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Value Added Tax in the Extractive Industries

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ABSTRACT: Lower capacity countries often struggle to administer the Value Added Tax (VAT) in the extractive industries, partly due to the large VAT refunds needs of this capital and export-intensive sector. Assuming that the first-best policy (apply the standard VAT to the extractive industry) is not possible in the medium-term, what should countries do? This paper systemically analyzes second-best VAT policy designs considering the impact of the VAT on three key stakeholders: the investor, domestic suppliers, and the tax administration. The analysis concludes that the generally preferred policy is to provide a VAT exemption for imports and either fully tax or exempt domestic supplies, although country characteristics (and, specifically the relative weighting of stakeholders) matter. Moreover, governments should make efforts to shorten refund delays and transition to a standard VAT over the longer-term.

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WORKING PAPERS

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Prepared by Artur Swistak and Nate Vernon[1]

[1] The authors would like to thank Thomas Baunsgaard for detailed comments and suggestions, as well as those that attended the seminars to the Fiscal Affairs Department and the IMF's Natural Resource Tax Group. The analysis is supported by data and information obtained from an International Tax and Investment Center (ITIC) assisted survey of petroleum and mining companies. The authors are thankful to ITIC, especially Mr. Dan Witt and Jim Robertson, for facilitating the survey and subsequent exchanges with extractive companies.

Contents

BOXES

FIGURES

TABLES

Glossary

AETR	Average Effective Tax Rate
CIT	Corporate Income Tax
EI	Extractive Industries
EIA	United States Energy Information Agency
EITI	Extractive Industries Transparency Initiative
EY	Ernst & Young
FAD	Fiscal Affairs Department
FARI	Fiscal Analysis of Resource Industries
GDP	Gross Domestic Product
IMF	International Monetary Fund
IRR	Internal Rate of Return
ITIC	International Tax and Investment Center
LCR	Local Content Requirements
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
METR	Marginal Effective Tax Rate
MN	Million
OECD	Organisation for Economic Co-operation and Development
PWC	PricewaterhouseCoopers
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollars
VAT	Value-Added Tax
VRPO	VAT Relief Purchase Orders

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1. Introduction

Discussions around the design of natural resource taxation have traditionally focused on taxing economic rents and various forms of direct taxes (or similar instruments) used to capture extractive companies' profits. Yet, extractive companies, as any other business, are also subject to indirect taxes, such as tariffs, excise taxes or sales taxes, usually in a form of a value added tax (VAT).[1],[2] While indirect taxes may pursue other important objectives (e.g., protect local market or discourage consumption of certain goods) their goal is not to tax profits per se. They are paid by businesses but are generally expected to be ultimately borne by others. This is especially the case with a VAT—it is not intended to tax businesses selling goods or services but, instead, the consumption of good and services.

VAT is a general tax applicable to all sectors, extractive industries (EI) included. Being a tax on final consumption, it should not impose any burden on investors and exporters and, in principle, oil and mining companies should be treated as any other business for the VAT purposes. In practice, however, this is hardly ever the case, especially in developing countries—VAT regimes applicable to extractive industries tend to depart from the standard design and vary significantly across countries. While the special nature of extractive operations might be a contributing factor, the variation and complexity of VAT EI regimes is largely driven by weaknesses in tax administration and cash management, especially challenges in timely approval and payment of excess VAT credits. By no means are challenges in the VAT administration and cash management a new phenomenon (Calder, 2014; Chambas 2014; Pessoa et al. 2021; van Oordt 2021); yet, they are especially acute and arduous for extractive industries, requiring thus additional scrutiny and identifying a second-best design option.[3]

As a consumption tax, the VAT does not usually receive much attention in discussions on the overall design of natural resource taxation. Although the VAT is not a rent or profit tax instrument and does not, as such, increase government take from the exploitation of natural resources, it may meaningfully impact investment decisions and should not be overlooked in the overall fiscal regime design for extractive industries. The focus of the discussion is different however—it is not about improving the revenue efficiency or equity of the VAT but about preserving its integrity and ensuring that it remains neutral to investors and their suppliers (OECD 2017). Insofar as the VAT does not adversely affect business decisions and hamper investment in extractive industries, it is a welcome and widely accepted element of the general tax regime (OECD 2020). When these conditions are not met, however, EI investors tend to oppose VAT and seek alternative solutions, and governments often comply. Failure to manage and pay VAT refunds by tax administrations is the most common trigger for introducing special VAT regimes for extractive industries.

The existing literature on VAT in the extractive industries is rather scant. Early work on taxation of extractive industries focused on direct fiscal instruments and evaluations of VAT were usually limited to highlighting weaknesses in refunding VAT and various tax concessions available to EI companies (Baunsgaard 2001; Keen

[1] In certain situations, withholding taxes on services fees and export taxes can also be considered indirect taxes.

[2] See Ebrill et al. 2001 for a description of the value-added tax's workings and common design considerations.

[3] In the context of this paper, second-best refers to VAT designs that deviate from a single standard rate that applies to all domestic consumption.

and Mullins 2017; Sunley, Baunsgaard and Simond 2011). In their account of evolution of fiscal regimes for minerals, Hogan and Goldsworthy (2010, p. 127) briefly noted that many countries provide exemptions to encourage investment and ease the burden of administering large VAT refund positions due to the zero-rating of exports. More recent work, notably the United Nation's Handbook for extractive industries (UN 2016), provides for an overview of main issues faced by EI investors and key considerations for VAT design and administration. Similar discussion, with much focus on the implications of non-refunding VAT to EI investors, can be found in van Oordt (2019). Various country studies highlight alike problems with VAT implementation and its adverse impact on investment and production in extractive industries in Tanzania (e.g., Madzivanyika 2012). Madzivanyika and Kadenge (2015) evaluate the relation between VAT incentives provided to mining industry and the growing level of VAT refunds.

While academic discussion on the VAT design in extractive industries is gaining momentum, there is consensus that a well-functioning VAT should not tax firms, while refund delays and VAT policy deviations can burden investment, impose large administration and compliance costs, and lead to revenue leakage. There is also consensus on the first best solution—treat the extractive industry as a normal business and provide timely refunds (UN 2017; van Oordt 2019). Some concede that in light of administrative weaknesses in paying VAT refunds some VAT concessions may be unavoidable (e.g., Sunley, Baunsgaard and Simond 2011).

There lacks, however, systematic analysis on which VAT designs maximize government objectives when the refund delay issue continues to be a problem. One option is to replace the VAT with a Retail Sales Tax, but this is not recommended for efficiency and revenue-raising reasons (IMF 2002).[4] Policies that reduce input VAT (such as VAT exemptions or deferrals on imports) can mitigate cash flow issues but introduce undesirable incentives (including bias against domestic firms) and, therefore, administrative solutions may be preferred (van Oordt 2021). Nevertheless, the literature does not provide a robust qualitative and quantitative analysis of the trade-offs across alternative design options. This paper attempts to fill that gap.

The overall objective of the paper is to identify, analyze and offer solutions to the most common VAT issues arising in extractive industries. While we fully subscribe to the consensus on the first-best solution, i.e., a broad-based VAT with timely payment of refunds, there appears to be no agreement on the second-best solution to a broad-based VAT in the literature or practice. Our analysis focuses on the impact of various VAT schemes introduced in response to the challenge of paying VAT refunds (as well as the cost of VAT refund delays). It seeks to establish which special VAT schemes are the least distortive and could be offered as a second-best solution to the general VAT regime and which schemes should be avoided. The discussion entails both qualitative and quantitate analysis, the latter based on the Fiscal Analysis for Resource Industries (FARI) modelling framework.

While we touch upon some administrative solutions related to excess input VAT recovery, we do not offer a full account of issues faced by tax administrations in managing VAT in extractive industries. Neither do we take up issues related to public financial management, including those related to budget appropriations and escrow accounts. Our focus is primarily on policy solutions.

[4] The VAT has a broader base, a built-in self-enforcing mechanism through to the credit-invoice system, and lower compliance costs for and greater revenue collection from smaller firms. The economic and practical advantages of the VAT are also illustrated by revealed preferences, as most governments use a VAT rather than an RST.

Section 2 provides a brief overview of features of extractive industries and establishes a link between the VAT design and its impact on EI companies' investment and production decisions. Section 3 focuses on challenges EI companies face in VAT recovery and possible solutions to that problem. Section 4 discusses various VAT schemes offered to EI companies to compensate them for ill-functioning management of VAT refunds. Section 5 quantifies the impact of common schemes and refund delays to measure distortions, bias against domestic suppliers, and revenue raising impacts. Section 6 delves into the second-best policy options with a view to qualify them depending on countries' circumstances.

2. What's so special about extractive industries?

Conceptually, a VAT is a straightforward tax—businesses charge it on their sales, take a credit for the tax paid on their inputs and remit the difference to the state. The crediting mechanism ensures there is no tax cascading and that the VAT can be collected at each transaction throughout the value chain, including upon importation. For a "typical" domestic buy-and-sell business (i.e., where the value of sales exceeds the value of input goods and services) with sales and purchases subject to a uniform VAT rate and no output exported, the VAT works smoothly—it does not require any special design concessions nor much involvement of a tax administration. In other words, it generates revenue with relatively low compliance and administrative costs.[5]

Extractive industries are, however, nowhere close to a "typical" business model. Their investment profile, business structure, value/supply chain, and cross-border operations pose significant challenges, requiring a very robust VAT regime, a strong tax administration and an efficient cash management system. Table 1 summarizes select features of extractive industries, their implications for the VAT design and operation, and possible distortions that may arise when the VAT is not properly designed, implemented, and/or enforced. These issues are expanded upon in the rest of this Section and Sections 3 and 4.

In most resource rich countries, especially low-income countries, extracted minerals and hydrocarbons are predominately exported (Figure 1). While some countries use domestic market obligations and other instruments, such as export taxes or royalty rate differentiation, to encourage domestic beneficiation, the market for crude oil, natural gas and most of minerals is typically abroad. The initial processing of minerals or liquefaction of natural gas is either undertaken by the same company as part of mining or petroleum operations or is provided for a fee to the exporting EI company. Substantial value-adding operations (e.g., refining of crude oil or smelting), with focus on domestic sales, are relatively rare in developing countries.[6]

[5] There is some evidence that compliance costs are significant for small firms, as evidenced by grouping below the VAT registration threshold (Lui, Almunia, and Tam 2021; Muthitacharoen, Wanichthaworn, and Burong 2021). However, compliance costs are generally thought to be fixed and firms operating in the extractive industries are large enough that compliance costs should not material.

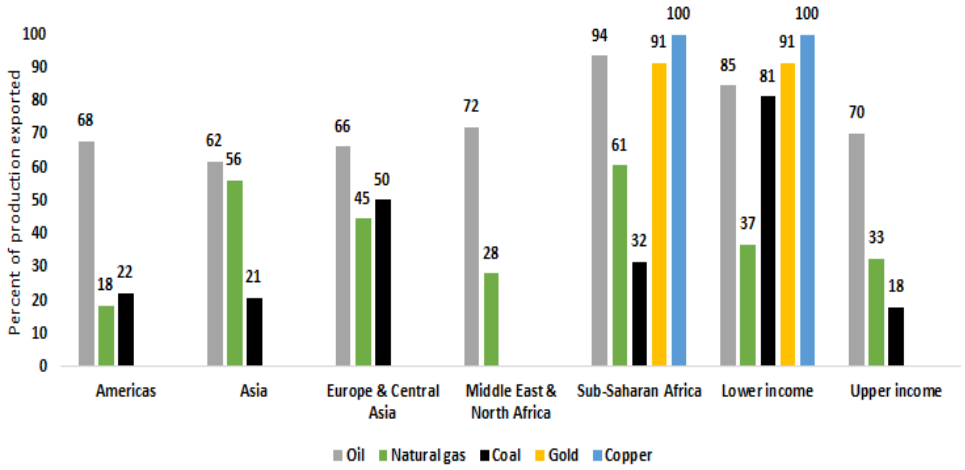
[6] In the case where initial processing, such as smelting of copper, is done in the producing country, the processing company will require VAT refunds upon export (if the processing company purchases the mineral, instead of using a tolling structure). In other words, the refund issue is pushed up the value-chain but still can have a substantial impact on investment and domestic value-added.

Table 1: Select Features of Extractive Industries and their Implication for the VAT

Extractive Industry Feature	Importance for VAT	Distortion (If Inefficient VAT)
Long investment periods	No output VAT during exploration and development stage	Deterred or reduced investment
High share of exports	No/very limited output VAT during production stage	Bias towards domestic sales
Capital intensity	High amounts of input VAT	Reduced and lower quality investment
Reliance on subcontractors *(labor)*	Higher input VAT/lower value-added	Bias towards vertical integration
Reliance on subcontractors (*goods vs. services*)	Variation in input VAT by input (if services taxed preferentially	Bias towards services; bundling provision of goods into services
Reliance on subcontractors *(supply chain)*	Variation in input VAT depending on the tier of contractor (where VAT preferences are available to EI company and direct suppliers only)	Flattening of supply chain; bias towards vertical integration
Cross-border supply chains	High level of import VAT and pressure for border exemptions	Bias against domestic supplies; reliance on imports and non-resident subcontractors (if import exemptions used)
Use of foreign currency	Large share of costs (and input VAT) incurred in foreign currency while refunds paid in local currency—exchange rate losses (if refunds delayed and local currency depreciates)	Deterred or reduced investment; use of (costly) hedging transactions
Operations in exclusive economic zones	Operations are outside the scope of the VAT (territorial or exterritorial model)	Bias towards offshore operations (territorial model)
Multinational companies (*supply chain*)	High level of import VAT on supplies from affiliated businesses	Bias against domestic supplies; ease of transfer pricing (especially if import exemptions used)
Multinational companies (*influence and power*)	Negotiation leverage/lobbying pressure for VAT relief	Ease of obtaining targeted VAT relief (often contractual)
Contractual arrangements	Convenient vehicle for tailoring VAT design	Ease of obtaining VAT reliefs and stability clauses
Perception of high rents	“A bird in the hand” issue	Reluctance to pay VAT refunds

Source: Authors

Figure 1: Share of Production Exported by Region and Income Level, 2018



Source: Authors. Data derived from Enerdata and EITI.; copper and gold export data reflect a sample of 15 major African mineral producers. Fossil fuels capture over 180 countries.

The high share of exports has important ramifications for the VAT—even if the extractive project moves to the production stage and has sales revenue, there is no output VAT as exports are zero-rated in line with the VAT's destination principle. If there is no or little domestic sales, EI companies would not be able to recover their input VAT through output VAT and, therefore, resort to refund claims. This situation is not much different from the pre-production stage; yet, it might be somewhat less pressing as the amounts of input VAT are typically lower during production compared to the exploration and development stage. Without access to timely refunds, EI companies (i.e., an operator and its partners where there is a joint venture) may be compelled to sell as much of their output as possible in the domestic market, which may not be efficient.[7] Distorting the location of sales may also reduce profits if the price received (net of transportation costs) is less than that offered by a foreign purchaser. This, in turn, decreases government revenues, especially since marginal tax rates for extraction activities are generally high (IMF 2012).

Extractive industries are capital intensive and spending for a single project often reaches billions of dollars per year.[8] The capital intensity varies with the type of project (with mining operations, especially coal mining, being relatively more labor intensive, and petroleum operations, especially gas liquefaction, being most capital intensive) and its phase (development and decommissioning requiring more capital inputs compared to

[7] It is thus comparable to the effects of an export tax. Export taxes and restrictions have generally failed to promote domestic value-addition and can reduce the value of extraction activities (Östensson 2019); as well as lead to unintended negative consequences, such as inefficient refineries and reduced resource rent capture (OIES 2019a).

[8] For example, capital costs make up roughly 80 percent of total costs and the average capital cost of a project is USD 150 million for sanctioned oil and gas projects in Africa, with many projects exceeding USD 1 billion (Rystad 2021).

production stage); yet, across all project types, capital cost are high and significantly exceed labor cost.[9] The low share of labor cost is amplified by the prevailing extractive business model whereby EI companies heavily rely on subcontractors and do not directly hire many employees (usually limiting them to local management, technical supervision, and office staff)—for example, subcontractors may make up 75 to 90 percent of total oil and gas costs (PWC 2016). For the VAT purposes, work performed by subcontractors, even if labor intensive, is billed as service and, as such, is subject to the VAT. Substituting hired labor with contracted services leads to higher amounts of input VAT.

