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Extractive industries: transforming states and improving economic management

Tony Addison¹ and Alan Roe²

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Abstract: While market mechanisms and private initiatives can deliver much for development, public action is also necessary to: maximize the economic benefits of the extractive industries; manage potentially large capital and revenues flows; minimize adverse environmental and social impacts; and steer the economy towards a net zero future. An ‘All of Government Approach’ is desirable: to coordinate action, especially between local and central government, around a long-term sector strategy; and to provide the private sector with a consistent policy framework which encourages investment. The paper also emphasizes improvements to public finance, including taxation, especially those tax issues relating to national strategies for net zero, as well as the politically challenging task of removing fossil fuel subsidies. The paper discusses the many decisions involved in the macroeconomic management of resource booms, including accumulating (or paying off) debt and how much to spend and how much to save in a sovereign wealth fund.

Key words: extractive industries, oil, mining, natural gas, sovereign wealth funds, taxation

JEL classification: L71, L72, O11, Q32

¹ University of Copenhagen, Denmark and UNU-WIDER, Helsinki, corresponding author: addison@wider.unu.edu; ² University of Warwick, Coventry, UK and UNU-WIDER, Helsinki

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

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1 Introduction

A related study in this collection of papers focused on the *governance* of resource wealth, concluding that, not surprisingly, transparency is the bedrock of successful inclusive development. Now we turn to the equally important topic of economic *management* where the issues, though technocratic and administrative, are no less political. We pose some key questions, explore the dilemmas, and examine lessons from experience rather than proposing formulaic solutions.¹

To kickstart our discussion, we pose the question: why does the management of the extractive industries so often go wrong? There are at least two reasons.

First, governments often assume that managing a resource can be delegated to a specialist ministry (of mining or petroleum), supported perhaps by a national oil company (NOC) and by the finance ministry (on debt and expenditure control) and the tax administration. But these risk missing the potential of the resource discovery to help diversify the economy for when it is eventually depleted or becomes uncommercial (stranded).² Pursuing this long-term strategy requires a broader set of ministries and agencies to engage with resources policy, not least the environment ministry to preserve renewable natural capital, and for deeper cooperation between all of these. And building the capabilities of local, not just central, government is critical to achieving the right kind of developmental impact.

Second, governments frequently take too short-term a view of the sector, often linked to the country's electoral cycle (4–5 years), which is incompatible with managing and regulating resources that can have decades of life. Moreover, it can take a decade or more after a resource's discovery before significant revenues arrive in the exchequer. There is then a risk of a 'presource curse'—excessive public spending and debt accumulation in advance of any revenue.³

We now discuss the first problem and possible solutions, then turn to the second problem, and finally discuss how to build greater macroeconomic stability around resource revenue flows (including issues of taxation, the fiscal implications of climate policy, and the choice of saving or spending the windfall).

2 An 'All of Government Approach'

To effectively manage mineral resources, the African Union's *Africa Mining Vision* (AMV) calls for an integrated approach across government: what Kathryn McPhail terms an 'All of Government Approach'.⁴ This contrasts with the more common approach of assigning responsibility to a few ministries and public institutions—the ones most obviously connected to the resource itself, which stems from the 'enclave mindset'. In moving to an 'All of Government Approach' mechanisms must also be built for effective collaboration around a shared common vision. Otherwise, there is

¹ See Addison and Roe (2018) for much more on economic management.

² See also Lahn and Stevens (2018).

³ On the 'presource' curse see Cust and Mihalyi (2017a, 2017b).

⁴ African Union (2009); McPhail (2018).

a danger that each state institution pursues its own agenda, to the detriment of both effective implementation and to cooperation with companies, civil society and aid agencies.⁵

Weakness in government capacity is a familiar development problem and requires hard work to construct the necessary institutions.⁶ For the resources sector (both non-renewables and renewables) and building on the work of McPhail (2018), we suggest the following approach.

First, joined-up government is more likely if the president, prime minister, and the cabinet can articulate and focus on a long-term development vision, preferably set out (and costed) in a detailed national plan (Botswana is a good example). Asian success in structural transformation provides many examples of effective and longer-term national planning.⁷

Second, that vision must be informed by a regularly refreshed base of evidence about the current situation in the resources sector together with *credible* scenarios for its future evolution as well as a risk assessment. Cooperation between stakeholders (not only within government, but also with companies and civil society) in constructing such a vision and evidence base should increase the prospects for effective cooperation in its implementation.

Forward-looking projected data (often extending out for three or more decades) are needed to guide scenario-building and ultimately sound policies—especially decisions over ‘saving versus spending’ discussed later. Otherwise, decision-making is vulnerable to ill-informed and over-optimistic assumptions, on revenues especially—a sure route to disaster. Risks can then be minimized and managed, increasing the chances of seizing the opportunities. Regrettably, as an African Development Bank (AfDB) study shows, good quality medium-term modelling/projection capacity is all too rare.⁸

Third, international initiatives exist to build trust between stakeholders (including across government). McPhail advocates regular multi-stakeholder workshops organized around solid bases of objective fact: an approach pioneered by the *Mining Partnerships for Development Initiative* (MPD) developed by the International Council on Mining and Metals (ICMM).⁹

3 Local versus national: reducing the tensions

To work effectively, an ‘all of government approach’ requires a better relationship between central and subnational (regional and local) government, as this is rarely satisfactory and in the worst cases it is beset by ethnic and religious division. The locality-specific nature of mines and oil and gas sites can exacerbate tensions if local power brokers try to take control of the revenue streams (and may seek secession to do so). Tensions can also arise when central government redistributes too

⁵ Lack of coordination has been a problem in Tanzania where there are at least twelve major government institutions involved with minerals and hydrocarbons policy in addition to the Ministry of Energy and Minerals (Roe 2016).

⁶ Addison (2003, 2012, 2014).

⁷ Nayyar (2019).

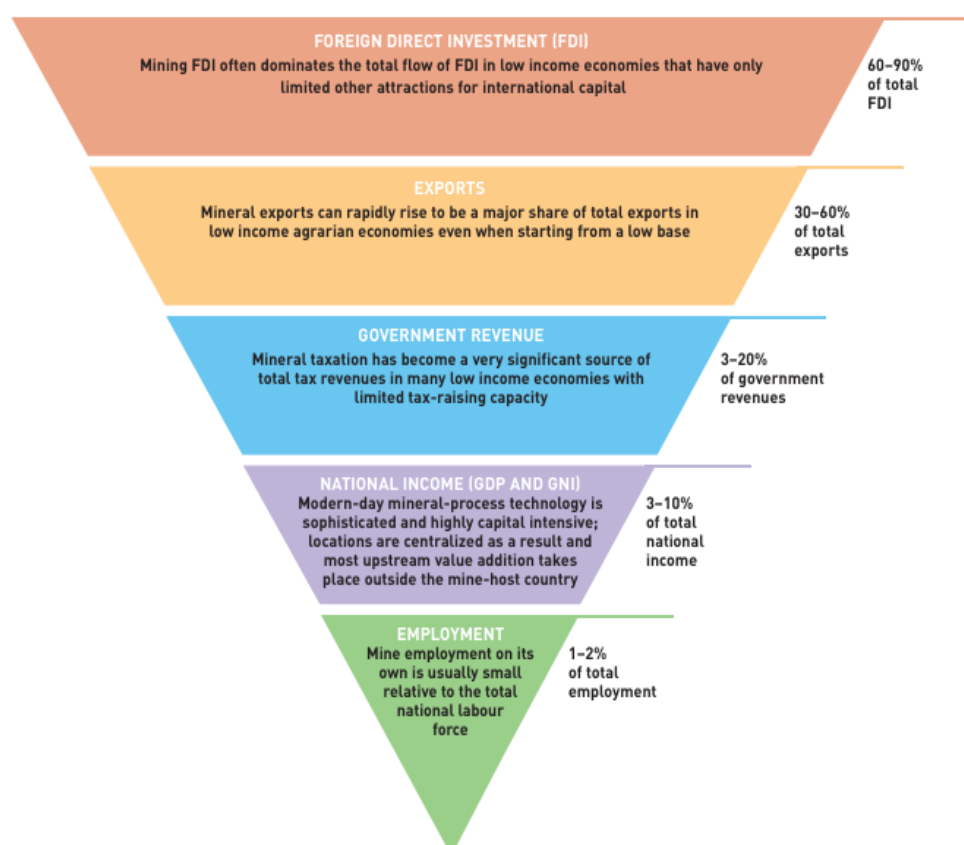
⁸ AfDB (2017).

⁹ ICMM (2010). The MPD was tested by case studies in Brazil, Ghana, Laos, Peru, Tanzania, and Zambia.

little revenue back to the regions. This governance challenge is much debated but rarely solved.¹⁰ Here we restrict ourselves to some key observations.

Problems arises in part because the direct footprints of extractive projects are spatially concentrated, often in locations remote from the main economic centres, and can be huge relative to the local host economies. Examples include Chile's copper mining in the remote Atacama Desert region, and Brazil's iron ore mining in the remote northwest of *Pará* state.

Figure 1: Mining: typical contributions in developing economies



Note: the percentages are not additive but indicate the range of stand-alone contribution in each segment.

Source: ICCM (2016). Reproduced here with permission.

The concept of an *inverted pyramid* of mining's share of direct impacts, developed from ICCM case studies, provides a simplified description of this problem (see Figure 1). Specifically, while the direct economic benefits can be very large relative to gross domestic product (GDP), most benefits at the summit of the inverted pyramid (including government revenues) are typically highly centralised: flowing to the national government and the capital city.¹¹ By contrast, the direct benefits (especially jobs) of most concern to the locality hosting the mine are at the base and so *relatively* much smaller. Moreover, these local areas bear the brunt of disruptions resulting from extractive investments, including: loss of cultivable land to mine and oil and gas facilities; population displacement (sometimes by force rather than consent); inward migration as migrants

¹⁰ Boadway and Shah (2012) provide a thorough review.

