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Canada's Mining Taxation Needs to Be Efficient and Simple, Not Riddled With Over- the-Top Incentives

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Philip Bazel and Jack Mintz

EXECUTIVE SUMMARY

Canada has one of the most competitive mining tax systems in the world. For most mining products, the overall tax burden in Canada is lower than in competing jurisdictions, which means that more targeted tax incentives aren't needed to attract investment. This paper evaluates Canada's mining-tax system across provinces and compares it with the tax regimes of 27 major mining jurisdictions worldwide, including Australia, Chile, Peru, South Africa, China, the United States and several Latin American and African producers.

The paper recommends several reforms to simplify and modernize Canada's mining-tax system. These include eliminating or scaling back targeted critical-mineral incentives and exploration tax credits, reducing development deductions under the corporate income tax from 30 to 25 per cent and reforming provincial processing allowances so they exempt only genuine processing income rather than extraction profits. In the exuberance to find critical minerals, incentives have become excessive and poorly administered thereby distorting the allocation of resources in the economy.

Provincial mining taxes should be converted to cash-flow taxes that fully expense capital investments and allow unused deductions to earn interest, following British Columbia's model. Such reforms would tax economic rents more efficiently while reducing distortions.

Overall, the recommendations would lead to a reduction in the effective tax rates on new investment in non-critical mining from 13.2 per cent to 12.5 percent, averaged across provinces. The effective tax rate on critical mining would increase from 10.2 per cent to 12.5 per cent although the tax burden would fall in Quebec and Alberta with the adoption of a cash flow approach to taxing mining. The policies would make the tax system more neutral across different mining projects while maintaining tax competitiveness for mining projects.

Canada's mining industry is a major contributor to the national economy, generating \$54.7 billion in shipment values in 2024, or about two per cent of GDP. Metallic mining — including copper, gold, iron ore, lithium, nickel, and zinc — accounts for nearly 70 per cent of total mining output. Exploration and development expenditures have also increased in the last 10 years, which shows investor confidence in Canada's resource sector.

In Canada, provincial governments generally levy profit-based mining taxes rather than revenue-based royalties, while the federal corporate income tax allows deductions for labour, exploration, development, capital investment and provincial mining taxes. Other incentives include accelerated capital cost allowances, provincial investment tax credits and the flow-through share system, which lets companies transfer unused deductions and credits to investors. Recently, the federal government introduced a 30 per cent tax credit for eligible exploration expenditures in critical minerals, financed through flow-through shares.

Although these measures were meant to strengthen investment, Canada's tax system is already sufficiently competitive. In particular, the new critical-mineral tax credit is unnecessary because Canada's overall tax burden is already among the lowest internationally. Taxation is not the main barrier; instead, the barriers to mining investment are regulatory delays, permitting uncertainty and project approval. Improving regulatory efficiency, through initiatives such as the federal *Building Canada Act*, or even better, regulatory reforms would be a more effective policy response than expanding tax preferences.

Canada should pursue tax reform to improve economic efficiency. Minerals are non-renewable resources, so tax policy should neither discourage investment nor artificially encourage extraction through subsidies. Excessive tax preferences risk shifting production from future generations toward marginal projects today, reducing the long-term value of Canada's resource wealth. The system also creates distortions by taxing mining more lightly than many other industries and by relying on numerous targeted deductions, credits and special provisions that complicate investment decisions.

Policymakers should focus on regulatory reform and a simpler, more neutral tax system that supports investment while preserving the long-term value of Canada's mineral resources.

The report was written prior to the announcement by the federal government on September 15th, 2026 that it will expand expensing from 15 per cent to two-thirds of assets. Expensing will enable companies to write off qualifying capital expenditures immediately rather than through time, thereby providing an interest free loan to companies. It will result in an even more favourable treatment of mining in Canada compared to other countries that is shown below. It will also introduce new economic distortions by favouring short-lived compared to long-lived capital, thereby making the mining tax system more non-neutral. This paper suggests a different path should be pursued that maintains competitiveness but reduces economic distortions.

INTRODUCTION

It is necessary to premise the four following maxims with regard to taxes in general. First, the subjects of every state ought to contribute towards the support of the government as nearly as possible in proportion to their respective abilities. Second, the tax which each individual is bound to pay ought to be certain and not arbitrary. Third, every tax ought to be levied at the time or in the manner in which it is most likely to be convenient for the contributor to pay it. And fourth, every tax ought to be so contrived as both to take out and to keep out of the pockets of the people as little as possible, over and above what it brings into the public treasury of the state.

Adam Smith, *Wealth of Nations*, 1776.

As Canada and other countries turn to the mining industry to provide materials for energy development, consumer products and infrastructure, taxation is one of the key policies that can deter investment. However, before we rush into a suite of tax incentives to encourage mining, it is important to remember the foundations for good tax policy.

The earliest statements about the “best” tax policy are attributed to Adam Smith. He stressed that taxes be efficient in taking as little as possible to fund the state. They should also be fair (proportional to abilities), certain and easy to collect. Today, Smith’s objectives for tax policy are consistent with the typical objectives argued for a good tax structure that raises a given amount of revenue for governments (Brazer 1967): minimize distortions; be as simple as possible for compliance by the private sector and administration; and fair.

With respect to the taxation of businesses, including mining, the 1997 Report of the Technical Committee on Business Taxation argued for “neutrality and internationally competitive tax rates” (Mintz et al. 1997). Competitive tax rates do not mean a race to the bottom with Canada adopting a low rate that might be found in Africa or the United States. Instead, with neutrality, business activities should be taxed at the same rates to achieve the best allocation of capital according to their more profitable use. Tax policy, such as tax credits for research and exploration, may be warranted since companies investing knowledge-producing assets cannot capture the returns benefiting other companies that can use the knowledge. These arguments are not based on an “industrial policy” choice that favours some industries over others without an explicit market failure in mind.

In this paper, we evaluate mining taxation¹ across provinces in Canada and compare it to 27 other mining producers in the world including Australia, Argentina, Bolivia, Brazil, Congo, Chile, China, Mexico, Peru, South Africa and the United States. To isolate tax factors, projects across jurisdictions are assumed to be identical. Our overall conclusion is that Canada has the lowest tax burden for most mining products than other countries. Further tax incentives such as the new critical-mining tax credit are not needed for tax competitiveness. Other issues that affect mining competitiveness, particularly regulation, have stalled mining projects in the past. However, the appropriate policy response is to fix regulations, which the federal government is attempting with the *Building Canada Act*.

¹ Our focus will be on metallic mining. A broader definition would include minerals, including potash (Saskatchewan is the largest producer in the world) and uranium (Saskatchewan is second largest producer after Kazakhstan). We exclude potash and uranium given the complexity involved in modelling the Saskatchewan royalty payments. See Chen and Mintz’s (2015) analysis of potash taxation. See Natural Resources Canada (n.d.).

What Canada does need, however, is a reform of its mining taxes to make them more efficient and less distortionary. In our rush to develop mining products, it must be remembered that metals and minerals are non-renewable resources. The supply is not infinite; future generations will depend on their availability too.² One might argue that the tax system should not discourage mining production but neither should it be subsidized. Subsidies shift production from the future to marginal development today that could impair a country's wealth.

Below, we begin with production and reserve data on Canada's metallic mining sector in comparison to other countries. We also compare critical and non-critical metals for Australia, Canada, the EU and the U.S. We then turn to a review and evaluation of mining taxation in Canada, considering the corporate income tax, mining profit tax and other taxes that impinge on capital decisions. This is followed by a comparison with other countries. We conclude with a discussion of reforms.

CANADA'S MINING SECTOR

To mine a product, a company first explores an area to determine its value and then assesses its feasibility to determine its viability. If viable, it uses capital and labour to develop the resource prior to earning profits from production. Once production commences, a mining company will sustain capital to continue production, undertake a mine expansion or explore further other potential deposits. Processing may be undertaken requiring comminution (crushing and grading ore), sizing, concentration (separating material into ore and waste) and dewatering. The final stage, reclamation, is when the mine is closed and land is rehabilitated. Companies require regulatory approval and monitoring to explore, develop, process and reclaim land. Consultation with First Nations is also necessary for approvals.

It can take years before a mine begins production after the exploration stage. The U.S. takes second longest to complete a mine (following Zambia) — on average 29 years from first discovery to production (S&P Global 2024).³ For Canada, the time taken is on average 27 years and for Australia 20 years. Uncertainty and litigation risk contributed to higher exploration budgets in Canada and Australia over the last 15 years — 81 per cent and 57 per cent higher than in the U.S. Given technical, price and regulatory uncertainties, mining is indeed a risky investment.

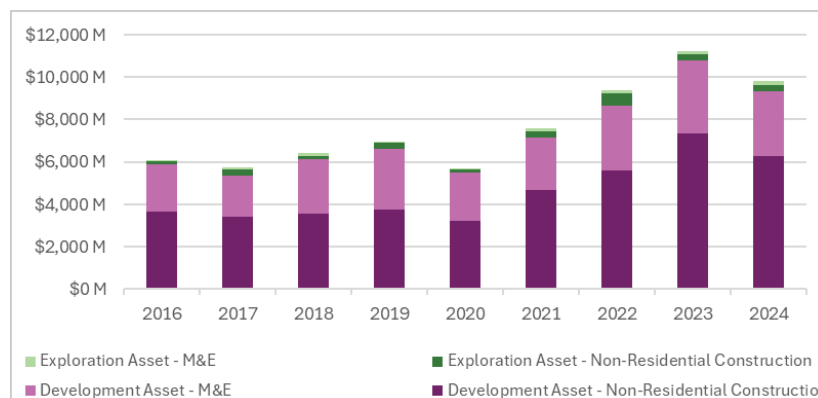
Canada's mining sector generated \$54.7 billion in shipment values in 2024 (two per cent of GDP) from metals, non-metals, clay and refractory products down from \$58.0 billion in 2023 (Statistics Canada 2026). Metallic mining shipments (\$38.4 billion) account for 69 per cent of shipment value, including copper, gold, iron ore, lithium, nickel and zinc. Since 2016, Canadian real exploration and development expenditure⁴ has risen by almost two-thirds (Graph 1). Most expenditure is related to development as exploration, capital, field work and overhead are only one-fifth of total E&D.

² Hotelling (1931) shows that the extraction rate for non-renewable products is optimal when the increase in the resource price (the capital gain from holding the asset in the ground) is equal to the opportunity cost by selling the resource and investing it in a financial asset. If the resource price increases at a rate less (more) than the interest rate, extraction is held back (increased). See the technical appendix.

³ The data compare 127 mines that have been completed or expected to start up (if no start-up date, it is presumed to be by 2030 for comparisons).

⁴ Canadian exploration expenses are defined as CEE and include costs incurred to determine the existence, location, extent or quality of a mineral resource or oil and gas accumulation. Canadian development expenditures refer to expenses incurred for the development of a well or mine in Canada once the resource has already been discovered. See Canada Revenue Agency (n.d.).

**Graph 1. Real Mineral Exploration vs. Development Expenditure, Canada
(in 2024 dollars)**

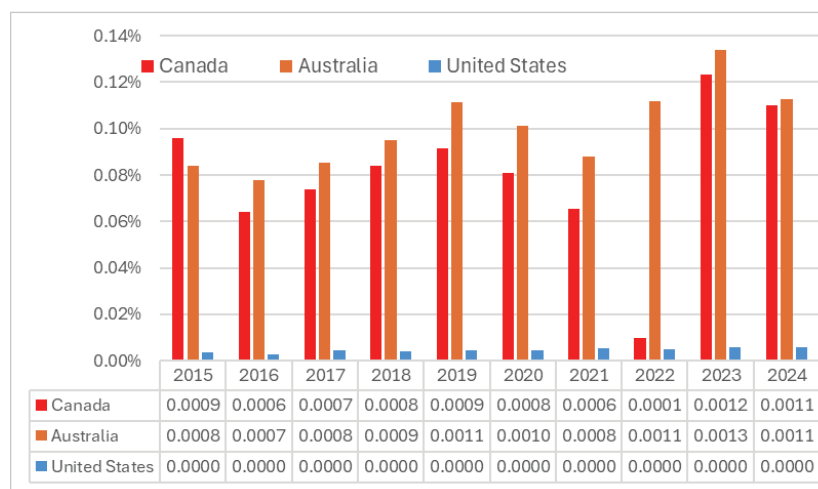


Source: Natural Resources Canada, Total Mineral Resource Development

As a share of mining value-added, Canadian development expenditure has slightly declined from 22 per cent (averaged 2016–20) to 19 per cent (2021–23). Exploration expenditure has averaged about one per cent of value-added throughout the period 2016–2022.

Exploration is particularly important for finding and developing new reserves. In nominal U.S. dollars, global exploration totalled \$12.7 billion. In comparison to the other countries, Canadian exploration has increased from 17 per cent of global exploration expenditure in 2015 to 19 per cent in 2024 (Graph 2). As a share of domestic GDP, exploration in Australia has been somewhat larger than in Canada while it has been very little in the United States.

Graph 2. Aggregate Nonferrous Exploration Budget as a Percentage of GDP



Source: S&P World Exploration Trends

With respect to metallic mining, which is the focus of this paper, Canada is only the top or second highest producer in potash and uranium, which are subject to highly complex mining royalties in Saskatchewan (for an analysis of potash, see Chen and Mintz (2015)). While Canada is one of the top 11 metallic mining producers, its share of global production and technically recoverable

reserves⁵ is no more than five per cent (Central Energy Resources Science Center 2024). Table 1 provides Canada's share of production and proven reserves of these specific commodities and compared to the first and second largest producers in the world. In Appendix A, we provide a further breakdown by country with respect to production and reserve shares.

Of the metals, Canada's most important product is gold, which accounted for \$16.9 billion of shipment value in 2024. This is followed by iron (\$5.6 billion), copper (\$4.5 billion), uranium (\$3.1 billion), nickel (\$2.8 billion), platinum group (\$1.1 billion) and zinc (\$0.2 billion). Non-metal shipments totalled \$11.3 billion in 2024 of which potash dominated with \$8.7 billion in shipment value.

Table 1. Canada's Share of World Production and Technically Recoverable Reserves of Selected Mining Products, 2024

Commodity	Canada Production Share	Canada Reserve Share	Top Producer Share in the World	Top Reserve Share in the World	Second Largest Producer Share	Second Largest Reserve Share
Copper	1.6% (11 th)	0.8% (11 th)	China 27.9%	Chile 19.4%	Australia 10.2%	Congo 14.8%
Gold	6.1% (4 th)	5.0% (5 th)	China 11.5%	Australia 18.8%	Russia 9.9%	Russia 18.8%
Iron Ore	2.3% (8 th)	2.9% (7 th)	Australia 37.7%	Australia 29.5%	Brazil 17.7%	Brazil 17.0%
Lithium	1.6% (6 th)	4.0% (7 th)	Australia 45.0%	Chile 31.0%	Chile 20.3%	Australia 45.0%
Nickel	4.2% (5 th)	1.8% (8 th)	Indonesia 54.1%	Indonesia 45.0%	Philippines 11.0%	Australia 19.7%
Zinc	1.1% (11 th)	1.5% (11 th)	China 33.6%	Australia 27.8%	Peru 12.1%	China 20.0%

Note: Numbers in parentheses indicate Canada's rank. Bolivia has the third largest potential lithium reserves but currently little production. Source: U.S. Geological Survey Mineral Commodity Summaries 2025

As shown in Table 2 below, Canada includes 34 critical minerals, up from 31 in 2022, but identifies six as priority "for their distinct potential to spur Canadian economic growth and their necessity as inputs for priority supply chains." These include lithium, graphite, nickel, cobalt, copper and rare earth elements. Gold and iron, the two most important products by value, are not classified as critical minerals, which account for three-fifths of the value of metal mining shipments. Copper, lithium, nickel, platinum group and zinc are labelled as critical products, as well as numerous other products that are currently small in production.⁶ The value of cobalt production is \$114 million in 2025. Graphite shipments are negligible (12,000 tonnes) and rare earth metals are not commercially produced. Future production is possible in these cases. For example, rare earth metal proven reserves (commercially viable) are estimated at 830,000 tonnes (potential reserves are estimated at 15.2 million tonnes).

⁵ The United States Geological Survey reports technically recoverable reserves regardless of cost, unlike proven reserves, which must also be economically recoverable as well.

⁶ The U.S. Geological Survey (2026) states: "Owing to continuing exploration, measured and indicated lithium resources have increased substantially worldwide and total about 150 million tons," rather than an official estimate of 37 million tonnes in 2024. Under the expanded measure, Canada is listed at 8.1 million (5.4 per cent of reserves). The Lithium Triangle — Argentina, Bolivia and Chile — have 43 per cent of world reserves. Australia has 10 million tonnes and the United States has 30 million tonnes in reserves.

Table 2. Critical and Non-Critical Metal and Non-Metal Products as Designated by Canada, the European Union, the United States and Australia.

Commodity	Canada 2024	EU 2023	USA 2025	Australia 2024
Aluminum	●	●	●	●
Antimony	●	●	●	●
Arsenic	●	●	●	●
Barium	●	●	●	●
Bauxite	●	●	●	●
Beryllium	●	●	●	●
Bismuth	●	●	●	●
Boron	●	●	●	●
Cadmium	●	●	●	●
Cesium	●	●	●	●
Chromium	●	●	●	●
Cobalt	●	●	●	●
Coking Coal	●	●	●	●
Copper	●	●	●	●
Feldspar	●	●	●	●
Fluorine	●	●	●	●
Fluorspar	●	●	●	●
Gallium	●	●	●	●
Germanium	●	●	●	●
Graphite	●	●	●	●
Hafnium	●	●	●	●
Helium	●	●	●	●
Indium	●	●	●	●
Iridium	●	●	●	●
Iron High-purity	●	●	●	●
Iron ore	●	●	●	●
Lead	●	●	●	●
Limestone	●	●	●	●

Commodity	Canada 2024	EU 2023	USA 2025	Australia 2024
Lithium	●	●	●	●
Magnesium	●	●	●	●
Manganese	●	●	●	●
Molybdenum	●	●	●	●
Nickel	●	●	●	●
Niobium	●	●	●	●
Platinum Group	●	●	●	●
Phosphate	●	●	●	●
Phosphorus	●	●	●	●
Potash	●	●	●	●
Rare Earth Group	●	●	●	●
Rhenium	●	●	●	●
Rubidium	●	●	●	●
Selenium	●	●	●	●
Silicon	●	●	●	●
Silver	●	●	●	●
Strontium	●	●	●	●
Tantalum	●	●	●	●
Tellurium	●	●	●	●
Thallium	●	●	●	●
Tin	●	●	●	●
Titanium	●	●	●	●
Tungsten	●	●	●	●
Uranium	●	●	●	●
Vanadium	●	●	●	●
Zinc	●	●	●	●
Zirconium	●	●	●	●

Notes:

1. Aluminum vs. bauxite: The EU combined aluminum with/into bauxite in the last revision. Bauxite is the primary ore from which aluminum is derived.
2. Disaggregated groups: The EU list splits rare earth elements into heavy and light categories.
3. U.S. 2025 list expansion: The 2025 U.S. list includes 60 minerals, up from 50 in 2022. The 2022 expansion from 35 to 50 was partly due to disaggregating groups previously included as single entries. For example, rare earth elements (REEs) and platinum group metals (PGMs) were previously grouped but are now listed individually.