Reliance on subcontractors has further implications for the VAT. As with labor, EI companies tend to acquire most of the goods as a service provided by contractors and subcontractors. In cases where there are differences in the level of taxation between goods and services, EI companies may choose to reduce the amount of input VAT by hiring a contractor to install equipment (and benefit from a lower rate on services) rather than buy goods directly, or by artificially bundling various goods and services. By the same token, they may prefer an operating lease rather than either a finance lease or outright acquisition of capital goods. The VAT regime would not impact any of these decisions if EI companies did not face a challenge with their input VAT recovery.[10] It is also common for EI companies to rely on a relatively small number of primary contractors which then choose to hire more specialized subcontractors to deliver work directly to EI companies. While the structure of a supply chain should not matter for the VAT, it very often does. This is the case where VAT regimes—general (legislated) or project specific (contractual)—provide certain benefits (e.g., exemptions or import deferrals) for extractive industries, but with benefits limited to petroleum and/or mining concession holders and, possibly, their first-tier contractors only. Such limitations may exert pressure for EI companies to adjust their supply chain and, in effect, undermine a project's efficiency.

Moreover, EI companies heavily rely on non-resident contractors and suppliers, usually due to limited availability of local expertise, technology, sophisticated equipment and quality goods and services required for EI operations. To incentivize domestic sourcing (and thus achieve a variety of policy objectives, including employment, industrial, and technological development), many mining and petroleum contracts (especially the latter) require EI investors to use a certain percentage of domestically-manufactured goods or domestically-supplied services (so called "local content requirement" or LCR).[11] Yet, the use of imported goods and services provided by non-resident contractors prevails and requires adequate VAT solutions that do not create a bias towards or against cross-border trade. Very often, however, countries' specific VAT measures (e.g., use of VAT import exemptions and/or the lack of a VAT reverse charge mechanism on services provided by non-residents) go against the neutrality principle and create an unlevel playing field between domestic and imported inputs.

Cross-border supply chains necessitate use of foreign currency (typically US dollars), leading to exchange rate risk. While this is true for any business involved in foreign trade, EI companies are particularly susceptible to

[9] Exploration and development costs are the largest contributors to total project costs and have low labor shares relative to production costs. Still, the direct labor cost share of production is roughly 10 percent (EIA 2016). Additional analysis of mining financial statements was done by the authors.

[10] The VAT treatment of finance and operating lease may have an impact on investors' decisions even if VAT refunds are paid timely. Bar income tax considerations, finance lease is more beneficial for companies as they may immediately claim input VAT on the underlying asset and also recover the VAT paid on the interest payment if these are taxable (and not exempt as part of the general exemption for financial services).

[11] For more on LCR see Stone, Messent and Flaig. 2015 and Olawuyi 2019.

such a risk. First, the share of foreign-sourced inputs—as noted above—is high. Second, unlike domestic businesses, EI companies typically keep their accounts and report financial outcomes in foreign currency. When refunds are delayed and the local currency depreciates (i.e., between the time when the input VAT is incurred and refunded), the EI company effectively receives a partial VAT refund since the VAT refund received in local currency is worth less in US dollars (or other foreign currency) than the input VAT paid.[12] The longer it takes for EI companies to receive a VAT refund the higher the risk of exchange rate losses or—put differently—increase in cost of doing business.[13] The sheer existence of such a risk may create an incentive for EI companies to lower or defer investment and/or engage in hedging transactions, including use of costly factoring services (if possible to arrange for the government debt).

It is not unusual for extractive operations, especially for petroleum (deep water drilling) and potentially mining (if seabed mining activity increases), to take place in the exclusive economic zone (i.e., beyond a country's territory, yet in the area where the country has exclusive rights to regulate and tax extractive operations). While there is usually little uncertainty with regards to the application of production or income taxes, whether extractive operations in exclusive economic zones attract VAT is not straightforward. A VAT may be strictly territorial (territory and territorial waters only) or extend to a country's exclusive economic zone.[14] While both models can be successfully implemented, they have distinct implications for input VAT payments and refund claims, as well as the number of taxpayers to be managed. In countries with a territorial VAT and ailing VAT refund mechanism, investors may be biased towards undertaking offshore operations (e.g., deep offshore projects and floating LNG processing ships) as imports and domestic supplies do not attract VAT (domestic supplies are treated as exports from the supplier's perspective).

Extractive industries are dominated by large multinational companies (Daniel et al. 2017). Typically, it raises concerns of profit shifting practices and income tax enforcement (Keen and Mullins 2017); yet, it has also two important implications for the VAT.

First (and related to the cross-border supply chain, discussed above), it creates natural incentive for EI companies to procure goods and services from within their own corporate group and affiliated contractors located outside the host country. Such import bias might be conducive to transfer-pricing practices and higher reported cost of inputs, leading to reduced profit in the host country. While typically it would not matter for the VAT, it does when the VAT design itself magnifies the bias towards imports (through exemptions for imported inputs—both goods and services) and potentially further facilitates transfer-pricing and the related profit shifting practices.

[12] It is in fact congruent to the risk of inflation, yet the exchange fluctuation is typically more pronounced over a shorter period of time.

[13] EI companies will realize exchange rate gains if the local currency appreciates, not an unlikely event in countries with large extractive sectors, however, this is typically associated with mature rather than nascent sectors (in the investment stage)—see more on the appreciation of the real exchange rate and the fear of Dutch Disease during oil export boom in Sachs (2007, p. 181-186).

[14] For example, most countries in the European Union, United Kingdom, Norway and India rely on territorial approach. Canada, Poland, Cyprus extend their VAT scope to include operations in their exclusive economic zones. Australia applies mixed approach – while in principle VAT territory does not extend to its exclusive economic zone, the extractive operations therein are included in the VAT scope.

Second, multinationals with large extractive operations can exercise significant influence over governments and lobby for VAT reliefs, usually without much regard for the reliefs impact on the local economy. Of course, the investors would not need to do so (nor have good justification for it) if they could register for the VAT and receive timely refunds of their excess VAT credits in the first place. Since this is often not the case, investors seek to secure various VAT reliefs that can limit their exposure to the input VAT. It is not uncommon for EI investors to enshrine these VAT reliefs directly in their petroleum or mining contracts, rather than in general legislation. Smaller domestic players—either their competitors (who have no access to similar VAT privileges) or suppliers (who end up with unrecoverable VAT)—do not have similar leverage and are put at disadvantage vis-a-vis foreign EI investors and their non-resident contractors.

The extractive industry is often dominated by contractual arrangements. This is mostly the case in the petroleum industry, where production sharing agreements are widely used, but also happens for mining. Whenever a petroleum or mining concession is accompanied by a contract—production sharing agreement, mining development agreement or a similar contract—it creates an opportunity for investors to negotiate fiscal terms, unless legislation explicitly prohibits it. Such contracts can, and often do, modify the general (legislated) VAT provisions, providing for various VAT reliefs and other special arrangements.[15] They can also provide fiscal stability clauses, including with regards to the VAT.[16] In addition to favoring large multinationals, the administrative burden increases when there are several different VAT regimes present within a country.

Importantly, extractive companies partner up to jointly undertake petroleum or mining operations—typically through an unincorporated joint venture (common in the petroleum industry) or mining partnerships, with underlying agreements conferring specific obligations to various partners. For example, a joint operating agreement typically assigns to the operating partner the responsibility for the project operations, including accounting. It raises important questions for the VAT design—for example, whether VAT is applied at the level of the joint venture (with responsibility for VAT accounting assigned to the operating partner) or each partner is subject to separate VAT accounting; and also how intra-project charges between partners (e.g., cash calls) are treated under the VAT. The contractual complexity and the nature of extractive operations calls for a well-designed VAT that recognizes the specific and genuine commercial structures for the industry.

Finally, EI projects can generate economic rents. While this is certainly not always the case, and projects may struggle to make any profit, the perception of high profitability persists and may influence the VAT design and implementation in the extractive sector. This may at first seem unrelated and contrary to what we already mentioned in the introduction: the VAT is not a tax that aims to tax profits, let alone rents. Yet, it is sometimes used as a tax of last resort or a tangible opportunity to receive some tax from EI companies where other taxes and fiscal instruments do not deliver the expected results. Governments adopt a “bird in the hand” approach to secure at least some tax revenue—they prefer to keep what is already available to them (input VAT) rather than return it and rely on a larger future benefit. Such approach is even more likely to materialize when the authorities anticipate that an EI company may cease its activities (e.g., due to license relinquishment or transfer of interest in a project). This is on the one hand due to a lack of trust in investors and, indeed, tax arbitrage practices give some credence to the governments’ reluctance to return excess input VAT. On the other hand, it

[15] Sometimes this is masked by a genuine need to provide clarity on the scope of the existing exemptions or other important VAT arrangements (e.g., on the territorial extent of the VAT or treatment of cash calls by UJV partners).

[16] In most cases, however, fiscal stability clauses focus on profit taxation or the overall tax burden.

is also a sign of an institutional weakness and the lack of belief that countries can capture profits (and rents) in an efficient way. Regardless, it is difficult to justify the “bird in the hand” tactic—the VAT should not be used to capture profits from extractive industries even if it presents an early opportunity and it is perceived that extractive companies can cope with it, as they might have already priced in the cost of unrecovered VAT when making the investment decision. [17]

3. Challenges in input VAT recovery

A well designed and administered VAT has the capacity to work well for the extractive industry. Despite its distinct features, the extractive sector can be well served by a broad-based VAT and—as it is the case in many advanced economies (e.g., Australia, Canada, Norway or United Kingdom) —does not require any special VAT schemes and measures. If EI companies can register as VAT payers, all their purchases and sales are subject to VAT, and if excess input tax credits are refunded promptly, the VAT remains neutral to investors, contractors, suppliers, and buyers. The government collects net VAT only where there is domestic consumption of hydrocarbons or minerals, and in this case, the tax falls on consumption rather than investment or production. While there might be instances where VAT laws need to address certain aspects of the extractive sector (e.g., with respect to offshore operations or unincorporated joint ventures), the standard VAT framework appears to be suitable for extractive industries and does not call for the government to intervene and correct for any shortcomings.

However, countries’ experience shows this is not always the case, and VAT regimes for extractive industries vary a lot. While there is a multitude of different VAT measures in use, they are invariably linked to challenges of input VAT recovery—denying VAT registration to investors or, more often, not providing timely refunds of excess input tax credits. Since EI companies (as discussed in Section 2) have no sales in the project’s early stages and, during production, a significant share of output is exported, they have substantial amounts of excess input tax credits and require uninhibited access to VAT refunds if the VAT is to remain neutral. Otherwise, EI companies experience higher cost of doing business, which reduces investment and production, and leads to various other distortions (bias towards import of service, self-supply and vertical integration, bias against exports, preference of offshore operations, etc., see discussion in Section 2).

To ensure companies have unconstrained access to VAT refunds certain conditions need to be met—EI companies should (1) be able to register as VAT payers as soon as they secure their petroleum or mining licenses, (2) be allowed to claim immediate refunds (or carry excess input tax credits for a very short time before making a refund claim), and (3) receive refund payments within a reasonable (and prescribed by law) period of time. Yet, this first-best policy approach is not always the case as some countries deny VAT registration during the pre-production period, mandate unlimited carry-forward of excess input tax credits or,

[17] Common perception (supported by anecdotal evidence) is that investors price in the cost of delayed VAT refunds (and other distortions caused by the VAT) when evaluating investment decisions.

most commonly, do not pay refunds on time even if they are legitimately claimed. These three topics are discussed in turn.

Deferred VAT Registration

Most VAT laws require companies to register for VAT once their taxable supplies exceed a certain threshold. Businesses with sales below such threshold can often voluntarily register. While EI companies exceed the VAT threshold once production starts, they typically have no sales during the investment period. To address this problem, most VAT regimes link the right to register to the expectation of future taxable sales. Yet, in some countries this rule is either subject to the tax authority's discretion or interpreted very narrowly (i.e., sales are expected to happen within the year of registration). Consequently, in these cases, EI companies cannot register for VAT until they start production and have taxable supplies (a policy referred to as deferred registration). This policy has been present, for example, in Ghana and Uganda.[18]

When an extractive company is denied VAT registration, it is impossible for it to recover the input VAT—since the company is not a VAT taxpayer, it cannot account for the VAT, file VAT returns, and claim VAT refunds. Effectively, during pre-production period extractive companies are treated as final consumers or VAT exempt businesses (e.g., financial institutions)—they pay VAT on their purchases without possibly to recover it through the VAT crediting mechanism.[19] While unrecoverable VAT typically enters the income account and VAT exempt companies can recover the cost of VAT under income taxes and/or production sharing, it is a partial and delayed recovery—up to the effective income tax/production sharing rates. The recovery of VAT through income taxes may be further undermined by loss carry-forward limitations.

In some cases of deferred VAT registration, countries allow businesses to bring to the VAT account all the input VAT accumulated during the pre-registration period. While in principle the total amount of the accumulated input VAT can be recovered upon the start of production, it happens only after several years and, thus, reduces the refund's net present value (it is in fact akin to a long delay in paying refunds). Simulations indicate that companies may be better off with a partial recovery of their input VAT through production sharing and income taxes (deferred VAT registration with no right to credit pre-registration input VAT), rather than waiting for the full

[18] Another variant of a VAT registration issue is requiring EI companies to register with a local tax office rather than with a large taxpayer office (e.g., a common practice in Tanzania). While technically VAT-registered, EI companies may face a significant slowdown in processing and paying VAT refunds—see discussion on 'Delayed VAT Refunds' further down in this Section.

[19] Registration constitutes a VAT payer (assigning a VAT number) and gives them the right to issue VAT invoices. Accordingly, EI companies not registered for the VAT cannot charge VAT on their sales if they materialized during pre-production stage (e.g., sale of data or other assets).

recovery through the VAT crediting mechanism upon the start of production if refunds are delayed upon VAT registration.[20]

Indefinite Carry of Excess Credits

Countries' approach to refunding excess input VAT credits varies. Some provide immediate refunds, some use a limited carry-forward system, and some resort to an indefinite carry-forward approach, where VAT payers have no right to claim a refund and must offset their excess credits against output VAT. The latter is common in Latin American countries but also used in Algeria, China, Madagascar, and Vietnam (Pessoa et al., 2021). However, in some countries with indefinite carry of excess credits, exceptions are often made to exporters (e.g., Madagascar, Morocco, Uruguay, Venezuela), investors (e.g., Venezuela, Vietnam), or specific industries. While extractive companies would often qualify (as investors during the pre-production stage and exporters during the production phase), it is still possible, at least in some countries, that they would have to carry their excess credits indefinitely.

Given the characteristics of extractive industries (see Section 2), an indefinite carry of excess credits implies that in most cases the input VAT can never be recovered, unless companies have substantial standard-rated domestic sales (and thus positive output VAT). Our simulations indicate that domestic sales would need to reach 50 percent to recover input VAT incurred during production and 60 percent to recovery input VAT incurred during the pre-production period in the first 5 years of production, but this is still at a large net present value cost.[21] Such policies create incentives for extractive companies to sell domestically; a result akin to export taxes. In practice, companies are more likely to push for the government to offer them exceptions to the general rule of indefinite carry—either through legislative carve-outs or contractual VAT concessions.

To ensure unconstrained recovery of the input VAT, extractive industries require an immediate refund system where investors can claim a refund at the end of the accounting period. The alternative—a limited carry-

[20] It is prudent to assume that in this case companies, even if technically VAT exempt (not registered for VAT), cannot recover their input VAT through income taxes and/or production sharing. If they had such a right during the pre-production stage, and then, upon registration, they could recover all accumulated input VAT through the VAT crediting mechanism, such approach would amount to a double dipping or a subsidy relative to just receiving a refund or deduction/cost recovery in nominal terms. From the investor's perspective, such "double dipping" with immediate refund payment is roughly equivalent to registering for VAT at the project start and receiving refunds with a 1.5-year delay in our base case scenario (see Section V)—if the project development period is longer or the effective tax rate on profit is lower, then equivalency requires a longer delay. Should companies treat VAT as cost for income tax purposes during the pre-production stage and then—upon registration—recover all accumulated VAT through the VAT crediting mechanism, the amount of VAT deducted for income tax purposes should treated as income and subject to taxation (deduction recouping).

