An Evaluation of Israel's Fiscal Regimes for Non-Oil and Gas Resources

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Executive Summary

This study evaluates Israel's fiscal levies on non-oil and gas resources. Israel produces potash, bromines, magnesium and sodium chloride in the Dead Sea region and phosphate rock in the Negev Desert.

The objective of governments is to levy taxes in order to fund public services. Taxes introduce some distortions into the economy as they alter the returns to individuals and firms in the market. Governments should assess taxes that minimize economic distortions, ensure fairness and reduce compliance and administrative costs. The most efficient resource tax is one applied to rents. Rents are maximized at the point in which the return on investments is equal to the economic cost of undertaking the investment.

Governments throughout the world collect various taxes and industry-specific levies paid by natural resource companies. Some are specific payments by a producer made in exchange for the right to extract a publicly held resource, which we will refer to as resource levies. Resource levies can be structured in a number of ways: they may be based on a payment per unit of production, a share of mineral production, a portion of sales revenues (such as the existing potash royalty in Israel), a percentage of "net-profits", or a percentage of economic rents. It is the latter arrangement—a percentage of economic rents—that we will advocate, and it is this form of resource tax that has been introduced in a number of countries including Canada, Australia, Norway and the United Kingdom. Other industry-specific levies include severance taxes (United States), bonus-bids or auction revenues from the sale of leases, and excise taxes.

Resource companies also pay other taxes and fees to governments. The most prominent is the company income tax, which is levied on profits accruing to shareholders to ensure the income is taxed – without the corporate tax investors can leave income in the corporation to reduce personal taxes. Some specific provisions are related to extractive industries such as exploration and development and mining tax deductions to ensure that company income is taxed appropriately. If a company income tax is neutral across assets and sectors, the tax burden as share of profits should be similar across business activities, which requires a clear definition of resource profits in the case of the extractive industry.

In our analysis below, we estimate *marginal effective tax rates* (METRs) by asset expenditure and compare METR's across countries with similar mining activity. Conceptually, a business invests in capital until the rate of return on incremental dollars is equal to the cost of capital (at this point no further rents are earned). To measure the effect of taxes and mining taxes on investment decisions, the METR is calculated as the amount of taxes paid as a percentage of the pre-tax-and-mining tax (net-of-risk) return on capital that would be required to cover taxes and the financing of capital with debt and equity (financing costs also measured net of risk). A cross county comparison is

made in order to establish the relative impact of fiscal systems among countries competing for investment from a given firm.

Marginal Effective Tax Rates, Major Mineral Countries, 2014

	Mining Levies Only	Incl. Mining, CIT and Other taxes	Corresponding product
Israel (with 2-percent royalty)*	0.5	10.4	Phosphate
Israel (with 5-percent royalty)*	2.8	12.8	All other products and low potash production
Israel (with 10-percent royalty)*	5.6	15.6	Potash if over 1.5M tonnes
Israel: Aggregate**	5.1	15.0	A weighted average across all products
Belarus (excl. fixed-amount royalty)	6.7	13.9	Potash
Canada: Saskatchewan***	14.2	22.6	Potash, phosphate, magnesium
China	6.3	19.5	Potash, phosphate, magnesium
Ethiopia	2.5	9.0	All industrial minerals
Germany	6.3	21.9	Potash, bromine
Jordan	11.0	16.1	Potash
Jordan	2.2	7.4	Phosphate
Russia	2.5	21.6	Potash, phosphate, magnesium
Spain	2.5	25.4	Potash, magnesium
U.K.	0.0	21.2	Potash
U.S.: New Mexico (with 2% royalty)	1.9	17.2	Sylvinite
U.S.: New Mexico (with 5% royalty)	3.8	19.1	Langbeinite
Average across all countries	5.0	17.7	

* The effective royalty rate used in our METR calculation is 0.8% for phosphate (provided by the Finance), 4.5% for "all other products and low potash production" and 9% for "potash if over 1.5M tonnes.

** The aggregate is a weighted average across all METRs by product as shown in the first three rows. The weight by product is 4.9% for phosphate, 11.5% for bromine and magnesium, and 83.6% for potash. Also note that we use the METRs corresponding to the 10-percent statutory royalty rate (i.e., 9-percent effectively) for potash since this is the marginal royalty.

*** Note the METRs for mining levies and all taxes in Saskatchewan are -34.2 percent and 0.3 percent respectively given the 120-percent capital allowance under the potash profit tax provided for investments of more than 90 percent of 2002 investment levels (refer to Table 3 for details).

Israel's mining and corporate tax regime on non-oil and gas resources is competitive. Its corporate income tax rate is close to the global average and incentives for resource firms are similar to other countries. The METR is also similar to other industries. However, any new exploration and development[1] activities would be highly taxed compared to other investment under the existing mining tax, which applies at a rate of 5

[1] At present, exploration and development expenditures are minimal in Israel since the reserves are known with certainty.

percent on products, except for potash which is taxed at 10 percent on production in excess of 1.5M tonnes. Further, as discussed later, the aggregate METR on non-oil and gas resources in Israel is roughly similar to other industries in Israel.

In our view, it would be better for Israel to convert its resource taxes to rent-based mechanisms. We specifically recommend a cash flow tax in which capital and current expenditures are written off the rent base. Any unused deductions are carried forward at a riskless rate of interest (government bond rate) since the government generally shares both the gains and losses associated with rent-based investments. As shown in the table below, the rent tax as low as 30 percent would maintain existing competitiveness while a 36 percent rent tax would be competitive with other countries.

Marginal Effective Tax Rate for Mining in Israel for Rent Taxes at a METR of 16 percent, or Higher

	Current Case		**The Rent Tax Options With the 5% basic mining tax creditable**		
	Mining Aggregate	Cross-industry Aggregate	Rent tax =30%	Rent tax =36%	Rent tax =50%
Depreciable assets	17.7	16.2	27.7	30.4	37.8
Land	10.8	10.8	19.9	22.5	29.5
Inventory	18.3	18.3	28.4	31.1	38.4
Aggregate: non-E&D	17.9	15.7	27.9	30.6	37.9
Exploration	11.2	11.2	0.7	1.0	1.9
Development	11.7	11.7	1.2	1.5	2.3
Aggregate	**15.0**	15.7	16.0	17.7	22.2

Introduction

The purpose of this study is to provide an evaluation of Israel's fiscal levies on non-oil and gas resources. Israel produces potash, bromines, magnesium and sodium chloride in the Dead Sea region and phosphate rock in the Negev Desert. The dominant mineral produced is potash, making Israel one of the largest potash producers in the world. However, Israel is also a large global producer of bromines and certain specialty phosphates[2].

Recently, Israel has been reevaluating its approach to taxes and royalties with respect to non-renewable resources. The Government adopted a new tax regime for oil and gas as recommended by the Sheshinski committee in 2011[3]. It is now examining fiscal levies relevant to non-oil and gas resources chaired by a new committee headed by Professor Sheshinski. The committee is charged with the following[4]:

1. Review of the overall fiscal mechanism that is currently applied in connection with the State's share received for the use of national natural resources by private entities.
2. Formulation of an updated fiscal mechanism of fundamental principles with respect to the share received by the State for the use of national natural resources by private entities, alongside the establishment of appropriate arrangements for the various natural resources and their different uses. The Committee will not discuss oil and gas resources in Israel, as this issue has been recently regulated.
3. Consideration of these issues in a broad manner, with reference to the implications of the existing agreements between the various parties operating in these areas and the State. Additionally, the Committee is to examine the implementation of the principles that would be established in connection with Dead Sea minerals. This would take into consideration, inter alia, Government Resolution No. 4060 and the detailed agreement that was consequently signed with Dead Sea Works in July 2012, as well as the public debate that took place in relation to the possible merger of the company with a foreign company.

This study focuses on the first two of the three issues to be covered by the Sheshinski committee: an evaluation of the existing fiscal system and proposals for reform. The third issue, with regard to the implications of existing agreements with various parties, is not a focus of this report as it enters into legal issues that lie outside our area of competence.

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[2] One producer operates in Israel– Israel Chemicals Limited (ICL) – that has been granted concessions from the Government of Israel to extract the minerals.

[3] State of Israel: *Conclusions of the Committee for the Examination of the Fiscal Policy with Respect to Oil and Gas Resources in Israel*, (Sheshinski Committee), Ministry of Finance, 2011.

[4] Ministry of Finance, State of Israel, Press Release, June 17, 2013.

The taxation of natural resources is a highly politicized topic in part because of the significance of the industry to economic growth and government revenues. However, with a focus on the appropriate criteria for taxation, the aim of fiscal policy is to:

- Provide government, as owner (in trust of the people of Israel), economic rents from the extraction of the nation's resources[5]

- Allow for competitive return to attract efficient producers to extract a given resource

- Administer an efficient and stable fiscal system designed to maximize rents available to both the government and producer

This rent-collection mechanism for governments is part of an overall fiscal system aimed to support public objectives. The over-riding objective of governments is to fund public services, for which it must levy taxes. However, for a given level of revenues needed to support public services, the government should assess taxes that minimize economic distortions, ensure fairness and reduce compliance and administrative costs. The most efficient resource tax is one applied to rents. Rents being the surplus value of a good after all costs, including opportunity costs, are subtracted from revenues arising from the sale of that good. Rents are maximized at the point where the return on investments is equal to the economic cost of undertaking the investment. In this regard, rent-based taxes on extractive industries minimize distortions since the producer decisions are not affected at the margin where no rents are earned.

Nonetheless, many taxes distort decisions made by firms in extractive industries. The levies might impact on the timing of extraction, the incentive to explore and develop reserves and techniques of production (such as whether to spend on development or post-production capital). In our analysis below, we shall estimate *marginal effective tax rates* (METRs) by asset expenditure and in comparison across countries. The aim of this specific measure, which is the amount of taxes and royalties paid as a percentage of income derived from marginal projects, is to understand the extent to which the fiscal system in Israel distorts the economic decisions of firms, and how this compares with competing countries. The METR should not be confused with an average tax rate, measured as the total taxes paid on investment income for the whole industry. The calculation of the average tax rate is of interest as well, especially in evaluating the

[5] Economic rents are defined as the income net of the economic costs of producing goods and services in a market. Economic costs include the imputed cost of financing cost with equity, not just borrowed funds. Shareholder profits are the economic rents before the deduction of imputed equity costs. For further elaboration, see J. Mintz and D. Chen, "Capturing Economic Rents through Taxes and Royalties," *SPP Research Paper* 5(30), School of Public Policy, University of Calgary, 2012. The concept is defined in more detail later.

overall amount of fiscal levies paid as a share of the return on capital investment under alternative tax proposals.

Governments throughout the world collect various taxes and industry-specific levies from natural resource companies. Some are specific payments by a producer made in exchange for the right to extract a publicly held resource, which we will refer to as resource levies. Resource levies can be structured in a number of ways; they may be based on a payment per unit of production, a share of mineral production, a portion of sales revenues (such as the existing potash royalty in Israel), a percentage of "net-profits", or a percentage of economic rents. It is the latter arrangement—a percentage of economic rents—that we will advocate and it is this form of resource tax that has been introduced in a number of countries including Canada, Australia, Norway and the United Kingdom.[6] Other industry-specific levies include severance taxes, bonus-bids or auction revenues from the sale of leases, and excise taxes on capital goods.

Resource companies also pay other taxes and fees to governments. The most prominent is the company income tax, which is levied on profits accruing to shareholders to ensure the income is taxed at the personal level – the absence of a company tax could enable individuals to avoid taxes on income left in the company. Some specific provisions are related to extractive industries such as exploration and development and mining tax deductions to ensure that company income is taxed appropriately. If a company income tax is neutral across assets and sectors, the tax burden as share of profits should be similar across business activities, which requires a clear definition of resource profits in the case of the extractive industry.

Other taxes paid by resource companies include sales taxes on capital purchases, financial transaction taxes, property taxes on tangible and/or intangible assets, and transfer taxes. However, these taxes, like the company income tax, are part of overall tax systems and should be judged accordingly. While the overall tax burden on capital investments varies by country depending on the various tax levies applied to capital investment, the reform of a specific levy within a country should be based on the objectives of the fiscal system.

This report is divided into four sections. The first provides some background on the Israeli non-oil and gas natural resource industry. The second lays out relevant fiscal provisions concerning the natural resource sectors in Israel and compares these to other relevant countries with similar mining activities. The third provides an evaluation of the existing Israeli fiscal structure with respect to economic distortions and competitiveness with other countries. The final section lays out our recommendations for mining and company income tax reforms for the non-oil and gas natural resource sector. We also

[6] Note that output-based and revenue-based levies are typically referred to as royalties. Profit or rent-based levies are referred to as royalties in some countries like Canada but rent taxes in other countries. For our purposes, we refer to profit or rent-based levies as resource rent taxes in this report.

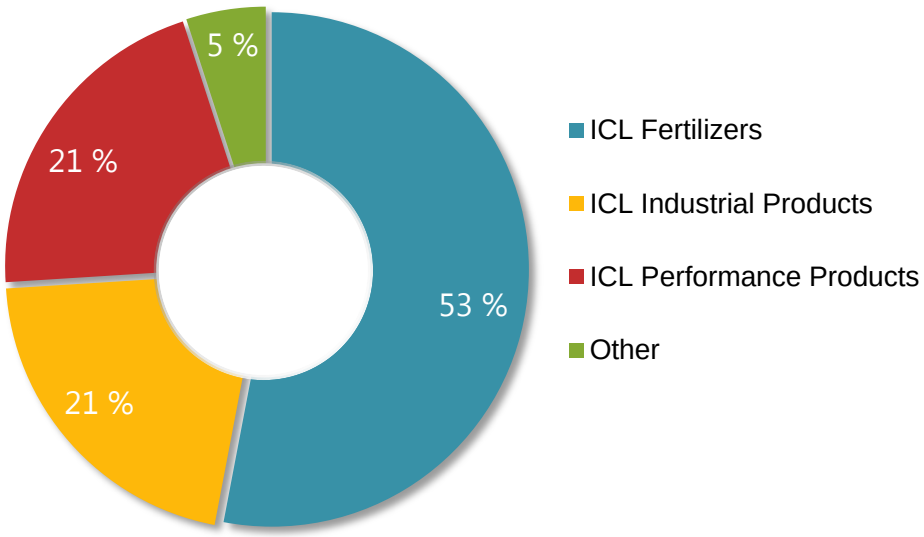
provide an analysis with respect to the impact of our recommendations on investment and production decisions.

Background

ICL holds the only non-oil and gas concession granted for mineral production in Israel. ICL produces a range of agricultural and industrial products derived from the primary potash, phosphate, bromine, and magnesium compounds it mines. The bulk of ICL's revenue is accounted for by its three primary subsidiary companies: ICL Fertilizers, ICL Performance Products, and ICL Industrial Products.

ICL Fertilizers the arm of ICL concerned primarily with potash and phosphates brought in total revenue of roughly $3.8 billion in 2012 and accounted for over one half of total ICL revenues in 2012 (Figure 1). Of fertilizers produced by ICL, potash accounted for over one half of revenues and over four-fifths of operating income in 2011 and 2012 (Table 1)[7]. The primary markets for sales of ICL fertilizer products are China, India, Brazil and Europe.

Figure 1: ICL Primary Corporations by Revenue Share 2012



Source: ICL Periodic Report 2012.