Also striking about Table 2 are differences among countries with respect to their interpretation of which minerals are critical and those that are not. The European Union labels bauxite a critical mineral but Australia doesn't, although it is a major producer of bauxite used in aluminum. Coking coal is labelled as a critical mineral by the EU but not Canada, the U.S. or Australia, despite its importance in iron production used for infrastructure. Canada and the U.S. list copper, potash, tin, uranium and zinc as critical minerals but Australia and the EU don't. Canada has listed high-purity iron as a critical mineral since 2024 but the other three countries don't. While most countries generally designate some minerals like lithium and rare earth metals as critical, many are chosen based on politically determined priorities such as national security and supply chain resiliency, which vary across countries. In other words, there is no clear scientific basis for determining which mining products are critical.

Overall, Canada is a significant producer of metallic mining products but does not have a dominant market share of any ore. Compared to the United States, Canada has a larger market share in the production of gold, iron ore and nickel.

CANADA'S MINING-TAX SYSTEM

In Canada, the provinces are primary owners of their resources, which gives provincial governments the right to levy royalties as payment by producers to extract a resource.⁷ However, the federal and provincial governments levy corporate income taxes on all companies, including those engaged in mining. The most significant provisions under the provincial mining-profit taxes and federal-provincial corporate income taxes are provided in Table 3 below. Appendix D provides further tax information with the addition of Yukon, Northwest Territories and Nunavut.

Generally, the provinces apply mining profits earned at the pit mouth as taxes on gross corporate profits (before the deduction of interest expense). The mining-profit taxes are applied at a flat rate except in Quebec, which uses a progressive rate schedule based on profit margins, and Manitoba, where it is based on profit levels. The provinces do not apply revenue-based royalties on mining that are more typically found in other countries although several provinces apply minimum taxes as a percentage of the value of mining production revenues at the pit mouth. Provinces allow pre-production to be recovered or deducted before profit taxes are applied on payouts (Saskatchewan provides a holiday until 150 per cent of costs are recovered).

Provincial governments provide processing allowances that are intended to exempt processing from the mining tax.⁸ Typically, as shown in Table 3 below, the processing allowance is eight per cent of the value of undepreciated processing assets subject to income limitation (65 per cent in most provinces). If the marginal profit rate on assets is 10 per cent and processing assets are one-quarter of total assets, the deduction is equal to 20 per cent of profits.

Several provinces also provide tax holidays for new and/or remote mines. In the case of Manitoba and British Columbia, a mining company does not pay mining tax until pre-production expenditures are fully recovered by profits (this is similar to a carry-forward of pre-production expenditures until fully written off). In Manitoba's case, it is 150 per cent of pre-production expenses while British Columbia allows companies to carry forward deductions at a rate of interest, which is discussed further below.

Along with the provinces, the federal government levies corporate income taxes on mining, as it does for other industries. Unlike Alberta and Quebec, which levy and collect their own corporate income taxes, other provinces have tax collection agreements with the federal government. Under these agreements, the federal government collects the corporate income tax on behalf of the provinces while the provinces agree to use the federal tax base. The provinces have the flexibility to choose their own corporate income tax rates, profit thresholds at which the small business tax rate is applied, investment tax credits and surtaxes.

The corporate income tax allows for the deduction of labour costs, 100 per cent of exploration costs, 30 per cent of development expenditures on a declining balance basis, capital cost allowances (rates varying from five to 100 per cent) and provincial mining taxes. The federal government and provinces provide several incentives, including accelerated investment incentive at one-and-one-half the normal capital cost allowance rate in the first year (with no half-year convention applied). It is provided to all industries (initially introduced in 2018, it was to be phased out by 2028 but is now renewed until 2028 and will be phased out by 2033). Manufacturing,

⁷ Provinces are vested with the ownership of Crown lands, mines, minerals and royalties. Ontario initially reserved mineral rights when it granted land to private landowners but, beginning in 1908, granted mineral rights to private landowners. In 1930, when the provinces gained ownership of Crown resources, more than 80 per cent of mineral rights belonged to the provinces; the remainder were freehold. See Carr and Livernois (2012).

⁸ Chen and Mintz (2013) point out that processing allowances can be quite distorting with investment since the allowance is based on the original cost of assets, rather than the undepreciated asset value.

processing and clean energy machinery and equipment are expensed. In addition, exploration costs are expensed and development written off at 30 per cent. The federal government also provides a 15 per cent mineral-exploration tax credit. Provinces also provide investment tax credits in some instances (British Columbia, Quebec and Saskatchewan).

Federal and provincial governments have also enabled companies to renounce claims for mineral exploration and development deductions and eligible investment tax credits. The investor can claim the expenses and credits that reduce personal income taxes. The original cost of the shares is written down by the amounts claimed — capital gains taxes are paid when shares are eventually sold. The flow-through share mechanism enables companies to make better use of unused deductions and credits by transferring them to tax-paying investors. The shares are sold at a premium (as companies give up their deductions) and are subject to management fees and sales commissions.⁹

In Budget 2022, the federal government introduced critical-mining incentives for exploration, eligible until March 31, 2027 (with a potential for renewal, which has been done in the past for the general exploration tax credit). The federal incentive is equal to 30 per cent of non-refundable exploration costs incurred in finding a critical mineral (unused investment tax credits can be carried back three years or forward for 15 years, not indexed with inflation). The credit can only be claimed by investors holding flow-through shares. If other non-critical minerals are discovered with critical minerals (polymetallic), the 30 per cent credit can be claimed if the primary metal is a critical mineral (if not critical, it is eligible for the 15 per cent exploration tax credit). If it is found later that the primary metal is not a critical mineral, subsequent critical-mining tax credits cannot be claimed (the mineral-exploration tax credit of 15 per cent cannot be claimed in later years, creating some uncertainty for investors) (Sala et al. 2023). Five provinces bump up critical-mining tax credits via flow-through shares: Ontario (five per cent), Quebec (20 per cent for producers and 40 per cent for non-producers), Saskatchewan (10 per cent), Newfoundland and Labrador (15 per cent) and New Brunswick (15 per cent with its 150 per cent expensing of exploration costs).

In addition to mining-profit and corporate income taxes, mining companies also pay other taxes on capital investments. These include sales taxes on capital inputs, particularly the retail sales tax in British Columbia, Saskatchewan and Manitoba. Asset-based taxes, such as property and real estate transfer taxes, are levied. Tariffs are applied to capital imported from abroad. For data reasons, municipal property taxes and tariffs are not available at this time.

Mining companies also pay carbon and fuel taxes on energy as well as employer-payroll taxes on compensation paid to labour. These taxes are not part of the effective tax rate on capital. Instead, they apply to energy and labour inputs. If a cost-of-doing-business approach is used to evaluate tax competitiveness (McKenzie, Mintz and Scharf 1997), an aggregation of taxes on different business inputs would be considered (see also Mintz et al. 1997).

⁹ Jog (2016) estimates a premium ranging between nine and 21 per cent (averaging 14.8 per cent). Ignoring tax benefits, flow-through shares had a negative rate of return ranging from -14 per cent (large firms) to -92 per cent.

Table 3. Key Mining and Corporate Tax Provisions by Province, 2026

	Federal	BC	AB	SK	MB	ON	PQ	NB	NS	NFLD
Mining-Profit Tax Provisions										
Tax Rate ¹	x	13%	12%	10%	10%-17%	10%	16, 22, 28%	16%	15%	15%
Exploration	x	100%	100%	150%	150%	100%	100%	150%	100%	100%
Development	x	100%	100%	100%	20%	100%	100%	100%	100%	10%
Post-Production	x	100%	15%	30%	20%	15-100%	30%	33%	30%	25% 100%
Processing Allowance ²	x	8%	8%	8%	Up to 20%	8-20%	10%	8%	8%	8%
Other Incentives	x	x	x	HOL until 150% of costs recovered	15% ETC	HOL 3 yr (10-yr for remote)	Mining- tax rates based on profit margins (lowest <35%, 35 top 50% >50%)	x	x	HOL 10-yr: credit for CIT against mining tax
Corporate Income Tax Provisions										
CIT Rate	15%	12%	8%	12%	12%	10%	11.5%	14%	14%	15%
Exploration	100%	100%	100%	100%	150%	100%	100%	100%	100%	100%
Development	30%	30%	15%	30%	30%	30%	30%	30%	30%	30%
Depreciable	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Critical Mining CMETC	30%	20%	x	30%	30%	5%	20% producers (45% others)	(5)	x	15%
Other Incentive ⁴	15% METC	20% METC (4)	x	30% METC 15% processing (CM)	30% METC	x	HOL 10 yr. for >\$100 million capital 10-22.5% METC	x	x	x

Notes: CMETC: critical-mineral exploration tax credit; METC: mineral-exploration tax credit; HOL: tax holiday. For the territories, see data appendix.

Some provinces use a pre-payout minimum tax: B.C. (two per cent), Alberta (one per cent), Saskatchewan (five per cent, 10 per cent based on volume), Quebec (one per cent), New Brunswick and Nova Scotia (two per cent).

- Processing allowance is a percentage of the undepreciated cost of processing assets subject to a maximum percentage of processing income (usually 65 per cent). Smelting allowances (manufacturing stage) may also be provided.
- Capital cost allowance rates for depreciable assets vary with structures, generally at five per cent, machinery up to 100 per cent (most common is 25 per cent) and processing at 33 per cent.
- Federal and provincial governments provide flow-through share incentives for exploration deductions and tax credits.
- New Brunswick's 150 per cent deduction for exploration under the mining tax boosts the critical-mining tax credit for flow-through shares.

MARGINAL EFFECTIVE TAX AND ROYALTY RATES

To assess the impact of taxes on mining investment decisions, we estimate the marginal effective tax and royalty rate (METRR). Companies invest in capital until the rate of return is equal to the cost of financing capital (or the financing rate) and any taxes paid on capital. Thus, taxes or royalties create a wedge between the pre-tax and post-tax rate of return on capital. For example, if the pre-tax rate of return is nine per cent and the after-tax return is five per cent, then the tax wedge is 44.4 per cent.

If the METRR is increased, it will create a bigger wedge between pre-tax/royalty and post-tax/royalty rates of return on capital. Because large mining companies fund investment from international capital markets, the post-tax cost of capital or interest rate is exogenous. Thus, the incidence of capital taxes results in an increase in the pre-tax cost of capital since the post-tax return is fixed. That would require companies to reduce investments that were previously acceptable when the tax rate was lower.

Thus, taxes impinge on capital decisions as they make marginal investments unprofitable. These are investments that generate little or no economic rents since profits are only sufficient to cover the cost of capital, which is equal to interest and equity financing costs and taxes. Taxes also reduce the rents earned by mining companies, but these come from profits earned by the company on its non-marginal investments. If the tax is applied to only rents with all economic costs deducted from revenues, the mining company will earn a lower average, not marginal, rate of return on capital. This point is relevant to later discussion on policy. Appendix C provides detail on the theoretical methodology.

It is important to note that defining the tax paid as a share of the return to capital, not equity, results in debt-sheltering investment from company income taxation. Companies relying more on leverage to finance capital will have a lower METRR. We assume that 40 per cent of capital is financed by debt for all countries in order to focus on tax differences among countries rather than differences in leverage ratios.

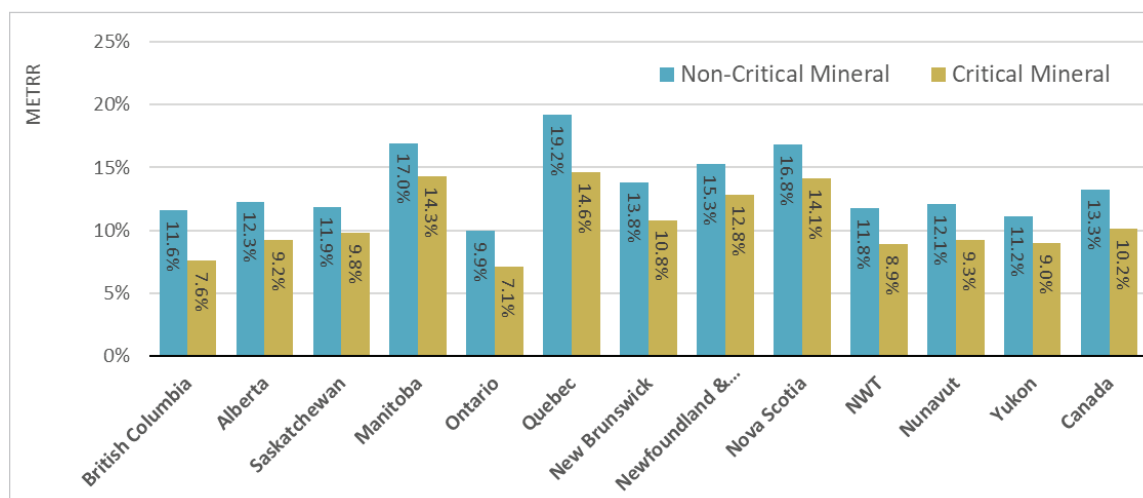
Another key metric that plays an important role in our assessment of the METRR is the gross profit margin (net price of unit operating costs divided by price). Since royalties fall on the value of production, its impact on profitability will depend on the price-cost margin — the smaller the difference between prices and unit costs, the greater the effective tax on the return to mining investments. Based on USGS data, price-cost margins are estimated by each product (see Appendix D for values by product, along with sources).

This analysis uses the same capital structure and other economic factors to isolate tax differences among countries to analyze tax competitiveness. The division between property, plant and equipment, and inventories, is obtained from PWC's top-40 mining company data. However, there was no breakdown between exploration, development and depreciable capital expenditures. To obtain this breakdown, Natural Resources Canada and Statistics Canada data were used, supplemented by Finance Canada data on tax depreciation categories. Economic depreciation rates for assets are also based on Statistics Canada estimates. Bond interest rates reflect differences in inflation rates across countries (following the purchasing power parity assumption). Equity costs are based on a marginal owner who is indifferent between after-tax rates of return on stocks and bonds (the marginal investor is assumed to be a G7 investor holding an international portfolio of bonds and equity). Appendix D provides information on parameters used for the modelling for Canada and comparator countries.

CANADIAN METRRS BY PROVINCE

Since the mining-profit taxes only vary according to whether they are non-critical or critical minerals, our task in presenting METRRs for each province is simplified. In Graph 3 below, we present METRRs for non-critical and critical mining respectively by provinces and averaged for Canada for non-critical and critical minerals respectively. Detailed METRRs for each type of capital investment and by province are provided in Appendix B.

Graph 3. METRRs Across Provinces: Critical and Non-Critical Mining, 2025



Not surprisingly, the exploration incentive for critical mining results in a lower METRR in all provinces, compared to non-critical mining. Across Canadian provinces, the METRR is 13.3 per cent for non-critical mining (with a 15 per cent exploration tax credit) and 10.2 per cent for critical mining with a 30 per cent federal credit (plus additional provincial credits in Manitoba, Ontario, New Brunswick, Quebec and Saskatchewan).

Still, there are remarkable differences among provinces, with mining most heavily taxed in Quebec and Manitoba, followed by Nova Scotia and Newfoundland and Labrador. The lowest METRR is in Ontario and British Columbia and next lowest in the three northern territories and Alberta. The key reasons for these differences are the following:

- Quebec and Manitoba have the highest top mining-profit tax rates among the provinces at 28 and 17 per cent respectively (Nova Scotia and Newfoundland and Labrador are third at 15 per cent). The lowest rates are in Saskatchewan and Ontario (10 per cent) followed by Alberta and Yukon (12 per cent).
- The provincial corporate income tax rate in Alberta is the lowest in Canada (eight per cent) with Ontario next lowest at 10 per cent (a preferential rate compared to other sectors). The highest is in Newfoundland and Labrador (15 per cent). New Brunswick and Nova Scotia are at 14 per cent. Most provincial corporate income tax rates are either 11.5 per cent (Quebec) or 12 per cent (e.g., British Columbia and Saskatchewan).
- British Columbia, Manitoba and Saskatchewan provide significant incentives for mining exploration compared to other provinces (60 per cent critical-investment tax credit combined with the federal credit). Alberta and Nova Scotia do not offer additional exploration tax credits.

- British Columbia's mining-profit tax is closest to a cash-flow tax that expenses capital with unused capital deductions carried forward at a rate of interest under their investment allowance. This is a significant advantage compared to other provinces. Quebec and Ontario depreciate rather than expense post-production capital expenditures under the mining tax, which is less favourable than other provinces (Ontario permits new mine expenditures to be expensed, limited by profit earned by the new mine or expansion).
- Effective retail sales tax rates in British Columbia (three per cent), Manitoba (5.4 per cent) and Saskatchewan (3.4 per cent) have a significant impact in raising the effective tax rate on capital in mining.

Appendix B provides a detailed look at the METRR by type of capital expenditure in each province for critical and non-critical mining. In Table 4 below, the Canada-wide averages are provided:

Table 4. METRR by Asset Expenditure, 2026, for Canada

	Share of Expenditure	Critical Mining	Non-Critical Mining
Depreciable Capital	23.5%	34.4%	34.4%
Land	0.2%	12.8%	12.8%
Inventory	12%	12.5%	12.5%
Processing	1.5%	20.6%	20.6%
Post-Production Investment	37%	28.9%	28.9%
Exploration	17%	-16.0%	1.8%
Development	46%	5.0%	5.0%
Aggregate	100%	10.2%	13.3%

Source: Authors' own calculations

Even without the latest incentive for critical mining, investment in exploration is favourably taxed in Canada, reflecting both expensing and mineral-exploration tax credits, either under the mining-profit tax or the corporate income tax. Development is also favourably taxed since cost deductions can be taken before the mine earns income (as discussed below, many countries match exploration and development expenditures with income earned from the mine, which is more neutral). Given these expenditures are almost two-thirds of mining capital expenditures, Canadian mining effective tax rates are below those of other sectors in the economy except manufacturing (Mintz 2025a). Processing assets benefit from higher capital cost allowances and in some provinces tax credits.