[21] This result is sensitive to the project's capital intensity—a stylized oil project (see Annex for project details) with high capital costs requires 75 percent of domestic sales to recovery pre-production input VAT in the first 5 production years.

forward—is also a viable option but only for a country where domestic market for the mining or petroleum output exists and the period of the limited carry-forward is not excessive, ideally not more than 6 months.

Delayed VAT Refunds

The immediate refund system does not always guarantee that extractive companies receive timely refund payments. The delays in paying refunds can reach years and the stock of non-refunded VAT credits exceed several percentage points of a country's GDP.[22] Typically, they are caused by poor risk management (with tax administrations being incapacitated by the risk of fraud and thus resorting to extensive evaluation and audits of refund claims[23]) or simply by the lack of cash to pay the approved refund claims (Pessoa et al. 2021). This problem may be exacerbated for the extractive sector, where the sheer size of investment (hence amounts of VAT refund claims), relative to a country's GDP, makes the problem of paying VAT refunds especially acute. Delays in paying VAT refunds have grown to be a structural issue in some developing countries, e.g. in Mozambique, largely on account of extractive industries.

Delayed refunds adversely affect business cashflow and can significantly impact project profitability. To compensate for that EI companies should receive **interest on delayed refunds**.[24] This is, however, hardly practiced in developing countries, and even if the law foresees payment of interest on delayed refunds, companies may not receive them.[25] To fully compensate for the delay and ensure neutrality of the VAT the choice of interest rate is important. While it may vary project by project (and depend on a company's weighted average cost of capital), in most cases it would need to be substantially higher than the headline penalty interest rate on tax arrears, which is typically just a few percentage points above the market interest rate.[26] An interest rate equal to the company's hurdle rate theoretically leads refund delays to not impact investment decisions, while an interest rate above the government's cost of capital incentivizes the government to pay VAT refunds. Simulations evaluate the impact of various interest rates on a stylized project (Table 3).

Recognizing the fact that refunding VAT in cash is not always feasible (or most efficient in terms of compliance cost), some countries allow or even require refundable excess input tax credits be **offset against other tax**

[22] For example, the stock of Zambia's verified and unrefunded refund claims reached 1.5 percent of GDP in 2018 (IMF 2019).

[23] In countries with low administrative capacity the risk (or fear) of fraud is a genuine challenge, especially where a country might have experienced a high incidence of 'invoice mill' fraud. While EI companies often invoke their untarnished reputation and good tax compliance record, it may not be true in every case. There is thus some logic to cautious threading and refusal of refunds in doubtful cases.

[24] While paying interest on delayed refunds at a sufficiently high rate may preserve the value of refunds, it does not offer any protection against exchange rate fluctuation.

[25] Paying interest on delayed refunds may be especially challenging for countries where the underlying reason for the delay is lack of cash rather than inefficiencies in tax administration.

[26] Country's approach to setting interest rates on tax arrears varies. The rate may be fixed in legislation, linked to a central bank policy rate (discount rate, repo rate, lombard rate, etc.) or certain category of government securities.

liabilities, e.g., income taxes.[27] Abstaining from the accounting complexity, such an approach may be indeed of benefit in safeguarding company's cashflow and preserving the value of refunds.[28] However, it may only bear fruit if a company has sufficient tax liabilities to be used for the offset. This is usually problematic for EI companies—in early stages of their operations, where VAT refund needs are typically the highest, they pay very little in other taxes (likely only small amounts of withholding taxes on service payments to non-resident providers, payroll taxes, and tariffs). It may, however, be a viable option for EI companies when they move to the production stage and start paying royalties, production sharing, or profit taxes, but additional complexities may be introduced if these other payments are collected by a different government agency than that collecting the VAT (as is sometimes the case with royalties and production sharing). The use of offsets may also create an unlevel playing field—EI companies in a loss position or newcomers are inherently disadvantaged vis-à-vis those with profitable operations and/or companies with existing projects. Governance risks, especially in cases where offsets are discretionary, further undermine the overall attractiveness of offsetting refundable excess VAT credits against other tax liabilities.

VAT grouping offers yet another opportunity for EI companies to recover their input VAT without tax administration's involvement. Under such a scheme, companies belonging to a corporate group can register jointly for the VAT and become a single VAT taxpayer. As such, an entity that would have been in a refund position can use other entity's positive output VAT and recover its input VAT—a solution contrary to ring-fencing often used for profit taxes and production sharing where companies are required to keep separate accounts for each project or concession area.[29] Under VAT grouping, companies consolidate their VAT accounts at the group level and the group can traverse different sectors of economic activities. However, for the VAT grouping to be of benefit for EI companies, there would have to be entities with positive VAT liability within the corporate group, which may not be common in the extractive sector, especially in the petroleum sector dominated by international companies with very limited presence in other sectors of the economy. Yet, it may be useful where ring-fencing rules or business requirements (e.g., related to financing) lead to establishing

[27] In some countries, e.g., Zambia, offsetting VAT refunds against other tax payments is possible only at the tax authority's discretion. Experience shows that in such cases offsetting may only be allowed occasionally (e.g., in Mozambique during the Covid-19 pandemic only) and often with respect to small amounts only. Such approach brings about another layer of uncertainty for EI investors, which renders the offsetting mechanism as a rather unreliable mechanism for consistent VAT recovery.

[28] Accounting of offsets proves to be very challenging for tax administrations, especially in developing countries where IT solutions and accounting software lack sophistication. Without well-established procedures, quality records and due diligence it is difficult to keep track of taxpayers' actual refund positions which only adds to disputes and uncertainty. Lack of proper accounting of offsets also blurs the overall picture of tax collections, often overstating revenue productivity of VAT and undermining that of other taxes.

[29] The use of ring-fencing for income tax purposes should not preclude companies from using VAT grouping. While the complexity of accounting should be properly weighed, the benefit of unconstrained input VAT recovery should outweigh the accounting cost.

midstream operations (e.g., liquefaction, mineral processing operations) or development of projects in a different license area as a separate company and one of the related companies has positive output VAT.

4. Common VAT schemes in extractive industries

Difficulties in recovering input VAT are by far the major challenge for extractive industries in the realm of the VAT. Rather than ensuring proper management of the excess input tax credits and refunding them in a timely way, countries tend to look for substitute solutions. Very often they decide to introduce measures that would limit the amount of input VAT (and, thus, reduce demand for refunds) in the first place (e.g., VAT exemptions) or otherwise alleviate the existing problem with imperfect alternatives to recovery input VAT (e.g., through offsetting excess credits against other tax liabilities or partial VAT recovery through income taxes and/or production sharing).

The reluctance to impose a broad-based VAT is sometimes exacerbated by the argument that there is often no net VAT to be collected from the extractive industry (if all output is exported) and all input VAT is refunded anyway. As such, governments seem to have weak incentives to incur the cost of administering the VAT in the extractive industry and prefer to grant VAT concessions to investors. While many countries resort to such concessions only after having experienced challenges in timely payment of refunds (and having been pressured by investors), some adopted various VAT reliefs for the extractive sector a priori, at the time of their VAT introduction (most recently, e.g., Angola). This often creates a perception that extractive industries require VAT reliefs. They do not; yet special treatment persists.

VAT concessions for extractive industries might be included in the general VAT legislation, sectoral legislation or even investment promotion legislation. While the latter may imply that they are offered as an investment incentive, they do not convey any benefit relative to a standard VAT with unconstrained input VAT recovery—as already mentioned, the underlying reason for the provision of VAT concessions is to limit the amount of input VAT and reduce demand for VAT refunds. It is also not uncommon for EI investors to negotiate and include VAT reliefs in project-specific contracts to confirm and stabilize the existing (legislated) VAT reliefs or expand them. For example, Benin does not offer any VAT reliefs to oil companies but in practice they secure VAT exemptions in their respective contracts. Chad offers a blanket VAT exemption to EI companies, but its scope is specified in respective contracts.

VAT concessions for the extractive industry typically focus on the input side. While there is no shortage of country examples where specific mining or petroleum products (e.g., natural gas, LPG) are subject to non-standard VAT rate,[30] such policy—as much as it is questionable on other grounds—does not pose a major challenge for EI companies (though it may reduce the amount of output VAT available for the input VAT recovery, a challenge if an indefinite carry of excess credits is used or VAT refunds are not paid on time). VAT exemptions on mining or petroleum output (with no right to input credit deduction) are hardly ever used, but would create a significant disincentive for EI companies to sell their products into the domestic market,

[30] For example, reduced rates for gasoline and/or diesel are provided in Eswatini, Kenya, Maldives, Mongolia, South Africa, and Zambia (EY 2021).

including to domestic processors (i.e., a refinery or smelter) prior to export.[31] It would be equally distortive, if a country exempted, rather than zero-rated exports (as is the case with gold in Mongolia).

The most common VAT measures—apart from those already discussed in Section 3, which are directly related to input VAT recovery (administrative measures)—include **VAT exemptions and/or VAT zero-rating** of goods and services purchased by EI companies. While both exemptions and zero-ratings result in no input VAT for the buyers they have different consequences for the suppliers—under the zero-rating scheme, suppliers can recover their input VAT whereas they do not receive any credits for the input VAT where their supplies are exempt. Depending on market conditions and suppliers' ability to pass the unrecovered input VAT onto buyers, exemptions offer a reduced benefit compared to zero-ratings and are typically not a preferred option for businesses, including EI companies. In the case of a full pass-through, supplies by domestic businesses are more expensive compared to imports (creating a bias towards imports), all else equal; and where no pass-through is feasible, VAT exemption disadvantages domestic suppliers by squeezing their profit margins and/or wages they pay (creating bias against transacting with EI companies and reducing market growth opportunities). See Section V for a quantification of this impact.

Rather than benefiting from exemptions, goods imported by EI companies may be instead subject to a **VAT deferral** (as is the case in Australia, Tanzania, etc.). In such a case, importers are not required to pay VAT upon importation (to clear goods) but account for it—similarly to a reverse charge mechanism (or self-billing)—in their next VAT return by reporting VAT due and VAT recoverable at the same time, implying no cash involvement.[32] While both import exemptions and a VAT deferral are economically equivalent (no VAT is paid), VAT deferral allows for a more targeted delivery of no-VAT benefit—it can be designed in a subjective manner (i.e., by linking the measure to a taxpayer rather than a good) and better monitored through a filing requirement. However, unlike exemptions, the VAT deferral scheme cannot be used with respect to domestic supplies, although **a reverse charge**—a vehicle primarily used to tax services provided by non-resident businesses—would achieve the same results. While the reverse charge is not in itself designed as a VAT relief,[33] it does in fact lead to no net VAT burden for a VAT registered business—accounting for both output and input VAT at the same time, as is the case with a VAT deferral, results in a wash and no VAT is paid. Similar results can be achieved in the domestic context—since it is the buyer that accounts for the VAT, it is possible to cancel the input and output VAT out, rather than pay it to the supplier in the first place and then request a refund.

Some countries (e.g., Uganda, Ghana, Mozambique) have used **VAT deeming** with respect to domestic supplies made to EI companies; an approach akin to a full VAT withholding, where suppliers charge VAT on

[31] This assumes that the processor buys the commodity from the miner, rather than enters into a tolling agreement where the miner retains rights to the commodity but pays a processing fee to the processor for its service.

[32] A deferred VAT needs to be distinguished from a VAT suspension (or temporary VAT exemption) typically used with respect to certain types of imports (e.g., inward processing, transit, re-export, etc.) and, oftentimes, requiring a financial guarantee or bond. In the extractive industry the VAT suspension regime can be of benefit where special equipment is imported to be temporarily used in certain work (e.g., exploration, construction) and is then re-exported. It is, however, not a viable option for general imports.

[33] A VAT reverse charge for domestic supplies is a special VAT scheme intended to address a missing trader fraud, i.e., situations where suppliers issue VAT invoices, receive VAT and never remit it to the state. By shifting the obligation to account for and remit the VAT to the buyer the risk of VAT loss is significantly reduced.

their supplies but do not receive the actual amount of VAT from the buyers—the buyers withhold the VAT from the payment and instead of remitting it to the state (as it would be the case under full VAT withholding), they retain it.[34] The VAT is thus deemed to have been paid by the buyer and received by the supplier; the buyer—an EI company (or its direct contractor)—effectively pays no input VAT on its purchases. It follows, buyers are not allowed take credit for the input VAT deemed to have been paid. In Uganda, the deemed VAT scheme is implemented in its simplest form—suppliers account for the VAT, issue an invoice showing the amount of VAT charged but receive no cash for the VAT portion of the price (they are paid only for the value of the underlying supply, net of VAT). In Ghana, EI companies receive from the Ghana Revenue Authority special forms (so called VAT Relief Purchase Orders or VRPOs), which they fill in with the amount of VAT charged by suppliers and furnish such forms to suppliers in lieu of cash payment for the charged VAT. In Mozambique, so-called Rationalization Notes are used.[35] The VRPOs or Rationalization Notes serve the purpose of certification; while effectively these documents become securities, suppliers cannot use them as vouchers and redeem for cash—they only extinguish the supplier's VAT liability with respect to supplies made to EI companies. If suppliers find themselves in a refund position they have to seek refunds through a standard VAT refund system.

The above-mentioned schemes—reverse VAT charge and deemed VAT—are economically equivalent to VAT zero-rating, both for buyers and suppliers. EI companies do not incur any input VAT and their suppliers have no output to be used for offsetting their input credits, leading them to be in a refund position (unless they have enough output VAT on fully taxable supplies to other buyers). All three schemes—if used with respect to EI companies—are subjective measures, requiring suppliers to carefully identify their buyers to ensure their eligibility for the scheme, a task driving up compliance cost. The reverse charge and deemed VAT carry additional compliance cost and risk for the suppliers—their right to forgo VAT payment on supplies made to EI companies depends on certification received from those companies. If no certification is received (e.g., copy of invoice showing that VAT was accounted for under the reverse charge by the buyer or a similar proof in the case of a deemed VAT, e.g., the Ghanaian VRPO) suppliers are responsible for paying the output VAT, even if it was not paid to them. While such risk may not be high in the case of transacting with reputable EI companies, it is higher than in the case of zero-rating where supplies are not dependable on any form of certification. In turn, zero-rating increases the risk of non-compliance by suppliers—they have more opportunities to sell their goods and services to non-eligible buyers and there is no additional layer of verification or prevention mechanism.

A partial withholding—with remittance of the withheld amounts to the state—is also possible. While many countries rely on standard VAT withholding (where withheld amounts are remitted to the state by the withholding agent, i.e., the purchaser of goods or services) for certain sectors (e.g., construction sector), this measure is hardly ever used in extractive industries, with a notable exception of Zambia. This is largely due to low compliance risks of extractive industries and the fact that the standard VAT withholding does not offer any

[34] While initially used in Uganda for EI companies only, the deemed VAT regime has been requested by other sectors, including NGOs and the project that they funded. The spread of the deemed regime proved to be overwhelming for tax authorities which did not have enough resources to monitor potential fraud.

[35] The new regime, introduced in June 2022, requires EI companies (including second-tier contractors and SPVs) to register for the VAT deeming scheme and obtain a booklet of numbered Rationalization Notes. It applies to all stages of EI project operations. Certain conditions have to be met by some of the companies, e.g., EI companies need to invest at least $25 million annually and, during the production phase (from the second year onward), 75 percent of output is exported.

benefit for EI companies in terms of their input VAT recovery. A partial VAT withholding without remittance—or **partial VAT deeming**—would allow EI companies to reduce their input VAT and thus limit their exposure to the risk of delayed refunds. If the supplier has inputs of USD 100 and outputs of USD 200, the VAT rate is 10 percent, and the withholding rate is 50 percent, then the investor is charged USD 20 in input VAT (i.e., USD 200 * 10 percent). The investor withholds and retains USD 10 in input VAT (e.g., USD 20 * 50 percent), while the remaining USD 10 is paid to the domestic supplier and used to credit the supplier's input VAT. The investor uses the withheld USD 10 to partially offset its excess VAT credit. In effect, no VAT is remitted to government. The partial VAT deeming scheme is economically equivalent to a VAT reduced rate for supplies to investors, the difference being the mode of implementation and distribution of risk (see more discussion on the design of this measure in Section V, specifically Box 1).

