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Overview

John Page and Finn Tarp

1. Introduction

For a growing number of countries in Africa the discovery and exploitation of natural resources is a great opportunity. It is also an opportunity accompanied by considerable risks. There is an extensive cross-country literature linking natural resource dependence to poor economic performance, known as the ‘resource curse’.¹ Several important oil exporters—Iran, Iraq, Kuwait, Libya, Qatar, and Venezuela—have experienced negative growth during the last few decades, and OPEC saw a decline in GNP per capita. In Africa, countries dependent on oil, gas, and mining have tended to have weaker long-run growth, higher rates of poverty, and greater income inequality than less resource-dependent economies.²

One significant risk is the structure of resource-rich economies themselves. Relative prices tend to make it more difficult to diversify into internationally competitive activities outside the resource sector, limiting the scope for structural change. In 2017, the Brookings Institution and UNU-WIDER launched a joint research project, Natural Resources, Structural Change and Industry in Africa. While a great deal of literature is available on the issues of transparency and accountability in the management of resource revenues, our interest was further up- and downstream.³ We were particularly interested in how better management of the revenues and opportunities associated with natural resource discoveries could be used to accelerate diversification and structural change in a low-income economy.

This book presents the results of that research, structured in three main parts. Part I presents three essays that survey key themes—managing the boom, the construction sector, and linking industry to the resource. We chose these three topics because they are at the centre of the debate on how to use natural resources for structural change. Relative prices make it more difficult for resource-rich economies to diversify into tradable activities, but natural resources also generate

¹ See Gelb (1988); Sachs and Warner (1995); Gylfason et al. (1999); Sala-i-Martin and Subramanian (2003). Van der Ploeg (2011) gives a survey.

² See Eifert, Gelb and Tallroth (2003); Arbache and Page (2009).

³ For a survey of good practices in transparency and accountability, see the *Natural Resources Charter* at (<https://resourcegovernance.org/approach/natural-resource-charter>).

public revenues. For structural change to succeed, governments must make critical choices about how these revenues are spent. Managing the boom addresses the policies and institutions needed for public revenue management in a resource-abundant economy.

The construction sector determines the extent to which investment effort results in investment outcomes, and, thus, the capacity of the economy to realize growth-promoting investments. High construction costs reduce the amount of physical capital obtained from the investment budget, and they can bias project selection away from investments in higher cost sectors. In addition, high construction costs reduce the number of projects carried out in a given sector, lowering the ability of construction firms in the sector to expand.

Since the 2009 publication of the African Mining Vision, many African governments have viewed diversification through the lens of local content. Local content legislation often requires resource investors to create national employment opportunities, procure from local suppliers, open equity to local partners, and encourage technology transfer. However, success in linking domestic firms to the natural resources sector depends on more than legislation. It requires putting the institutional framework in place to forge a successful public-private partnership between government, local firms, and the extractive industry.

Part II consists of fifteen chapters on five African countries, covering the same three issues as the chapters in Part I. Four of these countries—Ghana, Mozambique, Uganda, and Tanzania—are dealing with newly discovered hydrocarbon resources. The fifth, Zambia, has a much longer history of natural resource dependence. While the country-level studies show a great diversity of approaches and experience, there are also some common threads. Among these is a tendency to overestimate the size of the potential resource boom and underestimate the time it takes for revenue to come on line. Construction is constrained by a lack of capable African firms, the cost and quality of inputs, lack of skilled technicians and artisans, and lack of access to finance. Local content initiatives have been more successful in promoting local ownership and employment than in linking industry to the resource. Local procurement regulations have met with mixed results for several reasons, including the scarcity of small and medium enterprises capable of meeting industry quality and price standards.

Part III sets out some policy implications of the research. It contains our concluding chapter on the role of public policy in supporting structural change in resource-abundant economies. We first address policies directed at the three themes that guided our research—managing the boom, the construction sector, and linking industry to the resource. We then propose some ideas for widening the options for structural change, including policy and institutional reforms to deal with Dutch disease, widening the perspective from industrialization to ‘industries without smokestacks’, and investing in knowledge.

2. Resource abundance, risk, and diversification

For the majority of resource-rich economies in Africa, economic structure matters for at least two reasons. The first is that countries whose exports are concentrated in one or two natural resources are vulnerable to significant risks of declining commodity prices and volatility. The second is that there is persuasive evidence that what an economy produces and exports matters for its long-term growth.⁴

2.1 Commodity prices and volatility

Concentration of output and exports in one or two commodities can expose resource-rich economies to long-run declines in commodity prices and price volatility. Global GDP growth has consistently outpaced the demand for commodities, and commodity prices are likely to continue their gradual downward path relative to manufactured goods and knowledge-intensive services. Long-term estimates of the rate of decline vary from -0.6 to -2.3 per cent per year. The reasons for this secular decline have been widely explored. They include low demand elasticities for primary commodities relative to manufactures and services, growth of substitutes, and rapid technological advances that have reduced the cost of extracting commodities (Dadush 2010).