The processing allowance that potentially shelters post-production mining corporate taxable income is not included in the estimates. While the intention of the processing allowance is to exempt refining income that is beyond the extraction phase, companies write off an allowance based on the original non-depreciable cost of assets that can shelter mining non-refining profits from tax. For example, if the process allowance is more than 65 per cent of taxable mining income, it reduces the effective mining-profit rate by 65 per cent. Appendix B provides estimates of METRR with the processing allowance for both critical and non-critical mining.

Overall, METRRs diverge considerably across assets and provinces. The coefficient of variation (the weighted standard deviation divided by the mean) is a useful indicator of the deadweight loss of taxation due to non-neutral effective tax rates. Across asset expenditures, the coefficient is 0.98 for non-critical mining and 2.02 for critical mining. For critical minerals, that means the standard deviation is twice as high as the average effective tax rate. Such divergence in METRRs can result in a misallocation of capital resources. For example, there is an incentive to shift capital expenditure from post-production to development stages to reduce tax burdens. While we did not include the impact of manufacturing and processing allowances, the tax system also encourages smelting and refining in the province at the manufacturing stage.

CANADA'S MINING-TAX COMPETITIVENESS

A typical argument given for incentives is that Canada needs to be tax-competitive for mining in the world. Taxation, however, is only one factor influencing the location choice for investment but still matters as to whether a project is ultimately profitable. Regulation, economic uncertainties, political stability, labour availability and non-capital costs play an important role too. Assuming all else equal, even without the critical-mining incentive, the tax burden on mining in Canada is smaller compared to most major competitors for mining capital. Tax is not an impediment to mining development given Canada's low METRR compared to international competitors for mining capital.

Here we provide the overall results of METRR by country for products of which Canada is at least one of the top 11 producers in the world. Two are non-critical minerals — gold and iron — and four are critical minerals — copper, lithium, nickel and zinc. Appendix B provides estimates of METRR by asset and country for each product.

Significant differences in tax structures apply across the world. To understand how Canada compares, we focus on eight countries: Australia, Brazil, Chile, China, India, Mexico, Peru and the United States. Appendix D provides data on parameters used to estimate METRR for four Australian states, four U.S. states and 17 other jurisdictions.

In comparison to Canada, the primary differences are the following (see Table 5 for details):

1. Generally, Canada applies a similar corporate income tax rate (average 26 per cent) as other jurisdictions except for Nevada (21 per cent), Arizona (24.9 per cent) and Minnesota (22.9 per cent). Brazil has the highest corporate income tax rate at 34 per cent with Australia second highest at 30 per cent.
2. Profit-based royalties are becoming more common with Chile, Mexico, Peru and the United States applying them in addition to Canada. The lowest profit-based royalty rates are in the United States (1.3 per cent to seven per cent) and Mexico (7.6 per cent). However, Alaska and Minnesota also levy royalties, on gold and zinc in the case of Alaska, and iron in the case of Minnesota. By comparison, Canadian profit-based royalties are relatively high, particularly Quebec's top rate.
3. Unlike many jurisdictions, Canada provides faster write-offs for exploration and development. Several jurisdictions limit exploration and development deductions to the mine's life while Canada enables companies to deduct these expenses before income is earned. Brazil, China and, to a lesser extent, India amortize pre-production costs consistent with the life of the mine. Australia, Chile and Mexico expense exploration costs but write off development costs based on the life of the mine. The United States accelerates but does not expense exploration and development costs while Peru expenses exploration costs but amortizes development costs.

4. Canada is the only country that provides investment tax credits for exploration costs.
5. Most countries allow companies to write off inventory costs on a last-in-last-out basis (which uses a higher price for valuation due to inflation) or on an optional basis. Canada requires first-in-first-out valuation, which means the oldest inventories are written off first, resulting in taxes on inflationary inventory profits (however, inflation is quite low, assumed to be two per cent).
6. Many jurisdictions have other taxes that apply to mining, particularly Brazil and Nevada. Sales taxes on capital purchases are also important in India and China. Real estate transfer taxes are quite common internationally and applied in most jurisdictions.

Overall, Canada has accelerated deductions, especially for exploration and development expenditures, compared to other countries. It is common to find investment tax credits for exploration in Canada, unlike elsewhere. With respect to other provisions, Canada is similar or somewhat more accelerated.

In our calculations below, the same investment and financing structures are assumed across countries to isolate differences in effective tax rates. METRRs are presented by major producing country for selected products based on their importance in Canadian production: copper, gold, iron ore, lithium, nickel and zinc in Graphs 4 (a to f). Detailed calculations by asset expenditure are provided in Appendix B. Australian, Canadian and American sub-national jurisdictions are reported according to their prominence in producing a particular mineral.

Table 5. Major Tax Differences among Selected Large Mining Produced, 2026

	CIT Rate	Mining Tax/Royalty	E&D Deduction (declining balance equivalent)	Inventory Cost	Other Taxes
Australia	30%	Royalty: 4% (New South Wales) to 7.5% (Western Australia)	Exp. 100% Dev: 6%	Optional	Stamp duties: 7%
Brazil	34%	Royalty: 2%-3.5%	Exp: 4% Dev: 6%	Optional	Sales tax: 8% Transfer tax: 4% Financial transactions: 1.5% Gross receipts: 2%
Chile	27%	Profit-based: 14%	Exp: 100% Dev: 5%	LIFO	None
China	25%	Royalty: 6%-10%	Exp: 6% Dev: 6%	Optional	Sales tax: 1% Transfer tax 4%
India	25.1%	Royalty: 10%	Exp: 10% Dev: 10%	Optional	Sales tax: 4% Transfer tax: 7%
Mexico	30%	Profit-based: 7.6%	Exp: 100% Dev: 4.9%	LIFO	Transfer tax: 3%
Peru	29.5%	Profit-based: 20.4%	Exp: 100% Dev: 33%	Optional	Transfer tax: 3%
U.S.	21%-28.4%	Royalty: 1.1%2% Profit-based: 1.3% (Arizona) to 7% (Alaska)	Exp. 70% Deve: 70%	Optional	Sales tax: 1.7% (Alaska) to Nevada 7.8% Transfer tax: .26% to .4% Gross receipts: .9% (Nevada)
Canada	23-30%	Profit-based 10%-28%	Exp: expensed Dev: 30% Tax credits for exploration	FIFO	Sales tax: 0 (most provinces) to 5.4% (Manitoba) Transfer tax: 0 (Alberta) to 3% (B.C)

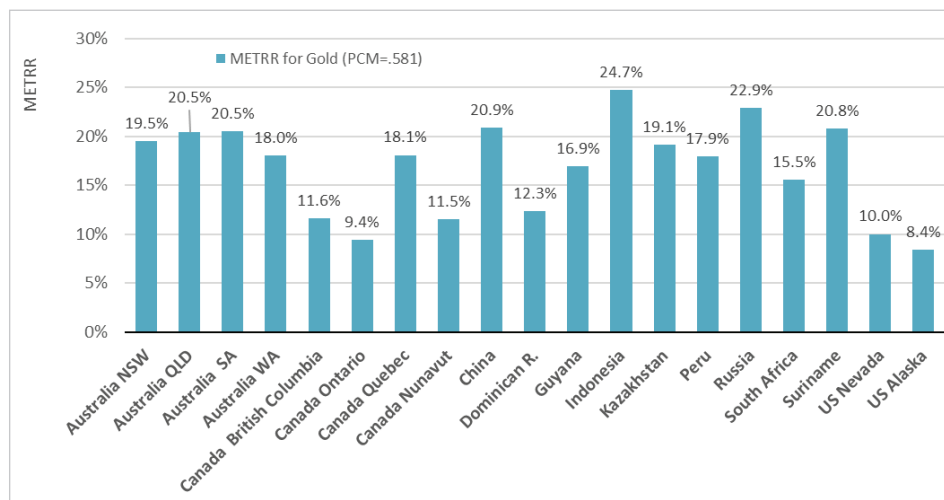
Notes:

- Royalties are expressed as a percentage of revenues. Values are those royalties applied to products in comparisons below.
- Sales taxes apply to capital purchases only.
- Transfer taxes apply to companies' purchases of real estate.
- Profits are inflation-adjusted in Chile and Mexico.

NON-CRITICAL MINERALS

With respect to gold as a non-critical mineral, British Columbia's, Nunavut's and Ontario's METRRs (11.6, 9.6 and 9.4 per cent respectively) are lower than other major producers except Nevada and Arizona (METRRs of 10 per cent and 8.4 per cent) that have much more favourable profit-based royalty rates than Canadian provinces. Quebec's METRR on gold (18.1 per cent) is similar or somewhat below other major producers, particularly the two largest ones by reserves: Australia (roughly 19 per cent) and Russia (22.4 per cent).

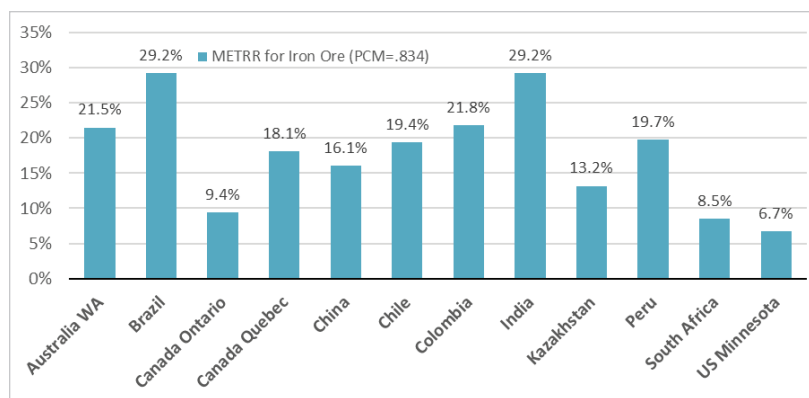
Graph 4a. METRR by Country for Gold, 2026



Note: PCM is the price-cost margin that is used to estimate effective tax rates when revenue-based royalties are applied.

As for the other non-critical mineral, iron ore, Ontario's METRR (9.4 per cent) is below other jurisdictions except for Alaska (8.4 per cent), which has a lower profit mining-tax rate and somewhat faster write-off for development costs. On the other hand, Quebec's METRR (18.1 per cent) is below the two largest producers, including Western Australia (21.5 per cent) and Brazil (29.2 per cent).

Graph 4b. METRR by Country for Iron Ore, 2026

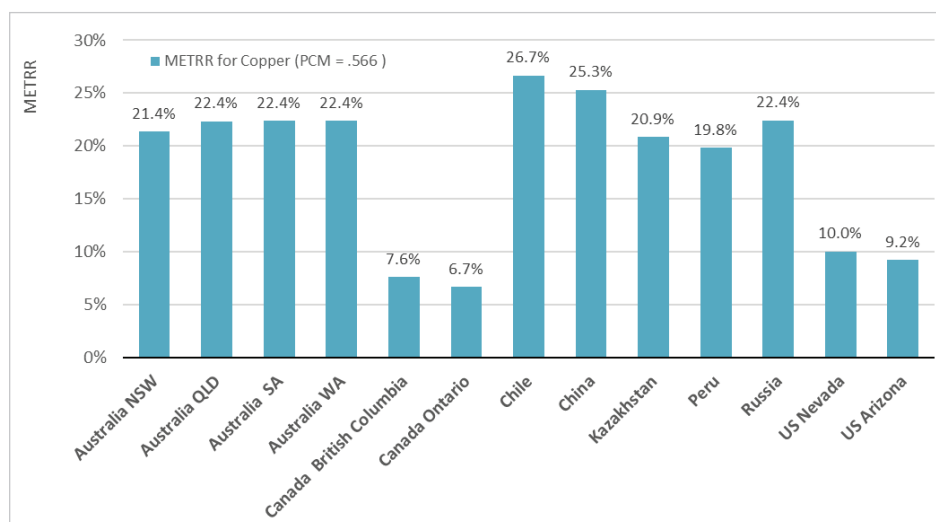


CRITICAL MINERALS

Four products are critical minerals with Canadian incentives for exploration more valuable than other countries. Again, Canada is tax-competitive for mining investments in each of the four products.

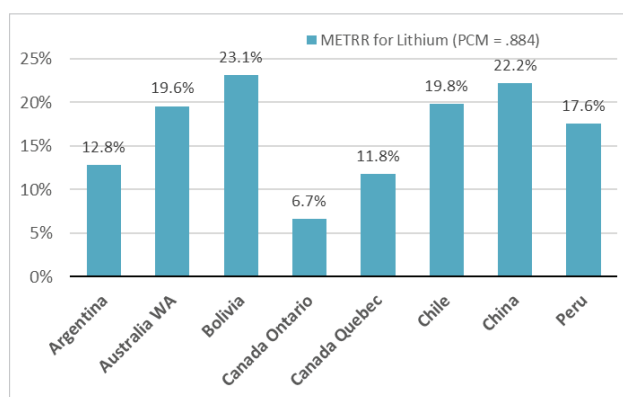
With respect to copper, METRRs in British Columbia (7.6 per cent) and Ontario (6.7 per cent) are below all other major copper jurisdictions, largely due to incentives for exploration and development.¹⁰ The three largest copper jurisdictions by reserves levy higher METRRs: Chile (26.7 per cent), Australia (22 per cent) and Peru (19.8 per cent).

Graph 4c. METRR by Country for Copper, 2026



The METRRs on lithium in Ontario and Quebec are below other major jurisdictions (again, largely due to development and exploration incentives) including Western Australia (19.6 per cent) and the Lithium Triangle: Argentina (12.8 per cent), Chile (19.4 per cent) and Bolivia¹¹ (23.1 per cent) (Jamasmie 2026).

Graph 4d. METRR by Country for Lithium, 2026

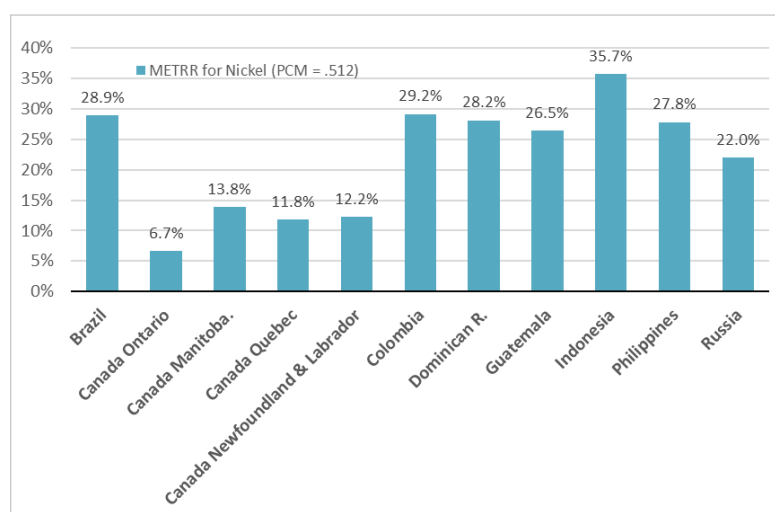


¹⁰ Without the critical mining incentive for exploration, British Columbia's and Ontario's METRRs would be lower than other jurisdictions except Nevada and Arizona, which would be roughly the same.

¹¹ The USGS estimates that Bolivia has 20 per cent of the world's lithium reserves but currently produces less than one per cent of lithium.

While Canada does not have a large share of nickel production or reserves in the world, it is fairly tax-competitive for nickel investments (Graph 4e). Ontario has the lowest METRR on nickel compared to other jurisdictions at 6.7 per cent. Despite relatively high profit-based mining taxes, Quebec, Newfoundland and Labrador and Manitoba also have lower METRRs than other countries. The highest METRR is in Indonesia, the largest producer of nickel in the world, primarily due to its progressive revenue-based royalty of 14 to 19 per cent (depending on nickel prices¹²). This is not only the highest royalty among jurisdictions for nickel but also any product in Appendix D (Colombia has the second highest nickel royalty rate of 12 per cent). Unlike a profit-based royalty, a revenue-based royalty is applied to revenue before any deduction for costs and therefore can have a large impact on marginal investments. Indonesia has increased incentives for processing.

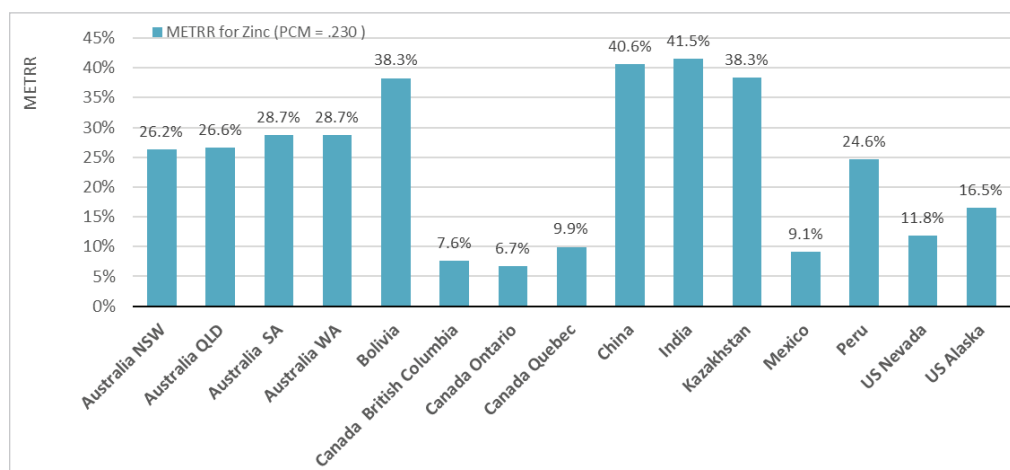
Graph 4e. METRR by Country for Nickel, 2026



With respect to zinc, Canada, the 11th largest producer in the world, has the lowest METRR on zinc investments compared to any other country. The METRR in Ontario is 6.7 per cent, followed by British Columbia (7.6 per cent) and Quebec (9.9 per cent). (Mexico at 9.1 per cent has a METRR slightly below Quebec's). The largest producer, China, imposes a much higher effective tax on zinc mining with a METRR of 40.6 per cent, in part driven by its limiting deductions for exploration and development to the life of the mine and a high royalty rate of 10 per cent (India has a royalty rate of 10 per cent that, coupled with some other disadvantages, has the highest METRR on zinc than all jurisdictions (41.5 per cent)). Australia has the largest share of zinc reserves in the world — its METRR varies between 26.2 per cent in New South Wales to 28.7 per cent in Western Australia.

¹² At current prices, the royalty rate is 14 per cent. For a description of Indonesia royalty rates adopted April 26, 2025, see Argus Media (2025). The previous royalty rate was 10 per cent.

Graph 4f. METRR by Country for Zinc, 2026



To conclude, Canada's tax system with respect to mining is the most tax-competitive in the world. Even without the recent critical-mining incentive, taxation would not be a deterrent to mining investment compared to other countries.

