Mines Ltd.	400 ton mine	75,3I0	Owned by Hastings Mining and Development Co.Ltd.,Ontario.
Merrill Island Mining Corporation	650 ton mill	-	Owned by Chib-Kayrand Copper Mines and Rosario Mining Corp..

(7).Represents about 30 per cent of total Canadian capacity;zinc,lead,gold obtained as by products.

APPENDIX I (continued)

Copper Smelters and Refineries in Quebec.	Product	Capacity (short tons per year)	Remarks
Gaspé Copper Mines Ltd. (smelter)	Copper anodes	300,000;ores and concentrates.	Owned by Noranda Mines Ltd.
Noranda Mines Ltd. (smelter)	Copper anodes	I,700,000;ores and concentrates.	Smelts most ores from Chibougamau-Chapais, Mattagami-Joutel and Val d'Or-Noranda Districts.
Canadian Copper Refiners Ltd.	Electrolytic copper,wire, ingot bars, billets and copper sulphates.	342,000	Refines anode copper from Noranda and Gaspé;owned by Noranda Mines Ltd..

Gold Mines in Quebec.	Daily Capacity	Remarks
Barnat Gold Mines Ltd.	600 tons of ores	Controlled by Little Long Lac Gold Mines Ltd.,Ontario based.
Camflo Mines Ltd.	I,000 tons of ores	Controlled by Discovery Mines Ltd., Ontario based.
East Malartic Mines Ltd.	I,700 ton mill	Controlled by Little Long Lac Gold Mines Ltd..
Lamaque Mining Co. Ltd.	2,000 ton mill	Controlled by Teck Corporation, Ontario based.
Sigma Mines (Quebec)Ltd.	I,300 ton mill	Controlled by Dome Mines Ltd.,U.S.
Wasamac Mines Ltd.	I,500 ton mill	Controlled by Little Long Lac Gold Mines Ltd.

APPENDIX I (continued)

Zinc-Lead Mines in Quebec.

	Mill Capacity (per day)	Remarks
Mattagami Lake Mines Ltd.	3,850 tons	Controlled by Noranda Mines Ltd.
New Calumet Mines Ltd.	800 tons	Controlled by Pioneer Consultants Ltd.
Orchan Mines Ltd.	I,900 tons	Controlled by Noranda Mines Ltd..

Silica Mines in Quebec.

	Mill Capacity (per day)	Remarks
Industrial Minerals of Canada Ltd.	I,000 tons	Controlled by Falconbridge Nickel Mines Ltd.
Union Carbide of Canada Ltd.	I,200 tons	Owned by Union Carbide Corporation,U.S..
E.Monpetit et Fils ltée.	n.a.	Quebec based.

Pyrite-pyrrhotite Mines in Quebec.

	Product	Remarks
Noranda Mines Ltd.	Pyrite as by product to copper ores.	Toronto based company.
Normetal Mining Corporation	Pyrite as by product.	Controlled by Noranda Mines Ltd.
Quemont Mining Corporation	Pyrite as by product.	Controlled by Noranda Mines ltd.
Solbec Copper Mines Ltd.	Pyrite as by product.	Owned by Hastings Mining and Development Co.Ltd.,Ontario based.

Sources of Appendix:Inter-Corporate Ownership;D.B.S.Cat.#6I-508,I967 and Operators List I (Parts I&2), List 2,List 3 (Parts;I&2);Mineral Resources Division,Department of Energy,Mines and Resources,Ottawa June I968.

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