[7] Revenues from potash account for 33 percent and phosphates and fertilizers account for 26 percent of total ICL revenue in 2012. Gross profit as a share of revenues is 46.7 percent for potash and 16.8 percent for phosphates and fertilizers in 2012. In 2010 and 2011, gross profit shares for potash were 57.3 percent and 62 percent respectively. For phosphates and fertilizers, the gross profit shares were 27.0 and 29.5 percent respectively. See ICL Periodic Report 2012, p. 43.

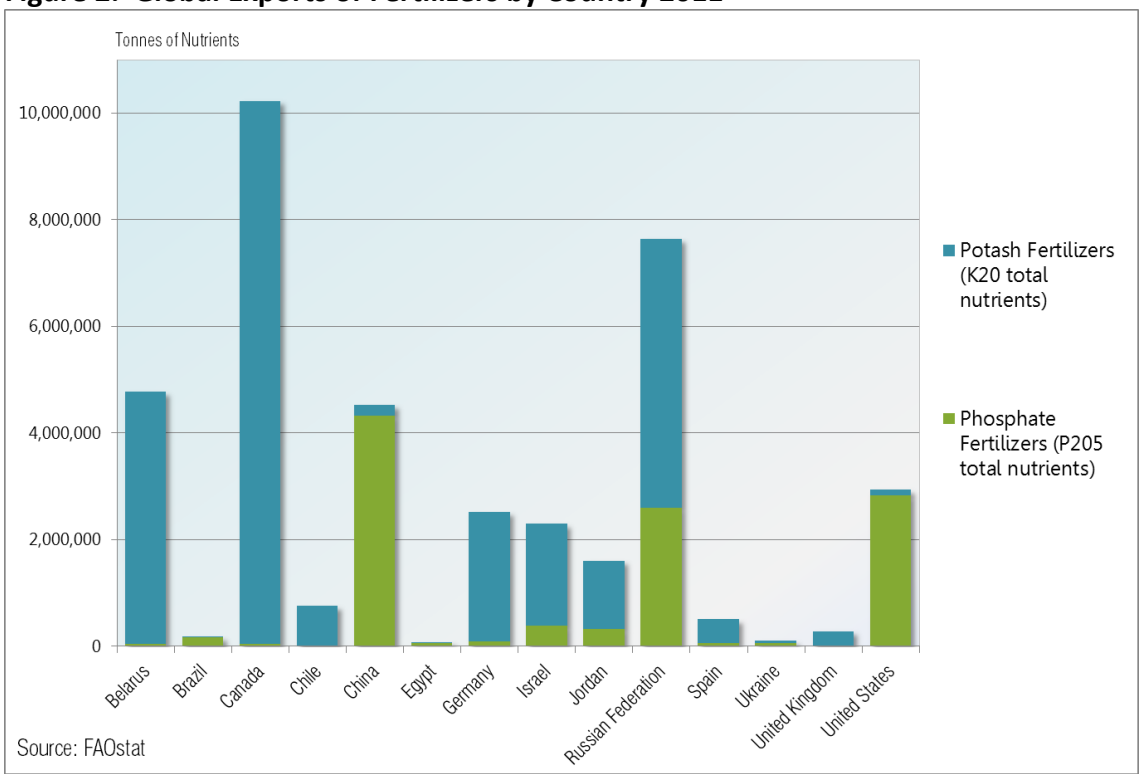
Table 1: ICL Fertilizers Distribution of Sales Revenues and Operating Income: Potash and Phosphates

❖	2012	2011
Sales		
Potash	56%	59%
Phosphate	44%	41%
Operating income		
Potash	86%	84%
Phosphate	14%	16%

Source: ICL Periodic Report 2012.

Israel's production of fertilizer products accounts for a significant share of world trade. It is the seventh largest exporter of fertilizers, an export market that is dominated by Russia, China and Canada (Figure 2).

Figure 2: Global Exports of Fertilizers by Country 2011

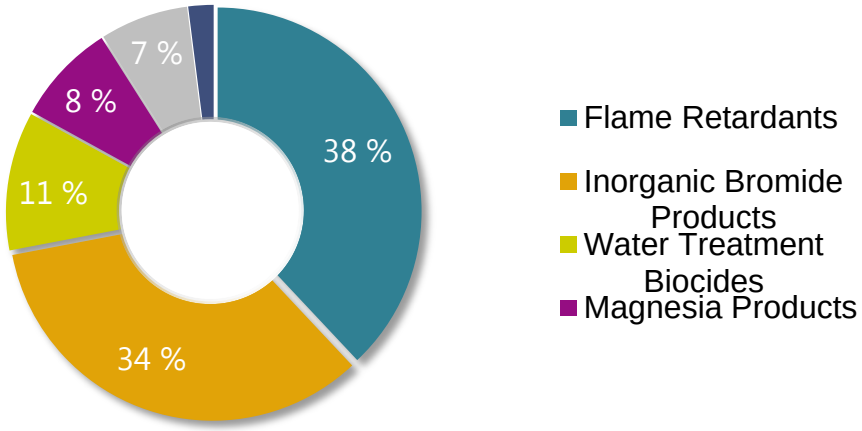


Industrial Products produces industrial chemical products derived from bromines, magnesia, chlorine and salts from the Dead Sea, in addition to phosphorous and chlorine purchased from third parties (figure 3). Its total sales in 2012 were $1.437[8]

[8] Ibid, p. 58.

billion ($1.421 in external sales). Israel is one of the largest producers of bromines in the world.

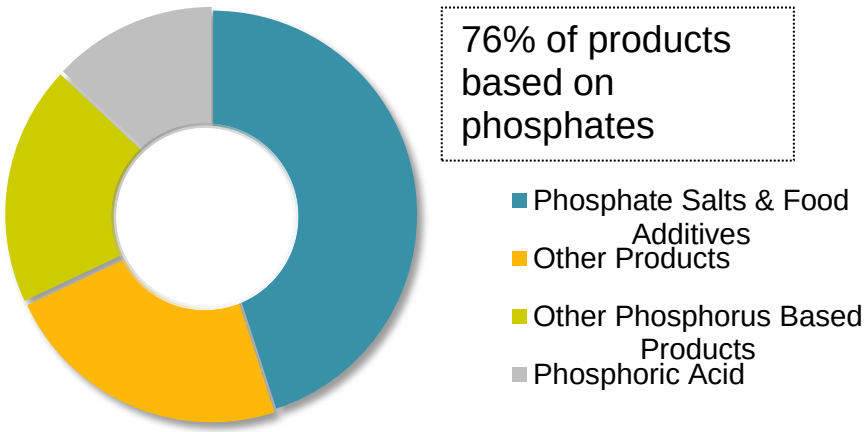
Figure 3: Distribution of ICL Industrial Product External Sales Revenues in 2012



Source: ICL Periodic Report 2012.

ICL Performance Products – alumina-based products and other industrial performance products – accounted for $1.477 million ($1.411 in external sales) in 2012[9]. About three-quarters of external sales are related to phosphoric acid of various grades (technical, food, electronics, and poly-phosphoric acid), partially produced from phosphate rock in the Negev Desert and phosphoric acid and manufactured from the rock and partially elemental phosphorous and phosphoric acid purchased from third parties (figure 4).

Figure 4: Distribution External Sales Revenues in 2012 for Industrial Performance Products



Source: ICL Periodic Report 2012.

[9] Ibid. p. 77.

From these activities, ICL earns a consolidated after-tax rate of return on capital for 2011 and 2012 equal to 21.7 and 17.6 percent in 2011 and 2012 respectively[10]. Sales, pricing, royalties, taxes and other factors influence the rates of return on capital. The pricing of products is important since both the company returns and the government's tax revenues depend on their evolution over time.

The royalty payments paid to the Israeli government are provided in Table 2. In 2012, the total payment was roughly $112 million (418 million shekels). Mining tax collections depend on the price of minerals. As to be shown below, prices were high in the run up to the global recession in 2008-9, falling sharply in that year and only recovering recently.

Table 2: Royalty Payments to the State of Israel, Various Years (Israeli Shekels: 3.73 per $US Dec 31, 2012)

		Thousands of Shekels				
		2008	**2009**	**2010**	**2011**	**2012**
Dead Sea Works Ltd.	Potash	306,669	139,144	204,923	376,738	352,234
Dead Sea Bromine Company Ltd.	Bromine	32,243	21,014	30,110	42,348	44,236
Dead Sea Magnesium Ltd.	Magnesium	6,171	3,038	2,450	3,936	4,327
	Total	**345,083**	**163,196**	**237,483**	**423,022**	**400,797**
Rotem Amfert Negev Ltd.	Phosphate	22,348	7,425	12,528	20,234	17,647
	Aggregate	**367,431**	**170,621**	**250,011**	**443,256**	**418,444**

Source: Government of Israel.

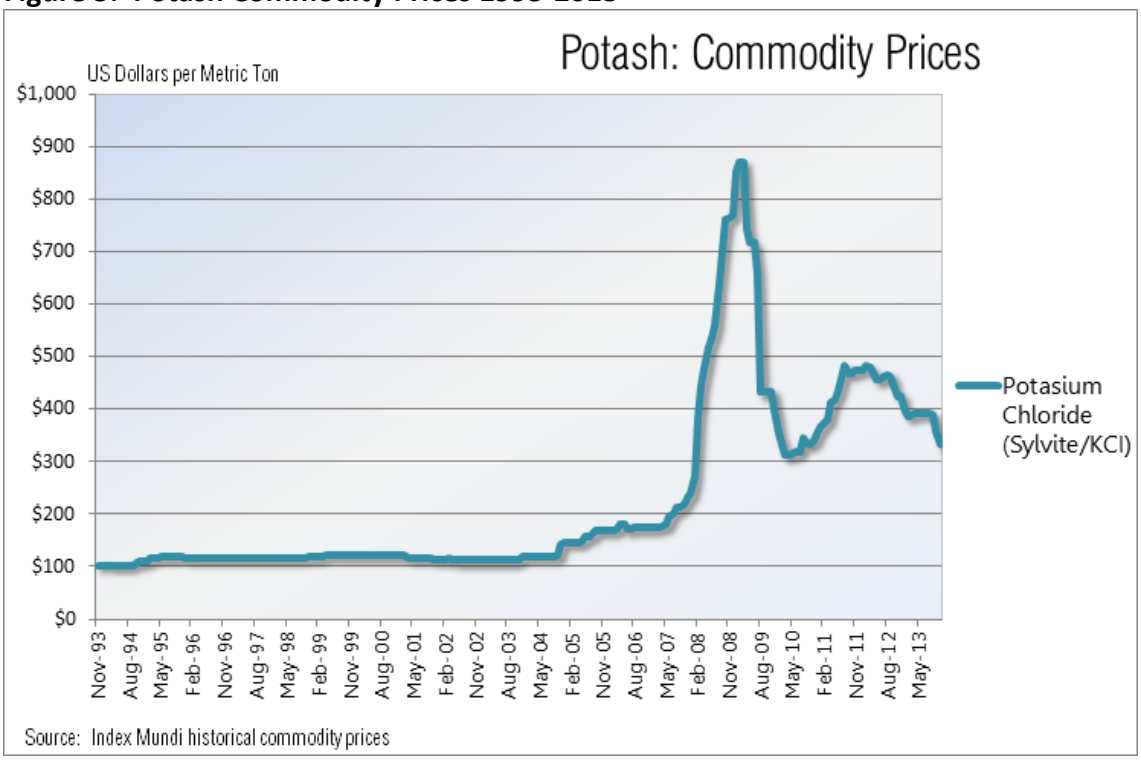
Potash Pricing Trend: The most common chemical compound associated with potash production and trade is Potassium Chloride or KCl, though this is only one of many potassium compounds commonly referred to as potash. There are no substitutes for potassium as a crop nutrient, thus agricultural demand has a direct influence on demand and pricing for potash.

[10] Calculated as net income gross of net financing expenses divided by equity and debt.

In 2008-2009 increasing potash demand combined with an estimated 40% reduction in global production triggered a sudden run-up in potash prices and produced a more than 300% increase in prices between January of 2008 and 2009, with a peak price of roughly $870 in February 09. In 2010 potash production returned to levels seen prior to 2009 and in January of 2010 potash had fallen to roughly $354 or 150 percent of January 2008 price levels. Increasing demand in 2011 and 2012 drove prices back into the high $400's for much of the period. By late 2012 moving into 2013 steadily increasing production had pushed prices downward, and over the course of 2013 increased supply and a reduction in demand saw prices in decline once again. 2013 also witnessed a significant restructuring of the potash market brought on by a break in cooperation between Belarus and Russia. This saw a further reduction in prices, which have continued to decline into the first quarter of 2014. [11] [12] (Figure 5)

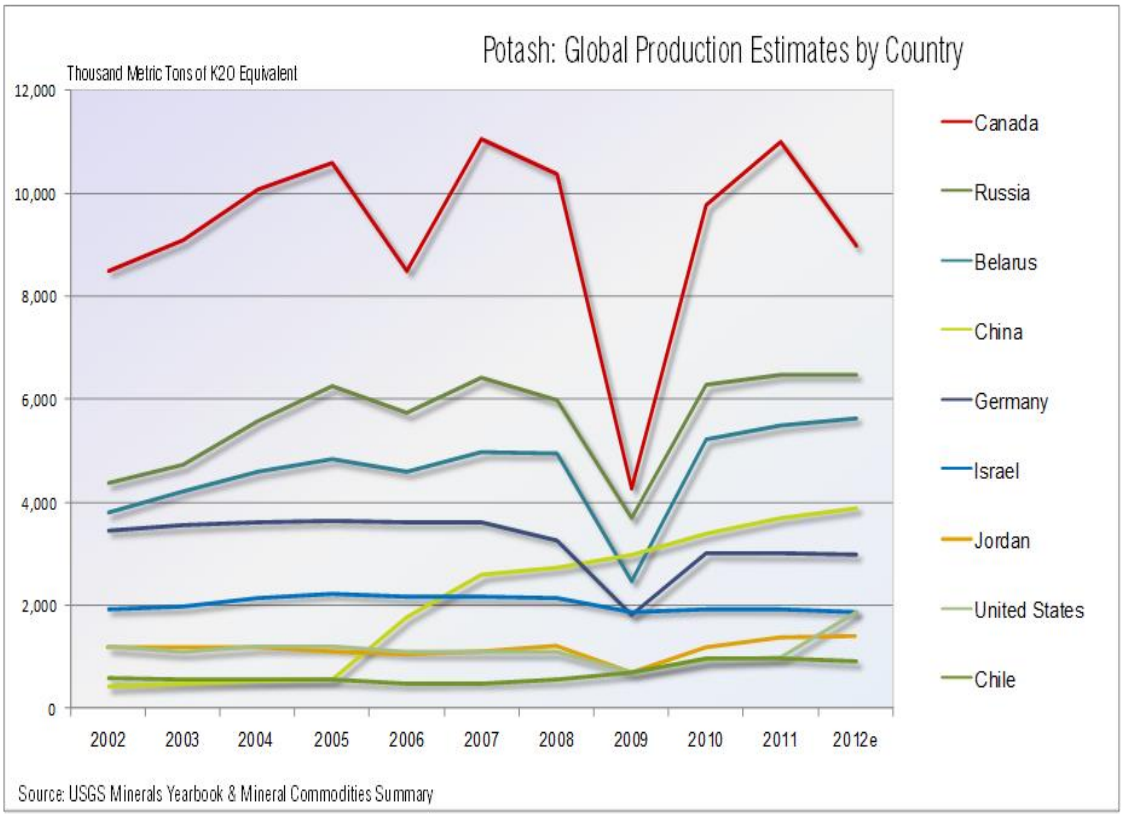
Potash Production Trend: Between 2002 and 2012 Canada, Russia, and Belarus, consistently accounted for roughly 61 to 64 percent of global potash production. Counting the production of China, Germany, Israel, and Jordan in addition to that of Canada, Russia, and Belarus, the combined output of the top 7 producing countries has consistently accounted for roughly 87-92 percent of global potash production since 2002 (Figure 6).