Independently of their long-term trend, commodity prices are also likely to remain highly volatile. van der Ploeg and Poelhekke (2009) argue that volatility is a quintessential feature of the resource curse. The reasons for high volatility of commodity prices have also been widely discussed. They include low short-term income and price elasticities of demand and supply, long lead times before investment and supply respond to changing demand conditions, weather shocks, and policy-induced distortions that impede the orderly adjustment of commodity markets (Dadush 2010).

Historical data suggest that external shocks are especially important determinants of growth in resource-rich countries (Collier and Goderis 2007). While output variability in general is declining among African countries, the relative importance of external shocks as sources of output instability has increased in the past twenty years. Because of Africa's marked improvement in economic management, internal shocks—including conflicts and policy instability—have declined substantially. At the same time, there has been a relative increase in the vulnerability of output to external shocks, such as price volatility (Raddatz 2008).

⁴ See for example, Haussmann, Hwang, and Rodrik (2007); UNIDO (2009).

The defence against volatility is diversification. Economic diversification can increase the resilience of countries to external shocks (Haddad et al. 2013). Both export and output diversification are associated with lower output volatility. The effect is manifest in low-income countries, where output volatility diminishes by 0.5 percentage points in the wake of diversification spurts. The effect of diversification on output volatility is primarily caused by a more evenly balanced export basket. This remains true even in countries that are more open to international trade, as measured by the ratio of exports and imports to GDP (IMF 2014).

2.2 Resource abundance and structural change

Income from resource extraction increases the demand for all goods. In the case of traded goods and services, imports at international prices can satisfy increased demand. On the other hand, rising marginal costs usually characterize the production of non-tradable goods, and their price will generally increase relative to internationally traded goods. The foreign exchange market reflects this in a real exchange rate appreciation. Because of these relative price changes, diversification into tradable goods production outside the resource sector is difficult, even with prudent management of overall spending. This is the ‘Dutch disease’, and it can limit the potential range of industries and services in which a resource-abundant economy is internationally competitive.

In the early stages of development, structural change links closely with diversification. Because most low-income countries are largely specialized in a narrow range of agricultural and other resource-based activities, structural change through reallocation of resources involves diversification into a more balanced production structure (IMF 2014). In Africa’s resource-abundant economies, production and exports are highly concentrated and—apart from growth of non-traded services—there is little evidence of structural change. As a result, the shares of agriculture and manufacturing in GDP are lower in the resource-rich economies than in middle-income benchmarks, and the manufacturing deficit is particularly large (Table 1.1). Other industry, mainly extractives, dominates the structure of output but not employment. Mines and gas fields do not generate many direct jobs.

Three quarters of the exports of Africa’s resource-rich countries are in less than three sectors (UNCTAD 2016). This strong export concentration limits the potential for growth-enhancing structural change. Low-income countries with a more diversified export base experienced more rapid structural change over the period 1990–2010, and sectoral reallocations of resources tended to be more productivity enhancing. Moreover, diversified exporters experienced higher average within sector productivity growth (IMF 2014).

Table 1.1 Structural characteristics of Africa's resource-abundant economies

	Value Added Share				Labour Share			
	Agriculture	Other Industry	Manufacturing	Services	Agriculture	Other Industry	Manufacturing	Services
Upper middle-income benchmark	7.0	10.3	30.0	52.7	14.0	10.0	19.0	57.0
Lower middle-income benchmark	21.7	12.2	21.9	44.2	45.2	6.6	11.6	36.6
Africa resource-abundant	17.8	44.3	16.8	21.1	45.4	4.8	6.5	43.4
Africa low-income	27.8	11.8	11.1	49.3	63.1	5.1	6.6	25.2

Notes: Angola, Botswana, Cameroon, Republic of Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Ghana, Guinea, Mauritania, Mozambique, Namibia, Nigeria, and Zambia classified as resource-rich middle-income countries (World Bank 2012).

We constructed the benchmark economies by identifying a group of currently middle-income countries at the time at which they crossed the World Bank GNI threshold for middle income. The economic structure of the benchmark is simply the average of the shares of value added and employment in four broad sectors—agriculture, manufacturing, other industry, and services—in the benchmark year, for the following countries: China (2000), India (2007), Indonesia (2004), Korea (1968), Malaysia (1968), Philippines (1976), and Thailand (1987).