A BETTER APPROACH TO TAXING MINING

Given the rising infrastructure, defence and electrification demand for mineral products, it is important that Canadian federal and provincial governments achieve a tax structure that is attractive for investment, distortionary as little as possible and provides revenues for governments to fund public services that are needed to support Canada's standard of living. In a rush to develop mining, it is important to avoid incentives that result in a misallocation of capital resources in the Canadian economy. Even without the critical-mining incentives for exploration, Canada's tax system is quite tax-competitive for investment capital, with the lowest METRR on investment among jurisdictions for most products. If Canada is having difficulty attracting investment, it is for other reasons that have led to long delays between discovery and start-up times, as discussed above.

Canada's mining-tax structure, however, is complex, distortionary and could do a better job raising revenue for governments. We specifically make three recommendations: (i) turning mining-profit taxes into cash-flow taxes as British Columbia does, (ii) reducing incentives for development and processing and (iii) eliminating investment tax credits for exploration, especially the critical-mining tax incentive that is only available to investors with flow-through shares.

CASH-FLOW MINING TAX

The current mining-profit taxes in most provinces could be substantially improved by adopting a rent tax. Economic rent arises from non-reproducible (or fixed) factors of production such as entrepreneurship, land and natural resources. It can also arise from the presence of natural or artificial barriers to entry that generate market power and special advantages that firms may possess (i.e., location, patents, etc.). More generally, rent is the surplus value of a resource after all opportunity costs of using factors of production are subtracted from the value of production.

Any tax or levy applied to pure economic rent will not distort the use of capital or other production factors. At the margin, firms employ capital, labour and other factors until the marginal return on the last unit employed is equal to its economic costs. A pure rent-based tax will neither discourage nor encourage investment because the levy is neutral (in that it does not affect allocation decisions).

The relationship between the government, who is the primary owner of resources in Canada, and the private producer, is similar to a public-private partnership. The government is the principal owner, and the private company is the agent hired to maximize the amount of rent that can be generated by the non-renewable resource project. As the owner of the natural resource, the government is entitled to the rents earned from extraction. The private producer must be offered a rate of return on capital that is at least as good as opportunities available in other jurisdictions. Some of the rents may be associated with entrepreneurship or land and therefore accrue to the private producer and landowners, with the government receiving the remainder. The payment structure should be efficient by minimally distorting economic decisions to maximize rents.

Rent taxation can follow two approaches: excess profit or cash flow. Under the excess-profit approach, a mining tax would be levied on revenues net of labour and current capital costs (depreciation and depletion of reserves) and financing costs, including an allowance for the cost of equity financing (e.g., an allowance equal to a company or government bond rate). Under the cash-flow approach, the mining tax would be applied to revenues with the expensing of current and capital expenditures, including exploration costs, with no deduction for borrowing and equity-financing costs (asset disposals would be fully taxed). With both rent-based approaches, unused deductions would be carried forward at a rate of interest (the financing allowance) to preserve the time value of deductions. These two approaches are compared in Box 1 (based on Bazel and Mintz (2023)), which demonstrates their equivalency of rent bases in terms of the time value of rents earned on projects.

It is not unusual for governments to diverge from the rent tax for several reasons. A minimum royalty may also be applied for two reasons: (i) providing upfront revenue and (ii) protecting the profit base from tax evasion. However, to preserve the rent base, the minimum royalty should be credited against the mining-profit tax and unused credits should be carried forward at a rate of interest.

Another aspect is determining the appropriate financing rate or carry-forward rate. If the government shares investment costs and any operating losses, the rent-based tax also fully shares risks (it is equivalent to a deduction for risk costs).¹³ Thus, no explicit deduction need be given for risk if losses are fully deducted from profits or refunded by the end of the project, so a long-term government bond rate would be appropriate to use. However, without the full sharing of losses, a risk premium should be added to the government bond rate. One possibility is a company bond rate, which includes a premium for bankruptcy. If a mine closes without deductions fully claimed, a premium on the company bond rate may at best serve as a proxy for the risk involved with losing deductions.

As in Manitoba and Quebec, profit-based mining royalties could be assessed at a flat rate or graduated rates that rise according to the level of profits (or just global prices). The argument in favour of the graduated royalty schedule is that it allows smaller projects to pay less tax. Yet, compared to a flat rate, a graduated schedule leads to higher effective tax rates on volatile profits, discouraging risky investments. Graduated profit rates also contribute to pro-cyclical investment patterns. At the top of the price cycle, cost deductions create the greatest royalty savings (since the royalty rates are highest then) with an expectation that future profits generated by the investment will be subject to lower royalty rates when profits revert to the average. This leads to a lower effective royalty rate on investment, providing an extra kick to investment in a boom. The converse holds at the bottom of the price cycle in that the graduated rates will discourage investment.

¹³ This proposition is well known in the literature and implies that the risk premium from capital-asset pricing models is reduced by the factor one minus the tax rate under loss refundability. See Gordon and Wilson (1989) and Mintz (1995).

**Box 1. Equivalency of Cash-Flow and Excess-Profit Royalty Bases
(negative values in parentheses)**

	Year 1	Year 2	Year 3	Year 4	Present Value of Rents (6)
Cash-flow tax base					
Net revenues (1)		\$2,000	\$1,800	\$1,600	
Capital expenditure	(\$5,000)				
Asset disposal (2)				\$3,500	
Cash flow (3)	(\$5,000)	\$2,000	\$1,800	\$5,100	\$2,943
Excess-profit base (4)					
Net revenues		\$2,000	\$1,800	\$1,600	
Depreciation and depletion		(\$500)	(\$500)	(\$500)	
Financing costs (5)		(\$250)	(\$225)	(\$200)	
Rent		\$1,250	\$1,075	\$900	\$2,943

(1) Net revenues are revenues net of labour and other current costs. Amounts decline by 10 per cent per year, matching the decline in undepreciated capital stock.

(2) Asset disposal is at the end of the year.

(3) Cash flow is equal to net revenue minus capital expenditure (asset disposal is added to the tax base).

(4) Rent base is net revenue minus depreciation and financing costs.

(5) Equity-financing cost is at the interest rate of five per cent of the undepreciated capital stock and equal to the bond rate.

(6) Calculated by discounting each year's tax base back to Year 1 by the discount rate of five per cent.

With a cash-flow approach, a \$5,000 capital expenditure is written off in the first year. Net revenues earned in subsequent years and remaining depreciable assets are sold off in the fourth year when the project closes. Discounting values back to Year 1 by a five per cent rate yields a present value of rents equal to \$2,943. If a cash-flow royalty is imposed, say at 50 per cent, the government would collect royalty payments equal to \$1,000 in Year 2, \$900 in Year 3 and \$2,550 in Year 4. The government would provide a refund of \$2,500 to the firm in Year 1 to cover the investment cost (alternatively, the \$5,000 could be carried forward as a deduction at the five per cent interest rate and reduce the future royalty base). In present-value terms, the royalty payment would be \$1,471.50 on rents equal to \$2,943. This is identical to the value under the excess-profits approach.

With the excess-profits approach, the profit-based royalty each year is net revenues less depreciation and depletion costs and imputed financing costs. With \$5,000 in capital expenditure and straight-line amortization at 10 per cent, the depreciation and depletion costs in Years 2–4 are \$500 each year. The financing cost is five per cent of undepreciated capital at the beginning of the year: \$250 in Year 2 (five per cent of \$5,000), \$225 in Year 3 (five per cent of \$4,500) and \$200 in Year 4 (five per cent of \$4,000). The excess-profit base after deducting amortization and financing costs is \$1,250 in Year 2, \$1,075 in Year 3 and \$900 in Year 4. Discounting these values at five per cent back to Year 1 yields \$2,943 in rent. At a 50 per cent tax rate each year, the present value of the royalty payments would be \$1,471.50.

The British Columbia mining tax is an example of a cash-flow approach. Exploration, development and post-production capital are expensed. No borrowing interest expense is deductible. Unused deductions are carried forward at a long-term government bond interest as an investment allowance. Other provinces should consider this approach for their own mining-profit taxes, which currently depreciate, rather than expense development expenditures and investment.

In addition, tax holidays used by Manitoba, Ontario, Quebec and Newfoundland and Labrador would not be needed under a cash-flow tax. Since deductions would be carried forward and written off before payout begins, it performs as a tax holiday in that sense. Manitoba defines its tax holiday at the point in which 150 per cent of pre-production capital expenditures are written off, which should be replaced by an investment allowance to carry forward 100 per cent of unused exploration and development expenditures.

INCENTIVES

The current federal and provincial mining-profit and corporate income tax policies include several incentives: expensing exploration and a deduction for development costs prior to earning profit from the mine that can be written off other profits pooled by the corporation; processing allowances; investment tax credits for exploration; and flow-through shares that enable companies to transfer exploration and development deductions and investment tax credits, including the new critical-mining tax credit, to investors. The flow-through share mechanism is left for discussion in the next section.

As argued in the previous section, expensing capital expenditures under the mining-profits taxes would be appropriate with a rent-tax approach. However, capital expensing under the corporate income tax can result in a tax subsidy for investment when coupled with debt-interest deductions. With expensing, the company is already saving the corporate tax for each dollar of capital expenditure (26 cents on average in Canada). If the capital is debt-financed, the company also deducts interest expenses over time of which the tax savings will be equal to the corporate tax rate times present value of interest deduction on one dollar of debt. Thus, both expensing and interest deductions are a double deduction for capital expenditures.

The various incentives result in a misallocation of capital resources that increase the cost of doing business. When all activities are taxed at the same rate, the company will allocate resources among assets in the same manner as if no tax is imposed, thereby minimizing economic costs. The main distortion left is an inter-temporal one in which taxation will discourage the overall level of investment, not the distribution of investment to produce the product. Neutrality among business activities is therefore a proper benchmark to assess corporate tax policy. Instead, current mining taxation is non-neutral among business activities, resulting in a suboptimal allocation of resources.

Neutrality, however, is not the appropriate guideline when some market decisions are not optimal. The classic case for differentiation is research and exploration. Companies will invest when the return earned is sufficient to compensate them for investment costs. Yet other firms benefit from research and exploration without compensating the discoverer for the costs incurred. Thus, firms will under-invest in research and exploration since they cannot fully appropriate the returns from investment. Regulations like patents and land permits help reduce the distortion but not fully since some types of information, once revealed, cannot be sold by the discoverer to firms benefiting from the information.

Thus, a case can be made for a preferential treatment of exploration, although there is no empirical estimate as to how much tax support needs to be given. Given that permits are provided to mining companies to explore an area, the appropriate level of tax support is less than without the permitting regulation. With respect to most development expenditures, there is no rationale for preferential treatment as in the case of exploration. Thus, several countries, including Australia, Canada and Peru, have provided greater tax relief for exploration compared to development.

There are other arguments for preferential tax treatment for some activities. Since mining companies are engaged in risky activities, arguments are made for preferential treatment of pre-production expenditures because a company may not be able to recover the costs if the project fails. Under the cash-flow tax, whereby expenditures are carried forward at a rate of interest that can be claimed against income a company earns from all projects, the government ends up sharing the majority of the risk. A lower tax rate is not needed to compensate for risk when governments share losses as well as profits symmetrically.¹⁴

¹⁴ If losses are not fully deductible, taxes impose a higher cost on risky investments. See Mintz (1995).

Preferential treatment has been proposed for processing so that an economy can benefit from higher value-added activities. Whether this is an economic benefit is unclear. By providing tax relief or subsidies for mining processing, resources are shifted from other activities that might generate higher value-added. Further, governments raise taxes on other activities to cover the cost of any tax preference. Tombe (2015) shows that fabricated metal product value-added net of depreciation per job (\$75,000) is lower than mining (\$400,000). Employment compensation is also higher in mining (\$50 per hour) compared to fabricated metal products (\$30 per hour). In other words, the significant economic rent comes from extraction of a resource, not its processing. Even if processing is of lower value-added than mining extraction, it does not suggest that higher value-added mining activities should be preferentially taxed. The best allocation of resources is achieved by letting capital shift to those activities with the highest pre-tax marginal rates of return on capital. As capital shifts to the more profitable opportunities, the marginal return declines until there is no further attraction for capital to be invested in a particular business activity. GDP is maximized by markets pursuing the best opportunities.

To summarize, expensing of exploration expenditure under the corporate income tax may be justified. Whether investment tax credits are needed is another matter. Given no other major producers are subsidizing exploration as much as Canada, too many resources are being invested in exploration, especially when taxed at negative marginal effective rates (-16 per cent for critical mining).

As for development, processing and other capital investments, differences in effective tax rates across activities should be minimized by scaling back incentives under the corporate income tax. Development expenditures write-offs could be reduced or matched with income earned from the mine. The processing allowance sharply reduces the METRR since it is based on eight per cent of the original cost of undepreciated processing assets and limited typically by 65 per cent of mining income. (When hitting the limit, the mining-profit tax in Ontario is reduced from 10 per cent to 3.5 per cent). This creates a significant incentive for processing to take place in Canada, but it also reduces differences in effective tax rates on other capital investments when the 65 per cent limit is hit.

FLOW-THROUGH SHARES AND CRITICAL-MINING INCENTIVES

Flow-through shares have been a mechanism in place since 1954 to stimulate investment in the mining, oil and gas industries. The aim has been to assist junior companies to claim pre-production costs since they do not have sufficient revenues from other operations, unlike incumbent companies. As discussed above, a company renounces deductions and investment tax credits that are transferred to investors who can claim the write-offs against personal income (shares must be held typically for two years). The amounts claimed reduce the cost basis of flow-through shares, resulting in higher capital gains taxes if share prices rise.

The tax benefits with flow-through shares are substantial when it comes to exploration costs. With non-critical mining, not only is exploration expensed but investors can claim federal mineral-exploration tax credits of 15 per cent and provincial tax credits renounced by the company. For example, in Ontario, a high-income investor receives a tax saving of \$100 in grassroots exploration cost deductions worth \$53.50 in personal tax savings (this can be compared to an Ontario company with tax savings of \$26.50 given the corporate income tax rate). The federal tax credit of 15 per cent can also be claimed, allowing the investor to claim close to \$68.50. However, three items reduce the value of the flow-through shares. The flow-through shares are sold at a premium since companies lose their own deductions and credits. The investor also pays capital gains taxes

on the value of shares sold (since the adjusted cost base is zero dollars) and dealer commissions. If the flow-through share is sold as a donated share, a further tax savings can be claimed.

While flow-through shares enable more loss refundability for junior companies, they are a costly approach to other refundability mechanisms, such as refundable tax credits or carrying forward deductions and credits at a rate of interest. Further, as we remarked above, investors are primarily interested in the tax benefits rather than the economic returns from flow-through shares, resulting in many poor projects being funded. As Jog (2016) shows, the economic returns on flow-through shares are negative, resulting in a destruction of economic value with investors losing almost half the value. When many poor exploration projects become funded, the better projects have more difficulty raising capital as investors lose confidence in the market (the “lemons” effect when investors cannot distinguish between good- and bad-quality projects when purchasing assets¹⁵).

Critical-mining tax credits — 30 per cent at the federal level plus provincial credits — are only available through flow-through shares, unlike the mineral-exploration tax credit that can be claimed by a company or alternatively, transferred to investors with flow-through shares. This is a surprising development in Budget 2022 in that flow-through shares clearly result in higher administrative and compliance costs and potentially higher revenue costs for governments, as high-income investors reduce substantial personal income taxes.

As we show above, the critical-mining incentives are not needed for competitiveness. They further complicate tax policy since companies exploring property may find both non-critical and critical mining. Besides, the definition of critical mining is unclear, with countries choosing different products as critical or revising critical-mining lists.

In our view, Canada has made three errors in its approach to investment tax credits. First, exuberance to find critical minerals has led to over-the-top investment tax credits for exploration. Second, the flow-through share approach used to fund investment is complicated and costly to administer and for investors to comply with. Third, the investment tax credits are distorting the allocation of resources in the economy, resulting in too much funding of exploration projects with little success.

We conclude that the critical-mining investment tax credit incentives should be disbanded in the next two years rather than phased out by 2034. If an exploration tax credit is made available, it should be at a low rate and made refundable for junior companies. The flow-through shares mechanism that has been used for over five decades should be replaced by a better approach to achieve refundability of unused losses and unused credits.

IMPACT OF RECOMMENDATIONS ON INVESTMENT AND DISTORTIONS

To summarize, we make three major recommendations to reduce tax distortions and maintain mining-tax competitiveness in Canada: (i) conversion of mining-profit taxes to cash-flow taxes in all provinces; (ii) reductions in corporate income tax depreciation deductions for post-extraction and processing assets; and (iii) elimination of provincial exploration tax credits and the critical-mining incentive (leaving the 15 per cent federal exploration tax credit in place). The first recommendation would reduce the METRR (except in British Columbia, which already follows this approach) and the second and third recommendations would increase the METRR. All three recommendations would generally reduce distortions and simplify the tax system as seen below.

¹⁵ George Akerlof (1970) identified the “lemons” problem with asymmetric information (sellers having more information than buyers). See McKenzie, Mintz and Zimnicki (1992) for a tax application.

In Table 6, the METRRs on mining for critical and non-critical minerals are compared to the reform proposal:

- **The METRR on mining for critical minerals would increase except in Quebec and Alberta:** For Canada (aggregated by province and territory), the METRR on critical-mineral mining increases from 10.2 per cent to 12.5 per cent. British Columbia almost doubles since it already has a cash-flow tax which does not offset the reduction in other incentives. Alberta's and Quebec's effective tax rates on new investment in critical mining drop, unlike in other provinces, since the cash-flow tax provides significant benefits to mining companies, given the expensing of capital under the mining tax compared to their existing mining-tax regimes.
- **The proposal would reduce the effective tax rate on non-critical mining in most provinces and territories:** With respect to non-critical minerals (e.g., gold and iron ore), the proposal reduces the METRR across Canada from 13.3 per cent to 12.5 per cent with effective tax rates declining in Alberta, Ontario, New Brunswick, Nova Scotia, Newfoundland and Labrador and the three territories. In Quebec, non-critical mining (dominated by iron ore) realizes the largest decline in the METRR by almost a third.
- **Both critical- and non-critical-mining taxation in Canada would remain internationally tax-competitive under the proposal:** While the METRR on critical mining is increased, Canada remains internationally tax-competitive for investment for most products. For example, Alaska is the largest zinc producer but its METRR of 16.5 per cent would be twice as high as that for Ontario at 8.5 per cent under the proposal. As for lithium, Canada's METRR of 12.5 per cent would be slightly below Argentina at 12.8 per cent (although well below other countries).
- **Mining taxes would be less complex and distortionary under the proposal:** There will be a substantial reduction in distortions across assets in mining under the proposal compared to the current system. The coefficient of variation (standard deviation divided by the mean), which approximates the economic cost of taxation, is 0.75 for the proposal, compared to 1.99 for critical mining and 0.98 for non-critical mining. This is a substantial reduction ranging from approximately one-quarter to three fifths of the economic cost of non-neutral taxation.
- **Overall investment across industries would be more evenly distributed:** While critical mining would be somewhat more heavily taxed at 12.5 per cent (non-critical would be taxed somewhat less), it would be more favourably taxed than other sectors (the marginal effective tax rate on new investments in Canada, is 15.8 per cent).

