THE EFFECT OF INCOME TAX REFORMS, ROYALTY REFORMS AND RELATIVE PRICE CHANGES ON POTENTIAL COPPER-ZINC PROJECTS IN MANITOBA

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by

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Abstract

The investment climate for copper-zinc projects in Manitoba worsened as a result of four distinct factors during the period from 1969 to 1977. These were: income tax reforms which led to increased federal and provincial tax assessments; a new provincial royalty act which resulted in increased royalty assessments for a profitable project; a jump in the annual rate of increase in capital and operating costs (inflation); and finally, copper and zinc price increases which failed to keep pace with the cost increases reflecting relatively long run changes in factors affecting world supply and demand. This study evaluates the effect of these factors on potential copper-zinc projects in the province. The analysis is undertaken using a computer model designed to calculate the optimum size of a project which would develop a given mineral deposit. The study shows that the private value of potential copper-zinc projects has declined by about 90 percent since 1969. Nearly two-thirds of this decline is attributed to increased tax and royalty assessments with the remainder a consequence of relatively depressed metal prices and inflation. The study also shows that from the province's point of view the income tax and royalty reforms have had some beneficial effects. In particular the new legislation has reduced the optimum private rate of ore extraction for a viable project closer to the socially optimum rate, resulting in an increase in overall benefits. The legislation is deficient where marginal projects are concerned in that a project will be unprofitable for a private firm even though it could generate some social benefits. Changes to the income tax legislation which would help alleviate this problem would be to allow preproduction development costs to be recovered immediately from a firm's income and include social

capital costs in the earned depletion bank. The royalty legislation could be improved by changing the fixed processing allowance to an investment allowance based on the undepreciated balance of total assets, increasing the rate at which investment could be recovered, and allowing losses to be carried forward. An unexpected deficiency in the existing royalty legislation in Manitoba is that it is not very effective in adjusting for inflation. Either more adequate indexing is needed or the two royalty rates should be replaced by a single rate. The study concludes that the worst feature of the reforms appears to be their timing. They were introduced when economic conditions were beginning to worsen, making the overall turn-down in the investment climate worse than it needed to be.

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For the errors and omissions that may remain, I accept full responsibility.

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Chapter 1

Introduction

1.1 Background

The release of The Report of the Royal Commission on Taxation, The Carter Report, in 1967 marked the beginning of change in federal and provincial taxation policies applicable to the mining industry. By the mid-1960's, federal and provincial government incentives to mining companies in the form of tax exemptions and allowances had reached a maximum. With regard to federal corporate taxation, a depletion allowance of 33 1/3 percent of mining profits was automatic; new mine income was tax exempted for three years and, exploration and development could be recovered immediately from other mine income or as soon as income would permit. Provincial royalty assessments during this period were small, averaging less than 10 percent on mining profits, and in the case of Manitoba, were reduced by 50 percent on new mine income for a period of three years.

Because of these special provisions, the metal mining sector experienced one of the lowest effective corporate profits tax rates of any industry in Canada. The mining tax plus income tax as a percentage of book profit before taxes averaged 22.0 percent for Metal Mining over the period 1967-69.[1] The comparable rate for Manufacturing was 41.9 percent while the rate for All Industries was 32.9 percent.

In conjunction with the low level of taxation in the mining sector during the 1960's and strong metal prices, net earnings were well above the

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[1] Statistics Canada, 61-207, Corporation Financial Statistics, (Ottawa). The average effective tax rates for these sectors of the Canadian economy from 1967 to 1975 are shown in Appendix I to this chapter.

average for All Industries in Canada. In 1969 for example, the after-tax return to equity for Metal Mining was 12.33 percent while for All Industries it was 9.00 percent.[2] The above average rate of return in Metal Mining in combination with strong markets led to a high level of mine investment in Canada and an increase in mineral exploration and development in other parts of the world. This activity resulted in the creation of excess Canadian mine and processing capacity which became apparent as early as 1970 for nickel with mines in both Thompson, Manitoba and Sudbury, Ontario, being initially bought "on stream" and then placed on standby where they remain.

The relatively high returns to mining investment along with The Carter Report recommendations proposing major tax reform led to a noticeable change in the mining investment climate by the 1970's. "Winds of change"[3] were blowing that by 1974 had culminated in significant taxation changes federally as well as announced changed in provincial mining tax and royalty legislation in British Columbia, Saskatchewan, Manitoba and Ontario.

