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Designing and Implementing Production Sharing Contracts for the Mining Sector

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This policy paper was written by IGF and ATAF with input from the governments of Senegal and Gabon

1.0 Introduction

Production Sharing Contracts (PSCs) were piloted by Indonesia in 1966 and soon became popular in the oil and gas sector. They were introduced in the context of increased national ownership and control of natural resources by countries that had recently gained independence (Nakhle, 2010). In the 1960s, the Organization of Petroleum Exporting Countries was formed alongside many national oil companies (McPherson, 2010; Organization of the Petroleum Exporting Countries, 2022). Countries took the view that with more control over their resources, they could increase their financial benefits (Hogan & Goldsworthy, 2010).

In a PSC, the government retains the title of the resource to be produced and contracts an investor to develop it in exchange for compensation. The contractor receives a share of production to cover its costs. The remaining production is shared between the contractor and the state as per an agreed formula. The state can monetize its share of production directly, through a state-owned company, or through an intermediary. While production is the main form of payment under a PSC, some governments also impose other charges such as royalties and corporate income tax.

PSCs have mainly been used for oil and gas. More than half of global oil reserves are controlled by state-owned companies, which use PSCs to contract private investors to extract the resources on their behalf (International Monetary Fund [IMF], 2012a). In contrast, the mining sector has fewer state-owned companies, and governments instead tend to allocate exploitation licences to private investors in exchange for mineral royalties and the payment of taxes—referred to as a tax/royalty regime. Although, in theory, PSC and tax/royalty provisions can be designed to provide a similar government share of total benefits, also called resource rents, PSCs are perceived to be more beneficial to host countries (Nakhle, 2010).



The main economic reasons given for why PSCs are less suitable for the mining sector are higher extraction costs and the need for constant reinvestments throughout the life of a mine (IMF, 2012a). Depending on how a PSC is designed, it might not be flexible enough to respond to periods of high-cost outlays such as reinvestments compared to corporate income tax (CIT), which is based on net profits.

Some resource-rich countries are expressing an interest in implementing PSCs or a form of production sharing to increase revenues and overall domestic benefits from the mining sector. For example, Gabon has introduced a provision for production sharing in its tax/royalty regime (Chauvet, 2019), and the Democratic Republic of the Congo has a PSC for a copper/cobalt mine (Reuters, 2018). Senegal and Uganda are discussing draft legislation, while Papua New Guinea is looking into introducing PSCs (Fall, 2017; Parliament of the Republic of Uganda, 2022; Searancke, 2021).

In the past, Côte d'Ivoire's mining legislation included PSCs, but this was removed from the draft mining law of 2014 (Asselineau et al., 2014; Norton Rose Fulbright, 2017). Egypt also had PSCs for gold but removed this provision after it struggled to generate sufficient interest from investors (Knecht, 2017). Despite limited historical experiences, the current level of interest makes it important to understand the conditions under which PSCs might be suitable for mining.