¹¹ ICCM (2014: 6).

compete with local people for the new jobs; localised ‘Dutch Disease’ effects as house and land prices are bid up; water shortages (when the requisite infrastructure is not developed to meet increased demand); air, soil and water pollution (when environmental standards are not enforced) and new social problems such as crime and alcoholism. Not surprisingly this generates resentment if communities expect to share in a large bonanza but are disappointed (which is exacerbated when politicians and companies talk up the benefits without delivering tangible results).

Devolving political and economic power to subnational authorities, including a share of the resource revenue previously flowing to central government, can in principle reduce these tensions. However, such revenues are volatile (and finite for non-renewable resources) which poses a risk to subnational government finances.¹² Diversifying the local revenue base by granting local authorities’ independent tax-raising powers (e.g. over property taxes) will help but can disappoint in poor and remote localities where the tax base is small. Central government needs to widen and deepen the non-resource revenue base at national level, and build fiscal buffers, thereby absorbing revenue risks and maintaining stability in subnational government funding.¹³

Fiscal decentralization will fail if accountability in subnational public expenditure management is weak (a common problem in Africa).¹⁴ Revenues can also be squandered on white elephant projects (e.g., the Canon Minera in Peru) and are often financially unsustainable as well. Project failures occur when local authorities have limited project planning and preparation capacities.¹⁵ Politicians inevitably lobby for their own constituencies, and this can dominate project selection irrespective of merit. In the worst cases, revenues are captured by local criminal mafias (e.g., some oil revenues in Colombia).

Sometimes the central government takes the position that areas with resource wealth are sufficiently well-off relative to the national average, and therefore do not need fiscal transfers from the centre (a tendency in Tanzania). Or it is assumed that while sub-national administrations are technically and financially weak, companies can step in to provide public goods and services (notably health care), acting as quasi government agencies. Such was the case in Zambia in the years after mining was nationalized and before privatization began in the 1990s.¹⁶ In sum, localities in which mining and oil and gas extraction is sited can be left with the worst of all worlds: local governments with increased expenditure obligations but little additional revenue, and negligible benefits for local communities (while local elites gain).

Local limitations in revenue and expenditure management are fixable. Indeed, if they are not fixed then little *inclusive* development can occur, whether the country has resource wealth or not. The starting point must be a thorough assessment of the technical and financial competencies of local and regional administrations. This is the basis for building the capacity to deliver high-return projects and services of real value to the local communities. Existing local competencies are often chronically deficient, and the non-resource sources of local revenue are commonly inadequate relative to the large new local demands arising from resource investments. Governments need to

¹² Morgandi (2008).

¹³ Formula-based approaches for allocating revenues (e.g. royalties) can have unintended consequences. In Brazil the sharing of the CFEM (*Compensação Financeira pela Exploração de Recursos Minerais*) royalty between municipalities and the state administration in *Pará* state resulted in some municipalities acquiring huge wealth and public assets while doing little to enhance the spending powers of the much larger state authorities (ICMM 2013).

¹⁴ Auditing practices are often deficient (NRGI 2021: 15).

¹⁵ ICMM (2006).

¹⁶ Mwaba and Kayizzi-Mugerwa (2021).

ask what are the expenditure responsibilities already assigned to local or regional administrations and are these complete given the new situation in which large private-sector investments are taking place? Additionally, what independent tax-raising powers does the local government already have? Should they have more?

Ideally this assessment should take place within the framework of a regional development strategy, which in its turn is integrated into the national plan. There are many promising possibilities. Examples include development corridors based on leveraging the transport and power infrastructure constructed for the mine or oil and gas facility; stronger incentives for new smaller-scale private investments; and supporting public investments for local renewable energy generation and telecoms systems. But these all depend on the available financial envelope. And so finally, a financial plan is necessary, realistically costed with a strategy for mobilizing funding from both local and national sources, public and private, as well as donor support. None of this is easy, but it is an essential part of any coherent long-term approach.

While localities with mines and oil and gas infrastructure have special needs—notably in minimizing adverse social and environmental impacts—their challenges are embedded in the wider politics and economics of regional policy. Every region cries out for more assistance whether it has resource wealth or not. When resource revenues are especially large, there is an opportunity to craft and fund a new regional policy, including a radical rethink of existing arrangements for fiscal decentralisation.¹⁷ Unfortunately, policy inertia rather policy reform is all too common in countries experiencing a revenue windfall. Fiscal transfer arrangements often continue much as before with local demands for improvements falling on deaf ears.

Spending resource revenues effectively—whether at the local or national levels—is one major fiscal challenge for an extractive sector programme. An equally important fiscal challenge is that of raising these revenues as efficiently as possible, and it is to this fundamental issue that we now turn.

4 Reforming taxation

4.1 Issues and controversies

Revenues are often the first item on the agenda when discussing the extractives industries with politicians and government officials who are invariably keen to grow the public purse.¹⁸ This priority is often accompanied by deep suspicions that companies, not least the multinational companies (MNCs), are evading their tax obligations. The domestic media is often quick to reinforce any suggestion that foreigners are taking an ‘unfair’ cut of national wealth. The commodity cycle stirs up additional passions: in boom times governments complain that their share of the windfall is too low, and in slumps companies complain that taxes are too high. Tax disputes are regular occurrences. Rio Tinto and the Government of Mongolia argued for years over the Oyu Tolgoi mine, one of the world’s largest copper (and gold) assets, and the country’s biggest foreign investment.¹⁹ Governments are prone to alter tax legislation in their favour,

¹⁷ Our recommendations are similar to those of the Benchmarking Framework provided by the Natural Resource Governance Institute (NRGI) (NRGI 2017).

¹⁸ McNabb (2023) discusses fiscal dependence on resource revenues.

¹⁹ ‘Rio Tinto and Mongolia Settle Feud over Oyu Tolgoi Copper Mine’. *Reuters*, 25 January 2022. Delays in starting a project to expand mining at Oyu Tolgoi led to the postponement of royalty and tax payments. Rio Tinto eventually

especially for the mining of metals that have highly cyclical markets such as copper (Zambia, a big copper producer, changed its mining tax regime ten times over 2002–17, making three changes in one year alone).²⁰ New governments are especially keen to show some muscle, and talking tough on mining goes down well with electorates. *Perú Libre*, for example, won power in 2021 on a pledge to take 80 per cent of mining profits to fund its promise of ‘no more poor people in a rich country’. *In extremis*, the sector can be nationalized in an assertion of sovereignty: every 18th March, Mexico celebrates the oil industry’s 1938 nationalization.

Whether such approaches (including full state ownership) can enhance the government’s revenue take is open to debate. State-owned mining and oil and gas companies do not necessarily have the best expertise, technology, or finance to deliver projects on time at a cost that is competitive with the best MNCs which have long-standing expertise: this is especially so in newly producing countries with little or no experience. In extreme cases public revenues collapse, disastrously so in the later years of public ownership in Zambia.²¹ That said there are some NOCs, notably Saudi Aramco (now partly privatized), that are highly effective project managers.

Nevertheless, MNCs certainly do have distinct advantages in limiting their tax burdens. They can field teams of international lawyers and tax experts that host countries rarely match, especially when the countries are new producers and lack experience with the industry. And, illicit payments are known to have secured some concessions on very favourable terms.

Aside from striking a hard bargain in the initial negotiations—including tax holidays and other concessions—common corporate strategies to reduce tax bills revolve around shifting profits to lower or zero tax jurisdictions through, for example, borrowing from a subsidiary of the multinational located in a tax haven (often a Caribbean jurisdiction). Intra-group purchases of equipment and services (transfer pricing) also shift profits and can be difficult for tax authorities to monitor and assess.²² Another tactic is to realize any capital gains outside the host country, and in a more favourable tax jurisdiction. More generally, the line separating evasion from avoidance can be a fine one and provides plenty of work for tax lawyers.

Inevitably the evidence on profit shifting is patchy since concealment is at its heart. However, profit shifting is proportionately larger for low-income countries (LICs) and middle-income countries (MICs) than for advanced economies: measures of profit shifting are inversely related to per capita income (Johannessen, Tørsløv, and Wier 2020). Two pieces of research from the International Monetary Fund (IMF) provide further evidence. First, using a sample of 74 countries over 2000–18, Beer and Devlin (2021) find that a one per cent increase in the host countries’ corporate tax rate reduces the reported profits of mining and oil and gas companies by more than 3 per cent. And the effect is stronger for mining companies than those in oil and gas, a sector which has more joint ventures and production sharing (which provides national authorities with greater clarity on revenue flows and costs). Second, and building on the first IMF study, Albertin et al. (2021) using EITI data calculate that sub-Saharan Africa (SSA) losses from multinational tax avoidance in mining are between US\$470 million and US\$730 million per year. A UNU-WIDER study using data from the Ugandan Revenue Authority, and covering both resource and non-resource MNCs, finds that multinationals pay lower effective tax rates, and are more likely to report

wrote off the US\$2.3 billion that the Mongolian government borrowed from the company to cover its share of the development costs, and the government will now receive revenue (in the form of dividends) at a much earlier date.

²⁰ Manley (2017). Lundstøl and Isaksen (2018).

²¹ Adam et al. (2014).

²² Viola et al. (2023) discuss transfer pricing in mining.

losses than domestic firms: partly due to favourable tax treaties but also profit shifting—the lower the tax rate in the country in which the multinational is registered, the lower the reported profit of its Uganda subsidiary (Koivisto et al. 2021). Indian multinationals in the extractives industries are also adept at using foreign subsidiaries, especially those in offshore financial centres, to lower their tax bills, according to two UNU-WIDER studies (Das 2022a, 2022b).