Federal changes included: (i) replacement of the three year tax holiday by an accelerated allowance for capital recovery; (ii) replacement of the automatic one-third depletion by an earned depletion system; and (iii) a limit on the rate at which preproduction development expenses could be recovered to 30 percent of the undepreciated cost.

Provincial changes were announced or implemented in several provinces. In British Columbia, an additional two-tiered royalty system was introduced in which the incremental royalty was tied to price changes in

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[2] Ibid. The net return to equity for these sectors of the Canadian economy from 1967 to 1975 are shown in Appendix II to this chapter.

[3] This is the sub-title of a tax and royalty summary for Canada published in 1974 by Price-Waterhouse & Co.

comparison to a moving average of past prices. In Saskatchewan it was announced that a potash reserve tax which would be based on world prices was to be introduced. In Manitoba, the royalty rate was increased from 15 percent to 23 percent pending the introduction of a new royalty system. In Ontario, new royalty rates were introduced which increased as profit increased and meant that large firms would normally be subject to higher average rates than small firms.

The mining sector, by way of the Mining Association of Canada, responded with three major objections to the new policies.[4] First the association argued that governments had not taken into account the unusual amount of risk facing the mining sector, which justified their receiving preferential tax treatment in relation to other sectors. Second the association pointed out the combined taxes and royalties could exceed the assessments on other sectors thereby leading to a dismantling of the mining sector. Third, the association argued that mining tax legislation which would slow the rate of resource development would not result in good conservation of mineral resources; it would only force Canadian-based mining companies to accelerate their exploration activity outside Canada. In the association view, accelerated development in other parts of the world in combination with higher costs of doing business in Canada would result in reduced Canadian production accompanied by fewer employment opportunities and a decline in exports.

The situation portrayed by The Mining Association of Canada in 1974 is becoming the reality of 1977 and 1978. Canada's share of world metal production is indeed falling; exports of refined metals have declined

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[4]The Mining Association of Canada, Supertax! The Impending Crisis in Canada's Mining Industry and How It Will Affect All Canadians, 1974.

contributing to an increased trade deficit and a weakened Canadian dollar; and, there have been significant employee lay-offs in the primary metal production sector. Yet these occurrences cannot be entirely attributed to the tax and royalty changes that were introduced in the early 1970's. A number of other factors have contributed to the poor performance of the mining sector. These include: (i) increased competition in nickel and copper production from "third world" countries in Africa, Central and South America, and Southeast Asia; (ii) reduced demand for minerals by Canada's main customer, the United States of America, following the Viet Nam War and a decline in spending for the space program; (iii) a desire by Canadian mining companies to increase investment in other countries in order to maintain their share of world production; (iv) the increased labour and energy costs experienced in the early 1970's; and (v) the creation of over capacity in the mining sector in the late 1960's because of the generous tax incentives in combination with a relatively high level of demand.

Thus world price increases for the metallic minerals failed to keep pace with cost increases for the Canadian industry. Although it could be argued that the desire by provincial governments for a larger share of mine profits encouraged mining company activity outside of Canada, the introduction of the revised legislation was coincident with the cost-price squeeze. That is, the adverse mining investment climate can be only partly attributable to the new mining tax and royalty legislation, with the remainder being attributable to the other factors referred to above as reflected in the relative price changes.

In addition to affecting the investment climate in the provinces, the income tax and royalty revisions along with the relative price changes also affect the potential mineral wealth of the provinces. This effect is

not so obvious. It would be normal that increased taxes and royalties could result in some marginal projects no longer being profitable to a private developer. However, because such projects are not undertaken does not mean there is a significant loss of social benefits. Firstly, if the social benefits from a project amount to the surplus which will be generated (the revenue in excess of costs plus a return to the invested capital), the benefits lost because a marginal project is not undertaken are by definition small. Furthermore, the project may still be undertaken in the future when economic conditions warrant development. Secondly, even though a project can generate profits for a private developer, it may not generate benefits for society (or the province). The tax and royalty legislation in place may result in a project being profitable for a private developer to undertake, yet the surplus generated could be negligible (or even negative). Such a project, while profitable to a private developer, could be profitable because of subsidies from the tax system. This is a possibility whenever the net taxes and royalties generated are negative.