2.0 Comparing PSC and Tax/Royalty Systems

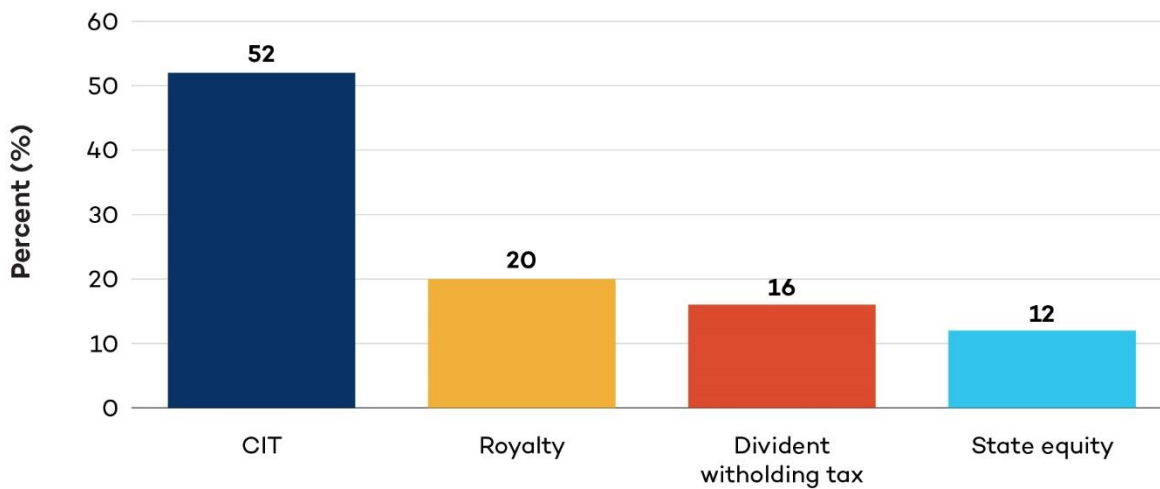
2.1 Tax/Royalty Regime

The design of mining tax systems varies depending on the policy objectives of each host government. However, the basic mineral sector taxation tools have remained similar over the past several decades. The two main elements are corporate income tax (CIT) and royalties, pillars of the tax/royalty fiscal regime. CIT is based on net profits, with rates typically varying between 25% and 35%. Royalty payments in the minerals sector are typically between 2% and 10% of gross sales and provide earlier and more stable/predictable revenues over the life of the mining operation. Royalty payments are intended to deliver proportionally less than CIT over the life of a mining project (BOUTERIGE et al., 2020). Figure 1 shows a stylized depiction of the theoretical breakdown of government revenues from mining, according to ex-ante modelling by the IMF.¹

¹ The IMF Fiscal Analysis of Resource Industries (FARI) model is used extensively as part of the Fiscal Affairs Department's technical assistance to governments.



Figure 1. Theoretical breakdown of mining revenues by instrument, based on ex-ante modelling²



Source: Luca & Puyo, 2016.

2.2 PSCs

Under a PSC, the government's primary source of revenue comes from its share of production. The state contracts an investor to explore and extract the resource on its behalf. The state retains ownership of the resource to be produced. The investor incurs all the costs associated with exploration and extraction unless the state has a paid equity interest.

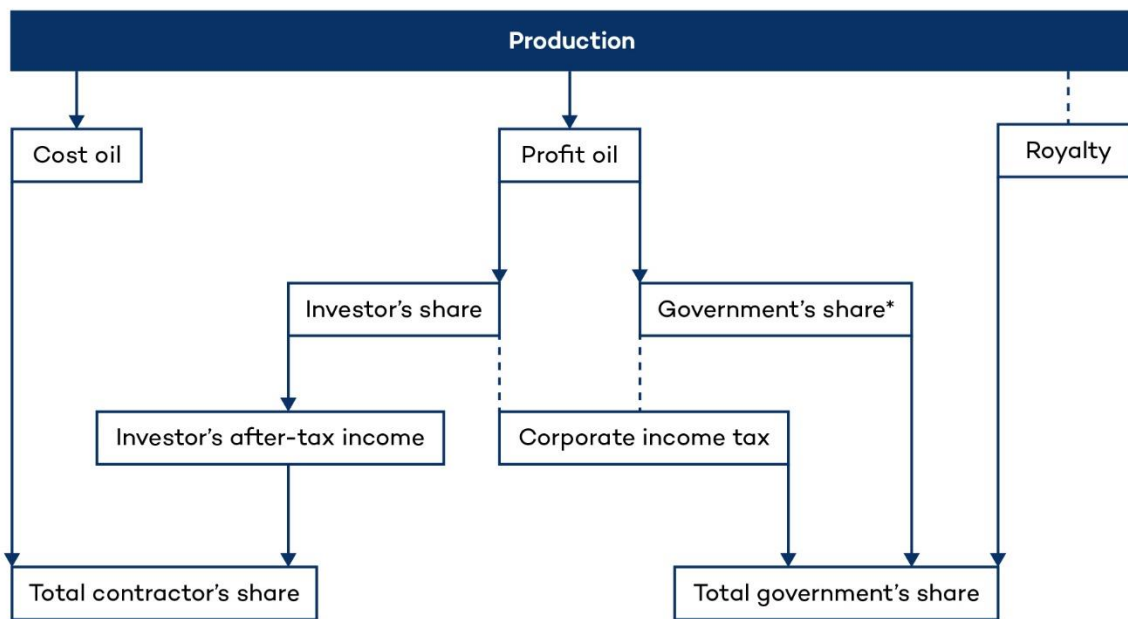
A PSC allows the investor to retain a portion of the production each year to cover its costs. This portion is known as "cost oil" and may be limited to a fixed percentage of the resource extracted if the accumulated costs are higher than the annual value of production. This limit is known as the cost recovery limit or ceiling. If costs exceed the cost recovery limit in a year, the excess costs are carried forward to be deducted in subsequent years.