What can be done to reduce these losses to the exchequer? The most important step is for governments to strengthen the capabilities of their own tax administrations. Many have made progress on this front in recent years, especially via establishing special departments competent in dealing with large taxpayers such as MNCs. International action and close cooperation across national jurisdictions are also necessary to share information, not least on transfer pricing risks.

In whatever they may do, government will always face the difficult task of balancing their desire for revenue with the need for investment. Extracting additional dollars of tax revenue can come at the cost of losing some future investment, not only in natural resources but right across the economy if foreign investors take fright. One example among many is the bitter tax dispute between UK company Cairn Energy and the Government of India. Cairn eventually received a reimbursement of over US\$1.2 billion in 2020.²³ The dispute did extensive damage to both India's international investment standing and Cairn's shareholder value.

Complete harmony in company-government relations is unlikely given the high stakes involved. Yet one country, Botswana, does seem to offer a model of good relations. Botswana's diamonds are mined and traded in a 50-50 joint venture with De Beers (an Anglo-American subsidiary) with the government owning a stake in De Beers itself. The government then receives a dividend. Zambia could move towards the Botswana model to end the country's seemingly endless cycle of fiscal renegotiation.²⁴ Ghana has gone down the route of limited joint ownership and receives significant mining revenues from state participation dividends.²⁵ Company-government relations tend to be better in oil and gas than in mining. This is probably because production sharing arrangements (PSAs) characterize hydrocarbons, and this provides the host authorities with more insight into the finances of its commercial partners. PSAs are much rarer in mining though there is now an uptick in their use, possibly in response to the difficulties of taxing MNCs.

4.2 Some technical choices

In sum, resource revenue policies are often highly conflictual and are always very political. But they are also very technical which is why countries would be wise to draw upon as much international expertise as is available. Space precludes us going into the finer details, but there are at least 4 sets of technical choices to be made around revenue policy.²⁶

First, should the fiscal terms be set out in detailed legislation or negotiated on a project-by-project basis? The former provides for greater rigour in aligning the fiscal terms for investors with national development policy, the latter is more flexible: it might encourage more investment and a quicker path to production and revenue. General tax legislation offers transparency, while project-by-project negotiations are often clouded in secrecy. The former will require more initial institutional investment in setting an appropriate fiscal framework, the latter requires substantial national

²³ 'Scots Oil Firm Wins £1bn Payout from Indian Government', BBC, 23 December 2020.

²⁴ On applying the Botswana model to Zambia see Mwaba and Kayizzi-Mugerwa (2021).

²⁵ Albertin et al. (2021: 8).

²⁶ For reviews see: Danie et al. (2010); Daniel et al. (2017); Nakhle (2012); Otto (2018); Readhead (2018).

negotiating skills. In recent years the balance of these arguments has led to a greater *relative* use of general tax legislation.

The second set of decisions revolves around choosing the mix of taxes on: (i) *income* (corporate income tax, economic rent, withholding taxes etc.) (ii) *production* (mainly royalties) and (iii) *trade* (excises and customs duties on imports of capital equipment, inputs etc. as well as export taxes).²⁷ These choices once made become embedded into tax administrations and into company behaviour. So new producing countries are advised to spend the time on getting it right at the outset. This reduces the danger of persistent and expensive tax inefficiencies, as well as an unstable/uncertain tax policy which will invariably deter investment.

Third, should mining or oil and gas companies receive more favourable tax treatments than other corporates? Given the unusually long gestation period for extractive projects, there is certainly a case for tax holidays to enable investors to recover their very large up-front investment costs—this is quite common: companies invariably expect it in project negotiations. Yet tax holidays can lead to political difficulties for governments as they may receive little if any revenue for several years after production commences, an outcome later perceived as unfair despite earlier agreement (and one that is ripe for opposition parties to exploit at election time). On this very thorny question governments need to ask themselves whether any particular investment would have been forthcoming *without* these tax incentives? This requires a good understanding of global market conditions, and the attractiveness of their own mineral deposits relative to the alternatives. Countries with large deposits extractable at low-cost are in the best position, especially when these are critical minerals in high demand by the technologies of the net zero transition. Little if any tax incentive may then be required for companies to sign up and invest.²⁸

Fourth, how can countries best achieve acceptable levels of revenue-capture over time while encouraging long-term investment? One way to reassure investors is to employ tax stability clauses in agreements to ensure an unchanging fiscal regime for a specified number of years. In practice, such agreements can encounter intense political pressure when prices boom as governments eye the extra revenue. This was evident during the ‘super cycle’ of commodity prices from the early 2000s through to about 2014. The optimistic future for metals markets at that time encouraged another round of tax increases: for example, Chile and Peru both raised their royalty rates on copper. Underlying this debate is a broad principle: taxation needs to be flexible and progressive. In short, the government’s tax take should increase when prices rise, and adjust downward when prices fall in order to preserve investment. The former is of course politically easier to achieve than the latter.

Fifth, there is the matter discussed earlier: how should the taxes collected from the sector be shared between the national and sub-national tiers of government? Should sub-national tiers be permitted to impose additional local taxes on companies? This would increase tax complexity and, if badly coordinated, deter investment. Yet, it could also enable poorer regions to be more pro-active in financing desirable local public goods, helping them reduce local company-community tensions. Much will depend on local institutional capacities and the politics of fiscal decentralization, both of which are very country-specific.

²⁷ On the concept of economic rent for taxation purposes, with an application to the global diamonds industry see the UNU-WIDER study by Löf et al. (2021).

²⁸ Readhead (2018) reviews tax incentives in mining.

In sum, policymakers are faced with complex technical choices in the context of market dynamics that in turn can alter the value of resources in unpredictable ways. Investment in the national capacities necessary to formulate tax policy in these challenging circumstances should more than pay off, as policy decisions made early in the project cycle will have ramifications for revenues and development often lasting decades.²⁹

4.3 Policy advice and the non-resource sectors

To help them with these specific technical problems and with the less familiar taxation challenges associated with critical minerals and the net zero agenda generally (of which more later), advice is available from several sources. These include the IMF's fiscal affairs department, which models oil and gas revenue management across countries, supporting countries to benchmark against best practice.³⁰ Also notable is the research and technical advice provided by the Intergovernmental Forum on Mining, Metals and Sustainable Development (IGF) which has, for example, a very comprehensive database on mining tax incentives as well as model to estimate the impact of tax incentives in mining.³¹ The Organisation for Economic Co-operation and Development (OECD) has many initiatives on tax policy and natural resource management.³² The UN Department for Economic and Social Affairs (UN-DESA) *Handbook of Extractives Taxation* is an invaluable guide to the finer details.³³ UNU-WIDER has undertaken a large amount of research on the extractives industries, as well as on tax policy more broadly (including ways to create a broader non-resource tax base).³⁴ The Columbia Center on Sustainable Development (CCSI) and the NRGI are also invaluable sources of advice and country experience.³⁵

The non-resource sectors, and their key role in economic diversification—including revenue diversification—are also vital to a long-term strategy for extractives intending to break with the enclave mindset. Successful policies for these sectors can diversify a country's revenue risks, and so render the public finances less vulnerable to the vicissitudes of the commodity cycle.³⁶ Unfortunately, and with but a few exceptions, resource-wealthy countries are notorious for their limited tax take outside the resource sectors: just one manifestation of the 'resource curse'

²⁹ A further complicating factor is the Global Minimum Tax (GMT), agreed by more than 130 countries in 2021, to ensure that MNCs with revenues above a given threshold are subject to a 15% effective minimum tax rate wherever they operate. Implementation of the GMT's so-called 'second pillar' is underway (as of 2024), but progress on the 'first pillar' is stuck in the US Congress for the moment. It is unclear how much developing countries will benefit.

³⁰ The IMF's Fiscal Analysis of Resource Industries (FARI) framework: <https://www.imf.org/en/Topics/fiscal-policies/fiscal-analysis-of-resource-industries>.

³¹ <https://www.igfmining.org/beps/current-topics/tax-incentives/> (an output of an IGF/OECD project). See also Readhead (2018) and Readhead et al. (2023).

³² See in particular OECD (2019) and the policy dialogues led by the OECD's Development Centre <https://www.oecd.org/dev/natural-resources/>.

³³ UN-DESA (2022) and <https://www.un.org/development/desa/financing/what-we-do/ECOSOC/tax-committee/thematic-areas/extractive-industries-taxation>

³⁴ The UNU-WIDER Domestic Resource Mobilization programme: <https://www.wider.unu.edu/about/domestic-revenue-mobilization-programme>

³⁵ <https://ccsi.columbia.edu/content/resources-publications> and <https://resourcegovernance.org>

³⁶ For discussion of commodity trends, cycles, and shocks, see <https://www.wider.unu.edu/project/extractives-development-e4d---risks-and-opportunities>, and Addison and Ghoshray (2023). Jones (2020) discusses revenue forecasting in mining.

phenomenon. This is something to be improved as part of the broader development strategy which we advocate.