More important, however, is the way the potential mineral wealth of a province can be changed by the effect of the tax and royalty on the optimum production rates of potential projects. This is because the total profit from a mineral resource project is a function, not only of annual costs and prices, but also of the rate of ore extraction. A rational developer does not simply maximize annual profits, but because a deposit has a finite life maximizes instead the present value of the total resource. As this study will show, the optimum rate of ore extraction for a private developer usually differs significantly from the socially optimum rate (defined as the rate which will maximize the surplus). Although some of this difference can be attributed to the higher discount rate used by a private developer, it is

also dependent on the income tax and royalty legislation in place. When a large, profitable deposit is mined at a rate which is too high or too low, the loss in potential wealth to society can be substantial.

1.2 Purpose of the Study

This study will evaluate the effect of income tax, royalty, and price changes on potential mining projects from two points of view. The first point of view is that of a mining firm maximizing the present value of the resource. The income tax and royalty regimes whose effects will be compared are those in force in Manitoba in 1969 (prior to any significant changes to the rates or method of calculating assessable profit) and those in force in 1977 (after the federal and provincial changes were nearly complete). Similarly, the costs and prices whose effects will be compared are those which existed in 1969 and again in 1977. In addition, the effects of the legislative changes will be compared with the effects of the cost and price changes and finally the combined effects of the price changes and legislative changes that occurred from 1969 to 1977 will be shown.

The second point of view is that of the province which would wish to maximize the surplus from a project. Again, a comparison will be made of the effects on projects because of changes to the income tax and royalty regimes as well as those resulting when costs and metal prices changed. As before the two points in time of concern are 1969 and 1977.

The study is limited to projects which would develop copper-zinc deposits in Manitoba. The reason for this is as follows. Of the present metallic mineral production in Manitoba only copper, nickel, and tantalum can be considered principal minerals; the others including zinc, gold, silver, the platinums, lead and selenium are essentially by-products. Tantalum is

a rare metal of which one deposit exists in this hemisphere. A study of the effects of the mining tax and royalty legislation on tantalum profitability would be limited to the one project already in operation as it is highly unlikely other deposits will be discovered in the province. Nickel is sufficiently different from copper in terms of production costs and marketing to justify a separate study. Copper is chosen over nickel in that more information is available on project capital and operating costs, greater potential appears to exist for new copper-zinc discoveries, and the most promising areas for new discoveries are more widely held than is the case for nickel.

Three different size of projects are used in the analysis. The first project characterises small copper-zinc deposits of up to one million tons in size. Such a project would have to be undertaken by a nearby operating mine since it is too small to support the costs of a separate processing facility. Also, it would need to be located near existing social infrastructure if development is to take place. These assumptions are incorporated in the model used in the analysis as follows. Concentrating (by the nearby large mining firm) is done for a constant charge per ton of input. Concentrator capital costs are assumed to be zero. Social capital costs are one-half the total needed if the deposit were to be developed as a separate project. Capital costs are recovered from other mining income to the extent allowed in the income tax and royalty acts. Consequently the net cost to the firm is gross cost less the saving in taxes and royalties. Projects of this size are therefore sensitive to the nearness of social infrastructure and to the capital recovery provisions in the income tax and royalty legislation.

The second project would develop copper-zinc deposits in the one million to ten million ton range. Although this size of deposit is often marginal as an independent project, it can be easily undertaken by a mining company in the same region. The assumptions in the model for the second project are that social capital costs are half those necessary for an independent project and that capital costs can be recovered from other mine income. This project has a separate concentrator. As with the smaller project, the feasibility of this size of project is sensitive to the nearness of social infrastructure and to the capital recovery provisions in the income tax and royalty legislation.

The third project would develop copper-zinc deposits in the ten million to 100 million ton range. It is assumed that this project is fully independent in that all costs are recovered from any income generated after production begins. Projects of this size and quality are shown to be profitable for a private developer to undertake under a wide range of conditions.