Figure 5: Potash Commodity Prices 1993-2013



[11] US Geological Services, Mineral Yearbook & Mineral Commodity Summaries, 2000-2011
[12] Mining.com , PotashCorp sees an even more difficult 2014, January 30, 2014, http://www.mining.com/potashcorp-sees-an-even-more-difficult-2014-25097/

Figure 6: Potash Production by Country 2002-2012

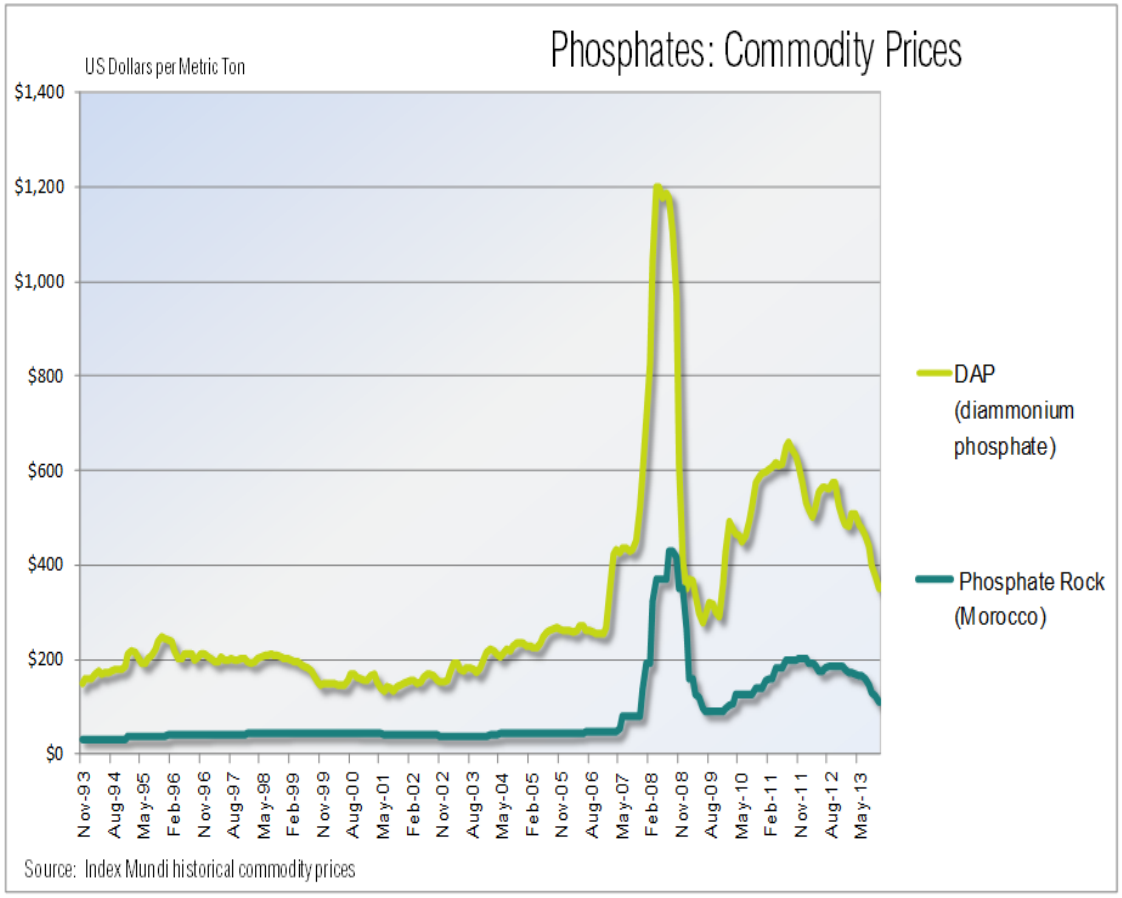


Phosphate Pricing Trend: Similar to potash, phosphates are commonly associated with agricultural fertilizer production, and there are no substitutes to the use of phosphorus in agriculture. Phosphate prices spiked between late 2007 and 2008 due to increasing demand for agricultural fertilizers and tightening supply. In the case of diammonium phosphate, this jump was roughly 4.5 fold between January 2007 and August 2008, in the case of phosphate rock originating from North African exporters this jump was as nearly tenfold over the same period. However, the market changed quickly and in 2009 the US reported the lowest levels of phosphate rock production and usage since the mid 1960's, following the recent run up in prices and expectations a weak market in 2009—following the economic down turn—saw producers holding excess levels of inventory, pushing prices down closer to 2007 levels. As market economies pulled farther way from the 2008-2009 economic downturn phosphate demand increased in 2010 amid overall production levels similar to those seen in 2009. Growth in demand continued into 2011 pushing prices to roughly 50% of those seen at the peak in 2008, despite a 9 percent increase in world production largely reflecting additional Chinese production capacity. Demand slowed in 2012 amid increasing Chinese supply, which saw phosphate rock prices in decline once again. Declining prices continued through 2013.[13](Figure 7)

[13] US Geological Services, Mineral Yearbook & Mineral Commodity Summaries, 2000-2011.

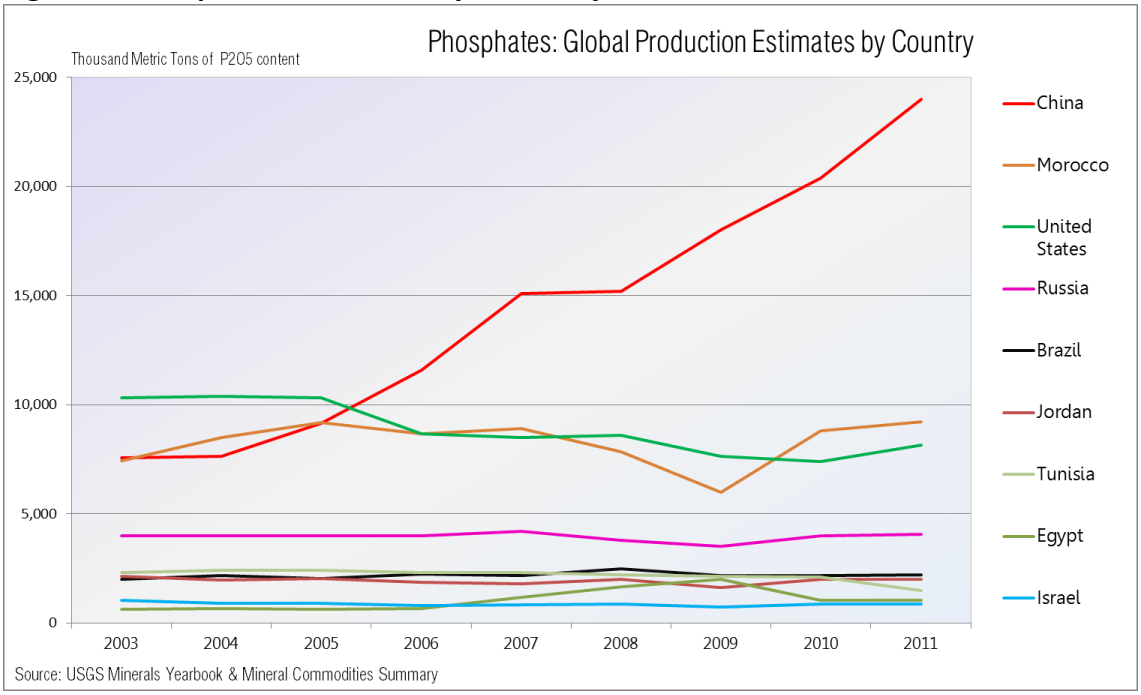
Phosphate Production Trend: In 2003 US production of phosphates represented roughly 24 percent of global supply, while Chinas total production accounted for roughly 17.5 percent. By 2011, Chinese production of phosphates had more than doubled, representing over 39 percent of global production, while US production fell to roughly 13 percent over the same period. In 2010-2011 Morocco overtook the US as the second largest global producer with some 15% of global production, and the Middle Eastern countries of Israel, Jordan and Egypt represented 1.4, 3.3, and 1.7 percent of global supply respectively.[14] (Figure 8)

Figure 7: Phosphate Prices (diammonium phosphate and phosphate rock) 1993-2013



[14] US Geological Services, Mineral Yearbook & Mineral Commodity Summaries, 2000-2011

Figure 8: Phosphate Production by Year, Major Countries, 2003-11



Magnesium Compound Pricing Trend: Magnesium compounds—including magnesium chloride—are also used as inputs to agricultural fertilizers, but unlike potash or phosphates magnesium compounds have a broader range of applications in industrial processes where they compete with a number of available substitutes.
Relative stability in production levels and the availability of substitutes for industrial processes seem to have contributed to relatively stable growth in the nominal value of magnesium compounds. Changes in price appear to reflect changes in industrial production rather than agricultural fertilizer markets. For instance, magnesium compounds were not subject to the price jumps seen in fertilizer inputs between 2007 and 2009, and USGS sights the 2009 dip in magnesium compound prices as corresponding to reduced industrial demanded resulting from 47 percent decline in US steel production over 2008.[15] (Figure 9)

Magnesium Compound Production Trend: In 2012 US production of magnesium compounds from Brine accounted for roughly 32 percent of total global production of magnesium compounds from Brine. A total of ten producing nations account for roughly 97 percent of global production, ordered from highest to lowest producing they are: US (31.5%), Netherlands (14.3%), Japan (9.8%), Mexico (9.0%), Ukraine (8.2%), Ireland (7.4%), Israel (5.7%), Jordan (4.9%), South Korea (3.3%), France (2.5%). Between 2003 and 2012 total global production of magnesium compounds from brine decreased roughly 21% from 1,548 to 1,223 thousand metric tons of MgO equivalent.[16] (Figure 10)

[15] US Geological Services, Mineral Yearbook & Mineral Commodity Summaries, 2000-2011.
[16] US Geological Services, Mineral Yearbook & Mineral Commodity Summaries, 2000-2011.

Figure 9: Magnesium Compound Prices 1990-2011

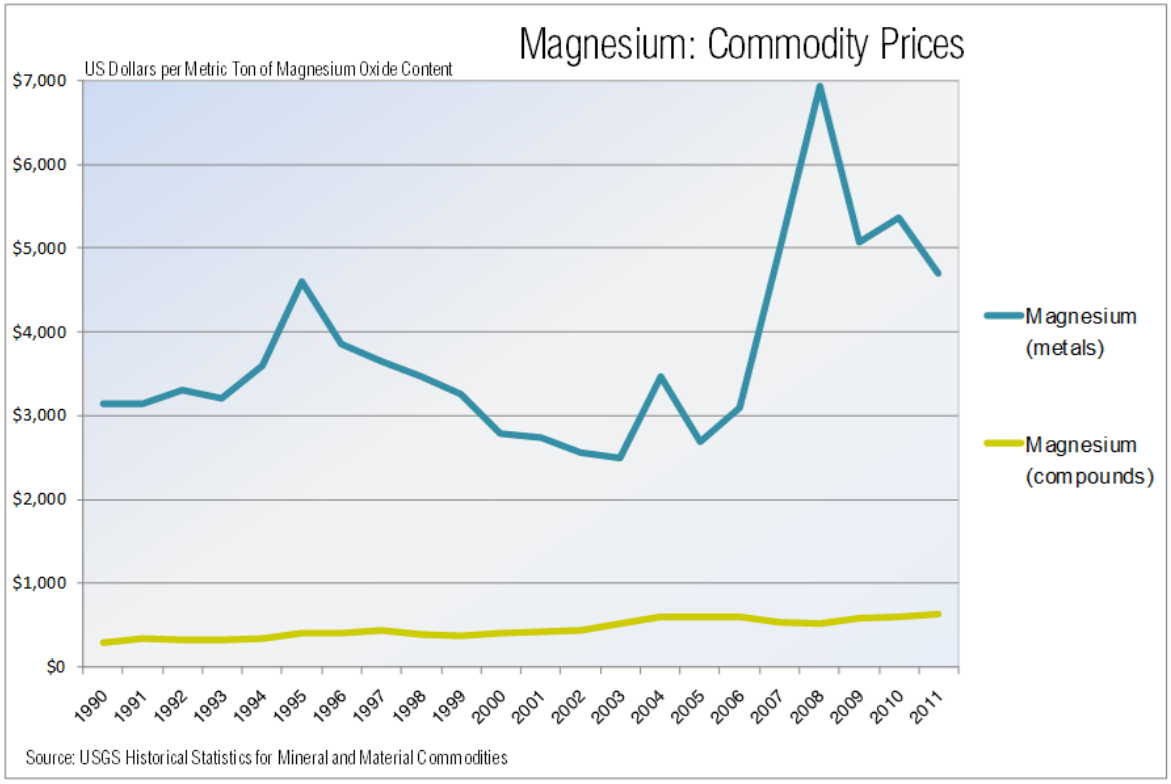
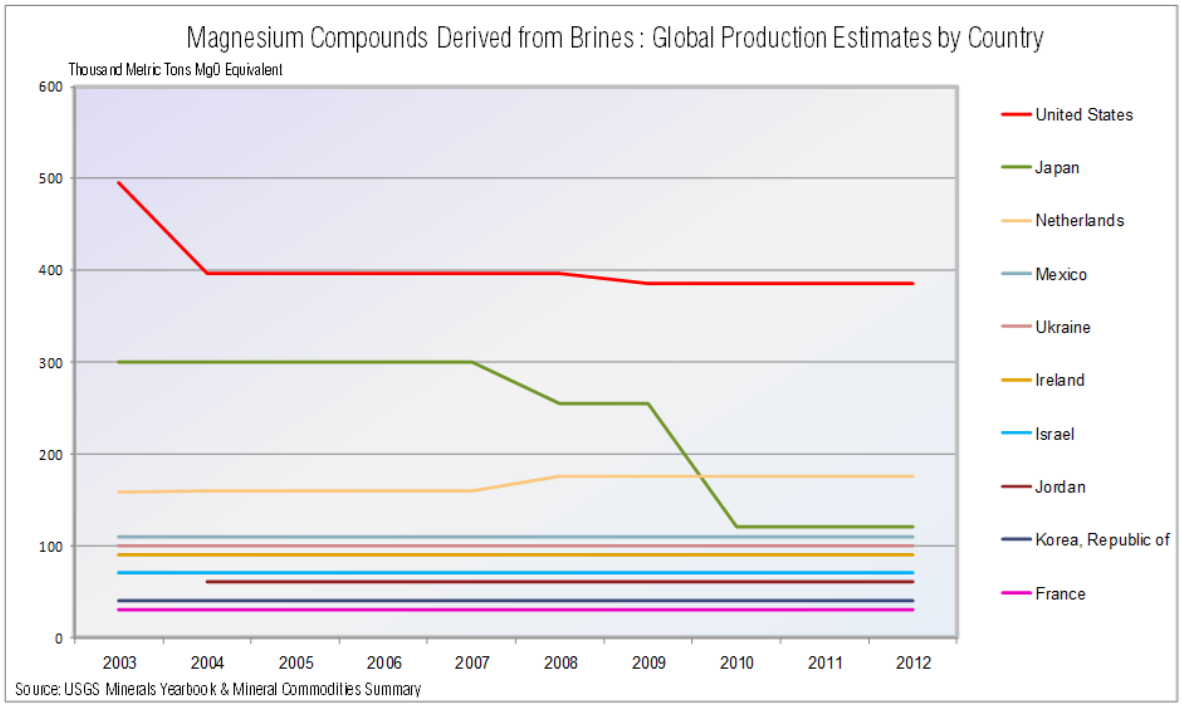