There are two dimensions to this. First, the governments of many resource-wealthy economies have had limited success, and sometimes limited interest, in turning their finite *below-ground* assets into *above-ground* assets such as human capital, infrastructure, and effective institutions to deliver taxable growth *in the non-resource sectors*. Hence the tax base outside the extractives sectors remains smaller than its potential, with much activity being informal and therefore outside the tax system. Second, tax administrations being often weak, the effective rates of indirect and direct taxes are low on average: but particularly so in the hydrocarbon economies. An influential IMF study finds that for a sample of 30 oil and gas economies, a one percent increase in hydrocarbon revenue (relative to GDP) is associated with a reduction of 0.2 per cent in non-hydrocarbon revenues.³⁷ Why mobilize revenues from other sources when resource revenues suffice? (at least to meet the needs of the country's elite). Or why risk a potential challenge to existing authoritarianism if developing non-resource revenues—especially income, property, and indirect taxation—leads citizens to demand democratic accountability and transparency in how the money is spent?³⁸

This poor tax performance of the resource-wealthy group contrasts with much progress (on average) across the developing world in tax reform: LICs have increased their tax-to-GDP ratios from 10 per cent in 2000 to around 14 per cent today (with value-added tax (VAT) making a big contribution).³⁹ But tax reform in hydrocarbon economies has been mostly disappointing. To take one example, Angola's revenues from non-resource sources have been 7.5 per cent of GDP, and from oil and mining 33 per cent of GDP, since 2000. Repeated attempts to improve the tax system (VAT, income taxes, and property taxes) have largely stalled.⁴⁰ This left Angola vulnerable to the 2020 oil price shock which hit its oil revenues hard resulting in much reduced fiscal space to deal with the Covid-19 pandemic. The good news is that there are some obvious opportunities to improve tax systems, if governments are politically willing.⁴¹

5 Climate change and public finances

5.1 Fossil fuel subsidies

In sum, there is no shortage of advice on taxation policy which is well-supported by research. But the political difficulties are acute and are intensified today by the new fiscal challenges posed by the global net zero agenda, to which we now turn. The daunting problem of fossil fuel

³⁷ Bornhorst et al. (2009).

³⁸ The answer to these questions lies in the nature of the country's 'political settlement'; see Masi et al. (2024) for further discussion and empirical evidence.

³⁹ Mullins et al. (2020).

⁴⁰ Angola did manage to create a single revenue administration agency (IMF 2017: 26). But Angola's other tax reforms stalled (Fjeldstad et al. 2020).

⁴¹ Chachu (2021).

(consumption) subsidies, which reached an all-time high of US\$1.1 trillion in 2022, illustrate the hard politics.⁴² These subsidies are especially common in hydrocarbon abundant countries.⁴³

Aside from driving up emissions, fossil fuel subsidies are fiscally ruinous. Yet they are hard to cut. As an example, in mid-2021 the Government of Nigeria announced the phase out of its imported petrol subsidy which has taken billions from the public purse since the 1970s (sometimes reaching 20 per cent of the public budget, more than the shares of education and health combined).⁴⁴ Previous attempts had failed and it was no surprise when, in 2022, the reform was pushed back until after the February 2023 presidential elections. In the event, the new administration bit the bullet and removed the subsidy in June 2023. Fuel prices tripled (and jumped in neighbouring countries which had enjoyed cheap smuggled petrol). Transport and food prices followed, as did electricity costs (many Nigerians depend on diesel generators).

Governments risk civil disorder when fuel prices increase: 41 countries experienced fuel riots between 2005–18.⁴⁵ Food security, especially in remote areas with high transport costs, is put at risk. Increasing targeted cash transfers *before* the subsidy's reform can mitigate the impact on the poor. But when social protection is inadequate the poor are left badly exposed to price shocks (Nigeria's government announced a cash transfer, but then paused, amid fierce criticism that the cost of living shock has not been effectively mitigated for the poor). The middle-class may also join the demonstrations as they spend a lot on fuel (the petrol subsidy benefitted non-poor Nigerians some 3-4 times more than poorer citizens). Overall, fuel subsidy reform is a risky political step for any government (and in Nigeria there are signs that it is creeping back in).

As the global energy transition accelerates, markets for fossil fuel will become more thinly traded and almost certainly more volatile, putting pressure on governments to maintain subsidies or reintroduce them. Whereas electric vehicles (EVs) will eventually prevail in the Global North, the internal combustion engine will be around for much longer in the poorer Global South. Driving an EV down Africa's roads remains a distant prospect (not least because of terrible roads and erratic power supplies). The political constituency to retain fuel subsidies will therefore remain strong. Governments do, however, need to act as there are much better uses for public money than fuel subsidies; that are often fiscally unsustainable (Nigeria's lesson); and they lock countries into energy and transport pathways that are now well-behind the technological frontier—to the detriment, ultimately, of a country's global competitiveness.

5.2 Greening fiscal policy

Cutting fossil fuel subsidies is just one item on the growing agenda of reforms necessary for the public finances to meet the net zero challenge. Other green fiscal instruments include carbon taxes

⁴² IEA (2023a). <https://www.oecd.org/fossil-fuels/>. 'Together implicit and explicit fossil fuels subsidies amount to US\$7 trillion in 2022 (equivalent to 7.1% of global GDP) according to an IMF study (Black et al. 2023: 3). Far more is spent on fossil fuel subsidies as well as other practices that harm nature than on conserving, protecting and restoring nature itself (about US\$200 billion in 2022) (UNEP 2023: xii).

⁴³ See McCulloch (2023).

⁴⁴ Siddig et al. (2015:4). The World Bank estimated the cost at US\$2.1 billion in just the first nine months of 2021 <https://www.reuters.com/markets/commodities/nigeria-should-end-fuel-subsidy-speed-reforms-boost-growth-world-bank-says-2021-11-23/>

⁴⁵ McCulloch et al. (2021).

and well-crafted subsidies for renewables (the public finances permitting), especially solar for poorer communities and ecoservices to preserve natural capital.⁴⁶

While in principle governments recognize the green fiscal agenda's importance, not least in meeting their obligations under the Paris Climate Agreement, finance ministries in poorer countries are usually in the desperate business of finding enough revenue to fund even this year's budget and debt service. So, climate and the environment invariably get pushed down the priority list. This is exacerbated by a lack of analytical capacity within government to address what are complex and novel policy problems, for example the distributional impact of introducing carbon taxes, an understanding of which is critical to mitigating the poverty impact, as well as dampening political trouble. Consequently, promising policy ideas often stall early on and opportunities to raise more revenue, save public money, or reduce social inequality are easily missed.

One example of a policy that can raise revenue while cutting emissions is taxing or fining the flaring and venting of gas by oil and gas facilities—a large source of methane emissions. This is facilitated by timely satellite data which is becoming ever cheaper: Nigeria has demonstrated success (see Box 1).

Such an approach, and carbon taxes more broadly, can incentivize oil, gas and mining companies to cut their *scope one* emissions: those that arise or are controlled by the producing company and its affiliates.⁴⁷ More countries are now legislating to require companies to track and report publicly their emissions that are either categorized as scope one or *scope two* (the latter include emissions from the energy used to power the production process, transport, refining etc.). Major investors are also putting pressure on companies to do this voluntarily even if they are not yet legally obliged.⁴⁸ Some oil and gas companies have announced targets to reduce scope one and two emissions (although only a fraction of these targets match up to the net zero scenario of the International Energy Agency (IEA)).⁴⁹ In sum, fiscal policy and investor pressure on companies can encourage a reduction in scope one and two emissions from oil and gas (which account for about 15 per cent of total energy-related emissions).⁵⁰ Similar opportunities exist in mining.

⁴⁶ IMF (2019); OECD (2022).

⁴⁷ On scope 1, 2, and 3 emissions, see <https://ghgprotocol.org>. Another approach is to hike royalties, since a royalty acts as an implicit carbon tax: 'A royalty of 10 per cent on a barrel of oil that sells for US\$100 is equivalent for instance, to a carbon tax on its content of about US\$20, tonne' (Keen 2023: 87).

⁴⁸ For example, UK requirements apply to all companies listed on the London, other European or US stock markets; large unquoted companies producing an annual Directors Report; and also large limited liability partnerships. Pressure also comes from emerging international arrangements such as the International Sustainability Accounting Standards Board (ISSB) established by the International Financial Reporting Standards Foundation (IFRS): <https://www.ifrs.org/news-and-events/news/2021/11/ifrs-foundation-announces-issb-consolidation-with-cdsb-vrf-publication-of-prototypes/>

⁴⁹ IEA (2023b: 6).

⁵⁰ IEA (2023c: 4).

Box 1: Cutting flaring and venting in the oil and gas industry

Some 7.5% of all gas extracted is flared or vented. Both contribute hugely to the atmospheric emissions originating in the upstream oil and gas industry (methane is an especially potent greenhouse gas) and cutting flaring and venting will help oil and gas producing countries in the developing world meet their Nationally Determined Contributions (NDCs) under the Paris Agreement. Particulate matter and chemicals from flaring and venting are also harmful to human health, especially in communities close to producing sites. UNU-WIDER studies by McPhail and Romsom (2021a, 2021b) find that reducing these emissions could provide an additional natural gas sales value globally of at least US\$36 billion annually and would therefore add considerably to energy generation.⁵¹

Affordable technologies to capture and use the gas are now available but are not necessarily used by producers when these would reduce their commercial returns.⁵² Flaring and venting is sometimes necessary for safety reasons, but much is excessive, and can be reduced by regulation and by appropriate taxation. To do so, however, requires timely data on the location and volume of the gas flares and vents. Fortunately, data from remote imaging technologies using satellites can now be used accurately to monitor individual flares, and so provide the data necessary to design appropriate taxes. Regulators no longer need to depend on companies to self-report.

Nigeria, a pioneer in this policy area, now measures flares across its upstream oil and gas sector, and reports these in a ‘Gas Flare Tracker’ which is an open-source data base, which civil society can also actively and freely monitor.⁵³ Penalties are applied and already provide significant revenues for the government: US\$120 million in 2019, and US\$270 million in 2020. Nigeria has gone from being the world’s second largest gas flaring nation, to being the seventh.