Some countries (e.g., Mozambique) experimented with 'exterritorial VAT' or a '**no VAT zone**' in cases where EI companies were given the status of an operator in a special economic zone or export processing zone and thus shielded from dealing with tax authorities.[36] In such a setting, EI companies are deemed to be outside the customs (and VAT) territory; as such, all supplies to EI companies by domestic businesses are deemed to be exported and thus zero-rated. Supplies by non-residents are outside the scope of VAT (they are deemed not to be imports) and do not attract VAT either. In effect, EI companies gain exterritorial status for VAT purposes, as is often the case for those operating in exclusive economic zones, e.g., offshore floating LNG vessels. The no VAT zones bring about similar challenges as subjective zero-rating would—without mitigation measures and strong compliance it may be prone to abuse. Due to the need to collect VAT on sales into the domestic market, additional avenues for non-compliance and revenue leakage might open, requiring thus even more oversight by the tax administration. Importantly, offering a 'no VAT zone' regime carries additional risk of automatically conveying additional tax privileges (beyond VAT) that are often available to investors in special economic zones.

Finally, a **deduction against income**—for profit taxes and other fiscal instruments' purposes—may sometimes be used for partially alleviating the VAT burden (usually because of non-registration for VAT or otherwise exempt status of EI companies). In such a case, EI companies are treated as VAT exempt entities—they can include input VAT as cost in their income account and reduce taxable income.

The VAT measures (exemptions, zero-ratings, deferrals, deeming, etc.) come in many forms and shapes. Very often they are time-limited and apply only during the specific stage of an extractive project's life (e.g., exploration or/and development stage; as is the case in Central African Republic and Tanzania), for a certain number of years (e.g., 5 years from the issuance of an exploration license, e.g., Mozambique), until the final investment decision or any other period. While these measures are of most benefit during early stages of a project (when most investment is undertaken), in some countries (e.g., Azerbaijan, Democratic Republic of the Congo (DRC), Zambia) they might be available—be it in general or per contractual arrangements—throughout the project life, including production and decommissioning.

The VAT measures can also be selective (i.e., applicable only to specific categories of goods and services). The prescribed list can use broad categories (e.g., goods, capital goods, machinery) or contain a very detailed

[36] Use of special economic zones (natural resource-based zones) is more common in the midstream segment (oil refineries, gas and mineral processing), e.g., Nigeria or Indonesia (UNCTAD 2019).

list of specific items that qualify. Equally, some of the measures can be only applicable to imports (exemptions, deferral) and some to domestic purchases only (zero-rating, deeming) or both (exemptions, reverse charge).

While EI companies may benefit from generally available VAT reliefs (e.g., purchases from small taxpayers, exemption of financial services, import VAT exemption for capital goods, etc.) very often the VAT measures offered to extractive industries are subjective—they can be used only by entities with specific operations. The most common case for EI companies is to benefit from VAT reliefs (usually exemption for imports and zero-rating of domestic purchases) available to exporters (e.g., Cambodia). Depending on the scope of operations, VAT measures may be accessible by petroleum companies but not mining companies (as is largely the case in Ghana), or upstream projects but not necessarily the midstream ones. Finally, the scope of the VAT measures can have vertical coverage limitations—it may be available to license holders but not their contractors, or to license holders and the first layer of contractors but not to their subcontractors (e.g., Azerbaijan). Some countries (e.g., Cameroon) do not use any vertical limitation and exempt any supplies made in connection with the EI contract, project, or operations. Some (e.g., Gabon) use a similar approach but only during the exploration and development stage (during the production stages VAT reliefs accrue only to license holders). If contractual arrangements are accounted for, the menu of available exemptions and other measures (their timing, scope, and coverage) can also vary project by project, effectively creating multiple VAT regimes.

5. Evaluation of select VAT schemes

In this section, we quantify the impact of various VAT schemes on investment decisions to help identify second-best solutions to paying immediately refunds. The assessment uses sensitivity analysis on key assumptions to illustrate the impact of VAT designs in various contexts.

Table 2: VAT Schemes Evaluated

Category	Description	Input VAT	Treatment of excess input VAT	Country examples
Standard VAT	VAT, without adjustments	Yes	Refund	Australia, Canada, Chile, South Africa, United Kingdom
Policy solutions	Imports exempt; domestic supplies taxable	No for imports	Refund	DRC, Ghana, Madagascar, Sierra Leone, Tanzania
	Imports exempt; domestic supplies zero-rated (equivalent to a no VAT zone)	No	N/A—no input VAT paid	Equatorial Guinea
	Both imports and domestic supplies exempt	No	N/A—VAT embedded in input price added to costs	Central African Republic
	Partial deeming; imports exempt and domestic supplies taxable	No for imports	Investor withholds and retains a portion of input VAT; supplier receives residual	--
	Cost recovery and tax deduction	Yes	Added to costs	Mongolia
Admin. Solutions	Non-VAT tax liability offset	Yes	Offset against other payments	Colombia, Ghana, Mongolia, Turkiye, Zambia
	Interest on unrefunded input VAT	Yes	Refund with interest	Botswana, Kazakhstan, Russia, South Africa

VAT schemes are assessed using the IMF's FARI methodology, which employs a discounted cash-flow model applied to a stylized oil project.[37] The approach allocates an oil project's pre-tax cash flow (i.e., revenues less costs) to the investor and government, according to a given set of tax and non-tax parameters. All non-VAT fiscal parameters are held constant across VAT designs so that the results isolate the impact of each VAT design on indicators measuring government take, investor profitability, and fiscal regime distortions. See Appendix A-C for details, limitations, and assumptions.

The VAT regimes modelled include a broad-based VAT with immediate refunds and common alternatives applied in practice (Table 2). The alternatives include policy solutions (such as exemptions for imports and/or domestic supplies, zero-rating domestic supplies, and tax deductibility and cost recovery) and administrative solutions (such as interest on non-refunded VAT and tax offsets). The analysis also covers the impact of deferred VAT registration on investor outcomes and the relationship between VAT policy solutions and domestic suppliers' profitability. Policies that are rare, less material, or difficult to model at the project-level are excluded—these include VAT grouping and limits on input VAT deductibility for specific cost categories.

[37] Sensitivity analysis varies key parameters to illustrate the impact of the VAT design on projects that more closely reflect mining and liquefied natural gas projects, such as the exploration and development period length and underlying fiscal regime stringency. Therefore, results are considered to be generally applicable to non-oil projects, although mining and LNG projects were not explicitly modelled.

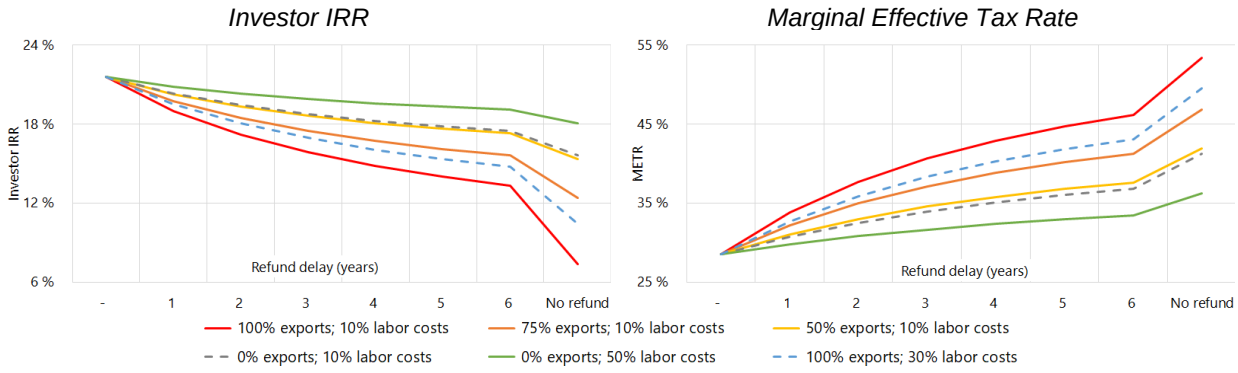
Standard VAT and delayed refunds

The VAT does not affect investor profitability, investment in marginal projects, or raise government revenue when refunds are provided immediately (left-most points in Figure 2). However, as refund delays increase, the burden on investor outcomes progressively increases, indicated by a falling investor IRR and rising marginal effective tax rate (METR). The adverse impact of delayed refunds is reduced if more output is sold domestically (as this increases investor's output VAT)[38] or labor costs make up a greater share of total costs (as this decreases investor's input VAT). It cannot, however, be eliminated even if all output is sold domestically due to long production lead time (and eliminating non-labor costs is utterly unrealistic) so the investor always pays some input VAT without corresponding output VAT prior to production.

In our base case scenario (red line in Figure 2), a VAT refund delay of 3 years reduces the investor's post-tax IRR by 6 percentage points (p.p.). and increases the METR from 29 to 41 percent—in other terms, this impact on investor post-tax IRR is equivalent to increasing the royalty rate or CIT rate by 8 and 22 p.p., respectively (i.e., the investor would be indifferent between a 3-year VAT refund delay and 8 p.p. higher royalty rate if VAT refunds were paid immediately). This illustrates that reducing the delay in paying VAT refunds would provide governments with the space to introduce higher royalty rates (which provide a stable and relatively easy to administer source of revenue), more progressive fiscal mechanisms (which encourage investment and provide government with a greater share of project upside), and/or incentivize investment in marginal projects (through removing the distortive nature of delayed VAT refunds). While results are fairly robust across project types, the impact of the VAT refund delay on investor profitability varies somewhat with the capital intensity of the project—VAT refund delays have a greater impact on profitability for more capital-intensive projects (see Appendix D for an illustration).

In the extreme case where VAT refunds are not paid, the stylized project goes from significantly profitable to likely unviable (investor IRR of 7 percent, METR of 53 percent), unless a large portion of output is sold domestically and/or labor costs are high. In the no refund scenario, the VAT acts directly as a tax on non-labor inputs, which increases costs by the VAT rate multiplied by the share of inputs that is subject to VAT (13.5 percent increases in costs or USD 5.3 per barrel of production in our base case example).

Figure 2: Evaluation of a Standard VAT



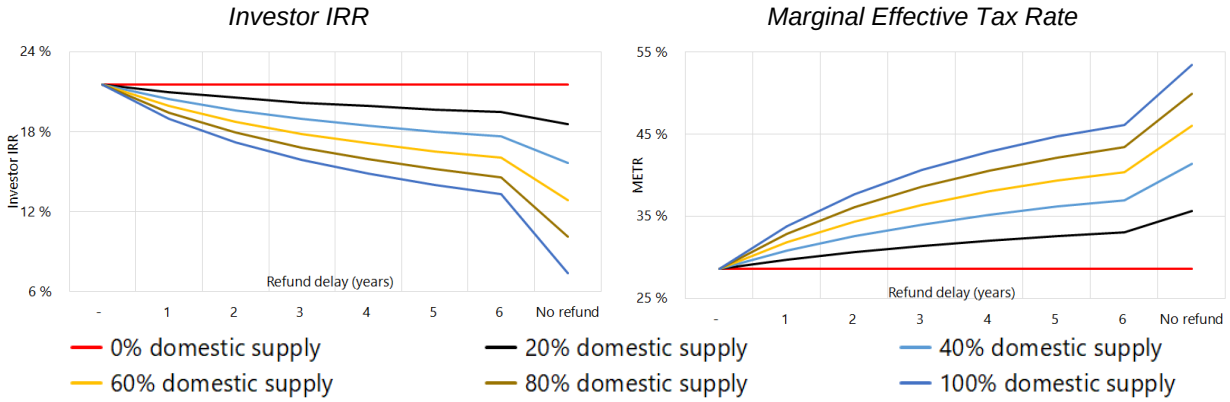
[38] Note that the marginal impact of increasing domestic sales disappears once output VAT on domestic sales equals input VAT. In the stylized project, this point is reached at around 70 percent of output sold domestically.

Source: Authors' calculations, FARI model. Investor IRR and METR for the stylized project by varying the share of output that is exported and share of costs that are labor.

Policy solution 1: Exempt VAT on imports with domestic supply taxable

Exempting imports while taxing domestic supplies reduces the impact of delayed refunds (relative to a standard VAT) but creates a bias against domestic firms.[39] As the share of domestic inputs increases, the investors' IRR falls and the fiscal regime becomes more distortive (Figure 3).[40] For example, the investor's IRR decreases by 3 p.p. and the METR increases by 6 p.p. when refunds are delayed by 3 years and half of the supplies come from domestic companies while the investor's IRR and METR are unaffected by refund delays if all costs are imported. Still, this is a significant improvement from the investor's perspective since a high proportion of costs are (generally) imported and the investor may not have strong incentives to promote domestic industry.

Figure 3: Evaluation of Exempt Imports and Taxable Domestic Supply



Source: Authors' calculations, FARI model. Investor IRR and METR for the stylized project by varying the share of costs that are provided by domestic suppliers, rather than imported.

Policy solution: Exempt VAT on imports with (2) domestic supplies zero-rated or (3) domestic supplies exempt

When imports are exempt and domestic supplies are zero-rated or exempt, the investor does not pay input VAT and, thus, the VAT is neutral (assuming domestic suppliers cannot pass-on the cost of refund delays or unrecovered input VAT to investors). This means that investor and government outcomes are equivalent to a fiscal regime without a VAT or with immediately paid refunds, regardless of the underlying project characteristics.

While zero-rating domestic supplies is favorable to the investor, it causes domestic suppliers to be in a refund position as they have no output VAT to credit against their input VAT (if they primarily supply to zero-rated

[39] Other VAT policies with similar implications include VAT reserve charge for imports and zero-rating a positive list of machinery and equipment purchased and used by extractive investors (e.g., Papua New Guinea and Zambia).

[40] The cost of purchasing domestic supplies relative to imports is equal to (1 + discount rate) ^ refund delay length in years. In other words, the bias against domestic supplies increases at higher investor's discount rates and longer refund delays.

extractive industry companies). Thus, such policy solutions push the delayed refund issue onto domestic suppliers. This has several adverse effects, including that it burdens domestic industry and local value-addition, both of which are often policymaker's objectives in resource-rich countries, and domestic firms likely have a much higher cost of capital than do multi-national investors, which increases the overall cost of refund delays under certain assumptions.[41]

Similarly, when imports and domestic supplies are exempt, the VAT is neutral from the investor's perspective (because it does not pay any input VAT). This policy does aggravate domestic suppliers' refund position since they can no longer recover the input VAT paid on their purchases, but (assuming no pass-through of costs to purchasers) it does not create additional burden to investors.

Policy solutions 1-3 with behavioral responses

The results above assume that the domestic supplier cannot pass-through the cost of unreclaimable input VAT (in the case of exemptions on domestic supplies) or expected refund delays (in the case of zero-rated output) to the investor. The extent to which a supplier can pass-through costs depends on whether there are substitutes (i.e., alternative domestic or foreign suppliers of similar goods and/or services) that are not subject to the cost imposed by the domestic zero-rating or exemptions. For example, if there are no competitive foreign suppliers of a particular good or service,[42] then domestic firms have a greater ability to charge higher prices (i.e., a greater proportion of the cost is passed-through). In turn, higher supplier prices (due to higher pass-through) reduce the impact of the VAT on supplier's profit margin but increase the cost of inputs for the investor and, thus, reduce the EI company's profit. In other words, the cost of VAT exemptions or delayed refunds is paid (or shared) by the investor through paying higher post-tax prices for inputs when costs are passed-through.

Investor results and the fiscal regime's distortion are very sensitive to the pass-through assumption when the share of domestic costs is high (See Appendix E for equations describing the relationship between pass-through, exemptions, and zero-rating.

Figure 4).[43,44] However, regardless of the pass-through assumption, zero-rating domestic supplies is likely preferred from both the investor and domestic supplier's perspective relative to an exemption (illustrated by improved investor outcomes under zero-rating compared to exemption at any given pass-through assumption, See Appendix E for equations describing the relationship between pass-through, exemptions, and zero-rating.

Figure 4). This is because input VAT paid is identical under the two policies, but zero-rating results in no net VAT collected by the government in nominal terms, with the only cost to the supplier coming from the net present value loss due to the delay of the refund. Under the exemption scenario, input VAT is never reclaimed,

[41] Whether the cost of a refund delay is greater for the supplier or investor depends on the supplier's value-added and difference in cost of capital. A greater domestic supplier value-added and lower discount rate disproportionately decrease the cost of refund delays for the supplier relative to the investor.