The remainder of the production after the cost oil is deducted is then shared between the government and the investor according to a formula agreed upon in advance. This portion is called "profit oil". Figure 2 shows the structure of a traditional PSC. Figure 3 provides a stylized depiction of the theoretical breakdown of government revenues from a PSC for oil and gas. The difference is clear: Whereas most mining regimes rely disproportionately on CIT, countries operating a PSC regime collect most, if not all, of their revenue from their share of physical production.

² The IMF FARI model assumes a 5% royalty on gross sales, 30% CIT, and 10% free state equity. Two alternative regimes included in the model are an additional profits tax and a tax on rent.

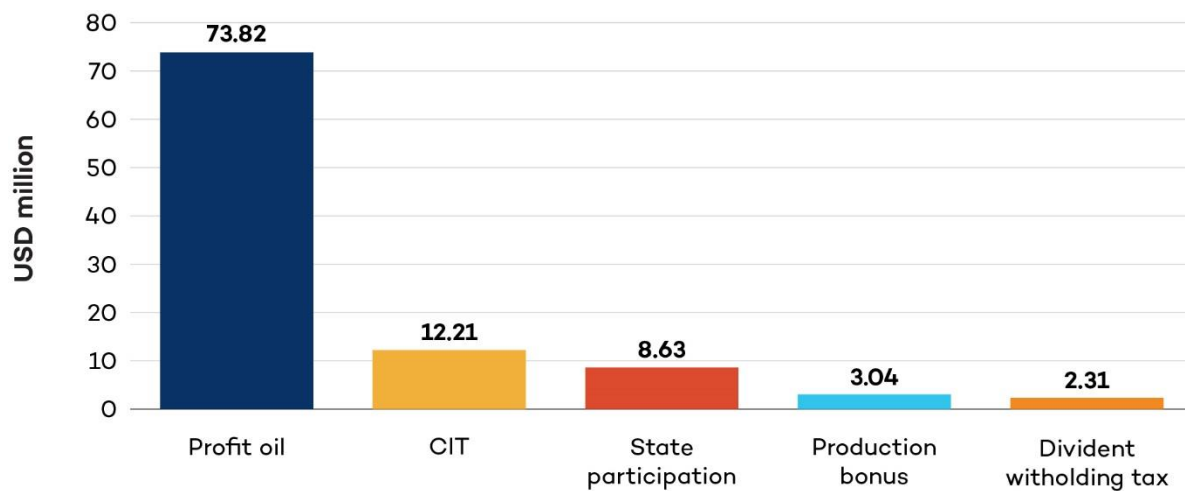


Figure 2. The structure of a PSC



*Government's share of profit oil may include CIT payable by the investor.

Figure 3. Theoretical breakdown of mining revenues by instrument, based on ex-ante modelling³



³ The IMF FARI model assumes a \$50 million bonus, 80% cost recovery ceiling, 20% CIT, 5% dividend withholding tax, 10% state equity, and 40% to 75% government share of profit oil depending on barrels of oil produced per day.