The analysis is carried out by undertaking a series of feasibility tests (or experiments) on the three different copper-zinc deposits using a modified version of a computer model developed by the author within The Department of Mines, Natural Resources and Environment.[5] The computer model is initially provided with geological data on the deposit, capital and operating cost data applicable to the type of deposit being evaluated, metal prices, discount rates, and inflation rates. Then using the discounted cash flow a project would yield, the model, by way of an iterative process,

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[5]Bagnall, R., A Computer Model for Determining the Optimum Size of a Mine Project, Study financed jointly by the Federal and Provincial governments under the Non-Renewable Resource Evaluation Program agreement (project number NM7511-3).

determines the size and life of the project which would maximize the present-value of the deposit. Since the present-value is sensitive to the kind of taxes and royalty systems in effect, the discount rate used, and relative prices, a change in any one of these not only affects the present value but also results in a project whose characteristics are changed. That is, different amounts of capital would be invested, the amount of primary ore in the deposit would change, and the project would yield different amounts of profit, taxes, and royalties.

In order to measure the effects on a project of changes in income tax and royalty legislation, metal prices, and production costs from the point of view of a mining firm, eight experiments are used. Six experiments abstract from inflation while two include inflation. The first of the six experiments assumes 1969 income tax and royalty legislation, and 1969 prices and costs. After the characteristics of the optimum project that would develop each deposit are determined, successive experiments introduce the 1977 income tax legislation, 1977 royalty legislation and 1977 metal prices and costs, in turn and then together. Inflation for 1969 and 1977 is introduced to the experiments that depict 1969 and 1977 conditions respectively. Each experiment identifies: (i) the optimum annual production rate; (ii) the amount of ore in the deposit; (iii) the private value of the deposit; (iv) the social surplus generated; (v) the taxes and royalties generated, and; (vi) the optimum level of capital investment under the specified conditions.

In order to show the effects of the new tax and royalty legislation as well as changing prices on copper-zinc projects from the point of view of the province, seven experiments are used. The first experiment maximizes the present value of the gross profit cash flow, using the social opportunity

cost as a discount rate. Subsequent experiments introduce the supply price of private capital as a discount rate, the 1969 income tax and royalty legislation, the 1977 income tax legislation, the 1977 royalty legislation, and then both pieces of legislation. The final experiment shows the effect on the socially optimum project when the 1969 metal prices and costs are replaced by those for 1977.

The results of the analysis shows that, from the point of view of a mining firm, the value of potential copper-zinc projects has dropped by nearly 90 percent in the period from 1969 to 1977. Nearly two-thirds of this decline is attributed to the changes in income tax and royalty legislation. The remaining one-third is attributed to a combination of the relative decline in metal prices and increased rates of inflation. Very small projects are rendered uneconomic both by the legislation and by depressed prices.

From the province's point of view, the analysis shows that the most significant factor affecting Manitoba's potential copper-zinc wealth has been the relative decline in prices. The new income tax and royalty legislation, on the other hand, has tended to increase this wealth as the optimum private production rates have been moved closer to the socially optimum production rates.

Finally, the analysis indicates that some changes to both the income tax and royalty systems are necessary if the maximum possible benefits are to be realized from the development of the province's mineral resources by private firms. Suggestions for changes are made in the final chapter.

APPENDIX I

COMPARISON OF EFFECTIVE TAX RATES

		1967	1968	1969	1970	1971	1972	1973	1974	1975
Metal Mining	Profit[1]	494.6	552.2	652.1	883.3	513.9	335.5	1,272.8	1,512.0	847.5
	Direct Taxes[2]	86.0	136.8	155.6	270.5	126.7	111.9	376.1	666.6	347.5
	Tax Rate (%)	17.39	24.77	23.86	30.62	24.65	33.37	29.55	44.09	41.00
Manufacturing	Profit	2,806.5	3,228.2	3,697.8	2,899.4	3,679.0	4,361.3	6,606.6	8,697.2	7,625.5
	Direct Taxes	1,184.1	1,362.4	1,527.7	1,237.6	1,500.2	1,771.2	2,464.7	3,424.9	3,092.6
	Tax Rate (%)	42.19	42.20	41.31	42.68	40.78	40.61	37.31	39.38	40.56
All Industries	Profit	8,191.0	9,246.0	10,131.7	9,651.2	11,616.5	11,553.0	16,980.1	23,890.0	23,366.2
	Direct Taxes	2,604.4	3,029.9	3,453.5	3,399.8	3,720.8	4,122.2	5,914.4	8,444.9	8,433.7
	Tax Rate (%)	31.80	32.77	34.09	35.23	32.03	35.68	34.83	35.35	36.09

Source: Statistics Canada, 61-207, Corporation Financial Statistics.