Figure10: Magnesium Compound Production by Major Country, 2003-2012



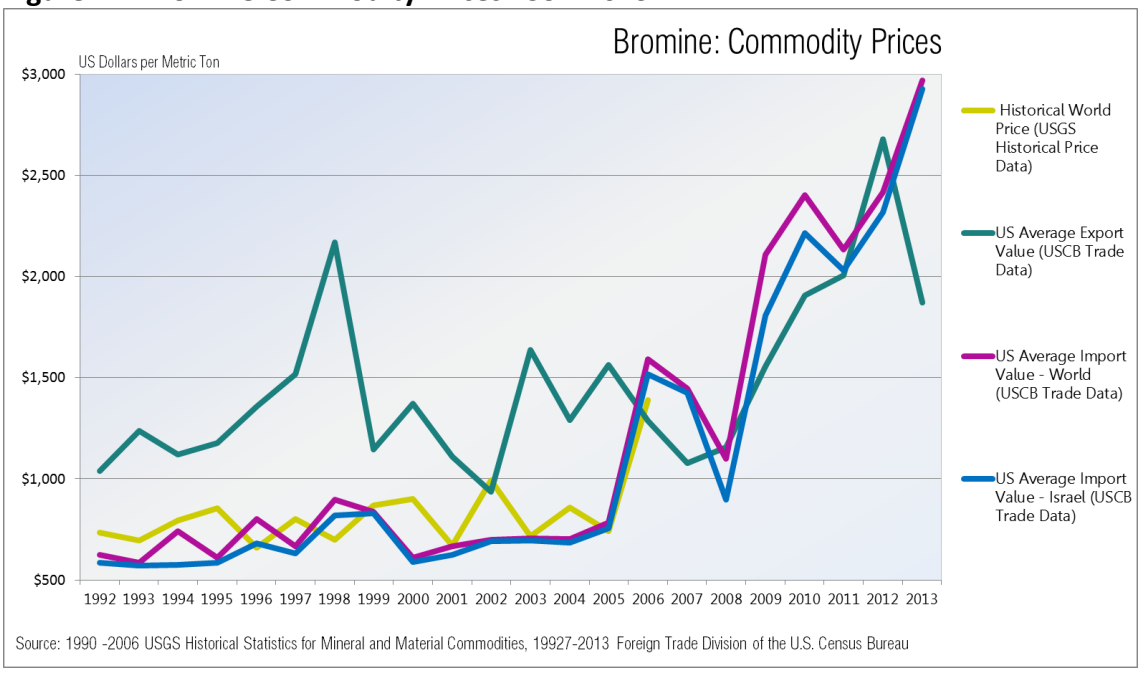
Bromine

Bromine is used in a variety of products including electronics, oil drilling, pharmaceuticals, rubber, steel, and water treatment. Its production depends on its concentration, availability of chlorine used as a raw material in bromine production, production technologies and safe transportation of bromine or its compounds.

Israel and Jordan are the largest verified producers of Bromine. US production levels cannot be verified due to the suppression of this data by USGS (US Geological Services). Prior to the suppression of this data the U.S. was the largest producer. U.S. figures for production capacity continue to be published but not actual production. It is possible that the U.S. continues to be one of, if not the largest producer of Bromine.

The sudden rise in bromine pricing seen since 2007 corresponds with the suppression of U.S. production data complicating the interpretation of the pricing trend seen following 2006. Two possible explanations for the dramatic increase in prices following 2006 are a steady decline in US production amid stable demand, or alternatively increasing demand amid relatively stable overall production levels (Figures 11 and 12).

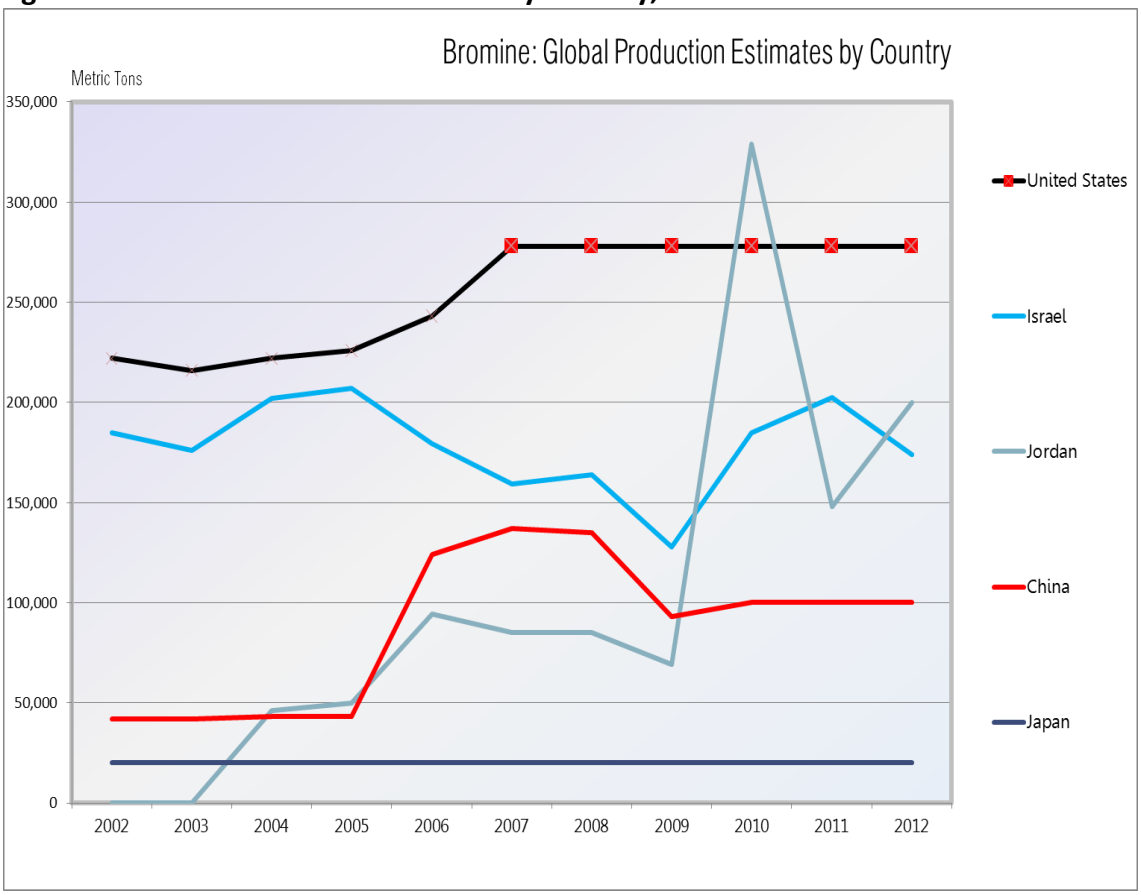
Figure 11: Bromine Commodity Prices 1992-2013



Notes:

1) USGS pricing data following 2006 is not published by USGS. USGS withholds some pricing figures; these are "Withheld to avoid disclosing company proprietary data".
2) For 1990–2006, the purified bulk bromine price published in USGS Historical Statistics for Mineral and Material Commodities is used. For 1992 - 2013 the US export/import value of Elemental bromine sold as such to non-producers is used. This value is calculated based on export/import data from U.S. Census Bureau Foreign trade division data.

Figure 12: Bromine Global Production by Country, 2002-2012



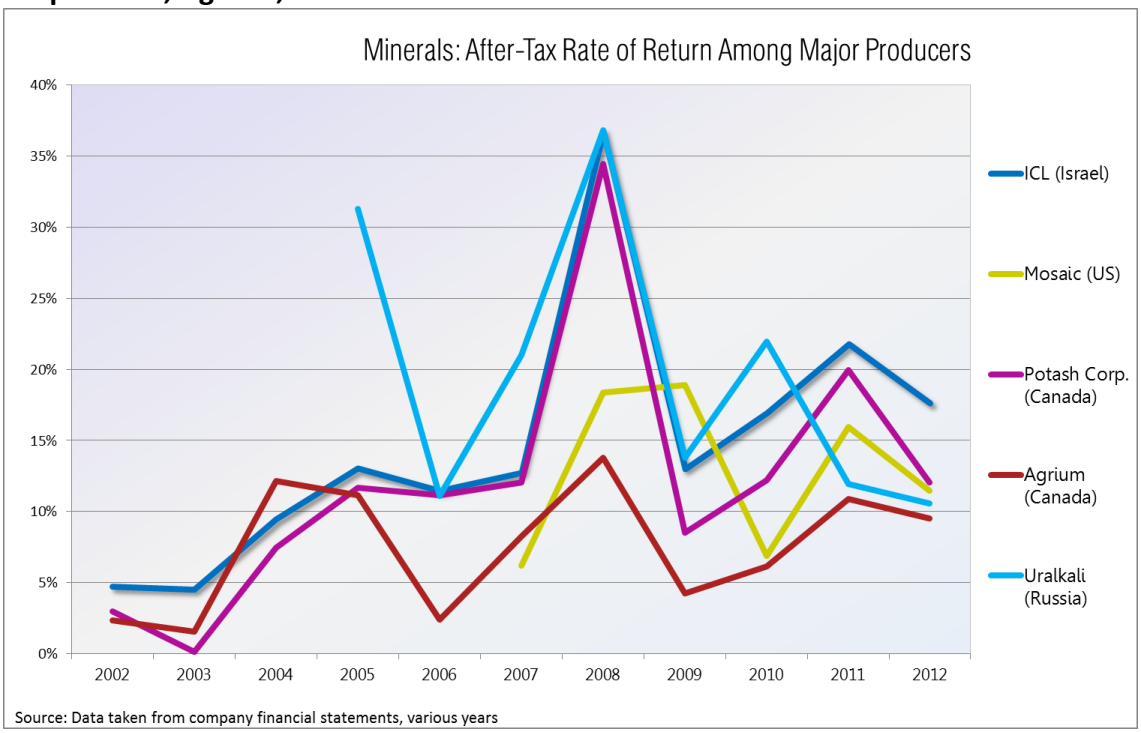
Notes: US estimates following 2006 are capacity not production. USGS withholds some US production figures, these are "Withheld to avoid disclosing company proprietary data".

Rate of Return to Capital

ICL has earned a relatively robust rate of return to capital on its global operations in the 2005-12 years (Figure 13). Although product mixes differ, potash is a dominant share of profits earned by ICL and other potash producers. Except for 2011-12, ICL's rate of return on capital was higher than the comparable producers.

For Saskatchewan Potash Corporation and Agrium, we also provide the share of corporate income and mining tax paid as a percentage of pre-tax earnings as a comparison to ICL for the years 2008-2012 in Figure 14 based on financial statements. The average rate of tax was generally higher for both Agrium and Saskatchewan Potash for all years except 2009.

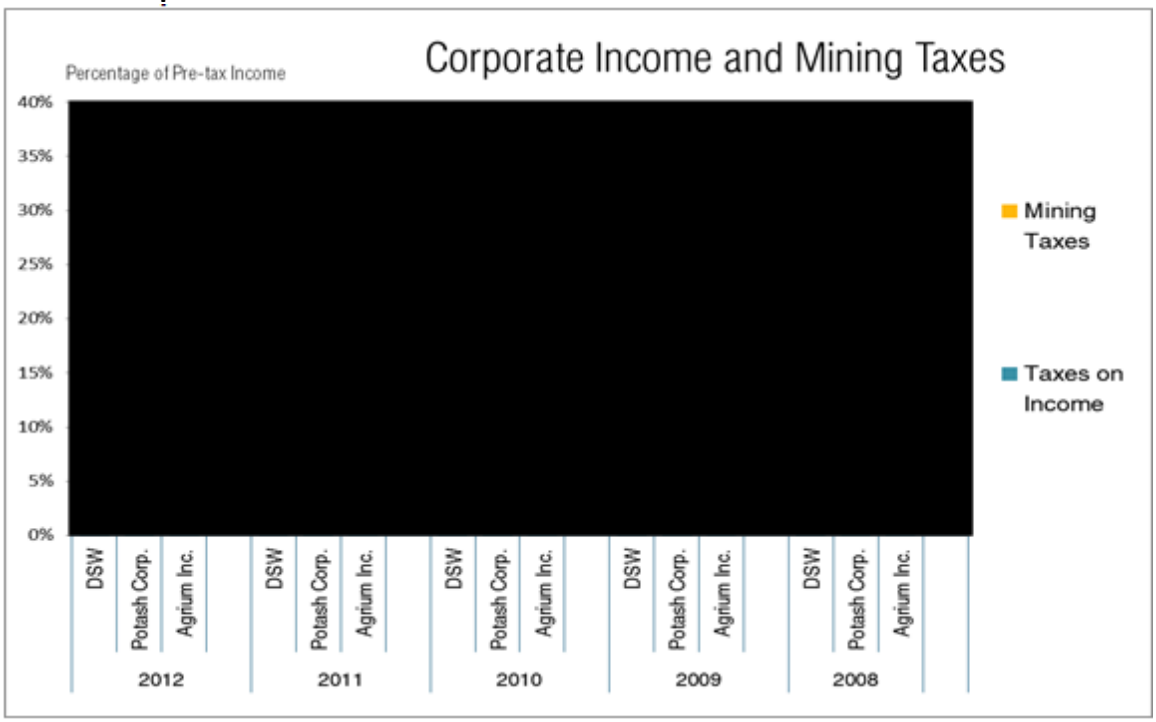
Figure 13: After-tax Rates of Return on Capital for ICL, Mosaic, Saskatchewan Potash Corporation, Agrium, and Uralkali Various Years



Source: Data taken from company financial statements, various years

Note: After-tax rates of return on capital are estimated as income before the deduction of interest divided by total assets.

Figure 14: Corporate and Mining Taxes as Percentage of Pre-tax Income for Selected Potash Companies



Statutory Tax/Mining tax Regimes: A Cross-border Comparative Review

Although Israel produces magnesium, sodium chlorides and bromines as discussed above, this section focuses on the statutory tax regime of major potash and phosphate-producing countries, given their importance in overall production in Israel. The five main potash-mining countries are Belarus, Canada, China, Russia and Germany; and the three main phosphate-producing countries are Jordan, Morocco, and the United States. We also include Ethiopia, Spain and the United Kingdom. Table 3 summarizes the statutory tax/mining tax provisions in these countries in comparison with those in Israel.