3.0 Theory Versus Practice

In theory, PSCs and tax/royalty systems can be designed to be equivalent in terms of overall financial benefits for the government—that is, based on ex ante financial modelling, the annual discounted revenues from the two regimes themselves or the total discounted government revenues for the entire project period would be the same. This is true for any fiscal regime. (Baunsgaard, 2016).

In practice, however, this equivalence may break down when the challenges in collecting revenues under both regimes are compared. In a tax/royalty regime, while royalty payments guarantee an early and reliable stream of revenue, CIT is prone to profit shifting where multinationals underprice mineral sales or inflate the cost of goods across related parties to reduce their taxable profits (Albertin et al., 2021). There is generally no limit on deductible expenses for income tax, creating a strong incentive for taxpayers to overstate costs to reduce or defer taxes for many years. While depreciation caps the amount of costs deducted in a year, it only applies to capital, not operating costs. As a consequence, developing countries tend to collect a much smaller proportion of CIT in practice and rely more heavily on royalty payments.

Under a PSC, production can be observed and as such more easily monitored. The value of the government share is not determined by related party sales. Although investors may still inflate their costs under both PSC and tax/royalty regimes, the impact on government revenues is likely to be lower given the practice of having a cost recovery ceiling and a limit on the loss carryforward. These features guarantee the government a share of profit oil every year.

Considering the potential benefits of relying more heavily on taxes on production, one response might be to increase the royalty rate under a tax/royalty system to guarantee the government a greater share of gross revenues, similar to a PSC. However, while a royalty and cost recovery ceiling have the same economic impact in theory—both guarantee a share of gross revenue (or production)—in practice, a higher royalty rate would be more distortionary for investors. Royalties and cost recovery ceilings are only equivalent if the company's actual expenses hit the cost recovery ceiling or if royalty payments are creditable against income taxes which is not the case in practice.

Another important difference is the treatment of financing costs. Interest expense is not cost recoverable under most PSCs. Instead, investors are entitled to carry forward unrecovered costs with a fixed uplift in lieu of interest. Related-party loans are a major transfer pricing risk in the extractives sector. While not unique to extractives, the scale of investment required means that the risk of excessive interest deductions looms especially large in this sector. Some countries have reduced this risk by limiting the amount of debt relative to equity or by limiting the deduction of interest expense. By disallowing interest expense and giving a fixed uplift on costs, PSCs significantly reduce the risk of excessive interest deductions eroding government revenues. So



would a cash flow tax, as proposed in (Baunsgaard, 2021). By contrast, financing costs are typically deductible for CIT.

Finally, implementation differences can have a significant impact on government revenue collection. Beer (2020) estimates that African countries are losing between USD470 million and USD730 million per year in CIT on average from tax avoidance by mining companies. They also show that the mining sector is more prone to profit shifting: a change in the domestic rate of CIT of 1% has historically led to a decrease in sectoral profits by over 3%—more than in the hydrocarbon sector. The authors suggest several explanations, including the frequent use of PSCs and joint ventures in oil and gas and the challenge of determining an arm’s-length price for some related-party transactions in the mining sector (Beer et.al, 2021).

4.0 Conditions for the Successful Implementation of PSCs in the Mining Sector

In this policy paper, we assume that mining countries considering PSCs are likely to replicate the designs used in the hydrocarbon sector. They may either adopt a pure PSC with only a production share, possibly including a CIT paid on behalf of the investor, or a hybrid PSC, which includes royalty and/or CIT payments. However, the example of Gabon shows that some countries may be interested in a different mechanism, which simply allocates a fixed share of the gross production to the state without a cost recovery limit. Box 1 contains examples of the production sharing mechanisms adopted by Gabon and Senegal. These reforms are still tentative (Roseline Mbaye, personal communication, 2022).