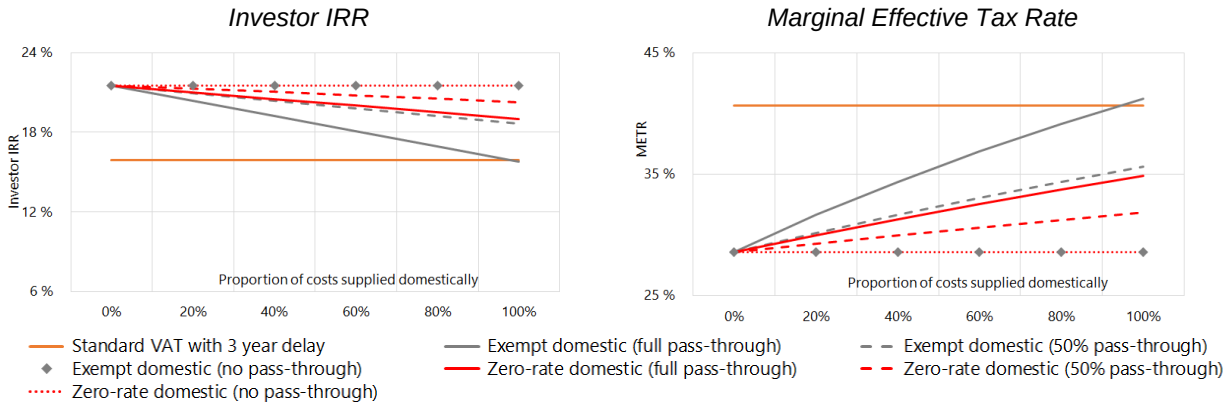
[42] This is more likely to be the case for goods and services more dependent on labor, as labor is non-tradable and generally cheaper in resource-rich, developing countries.

[43] This analysis ignores differences in discount rates between the investor and domestic firm.

[44] A scenario of high domestic costs and pass-through is unlikely to occur as the investor could find imported alternatives for non-labor inputs but, perhaps, could occur with stringent local content rules.

leading to positive nominal net VAT paid to government. In the extreme case where refunds are never paid, the two policies are equivalent. See Appendix E for equations describing the relationship between pass-through, exemptions, and zero-rating.

Figure 4: Evaluation of Domestic Exemption and Zero-Rating



Source: Authors' calculations, FARI model. Investor IRR and METR for the stylized project by varying the pass-through of costs from the supplier to the investor for zero-rating (red lines) and exemptions (grey lines), compared to a standard VAT with 3-year delay (orange line).

Zero-rating domestic suppliers decreases the total VAT refund required, compared to a standard VAT, since the domestic suppliers' inputs are less than that of the investor (i.e., domestic suppliers outputs equal the investor's inputs). The reduction in refund required is equal to the domestic supplier's value-added multiplied by the VAT rate.[45] This means that, on net, the entirety of the supply chain requires less VAT refunds, reducing the impact of delayed refunds on the overall project viability (assuming that discount rates are equal between the investor and domestic supplier).

Nevertheless, there are various qualitative and political considerations in shifting the VAT refund issue from the investor to domestic suppliers through zero-rating—these issues are discussed in more detail Section 3 and consolidated in Section 6, while additional analysis on the impact of pass-through assumptions on domestic suppliers' profitability is provided at the end of this section. The following sub-section offers a potential solution that balances the bias against domestic suppliers, impact on investor profitability, and fiscal regime distortion.

Policy solution 4: Partial deeming

A solution in between full taxation and domestic zero-rating, which we are calling partial deeming, is to allow investors to withhold a portion of their input VAT, with the reminder available for the domestic supplier to recover its own input VAT and remit any excess output VAT to the government at the end of the accounting period. A numerical example is provided in Box 1. This policy both (1) avoids putting the domestic supplier in a

[45] When the supplier is zero-rated, the refund amount is equal to the domestic supplier's inputs multiplied by the VAT rate. If the supplier is not zero-rated and all production is exported, the refund amount is equal to the domestic supplier's outputs multiplied by the VAT rate. The domestic supplier's output equals inputs plus value-added so the difference in input VAT paid between the two scenarios is the domestic supplier's value-added multiplied by the VAT rate.

refund position, if the withholding rate is low enough for there to be sufficient VAT allocated to the supplier to offset its input VAT and (2) effectively reduces the input VAT paid by the investor, decreasing the cost of delayed VAT refunds.

Box 1: Numerical example of partial deeming

Assume that the supplier and investor only have one transaction during the VAT accounting period, the VAT rate is 10 percent, the supplier has inputs of 100 and value-added of 100 percent, and the VAT withholding rate is 25 percent.

The supplier pays 10 in VAT on its inputs and sells to the investor at 220 (inclusive of 20 in output VAT). The investor withholds 5 in VAT (25 percent of 20 in suppliers' output VAT), while the supplier keeps the remaining 15 until the end of the VAT accounting period. At the end of the VAT accounting period, the supplier credits its input VAT (which was 10) against the remaining 15 and then remits the remainder to government (which is 5). The investor requests a refund for the input VAT that it has paid and not withheld (5 in withheld VAT minus the 20 in input VAT equals 15 in VAT refund requested by the investor). In this example, it is assumed that the investor has no output VAT during the period (i.e., production has not begun or all production is exported).

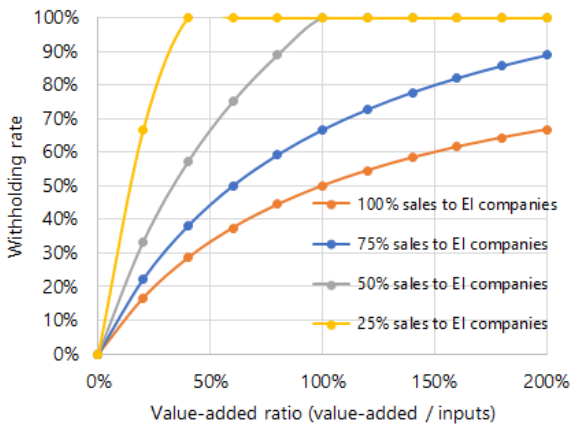
The economic impact of partial deeming on the supplier and investor is equivalent that of a reduced VAT rate for the supply to the investor, with the reduced rate equal to the standard rate multiplied by 1 minus the withholding rate (7.5 percent in the above example; 75 percent * 10 percent). If the reduced rate is 7.5 percent, the supplier pays input VAT of 10 (since the supplier pays the standard rate on its purchases) and charges output VAT of 15 (7.5 percent * output of 200). The supplier remits 5 to the government (output VAT of 15 minus input VAT of 10) and the investor requests a refund on its input VAT of 15.

Under a standard VAT, the investor would have had excess VAT credit of 20, rather than 15, so its refund request has fallen by 25 percent (which is the withholding rate).

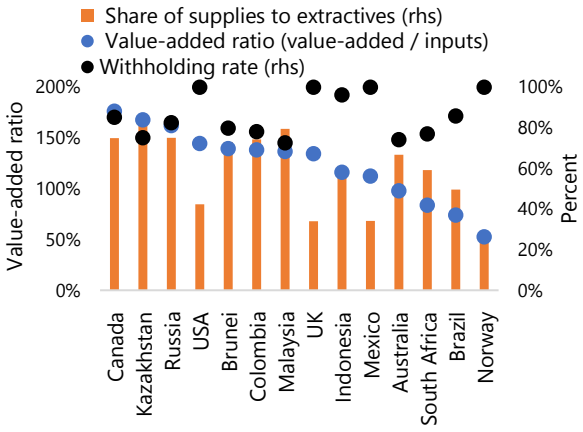
The withholding rate would need to be carefully set as the withholding rate impacts the extent to which suppliers and EI company require refunds. Appendix F shows the withholding rate that results in the domestic supplier having exactly enough output VAT to credit against its input VAT (Figure 5 for graphical illustration). All else equal, the withholding rate needed for domestic suppliers to avoid refunds is higher when (i) the share of sales to EI companies decreases because this results in fewer sales in which a portion of output VAT is withheld from the supplier (sales to non-EI companies would not have a portion of output VAT withheld) and (ii) the value-added of the supplier increases since this results in less input VAT relative to output VAT and, thus, a smaller portion of the output needed to recover input VAT. The EI investor prefers a larger withholding rate since this allows the investor to retain a greater portion of its input VAT and require a smaller refund.

Figure 5: Withholding Rate vs. Value-Added (Across Countries)

Value-added vs. withholding rate vs. sales to resource sector



Value-added, supplies to extractive companies and withholding rates by country



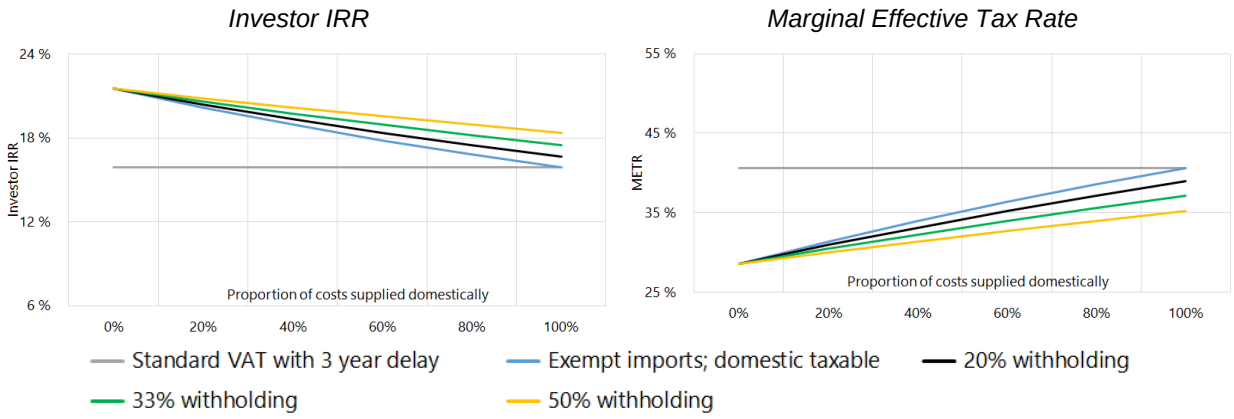
Source: OECD input-output tables, authors' calculations.

Ideally, the withholding rate would be set at the transaction- or supplier-level but this is not administratively feasible and, therefore, a single withholding rate applicable to all suppliers is likely needed. The rate could be set conservatively low to avoid putting domestic suppliers with a high share of supplies to extractive investors and low value-added in a refund position (if that is indeed the policy objective). While more detailed country-specific analysis would be needed to design policy, a withholding rate of around 50 percent may be relevant for countries where it is expected that suppliers to extractive companies do not supply to other sectors or have low value-added—for example, a withholding rate of above 70 percent would allow the average supplier to an extractive investor to reclaim their input VAT in all countries analyzed (Figure 5).[46]

Assuming a fixed refund delay, the policy is also preferred by the investor over a standard VAT and taxing domestic supplies with imports being exempt (Figure 6), increasing the investor post-tax IRR by 2 and 3 p.p. (relative to fully taxing domestic supplies) when the withholding rate is 33 and 50 percent and domestic supplies make-up half of total costs, respectively. The fiscal regime's distortion on marginal project is also significantly decreased—a 2 to 4 p.p. decrease in the METR with a withholding rate of 33 to 50 percent and half domestic supplies.

[46] Value-added reflects total value-added for "mining support service activities" in an economy, rather than only supplies to extractive industry firms due to a lack of data availability. The share of total supplies to all EI firms also only reflects data for "mining support service activities". The full set of suppliers to EI investors would include other types of firms.

Figure 6: Evaluation of Partial Deeming



Source: Authors' calculations, FARI model. All policies assume a 3 year delay in paying refunds.

Policy solution 5: tax deduction/cost recovery and administrative option 1: tax offset

All else equal, a tax offset is superior from the investor's perspective to the tax deduction/cost recovery scheme for two primary reasons (Figure 7). First, the nominal benefit to the investor is greater—each dollar of input VAT provides a dollar reduction in other taxes under the tax offset option while each dollar reduces taxes by the marginal tax rate for the tax deduction/cost recovery scheme. Second, the nominal benefits from tax offsets likely occur earlier in the project life—tax deductions reduce CIT payments, but CIT is paid later in the project life relative to other non-VAT fiscal payments that can be used as offsets, such as withholding taxes on services (paid from the start of exploration) and royalties (paid from the start of projection). Of course, this is impacted by the specific taxes that can be used as offsets and policymakers may restrict which taxes against which the VAT can be offset, as well as whether offsets can apply to tax liabilities generated by another project but that are owed by the same corporate group (e.g., ring-fencing at the corporate level, rather than project level, would make offsets and deductions more attractive to the investor).

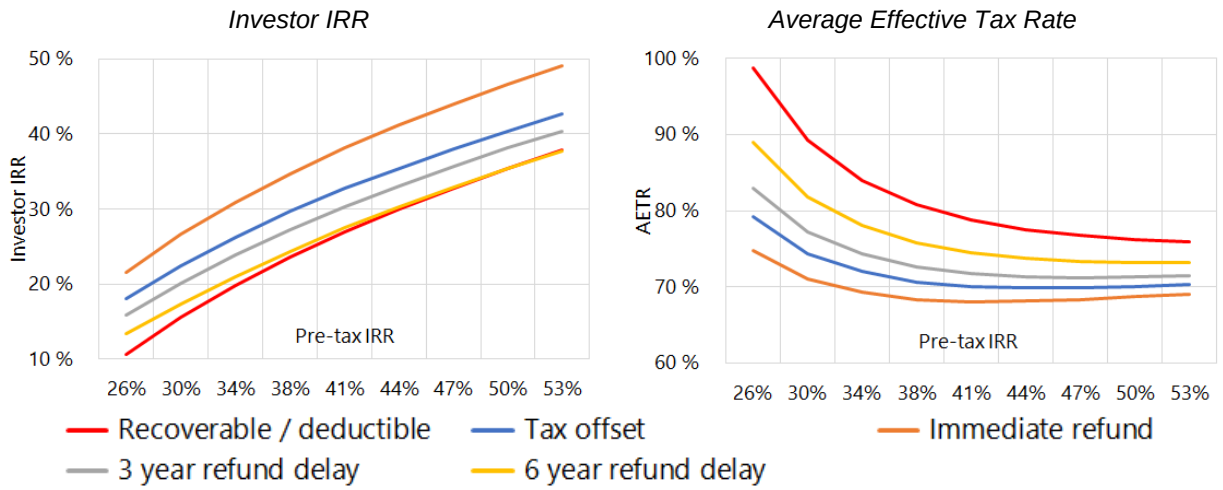
The tax deduction/cost recovery option is generally regressive since it places a relatively high fiscal burden on low profitability projects (Figure 7, indicated by the steep downward sloping line). This is because the benefits of the tax deduction are partly derived from reduced CIT (and/or rent tax) payments, which are paid earlier and at higher levels and rates for profitable projects.[47] The tax offset scheme's regressivity depends on the underlying fiscal regime—if the underlying fiscal regime is progressive/weighted towards profit-based taxes, the tax offset option is more regressive since the benefits to the investor occur are greater under more profitable projects.

In the base case scenario, a tax offset performs similarly to a two-year refund delay (but still far inferior to immediate refunds), while the recoverable/deductible option is similar to a six-year delay. These options are also impacted by other project and fiscal regime features. Specifically, a shorter exploration and development

[47] For example, in the stylized project, the breakeven price increases by USD 2 and 9 per barrel and the breakeven cost decreases by USD 2 and 7 per barrel for the tax offset and tax deduction / cost recovery compared to the VAT with immediate refund, respectively.

period and increased overall government take increase the benefit of these schemes because they bring forward the timing of non-VAT fiscal payments.

Figure 7: Evaluation of Tax Offset and Tax Deduction / Cost Recovery



Source: Authors' calculations, FARI model.

Administrative solution 2: interest on unrefunded VAT

Providing interest on unrefunded input VAT can mitigate the burden of delayed refunds, but at a cost to government (Table 3). A government is (theoretically) indifferent to VAT refund delays when the interest rate is equal to its cost of capital (9 percent interest rate assumed for analysis), while the investor is indifferent from an investment decision or IRR perspective when it is equal to the investor's hurdle rate or investor IRR with immediate refunds of input VAT, respectively. Under interest rates of 9 (government cost of capital), 15 (investor hurdle rate), and 21.5 (investor IRR without VAT) percent, the discounted government take decreases by 0, 16, and 40 p.p., investor IRR decreases by 3, 2, and 0 p.p., and the METR increases by 5, 1, and negative 8 p.p. when refunds are delayed 3 years, respectively.