As Table 3 shows, in all major potash-producing countries, miners face both general company income taxes and specific mining taxes; and the specific mining taxes are deductible for income tax purposes. Some countries such as Belarus, Morocco and Russia also impose general taxes that are asset-based and hence apply to mining or non-mining like other sectors.

The tax burden of a given company income tax regime is determined by both the statutory company income tax rate and the availability of tax allowances, including allowances for exploration, development and depreciable capital expenditures, and inventory accounting regulations. For example, as measured by the statutory company income tax rate, the U.S. stands out as having the highest company income tax rate. But the U.S. also provides one of the more generous tax allowances (see below).

It is noteworthy that a main feature of a company income tax regime targeting the mining industry is how it treats the exploration expenditures incurred by the miners, since such upfront expenditures can be substantial and may generate externalities that benefit the whole mining industry and even the overall economy.[17] As shown in table 3 below, among the twelve potash-mining countries including Israel, only Canada and the UK allow full expensing of the exploration expenditures and the U.S. allows a 70-percent write-off upfront with the remaining 30 percent being amortized within five years. The remaining nine countries do not, for income tax purposes, differentiate exploration expenditures from general capital expenditures on depreciable assets. Therefore, the tax generosity in these countries towards exploration expenditures is determined by the generosity of their depreciation allowances. For example, Russia provides a 30-percent initial allowance for any depreciable assets with a useful life up to 20 years and largely allows the taxpayers to determine the useful life of their capital investment in conformity with the government guidelines.[18] Similar generous allowance appears to be in Ethiopia where all capital expenditure and pre-production costs can be written off over a prescribed useful life of four consecutive years on a straight-line basis.

[17] For an in-depth discussion of this issue, refer to Mintz and Chen, "Capturing the economic rents from resources through royalties and taxes," *SPP Research Papers*, 5(30), October 2012.

[18] In the meantime, it is also noteworthy that, compared to most other mining products, potash mining is relatively less exploration-intensive once the resource location has been firmly identified.

As for the mining tax regimes, among the twelve potash and phosphate-producing countries, Canada (Saskatchewan) has overly-complex mining taxes that contain multiple levies; Israel, along with Ethiopia, Germany, Jordan, Russia, the U.S., and China (with its newly introduced pilot mining tax regime for potash)[19] follow a conventional ad valorem royalty setting that is largely based on gross mining revenue, net of transportation and distribution cost; and Belarus, Jordan (with its additional annual mining fees), Morocco and China (with its unreformed mining tax regime) still collect a fixed amount of mining levy that is either unit-based, or by type of mining activity combined with or without other criteria (such as area of land used). On the other hand, in lieu of mining royalty, Belarus collects a unit-based export duty and Spain collects an ad valorem fee on qualifying capital expenditures. The UK does not have any mining-specific levy. All countries allow their royalties or mining taxes targeting potash, phosphate and other industrial minerals to be deducted for income tax purposes.

Below are more detailed reviews of the mining tax system by country.

In **Belarus**, the mining tax is levied as a specific tax, or per-unit tax, that varies by mining product. For potassium, the mining tax is BYR972 ($0.11) per tonne.[20] Belarus also collects an export duty on potash fertilizers, varying by the country of destination. This export duty was suspended from 1 September 2013 to 31 December 2013[21] and reintroduced in 2014 at €60 per ton,[22] which, based on a 5-year average price of $468/tonne for potassium, can be converted roughly as a revenue-based mining tax of 11 percent.[23]

The most complex system appears to be in **Saskatchewan (Canadian)**, where potash miners face multi-layered mining levies, although the true burden of these levies is not as staggering. The provincial potash fiscal regime effectively includes a production-based Crown royalty, two virtual revenue-based levies and two profit-based levies. These multiple levies are tangled with each other through crediting or deductions such that the ultimate mining tax burden does not justify the complexity.[24]

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[19] China introduced an ad valorem royalty for potash mining, which is implemented only in Hubei Province as a pilot project. The rest of its potash industry is still paying a fixed royalty of 15-yuan per metric tonne.
[20] Refer to the Tax Code of the Republic of Belarus, Chapter 20 and Application 10 at http://www.wipo.int/wipolex/en/text.jsp?file_id=230139 (in Russian only)
[21] Refer to Reuters, http://www.reuters.com/article/2013/09/05/belarus-potash-lukashenko-idUSL6N0H135R20130905
[22] Refer to Belarusian Telegraph Agency, http://news.belta.by/en/news/econom?id=735116.
[23] This calculation is based on the following assumptions: an exchange rate of $1 = €0.73, according to The Economist (Feb 1st 2014) and a 0.61 ratio of KCl (potash fertilizer) to K_2O (potassium), based on http://www.potashcorp.com/glossary/ That is, €60/($468 x 0.73) x 0.61 = 10.7%.
[24] Refer to Chen and Mintz, "Fixing Saskatchewan's Potash Royalty Mess: A New Approach for Simplicity and Efficiency," SPP Research Paper, 6(7), School of Public Policy, University of Calgary, February 2013.

The **Chinese** mining fiscal regime, like that in Belarus, is in a primitive stage of development. The general mining tax for potash production is largely a fixed amount based on production volume representing roughly 15-yuan ($2.5) per metric tonne. However, in January 2013, a new revenue-based ad valorem mining tax (10 percent) was introduced as a pilot tax regime for potash mining; it has been implemented in Hubei Province, a major potash-producing province in China.[25]

In **Ethiopia**, the ad valorem royalty varies by mining product. For the holders of large-scale mining licenses, the royalty is 4 percent for all industrial minerals, based on the sales price. The state laws fix the royalty rates for the artisanal and small-scale miners.

In **Germany**, the federal mining act contains detailed rules on royalties for the extraction of mineral resources, setting them at a standard rate of 10 percent of the market value. This standard mining tax rate "can be reduced or raised by Ordinance if so required in order to achieve any of the following aims as set out in the Act: preventing an overall economic imbalance, preventing the risk of a distortion of competition among the companies engaged in exploration and exploitation, assuring adequate supply of the market in raw materials, improving the exploitation of deposits or protecting other interests of the national economy."[26] This principle determined that the German Federal Mining Act (Bundesberggesets, BBergG) runs since 1st January 1982 on an on-going basis: a new rule regarding a specific mining product may be issued when the government deems it to be necessary.[27]

In **Jordan**, an ad valorem royalty based on sales is set at JD 1.42 per tonne for phosphates but capped at 5 percent of net profit, and JD 125 per tonne for potash but capped at 25 percent of net profit. A variety of fees for initial application and annual renewal are levied based on per square kilometer of land used for mining-associated activities including exploration permits, prospecting licenses, certificates of discovery and mining rights. For example, the application fee for the prospecting license is JD 200 (US$280) per square kilometre (pskm), and the subsequent annual renewal fee is JD 300/pskm. As for mining rights, the annual fee is JD 500/sqkm for a maximum period of 30 years; and an additional fee of JD4/sqkm for leasing the land comprising the mining site also applies. There are also other fees that are relative to the type of mineral production. [28]

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[25] Refer to China Chemical Industry News, Sept 10, 2013, http://www.ccin.com.cn/ccin/news/2013/09/11/274974.shtml (this news report is in Chinese only)

[26] Refer to http://www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/germany/mining.pdf.

[27] The official site of such an "on-going" Federal Mining Act is http://faolex.fao.org/cgi-bin/faolex.exe?rec_id=059848&database=faolex&search_type=link&table=result&lang=eng&format_name=@ERALL (in German).

[28] Refer to Norton Rose Fulbright (a global legal practice) at www.nortonrosefulbright.com/knowledge/publications/100673/mining-in-jordan-10-things-to-know#section8

Similarly, the **Moroccan** government also collects fees for application and annual renewal of mining activities. However such fees are not based on the area of land being used for mining activities. For example, the application fee for an exploration permit is MAD 2,000 (U$240) with a renewal fee of MAD 4,000; for a mining permit or its annual renewal, the fee is MAD 7,200; and for a mining concession, the application fee is MAD 20,000, with a renewal fee of MAD 6,000. In addition, a royalty based on turnover is also levied on the permit holders.[29]

Russia collects mining royalty under its mineral resource recovery tax. The tax base is the sales value net of VAT (and customs duties if applicable) and transportation and delivery costs. The tax rate varies by type of mining product; it is 4 percent for Apatite-nipheline, apatite and phosphorite ores.[30]

In **Spain**, no Government or State royalties are payable for potash production. In lieu of an ongoing royalty regime, potash miners must pay a fee that equates to 6% of the total costs of "fixtures" as part of the upfront capital expenditure. [31]

There is no mining royalty in the **United Kingdom**.

New Mexico, the largest potash producing state in the **U.S.**, collects two parallel levies related to potash mining. One is the state severance tax: the tax rate is 2.5 percent and the tax base is 50 percent of a third of the sales value net of royalty paid. The other is the state resource excise tax: the aggregated tax rate is 0.625 percent including a 0.5-percent resource tax and a 0.125-percent processors tax, based on the commercial (i.e., net of any transaction with the government organizations such as sales revenue received from the government or royalty paid to the government) sales value.[32]
There are also royalties based on the sales value of potash and payable to the government as a property owner. The federal royalty appeared to be 1% and the state royalty rate is 2 percent for sylvinite and 5 percent for langbeinite.[33]

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[29] Refer to Norton Rose Fulbright (a global legal practice) at http://www.nortonrosefulbright.com/knowledge/publications/99327/mining-in-morocco-ten-things-to-know#section7. We have not been able to identify royalty rates.
[30] Refer to the Tax Code of Russia Federation, Chapter 26: The Mineral Resource Recovery Tax, http://www.russian-tax-code.com/PartII/Section8/Chapter26.html
[31] Refer to http://www.highfieldresources.com.au/pdfs/ReportCanaccordGenuity13Feb14.pdf, page 4. Similar references may be found at http://www.highfieldresources.com.
[32] Refer to the website of New Mexico's Taxation and Revenue Department: http://www.tax.newmexico.gov/All-Taxes/Pages/Severance-Tax.aspx
[33] This is according to a dated news report at http://www.bizjournals.com/albuquerque/stories/2004/12/06/daily12.html?page=all.

Table 3: Fiscal Regimes for Non-Oil and Gas Minerals: A Cross-country Overview (2013)

	Israel	Belarus	Canada/ Sask.	China	Ethiopia	Germany	Jordan	Morocco	Russia	Spain	United Kingdom	New Mexico (U.S.)
Corporate Income tax	26.5 percent (2014)	19.8 percent (incl. an 18% CIT and a 10% surtax as a contribution to an "innovation fund."	32 percent	25 percent	35 percent for mining (vs. the standard CIT rate of 30 percent).	30.2 percent incl. federal and sub-national rates	14% for mining industry.	30 percent	20 percent	30 percent	22 percent	37 percent (incl. the 31.85% federal CIT and the 7.6% state CIT)
Exploration expenditures	Successful exploration amortized and unsuccessful exploration is expensed.	No special provision but follows the financial accounting, which is most likely an amortization over the estimated life span.	Expensed	No special provision but treated as depreciable assets.	25% SL for pre - production exploration expenditures, expensed otherwise.	No special provision but treated as depreciable assets.	No special provision but treated as depreciable assets.	No special provision but treated as depreciable assets.	Assumed to provide a 30% initial allowance with the 70% amortized within the length of useful life.	Generally amortized at an annual rate of 10%.	Expensed ("relieved")	Election between: 70% deductible with 30% amortized within 5 years and a 10-year amortization.
Development Expenditures	Capitalized and amortized according to the useful life.	No special provision but follows the financial accounting (see above)	30% annual allowance on declining balance	No special provision but treated as depreciable assets.	25% SL	No special provision but treated as depreciable assets.	No special provision but treated as depreciable assets.	No special provision but treated as depreciable assets.	Assumed to provide a 30% initial allowance with the 70% amortized within the length of useful life.	Generally amortized at an annual rate of 10%.	Expensed ("relieved")	Same as for exploration expenditure
Depreciation: [SL-straight line DB-declining balance]	Buildings and structures: 1.5%~6.5%SL; M&E: 6-20%SL (M&E for mining: 7%-20%SL); Automobiles:	Tax depreciation premium (TDP): 10% for buildings and structures and up to	25% DB annual allowance for majority of depreciable mining assets.	Buildings: 5% SL M&E: 10% SL Automobiles: 25%SL Electronic equipment: 33.3%SL	5% SL for buildings, and 25% SL for fixed assets of mining companies.	Buildings: 3%SL M&E: 6~12.5%SL Automobiles: 16.6%SL PC and related	Industrial buildings: 4%SL, M&E: 10~20%SL, Automobiles: 15%SL, Computer equipment: 25%SL	Industrial buildings: 5%SL, M&E: 10~15%SL, Automobiles: 20~25%SL.	Initial allowance of 10% (for long-life assets) and 30% (for assets with a useful life of 3-20 years);	Industrial buildings: 3%SL; M&E: 10%; Motor vehicles: 16%; and Intangible	8% for long-life assets; 18% for M&E; no allowance for commercial	The MACRS categorizes depreciable assets by their useful lives: Buildings: 39-yr,

	15~25%SL; Computers: 25%. Accelerated depreciation allowance available for multi-shift use of assets.	20% for other assets; such TDP reduces the base for the annual depreciation allowance, which follows financial accounting practice.				equipment: 33.3%SL			officially specified useful life ranges from 2 to 30+ years, both SL and DB methods are allowed.	assets: 10%.	buildings.	M&E: 7- or 12-yr, Motor vehicles and computer equipment: 5- or 12-yr.
Inventory accounting	Actual, average or FIFO; LIFO is not allowed.	Both FIFO and weighted-average-cost accounting are allowed.	FIFO	FIFO or weighted-average; LIFO is not allowed.	Assuming all conventional methods incl. FIFO and LIFO are allowed.	LIFO is allowed but not FIFO.	FIFO	Weighted-average or FIFO	Both FIFO and LIFO are allowed.	All evaluation methods are allowed.	FIFO	Optional
Mining Tax:	For potash chloride, a two-tier revenue-based royalty applies: 5% for sales up to 1.5M* tons, and up to 10% for sales in excess of 1.5M* tons; and the royalty base is the unpacked ex-work value excluding "the proper expenses of packaging, sales fee and insurance and transportation" and a further 10% deduction.	A mining tax levied as a per-unit fixed amount, which is BYR972 (or $0.11); there is also an export duty for potash at about 80 euro per tonne, which was suspended for 2013. (The 2014 status?)	Crown royalty (CR): 2.1%~4.5% on production value; Production tax: Base payment (BP): 35% of profit with a tight band of limits between $11 and $12.33 per tonne; Profit tax (PT): 15% under an indexed	State mining royalty: 15-yuan/T, or 10% on revenue; deductible for CIT purpose.	Ad valorem royalty based on the scale price of the minerals sold. The royalty rate varies by mining product; it is 4% for industrial minerals and salt.	A general mining tax of 10%, which is based on the sales value. But this general rate is varied significantly by mining product and can be adjusted from time to time. [The royalty rate for potash is assumed to be the general 10% until further information becomes available.]	Ad valorem royalty based on sales is JD1.42 per tonne for phosphates, max 5% of net profit, and JD125 per tonne for potash, max 25% of net profit. There are also a variety of annual mining fees largely based on per square kilometer of land for mining such as fees for exploration permits, prospecting licenses (JD200~300/sqkm), certificates of discovery and mining rights	No ad valorem royalty but fees for applying for and renewing permits for mining-related activities (e.g., the annual fee for a mining permit: MAD 7,200, and applying for a mining concession: MAD 20,000 with annual renewal fee of MAD 6,000, note	Mineral Resources Extraction Tax is based on the sales value net of VAT (and customs duties) and transportation and delivery costs, or cost of production; the tax rate is 4% for Apatite-nipheline, apatite and phosphorite oresis.	No royalties are payable for potash production in Spain. In lieu of an ongoing royalty regime, potash miners must pay a fee that equates to 6% of the total costs of 'fixtures' as part of the upfront capital expenditure	NA	There are two parallel state levies on potash mining: (1) the state severance tax for potash is 2.5% on taxable value, which is 50% of the 1/3 of the sales value net of royalty paid (see below); and (2) the state resource excise tax: 0.625% including a 0.5%

	For bromine and magnesium: the 5% royalty rate and the same calculation of royalty base as that for potash products apply including the 10 percent allowance. Phosphates are subject to a 2 percent royalty on market prices (the royalty is reduced for certain deductions).		profit cap, beyond which 35% applies. Under this profit tax, a 120% capital allowance is provided for investment exceeding 90% of a company's investment level in 2002, otherwise, a 35% allowance applies.				(JD500/sqkm) and the type of mineral production.	that MAD 1 = U$0.12).				resource tax and a 0.125% processors tax. There appear to be royalties on potash payable to property owners: the federal royalty is 1% and the state 2% - 5% by type of potash product. Both royalties are based on the sales value.
Other taxes (excluding property taxes)		There are numerous other levies along with conditional exemptions.	Provincial sales tax on capital inputs with partial exemption.	N/A				Transfer tax on share capital: 1%, and a business license tax based on the gross rental value of the business premises: 10%~30% depending on the type of business.	Asset tax up to 2.2 percent, on fixed assets only.	There are several asset- and revenue-based taxes such as the general capital duty and local taxes on economic activities, which may be largely exempted for mining.		