Box 1. PSC structure for Gabon and Senegal

Example 1: In Gabon, the government amended its royalty/tax regime in 2019 to include a 10% share of production as part of a set of reforms to increase financial benefits from the mining sector. In recent mining agreements, the state is entitled to a 10% share of the physical production as soon as production starts. The state mining company, Société Equatoriale des Mines, markets and sells the government share of minerals (Marcelle Babin, personal communication, 2022) (Chauvet, 2019).

Example 2: Senegal is planning to replicate the PSC regime used in its oil sector, which adopts a typical profit oil/cost oil distinction. PSC holders will, however, not be subject to mineral royalties (Roseline Mbaye, personal communication, 2022).



Governments interested in introducing PSCs in their mining sector should consider the following issues:

PSCs as a central part of the mining policy

Many countries see a direct appeal in PSCs because the government retains the title of the resource to be extracted, which has potential administrative and financial benefits. The feature aligns with a natural sense of resource nationalism felt by citizens of resource-rich countries, who assume that their government will therefore have more control over its resources and capture more of their value (McPherson, 2010).

PSCs represent a different approach to how governments leverage the country's natural resources. They are therefore better introduced as a central piece of a government's mining policy than as an add-on to a mining regime based on private concessions. Though it is not a traditional PSC regime, the version introduced by Gabon was associated with additional requirements on local content and an increased role for the state in the mining value chain. This presented a key shift in the government's approach and, perhaps as a result, was relatively well accepted by the industry (Marcelle Babin, personal communication, 2022). This example illustrates that the policy shift behind the introduction of a new fiscal regime matters more for domestic resource mobilization than the choice of adopting a particular contractual arrangement.

A country needs consensus behind policy reform to adopt PSCs for mining. Because the tax/royalty regime is the most prevalent in the mining sector and because some countries have already abandoned early attempts at introducing PSCs in their mining legislation, governments may be worried that introducing PSCs will stifle investments, especially when neighbouring countries are still using tax/royalty regimes (Roseline Mbaye, personal communication, 2022). In Senegal, the operationalization of the PSC has stalled since its introduction in the mining law in 2016. This has been attributed to a general lack of understanding of how to implement the regime and how it will interact with other fiscal instruments, such as state equity, in addition to strong opposition from the industry (Roseline Mbaye, personal communication, 2022).

Balance between risk and reward

Governments may consider phasing in or selectively introducing PSCs. Mining ventures can represent high risks for investors with large capital costs and long lead times before revenues start to stream in. One way to reduce risks is to increase the certainty of the geological and economic prospects of a mine. Investors may be more inclined to adopt PSCs in areas with proven mineral reserves or for minerals that are in high demand and promise strong financial returns. Senegal, for example, plans to introduce PSCs only in areas with proven resource endowments, called "promotional zones" (Roseline Mbaye, personal communication, 2022). Countries with particularly rich endowments in certain minerals critical for the energy transition that are extractable at a lower cost than in other regions may be well placed to introduce PSCs for these commodities.



PSC terms adapted to economic conditions

Critics have argued that PSCs may not be adaptable to the mining sector because of its high extraction costs and the possibility of changes in operating and capital costs across the extraction period, which may mean the cost recovery limit is no longer viable for the investor (PNG Chamber of Mines and Petroleum, 2020). This may be true, but maybe not for all minerals and maybe not for every mine. Project economics vary from mine to mine, which gives governments more room when designing fiscal regimes for projects at the lower end of the cost curve. For each commodity, the cost curve shows the costs of production per unit of each mine, from the cheapest to the most expensive mine in the world. Governments may consider having a high-cost recovery limit for marginal mines or even explore a period of no cost recovery limit during mine expansion.

Simple PSC structures

A “pure” version of a PSC does not include any other fiscal obligation (Bindemann, 1999). In some contracts, the government’s share of profit may include the amount of CIT payable by the investor. These contracts consider that the government or state-owned enterprise “pays CIT on behalf” of the investor. For the government, this ensures that the project falls under the generally applicable income tax law. For the investor, a CIT paid on their behalf can still be used as a foreign tax credit in its home jurisdiction but does not represent an additional payment or come with an additional administrative burden. Other more recent PSCs may require investors to pay royalties on gross production and/or CIT from their net profit in addition to the state’s production share.