Table 6. METRRs on Mining for Critical and Non-Critical Minerals

	Current System (Critical Minerals)	Current System (Non-Critical Minerals)	Proposed Combined System
British Columbia	7.6	11.6	15.1
Alberta	9.2	12.3	7.5
Saskatchewan	9.8	11.9	13.9
Manitoba	14.3	17.0	16.8
Ontario	7.1	9.9	8.5
Quebec	14.6	19.2	13.2
New Brunswick	10.8	13.8	12.4
Nova Scotia	14.1	16.8	12.3
Newfoundland & Labrador	12.8	15.3	13.0
Northwest Territories	8.9	11.8	10.1
Nunavut	9.3	12.1	10.4
Yukon	9.0	11.2	10.3
Canada	10.2	13.3	12.5
Addendum Items			
Co-efficient of Variation across Assets	1.99	0.98	0.75
Canada Manufacturing METR	-2.2	-2.2	n/a
Canada METRR Oil and Gas	26.0	26.0	n/a
Canada Aggregate METR as of 2026	15.8	15.8	n/a
METRR Nevada Gold	n/a	10.0	10.0
METRR Australia Iron Ore	n/a	21.5	21.5
Argentina Lithium	12.8	n/a	12.8
Alaska Zinc	16.5	n/a	16.5

Notes:

- Capital cost allowance under the corporate income tax is 10 per cent (instead of a mix of 20 per cent and 30 per cent).
- Development costs are written off on a decline-balance basis of 25 per cent under the corporate income tax.
- Single exploration tax credit at 15 per cent (federal only, no provincial).
- Elimination of provincial exploration tax credits.
- Cash-flow tax across provinces instead of income-based mining tax.

CONCLUSIONS

Canada's mining-tax system is internationally competitive but needs reform. Mining is less heavily taxed than other industries in Canada, which is itself a distortion in the allocation of capital in the economy. More importantly, mining taxation is needlessly complex and distortionary, resulting in an inefficient use of capital resources in the industry. Specific recommendations include:

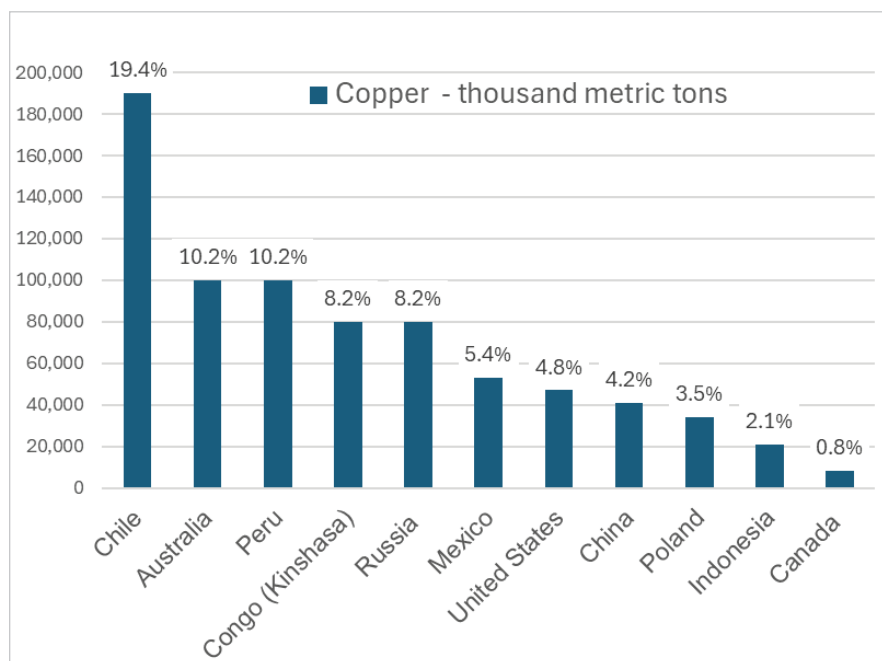
- Targeted incentives for critical mining are complex, poorly designed as flow-through share, distortionary and unneeded with respect to international competitiveness.
- Exploration investment tax credits should be scaled back.
- Development deductions under the corporate income tax could be further reduced to 25 per cent without harming competitiveness.
- Processing allowances should be scaled back. In addition to our proposal, provinces should revise processing allowances to truly exempt mining income from processing activities at the pit mouth rather than shelter income earned at the extraction stage the way it currently exists.
- Provincial mining taxes should also be reformed by converting them into cash-flow taxes by expensing of capital expenditures and carrying forward unused deductions at a rate of interest. Since the B.C. mining tax is already a cash-flow tax, other provinces should consider emulating the approach to tax mining rents.

Overall, both critical and non-critical mining provide tremendous opportunities for the Canadian economy as the world shifts to mineral products to build infrastructure and expand electrification. Market pricing will stimulate most mining investment in the future without Canada relying on a mining-tax structure that undermines the best uses of resources in the economy.

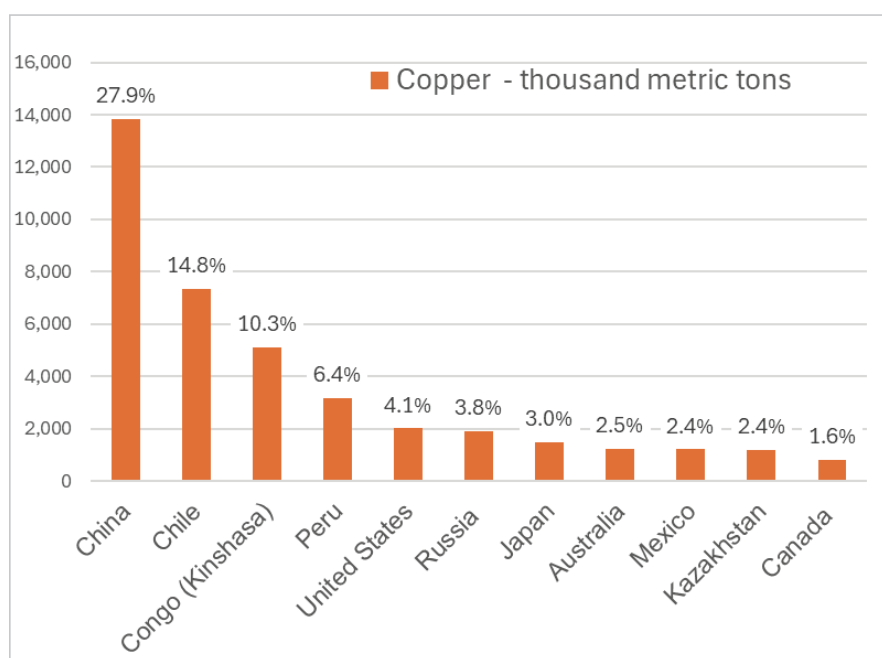
APPENDIX A: PRODUCTION AND RESERVES BY COUNTRY FOR SPECIFIC PRODUCTS

Below, we provide production and reserves in 2024 by country for copper, gold, iron ore, lithium nickel and zinc, comparing Canada with other top producers in the world. The data are based on the U.S. Geological Survey's Mineral Commodities Summaries 2025: World Production, Capacity and Reserves Commodity.

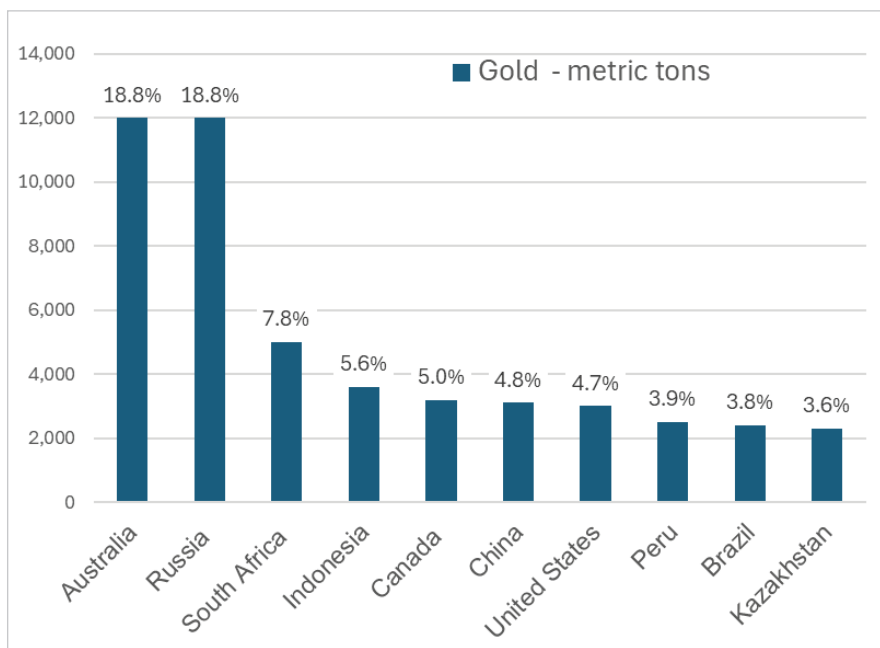
A.1 Copper Proven Reserves (% = Share of World Total)



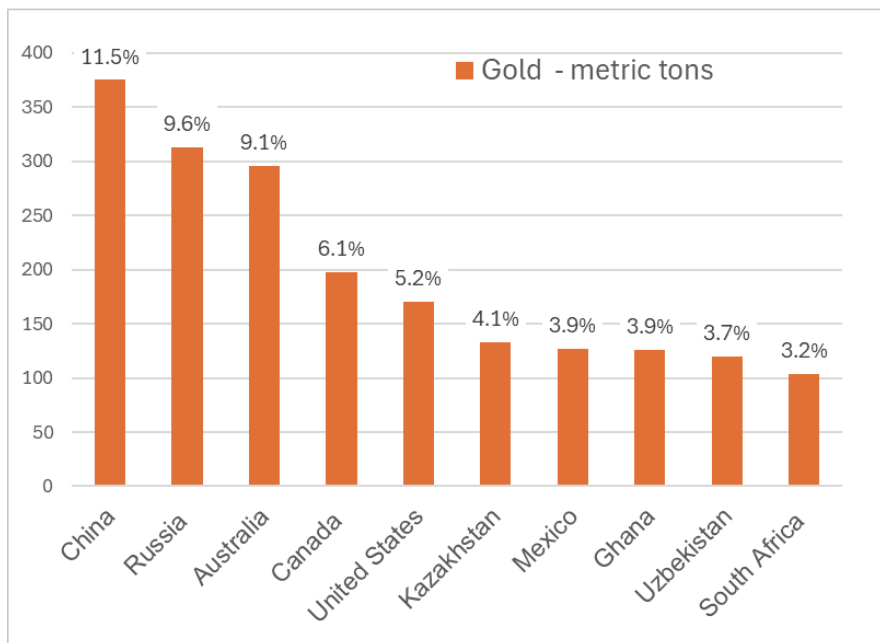
A.2 Copper Production - Mining & Refining (% = Share of World Total)



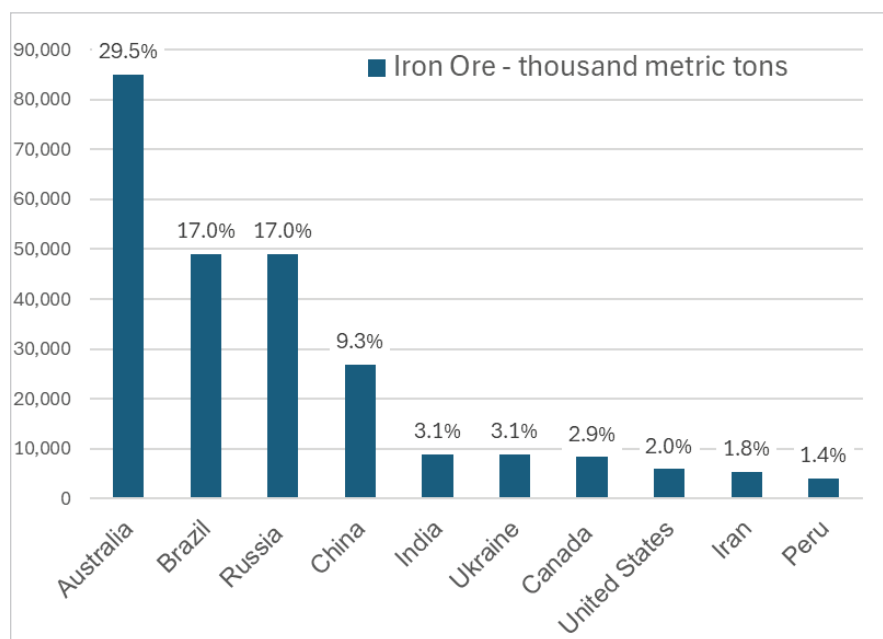
A.3 Gold Proven Reserves (% = Share of World Total)



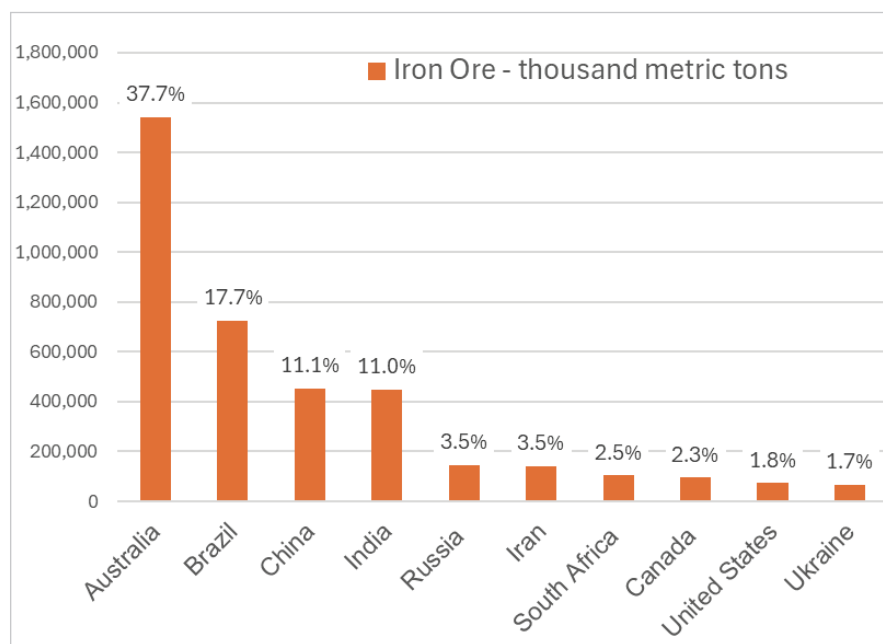
A.4 Gold Production - Mining & Refining (% = Share of World Total)



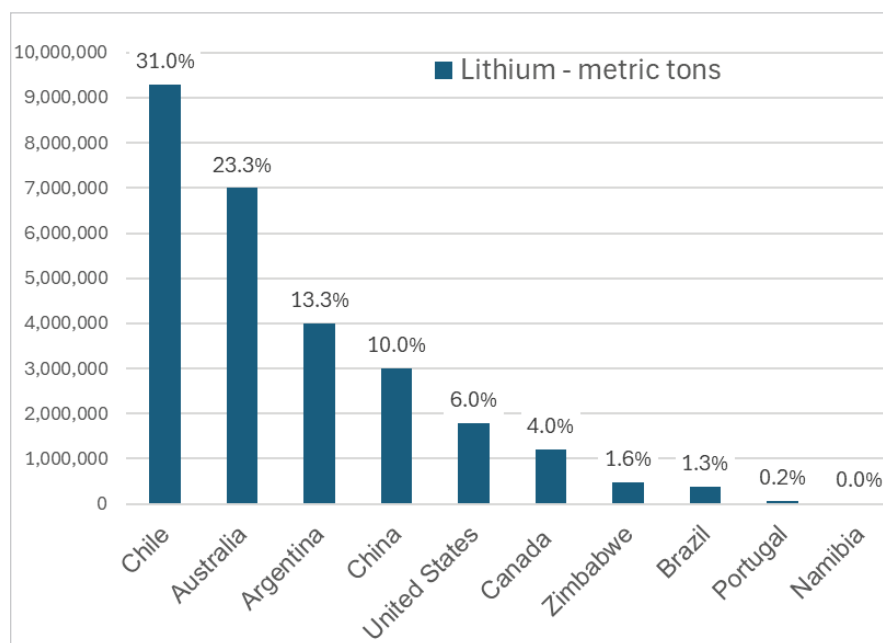
A.5 Iron Ore Proven Reserves (% = Share of World Total)



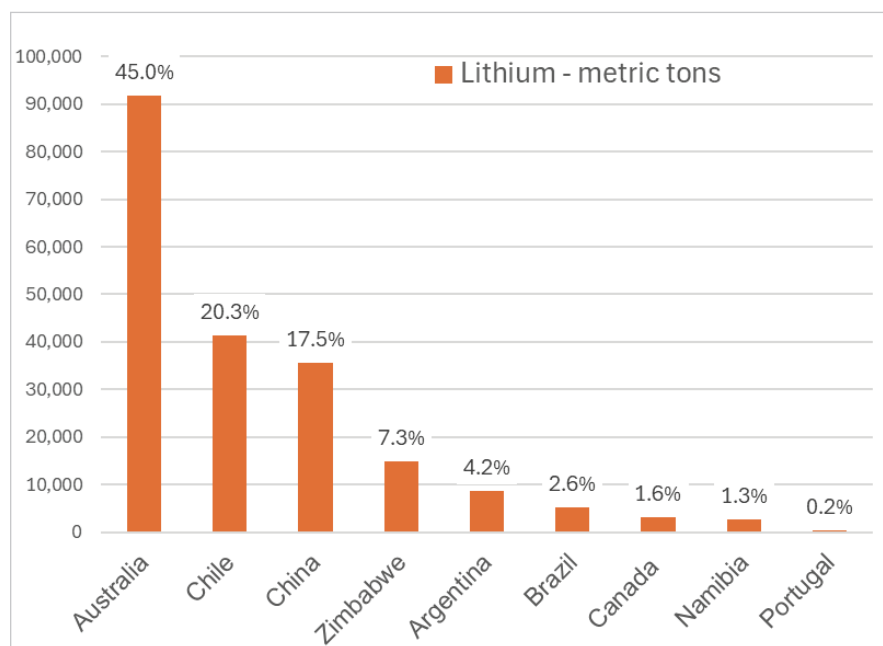
A.6 Iron Ore Reserves (% = Share of World Total)