* This production volume for the period of 2010-2011 was 3M tons, beyond which the 10-percent royalty applied.

Sources:

(1) Israel: Based on information provided by the Israeli Ministry of Finance.
(2) Belarus: Ernst & Young, Worldwide corporate tax guide 2013, and the Tax Code of the Republic of Belarus, Chapter 20 and the Application 10 (http://www.wipo.int/wipolex/en/text.jsp?file_id=230139)
(3) Canada: Chen and Mintz (2013).
(4) China: various websites in Chinese including: www.ccin.com.cn/ccin/news/2013/09/11/274974.shtml
(5) Ethiopia: for mining income tax: http://chilot.files.wordpress.com/2011/09/mining-taxproclamation-no-53-of-1993.pdf, for mining royalty: http://www.mom.gov.et/upload/MineralProclamation.pdf and additional official reference: www.mom.gov.et.
(6) Germany: a collection of Federal Mining Act at http://faolex.fao.org/cgi-bin/faolex.exe?rec_id=059848&database=faolex&search_type=link&table=result&lang=eng&format_name=@ERALL
(7) Jordan: http://www.nortonrosefulbright.com/knowledge/publications/100673/mining-in-jordan-10-things-to-know#section8
(8) Morocco: http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-moroccohighlights-2013.pdf for general business taxation, International Comparative Legal Guide: http://www.iclg.co.uk/practice-areas/mining-law/mining-law-2014/morocco, which categorizes the mining levies, and http://www.nortonrosefulbright.com/knowledge/publications/99327/mining-in-morocco-ten-things-to-know#section7 which provides specific amount of each mining levy.
(9) Russia: http://www.russian-tax-code.com/PartII/Section8/Chapter25.html for Tax Codes of the Russian Federation" (Chapter 25), http://www.russian-tax-code.com/PartII/Section8/Chapter26.html for "The Mineral Resource recovery Tax," and "http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-russiahighlights-2013.pdf for general company taxation.
(10) Spain: Law 22/1973, of 21st of July, on Mining (amended by Law 54/1980, 5th Nov, RL-D 1303/1986, 28th June, Law 50/1985, 27th Dec, Law 12/2007, 2nd July, Law 25/2009, 22nd Dec, and Law 40/2010, 29th Dec), available in Spanish: http://noticias.juridicas.com/base_datos/Admin/l22-1973.html. Additional references: http://www.iclg.co.uk/practice-areas/mining-law/mining-law-2014/spain and http://www.highfieldresources.com.au/pdfs/ReportCanaccordGenuity13Feb14.pdf, page 4.
(11) The United Kingdom: http://www.hmrc.gov.uk/manuals/bimmanual/ and http://www.hmrc.gov.uk/manuals/camanual/
(12) The U.S./New Mexico: U.S. Master Tax Guide 2013, page 344-45, for "mining company's expenses," http://www.tax.newmexico.gov/SiteCollectionDocuments/rpd-41214.pdf for New Mexico's state severance tax on potash, the website for New Mexico Taxation and Revenue Department http://www.tax.newmexico.gov/All-Taxes/Pages/Resources-Excise-Tax.aspx for corporate income tax and resource excise tax in N.M., and http://www.bizjournals.com/albuquerque/stories/2004/12/06/daily12.html?page=all for federal and state royalty on potash.

Evaluation of the Existing Israeli Fiscal Regime System

In this section, we evaluate the Israeli fiscal system as it applies to potash, phosphate and other industrial mineral investments. The analysis will be focused on distortions present in the current regime and the competitiveness of tax regimes across nations. Our analysis is based on a "time to build" model in which a mining company incurs exploration and development expenditure to prepare mineral reserves available for extraction[34]. After the reserves are ready, the mining company extracts minerals for processing and transportation to markets.

Conceptually, a business invests in capital until the rate of return on incremental dollars is equal to the cost of capital (at this point no further rents are earned). To measure the effect of taxes and mining taxes on investment decisions, the marginal effective tax rate (METR) is calculated as the amount of taxes paid as a percentage of the pre-tax net-of-risk return on capital that would be required to cover taxes and the financing of capital with debt and equity. Risk is incorporated into the analysis by measuring the risk-adjusted rate of return on capital. To the extent that the tax system for the full deduction of losses, the government provides an implicit deduction for the cost of risk.[35] This point is further discussed below.

In the analysis, we focus on METRs to determine how investment decisions are affected by tax systems. With marginal analysis, there is no need to specify project revenues and costs since companies will invest in capital until the rate of return on capital is equal to the cost of capital. What is required is to measure the cost of capital with adjustments for fiscal levies. The advantage of this approach is that the variation in METRs across assets and industries provide a basis for analyzing capital distortions in a fiscal system. The higher the METR, the lower is investment as the tax-adjusted cost of capital is pushed higher, squeezing out marginal projects. Similarly, if one type of asset is favoured over others, companies will have an incentive to shift expenditures from one stage of production to another, therefore influencing the technical choices made by firms in the development of extractive projects. For example, fiscal systems typically provide incentives for exploration and development – it is not inconceivable that firms will push expenditure into the exploration or development phase that would have taken place post-production.

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[34] The theoretical details of the model can be obtained from J. Mintz and D. Chen, "Capturing Economic Rents through Taxes and Royalties," *SPP Research Paper* 5(30), School of Public Policy, University of Calgary, 2012.

[35] This proposition is well known in the literature, which implies that the risk premium from capital asset pricing models is reduced by the factor one minus the tax rate. See Roger Gordon and John D. Wilson, "Measuring the Efficiency Cost of Taxing Risky Capital Income," *American Economic Review*, 79(3), 1989, 427-39 and J. Mintz, "The Corporate Income Tax: A Survey," *Fiscal Studies*, 16(4), 23-68, 1996.

The METR does not provide an estimate of the overall taxes governments collect since those amounts depend on both the marginal and infra-marginal returns (rents) earned on an investment. It is not unusual, for example, for the METR to be low and even negative even though the government could be collecting revenues. The implication is that any tax loss on the marginal investment is being used to reduce the tax payment on rents earned on infra-marginal investments, or being carried forward to shelter income from taxes in the future. Instead, the METR is a benchmark with which to determine the effects of taxes on investment decisions.

The METR for resource companies is calculated for each type of asset expenditure: exploration, development, depreciable capital, land, and inventories. The analysis is based on a calculation of the present value of income earned from projects that yield an annualized rate of return on capital. The gross-of-tax rate of return on capital is equal to the inflation-adjusted cost of financing capital (taking into account interest deductibility), adjusted for taxes. The net-of-tax rate of return on capital is equal to the weighted average of the interest rate for debt and the imputed cost of equity finance provided by savers to fund the investment. The METR on capital is equal to the tax paid divided by the gross-of-tax rate of return on capital. The analysis includes federal and provincial/state corporate income, capital, and sales taxes, as well as sub-national resource levies. Various features of taxes are modelled including inventory valuation, capital cost allowances, statutory tax rates, and the investment tax credit.

For example, if a business invests in capital at the margin that yields a pre-tax net-of-risk rate of return equal to 15% and, after taxes, a net-of-risk rate of return equal to 10%, then the METR is 15% minus 10% divided by 15%, giving a result of 33%.[36]

There have been other studies[37] that focus on average cash flows earned by the industry, which requires a specification of revenues and costs that are representative of the industry, even though in reality these values vary widely by project. Specific companies in planning their investments would reasonably use their own revenues and costs based on the geological and other factors that impact on their cash flows. Average effective tax rates are calculated as a share of the internal rate of return earned on mining projects, which are typically above the cost of capital used for marginal analysis.

However, the average effective tax rate is quite sensitive to the internal rate of return. For example, with a high internal rate of return, a fiscal regime with a high statutory rate and accelerated cost deductions and tax credits would have an average effective tax

[36] To be clear, we are not assuming 10% is the after-tax rate of return (net of risk) for a project in our analysis. The after tax rates of return are based on a modeling of capital market equilibrium for observable interest rates.

[37] Smith provides a detailed survey on various models used to analyze fiscal impact on investments in extractive industries. See James Smith (2012), "Issues in Extractive Resource Taxation: A Review of Research Methods and Models," IMF Working Paper WP/12/287, Washington: International Monetary Fund.

rate that would be greater than the case of a regime with low rates and broad bases. Conversely, with a low internal rate of return, the opposite would hold. Thus, in comparison with the marginal analysis (that focuses on low internal rates of return equal to the observed cost of capital earned at the margin), the average effective tax rate analysis could lead to a conclusion that a high rate narrow base regime is less competitive than a low rate broad-base regime, assuming a high internal rate of return on a projects.

In the rest of this section, we first construct a cross-asset and cross-industry METR comparison within Israel to assess the efficiency of Israel's business tax regime. Following this domestic METR analysis, we compare Israeli's METR for potash mining with its counterparts in other major potash mining countries to evaluate Israeli's tax competitiveness for potash mining. Based on this two-step METR analysis, we provide options for introducing a rent-based tax on potash mining in Israel.

Efficiency of Business Level Taxation and the Allocation of Capital in Israel

Table 4 provides an evaluation of the existing tax impact on potash and other relevant non-oil and gas minerals in Israel, compared with other non-resource industries, as measured by the marginal effective tax rate (METR). We aggregate the royalty rates for potash, phosphates, magnesium and bromines based on revenue shares. (See Table 5 for the METR by product.)

Several observations can be drawn from Table 4.

Table 4 Marginal Effective Tax Rate on Capital Investment in Israel, 2014

Mining Aggregate	Utility	Constr.	Manuf.	Wholesale Trade		Retail Trade	Transp.	Comm.	Other Services	Aggregate
Depreciable	17.7	4.2	16.0	17.0	16.2	20.4	6.1	15.8	16.5	16.2
Land	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
Inventory	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
Non-E&D Aggregate	17.9	7.8	16.7	16.8	16.9	18.4	7.0	15.6	15.7	15.7
Exploration	11.2	NA	NA	NA	NA	NA	NA	NA	NA	11.2
Development	11.7	NA	NA	NA	NA	NA	NA	NA	NA	11.7
Aggregate	**15.0**	**7.8**	**16.7**	**16.8**	**16.9**	**18.4**	**7.0**	**15.6**	**15.7**	15.7

Source: Authors' estimate. Refer to Table 1 for statutory tax and mining tax provisions and Appendix C for non-tax data description.

First, the combination of company income taxes and mining royalties impose asset distortions on mineral production. For mining, the aggregate METR is 15.0 percent in aggregate but varies significantly by asset type from 10.8 percent for land to 18.3 percent for inventory. On average, inventories are the highest taxed assets and land the least; and the METR on depreciable assets varies significantly depending on how the tax depreciation allowance for a given class of assets deviates from the related economic depreciation rate (see below).

There are two main factors behind this METR dispersion among different types of assets. The low effective tax on exploration and development is driven by expenditures undertaken before income is produced. Although Israel allows exploration and development expenditures to be written off over time, some expenditure is written off before income is realized from extraction of reserves (at the current reserves are known). The other is the cost deduction for depreciation, which can diverge from the economic depreciation rate. For a given income tax rate across all classes of depreciable assets, the METR is higher for a given class of depreciable assets if the associated tax depreciation allowance is below its economic depreciation rate, and vice versa.

The other factor behind the inter-asset METR dispersion is inflation. More specifically, a positive inflation rate increases the discount rate, which in turn reduces the present value of accumulated tax depreciation allowances over the useful life of depreciable assets and hence increases the METR on depreciable assets. Given inventories are written off at historical cost (with first-in-first-out accounting), the tax deduction is also less than replacement cost. On the other hand, the same inflation rate reduces the METR since nominal interest costs are deducted from taxable income – this provides a benefit to firms since part of the nominal interest is compensation to lenders for the loss in the purchasing power of the debt's principal due to inflation. Land thus has the lowest METR due to the deductibility of nominal interest costs. Inventories have the highest METR due to unrecognized costs associated with replacing inventory.

Second, differential effective tax rates cause a distortion in the allocation of capital across industries. The overall METRs for mining – 15 percent – appear to be in line with the weighted average METR across all industries, which is 15.7 percent. The public utilities sector and the transportation industry appear to be outliers with their METRs below 8 percent. As mentioned above, the METR variation for depreciable assets is mainly caused by the tax depreciation allowances that deviate from the related economic depreciation rates, to different degrees, for different classes of depreciable assets. For example, for the public utilities sector and transportation industry in Israel, the current tax depreciation allowances for its major capital assets (e.g., 10 percent for gas pipelines and up to 20 percent for motor vehicles) are much more generous than those indicated by the associated economic depreciation rates, which is the main contributor for the rather low METRs for these two industries.

The Cross-Country METR Comparison for Mining

Table 5 presents the METR for the mining industry comparing Israel and the other eleven countries with similar minerals. To segregate the METR impact of mining levies and that of the income and other taxes, we provide two sets of METRs In the table: one with mining levies only and the other with both mining levies and general taxes applicable to all industries such as corporate income taxes, assets-based taxes (Russia)

and the retail sales tax on capital purchases (Canada and the U.S.). Also note that we exclude special incentives such as the accelerated capital allowance or the reduced profit tax rate under Saskatchewan's potash profit tax since these incentives are conditional on the investment size or production volume. When such incentives are included, the METR for Saskatchewan's potash investment can be well below zero (i.e., being subsidized at the margin) as shown below.