The original PSCs were meant to replace tax/royalty regimes, not to be added as extra fiscal tools on top of them. This objective is rarely understood by countries newly introducing them in their legislation. Many of the fiscal instruments in a tax/royalty system are redundant with PSC terms. For example, a mineral royalty can collect a share of gross sales, as can a PSC with a cost recovery limit. While additional taxes may increase government revenues, they could prove too onerous, especially when applied to marginal projects, reducing investors’ interest in mining projects. Adding CIT makes PSCs more complex to administer. Governments should consider not including mineral royalties and CIT in PSCs

Some countries have gone a step further to simplify the traditional PSC by eliminating cost recovery. In 2017, Indonesia introduced a variation on its petroleum PSC. The gross split PSC does away with a cost recovery limit, and instead, the government and the contractor share the total production as per an agreed-upon formula. The formula varies across licences according to different factors, including the location of the field, depth, availability of supporting infrastructure, etc. (Roach & Dunstan, 2018). This approach allows the government to avoid having to verify costs. The challenge is determining the appropriate profit split per project, in order to not deter investors. This approach is similar to Gabon’s, whose government applies a 90/10 profit split in favour of the contractor, except that it operates a tax/royalty regime and, as such, still collects CIT on net profits.



A simple and progressive profit-sharing formula

In hydrocarbon PSCs, there are three different profitability metrics used to allocate profit oil between the government and the investor (IMF, 2012a):

a. Production

The government's share of profit oil increases/decreases with production. Production can be measured in terms of the daily rate of production or cumulative production.

Table 1. Government profit share based on the Daily rate of oil production

Daily rate of oil production (DROP) in kbpd (thousand barrels per day)	Government profit oil share
Barrels per day < 20 kbpd	40%
20 ≤ barrels per day ≤ 40 kbpd	50%
Barrels per day > 40 kbpd	60%

b. R-factor

The government's share of profit oil increases/decreases with the investor's R- factor. The R- factor is determined by the ratio of the investor's cumulated revenues over its cumulated costs.

$$R - factor = \frac{Revenues}{Costs}$$

An R-factor equal to 1 means that the investor's revenues equal its costs. An R-factor smaller than 1 means that the investor's costs still exceed its revenues, while an R-factor larger than 1 means that the investor's revenues have exceeded its costs. In a typical extraction project, the R-factor should progressively increase from 0, before the date of first production, to a number higher than 1 after several years of operation.

Table 2. Government profit share based on the investor's R-factor

Investor's r-factor	Government profit oil share
R-factor < 1	40%
1 ≤ r-factor ≤ 1.5	50%
R-factor > 1.5	60%

c. Project's /Investor's rate of return (ROR)

The government's share of profit oil increases/decreases with the project's/investor's ROR—often the internal rate of return (IRR) of a project.



Table 3. Government profit share based on the investor’s rate of return

Project’s/investor’s ROR	Government profit oil share
IRR < 10%	40%
10% ≤ IRR ≤ 12%	50%
IRR >12%	60%

The metrics based on profitability are the best suited to the mining sector. While the use of production as a metric is simpler, it does not consider the cost profile of the project (i.e., an increase in production may be accompanied by an increase in costs and as such should not trigger an increase in profit mineral for the government). Because oil and gas projects have typically been more profitable than mining projects, and variable production costs are a smaller share of total production costs, the risk that a profit oil split based on production makes a project unviable is much lower. R-factor and IRR metrics take into account the costs of production and the price of minerals and better reflect the profitability of a project.

The challenge with the R-factor and IRR metrics is that they are harder to administer and more prone to profit shifting than DROP. For instance, the rate of return depends on the correct determination of mineral prices and production costs, both challenges that countries may be seeking to limit by adopting PSCs. An alternative is to adopt a sliding scale that varies the profit mineral split according to factors that governments can more easily observe but better reflect profitability. This would be similar to Indonesia’s approach using factors such as location, geology, type of deposit (surface/ underground), or access to infrastructure.