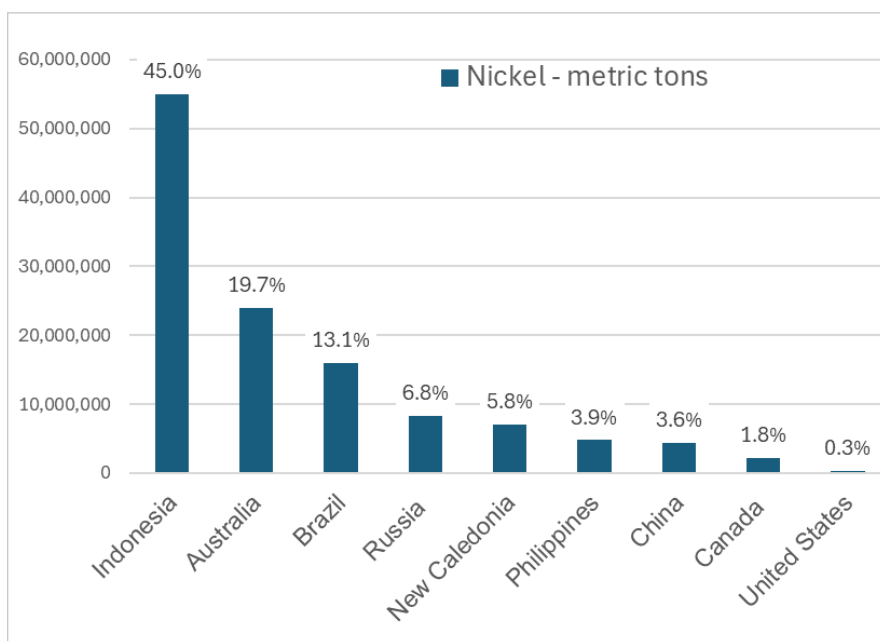
A.7 Lithium Reserves (% = Share of World Total)



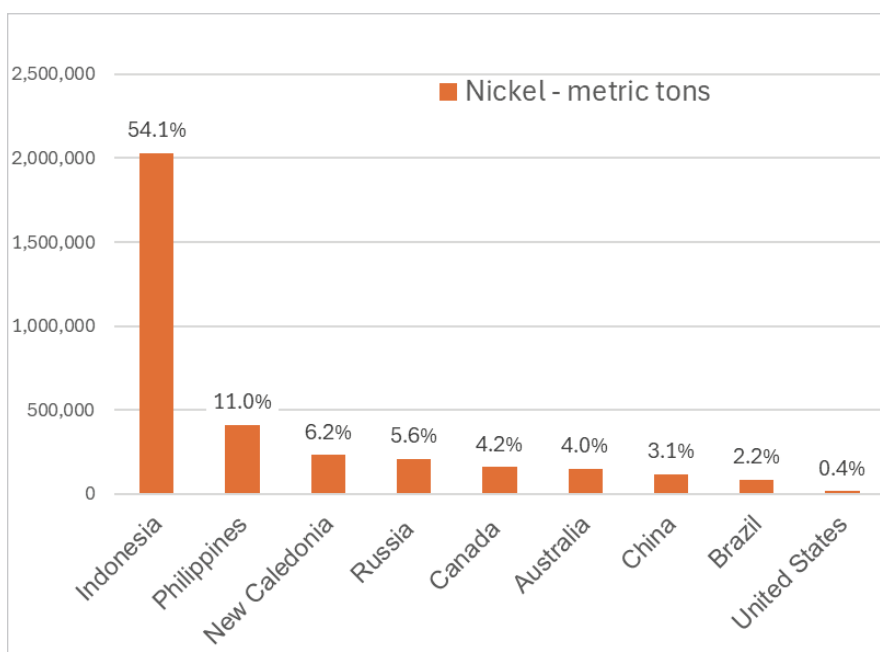
A.8 Lithium Production (% = Share of World Total)



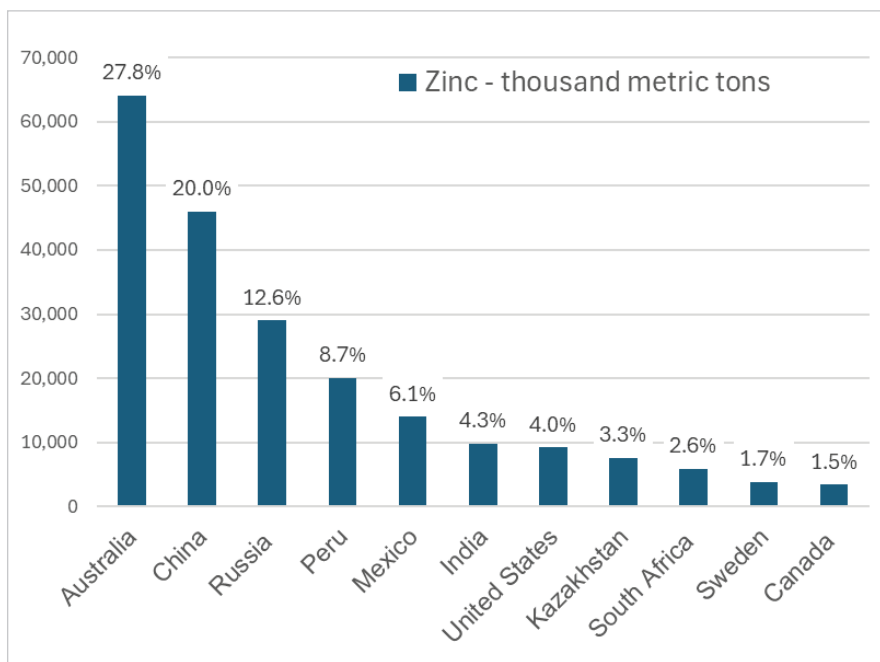
A.9 Nickel Reserves (% = Share of World Total)



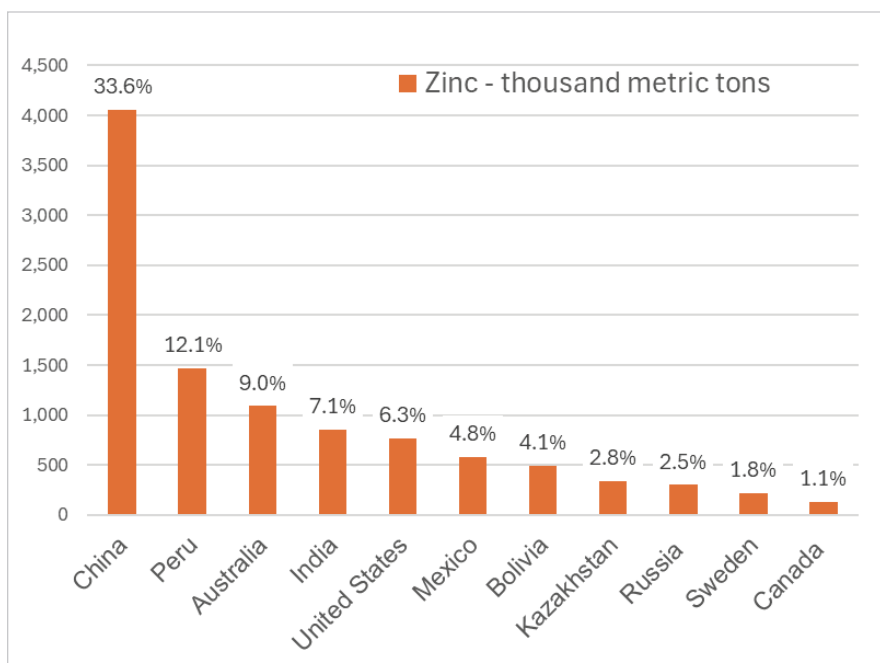
A.10 Nickel Production (% = Share of World Total)



A.11 Zinc Reserves (% = Share of World Total)



A.12 Zinc Production (% = Share of World Total)



APPENDIX B: DETAILED RESULTS

Table B.1 METRRs by Asset and Province in Canada, 2026

Non-Critical Mineral													
METRR	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	Quebec	New Brunswick	Newfoundland & Labrador	Nova Scotia	NWT	Nunavut	Yukon	Canada
Capital	38.3%	27.5%	39.6%	52.4%	19.0%	45.6%	34.7%	25.3%	34.5%	20.6%	21.1%	30.0%	34.4%
Land	13.7%	9.1%	10.5%	14.1%	11.2%	17.3%	14.0%	13.6%	14.0%	11.0%	11.2%	10.9%	12.8%
Inventory	11.9%	9.7%	11.0%	13.2%	10.1%	16.9%	13.9%	14.1%	13.6%	11.7%	11.9%	11.6%	12.5%
Non-E&D	31.7%	22.6%	32.6%	44.2%	18.4%	38.8%	29.1%	22.0%	28.9%	18.0%	18.3%	25.0%	28.9%
Processing	20.7%	12.3%	24.7%	46.4%	10.0%	31.1%	16.5%	16.5%	16.4%	0.3%	0.4%	12.5%	20.6%
Exploration	-4.8%	11.8%	-14.1%	-20.8%	10.8%	11.8%	2.3%	11.9%	20.3%	16.6%	17.2%	-2.2%	1.8%
Development	1.5%	4.1%	4.9%	9.1%	4.4%	6.1%	5.8%	11.1%	5.7%	5.0%	5.1%	5.0%	5.0%
Aggregate	11.6%	12.3%	11.9%	17.0%	9.9%	19.2%	13.8%	15.3%	16.8%	11.8%	12.1%	11.2%	13.3%
Critical Mineral													
METRR	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	Quebec	New Brunswick	Newfoundland & Labrador	Nova Scotia	NWT	Nunavut	Yukon	Canada
Capital	38.3%	27.5%	39.6%	52.2%	18.8%	45.3%	34.4%	24.9%	34.2%	20.4%	20.8%	30.0%	34.2%
Land	13.7%	9.1%	10.5%	14.1%	11.2%	17.3%	14.0%	13.6%	14.0%	11.0%	11.2%	10.9%	12.8%
Inventory	11.9%	9.7%	11.0%	13.2%	10.1%	16.9%	13.9%	14.1%	13.6%	11.7%	11.9%	11.6%	12.5%
Non-E&D	31.7%	22.6%	32.6%	44.1%	16.2%	38.5%	28.9%	21.8%	28.7%	17.8%	18.2%	25.0%	28.8%
Processing	20.7%	12.3%	24.7%	42.2%	4.9%	20.1%	8.7%	12.1%	9.7%	-7.0%	-6.9%	12.5%	16.2%
Exploration	-27.7%	-5.9%	-26.1%	-35.7%	-5.1%	-13.8%	-14.7%	-1.7%	4.9%	0.4%	1.2%	-14.5%	-16.0%
Development	1.5%	4.1%	4.9%	9.1%	4.4%	6.1%	5.8%	11.1%	5.7%	5.0%	5.1%	5.0%	5.0%
Aggregate	7.6%	9.2%	9.8%	14.3%	7.1%	14.6%	10.8%	12.8%	14.1%	8.9%	9.3%	9.0%	10.2%

Table B.2 METRRs by Major Producing Country: Copper, 2026

METRR for Copper (PCM = 566)													
METRR	Australia NSW	Australia QLD	Australia SA	Australia WA	Canada British Columbia	Canada Ontario	Chile	China	Kazakhstan	Peru	Russia	US Nevada	US Arizona
Capital	30.1%	30.0%	30.1%	30.1%	38.3%	17.1%	31.2%	30.7%	24.7%	47.8%	28.9%	23.8%	17.8%
Land	11.3%	10.2%	11.3%	11.3%	13.7%	11.2%	24.8%	16.3%	-21.2%	10.6%	17.3%	10.5%	10.6%
Inventory	22.4%	22.4%	22.4%	22.4%	11.9%	10.1%	39.1%	17.7%	17.3%	44.2%	14.6%	23.4%	21.6%
for non-E&D	27.8%	27.7%	27.8%	27.8%	31.7%	15.0%	33.9%	26.9%	22.4%	46.6%	24.8%	23.6%	19.0%
Exploration	3.7%	5.5%	5.5%	5.5%	-27.7%	-5.1%	0.2%	23.8%	19.1%	-3.9%	15.0%	1.4%	2.7%
Development	22.9%	24.4%	24.4%	24.4%	1.5%	4.4%	30.8%	24.5%	20.3%	7.2%	23.1%	2.3%	3.8%
Aggregate	21.4%	22.4%	22.4%	22.4%	7.6%	6.7%	26.7%	25.3%	20.9%	19.8%	22.4%	10.0%	9.2%

Table B.3 METRRs by Major Producing Country: Gold, 2026

METRR for Gold (PCM=581)																			
METRR	Australia NSW	Australia QLD	Australia SA	Australia WA	Canada British Columbia	Canada Ontario	Canada Quebec	Canada Nunavut	China	Dominican R.	Guyana	Indonesia	Kazakhstan	Peru	Russia	South Africa	Suriname	US Nevada	US Alaska
Capital	30.1%	30.0%	30.1%	30.1%	38.3%	17.1%	42.2%	18.9%	30.7%	17.6%	28.9%	43.3%	24.7%	47.8%	28.9%	31.8%	-13.4%	23.8%	4.9%
Land	11.3%	10.2%	11.3%	11.3%	13.7%	11.2%	17.3%	11.2%	16.3%	-6.3%	4.9%	8.9%	-21.2%	10.6%	17.3%	-0.4%	123.9%	14.0%	14.0%
Inventory	22.4%	22.4%	22.4%	22.4%	11.9%	10.1%	16.9%	11.9%	17.7%	-6.5%	18.2%	21.4%	17.3%	44.2%	14.6%	19.1%	58.5%	23.4%	27.4%
for non-E&D	27.8%	27.7%	27.8%	27.8%	31.7%	15.0%	35.9%	16.8%	27.0%	10.6%	25.7%	37.7%	22.4%	46.6%	24.8%	28.1%	25.7%	23.0%	10.5%
Exploration	3.5%	5.3%	5.3%	0.8%	-4.8%	10.8%	11.8%	17.2%	16.7%	11.6%	10.9%	16.2%	15.9%	-3.9%	16.5%	5.5%	-16.5%	1.3%	4.9%
Development	18.9%	20.4%	20.4%	16.6%	1.5%	4.4%	6.1%	5.1%	17.5%	14.2%	12.1%	17.5%	17.7%	2.9%	23.8%	9.2%	30.9%	2.3%	5.8%
Aggregate	19.5%	20.5%	20.5%	18.0%	11.6%	9.4%	18.1%	11.5%	20.9%	12.3%	16.9%	24.7%	19.1%	17.9%	22.9%	15.5%	20.8%	10.0%	8.4%

Table B.4 METRRs by Major Producing Country: Iron Ore, 2026

METRR for Iron Ore (PCM = 834)													
METRR	Australia WA	Brazil	Canada Ontario	Canada Quebec	China	Chile	Colombia	India	Kazakhstan	Peru	South Africa	US Minnesota	Zambia
Capital	30.1%	51.3%	17.1%	42.2%	9.4%	21.9%	42.3%	47.5%	24.7%	42.5%	-1.5%	-1.0%	22.5%
Land	11.3%	-31.0%	11.2%	17.3%	16.3%	21.2%	-11.2%	18.1%	-21.2%	18.7%	-0.5%	-253.7%	-42.1%
Inventory	22.4%	22.7%	10.1%	16.9%	17.7%	29.2%	-11.2%	32.5%	17.3%	40.9%	20.5%	34.6%	26.7%
for non-E&D	27.8%	44.7%	15.0%	35.9%	12.2%	24.4%	31.7%	43.4%	22.4%	41.9%	6.7%	13.7%	23.8%
Exploration	5.7%	20.2%	10.8%	11.8%	17.8%	-1.6%	8.9%	19.6%	5.9%	0.8%	7.3%	1.1%	-0.4%
Development	22.4%	20.1%	4.4%	6.1%	18.5%	23.2%	18.6%	21.3%	8.5%	8.9%	10.5%	3.2%	11.8%
Aggregate	21.5%	29.2%	9.4%	18.1%	16.1%	19.4%	21.8%	29.2%	13.2%	19.7%	8.5%	6.7%	14.1%

Table B.5 METRRs by Major Producing Country: Lithium, 2026

METRR for Lithium (PCM = 884)						
METRR	Argentina	Australia WA	Bolivia	Canada Ontario	Canada Quebec	Chile
Capital	27.8%	30.1%	54.1%	17.1%	36.8%	21.9%
Land	30.9%	11.3%	20.5%	11.2%	15.1%	21.2%
Inventory	29.6%	22.4%	30.5%	10.1%	14.6%	29.2%
for non-E&D	28.4%	27.8%	48.4%	15.0%	31.0%	24.4%
Exploration	-16.0%	2.2%	-3.7%	-5.1%	-13.0%	-1.6%
Development	11.1%	19.5%	12.7%	4.4%	5.6%	24.2%
Aggregate	12.8%	19.6%	23.1%	6.7%	11.8%	19.8%
						22.2%
						17.6%

Table B.6 METRRs by Major Producing Country: Nickel, 2026

METRR for Nickel (PCM = 512)											
METRR		Canada	Canada	Canada	Canada						
	Brazil	Ontario	Manitoba	Quebec	Newfoundland & Labrador	Colombia	Dominican R.	Guatemala	Indonesia	Philippines	Russia
Capital	51.3%	17.1%	50.8%	36.8%	22.7%	42.3%	59.7%	50.1%	41.0%	50.2%	28.9%
Land	-31.0%	11.2%	14.1%	15.1%	13.6%	-11.2%	-6.3%	13.9%	8.1%	4.2%	17.3%
Inventory	22.7%	10.1%	13.2%	14.6%	14.1%	-11.2%	-9.5%	31.5%	19.8%	23.8%	14.6%
for non-E&D	44.7%	15.0%	42.8%	31.0%	20.1%	31.7%	49.4%	45.2%	35.4%	43.9%	24.8%
Exploration	17.6%	-5.1%	-35.7%	-13.0%	-1.7%	23.7%	13.8%	6.8%	35.2%	6.3%	8.4%
Development	20.4%	4.4%	9.1%	5.6%	11.1%	29.2%	16.4%	18.7%	36.1%	23.0%	24.8%
Aggregate	28.9%	6.7%	13.8%	11.8%	12.2%	29.2%	28.2%	26.5%	35.7%	27.8%	22.0%