Note that the mining levies in Morocco are mostly annual fees for concessions and mining permits that vary by type of mining activities. There is no quantitative linkage between these levies and revenues or other financial data that would enable a conversion from such mining levies to an equivalent ad valorem rate on sales (in principle more production should require more land although marginal production levels could vary for a fixed level of land). Therefore, we treat the marginal mining levy in Morocco as equal to zero since marginal production can vary without acquiring more leases.

By looking at the first set of METRs that cover only mining levies, Israel's METR associated with the 5-percent royalty (2.8 percent) is well below the average value among all countries. If the 10 percent rate prevailed, Israel's effective tax rate on marginal production would be slightly above the average of the twelve countries, but similar to Belarus, China and Germany, and well below that in Canada and Jordan (potash).

Saskatchewan, a Canadian Province and the world largest potash producer, appears to have the highest METR targeting only potash mining, mainly due to its multiple levies targeting potash specifically for investments not qualifying for accelerated cost recovery under the potash tax. On the other end of the spectrum, except for the U.K. where there is no mining tax, the comparable METRs for miners in Ethiopia, Jordan (phosphates), Russia, Spain and the State of New Mexico are much lower, ranging from 2 to 4 percent, because of their relatively low mining levies, which range from 4 to 6 percent. The METRs in these jurisdictions are similar to the lower METR (2.8 percent) associated with the 5-percent royalty rate in Israel.

However, it would not be appropriate to only look at mining levies to understand the overall impact of taxation on the incentive to invest. When both mining and all taxes are considered, the METR in Israel is within the range of 10.4 percent (for phosphates) and 15.6 percent (with the marginal royalty of 10 percent on potash). Both these two METRs for Israel are below the average among all countries, which is 17.7 percent.

Table 5 Marginal Effective Tax Rates, Major Mineral Countries, 2014

	Mining Levies Only	Incl. Mining, CIT and Other taxes	Corresponding product
Israel (with 2-percent royalty)*	0.5	10.4	Phosphate
Israel (with 5-percent royalty)*	2.8	12.8	All other products and low potash production
Israel (with 10-percent royalty)*	5.6	15.6	Potash if over 1.5M tonnes
Israel: Aggregate**	**5.1**	**15.0**	A weighted average across all products
Belarus (excl. fixed-amount royalty)	6.7	13.9	Potash
Canada: Saskatchewan***	14.2	22.6	Potash, phosphate, magnesium
China	6.3	19.5	Potash, phosphate, magnesium
Ethiopia	2.5	9.0	All industrial minerals
Germany	6.3	21.9	Potash, bromine
Jordan	11.0	16.1	Potash
Jordan	2.2	7.4	Phosphate
Russia	2.5	21.6	Potash, phosphate, magnesium
Spain	2.5	25.4	Potash, magnesium
U.K.	0.0	21.2	Potash
U.S.: New Mexico (with 2% royalty)	1.9	17.2	Sylvinite
U.S.: New Mexico (with 5% royalty)	3.8	19.1	Langbeinite
Average across all countries	**5.0**	**17.7**	

* The effective royalty rate used in our METR calculation is 0.8% for phosphate, 4.5% for "all other products and low potash production" and 9% for "potash if over 1.5M tonnes.

** The aggregate is a weighted average across all METRs by product as shown in the first three rows. The weight by product is 4.9% for phosphate, 11.5% for bromine and magnesium, and 83.6% for potash. Also note that we use the METRs corresponding to the 10-percent statutory royalty rate (i.e., 9-percent effectively) for potash as the marginal royalty rate.

*** Note that the METRs for Saskatchewan is -34.2 percent and 0.3 percent respectively when the 120-percent capital allowance under the potash profit tax applies for investments in excess of 90 percent of 2002 investment (refer to Table 3 for details).

The Israel combined METR is also below industrialized countries including Canada (when excluding special tax incentives), Spain, the United Kingdom and the United States. Countries with a higher overall METR compared to that in Israel either have a much higher corporate income tax rate (e.g., 37 percent in the U.S.), a much higher combined

mining levy (e.g., Canada), a less generous tax allowance for depreciable assets (e.g., China, Germany, Spain and the U.K.), or a high tax based on capital assets (e.g., Russia).

In summary, the tax and mining levy cost for Israeli investors, even at the 10 percent tax rate on sales, is both compatible with their domestic counterparts for the non-resource industries and competitive compared with their foreign counterparts in other major mining countries. Therefore, in our opinion, a higher METR in the range of 15.7 to 17.7 percent is an appropriate yardstick, in terms of tax neutrality among sectors and international competitiveness, for introducing a rent-based tax should the government consider doing so.

Optimal Mining Tax Design

Mining tax design is a complex subject since governments around the world extract a share of the "rents" by using various approaches. These approaches take into account various factors including revenues, investments and information especially with regard to production costs.

A common mining levy is a payment either based on a share of gross output or revenues of a non-renewable resource project for the "provision of goods or services below market value." However, the market does not set the price since mining taxes are set by government fiat. Indeed, there is no necessity that governments use mining taxes as commonly understood to collect a "payment" as in the private sector. Governments can, and do, use other mechanisms.

Economic rent arises from non-reproducible (or fixed) factors of production such as entrepreneurship, land and natural resources. It can also arise due to the presence of natural or artificial barriers to entry that generate market power and special advantages that firms may possess (such as location, patents, etc.). More generally, rent is the surplus value of a resource after all costs, including opportunity costs, are subtracted from revenues arising from the sale of goods and services.

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 others until the marginal return on the last unit employed is equal to its economic costs. In economic terms, rents are zero at the margin, negative if too much production takes place and positive if too little rent-earning production is undertaken by the producer. Hence, for marginal decisions – investment or otherwise – the rent earned is zero as returns equal costs in using production factors. A pure rent-base tax will neither discourage nor encourage the investment or production decision since the levy is *neutral* in not affecting investment and technology decisions.

The relationship between the government as owner of the resource and the private producer is similar to a "public-private partnership". The government is the principal

owner and the private company is the agent brought in to maximize the amount of rents that can be generated by the non-renewable resource project. The assessment of mining tax policy is based on several critical factors:

> *Government ownership*: As the owner of the natural resource, the government is entitled to its share of rents accruing to the project. Some of the rents may be associated with entrepreneurship or land and therefore accrue to private producer and landowners with the government receiving the remainder.
>
> *Competitive return for private investors*: As the agent, the private producer and its investors must be provided a risk-adjusted rate of return on capital that is at least as much as what is available elsewhere to have sufficient incentive to invest in the project.
>
> *Efficiency*: The mining tax structure should be devised to maximize rents available to both the public owner and private producer. A rent-based mining tax achieves a maximum amount of rents being earned by the public and private partners since production, investment, exploration and development are sufficiently profitable with and without the mining tax, which is zero for the marginal project.
>
> *Stability*: Mining tax regimes can exacerbate uncertainty if they are not properly designed. When resource prices are high, government may not feel they receive their share of rents, resulting in tax hikes. When prices fall, the government might look at providing new incentives, finding them too rich once the economy recovers. To minimize political risk for private investors, it is appropriate for the government to choose a mining structure that provides both sufficient incentive for investment and revenues for governments without having to change public policy on a continuous basis.

These four principles are simple to consider for mining design and lead to a very specific recommendation: the optimal mining tax is a rent-based one to maximize economic rents.

Nonetheless, there are various other issues that could be considered in designing the optimal mining tax.

The first is that a government might wish to hold back some growth if the social discount rate in determining the benefits accruing to future generations is less than the private discount rate for determining profitability. In this case, a rent-based tax will not be socially efficient since the market undertakes too much production and investment relative to the social optimum. Therefore, some sort of other mechanism might be used to discourage investment including an output or sales-related mining tax, regulation or corporate taxation if a government wishes to have slower development of resources

than that determined by a market. This is very much a political judgment since social discount rates reflect political preferences and are not observable.

Second, non-renewable resource production can impact the quality of air, water and land. Mining taxes could be adjusted to encourage responsible environmental stewardship in the production of resources. On the other hand, other economic instruments are better suited to address environmental issues as they are specifically directed at the problem. For example production-related environmental taxes that impose a cost on emissions, or regulations concerning the reservation of funds for reclamation and decommissioning of the site when the mine is terminated (supported by tax-assisted trust rules).

Third, it is critical to recognize that governments not only collect specific resource levies but corporate income taxes, capital taxes and other capital-related levies. These taxes add to investment costs and reduce the return to capital earned by the investor. In some jurisdictions such as Norway and the United Kingdom, the resource tax is explicitly recognized as part of the corporate income tax and levied as an additional corporate tax on the industry. In most jurisdictions, resource taxes are treated as separate levies from the corporate income tax. Regardless, any analysis should account for this interaction with the corporate income tax. As shown in the theoretical Appendix A, a rent-based mining tax system is not neutral with respect to investment since the government might share revenues, costs and risks with investors but not the corporate tax burden – investments are discouraged as a result when a rent-based mining tax is superimposed on a corporate income tax.

Fourth, a government in contracting with private producers to extract non-renewable resources may not have full information about costs of production in determining the rent-based mining tax payment. Many governments often use output or revenue-based taxes, arguably as a result of informational deficiencies in measuring costs. The rationale for production and price-sensitive revenue-based or gross royalties lies in the notion of economic rent. By their nature revenue-based royalties do not constitute a tax on economic rent because they are levied on gross production or revenue, with no deduction for costs. As such, such royalties are by their nature distortionary, and indeed discourage investment and production in the oil and gas industry.

As output or sales-based taxes are not sensitive to cost, it is not unusual for governments to introduce ad hoc methods to account for high cost production, such as providing special drilling tax credits or varying tax rates according to production volumes and sales prices. Or government might ramp up rates during booms and cut rates during downturns, creating policy instability for the industry.

To conclude, the rent-based mining tax system is an appropriate way to collect rents while minimizing economic distortions.

Recommended Options for Reform

The Israeli royalty for non-renewable resource sectors is particularly simple with respect to potash and other minerals since it is a percentage of sales revenues. Yet combined with the company tax, fiscal burdens on investment cause a number of distortions, which currently have a negative impact on the economy. Taxes deter investment at the margin, thereby impeding economic growth. Further gains could be achieved by making the tax system more neutral and removing special preferences that favour some business activities and discourage others. When tax burdens differ across business activities and types of businesses, capital is allocated to activities that earn lower pre-tax rates of returns on capital due to tax preferences (the pre-tax return on capital is lower since all investments earn the same after-tax rate of return on capital accruing to international lenders). Thus, a more a neutral company tax and mining tax system can boost productivity by shifting capital resources from less productive to more productive business activities.

In our proposals below, we shall examine a true rent-based tax. To ensure that the government raises some revenues, a minimum mining tax (similar to the existing Israeli royalty) is applied to net revenues. This minimum tax is to be credited against the rent-based mining tax; and any unused credits would be carried forward at a risk free interest rate as discussed below.

Governments could assess two types of rent taxes.

One approach is the *cash flow tax* used in principle for the British Columbia mining tax, the Saskatchewan potash profit tax, the New Brunswick shale gas royalty, the Australian oil and gas rent taxes, the Saskatchewan potash tax, Alberta oil sands royalty, and the Norwegian and UK oil and gas taxes. While all these resource industries differ, the rent tax is similar in that it is assessed on sales revenues net of labour and capital costs (capital is expensed which is equivalent in time value to depreciation and financing cost deductions). However, given that expenditures for resource firms are incurred prior to any payouts, unused deductions are carried forward at financial costs.

The second approach is the *R-base rent tax.* This tax would apply to revenues net off operating costs (labour, depreciation and other current expenditures) net of an allowance for the cost of financing capital. This approach to rent taxes has been used in Saskatchewan potash taxation in the 1980's and new Israeli rent tax on oil and gas. It is also used for the corporate income tax in Belgium and, in the past, Croatia.

The R-base and cash flow taxes are, in principle, similar in their impact. The expensing of exploration, development and capital expenditures under the cash flow tax is equal to the present value of depreciation, borrowed financing costs and an imputed cost of equity finance over time as under the R-base. Given that the cash flow tax has large

upfront deductions in the resource sector, the tax base is more negative at the beginning but higher in later years compared to the R-base.

We will focus on the cash flow tax approach in part because it is somewhat less sensitive to the choice of the discount rate since capital expenses are more likely to be deductible when expenses are incurred. If the discount rate used is higher than the appropriate rate under the R-base, a firm will over-capitalize projects since more expenditures increase the exempt tax base, driving down the average tax rate. In effect, too high of an exempt return can lead to excessive cost deductions.[38] However, the R-base treatment providing an allowance for the imputed cost of financing capital provides relief for capital expenditures undertaken before the new rent tax is implemented.

A controversial aspect of both the cash flow and R-base rent taxes is determining the appropriate discount rate or exempt return in assets. Given that the government shares the cost of investment and any losses (that can be written off against other income over time), the cash flow tax enables governments to share most if not all of the risk associated with projects. Both the UK Mirrlees report and the Australian Henry report[39] discussed these issues at length, recommending that the financing allowance should reflect a riskless interest rate (such as the long-term government bond rate) since risk is implicitly deductible as an expense when governments fully share losses. The Alberta oil sands royalty, British Columbia mining taxes and Belgian rent-based corporate tax use a version of a government bond rate to carry forward unused deductions. However, not all risks are fully shared if losses at the end of the project or unsuccessful exploration costs are deductible under the rent base. Some governments include high financing rates for investments inclusive of risk such as Australia's existing mining tax regimes, Newfoundland & Labrador offshore oil and gas, Nova Scotia offshore oil and gas and British Columbia shale gas. We note that the Israeli new gas tax regime uses a financing cost or exempt return that is inclusive of risk.

To understand why the riskless financing rate or exempt return is appropriate for rent taxes when tax losses are fully offset against other income, the following example is given in Table 6 below.[40] We assume a firm invests $10000 in either a riskless or risky project assets. The riskless project earns $1000, providing an overall return on assets

[38] For example, Saskatchewan potash taxes were based on the R-base approach in the 1980s. With a progressive rate structure and excessively high exempt return, marginal effective tax rates were highly negative. See J. Mintz, "Potash Taxation in Saskatchewan: An Evaluation of the Current Agreement", mimeograph, May 1986.

[39] Institute of Fiscal Studies, *The Mirrlees Report, Tax by Design: Reforming the Tax System for the 21st Century*, 2011, http://www.ifs.org.uk/mirrleesReview/design and the Henry Report, *Australia's Future Tax System*, 2010 at http://taxreview.treasury.gov.au/content/Content.aspx?doc=html/pubs_reports.htm.

[40] This example is based on investors willing to hold risky assets if the expected return is equal to the riskless return. A risk premium could also be included but the key point here is the non-refundability of tax losses that add costs onto investors. If a risk premium were included the government would be sharing one-quarter of the risk with investors through the 25 percent tax on gains and losses with full refundability.

equal 10 percent, one half of which is rent. The risky project earns profits equal to $1700 with high commodity prices and $300 with low commodity prices. The exempt or normal return is $500 based on a riskless bond rate of 5 percent for both risky and non-risky assets. The expected rent per period is equal to $500 for both investments. The rent tax is 25 percent.