Sources: World Bank WDI database 2018; de Vries, Timmer, and de Vries (2013). Authors' calculations.

2.3 Implications for long-run growth

Growth and diversification correlate, although the relationship displays considerable cross-country heterogeneity. Initial diversification is on average positively associated with subsequent growth. The size of the growth boost associated with export and output diversification is economically significant. A one standard deviation increase in export product diversification in low-income countries raises their growth rate by about 0.8 percentage points. Similarly, a one standard deviation increase in output diversification raises the average annual growth rate by about 1.4 percentage points. In addition, large increases in diversification are associated with subsequent growth accelerations (IMF 2014).

One reason why diversity matters for growth is that diverse economies appear to be better able to take advantage of opportunities in global markets, as they emerge. Cross-country evidence suggests that output diversification leads to export diversification.⁵ This is consistent with the idea that economies build competence and then enter global markets in more complex and sophisticated products. Empirical studies (Hausmann, Hwang, and Rodrik 2007; UNIDO 2009) have found that there is a strong, positive relationship between the level of sophistication of a country's exports and its subsequent growth.⁶ Another reason why diversity spurs growth is that a wide range of activities provides a broad basis for the entry and exit of firms, and this 'churning' raises economy-wide productivity (Syverson 2011).

3. Understanding the boom

While the relative price changes that accompany natural resource extraction are unavoidable, public policy can mitigate them. Tradable goods production will expand or contract according to whether it is internationally competitive. This depends partly on the exchange rate and partly on the investments and institutional innovations that governments make to enhance competitiveness. Understanding the size and timing of the boom and putting in place the policies and institutional structures needed to manage resource revenues and public investments are essential first steps to support structural change in resource rich economies.

⁵ See Imbs and Wacziarg (2003) and Cadot, Carrere, and Strauss-Kahn (2011).

⁶ This research measures the degree of sophistication of a product or export based on the per capita incomes of the countries that 'intensively' export it. If mostly high-income countries export a product, the associated income level is high, and the classification of the product is sophisticated. Measured in this way, sophistication directly reflects higher productivity—firms that export goods characteristic of richer economies must have productivity levels greater than would be predicted from their host country level of income.

3.1 How much revenue and when?

The early questions posed by a natural resource discovery are mostly questions of public financial management. In chapter 2, Mark Henstridge argues that the first questions should be how big is the revenue boom likely to be and when will revenue come on line? These are often the questions least well understood by politicians and the public. Sometimes it can take a decade or more to take the steps that move an economy from the discovery of a new mineral deposit to a point where there is material mineral revenue showing up in the public finances.

Henstridge points out that in addition to uncertainty about the size and timing of the revenue flow, resource revenues can be highly volatile. Even if prices are stable and production volumes constant, revenues will often change from year to year. This is because the relationship between the value of production and the revenue associated with it can change as the fiscal regime accommodates a phase of cost recovery, or the capital allowances carried forward change, or the interest cost of finance changes. In Tanzania, for example, the central projection of revenue from the possible LNG project varies each year, even though the price assumption is constant and the assumption of volumes of production after a ramp-up phase is flat through to a period of decline.

The experiences of Ghana, Mozambique, Tanzania, and Uganda show that in general the size of the boom is overestimated and the delay in receiving revenues is underestimated. There has been almost no public discussion of the possible volatility of revenues to the treasury, in part because of lack of transparency regarding the terms of extraction agreements between the foreign investor and the government. This has frequently led to a great deal of confusion about the projected revenues, and at times suspicion of corruption.

Ghana experienced difficulties controlling fiscal expenditures in the face of optimistic revenue projections. In chapter 5, Ernest Aryeetey and Ishmael Ackah point out that in 2009 the World Bank estimated that Ghana would earn US\$20 billion in the period 2012–30 from oil production from its Jubilee field. In reality, petroleum has contributed less than 10 per cent to government revenue, averaging about 7.5 per cent for the first five years of oil production.

Writing in chapter 8, Alan Roe argues that in Mozambique inflated expectations about the availability and timing of future public revenues following the large hydrocarbon finds offshore in Cabo Delgado Province led to a debt crisis. The government contracted very large external loans to public companies and government-linked organizations on the assumption that Mozambique would quickly become a global gas exporter. Projections of future government revenues—including by the IMF—had assumed that development of the field would proceed quickly and used informed guesses of what the negotiated terms and cost structures might be. In fact, the timelines for the LNG projects were delayed several

times, and the most recent projections assume that additional resource revenues will not flow before 2023 at the earliest.