Table B.7 METRRs by Major Producing Country: Zinc, 2026

METRR for Zinc (PCM = 230)															
METRR						Canada	Canada								
	Australia NSW	Australia QLD	Australia SA	Australia WA	Bolivia	British Columbia	Ontario	Canada Quebec	China	India	Kazakhstan	Mexico	Peru	US Nevada	US Alaska
Capital	30.1%	30.0%	30.1%	30.1%	55.9%	38.3%	17.1%	31.3%	30.7%	47.0%	23.8%	16.9%	43.4%	23.8%	4.9%
Land	11.3%	10.2%	11.3%	11.3%	16.5%	13.7%	11.2%	13.1%	16.3%	18.7%	-13.4%	24.8%	19.1%	10.5%	14.0%
Inventory	22.4%	22.4%	22.4%	22.4%	31.1%	11.9%	10.1%	12.6%	17.7%	31.9%	16.5%	26.8%	42.0%	23.4%	27.4%
for non-E&D	27.8%	27.7%	27.8%	27.8%	50.0%	31.7%	15.0%	26.2%	26.9%	42.9%	21.5%	20.4%	42.9%	23.6%	13.5%
Exploration	14.4%	15.1%	18.9%	18.9%	15.3%	-27.7%	-5.1%	-12.3%	48.3%	40.3%	47.5%	-1.8%	10.4%	4.2%	17.5%
Development	29.5%	30.1%	33.2%	33.2%	37.4%	1.5%	4.4%	5.1%	48.8%	40.9%	48.5%	4.1%	15.2%	5.2%	18.6%
Aggregate	26.2%	26.6%	28.7%	28.7%	38.3%	7.6%	6.7%	9.9%	40.6%	41.5%	38.3%	9.1%	24.6%	11.8%	16.5%

Table B.8 METRRs Including and Excluding Processing Allowance: Canada

Non-Critical Mineral													
METRR	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	Quebec	New Brunswick	Newfoundland & Labrador	Nova Scotia	NWT	Nunavut	Yukon	Canada
Capital	38.3%	27.5%	39.6%	52.4%	19.0%	45.6%	34.7%	25.3%	34.5%	20.6%	21.1%	30.0%	34.4%
Land	13.7%	9.1%	10.5%	14.1%	11.2%	17.3%	14.0%	13.6%	14.0%	11.0%	11.2%	10.9%	12.8%
Inventory	11.9%	9.7%	11.0%	13.2%	10.1%	16.9%	13.9%	14.1%	13.6%	11.7%	11.9%	11.6%	12.5%
Non-E&D	31.7%	22.6%	32.6%	44.2%	16.4%	38.8%	29.1%	22.0%	28.9%	18.0%	18.3%	25.0%	28.9%
Processing	20.7%	12.3%	24.7%	46.4%	10.0%	31.1%	16.5%	18.5%	16.4%	0.3%	0.4%	12.5%	20.6%
Exploration	-4.8%	11.8%	-14.1%	-20.8%	10.8%	11.8%	2.3%	11.9%	20.3%	16.6%	17.2%	-2.2%	1.8%
Development	1.5%	4.1%	4.9%	9.1%	4.4%	6.1%	5.8%	11.1%	5.7%	5.0%	5.1%	5.0%	5.0%
Aggregate	11.6%	12.3%	11.9%	17.0%	9.9%	19.2%	13.8%	15.3%	16.8%	11.8%	12.1%	11.2%	13.3%
*Aggregate (PA)	11.6%	12.3%	11.9%	16.2%	9.4%	18.3%	13.2%	14.6%	16.3%	11.3%	11.6%	11.2%	12.9%
Critical Mineral													
METRR	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	Quebec	New Brunswick	Newfoundland & Labrador	Nova Scotia	NWT	Nunavut	Yukon	Canada
Capital	38.3%	27.5%	39.6%	52.1%	18.8%	45.3%	34.4%	25.0%	34.2%	20.4%	20.9%	30.0%	34.2%
Land	13.7%	9.1%	10.5%	14.1%	11.2%	17.3%	14.0%	13.6%	14.0%	11.0%	11.2%	10.9%	12.8%
Inventory	11.9%	9.7%	11.0%	13.2%	10.1%	16.9%	13.9%	14.1%	13.6%	11.7%	11.9%	11.6%	12.5%
Non-E&D	31.7%	22.6%	32.6%	44.0%	16.2%	38.5%	28.9%	21.8%	28.7%	17.8%	18.2%	25.0%	28.8%
Processing	20.7%	12.3%	24.7%	40.1%	4.9%	20.8%	8.4%	12.8%	10.5%	-5.3%	-6.2%	12.5%	16.5%
Exploration	-27.7%	-5.9%	-26.1%	-35.7%	-5.1%	-13.8%	-14.7%	-1.7%	4.9%	0.4%	1.2%	-14.5%	-16.0%
Development	1.5%	4.1%	4.9%	9.1%	4.4%	6.1%	5.8%	11.1%	5.7%	5.0%	5.1%	5.0%	5.0%
Aggregate	7.6%	9.2%	9.8%	14.3%	7.1%	14.6%	10.8%	12.8%	14.1%	8.9%	9.3%	9.0%	10.2%
*Aggregate (PA)	7.6%	9.2%	9.8%	13.6%	6.7%	13.8%	10.2%	12.3%	13.7%	8.5%	8.9%	9.0%	9.8%

Table B.9 Combined Reform Proposal

Critical Mineral												
Combined Proposal												
METRR	British Columbia	Alberta	Saskatchewan	Manitoba	Ontario	Quebec	New Brunswick	Newfoundland & Labrador	Nova Scotia	NWT	Nunavut	Yukon
Capital	39.1%	18.5%	35.3%	42.6%	19.6%	27.2%	25.1%	25.7%	24.8%	21.7%	22.2%	22.1%
Land	13.7%	9.1%	10.5%	14.1%	11.2%	17.3%	14.0%	13.6%	14.0%	11.0%	11.2%	10.9%
Inventory	11.9%	9.7%	11.0%	13.2%	10.1%	16.9%	13.9%	14.1%	13.6%	11.7%	11.9%	11.6%
Non-E&D	32.4%	15.8%	29.0%	35.6%	16.7%	24.2%	21.8%	22.3%	21.5%	18.8%	19.2%	19.0%
Processing	38.9%	21.9%	40.7%	42.8%	19.6%	21.5%	23.7%	25.9%	24.9%	22.7%	23.3%	25.9%
Exploration	10.9%	3.9%	9.6%	11.0%	6.5%	12.3%	13.8%	15.1%	13.6%	9.4%	10.2%	10.0%
Development	2.5%	2.2%	3.2%	3.8%	2.6%	4.6%	4.3%	4.6%	4.3%	3.3%	3.4%	3.4%
Aggregate	15.1%	7.5%	13.9%	16.8%	8.5%	13.2%	12.4%	13.0%	12.3%	10.1%	10.4%	10.3%

Cross Asset	
Dispersion	Coefficient of Variation CV
0.075	0.68

APPENDIX C: THEORETICAL MODELLING

Here, we present the general theoretical model following that found in Boadway et al. (1987), used in the above analysis of national and international mining taxation. The model has been adjusted to recognize that it takes time to build up reserves with exploration and development before extraction takes place (MacKie-Mason and Mintz 1991; Chen and Mintz 2012). The “time-to-build” analysis results in a higher capital cost for a company since income is earned after spending on exploration and development has taken place with a financing cost. Tax payments are affected since tax deductions for exploration and development expenditures are taken prior to income being earned when the resource is exploited, thereby leading to a mismatching of income and costs for tax purposes. The delay in creating income raises the cost of capital but the mismatch of income and expenses under the tax system reduces the cost of capital.

A resource firm maximizes the present value of cash flows from its project subject to the constraint that the extracted resources equal the amounts discovered over time. Let T be the period in which reserves are discovered and prepared for extraction that begins at that time.

$$(1) \text{ Max } V = \sum_{0\infty} (1+R)^t - tCF_t dt$$

$$(2) \text{ subject to } \sum_{t=0}^{\infty} Q_t[L_t, k_t] = X = \sum_{0T} f[e_t] \text{ (accumulated reserves equals total extraction)}$$

$$\text{with } CF_t = P_t Q_t[L_t, k_t] - w_t L_t - (\delta K_t + k_t)(1+\pi)^t - TAX_{c[t]} - TAX_{R[t]} \text{ for } t \geq T$$

$$CF_t = -e_t(1+\pi)^t - T_{c[t]} \text{ for } t \leq T$$

V is the present value of the firm's nominal cash flows CF , discounted by the nominal financing rate R over the lifetime of the firm's project. The nominal cost of finance is the weighted average of debt and equity finance ($R = Bi(1-u) + (1-B)\rho$) the firm uses for all of its projects, adjusted for the deductibility of interest expense. (B is the portion of assets financed by debt, i is the nominal cost of debt and ρ is the nominal cost of equity, net of risk, with all values expressed in certainty-equivalent terms¹⁶). International markets determine these costs and they can depend on tax-planning opportunities.

Note that P_t = nominal price of output normalized to one and rises at the same inflation rate as other prices ($P_t = P(1+\pi)^t$) and $w_t L_t$ are current costs (which we will later denote as C and $w_t = w(1+\pi)^t$). We note that these costs are equivalent to market prices, abstracting from any transfer-pricing issues. The marginal productivity of outputs declines with the use of factors of production. Current costs, $C_t[Q_t, k_t]$, Q_K and Q_L , can therefore be alternatively treated as a strictly joint convex in output Q (denoted as $C_Q > 0$ and $C_{QQ} > 0$) and capital that reduces costs (denoted as $C_K < 0$ and $C_{KK} < 0$) with K_t = depreciable capital stock, k_t = new investment = $K_{t+1} - K_t$ and δ = economic depreciation. (Note that $C_Q = w/Q_L$ with profit maximization). Capital is treated as the numeraire with a real price equal to one.

Note that $f[e_t]$ are reserves found through spending on exploration in period t with the function being strictly concave in expenditure on exploration and development ($f' > 0$ and $f'' < 0$).

$TAX_{c[t]}$ = company tax payments (paid in each period and can be negative) and

$TAX_{R[t]}$ = royalty payments in each period t (only paid after extraction begins).

¹⁶ It is assumed below that companies are fully tax-paying in that they can use their deductions against other sources of income. This implies governments implicitly provide a deduction for risk costs through full refundability of losses.

The company tax is imposed on the revenues earned from the sale of resources net of the costs of production, which include current extraction costs, capital cost allowances and exploration and development costs (exploration is expensed but development is capitalized and written off at the declining balance rate σ). This implies the following:

$$(3) \quad TAX_{c[t]} = u\{P_t Q_t - wL_t(1+\pi)^t - \alpha D_t - \sigma E_t(1+\pi)^t - T_{R[t]}\}$$

$$(4) \quad D_t = (\delta K_s + k_s)(1+\pi)^t - \alpha D_{t-1}$$

$$(5) \quad E_t = e_t(1+\pi)^t - \sigma E_{t-1}$$

(6) with α = capital cost allowance rate, D_s = the undepreciated capital cost base and E_s = the undepreciated “stock” of exploration and development spending at time s .

Manipulating the terms associated with capital-cost allowances and investment, $(\delta K_t + k_t)(1+\pi)^t$, in equation (1) with the insertion of terms in (3), (4) and (5), one can show that the present value of capital allowances reduces the investment costs so that:

$$CF_t = \{P_t Q_t - wL_t\}(1-u)(1+\pi)^t - (\delta K_t + k_t)(1-uZ)(1+\pi)^t - TAX_{R[t]}(1-u)$$

for $t \geq T$

$$CF_t = -e_t(1-uZ')(1+\pi)^t - TAX_{R[t]}(1-u) \text{ for } t < T$$

with $Z = \alpha(1+R)/(\alpha+R)$ and $Z' = \sigma(1+R)/(\sigma+R)$ ¹⁷.

Note that royalty payments in the exploration and development phase are negative if such costs are deductible from the royalty base, which will be the case for the rent tax.

REVENUE-BASED ROYALTY

Revenue-based royalties are a percentage of the value of extracted output and the corporate income tax system allows companies to deduct exploration and development expenses against other income earned. Let τ be the ad valorem payment on sales, PQ , so that $T_R = \tau PQ$ (suppressing time scripts here on in, unless needed). Maximizing equation (1), subject to (2) and (2'), choosing L , K , k and E , with appropriate substitutions, yields the following:

OUTPUT DECISION

The choice of Q yields the following result (λ is the Lagrange multiplier for the constraint in (2)):

$$(7) \quad (1+r)^{-t}(P(1-\tau) - C_Q)(1-u) = \lambda$$

with $r = R - \pi = Bi(1-u) + (1-B)p - \pi$.

The implied Hotelling Rule by using two first-order conditions is the following:

$\{P(t+1) - P(t)(1-\tau) - (C'(t+1) - C'(t))\} / \{P(t)(1-\tau) - C'(t)\} = r$. The firm extracts output until the net-of-royalty gain from holding a unit of reserve is equal to financing costs that could be saved by selling one more unit of output.

¹⁷ See Chen and Mintz (2013) for a derivation.

The shadow price of extracted output λ is equal to the marginal value of extracting a marginal unit of output. The royalty rate on ad valorem sales generally reduces quasi-rents and the incentive to extract since the royalty reduces revenues relative to costs of extraction. On the other hand, the deductibility of interest expense from corporate taxable income lowers the cost of finance and, therefore, shifts extraction to early periods.

DEPRECIABLE CAPITAL

The choice of capital stock and new investment, post-exploration and development, as well as the undepreciated capital-cost base and changes to it, yields the following cost of capital for depreciable capital:

$$(8) \quad -C_K = (\delta + R - \pi)(1 - uZ)/(1 - u)$$

This is the familiar cost of capital expression, noting that R is the weighted average of the cost of debt and equity finance and Z is the present value of depreciation.

EXPLORATION AND DEVELOPMENT

The choice of exploration and development, e , yields the following for the cost of capital:

$$(9) \quad (P_T - C_T)f'_t = (1 - uZ')(1 + r)^{(T-t)} / [(1 - u)\{1 - \tau P/(P - C')\}]$$

The quasi-rent earned by investing in exploration $(P_T - C_T)f'_t$ is equal to the interest-adjusted cost of exploration (the price of exploration and development is set equal to unity) divided by the one minus the royalty imposed on the cost of capital. The term in the denominator $\tau P/(P - C')$ is the ad valorem tax paid as a share of the quasi-rents on incremental sales (this is expected to be less than one so long as the ad valorem tax rate is less than the margin $(P - C')/P$). The cost of exploration is reduced by interest deductions taken early at time t relative to the earning of income at time T . Given the deductibility of interest expense from income, the effect of corporate taxation is to reduce the real cost of finance (r) and the discount factor $(1 + r)^{(T-t)}$, resulting in a lower cost of capital (and lower effective tax rate on capital).

RENT-BASED ROYALTY ON CASH FLOWS

Cash flow is equal to the revenues net of both current and capital costs incurred in undertaking the project. Interest expense is not deductible and unused deductions, fully written off in later years, are carried forward at the riskless bond rate (the uplift factor).

The royalty payment after payout is the following: $T_R = \tau[P_t Q_t - C(Q_t, K_t)(1 + \pi)^t - (\delta K_t + k_t)(1 + \pi)^t - e_t(1 + \pi)^t]$, which is substituted into equation (3).

The determination of output, Q , accords with the following Euler equation:

$$(10) \quad (1 + r)^{-t}(1 - \tau)(P - C')(1 - u) = \lambda$$

implying that only interest deductibility of debt-financing costs (incorporated in r) affects the extraction decision $\{(p_{t+1} - p_t) - (C_{Q,t+1} - C_{Q,t})\} / \{p_t - C_{Q,t}\} = r$.

DEPRECIABLE CAPITAL

The user cost for depreciable capital for the oil sands case is similar to equation (9), but royalties directly affect the cost of capital because current costs are deductible from the royalty base. That is, changes in the stock of capital reduce current costs, which are netted from royalty payments.

$$(11) \quad -CK = (\delta + R - \pi) \{1 - \tau(1-u) - uZ\} / [(1-u)(1-\tau)]$$

EXPLORATION AND DEVELOPMENT

The user cost for exploration and development for the cash-flow tax is the following:

$$(12) \quad (P-C')f'_t = (1-uZ' - \tau(1-u))(1+r)^{(T-t)} / [(1-u)(1-\tau)].$$

If the company's tax terms are zero ($u=0$ and $Z=1$), the royalty terms appearing in equations (12) to (14) disappear. Otherwise, the rent-based royalty is not neutral, as it increases the company's tax burden on capital. Government might fully share returns, risk and the cost of investment but not the company tax on marginal investments.

THE FUNCTIONAL METALLIC MINING METRR MODEL FOR CANADA

This section describes the application of the broader resource methodology used to build the METRR model as applied to metallic-mining sectors in the included provinces. Despite excessive complexity and great diversity among the provinces in their mining-tax structures and allowances, we have developed a generic Canadian METRR model that is capable of representing the features present within all the provincial regimes.

Here we present the structure of the generic METRR model followed by a parameter table below that provides tax parameters for individual terms including statutory tax and royalty provisions associated with metallic mining.

GENERIC MODEL

The following equations were used for estimating the cost of capital, inclusive of taxes, for each type of investment expenditure.

Exploration:

$$(1) \quad (P_T - C'_T)f'_t = \frac{(1+r)^{T-t}(1-\phi_p - \tau^*Z_m)}{(1-g/PCM)(1-\tau^*)}$$

ϕ_p = combined federal-provincial investment tax credit (ITC) for qualifying exploration and development. This includes the federal mineral and critical-mineral exploration tax credit at 15 and 30 per cent respectively and provincial credits ranging from zero to 30 per cent. It also includes Quebec's refundable tax credit, ranging from 15 per cent up to 45 per cent for critical and strategic minerals (CSM) depending on the corporation's status, the type of resource and the location of expenditures.

τ = Statutory mining-tax rate.

$\tau^* = \tau(1+r)^{-(T-t-1)}$, with τ = real financial cost, and $T-t = 4$ is time span between starting exploration and the commencement of production and $T-t = 2$ is that for development (hence τ^* is of different values for exploration and development).

Z_m = present value of the tax allowances including provincial mining allowance provisions.

g = the first-tier mining tax that is based on gross revenue which applies in a number of provinces: B.C., Alberta, Saskatchewan.

PCM = profit margin = generated on a per-mineral basis based on publicly available data and authors' calculations.

Development:

$$(2) \quad (P_T - C'_T)f'_t = \frac{(1+r)^{T-t}[(1-\phi_f)(1-u_f Z_f - u_p Z_p) - \tau^*(1-u)Z_m]}{(1-g/PCM)(1-\tau^*)(1-u)}$$

u_f = Statutory federal corporate income tax rate.

u_p = Statutory provincial corporate income tax rate.

$$U = u_f + u_p$$

Note that Z_m for development may differ from those for exploration and depreciable capital assets. Also note that the term $(1 - u_f Z_f - u_p Z_p)$ rather than $(1 - uZ)$ is used here to accommodate Quebec's system in which the depreciation allowance for development and certain depreciable assets under the provincial income tax is different from that under the federal income tax.