The scope for replicating the Nigerian example in other producing counties is huge. In particular, the VIIRS Nightfire satellite-based algorithm has registered and measured no fewer than 10,820 individual flares globally, in more than 100 countries, many in the developing world.⁵⁴ It is also increasingly possible to obtain fine detail on the composition of each flare: to show, for example, the dominant amount of methane that they contain. Satellite data are especially useful in identifying ‘super-emitters’: 61% of all gas flared globally originates from just 6.6% of flares. It is vital to make these satellite data on flares and vents freely available as a global public good, so that every country can identify the specific sources, the amounts, and the responsible companies.

In summary, flaring and venting can be reduced, and the gas that would otherwise be wasted can be monetized, including via small-scale energy generation for neighbouring communities (which despite their proximity to the energy source often lack adequate energy access). Furthermore, improved air quality leads to significant health benefits and, not least, the new fiscal measures can yield additional revenues for governments—as Nigeria successfully demonstrates.⁵⁵

This represents progress but it still leaves unanswered questions about scope *three* emissions, which occur from activities outside the control of the producer. Such emissions arise from the combustion of hydrocarbon products for energy generation and transport; from the use of hydrocarbons as a feedstock in manufacturing petrochemicals; and from the smelting of metals

⁵¹ McPhail and Romsom (2021a). Based on an assumed average gas price (US\$4/MMBtu), and if 75% of the global upstream gas flared and vented is instead captured.

⁵² McPhail and Romsom (2021c).

⁵³ See <https://nosdra.gasflaretracker.ng/>. Advisory work for the tracker was conducted by Oxford Policy Management (OPM) under a Department for International Development (DFID)-funded project: <https://www.opml.co.uk/projects/facility-oil-sector-transformation-foster-2>. Subsequent work is described in McPhail and Romsom (2021b), Roe et al. (2021); and Romsom and McPhail (2023).

⁵⁴ The algorithm uses the Visible Infrared Imaging Radiometer Suite (VIIRS): data collected nightly by the Suomi National Polar Partnership spacecraft: <https://ncc.nesdis.noaa.gov/VIIRS/>

⁵⁵ See also Lorenzato et al. (2022).

and their subsequent use in manufacturing consumer and capital goods. Scope three emissions account for between 80–95 per cent of the emissions of the global oil and gas industry i.e., mostly in midstream and downstream.⁵⁶ Scope three emissions also account for the bulk of mining emissions, notably from coal, but also from metals refining much of which still relies on energy from burning coal and gas. Consequently, reducing emissions *throughout* the value chain, and not just in the upstream, will require new actions including carbon taxes at increasing rates.

This gives rise to a thorny and unresolved policy dilemma, and one that will increasingly dominate both the climate and development debates. Consider the global oil and gas value chain. A carbon tax can be levied at any point in the value chain but levying it on the upstream companies is administratively easier as their number is much smaller than the vast number of companies and consumers further down the value chain. A hydrocarbon producer with a small domestic energy market—the typical African country—will export much of what it extracts, and so most scope three emissions will occur abroad, often thousands of miles away. The governments producing hydrocarbons will be reluctant to levy a full carbon tax on their oil and gas—covering all emissions irrespective of where they occur—as they quite reasonably fear a loss of investment that ultimately cuts into revenues from royalties, corporate taxes, and dividends. This reluctance will be even greater if their competitors fail to levy full carbon taxes (and if importing countries also fail to levy carbon taxes on their energy consumers).

Consequently, while the ‘polluter should pay’ is a well-established principle in environmental taxation, in practice we foresee a complex game between sovereign nations over exactly where in the value chain the taxes should be levied and who is responsible. Much better would be a global emissions control system established and enforced comprehensively as an agreed global ‘public good’.⁵⁷ This, however, remains a distant prospect, especially in the current state of geopolitics.

How all this will all play out is therefore highly uncertain. What is likely, however, is that the taxable economic rents from fossil fuels will eventually be squeezed, putting fiscal pressure on producing countries.⁵⁸ Consequently, they are well advised to redouble their efforts to diversify the revenue base away from over-dependence on fossil fuels in ways suggested earlier. And they need to look also to their renewable natural capital as a revenue source, when sustainably managed. Public revenues from mining metals should be more resilient. However, someone in the value chain must bear the costs of cutting emissions (and other environmental pollution) and so poorer countries might not get quite the revenue bonanza they expect from critical minerals. The richer countries could share some of their own carbon tax revenue with the Global South, via increased climate finance and more bilateral and multilateral aid (and there is certainly a strong ethical case given the Global North’s historic and current emissions). But the poorer world cannot bank on such ‘generosity’.

⁵⁶ Wood Mackenzie (2022).

⁵⁷ Evelyn Dietsche succinctly spells out the implications: ‘a truly effective global emissions control system would need to cover all excess emissions without exceptions and that it would need to do so across the boundaries of sovereign nation states; and would need to apply equally to all carbon consumers, leaving no room for free riders’ (Dietsche 2020: 5).

⁵⁸ Jensen (2023) estimates the loss from stranding.

6 Building macroeconomic stability

6.1 Managing the public finances

Economic transformation is made harder when macroeconomic policy fails to respond effectively to Dutch Disease⁵⁹ and economic incentives become distorted. Fiscal policy—the management of public expenditures, public revenues, and public debt—plays a central role in reducing the risk of Dutch Disease and mitigating the business cycle.⁵⁹ Public finance management (PFM) and the necessary expertise and institutions are at the heart of successful development and the maintenance of macroeconomic stability.

Most countries now deploy standard budgetary mechanisms for both revenue-raising and expenditure management, which are usually overseen by the finance ministry. There is also much experience on good PFM practice.⁶⁰ Once again the NRGi Benchmarking Framework provides a set of valuable suggestions.⁶¹ This is yet another area of economic management where the technical tools required are extremely well defined. Yet their *application* is often weak, the result of not only limited technical capacity within some governments, but also of the politics of spending, taxing, and debt, together with the shocks that make it hard to keep poorer economies on a steady growth path.

Fiscal policy choices must start with the *exploration phase* for minerals and oil and gas, since the investments involved in exploration invariably generate significant public revenue (e.g., from exploration fees) regardless of whether the venture is successful or not. Later, if a project's commercial viability is confirmed, expectations of wealth grow—often unrealistically. But further project development will still be needed before a final investment decision is taken and large-scale investment starts in constructing the mine or oil and gas production facility together with the necessary power, transport, and other infrastructure. At this stage, given the expected volumes of production and export, the prospects for public revenues can be evaluated—based on realistic assumptions (and scenarios) about future prices and the likely magnitude and timing of the completion of the investment phase, the start of production, and the arrival of revenue flows into the exchequer.⁶² This is also the time to conduct a risk analysis.

In principle, the policy agenda around the revenues comprises five sets of decisions which can be categorized as follows:⁶³

- Decision 1: Should the government borrow in advance of the arrival of the resource revenues, to allow earlier spending on its development priorities?⁶⁴ Or, if public debt is

⁵⁹ Monetary policy in both LICs and lower-middle-income countries (LMICs) has a supporting role given the thinness of their financial markets. Addison and Roe (2004), Henstridge and Roe (2018), and Magud and Sosa (2010) provide a fuller discussion.

⁶⁰ See: IMF (2007); Kristensen et al (2019); ODI (2011); and OPM (2000).

⁶¹ NRGi (2017).

⁶² In practice commercial operators normally work with a range of different scenarios each associated with specific assumptions about uncertain parameters, especially prices. Any revenue projections should take full account of (i) engineering timelines for the construction of production and export facilities; (ii) price assumptions; (iii) an assessment of geological, engineering, and other non-technical risks.

⁶³ This categorization follows Henstridge and Roe (2018) and AfDB (2015).

⁶⁴ Depending on the project's complexity and its scale, many years may elapse between the start of construction work on the mine or oil and gas facility and the start of production. There can then be a further delay in the arrival of

already high, should the government signal an intention to pay down debt once the revenues arrive in order to borrow in future on more favourable terms?

- Decision 2: Once the revenues arrive, should the government spend most of it (after debt service) or save some portion and, if saving, how much and for what purpose (fiscal stabilization or intergenerational wealth transfer being the most common goals)?
- Decisions 3: For the portion of revenues to be spent, should it be spent on ‘consumption’ (e.g., the civil service wage bill or social protection?) or ‘investment?’ (e.g., physical infrastructure such as roads and bridges or human capital investment (via education and health)?⁶⁵
- Decision 4: Should saving be undertaken on a regular (annual base), according to a well-defined ‘fiscal rule’?⁶⁶
- Decision 5: For the savings, what should be the allocation of assets? Should the savings be accumulated in the foreign currency reserves of the nation’s central bank, or deposited in a Sovereign Wealth Fund (SWF)? If the latter, what mix of foreign and domestic assets should the fund be mandated to hold, and of what duration? (decisions that in turn depend on the purpose of the fund).

The complexity involved in making these decisions is discussed in our earlier work.⁶⁷ Suffice it to say that serious errors can arise in any one of these sets of decisions. Mozambique illustrates the consequences of early over-borrowing, as do Nigeria and Venezuela over the decades (Decision 1). Ghana’s experience after the discovery of its large Jubilee oil field in the late 1990s illustrates the same danger of overborrowing but also that of committing too large a portion of additional revenue to current expenditures (in particular, civil service wages) (Decisions 3 and 4).⁶⁸ Nigeria’s immense oil and gas revenues could have been saved over the decades to build a very large SWF but were instead mostly spent (Decision 2) and too little of its spending has been allocated to social protection, education and health (Decision 3). Equatorial Guinea has both spent too much of its oil revenue, and in ways that benefit the elite rather than most of its citizens (Decisions 2 and 3). Angola, Chad, Libya, and Malaysia have all experienced serious mismanagement of their SWFs (Decision 5).