More qualitatively, investors will likely perceive VAT refunds paid with interest as riskier than refunds without interest if investors expect additional delays, less than full repayment, or pressure to renegotiate interest rate terms. Conversely, charging interest on arrears could incentivize the government to pay refunds more quickly, especially if the interest rate is at or above the government's cost of borrowing.

Table 3: Evaluation of Interest on Unrefunded VAT

Refund delay	0% interest		5% interest		9% interest		15% interest		21.5% interest	
	IRR	METR	IRR	METR	IRR	METR	IRR	METR	IRR	METR
-	21.5%	29%	21.5%	29%	21.5%	29%	21.5%	29%	21.5%	29%
1	19.0%	34%	19.7%	32%	20.2%	31%	20.7%	29%	21.5%	26%
2	17.2%	38%	18.4%	35%	19.1%	32%	20.1%	29%	21.5%	24%
3	15.9%	41%	17.3%	37%	18.3%	34%	19.6%	30%	21.5%	21%
4	14.8%	43%	16.5%	39%	17.6%	35%	19.1%	30%	21.5%	17%
5	14.0%	45%	15.8%	40%	17.1%	37%	18.8%	30%	21.5%	13%
6	13.3%	46%	15.3%	42%	16.6%	38%	18.5%	31%	21.5%	8%
No refund	7.4%	53%	7.4%	53%	7.4%	53%	7.4%	53%	7.4%	53%

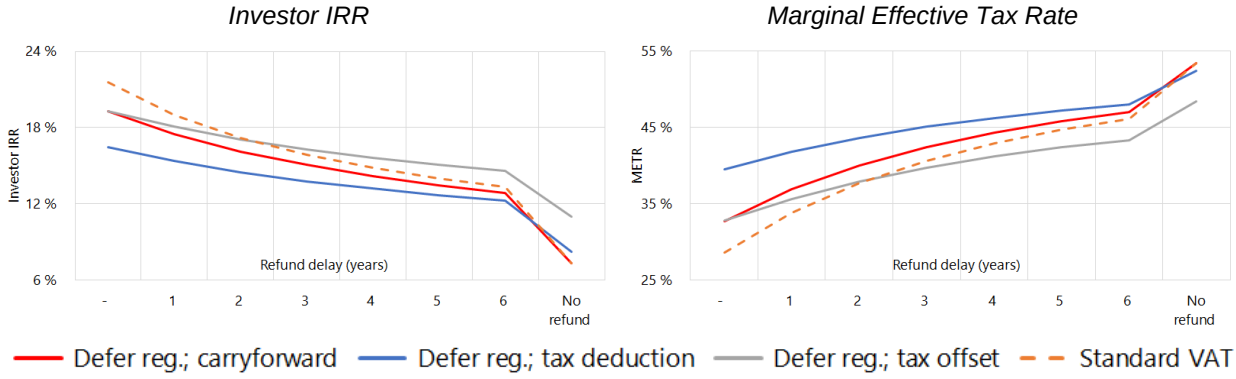
Source: Authors' calculations, FARI model.

Implications of deferred registration

The impact of not allowing VAT registration until production depends on the treatment of input VAT paid prior to registration. There are three primary options: (1) input VAT is deductible against income (i.e., it sticks to costs), (2) input VAT is carried forward to the time of registration and then it is refunded, or (3) input VAT is offset (i.e., credited) against non-VAT taxes (as opposed to offsetting excess input VAT credit)—the third option is not seen in practice and (potentially) administratively difficult. The first two options perform poorly relative to the standard VAT, regardless of the refund delay length, while allowing the tax offset is more favorable to the investor under the base case scenario if refund delays are longer than two years, but worse than a standard VAT if refund delays are shorter (Figure 8). The nuances mentioned in previous sub-section generally apply to the tax deduction/cost recovery and offset options. When refunds are paid in two years or less, each of these options significantly increase the fiscal regimes distortion compared to the standard VAT.

A problematic feature of deferring registration until production and then providing input VAT refunds is that it likely creates an enormous refund request when the investor is registered. For example, in the stylized oil project, the government owes a refund of USD 500 million in the year that the investor registers for VAT, which would likely be difficult to fulfill and potentially lead to alternative solutions or negotiations, all of which could increase the investor's risk perception.

Figure 8: Evaluation of Deferred Registration



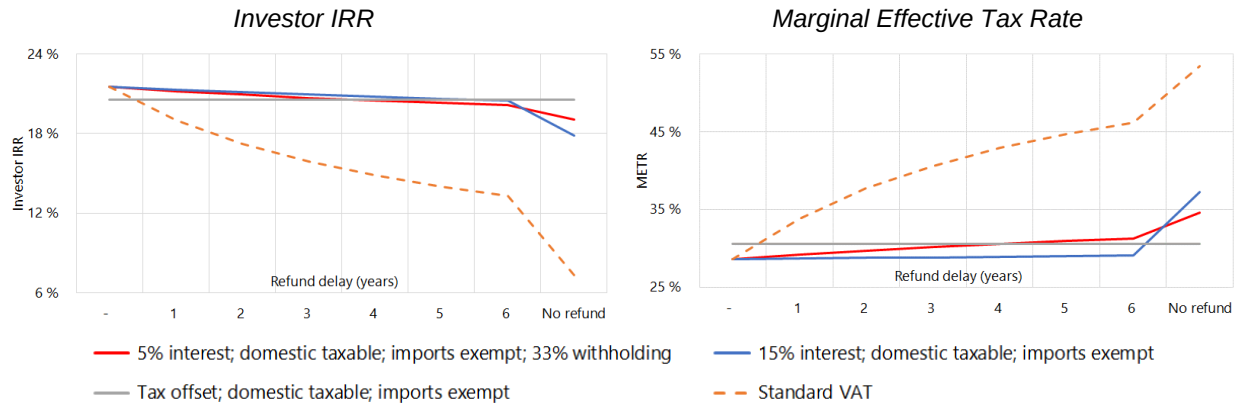
Source: Authors' calculations, FARI model.

Administrative and policy solutions combined

The administrative and policy solutions are not mutually exclusive and can be combined in some cases. The impact of doing so (

Figure 9 for a sample of combinations) can balance policy objectives, such as avoiding bias against domestic industry, while reducing the burden on investors, but could create a difficult to administer and/or comply with VAT design. For instance, 15 percent interest on unrefunded VAT with domestic supplies taxable and imports exempt significantly reduces the cost of refunds, creates minimal bias against domestic suppliers, and is less distortive on marginal investment. Other well performing combinations include tax offset with import exemption and partial deeming, with import exemption and a low interest rate on unrefunded input VAT.

Figure 9: Evaluation of Combined Policy and Administrative Solutions



Source: Authors' calculations, FARI model.

Implications for domestic suppliers

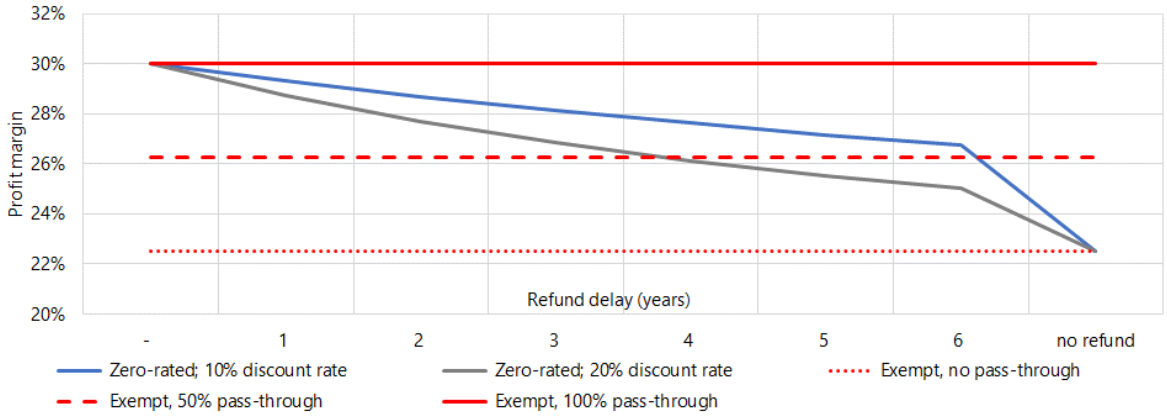
So far, the model used in this section does not explicitly capture the impact of the VAT on suppliers to the EI investor, but (as discussed) suppliers may be significantly impacted when supplies are zero-rated or exempt. These issues are especially pertinent to domestic suppliers because they have value-added within the host country (making them difficult or costly to exempt from the VAT) and likely have a higher cost of capital than do multi-national investors and non-resident suppliers (making the net present value cost of refunds greater). Also, the costs accruing to domestic suppliers may cause the suppliers to oppose government's attempts to support local industry and increase domestic value-addition, and potentially distort investor supply decisions.

A domestic supplier's preference for an exemption vs. zero-rating supplies depends on various factors, including: (1) whether the domestic supplier has other sales subject to output VAT, (2) the suppliers' ability to pass-through costs of un-reclaimed or unrefunded input VAT to investors, (3) the length of the refund delay, and (4) the domestic supplier's discount rate. Each factor is discussed below with results illustrated in Figure 10.

The domestic supplier clearly prefers zero-rating output when the domestic supplier has other sales subject to VAT since there is output VAT available to reclaim input VAT. It is also clear that the domestic supplier prefers zero-rating over exemptions when it can pass-through costs coming from refund delays and un-reclaimable VAT (as discussed above). The only nuance is that zero-rating and exempting are equivalent if the supplier can pass-through the full cost of the exemption to the investor, but this is very unlikely.

When the supplier can pass-through the costs of the exemption to a greater extent than it can for the costs of a delayed refund, the supplier's preference depends on the refund delay length, discount rate and pass-through assumption.[48] As an illustration (Figure 10), the supplier prefers zero-rating over an exemption as long as the refund length is less than 3.8 years (if the supplier's discount rate is 20 percent and it can pass-through 50 percent of the unreclaimable input VAT).

Figure 10: Impact on Domestic Suppliers



Source: Authors' calculations, FARI model.

6. Plausible VAT solutions for EIs

This section presents a framework to compare VAT policies and recommends second-best policies relevant for different contexts. The framework considers the burden of the VAT scheme placed on three key stakeholders: the investor, domestic suppliers, and the tax administration.

First, we focus on investors, using the IRR and METR metrics to evaluate the tax burden and level of distortion brought about by different design options (Table 4). The IRR and METR are shown with immediate refunds and a three-year delay—a higher IRR and a lower METR reflect less burden on the investor—and the right-hand column shows factors that would increase the investor's burden, which may be relevant when relating results to contexts with economic or project-specific characteristics that differ from our base case example.

From the investor's perspective, solutions that fully remove the VAT from the supply chain are neutral compared to the standard and fully operational VAT—these schemes are domestic zero-rating and exemptions with no pass through of associated costs from domestic suppliers to the investor. Paying interest on

[48] While such heterogeneity between exemption and refund pass-through may seem unlikely, it could occur for various reasons, such as competitors not requiring refunds (potentially due to having VAT charged on other sales), competitors receiving faster refunds (potentially due to a system that fast tracks refunds to firms with a proven track-record), or a supplier not expecting a delay.

unrefunded input VAT, partial VAT deeming, and import exemptions coupled with domestic zero-rating or exemptions (with full pass-through)[49] all have similar and relatively small impacts on the investor. Maintaining the standard VAT while paying refunds with significant delays results in much lower investor IRR than all but the cost recovery and tax deduction option, illustrating the importance of improving refund timeliness and the disincentive caused by allowing VAT to stick to costs. Tax offsets place a significant burden on investors, especially for less profitable projects and even when VAT refunds are timely. They should be avoided as there are several superior options.

Table 4: Evaluation of Analyzed VAT Schemes—impact on investors

Category	Description	Investor IRR (percent)		Distortion (METR)		Factors increasing burden for the investor
		No delay	3-year refund delay	No delay	3-year refund delay	
Standard VAT	Standard VAT	21.5	15.9	28.6	40.6	Greater share of exported production
Policy solutions	Imports exempt; DS taxable	21.5	19.9	28.6	32.1	More domestic supplies
	Imports exempt; DS zero-rated* (full pass-through to investor)	21.5	20.9	28.6	30.3	More domestic supplies
	Imports exempt; DS zero-rated* (no pass-through to investor)	21.5	21.5	28.6	28.6	None
	Imports exempt; DS exempt (full pass-through to investor)	20.1	20.1	32.3	32.3	More domestic supplies
	Imports exempt; DS exempt (no pass-through to investor)	21.5	21.5	28.6	28.6	None
	Partial VAT deeming**	21.5	20.4	28.6	30.9	More domestic supplies, lower withholding rate
	Cost recovery and tax deduction	10.6	10.6	49.6	49.6	Longer development period, more capital intensity, less profitable project, lower AETR
Administrative solutions	Interest on unrefunded input VAT***	21.5	18.2	28.6	34.5	Longer refund delay, lower interest rate
	Tax offsets****	18.0	18.0	35.8	35.8	Longer development period, more capital intensity, less profitable project, lower AETR

Source: Authors' calculations, FARI model. Notes: DS= domestic supplies. Domestic suppliers are assumed to have delayed refunds as well; *Equivalent to no-VAT zone; **Assumes exemption of imports; DS taxable under VAT deeming; ***Interest at 10% nominal; ****Assumes all non-VAT payments to government are available for tax offsets.

Considering investors' perspective paints only a partial picture. What is favorable to investors, may not be welcome by domestic suppliers and could also result in a high effort to administer the regime. Therefore, to consider all aspects of the triangular relation (of investors, suppliers, and tax administration) and balance their respective interests, we construct a composite index where the desirability of a VAT scheme considers the burden on each stakeholder as determined by the weights (Table 5, see Appendix G for more details). Since the weight (i.e., importance) provided to each stakeholder may vary by policymakers' priorities, Table 5 indicates how the composite index changes if more weight is provided to a given stakeholder. For instance, the

[49] It is assumed that domestic suppliers have excess input VAT when they are zero-rated and, thus, receive refunds with a delay. Since they expect the delay, domestic suppliers factor it into their price charged to the investor.

supplier column shows how the compositive index would change if more weight (or preference) is given to the domestic suppliers' outcomes (60 rather than 30 percent as is the case in the baseline scenario).

Table 5: Composite index breakdown and sensitivity

Category	Refund delay	Stakeholder-> / Consideration -> / Weights (percent) for composite index:	Total: Investor	Total: Supplier	Total: Tax Authority	Composite index: Baseline	Sensitivity/favoring:***** Investor (70%)	Supplier (60%)	Tax Auth. (60%)
			40	30	30				
Standard VAT	No	Standard VAT (no delays)	0.0	0.0	1.0	0.3	0.2	0.2	0.6
	Yes	Standard VAT (with delays)	3.9	0.0	1.4	2.0	2.9	1.1	1.6
Policy	Yes	Imports exempt; DS taxable	1.9	1.4	1.0	1.5	1.7	1.4	1.3
	Yes	Imports exempt; DS zero-rated* (full pass-through to investor)	1.9	0.6	3.1	1.9	1.9	1.4	2.4
	Yes	Imports exempt; DS zero-rated* (no pass-through to investor)	1.1	3.4	3.1	2.4	1.7	2.9	2.8
	Yes	Imports exempt; DS exempt (full pass-through to investor)	2.0	0.3	1.7	1.4	1.7	0.9	1.5
	Yes	Imports exempt; DS exempt (no pass-through to investor)	2.0	3.8	1.7	2.5	2.2	3.0	2.2
	Yes	Partial VAT deeming**	2.2	1.6	2.2	2.0	2.1	1.8	2.1
	Yes	Cost recovery and tax deduction	4.9	0.0	0.4	2.1	3.5	1.1	1.2
Admini-strative	Yes	Interest on unrefunded input VAT***	3.0	0.0	1.0	1.5	2.3	0.8	1.2
	Yes	Tax offsets****	3.1	0.0	2.0	1.8	2.5	1.0	1.8

Source: Authors' calculations, FARI model. Note: Severity of impact: 0-5 (0=nil; 5=very high); DS = domestic supplies; *Equivalent to no-VAT zone; **Assumes exemption of imports; DS taxable under VAT deeming; ***Interest at 10% nominal; ****Assumes all non-VAT payments to government are available for tax offsets; *****Weights are distributed evenly across the other two stakeholders.