Limited cost recovery and loss carryforward

The cost recovery limit varies from one oil and gas project to another. According to Bindemann (1999), the cost recovery limit averages 37% for projects in Middle Eastern countries where the operating margin is high, but 66% and 69%, respectively, for projects in Asia and Central America, where the operating margin is lower. A higher cost recovery limit helps investors recover their costs sooner. If costs exceed the cost recovery limit in a year, the excess costs are carried forward to be deducted in subsequent years. The number of years for which an investor can carry forward excess costs not recovered can be limited. In countries where financing costs are not recoverable, the investor is allowed to carry forward such costs with a markup, also called an “uplift.”

Governments should ensure that PSCs have limitations on cost recovery and loss carryforward, especially if they are exempted from paying a mineral royalty. A cost recovery limit ensures that there is production left, once costs are deducted, to be divided between the government and the investor, allowing governments to receive a share of the minerals as soon as production starts. A limit on the loss carryforward further reduces the impact of cost overstatements by the investor. As



in oil and gas, both limits can be adjusted depending on the cost and profitability profile of each project.

Governments should also increase their capacity to monitor the costs declared under a PSC. A proper description in the PSC of what costs are to be recovered and the priority of recovery of these costs is a good starting point. They should also include the no-profit rule, which requires that any shared costs incurred by the operator of a joint venture be charged to the group at the original cost without a profit or markup. This reduces the risk that the operator (or any other partner in a joint venture) inflates the cost of goods and services charged to the group, thus reduces each partner's, and the government's, share of production (Readhead, 2018b). Additionally, governments should request detailed work plans and budgets. They should also require investors to seek approval before incurring expenditures higher than budgeted and periodically audit the actual capital and production costs (Readhead et al., 2018a).

State capacity to sell its share of profit mineral

If governments receive their share of production in-kind, they have to sell it and try to get the best possible price. This may be a challenge for governments that do not have such marketing capacity. As governments build their capacity to market and sell their share of production, they may consider jointly marketing and selling their share with investors, under the appropriate oversight, or contract an independent third party to do it on their behalf (these options are elaborated below). In Gabon, the government built up the capacity of its state-owned company Société des Mines Equatoriale years before introducing the requirement for companies to give it 10% of their production. It hired Gabonese professionals with experience in the mining industry while training a new cohort of young professionals. As a result, the state-owned company has been able to successfully sell its share of minerals when the requirement since introduced (Marcelle Babin, personal communication, 2022).

Options for marketing and selling the government's share of profit minerals:

- a. The government could sell its share of profit minerals directly. The challenge with this approach may be access to markets, as well as a lack of marketing knowledge and expertise.
- b. The government could sell its share back to the operator at market price less the cost to the investor of selling the production. One risk with this approach is that the marketing fee is charged by a related party. To address this, the government could agree to a fixed fee based on a percentage of the company's operating costs or, where the service is provided by a related party, require comparable evidence of at least three third-party quotes.
- c. The government could outsource this function to a third-party trader. It is common for mining companies to hire a trading company to market the minerals on their behalf. It is estimated that trading companies handle 20% to 40% of the total international trade of iron ore, copper, nickel, and zinc (Löf & Ericsson, 2019). The trader's fee will lower the



government's profits from the sale of its share, but as long as the return is higher than under options a or b, the country is still better off.

5.0 Conclusion

PSCs may become increasingly common in the mining sector as many countries contemplate reforms that aim to increase national control over critical mineral resources. Under the right circumstances, PSCs can provide more benefits than traditional tax/royalty concessionary regimes to resource-rich countries and protect against some forms of tax base erosion and profit shifting. But PSCs are no magic wand. To achieve a positive outcome, it is important for governments to consider PSCs as a central piece of their mining strategy, design PSC terms in light of the prospective profitability of their mineral resources, and build the capacity required to monitor contractor costs and sell the state's share of minerals.



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