Table 6: Comparison of Expected Tax Payments for Risky and Non-Risky Project Depending on Loss Refundability

	Riskless Investment	Risky Investment with loss refunds			Risky Investment without loss refunds		
		Low Price Rent (50% chance)	High Price Rent (50% chance)	Average	Low Price Rent (50% chance)	High Price Rent (50% chance)	Average
Gross Profit	$1000	$300	$1700	$1000	$300	$1700	$1000
Exempt return (1)	$500	$500	$500	$500	$500	$500	$500
Expected Rent	$500	-$200	$1200	$500	-$200	$1200	$500
Expected Tax (25%)	$125	-$50	$300	$125	$0	$300	$150
Net Expected Rent	$375	-$150	$900	$375	-$200	$900	$350

(1) Exempt return is calculated as the riskless bond rate (5 percent) multiplied by invested capital ($10000).

If losses are fully refundable, both the risky and riskless projects are taxed similarly. The expected tax is $125, leaving $375 in rents to the investor (note the investor actually received $875 in profits including the exempt return). However, if no refund is provided when rent losses are incurred for tax purposes, the firms pays expected rent taxes equal to $150, which is 30 percent of rent (in other words the effective rent tax rate is more than the 25-percent rent-based tax rate with full loss refundability). In other words, without full refundability, the government does not fully share risks resulting in a higher tax on capital investments. The net rent received on the risky project is $350, which is lower than the rent earned on the riskless project, which is $375. Lack of refundability also increases the marginal effective tax rate on capital since the full cost of risk is not deductible, thereby discouraging investment in risky projects.

For an R-base rent tax, rents are measured in excess of the riskless discount rate, as shown by the above example since the government provides an imputed deduction for the cost of risk with full loss refundability. Similarly, for the cash flow tax, the riskless interest rate is appropriate to carry forward losses. Given the loss is known when incurred, the tax refund amount, which is equal to the tax rate multiplied by the loss, is known with certainty. A government could pay refunds immediately or instead allow the amount to be carried forward at a financing rate to offset future taxes. The appropriate financing rate is not the discount rate of the company used to assess risky future income but the riskless interest rate.

The example provided in the table also makes clear that the lack of loss refundability would require a higher discount rate to carry forward unused deductions or losses. Otherwise, risky and non-risky investments are equally treated with riskless financing rate.

Another issue with the rent-based system is that some costs are not easily observable. For example, overhead costs of multinational companies attributed to a jurisdiction are difficult to measure and audit. Therefore, as seen in Saskatchewan potash tax, a presumptive allowance is provided for overhead costs (as a share of revenues although it could be an uplift factor for costs as used in Norway).

Another problem is with respect to the price used to measure sales revenues to assess revenue-based or rent-based rent taxes. Given that the observed prices might be at the border and not the pit's mouth, the netback price received by the producer is assessed as the gross price net of transport, distribution and processing costs. For potash, it seems that the deductible costs to arrive at the net selling price is consistent with typical distribution costs (less than 10 percent of the selling price). In our view, the net selling price should reflect comparable distribution cost margins. It would be better to provide an average presumptive margin to reflect average transportation and distribution costs over time rather than measure specific costs. If the company can incur costs lower than the margin, the increased competitiveness resulting from efficiency will ultimately benefit Israel.

One further point is critically made here. The rent-based tax does not share the corporate tax burden with investors. Thus, increasing the rate can lead to higher marginal effective fiscal burdens on investments in the industry. For example, the to-be-repealed Australian mining tax at 40 percent would have resulted in marginal mining investments being more heavily taxed than those of other industries[41].

[41] See J. Mintz, "An Evaluation of the Business Tax Recommendations in the Henry Report and the Australian Government Response" in in *Australia's Future Tax System: The Prospects After Henry*, edited by C. Evans, R. Krever and P. Mellor, Thompson Reuters, 2010, 162-82.

In our options below, we assume that the rent tax would apply to the mining operations in Israel. We do not assume that operations should be ring-fenced. Instead the mining tax would apply to all operations, effectively allowing any losses with some products to be applied against profits yielded from other operations.

Table 7 presents our METR simulation for possible options in introducing a rent-based tax along with a revenue-based minimum tax, which is creditable for rent tax purposes. These options would be competitive with other countries for marginal projects and well as neutral with respect to other Israeli sectors.

Table 7 Marginal Effective Tax Rate for Mining in Israel for Rent Taxes at a METR of 16 percent, or Higher

	Current Case		**The Rent Tax Options With the 5% basic mining tax creditable**		
	Mining Aggregate	Cross-industry Aggregate	Rent tax =30%	Rent tax =36%	Rent tax =50%
Depreciable assets	17.7	16.2	27.7	30.4	37.8
Land	10.8	10.8	19.9	22.5	29.5
Inventory	18.3	18.3	28.4	31.1	38.4
Aggregate: non-E&D	17.9	15.7	27.9	30.6	37.9
Exploration	11.2	11.2	0.7	1.0	1.9
Development	11.7	11.7	1.2	1.5	2.3
Aggregate	**15.0**	15.7	16.0	17.7	22.2

As mentioned above, the current 15 percent METR associated with the 10-percent minimum tax on sales, which is the royalty applied to only potash production volume above 1.5M tons, is somewhat below the 15.7 percent average of METRs for the non-resource industries in Israel and competitive among other potash mining countries. Taking this as a baseline, we examine equivalent rent tax that would result in a METR of 16.0 percent, as first step of the analysis.

The three simulations presented in Table 7 are for the three rate options for a proposed rent-tax regime, under which the existing revenue based mining tax is set at 5 percent and creditable against the proposed rent tax. The three optional rent tax rates are: 30-percent, 36-percent and 50-percent. These three optional rent tax rates correspond to three levels of METR: the 16-percent METR is the cross-industry aggregate in Israel, the 17.7-percent METR is the simple average of the METRs across all major potash/phosphate/magnesium producing countries (as shown in Table 5) and the 22.2-percent METR is the one borne by Canadian potash producers in Saskatchewan without accelerated cost recovery.

As Table 7 shows, by allowing the revenue-based mining tax to be fully creditable against the proposed rent-based tax, the government could introduce a rent-based

mining tax as high as 30 percent without violating the METR baseline of 16.0 percent. Of course, the current 16.0-percent METR is not a rigid magic number for guiding policy design; it is only used for illustrative purposes. For the same purpose, we provide simulations for higher rent tax rates that match the cross-country average and the highest METR as incurred in Canada among major potash producing countries.

Conclusions

In this paper, we suggest that the best form of mining levy is a rent tax, using the cash flow approach that has been widely adopted in a number of advanced industrial countries. For the non-oil and gas sector in Israel with an existing producer, we believe this approach is appropriate.

We consider a new resource tax regime within which the existing 5-percent revenue-based mining tax is creditable against a rent-based tax of 30 percent or higher. At this rate, the new regime would not hurt international competitiveness for marginal investment projects. It will also improve the efficiency and neutrality of the business tax system in Israel.

Appendix A:

Cash Flow Tax with Corporate Income Tax: Basic Model for Non-Renewable Resources

A resource firm maximizes the present value of cash flows from its project subject to the constraint that the extracted resources is equal to 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) $\text{Max } V = \int_0^{\infty} (1+R)^{-t} CF_t \, dt$

(2) subject to $\int_T^{\infty} Q_t dt = X = \int_0^{T} f[e_t]$ (accumulated reserves equals total extraction)

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

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

$C(Q_t, K_t)$ are current costs that are strictly concave in output (denoted as $C'>0$ and $C''>0$) and capital that reduces costs (denoted as $C_K<0$ and $C_{KK}<0$).
K_t = depreciable capital stock
k_t = new investment = $K_{t+1} - K_t$
δ= economic depreciation
$f[e_t]$ = reserves found through spending on exploration in period t with the function being strictly concave ($f'>0$ and $f''<0$).
$T_{c[t]}$ = corporate tax payments (paid in each period and can be negative)
$T_{R[t]}$ = rent tax payments in each period t (only paid after extraction begins)
P_t= nominal price of output normalized to one and equal to all other prices ($P_t = P(1+\pi)^t$).

The analysis below incorporates corporate income taxes and mining tax payments based on revenues and cash flows. Corporate tax is imposed on the revenues earned from the sale of resources net of the costs of production, which include current extraction costs, capital costs 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) $T_{c[t]} = u\{P_t Q_t - C(Q_t, K_t)(1+\pi)^t - \alpha D_t - \sigma E_t(1+\pi)^t - T_{R[t]}\}$

(4) $D_t = (\delta K_s + k_s)(1+\pi)^t - \alpha D_s$

(5) $E_t = e_t(1+\pi)^t - \sigma E_s$

(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 investment costs are reduced by the present value of capital allowances so that:

(2') $CF_t = \{ P_tQ_t-C(Q_t,K_t)\}(1-u)(1+\pi)^t - (\delta K_t+k_t)(1-uZ)(1+\pi)^t - T_{R[t]}(1-u)$ for $t \geq T$

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

with $Z = \alpha/(\alpha+R)$.

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

Revenue-based Mining Tax

Mining taxes are a percentage of the value of extracted output and 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 Q, K, k, and E, yields the following:

Output Decision

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

(7) $(1+r)^{-t}(P(1-\tau)- C')(1-u) = \lambda$

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

The shadow price of extracted output is equal to marginal value of extracting a marginal unit of output.

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

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

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 mining tax 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 Tax 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 rent tax payment after payout is the following:

$T_R = \tau[P_tQ_t - C(Q_t,K_t)(1+\pi)^t - (\delta K_t+k_t)(1+\pi)^t - e_t(1+\pi)^t]$,

Which is substituted into equation (3). The determination of output, Q, accords with the following Euler equation:

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

Depreciable Capital

The user cost for depreciable capital for the oil sands case is similar to equation (9), but rent taxes directly affect the cost of capital because current costs are deductible from

the rent base base. That is, changes in the stock of capital reduce current costs, which are netted from rent tax payments.

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

with $Z = \alpha/(\alpha+R)$

Exploration and Development

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

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

The term of Z is the typical CCA allowance by which the deduction could be used against other income.

If the corporate tax terms are zero (u=0 and Z=1), the mining tax terms appearing in equations (12) to (14) disappear. Otherwise, the mining tax is not neutral as it increases the corporate tax burden on capital.

APPENDIX B

Documentation of Data Sources and Procedural Methodology

I. Non-tax data for METR calculation

Our METR model for Israel covers ten industries primarily including potash mining and nine non-resource industries: public utilities, construction, manufacturing, wholesale trade, retail trade, transportation and storage, communications, and other services.

For each of these nine non-resource industries, capital investment may be generally divided into four main asset types: buildings (and structures), machinery and equipment or M&E, inventory, and land. As for mining, there are two additional capital assets: exploration expenditures and development expenditures. We apply the Canadian capital structure (i.e., the capital allocation among the four main asset types) and the further breakdown of the depreciable assets (see below) within each industry to our Israel METRR model.

Buildings and M&E are depreciable assets. They are further divided into 20 classes according to the Canadian "capital cost allowance" (CCA) classification. We apply the Canadian CCA classification to the Israeli METR model for two main reasons: (1) the Canadian CCA structure provides detailed asset categorization, which can help us not only match Israel's current tax depreciation rates to these itemized depreciable assets more accurately but also in generating more segregated tax depreciation rates possibly required for future tax reforms; and (2) our Canadian METR model provides official estimates of economic depreciation rates by CCA class based on the Canadian CCA classification, which can be equally applied to the Israeli METR model as we assume the economic depreciation rates for future or new capital investment would be the same anywhere in the world. Behind this strong assumption are the presumed full mobility of capital and associated technology by industry; and the future (rather than existing) capital investment is all that a METR analysis concerns. It would certainly be desirable that such a detailed categorization of depreciable assets can be conducted based on the Israel's reality.

As for the Israeli capital distribution among various industries, we would ideally estimate such capital distribution by industry based on the cumulative capital flow data or average capital stock data by industry. But without the capital stock data for a sufficiently long period (say 3 years for averaging the capital stock data), we use the GDP structure by industry as a proxy.

Below are the steps taken to develop such a GDP structure by industry in Israel, based on the United Nations' national account data (http://data.un.org/Browse.aspx) and the

Israeli input-output table dated 2006
(http://www1.cbs.gov.il/reader/?MIval=cw_usr_view_SHTML&ID=966)

- Obtain the "Gross Value Added by Kind of Economic Activity at constant (2005) prices - US dollars" for 2006-2012 to derive a 7-year average of GDP share for "mining and public utilities, manufacturing, construction, trade (which includes wholesale and retail trade and restaurants and hotels), transportation and communications, other activities (which includes public services provided by the government including defense).
- Subtracting from "other activities" the government share (i.e., "Local, public and defense administration and social security") to arrive at the GDP share for "other services."
- Using the 2006 IO table to derive the value-added by industries to segregate mining and public utilities, and to segregate transportation (including storage, courier and postal services) and communications.
- Using the relative shares between wholesale and retail trade in Canada to split Israel's trade sector into wholesale and retail industries. This is the most unrealistic procedure used for Israel but can be corrected once the local information becomes available.

As for other non-tax parameters used in our METR model, the inflation rate is assumed to be 2 percent,[42] the personal income tax rates on capital incomes (including interest and equity incomes) are weighted averages among G-7 countries assuming full capital mobility for a small open economy like Israel; the debt-to-asset ratio of 40 percent is based on the Canadian corporate financial statistics; and the price-cost margin for potash mining is 70 percent, derived from the recent Potash Corp's annual financial reports. These parameters are all adopted from the METR model at the School of Public Policy and applied to all countries under this study.

Table B1 presents major non-tax parameters used in our METR model.

[42] The 2-percent inflation rate is below Israeli's five-year geometrical average (2008-2013) of 2.3 percent but higher than The Economist poll of 1.5 percent on Feb 8.

Table B1 Non-Tax Parameters for Calculating METR in Israel and Other Countries

	Mining	Public Utilities	Constr.	Manuf.	W. Trade	R. Trade	Transp.	Comm.	Other Services
GDP share by industry	0.5%	2.3%	4.7%	14.8%	4.1%	6.0%	2.6%	5.0%	50.7%
Capital weight by asset type:									
Depreciable	39.2%	63.6%	52.1%	70.5%	43.4%	51.2%	84.4%	93.8%	78.9%
Land	0.2%	24.5%	6.2%	8.8%	8.1%	13.6%	14.3%	4.8%	17.4%
Inventory	16.8%	11.8%	41.7%	20.7%	48.5%	35.2%	1.3%	1.4%	3.8%
Exploration	30.6%								
Development	13.2%								
Aggregate	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Other parameters for all countries:									
Inflation rate		2%							
Debt/asset ratio		40%							
Personal tax rate:									
On interest income		27.4%							
On equity income		20.4%							
Price-cost margin[43]		70%							
Capital weight by asset type for mining:									
Exploration	30.6%								
Development	13.2%								
Depreciable asset	39.2%								
Land	0.2%								
Inventory	16.8%								
Exploration	30.6%								

Source: Authors' estimate.

* The aggregate is for industries covered in our METR model only. The other economic sectors excluded from this aggregate are agriculture, oil and gas, and the government sector.

[43] Adopted from our Saskatchewan model for potash mining. It can be adjusted according the more recent data. Any adjustment in this price-cost margin may affect the domestic METR comparison between the potash-mining sector and the non-resource industries as a whole, but it will not change the METR comparison across potash mining countries in any significant manner.