Failures are more evident than successes, but among the few successes two stand out: Botswana and Chile. Botswana has accumulated substantial savings for future generations in a well-managed SWF (the Pula Fund).⁶⁹ Chile is one of the few countries that have stuck to a fiscal rule through the commodity cycle for copper. Public expenditures there are budgeted based on the long-term copper price, rather than the current market price (which can be as much as three times greater

significant revenues into the exchequer depending on the specifics of the tax agreement with the company (in particular, the nature of the agreed investment tax breaks).

⁶⁵ On public spending choices in resource economies, see Mosley (2017) and Witter and Jakobsen (2018).

⁶⁶ A fiscal rule acts as a ‘... constraint on fiscal policy through numerical limits on budgetary aggregates’ (Lledó et al. 2017: 8). Rules may be based on targets for expenditures, revenues or the budget balance.

⁶⁷ Addison and Lebdioui (2022); Addison and Roe (2004); Henstridge and Roe (2018). See also Van der Ploeg and Venables (2018) on the theory.

⁶⁸ Bawumia and Halland (2018) discuss Ghana.

⁶⁹ <https://www.bankofbotswana.bw/content/pula-fund>. While the stated objective of the Pula Fund is intergenerational wealth transfer, it has in practice also been used as a stabilization fund (Sebudubudu 2021: 82).

than the long-run price during boom times).⁷⁰ The savings are then deposited in a stabilization fund and a pension fund. Chile's fiscal rule contained over-spending as copper entered a super-cycle from 2000 onward, despite the political pressures to do so, and eased the adjustment to the sharp drop in the copper price caused by the Global Financial Crisis of 2008–09.⁷¹ The merits of fiscal rules are many and numerous countries have tried them out—only to reverse course later. We are reminded of Saint Augustine's plea, 'Please God, make me virtuous, but not just yet'.

6.2 Sovereign Wealth Funds

Countries with new resource discoveries are often urged to establish a SWF to signal policy credibility.⁷² This is intended to reassure domestic and foreign investors that macroeconomic stability is taken seriously as a goal.

Additionally, it is often argued that resource revenues should be saved until such time as the effective institutions necessary for spending the money wisely can be built. This is a strong argument—and nobody can doubt the value of effective institutions—but they are not cheap to build, especially in countries that lack a broad base of the requisite skills and expertise. Constructing robust institutions can itself absorb a good portion of the new revenues: for example, building a comprehensive and effective public health system, or a primary school system that delivers quality education right across the nation, or a well-managed tax system (which is especially important in diversifying the revenue base away from an over-reliance on resource revenues).

Technocrats, such as government economists, tend to favour SWFs as a way of resisting politicians keen to overspend on the back of resource booms. This is especially so in countries that have undergone debt crises, like Mozambique. There it is hoped that an SWF will provide an institutional lock on the resource treasure chest. However, it is a lock that is not unbreakable. Numerous SWFs have been looted by political leaders together with their families and friends.⁷³ One prime example is Malaysia's state investment fund, known as 1MDB (*1Malaysia Development Berhad*): some US\$4.5 billion was stolen from the fund according to Malaysian and US investigators, with more than US\$1 billion going to accounts linked to the former prime minister Najib Razak (who was subsequently jailed for 12 years).⁷⁴ We again come back to a theme of this book that any mechanism to ensure probity is only really as good as the political context in which it operates, and the quality of the checks and balances in place to restrain elites from putting their personal interests ahead of the public interest.

More fundamentally, many governments are insufficiently clear about the purposes of public saving.⁷⁵ Funds intended to transfer wealth to future generations often end up being raided to shore up the public finances in times of macroeconomic stress. In such cases, it would have been better to create a fund for the *explicit* purpose of fiscal stabilization with its assets in mainly liquid short-term instruments (such as US Treasuries of short maturity) rather than in the illiquid assets characteristic of funds intended to maximize long-term investment returns. Likewise, SWFs

⁷⁰ Céspedes and Velasco (2014).

⁷¹ Solimano and Calderón Guajardo (2018); Villafuerte et al. (2010).

⁷² Roe (2016, 2018) discusses Mozambique and Tanzania. SWFs take a variety of forms: see Cumming et al. (2017).

⁷³ Angola's SWF is alleged to have greatly benefited the family and friends of former President dos Santos. One of the worst cases is Libya, involving Africa's largest SWF. See Addison and Lebdioui (2022).

⁷⁴ 'Jailed Malaysian ex-PM Najib Loses Final Bid to Review Graft Conviction'. *Reuters*, 31 March 2023. See Wright and Hope (2018).

⁷⁵ Addison and Lebdioui (2022); Van der Ploeg and Venables (2018).

created for the purpose of intergenerational wealth transfer or fiscal stabilization may end up investing in domestic enterprises—which can have the potential to become profitable but are risky assets. It is better to establish a fund specifically for domestic investment or to capitalize a national development bank.

Box 2: Sovereign Wealth Funds: intergenerational wealth transfer

Building up a SWF to help maintain essential public spending for when shocks strike is desirable but what about using a SWF to transfer some of today's resource wealth to future generations? Many SWFs have this objective, often alongside fiscal stabilization.

Norway's SWF (a pension fund) fed by the country's oil and gas revenues is among the largest and most well-known.⁷⁶ This makes sense for Norway which was already a prosperous country with good infrastructure and insignificant poverty when North Sea oil and gas came into production in the 1970s. However, it took at least 7 or 8 years before any revenues could be placed in this fund and a couple of decades at least before the magic of compounding could enable Norway's oil fund to reach the impressive size and power that it now commands.

Intergenerational wealth transfer makes sense for developing countries with small populations, and large hydrocarbon or mineral endowments, the revenues from which unambiguously exceed the ability of their economies to spend it productively. Guyana, with a population of only 820,000, has recently established an SWF to save a portion of its rapidly growing and potentially immense oil revenues. Botswana (population 2.6 million) and which is now an upper-middle-income country, also saves a portion of the diamond revenues for future generations via its Pula Fund.

However, in cases of LICs with large, but not massive revenue expectations, intergenerational saving is a more doubtful goal. Compare, for example, Mozambique (population 32 million) with Norway (population 5.5 million). A prosperous Norwegian can be generous as far as the future generation is concerned, but nearly half of Mozambique's population are extremely poor.⁷⁷ Today's Norwegian babies will live to a comfortable old age: the infant mortality rate (IMR) is one of the world's lowest at just under 2 per 1,000 live births, whereas Mozambique's IMR is one of the world's highest at around 70.⁷⁸ A Mozambican might well conclude that the best help for the future generation would be to spend more today on healthcare, especially child and maternal healthcare, so that more babies survive into adulthood. And the returns to human capital investments via well designed education and health spending in poor societies, are far higher than the expected returns on the financial assets comprising a SWF.⁷⁹

In addition, many rural people in Mozambique (and much of Africa) are especially poor and have limited access to power and transport infrastructure.⁸⁰ There are higher rates of return on well-designed anti-poverty projects, and infrastructure which could deliver real benefits for the economy and poor people. This adds to the case for spending the gas revenues quite early—provided that any projects are well-planned. This in turn intensifies the case for investment in the necessary analytical capacity within local and national government, and tight project execution. None of this is easy, but unless this institutional capacity is built—which itself requires spending a good portion of the revenue—then the prospects for better livelihoods and a more diversified economy will be limited.

Finally, the purpose of funds that save for future generations needs closer examination (see Box 2). Rich countries can afford to give more weight to their future generations, but much of the population in poor countries is desperately poor: they need better livelihoods, more social

⁷⁶ <https://www.nbim.no>

⁷⁷ Government of Mozambique (2016).

⁷⁸ <https://data.unicef.org>

⁷⁹ This point is discussed further in Addison and Lebdioui (2022).

⁸⁰ Cruz et al. (2023).

protection, and quality health and education *now*. When infant mortality is so high, it is hard to see why saving a dollar for those not yet born is preferable to spending that dollar on saving a child's life today—after all, children *are* a nation's future. Health is vital, and so is education. Current spending on education improves the lives of the current generation but also that of future generations as more of today's children become the teachers of the next generation and so on—building, over time, society's stock of human capital. In this way educational investment using the revenues from oil, gas and mining constitutes an ideal way of converting natural resources with finite lives into one that is in effect renewable (human capital). In sum, countries with resource revenues need to be clear why they are saving.

7 Conclusions

'Transforming the state' in the various ways discussed in this paper (improved management) may strike the reader as over-ambitious, given the politics of poorer countries. Many have long histories of initiating change only to fall far short, or fail entirely. State capacities are often in short supply, especially at the local government level. There is rarely enough funding. Grand theories of institutional change have run up repeatedly against these realities. Progress depends on dealing with a complex web of interconnected problems few of which lend themselves to simple or formulaic solutions.

Resource booms, such as the one in critical minerals now driven by the net zero transition, provide countries with a window of opportunity to catalyse change, even if progress is then iterative rather than rapid. Our view is that this requires an 'all of government approach' involving close collaboration between the different ministries and public institutions, preferably coalescing around a well-thought out longer-term national vision and plan. These must be based on a realistic assessment of possible market scenarios rather than wishful thinking, and with the backing of the highest levels of political leadership.

The relationships between the different layers of government also require sorting out as they are rarely satisfactory. Local grievances over the social and environmental impacts of mining or oil and gas extraction and over the apportionment of the revenues between national and local government are the result. This paper suggests greater revenue sharing between local and central government to fund increased local development spending, including at the community level, but with the proviso that *local capacity* in public expenditure management as well as project planning and execution must also be built. None of this will be easy, and each country needs to work out its own solutions.

Whatever institutional improvements are settled on, they do need to be funded. Governments and companies are never going to have a completely harmonious relationship—both have strong interests to protect—but they do need to reach a stable modus operandi. Governments need to reinforce their tax administrations and greater international cooperation on tax evasion is essential. Frequent and politically driven changes in tax legislation create an unstable investment climate and ultimately reduce public revenues. Nationalization is no panacea: NOCs for instance can be efficient and effective, but they can also become bloated and costly thereby reducing the revenue take for the treasury.