Depreciable Assets:

$$(3) \quad -C_K = \frac{(\delta + R - \pi)\{(1 - uZ - \phi_{ct}) - \tau(1 - u)Z_m\}}{(1 - u)(1 - \tau)}$$

Similarly, depending on the province, Z_m may differ from exploration and development.

Processing (milling, smelting and refining):

$$(4) \quad -C_K = \frac{(\delta + R - \pi)\{(1 - uZ - \phi_{ct}) - \tau(1 - u)(Z'_m + Z_m^*)\}}{(1 - u)(1 - \tau)}$$

$(Z'_m + Z_m^*)$ = The present value of processing allowances. In jurisdictions like Ontario, processing activities for concentration remain subject to specific straight-line depreciation rules (e.g., 15 per cent for the first six years). Calculated as $a/(R+a)$.

Note that smelting and refining are manufacturing activities according to the North America Industry Classification System. As established in a previous analysis (Mintz and Chen 2013), the processing activity in the mining industry is almost exclusively for concentration, for which the capital assets are typically subject to a straight-line annual depreciation allowance under the mining tax.

APPENDIX D: DATA USED IN THE MODEL

	Argentina	Australia NSW	Australia NT	Australia QLD	Australia SA	Australia WA	Bolivia	Brazil	Canada British Columbia
Company Income Tax Rate	35.0%	30.0%	30.0%	30.0%	30.0%	30.0%	40.9%	34.0%	27.0%
Federal Tax Rate		30.0%	30.0%	30.0%	30.0%	30.0%	25.0%	34.0%	15.0%
Revenue-Based Royalty^(1, 2)									2.0%
Copper		4.0%		5.0%	5.0%	5.0%			
Gold		4.0%		5.0%	5.0%	2.5%			
Iron Ore						7.5%		3.5%	
Lithium	3.0%					5.0%	3.0%		
Nickel								2.0%	
Zinc		4.0%		4.2%	5.0%		5.0%		
Profit-Based Royalty			20.0%						13.0%
Additional Taxes									
Effective Sales Tax On Capital Purchases								8.00%	4.3%
Real Estate Transfer Tax		7.00%	5.95%	5.75%	7.00%	7.00%		4.00%	3.00%
Capital Asset Tax ⁽³⁾	0.75%								
Gross Receipts Tax	1.0%							2.48%	
Financial Transaction Tax(s)	1.0%						0.30%	1.50%	
Additional Features									
Inflation adjustment	Yes								
Jurisdiction Specific Notes								INE/JCP	Base METC Fed & Prov
Jurisdiction Specific Notes								Non-VAT Manu. Tax	30.00%
									CMETC shown (additional 15%)
Company Income Tax Depreciation ⁽⁴⁾								*	
Depreciable Capital - Min	4%	8%	8%	8%	8%	8%	2%	4%	5%
Depreciable Capital - Max	40%	47%	40%	47%	47%	47%	33%	20%	100%
Exploration ⁽⁵⁾	200%	100%	100%	100%	100%	100%	200%	4%	100%
Development ⁽⁵⁾	60%	6%	25%	6%	6%	6%	13%	5%	30%
Mining Tax									
Exploration			50%						100%
Development			50%						100%
Depreciable Capital			100%						100%
Depreciable Capital - Processing									100%
Minimum Tax			Yes						
Inventory	LIFO	Optional	Optional	Optional	Optional	Optional	FIFO	Optional	FIFO
Non-Tax Parameters									
Inflation	38.8%	3.8%	1.5%	3.8%	3.8%	3.8%	2.2%	6.0%	3.0%
Real interest rate	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Nominal Interest Rate	42.6%	7.6%	5.3%	7.6%	7.6%	7.6%	6.0%	9.8%	6.8%
Debt-to-Asset ratio	40%	40%	40%	40%	40%	40%	40%	40%	40%
Cost of Equity	3.5%	7.1%	4.9%	7.1%	7.1%	7.1%	5.6%	9.1%	6.3%
Nominal Financing Cost	42.2%	6.4%	4.4%	6.4%	6.4%	6.4%	4.8%	7.5%	5.8%
Real Financing Cost	3.3%	2.6%	2.9%	2.6%	2.6%	2.6%	2.6%	1.6%	2.8%
Time to Payout - Exploration	8	8	8	8	8	8	8	8	8
Time to Payout - Development	4	4	4	4	4	4	4	4	4
Capital weights⁽⁶⁾									
Depreciable assets	25%	25%	25%	25%	25%	25%	25%	25%	25%
Inventory	12%	12%	12%	12%	12%	12%	12%	12%	12%
Land	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%
Exploration	17%	17%	17%	17%	17%	17%	17%	17%	17%
Development	46%	46%	46%	46%	46%	46%	46%	46%	46%
Aggregate-including E&D		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

	Canada Alberta	Canada Saskatchewan	Canada Manitoba	Canada Ontario	Canada Quebec	Canada Quebec	Canada Quebec	Canada New Brunswick
Company Income Tax Rate	23.0%	27.0%	27.0%	25.0%	26.5%	26.5%	26.5%	29.0%
Federal Tax Rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Revenue-Based Royalty^(1, 2)	1.0%							2.0%
Copper								
Gold								
Iron Ore								
Lithium								
Nickel								
Zinc								
Profit-Based Royalty	12.0%	10.0%	17.0%	10.0%	16.0%	22.0%	28.0%	16.0%
Additional Taxes								
Effective Sales Tax On Capital Purchases		3.4%	5.4%					
Real Estate Transfer Tax	0.04%	0.30%	2.00%	2.00%	1.50%	1.50%	1.50%	1.00%
Capital Asset Tax ⁽³⁾								
Gross Receipts Tax								
Financial Transaction Tax(s)								
Additional Features								
Inflation adjustment								
	Base METC		Base METC	Base METC	Base METC	Base METC	Base METC	Base METC
Jurisdiction Specific Notes	Fed	Base METC Fed	Fed	Fed	Fed & Prov	Fed & Prov	Fed & Prov	Fed
Jurisdiction Specific Notes	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%
	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)
Company Income Tax Depreciation⁽⁴⁾								
Depreciable Capital - Min	5%	5%	5%	5%	5%	5%	5%	5%
Depreciable Capital - Max	100%	100%	100%	100%	100%	100%	100%	100%
Exploration ⁽⁵⁾	100%	100%	100%	100%	100%	100%	100%	100%
Development ⁽⁵⁾	30%	30%	30%	30%	30%	30%	30%	30%
Mining Tax								
Exploration	100%	150%	150%	100%	100%	100%	100%	150%
Development	100%	100%	20%	100%	100%	100%	100%	100%
Depreciable Capital	15% *	30%	20%	100%	30%	30%	30%	33%
Depreciable Capital - Processing	15% *	100%	20%	15% *	30%	30%	30%	33%
Minimum Tax								
Inventory	FIFO	FIFO	FIFO	FIFO	FIFO	FIFO	FIFO	FIFO
Non-Tax Parameters								
Inflation	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Real interest rate	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Nominal Interest Rate	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
Debt-to-Asset ratio	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Cost of Equity	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%
Nominal Financing Cost	5.9%	5.8%	5.8%	5.9%	5.8%	5.8%	5.8%	5.7%
Real Financing Cost	2.9%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.7%
Time to Payout - Exploration	8	8	8	8	8	8	8	8
Time to Payout - Development	4	4	4	4	4	4	4	4
Capital weights⁽⁶⁾								
Depreciable assets	25%	25%	25%	25%	25%	25%	25%	25%
Inventory	12%	12%	12%	12%	12%	12%	12%	12%
Land	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%
Exploration	17%	17%	17%	17%	17%	17%	17%	17%
Development	46%	46%	46%	46%	46%	46%	46%	46%
Aggregate-including E&D	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

	Canada Newfoundland & Labrador	Canada Nova Scotia	Canada NWT	Canada Nunavut	Canada Yukon	Chile	China	Colombia
Company Income Tax Rate	30.0%	29.0%	26.5%	27.0%	27.0%	27.0%	25.0%	30.0%
Federal Tax Rate	15.0%	15.0%	15.0%	15.0%	15.0%	27.0%	25.0%	30.0%
Revenue-Based Royalty^(1, 2)		2.0%						
Copper								
Gold							6.0%	
Iron Ore							9.0%	
Lithium							10.0%	
Nickel								12.0%
Zinc							10.0%	
Profit-Based Royalty	15.0%	15.0%	13.0%	13.0%	12.0%	14.0%		
Additional Taxes								
Effective Sales Tax On Capital Purchases							1.02%	
Real Estate Transfer Tax	0.40%	1.50%	0.11%	0.10%	0.10%		4.0%	9.38%
Capital Asset Tax ⁽³⁾								
Gross Receipts Tax								0.75%
Financial Transaction Tax(s)								0.40%
Additional Features								
Inflation adjustment						Yes		
Jurisdiction Specific Notes	Base METC Fed	Base METC Fed	Base METC Fed	Base METC Fed	Base METC Fed			
Jurisdiction Specific Notes	30.00%	30.00%	30.00%	30.00%	30.00%			
	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)	CMETC shown (additional 15%)			
Company Income Tax Depreciation⁽⁴⁾						*	*	*
Depreciable Capital - Min	5%	5%	5%	5%	5%	2%	5%	5%
Depreciable Capital - Max	100%	100%	100%	100%	100%	33%	33%	25%
Exploration ⁽⁵⁾	100%	100%	100%	100%	100%	100%	6%	20%
Development ⁽⁵⁾	30%	30%	30%	30%	30%	5%	6%	20%
Mining Tax								
Exploration	100%	100%	100%	100%	100%			
Development	10%	100%	100%	100%	100%			
Depreciable Capital	100%	30%	100%	100%	15% *			
Depreciable Capital - Processing	25%	30%	100%	100%	15% *			
Minimum Tax								
Inventory	FIFO	FIFO	FIFO	FIFO	FIFO	LIFO	Optional	LIFO
Non-Tax Parameters								
Inflation	3.0%	3.0%	3.0%	3.0%	3.0%	6.2%	1.2%	6.3%
Real interest rate	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Nominal Interest Rate	6.8%	6.8%	6.8%	6.8%	6.8%	10.0%	5.0%	10.1%
Debt-to-Asset ratio	40.0%	40.0%	40.0%	40.0%	40.0%	40%	40%	40%
Cost of Equity	6.3%	6.3%	6.3%	6.3%	6.3%	3.5%	4.6%	9.4%
Nominal Financing Cost	5.7%	5.7%	5.8%	5.8%	5.8%	9.4%	4.3%	8.5%
Real Financing Cost	2.7%	2.7%	2.8%	2.8%	2.8%	3.2%	3.1%	2.2%
Time to Payout - Exploration	8	8	8	8	8	8	8	8
Time to Payout - Development	4	4	4	4	4	4	4	4
Capital weights⁽⁶⁾								
Depreciable assets	25%	25%	25%	25%	25%	25%	25%	25%
Inventory	12%	12%	12%	12%	12%	12%	12%	12%
Land	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%
Exploration	17%	17%	17%	17%	17%	17%	17%	17%
Development	46%	46%	46%	46%	46%	46%	46%	46%
Aggregate-including E&D	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

	Dominican R.	Guatemala	Guyana	India	Indonesia	Kazakhstan	Mexico	Peru	
Company Income Tax Rate	40.0%	25.0%	25.0%	25.1%	29.5%	20.0%	30.0%	29.5%	
Federal Tax Rate					29.5%	20.0%		29.5%	
Revenue-Based Royalty^(1, 2)									
Copper						8.6%			
Gold	5.0%		5.0%			7.5%			
Iron Ore				10.0%		3.6%			
Lithium									
Nickel	5.0%	1.0%			14.0%				
Zinc				8.0%		10.5%			
Profit-Based Royalty							7.5%	20.4%	
Additional Taxes									
Effective Sales Tax On Capital Purchases				4.0%		0.00%			
Real Estate Transfer Tax	3.0%	3.0%		7.0%		0.00%		3.0%	
Capital Asset Tax ⁽³⁾		0.9%							
Gross Receipts Tax									
Financial Transaction Tax(s)				0.20%					
Additional Features									
Inflation adjustment	for depreciation						Yes		
Jurisdiction Specific Notes									
Jurisdiction Specific Notes									
Company Income Tax Depreciation⁽⁴⁾									*
Depreciable Capital - Min	10%	10.0%	8%	8%	10%	15%	7.5%	5%	
Depreciable Capital - Max	47%	47.3%	20%	40%	13%	25%	40.3%	20%	
Exploration ⁽⁵⁾	6%	20.0%	20%	10%	6%	25%	100%	100%	
Development ⁽⁵⁾	6%	5.1%	20%	10%	6%	25%	4.9%	33%	
Mining Tax									
Exploration									
Development									
Depreciable Capital									
Depreciable Capital - Processing									
Minimum Tax									
Inventory	LIFO	Optional	Optional	Optional	Optional	Optional	LIFO	Optional	
Non-Tax Parameters									
Inflation	5.8%	4.7%	1.0%	5.3%	2.9%	9.9%	4.0%	4.6%	
Real interest rate	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	
Nominal Interest Rate	9.6%	4.8%	4.8%	9.1%	6.7%	13.7%	7.8%	8.4%	
Debt-to-Asset ratio	40%	40%	40%	40%	40%	40%	40%	40%	
Cost of Equity	8.9%	7.9%	4.5%	8.5%	6.3%	12.7%	3.5%	7.8%	
Nominal Financing Cost	7.6%	7.3%	4.1%	8.3%	5.7%	12.0%	7.2%	7.1%	
Real Financing Cost	1.9%	2.6%	3.1%	2.9%	2.7%	2.1%	3.2%	2.4%	
Time to Payout - Exploration	8	8	8	8	8	8	8	8	
Time to Payout - Development	4	4	4	4	4	4	4	4	
Capital weights⁽⁶⁾									
Depreciable assets	25%	25%	25%	25%	25%	25%	25%	25%	
Inventory	12%	12%	12%	12%	12%	12%	12%	12%	
Land	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	
Exploration	17%	17%	17%	17%	17%	17%	17%	17%	
Development	46%	46%	46%	46%	46%	46%	46%	46%	
Aggregate-including E&D	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

	Philippines	Russia	South Africa	Suriname	US Alaska	US Arizona	US Minnesota	US Nevada
Company Income Tax Rate	30.0%	20.0%	25% / 27% (b)	36.0%	28.4%	24.9%	22.9%	21.0%
Federal Tax Rate		20.0%	25.1%		28.4%	21.0%	21.0%	21.0%
Revenue-Based Royalty ^(1, 2)								
Copper						2.0%		1.1%
Gold		6.0%	5.0%	6.5%	3.0%			1.1%
Iron Ore							2.8%	
Lithium								
Nickel	5.0%	5.1%						
Zinc					3.0%			
Profit-Based Royalty					7.0%	1.3%	2.5%	5.0%
Additional Taxes								
Effective Sales Tax On Capital Purchases			0.15%		1.7%	7.7%	7.3%	7.8%
Real Estate Transfer Tax							0.45%	0.26%
Capital Asset Tax ⁽³⁾		1.32%						
Gross Receipts Tax	1.50%							0.9%
Financial Transaction Tax(s)	0.50%							
Additional Features								
Inflation adjustment								
Jurisdiction Specific Notes								
Jurisdiction Specific Notes			Special CIT for Gold (b)			Occupation Tax ^(A)		
Company Income Tax Depreciation ⁽⁴⁾								
		*	*					
Depreciable Capital - Min	10.0%	20%	12%	5%	4%	4%	4%	4%
Depreciable Capital - Max	47.3%	67%	12%	47%	45%	45%	45%	45%
Exploration ⁽⁵⁾	100%	6%	100%	100%	70%	70%	70%	70%
Development ⁽⁵⁾	5.1%	6%	100%	6%	70%	70%	70%	70%
Mining Tax								
Exploration								
Development								
Depreciable Capital								
Depreciable Capital - Processing								
Minimum Tax								
Inventory	Optional	Optional	Optional	FIFO	Optional	Optional		Optional
Non-Tax Parameters								
Inflation	4.3%	4.2%	4.9%	42.6%	2.0%	2.0%	20.0%	2.0%
Real interest rate	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Nominal Interest Rate	8.1%	8.0%	8.7%	46.4%	5.8%	5.8%	23.8%	5.8%
Debt-to-Asset ratio	40%	40%	40%	40%	40%	40%	40%	40%
Cost of Equity	7.5%	7.4%	8.1%	43.1%	5.4%	5.4%	22.1%	5.4%
Nominal Financing Cost	6.8%	7.0%	7.4%	37.7%	4.9%	5.0%	20.6%	5.1%
Real Financing Cost	2.5%	2.8%	2.6%	-4.9%	2.9%	3.0%	0.6%	3.1%
Time to Payout - Exploration	8	8	8	8	8	8	8	8
Time to Payout - Development	4	4	4	4	4	4	4	4
Capital weights ⁽⁶⁾								
Depreciable assets	25%	25%	25%	25%	25%	25%	25%	25%
Inventory	12%	12%	12%	12%	12%	12%	12%	12%
Land	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%
Exploration	17%	17%	17%	17%	17%	17%	17%	17%
Development	46%	46%	46%	46%	46%	46%	46%	46%
Aggregate-including E&D	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Tax Parameters Common Features	
Real interest rate	3.8%
Debt-to-Asset ratio	40%
Time to Payout - Exploration	8
Time to Payout - Depreciation	4
Capital weights ⁽⁶⁾	
Depreciable assets	25.1%
Inventory	11.8%
Exploration	17.3%
Development	45.6%

Price Cost Margin by Resource	
Copper	56.6%
Gold	58.1%
Iron ore	83.4%
Lithium (Carbonate)	88.4%
Nickel	51.2%
Zinc	23.0%

Average Life of Mine by Resource (Years)	
Copper	17.5
Gold	16.5
Iron Ore	18.5
Lithium lithiumc	20.5
Nickel	19.5
Zinc	20.5
Cross Mineral Average	20.5

Parameter Table Notes:

- (a) Similar in structure to the corporate franchise tax.
- (b) Assumes 19 per cent profit-to-revenue ratio for gold producers. For more info, see South African Revenue Service (n.d.).
- (1) Where sale in various forms or stages of processing faces different rates, we take the rate for "Concentrate."
- (2) Revenue-based royalties for Canadian provinces reflect first-tier pre-payout revenue-based royalties that are superseded by profit-based royalties post-payout.
- (3) Capital asset tax is not a minimum tax.
- (4) Declining balance unless denoted by a star.
- (5) Where additional mining-tax depreciation rates are not explicitly given, rates shown are also applied for depreciation under the mining-profit tax for jurisdictions with a profit tax.
- (6) Capital weights derived from the top 40 mining company balance sheets and Canadian sources for 2017-2022.

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