Notes: 1. Profit is Net Profit (Before Taxes).

2. Direct taxes are income and mining taxes assessed on profits.

APPENDIX II

COMPARISON OF RATES OF RETURN

		1967	1968	1969	1970	1971	1972	1973	1974	1975
Metal Mining	Net Profit	408.6	415.4	496.5	612.8	387.2	223.6	896.7	845.4	500.0
	Equity	2,864.1	2,996.8	4,026.7	4,286.5	4,365.7	4,358.7	4,887.8	5,272.3	5,422.9
	Rate of Return (%)	14.27	13.86	12.33	14.30	8.87	5.13	18.35	16.03	9.22
Manufacturing	Net Profit	1,622.4	1,865.8	2,170.1	1,661.8	2,178.8	2,590.1	4,141.9	5,272.3	4,532.9
	Equity	19,063.5	19,863.2	22,110.0	23,141.2	24,670.9	25,800.1	28,310.9	32,447.5	36,000.5
	Rate of Return (%)	8.51	9.39	9.82	7.18	8.83	10.04	14.63	16.25	12.59
All Industries	Net Profit	5,586.6	6,216.1	6,678.2	6,251.4	7,895.7	7,430.8	11,065.7	15,445.1	14,932.5
	Equity	63,222.0	67,769.9	74,210.0	83,036.0	90,102.2	97,070.8	106,442.0	118,476.5	130,416.5
	Rate of Return (%)	8.84	9.17	9.00	7.47	8.76	7.66	10.40	13.04	11.45

Source: Statistics Canada, 61-207, Corporation Financial Statistics.

Chapter 2

The Analytical Model

The analysis is carried out using a computer program which will determine the optimum size of the mining project that would develop each deposit. Basically the program is an algorithm which will calculate the present value of the cash flow generated over the life of a project. Coupled to this is a procedure for systematically adjusting the size and productive life of the project until such time as the present-value is at a maximum.

The three sizes of copper-zinc project used in the analysis are evaluated from two points of view. The first point of view is that of a private investor who would be undertaking the project using equity capital. The optimum project in this case is the one which yields the highest present value of the annual net cash flow using the supply price of capital (SPC) as a discount rate. The supply price of capital is the minimum acceptable return an investor would anticipate before advancing capital for the project.

The second point of view is that of the province which, ideally, would want to maximize the present value of the before-tax cash flow, using the social opportunity cost (SOC) as a discount rate. The social opportunity cost is the average before-tax rate of return capital can earn in the Province.[1]

2.1 Project Evaluation

The appraisal of capital expenditure for a mining project is no different from the appraisal of any other investment. The method uses the discounted cash flow for an investment in one of three possible ways.[2] First,

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[1] These discount rates plus a third, the private opportunity cost, are discussed more fully in Chapter 3 when the actual values are determined.

[2] Edge, C. G., A Practical Manual on the Appraisal of Capital Expenditure (Hamilton, Ontario: The Society of Industrial and Cost Accountants of Canada, 1971).

if a single investment is being considered, the internal rate of return (IRR) for the cash flow is calculated and compared to the investor's minimum acceptable return. The investment is desirable if the IRR exceeds the investor's minimum.

Second, where there is more than one investment opportunity, then the cash flow from each can be present-valued using the investor's minimum acceptable return as a discount rate. The investment with the highest present value is preferred, so long as it is positive and the projects are of similar life.

Third, if a specific project or task must be undertaken, but it can be undertaken a number of ways, the initial investment can be expressed as an equivalent after-tax annual cost (using the appropriate discount rate) and added to the after-tax operating cost. The investment with the lowest total annual cost is the preferred one.

The appraisal method used in this study is the second. Since the model determines the optimum size of project to develop a mineral deposit, it compares variations of the project and chooses the one that yields the highest present value. The variation that yields the highest present value is the optimum project because the marginal investment is just able to earn the desired minimum acceptable return. If the last increment of investment earns more than the minimum return, then the present value of the cash flow would still not be at a maximum; if it earns less, then the present value would be reduced below maximum.

The annual cash flow from the point of view of a private investor is calculated as follows:

from: Sales Revenue

deduct: Operating Costs

deduct: Provincial Royalties