Net zero will increasingly come to dominate the debate around fiscal policy in developing countries as both their economies and populations grow. If they remain on their current fossil-fuel pathways then their share of global emissions will inevitably rise, especially as the advanced economies move

ever closer to achieving net zero. It is not inconceivable that populous developing nations such as Nigeria will, on current trajectories, have bigger emissions than the whole of Europe by 2050.

Achieving the necessary institutional changes, which are difficult in themselves, is made even harder when macroeconomic instability prevails. Shocks are an unavoidable fact of economic life, and developing countries have little of the fiscal space available to wealthy advanced economies to absorb these. Yet there are still steps they can take to reduce the risk and give themselves more room for manoeuvre should bad times strike. One is to diversify the economy as it lessens the impact of sectoral shocks and diversifies the revenue base as well. Limiting foreign borrowing is also prudent, as is building up a fiscal stabilization fund by saving a portion of any additional revenue (ideally guided by a fiscal rule) to maintain essential expenditures if a shock hits revenues (a frequent event in commodity dependent economies). Governments do, however, need to rethink whether they should save into an intergenerational sovereign wealth fund unless the resource revenue inflow is exceptionally large relative to the economy's absorption capacity, and they are confident that they can commit enough funding to the current budgets of priority social expenditures and development infrastructure.

References

- Adam, C., P. Collier and M. Gondwe (eds) (2014). *Zambia: Building Prosperity from Resource Wealth*. Oxford: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199660605.001.0001>
- Addison, T. (ed.) (2003). *From Conflict to Recovery in Africa*. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/acprof:oso/9780199261031.001.0001>
- Addison, T. (2012). 'The Political Economy of Fragile States', in G. K. Brown and A. Langer (eds), *Elgar Handbook of Civil War and Fragile States*, 363-78. Cheltenham: Edward Elgar. <https://doi.org/10.4337/9781781006313.00030>
- Addison, T. (2014). 'Development', in P. Burnell, V. Randall and L. Rakner (eds), *Politics in the Developing World*. Oxford: Oxford University Press.
- Addison, T. and A. Ghoshray (2023). 'Discerning Trends in International Metal Prices in the Presence of Nonstationary Volatility', *Resource and Energy Economics*, 71. <https://doi.org/10.1016/j.reseneeco.2022.101334>
- Addison, T. and A. Lebdioui (2022). 'Public Savings in Africa: Do Sovereign Wealth Funds Serve Development?', WIDER Working Paper 159/2022. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2022/292-8>
- Addison, T. and A. Roe (eds) (2004). *Fiscal Policy for Development: Poverty, Reconstruction and Growth*. London: Palgrave Macmillan for UNU-WIDER.
- Addison, T. and A. Roe (eds) (2018). *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.001.0001>
- AfDB (2015). *Delivering On The Promise: Leveraging Natural Resources for Human Development*. Abidjan: African Development Bank and the Bill & Melinda Gates Foundation.
- AfDB (2017). *Running the Numbers: How African Governments Model Extractives Projects*. Abidjan: African Development Bank.
- African Union (2009). *Africa Mining Vision*. Addis Ababa: African Union.
- Albertin, G., B. Yontcheva, D. Devlin, H. Devine, M. Gerard, S. Beer, I. J. Suljagic, and V. V. Thakoor (2021). 'Tax Avoidance in Sub-Saharan Africa's Mining Sector', IMF African and Fiscal Affairs

- Departments Discussion Paper 2021/022, Washington, DC: International Monetary Fund. <https://doi.org/10.5089/9781513594361.087>
- Bawumia, M., and H. Halland (2018). ‘Oil Discovery and Macroeconomic Management: The Recent Ghanaian experience’, in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 220-42. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0011>
- Beer, S. and D. Devlin (2021). ‘Is There Money on the Table? Evidence on the Magnitude of Profit Shifting in the Extractive Industries’, IMF Working Paper 21/09. Washington, DC: International Monetary Fund. <https://doi.org/10.5089/9781513566801.001>
- Black, S., A. A. Liu, I. Parry and N. Vernon (2023). ‘Fossil Fuel Subsidies Data: 2023 Update’, IMF Working Paper, 23/169. Washington, DC: International Monetary Fund. <https://doi.org/10.5089/9798400249006.001>
- Boadway, R. and A. Shah (2012). *Fiscal Federalism: Principles and Practice of Multiorder Governance*. Cambridge: Cambridge University Press.
- Bornhorst, F., S. Gupta, and J. Thornton (2009). ‘Natural Resource Endowments and the Domestic Revenue Effort’, *European Journal of Political Economy*, 25(4): 439–46. <https://doi.org/10.1016/j.ejpoleco.2009.01.003>
- Céspedes, L. F. and A. Velasco (2014). ‘Was This Time Different?: Fiscal Policy in Commodity Republics’, *Journal of Development Economics*, 106: 92-106. <https://doi.org/10.1016/j.jdeveco.2013.07.012>
- Chachu, D. (2021). ‘Good Institutions and Tax Revenue Outcomes in Resource-Rich Countries: When ‘Good’ is not Enough’, WIDER Working Paper 2021/75. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/013-9>
- Cruz, A. S., I. A. Ferreira, J. Flentø, and F. Tarp (eds) (2023). *Mozambique at a Fork in the Road*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/9781009265799>
- Cumming, D. J., G. Wood, I. Filatotchev and J. Reinecke (eds) (2017). *The Oxford Handbook of Sovereign Wealth Funds*. Oxford: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780198754800.001.0001>
- Cust, J. and D. Mihalyi (2017a). ‘The Presource Curse’, *Finance and Development*, 54(4): 36-40.
- Cust, J. and D. Mihalyi (2017b). ‘Evidence for a Presource Curse?: Oil Discoveries, Elevated Expectations, and Growth Disappointments’. Policy Research Working Paper 8140, World Bank, Washington, DC. <https://doi.org/10.1596/1813-9450-8140>
- Daniel, P., M. Keen, and C. McPherson (eds) (2010). *The Taxation of Petroleum and Minerals: Principles, Problems and Practice*. London: Routledge. <https://doi.org/10.4324/9780203851081>
- Daniel, P., M. Keen, A. Świstak, and V. Thuronyi (eds) (2017). *International Taxation and the Extractive Industries*. London: Routledge. <https://doi.org/10.4324/9781315658131>
- Das, K.C. (2022a). ‘Profit-Shifting Behaviour of Emerging Multinationals from India’, WIDER Working Paper 2022/21. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2022/152-5>
- Das, K. C. (2022b). ‘Tax Provisioning by Extractive Industry Multinational Subsidiaries’, WIDER Working Paper 2022/133. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2022/266-9>
- Dietsche E. (2020). ‘Taxing Extractive Resources in the Transition to a Low-Carbon Future’, WIDER Working Paper 2020/125. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2020/882-5>
- Fjeldstad, O-H., A. Orre, and F. Paulo (2020). ‘The Non-Oil Tax Reform in Angola: Escaping from Petroleum Dependency?’, *Extractive Industries and Society* 7(4): 1189-99. <https://doi.org/10.1016/j.exis.2020.05.009>

- Government of Mozambique (2016). 'Poverty and Well-Being in Mozambique: Fourth National Poverty Assessment', Maputo: Ministry of Economics and Finance, Directorate of Economic and Financial Studies.
- Henstridge, M. and A. Roe (2018). 'The Macroeconomic Management of Natural Resources', in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 161-78. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0008>
- ICMM (2006). *The Challenge of Mineral Wealth: Using Resource Endowments to Foster Sustainable Development*. London: International Council on Mining and Metals.
- ICMM (2010). *Mining Partnerships for Development: Position Statement*. London: International Council on Mining and Metals. London: International Council on Mining and Metals.
- ICMM (2013). *The Mining Sector in Brazil: Building Institutions for Sustainable Development*. London: International Council on Mining and Metals.
- ICMM (2014). *Enhancing Mining's Contribution to the Zambian Economy and Society*. London: International Council on Mining and Metals.
- IEA (2023a). *Fossil Fuels Consumption Subsidies 2022*. Paris: International Energy Agency.
- IEA (2023b). *Emissions from Oil and Gas Operations in Net Zero Transitions: A World Energy Outlook Special Report on the Oil and Gas Industry and COP28*. Paris: International Energy Agency/OECD.
- IEA (2023c). *CO2 Emissions in 2022*. Paris: International Energy Agency.
- IMF (2007). 'The IMF Code of Good Practice on Fiscal Transparency (ROSC)'. Washington, DC: International Monetary Fund.
- IMF (2017). 'Angola: 2016 Article IV Consultation', IMF Country Report 17/39. Washington DC: International Monetary Fund.
- IMF (2019). *Fiscal Policies for Paris Climate Strategies: From Principle to Practice*. Washington, DC: International Monetary Fund.
- Jensen, L. (2023). *Global Decarbonization in Fossil Fuel Export-Dependent Economies: Fiscal and Economic Transition Costs*. New York: United Nations Development Programme. <https://doi.org/10.2139/ssrn.4509213>
- Johannesen, N., T. Tørslov, and L. Wier (2020). 'Are Less Developed Countries More Exposed to Multinational Tax Avoidance? Method and Evidence from Micro-Data', *World Bank Economic Review*. 34(3): 790-809. <https://doi.org/10.1093/wber/lhz002>
- Jones, B. (2020). 'Revenue Forecasting in the Mining Industries: A Data-Driven Approach', WIDER Working Paper 22/2020. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2020/779-8>
- Keen, M. (2023). *Taxation and the Environment: An Overview of Key Issues for Developing Countries*. Clermont-Ferrand: Fondation Pour les Études et Recherches sur le Développement International (FERDI), Ministry of Foreign Affairs, France (Mobilisation des Ressources Intérieures Publiques, MRIP).
- Koivisto, A., N. Musoke, D. Nakyambadde, and C. Schimanski (2021). 'The Case of Taxing Multinational Corporations in Uganda: Do Multinational Corporations Face Lower Effective Tax Rates and is there Evidence for Profit Shifting?', WIDER Working Paper 2021/51. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/989-1>
- Kristensen, J. K., M. Bowen, C. Long, S. Mustapha, and U. Zrinski (eds) (2019). *PEFA, Public Financial Management, and Good Governance*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1466-2>
- Lahn, G. and P. Stevens (2018). 'The Curse of the One-Size-Fits-All: Re-Evaluating What We Know About Extractives and Economic Development', in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 93-113. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0005>