Suppliers and tax administration results

Suppliers' interests are best protected under the standard VAT (irrespective of whether there are delays in refunding VAT), cost recovery, and administrative solutions (interest on delayed refunds and tax offsets) because these schemes do not affect transactions between suppliers and investors and, therefore, do not result in any additional cost for suppliers nor do they create any distortion through import bias. In cases where imports are exempt (and thus import bias created), domestic suppliers would favor a domestic VAT relief but only if market conditions allow them to shift unrecoverable input VAT (for domestic exemptions) or refund delays (for zero-rating) onto investors, or if they are diversified and, thus, do not require refunds (for zero-rating). If these conditions cannot be met, domestic VAT reliefs would put suppliers in a worse position. Partial deeming would be a compromise solution, assuming that compliance costs are manageable.

The tax administration effort varies significantly across the analyzed VAT schemes. The least demanding approach appears to be the cost recovery scenario—since VAT cost is assumed in the input cost, there is no need for VAT accounting by investors and thus any VAT specific oversight by the tax administration, and also there are no refunds required for investors or domestic suppliers. The burden of the interest on the unrefunded VAT scenario and the scenario where imports are exempt and domestic supplies are taxable is at par with the standard VAT operation. Where domestic VAT reliefs are used, our analysis suggests that the tax administration may favor domestic tax exemptions over zero-rating (reverse charge or VAT deeming), simply because of a less demanding oversight of domestic transactions and the lack of refunds for domestic suppliers.

Results considering all stakeholders

The most efficient approach is the standard VAT if there is no refund delay—the VAT is neutral to investors and suppliers, and the tax authority is assumed to be able to manage the payment of sizable refunds. However, for the subsequent discussion, we assume a refund delay as given because experience consistently shows that countries with weak administrative capacity and cash management challenges are unable to regularly pay timely refunds, which is indeed the impetus for the prevalent special VAT schemes for the extractive industry and analysis presented in this paper.

Assuming a refund delay, the preferred policy is to provide a VAT exemption for imports and either fully tax domestic supplies or exempt them, if conditions allow for a high-level of pass-through of unrecoverable VAT. As most extractive industry costs are imported in developing countries, providing exemptions for imports significantly reduces the input VAT paid by investors. This does create a bias against domestic suppliers because investors pay input VAT (and need refunds) if domestic suppliers are taxable or pay higher costs if domestic suppliers are exempt and can pass-through the costs. Still, the costs to domestic suppliers are more than offset by administrative simplicity and low costs to the investor unless a premium is placed on domestic suppliers, in which case interest on unrefunded VAT is preferred.

Alternatively, zero-rating domestic supplier performs similarly well if refunds to domestic suppliers are paid on time and the potentially high volume of refund requests from domestic suppliers are manageable for the tax authority (although the risk of fraudulent refund claims remains and in many countries it will be rather overwhelming for tax authorities). This policy avoids creating a bias against domestic suppliers from the investor's perspective (assuming the cost of expected refund delays are not passed-through to the investors) at the expense of (potentially) forcing domestic suppliers into a refund position—the latter of which, similar to VAT exemptions, squeezes profit margins or leads to higher supplier prices and, thus, higher investor project costs (marginally decreasing the overall profitability of the resource project). There are additional administrative costs in such a policy as this increases output VAT levied at a differential rate bringing about the need to monitor risk of misclassification and overall tax evasion.

A variant of full zero-rating is to allow a positive list of approved machinery and equipment to be zero-rated when supplied to EI investors. This avoids differentiating between importers and domestic suppliers and can significantly reduce input VAT by the investor, especially during the exploration and development phases when cash flow pressure is likely highest. However, this does risk putting domestic suppliers in a refund position if their primary business is supplying capital equipment to extractive industry investors.

If properly designed, a partial VAT deeming policy can balance forcing domestic suppliers into a refund position and biasing against them. This approach, akin to applying a VAT reduced rate, lowers (but does not alleviate) concerns about cash flow and refund delay for the investor while allowing the domestic supplier to reclaim its input VAT if the withholding rate is low enough. As with any system that treats EI investors different than other businesses, there are additional administrative and compliance costs. The choice of withholding rate is critical.

Providing interest on unrefunded VAT allows for the VAT system to function as is, while reducing the impact of delayed refunds to the investor. The interest rate is the key parameter for such a policy—if it is below the investor's hurdle rate then there is a risk of deterring investment in marginal projects but an interest rate equal to the hurdle rate may be too costly for government. Also, interest increases the VAT refund required, potentially exacerbating the refund delay issue (especially where cash availability is the underlying problem),

and, thus, such a policy may not be seen as fully credible. Still, there is significant merit in providing interest on unrefunded input VAT since administrative costs are likely low, it does not bias domestic suppliers, and it can be combined with other policies.

Allowing for input VAT to be offset against other fiscal obligations can significantly improve investor outcomes (relative to a scenario of delayed refunds). However, there is the potential for fraud and reduced transparency if the offsets are not properly accounted for, which may be especially difficult if the offsets can be used to reduce taxes collected by a ministry that differs from the one that collects and refunds VAT (as is often the case with royalties). The impact of this policy is sensitive to the underlying fiscal regime, exploration and development length, and is more beneficial to the investor if the fiscal regime contains taxes paid early in the project life—for example, it may not be a good fit for an LNG project as these are highly capital intensive and have long pre-production periods.

The composite index reveals also that certain schemes should be avoided—the cost recovery alternative might bring about more adverse results than a standard VAT with a 3-year (or longer) refund delay, especially for marginal projects (as the cost recovery scheme is regressive). Domestic VAT reliefs should also be avoided where refunds for suppliers cannot be paid on time (zero-rating) or a full pass-through is impossible (exemptions) if a high premium is placed on tax administration and suppliers' welfare.

The interaction between VAT treatment for the EI and the VAT's overall performance should also be considered. Second-best policies that lessen refund requirements for the EI reduce governments' incentive to address the underlying cash management issues that result in delayed refunds in the first place—this can lead to non-EI sectors with refund requirements asking for the special treatment provided EI to be extended and/or more persistent refund issues (as was for example the case with the VAT deeming in Uganda gradually offered to a wider range of taxpayers beyond the EI). Extending such relief increases administrative complexity and leakage risks and, thus, should be considered with caution.

7. Conclusions

The first best solution is clear: countries should apply the standard VAT regime and pay timely refunds through reforming VAT refund mechanisms (Pessoa et al, 2021, van Oordt 2019). This maintains the integrity of the overall VAT system, avoids burdening the investor, and provides space for the government to increase less-distortive fiscal mechanisms—for example, in our base case scenario, an investor is indifferent between a three-year delay in VAT refunds and an 8 or 22 percentage point increase royalty or CIT rate, respectively. Even if refund delays cannot be eliminated, reductions in length can significantly improve project viability (e.g., a one-year reduction in the delay increases investor IRR by around 2 percentage points, Figure 2). Of course, there may be barriers to realizing such reform and, therefore, second-best solutions that take refund delays as a given in the short- to medium-term are needed.

Yet, there is no silver bullet—any second-best solution would need to balance the objectives of minimizing economic distortions and reducing administrative complexity. As such, there is an inherent tension between interests of EI investors (seeking all input VAT to be removed from their imports and domestic purchases), domestic suppliers (looking for opportunities to trade with EI companies but not be put at a disadvantage due to margin suppression and requiring VAT refunds), and tax authorities (supporting policy options that reduce their administrative effort).

Exterritorial VAT (no-VAT zone) is economically equivalent to a fully working VAT and could be deemed the best policy alternative. However, while it materially reduces the demand for VAT refunds, it significantly increases the risk of fraud and, thus, is very demanding in terms of enforcement. As such, it may be a workable solution for countries with relatively strong tax administrations, high level of exports, and geographical concentration of EI operations. Additionally, the exterritorial VAT creates relatively small distortions for suppliers through delayed refunds, and only for domestic suppliers that transact predominantly with EI companies—these costs increase if domestic suppliers have a higher cost of capital and little market power (Figure 10). It follows, a no-VAT zone is a plausible solution for countries where the underlying problem of VAT refund delays stems from deficiencies in cash appropriation (a PFM issue), rather than low tax administration capacity (risk management and VAT claims processing). Geographical location and level of exports matter too. If EI output is sold domestically (in which case VAT should be imposed), the risk of fraud increases, further driving up the administrative effort. Also, dispersed operations (rather than concentrated in a designated location) make oversight of the inbound and outbound movement of goods very difficult.

For countries with weak tax administrations, the second-best VAT solution likely lies in a combination of VAT exemptions and subjective domestic zero-ratings (or equivalent measures, such as reverse charge or VAT deeming). VAT exemptions offer the benefit of reduced administrative complexity and non-compliance (revenue leakage) and cater well to the underlying problem (the lack of capacity to pay VAT refunds).[50] Also, they do not materially distort EI investment decisions unless a large portion of costs is supplied domestically and there is high pass-through to the investor (See Appendix E for equations describing the relationship between pass-through, exemptions, and zero-rating.

Figure 4). Both subjective zero-rating and exemptions create bias against domestic suppliers, but the size of the bias depends on several factors. Where domestic suppliers are comprised of small businesses, service providers and/or large businesses with market power, exemptions may prove to be less distortive.[51] In cases where the domestic supplier sector is highly competitive and diversified, reliance on VAT zero-rating may be a better approach. [52] Partial deeming may strike the optimal balance between avoiding bias against local industry and reducing the burden of delayed refunds for investors, but it is a relatively complex solution and the withholding rate needs to be selected carefully.

[50] Zero-rating increases the number of refund requests (unless suppliers are diversified), potentially creating administrative difficulty and revenue leakage.

[51] The cost of registering and complying with VAT obligations (required under zero-rating approach) may outweigh the cost of unrecoverable input VAT (small businesses). Suppliers having little input VAT (e.g., service providers) are less disadvantaged by the VAT exemption than those trading in goods (the cost of unrecovered input VAT may be smaller than the combined cost of VAT compliance and delays in obtaining VAT refunds under the zero-rating approach). And where domestic suppliers have a degree of market power they can shift a portion of the cost of unrecoverable input VAT onto EI companies.

[52] Zero-rating leads to relatively less bias when suppliers are diversified because they can recover input VAT against positive output VAT on sales to non-EI companies. Also, where the market is highly competitive there is little room for suppliers to pass-on costs to the investor, a disadvantage under the VAT exemption approach—much greater than the cost of potential delays in paying VAT refunds to suppliers.

The analysis further indicates that some policies (e.g., disallowing registration prior to production and allowing for a tax deduction/cost recovery) should be avoided, as they are highly distortive and difficult to administer.

Our analysis reveals that second-best solutions would always lead to some distortions and/or increase the risk of non-compliance, putting thus additional burden on tax administrations. In deciding on the second-best solutions, countries will need to decide which player in the triangular relationship (i.e., domestic supplier, EI company and government) is most capable of carrying the weight of those distortions and/or risks. The choice should also be closely aligned with the underlying policy objectives and—where possible—the premium should be put on protecting domestic suppliers. The high-level recommendations are thus for high-capacity administrations to pursue no VAT zones and low-capacity administrations to used zero-rating or exemptions, with the preference depending on the domestic supplier market structure and the weight given to the risk of revenue leakage and to administrative simplicity (exemptions lower risk and enable more simple administration). However, there are several nuances and policies to be considered, as discussed in the paper.

Appendix

Appendix A. Project, financial and fiscal regime assumptions

The analysis assumes a medium-sized stylized oil project. Key parameters relevant for the impact of VAT regimes include: (i) proportion of costs provided by domestic (25 percent) vs. foreign supplies (75 percent); (ii) the proportion of costs that are subject to VAT (only non-labor supplies are subject to VAT, 90 percent); and (iii) the proportion of output exported (100 percent). The project assumptions were determined based on data from IMF technical assistance work, Rystad, and input from the ITIC. The model uses an annual time frequency.

The underlying fiscal regime used contains production sharing mechanisms that are common in the petroleum and natural gas sector (IMF 2012). The only fiscal payments modelled are production sharing, royalty, Corporate Income Tax, and the VAT, as other fiscal mechanisms are generally rare or less material (e.g., surface rental fees). Additionally, the fiscal regime stringency was calibrated to approximate a common government take of 75 percent discounted (IMF 2012).

The VAT rate is assumed to be 15 percent[53] for all regimes and the average effective tax rate of the entire fiscal regime is 75[54] percent when discounted at 10 percent. Table A.1 and Figure 11A.1 provide key project, financing, and fiscal regime assumptions and project cash flow structure, respectively.

Table A.1.: Key Assumptions

a. Project Assumptions

	Unit	*Value*
Project life	years	28
Production period	years	22
Pre-tax rate of return	%	26.1 %
	USD mm	*Per bbl*
Oil production	375	
Oil price	55	
Oil revenue	20,625	55.0
Exploration costs	269	0.7
Development costs	4,945	13.2
Operating costs	6,715	17.9
Decommissioning costs	597	1.6
Project costs	12,526	33.4
Pre-tax cash flow	8,099	21.6

b. Financing Assumptions

	Unit	*Value*
Exploration costs (debt)	%	0.0%
Development costs (debt)	%	70.0%
Interest rate	%	5.5%
Grace period	years	2
Debt repayment	years	7

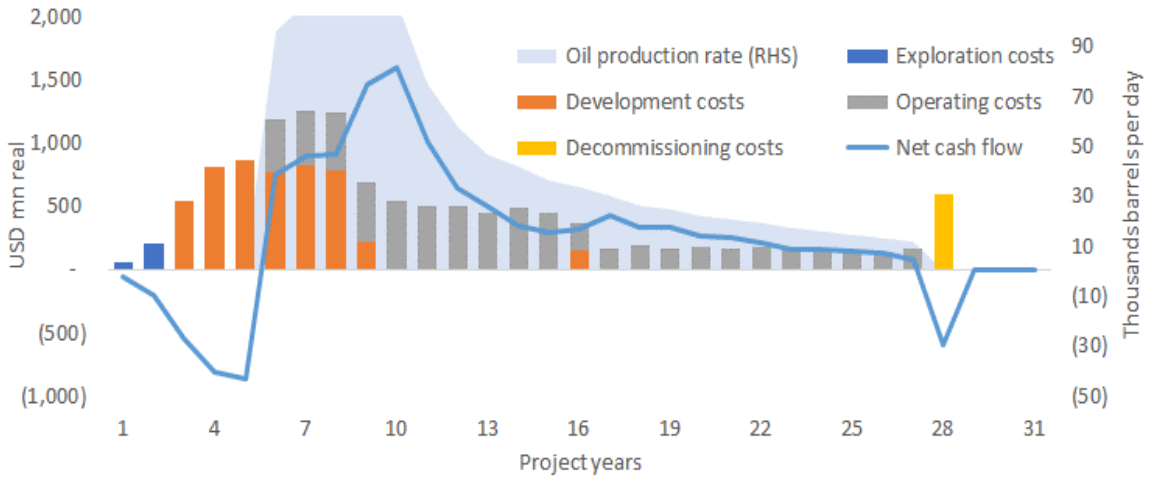
c. Fiscal Assumptions

Indirect taxes		
VAT rate	%	15%
Royalty		
Royalty rate	%	10%
Cost recovery		
Cost recovery limit	%	100%
Depreciation	years	1
Government share of profit petroleum		
R-factor < 1	%	20.0 %
R-factor 1 to 3	%	20% to 70%
R-factor > 3	%	70%
Corporate Income Tax		
CIT rate	%	30%
Depreciation	years	5

[53] The average VAT rate for resource-rich countries in 2017 was 15.45 percent. A country was classified as resource-rich if its resource rents exceeded 5 percent of GDP in 2017. The IMF FAD's rate database provides VAT rate and the World Bank World Development Indicators provides resource rent data.

[54] The discounted government take for petroleum projects ranges from 65 to 85 percent (IMF, 2012).