- Lledó, V., S. Yoon, X. Fang, S. Mbaye, and Y. Kim (2017). 'Fiscal Rules At a Glance', Washington DC: International Monetary Fund.
- Löf, A., O. Löf, and M. Ericsson (2021). 'Resource Rents in the Diamond Industry 2014–19: Rents, Issues, Methods, and Data Availability', WIDER Working Paper 2021/39. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/977-8>
- Lorenzato, G., S. Tordo, B. van den Berg, H. M. Howells, and S. Sarmiento-Saher (2022). *Financing Solutions to Reduce Natural Gas Flaring and Methane Emissions*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1850-9>
- Lundstøl, O. and J. Isaksen (2018). 'Zambia's Mining Windfall Tax', WIDER Working Paper 2018/51. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2018/493-3>
- Magud, N. and S. Sosa (2010). 'When and Why Worry About Real Exchange Rate Appreciation? The Missing Link between Dutch Disease and Growth', IMF Working Paper 10/271. Washington, DC: International Monetary Fund. <https://doi.org/10.5089/9781455210787.001>
- Manley, D. (2017). 'Ninth Time Lucky: Is Zambia's Mining Tax the Best Approach to an Uncertain Future?', Briefing. New York: Natural Resource Governance Institute.
- Masi, T., A. Savoia, and K. Sen (2024). 'Is There a Fiscal Resource Curse? Resource Rents, Fiscal Capacity and Political Institutions in Developing Economies', *World Development*, 177. <https://doi.org/10.1016/j.worlddev.2024.106532>
- McCulloch, N. (2023). *Ending Fossil Fuel Subsidies: the Politics of Saving the Planet*. Rugby: Practical Action. <https://doi.org/10.3362/9781788532044>
- McCulloch, N., D. Natalini, N. Hossain, and P. Justino (2021). 'An Exploration of the Association Between Fuel Subsidies and Fuel Riots', WIDER Working Paper 159/2021. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/099-3>
- McNabb, K. (2023). 'Fiscal Dependence on Extractive Revenues: Measurement and Concepts'. WIDER Working Paper 46/2023. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2023/354-3>
- McPhail, K. (2018). 'Enhancing Sustainable Development from Oil, Gas, and Mining: From an 'All of Government' Approach to Partnerships for Development', in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 342-65. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0017>
- McPhail, K. and E. Romsom (2021a). 'Capturing Economic and Social Value from Hydrocarbon Gas Flaring: Evaluation of the Issues', WIDER Working Paper 5/2021. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/939-6>
- McPhail, K. and E. Romsom (2021b). 'Capturing Economic and Social Value from Hydrocarbon Gas Flaring: Solutions and Actions', WIDER Working Paper 6/2021. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/940-2>
- McPhail, K. and E. Romsom (2021c). 'Reducing Wasted Gas Emissions is an Opportunity for Clean Air and Climate', Blog. Helsinki: UNU-WIDER.
- Morgandi, M. (2008). 'Extractive Industries Revenues Distribution at the Sub-National Level: The Experience in Seven Resource-Rich Countries', New York: Revenue Watch Institute.
- Mosley, P. (2017). *Fiscal Policy and the Natural Resources Curse How to Escape from the Poverty Trap*. London: Routledge. <https://doi.org/10.4324/9781315671444>
- Mullins, P., S. Gupta, and J. Liu (2020). 'Domestic Revenue Mobilization in Low Income Countries: Where To From Here?', CGD Policy Paper 195. Washington, DC: Center for Global Development.
- Mwaba, A. and S. Kayizzi-Mugerwa (2021). 'Boosting Mineral Revenues in Zambia: Policy Options for a Sustainable Fiscal Regime', WIDER Working Paper 2021/178. Helsinki: UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2021/118-1>

- Nakhle, C. (2012). *Petroleum Taxation: Sharing the Oil Wealth: A Study of Petroleum Taxation Yesterday, Today and Tomorrow*. London: Routledge.
- Nayyar, D. (ed) (2019). *Asian Transformations: An Inquiry into the Development of Nations*. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198844938.001.0001>
- NRGI (2017). *Natural Resource Charter Benchmarking Framework*, New York: Natural Resource Governance Institute.
- NRGI (2021). *2021 Resource Governance Index*, New York: Natural Resource Governance Institute.
- ODI (2011). *A Guide to Public Financial Management Literature for Practitioners in Developing Countries*. London: Overseas Development Institute.
- OECD (2019). *Guiding Principles for Durable Extractive Contracts*. Paris: Organisation for Economic Co-operation and Development.
- OECD (2022). *OECD Investment Tax Incentives Database — 2022 Update: Tax incentives for sustainable development*. Paris: Organisation for Economic Co-operation and Development.
- OPM (2000). 'Medium Term Expenditure Frameworks: Panacea or Dangerous Distraction?' OPM Review Briefing Note. Oxford: Oxford Policy Management.
- Otto, J. M. (2018). 'The Taxation of Extractive Industries: Mining', in T. Addison, T. and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 275-97. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0014>
- Readhead, A. (2018). 'Tax Incentives in Mining: Minimizing Risks to Revenue', Geneva and Paris: Intergovernmental Forum on Mining, Metals and Sustainable Development and Organisation for Economic Co-operation and Development.
- Readhead, A., V. Tarus, T. Lassourd, E. Madzivanyika, and B. Schlenther (2023). *The Future of Resource Taxation: 10 Policy Ideas to Mobilize Mining Revenues*, Geneva and Pretoria: Intergovernmental Forum on Mining, Metals and Sustainable Development and African Tax Administration Forum.
- Roe, A., (2016). 'Will Norway's Model of Sovereign Wealth Fund Work in Tanzania: A Reality Check', Blog. Helsinki, UNU-WIDER.
- Roe, A. (2018). 'Mozambique: Bust Before Boom: Reflections on Investment Surges and New Gas', in J. Page and F. Tarp (eds), *Mining for Change: Natural Resources and Industry in Africa*, 161-82. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.35188/UNU-WIDER/2018/582-4>
- Roe, A., K. McPhail and E. Romsom (2021). 'Gas and Oil Industry Emissions: What Could be Done Right Now?', Blog. Oxford: Oxford Policy Management.
- Romsom, E. and K. McPhail (2023). *Nigeria's Super-Emitter Flares: Flare Performance Comparison*. Singapore: EnergyCC for Oxford Policy Management.
- Sebudubudu, D. (2021). 'Botswana's Natural Resource Fund (The Pula Fund)', in E. Okpanachi and R. Chowdhari Temblay (eds), *The Political Economy of Natural Resource Funds*, 63-85. London: Palgrave Macmillan. https://doi.org/10.1007/978-3-030-78251-1_4
- Siddig, K., P. Minor, H. Grethe, A. Aguiar, and T. Walmsley (2015). 'Impacts on Poverty of Removing Fuel Import Subsidies in Nigeria', Policy Research Working Paper 7376, Washington, DC: World Bank. <https://doi.org/10.1596/1813-9450-7376>
- Solimano, A. and D. Calderón Guajardo (2018). 'The Copper Sector, Fiscal Rules, and Stabilization Funds in Chile: Scope and Limits', in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 200-19. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0010>
- UN-DESA (2022). *Handbook on Selected Issues for Taxation of the Extractive Industries by Developing Countries*. New York: United Nations Department of Economic and Social Affairs.
- UNEP (2023). *State of Finance for Nature: The Big Nature Turnaround, Repurposing \$7 Trillion To Combat Nature Loss*. Nairobi: United Nations Environment Programme.

- Van der Ploeg, R. and A.J. Venables (2018). 'Extractive Revenues and Government Spending: Short- Versus Long- Term Considerations', in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 179-99. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0009>
- Villafuerte, M., P. Lopez-Murphy, and R. Ossowski (2010). 'Riding the Roller Coaster: Fiscal Policies of Nonrenewable Resource Exporters in Latin America and the Caribbean', IMF Working Paper, 10/251. Washington, DC: International Monetary Fund. <https://doi.org/10.5089/9781455209514.001>
- Viola, A., T. Lassourd, and A. Readhead (2023). *Determining the Price of Minerals: A Transfer Pricing Framework*. Geneva and Paris: Intergovernmental Forum on Mining, Metals and Sustainable Development and Organisation for Economic Co-operation and Development.
- Witter, S. and M. Jakobsen (2018). 'Choices for Spending Government Revenue: New African oil, Gas, and Mining Economies', in T. Addison and A. Roe (eds), *Extractive Industries: The Management of Resources as a Driver of Sustainable Development*, 547-67. Oxford: Oxford University Press for UNU-WIDER. <https://doi.org/10.1093/oso/9780198817369.003.0026>
- Wood Mackenzie (2022). *How Will Oil and Gas Companies Get to Scope 3 Net Zero?* Edinburgh: Wood Mackenzie.
- Wright, T. and B. Hope (2018). *Billion Dollar Whale: The Man Who Fooled Hollywood, Wall Street and the World*. New York: Hachette Books.