Figure 11.: Project Pre-tax Cash Flow



Source: Authors' calculations, FARI model

Appendix B. Limitations of modelling approach

As with any model, this approach contains simplifications and results should be interpreted with the following caveats. First, the model only captures VAT payments from and refunds to the investor – a separate modelling exercise illustrates the impact that zero-rating or exempting the investor has on suppliers in Section 5. Second, we assume a ring-fence around a single resource project (i.e., costs and revenues from one project are not consolidated with others for tax purposes, including VAT) as is common for production sharing and profit taxes but not universal in the sector.[55] Third, our approach assumes full compliance, meaning that there is no revenue leakage. Fourth we do not consider the cost of administering the fiscal regime, although this may vary across VAT designs.

A final caveat is that the model does not assume any behavioral changes due to differences in the VAT design and administration. Two examples can illustrate the impact of this assumption: (i) the investor does not adjust project cost and production decisions to reduce the impact of VAT refund delays, such as increasing imported inputs if imports are exempt from VAT, and (ii) the government does not adjust the overall fiscal regime to account for the impact of delayed VAT refunds—a well-functioning VAT, as compared to a VAT with delayed refunds, would allow the government maintain investment appetite while increasing other fiscal charges, such as royalty and CIT, all else equal.

Appendix C. Indicators used to assess the impact of fiscal regimes

Average Effective Tax Rate (AETR): often referred to as government take, the AETR is the share of project pre-tax cashflows that the government collects as revenue (inclusive of state participation), over the life of the project.

[55] The implications of ring-fencing choices for the VAT are discussed in detail in previous sections and where relevant when explaining modelling results.

Investor Post-Tax Rate of Return (IRR): the IRR is equal to the discount rate that results in the investor's post-tax net present value being zero. This is calculated on investor post-tax cash flows in real terms and an IRR below the investor's required return indicates that the project is unviable.

Marginal Effective Tax Rate (METR): the gap between the investor's minimum post-tax return (assumed to be 15 percent in real terms)[56] and the pre-tax project return needed to realize it. It is a measure of the fiscal regime's impact on marginal investments and calculated as (pre-tax IRR less post-tax IRR) / pre-tax IRR. A lower METR means that the fiscal regime places less burden on marginal projects, with a METR of 0 indicating that the fiscal regime has no impact on investment decisions at the margin.

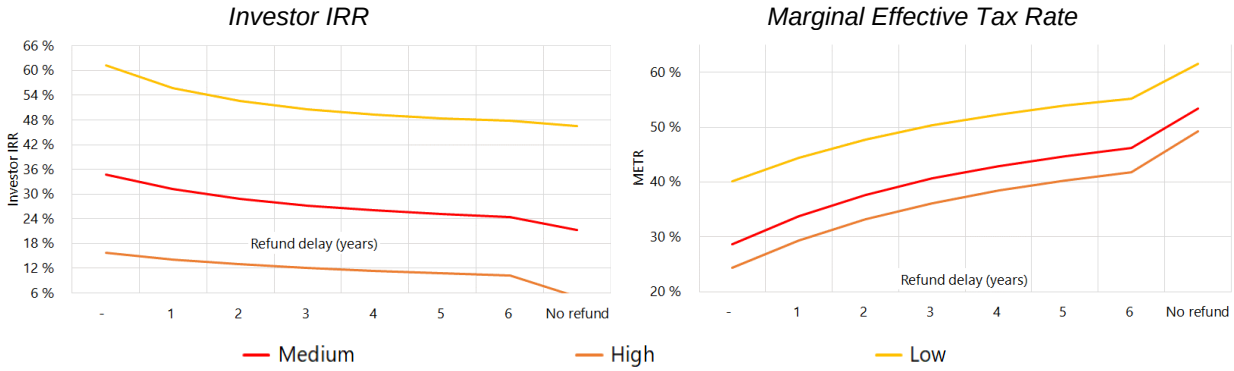
Appendix D. Impact of VAT refund delays for resource projects with different capital intensities

The resource project's capital-intensity is the main project characteristic impacting the relationship between VAT refund delays and investor profitability. To illustrate this relationship and the robustness of results, the impact of refund delays on investor outcomes are summarized for a low, medium, and high capital intensity project, with the oil price adjusted upward to USD 70 per BBL for all projects to ensure that the high capital intensity project is profitability under no refund delay. The unit capital costs are: USD 7 per BBL (low capital intensity), USD 13 per BBL (medium capital intensity, and base case project used in analysis), and USD 22 per BBL (high capital intensity). The development period length and resource size are kept constant across projects to isolate the impact of capital intensity.

Results are robust across the various capital intensities. The proportional changes in investor IRR and METR are similar for the low, medium, and high capital intensity projects, although the starting points vary due to the different cost levels. The increase in royalty and CIT rates (assuming no refund delay) that makes the investor indifferent between no refund delay and a three-year delay are comparable across low and medium capital intensities, but a larger change in rates is required for the more costly project—the investor IRR is equivalent when the royalty rate is seven, eight, and 15 percentage points (p.p.) higher for the low, medium, and high capital intensity projects, respectively, and the CIT rate is seven, 20, and 21 p.p. higher, respectively. The reason for the larger difference in high capital intensity project is that the VAT refund represents a larger share of investor's total costs and positive post-tax cash flow.

[56] A recent survey found that the required return for large emerging market oil projects is 21 percent on average (OIES, 2019b), and adjusted for inflation and full lifecycle analysis (rather than Final Investment Decision-forward) to result in 15 percent. Other, older sources estimate hurdle rates as 13 to 20 percent (Wood Mac, 2018; Edison, 2017; previous estimates from OIES, 2019b).

Figure A.2.: Evaluation of Different Capital Intensities



Source: Authors' calculations, FARI model

Appendix E. Relationship between cost of zero-rating and exemption

The formulas below summarize the relationship between the value of zero-rating and exemption from the supplier's perspective. For example, as the refund delay increases, the value of zero-rating falls, while if the pass-through is 100% then the value of an exemption is 0 (i.e., it has no cost to the domestic supplier).

$$Where\ i = input\ VAT; r = discount\ rate; n = refund\ delay\ in\ years; p = pass\ through$$

$$(1)\ Value\ of\ zero\ rating\ = \frac{i}{(1+r)^n} - i$$

$$(2)\ Value\ of\ exemption = -i * (1-p)$$

$$(3)\ Zero\ rating = \ exemption\ when\ \frac{1}{(1+r)^n} = p$$

Appendix F. Relationship between value-added, purchaser type, and full credit of input VAT

Formulas 1-2 below show the input VAT paid and output VAT charged on sales by domestic suppliers under the partial deeming scheme. The third formula provides the withholding rate that leads to input and output VAT being equivalent from the suppliers' perspective and, thus, is the withholding rate that minimizes total refund claims by the investor while avoiding a refund for the domestic supplier.

$$Where\ i = inputs, v = value - added, var = value - added\ ratio = v/i, VAT = VAT\ rate, w = withholding\ rate, \quad e = \%\ of\ supplies\ to\ extractive\ industry\ companies$$

$$(1)\ \text{input VAT} = \text{i} * \text{VAT}$$

$$(2)\ \text{output VAT} = (\text{i} + \text{v}) * \big(\text{e} * (1 - \text{w}) + (1 - \text{e})\big) * \text{VAT}$$

$$(3)\ \text{input VAT} = \text{output VAT when } w = \frac{var}{(1+var) * e}$$

Appendix G. Comparison of VAT schemes by stakeholder

To provide a holistic analysis, we construct a simple matrix that grades the burden imposed on each stakeholder along key considerations (Table A.2), with the grade ranging from zero (no burden) to five (high burden). Investors are evaluated based on distortion (i.e., impact on IRR and the METR) and the cost of

complying with the VAT scheme. The considerations for domestic suppliers are compliance costs and distortions imposed by each VAT scheme—distortions either arise from a bias towards imports when imports are exempted and domestic suppliers are taxable or delayed refunds when domestic suppliers are zero-rated. The tax administration effort captures the excess oversight required (separately for domestic and import transactions) and size and number of refunds relative to the standard VAT design and operation.

The individual considerations are aggregated to understand the overall impact on each stakeholder. This is done by taking a weighted average across components using weights for the relative importance of each consideration to a given stakeholder.

Lastly, each stakeholder is assigned a weight and a composite index is calculated to provide a ranking for each VAT schemes. In the base case scenario, we assume relative importance of investors (40 percent), suppliers (30 percent), and the tax administration (30 percent).

The stakeholder weights and the less quantitative considerations, such as excess oversight, are inherently arbitrary and based on the authors' experience from working with governments that face VAT refund payment issues. Ultimately, policymakers need to determine the appropriate weighting across stakeholders and components, and we hope that transparently providing a more holistic framework is a useful start.

Table A.2.: Evaluation of Analyzed VAT Schemes—composite index

		Stakeholder->	Investor		Suppliers		Tax Authority				Composite index
	Refund	Consideration ->	Distortion	Compliance	Distorion	Compliance	Excess oversight (domestic)	Excess oversight (import)	Refunds size (amounts)	Refunds number (processing)	
Category	delay	Weights (percent) for composite index ->	37	3	21	9	12	8	5	5	
Standard VAT	No	Standard VAT (no delays)	0	0	0	0	0	0	5	1	0.3
	Yes	Standard VAT (with delays)	4	2	0	0	1	0	5	1	2.0
Policy	Yes	Imports exempt; DS taxable	2	1	2	0	0	2	2	1	1.5
	Yes	Imports exempt; DS zero-rated* (full pass-through to investor)	2	1	0	2	4	2	1	5	1.9
	Yes	Imports exempt; DS zero-rated* (no pass-through to investor)	1	2	4	2	4	2	1	5	2.4
	Yes	Imports exempt; DS exempt (full pass-through to investor)	2	2	0	1	3	2	0	0	1.4
	Yes	Imports exempt; DS exempt (no pass-through to investor)	2	2	5	1	3	2	0	0	2.5
	Yes	Partial VAT deeming**	2	4	1	3	3	2	1	2	2.0
	Yes	Cost recovery and tax deduction	5	3	0	0	1	0	0	0	2.1
Admini-strative	Yes	Interest on unrefunded input VAT***	3	3	0	0	0	0	5	1	1.5
	Yes	Tax offsets****	3	4	0	0	3	0	3	2	1.8

Source: Authors' calculations, FARI model. Note: Severity of impact: 0-5 (0=nil; 5=very high); Weights: Investor = 40, Supplier= 30 and Tax Authority= 30. DS = domestic supplies; *Equivalent to no-VAT zone; **Assumes exemption of imports; DS taxable under VAT deeming; ***Interest at 10% nominal; ****Assumes all non-VAT payments to government are available for tax offsets.

References

Benedek, Dora, Ruud A. De Mooij, Michael Keen, and Philippe Wingender. “Varieties of VAT Pass Through.” *International Tax and Public Finance* 27, no. 4 (August 2020): 890–930. https://doi.org/10.1007/s10797-019-09566-5.

Calder, Jack, 2014. "Administering Fiscal Régimes for Extractive Industries : A Handbook. » Washington D.C. : International Monetary Fund

Chambas, Gérard, 2014. “Sécuriser remboursements de crédits de TVA dans les pays membres de l’UEMO", Conference Paper, UEMOA-IMF Conference Coordination fiscale en UEMOA: évaluer le passé et tracer l’avenir. 30 April—2 May, 2014. Available at : https://www.imf.org/external/french/np/seminars/2014/waemu/pdf/chambas.pdf

Deloitte. “European VAT Refund Guide 2020,” 2020. https://www2.deloitte.com/content/dam/Deloitte/be/Documents/tax/Pan%20EU%20VAT%20Refund%20Guide%20GTCE_2020.PDF.

Ebrill, Liam, Michael Keen, Victoria Perry, and Jean-Paul Bodin. *The Modern VAT*. Washington, D.C.: International Monetary Fund, 2001.

Fattouh, Bassam, Rahmatallah Poudineh, and Rob West. “Energy Transition, Uncertainty, and the Implications of Change in the Risk Preferences of Fossil Fuels Investors,” 2019. https://www.oxfordenergy.org/wpcms/wp-content/uploads/2019/01/Energy-Transition-Uncertainty-and-the-Implications-of-Change-in-the-Risk-Preferences-of-Fossil-Fuel-Investors-Insight-45.pdf.

Fiscal Affairs Department. “Fiscal Regimes for Extractive Industries—Design and Implementation,” 2012.

International Monetary Fund. “Zambia : 2019 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Zambia.” Washington, D.C., 2019.

Keen, Michael, and Peter Mullins. “International Corporate Taxation and the Extractive Industries.” In *International Taxation and the Extractive Industries*, 11–41. Oxon-New York: Routledge, 2017.

Liu, Li, Miguel Almunia, and Eddy H. F. Tam. “VAT Notches, Voluntary Registration, and Bunching: Theory and UK Evidence.” *The Review of Economics and Statistics,* 103 (1) (2021): 151–164. https://doi.org/10.1162/rest_a_00884.

Mansour, Mario, and Artur Swistak. “International Corporate Taxation and the Extractive Industries.” In *International Taxation and the Extractive Industries*, 332–57. Oxon-New York: Routledge, 2017.

Mario, Pessoa, Andrew Kazora Okello, Artur Swistak, Muyangwa Muyangwa, and Virginia Alonso-Albarran. “How to Manage Value-Added Tax Refunds.” International Monetary Fund, 2021. https://www.imf.org/en/Publications/Fiscal-Affairs-Department-How-To-Notes/Issues/2021/05/10/How-to-Manage-Value-Added-Tax-Refunds-50357.

Muganyizi, Tonedeus. “Mining Sector Taxation in Tanzania,” 2012. https://assets.publishing.service.gov.uk/media/57a08a8440f0b64974000636/ICTD-Research-Report-1_0.pdf.

Muthitacharoen, Athiphat, Wonma Wanichthaworn, and Trongwut Burong. “VAT Threshold and Small Business Behavior: Evidence from Thai Tax Returns.” *International Tax and Public Finance*, no. 28 (5) (2021): 1242–75.

OECD. “Consumption Tax Trends 2020: VAT/GST and Excise Rates, Trends and Policy Issues.” Paris, 2020.

Olawuyi, Damilola S. “Local Content Requirements in Oil and Gas Contracts: Regional Trends in the Middle East and North Africa.” *Journal of Energy & Natural Resources Law* 37, no. 1 (January 2, 2019): 93–117. https://doi.org/10.1080/02646811.2018.1477494.

Oordt van, Marius. “VAT Refunds in Developing Countries,” African Tax Institute, 2019. http://dx.doi.org/10.2139/ssrn.3899056

Östensson, Olle. “Promoting Downstream Processing: Resource Nationalism or Industrial Policy?” *Mineral Economics* 32, no. 2 (July 2019): 205–12. https://doi.org/10.1007/s13563-019-00170-x.

Philip, Daniel, Michael Keen, Artur Swistak, and Victor Thuronyi. “Introduction and Overview.” In *International Taxation and the Extractive Industries*, 1–10. Oxon-New York: Routledge, 2017.

PWC. “How VAT Impacts You. Oil and Gas Sector,” 2016. https://www.pwc.com/m1/en/tax/vat-in-the-middle-east/pdf/vat-oil-and-gas-gcc-dec2016.pdf.

Sachs, Jeffrey. “How to Handle the Macroeconomics of Oil Wealth.” In *Escaping the Resource Curse*. New York: Colombia University Press, 2007.

Stone, Susan, James Messent, and Dorothee Flaig. “Emerging Policy Issues: Localisation Barriers to Trade.” OECD Trade Policy Papers, May 1, 2015. https://doi.org/10.1787/5js1m6v5qd5j-en.

UNCTAD. “World Investment Report 2019 – Special Economic Zones”, 2019. https://unctad.org/system/files/official-document/WIR2019_CH4.pdf

United Kingdom Oil Industry Tax Committee – Indirect Taxes Committee. “The North Sea Memorandum,” 2015. https://oilandgasuk.co.uk/wp-content/uploads/2015/05/EC039.pdf.

United Nations. “Guidance Note on Value-Added Tax in the Extractive Industries.” New York, 2016. https://www.un.org/esa/ffd/wp-content/uploads/2016/12/13STM_CRP23_Extractives_VAT.pdf.

US Energy Information Administration. “Trends in U.S. Oil and Natural Gas Upstream Costs,” 2016. https://www.eia.gov/analysis/studies/drilling/pdf/upstream.pdf.

Yermakov, Vitaly, James Henderson, and Bassam Fattouh. “Russia’s Heavy Fuel Oil Exports: Challenges and Changing Rules Abroad and at Home.” OIES, 2019.

PUBLICATIONS

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