In chapter 11, Mark Henstridge projects that in Tanzania the revenue stream will peak in 2040 at about 1.9 per cent of GDP or US\$54 per person, if production of gas starts in 2021. Writing in chapter 14, Sebastian Wolf and Vishal Potluri project oil revenues in Uganda to begin in 2021 with peak revenue between 2025 and 2028. In per capita terms, they project revenues of up to US\$83 at peak oil extraction and US\$38 on average over thirty-three years. As a percentage of non-oil GDP, the oil revenue would be 13 per cent at peak and 6 per cent on average. In both cases the likely size and timing of the windfall suggests that it will not be large enough to be transformative.

Zambia is a country with a long history of copper mining, and a mixed history of managing copper revenues. In 2018 it found itself facing a bullish price outlook for copper and other commodities (notably cobalt). In chapter 17, Robert Liebenthal and Caesar Cheelo observe that the range of possible public revenue outcomes is large, and some projections do not forecast a significant increase in public revenues. Despite this uncertainty, fiscal balances in Zambia have deteriorated, as deficits have grown since 2014.

3.2 Save or spend?

Prudent public revenue management requires establishing how much public spending should increase and how much to save before resource revenues begin to accrue to the treasury. Sustainable development depends on converting rents from resource extraction into other sources of income. Accordingly, it is necessary to save and invest some revenue. In chapter 2, Henstridge argues that the widely used rules governing saving from non-renewable resources—such as those implied by the permanent income hypothesis, or the ‘bird-in-hand’ rule—tend to place excessive weight on the welfare of future generations and encourage the accumulation of foreign assets.

In a poor, capital-scarce economy he observes, this is inappropriate for two reasons. First, it is likely that future generations will be richer, making it reasonable for government to use a portion of the oil windfall to increase the consumption of today’s poor.⁷ Second, the returns to domestic investment in a capital-scarce economy should exceed those offered by foreign assets (Collier, van der Ploeg, Spence, and Venables 2010). Henstridge offers one very important qualification to this judgement: *provided funds are well invested*.

⁷ Indeed, one strand of the literature argues for the direct distribution of a share of oil revenues to citizens (Gelb and Majerowicz 2011).

3.3 Paying it forward: debt financing

The country studies reveal a new wrinkle in public expenditure management in emerging resource-exporters: some countries have responded to the news of a resource windfall by increasing public expenditure and accumulating debt well ahead of the income coming on stream. Ghana's external debt to GDP ratio increased from 37 per cent in 2009 to 50 per cent in 2016. Mozambique's debt to GDP ratio shot up from around 40 per cent in 2012 to now around 130 per cent. Heavy international and domestic borrowing has driven up public debt, and the government issued public guarantees of loans amounting to US\$2.3 billion (about 20 per cent of GDP) beginning in 2013. Public payments arrears have also become a problem. In Zambia, the public debt stock rose from 36 per cent of GDP in 2014 to 62 per cent in 2015, and the IMF predicts that it will reach 72 per cent of GDP by 2023. Both Mozambique and Zambia are classified by the IMF as at risk of debt distress. Ghana's medium-term debt trajectories have worsened, and gross financing needs are likely to remain elevated in the near term. As Alan Roe points out in chapter 8, any increased borrowing still needs to be cognizant of both the fiscal productivity of the extra spending—how much extra tax revenue it will generate and how quickly—and of the additional debt service in the period *before* the large expected extractive revenues actually accrue. Significant additional fiscal slippages could seriously jeopardize debt sustainability in all three countries.

In contrast, Tanzania and Uganda have successfully resisted the temptation to front-load public expenditures. In Tanzania, total public and publicly guaranteed debt was 36.2 per cent of GDP at end-2015/16. Although the share of commercial financing has increased to about 30 per cent, official bilateral and multilateral creditors continue to be the major financiers, accounting for more than two thirds of external debt at end-2015/16. Uganda's external debt was about 21 per cent of GDP in 2016. Although scaling-up of investment spending has increased fiscal pressure, revenue collection strengthened significantly over the last few years, albeit from a low base. Domestic debt is low. Public and publicly guaranteed debt is mostly concessional multilateral debt, and Uganda has made no effort to tap external private debt markets. The government plans to increase its debt stock further to 47.8 per cent by 2022 and expects future oil revenues to play an important medium-term role in debt management.

3.4 Setting the rules

Ironically, a long lead-time before revenues begin to flow—while it increases pressures to borrow and spend—can be beneficial to resource exporters. Countries with new discoveries have a window of opportunity to make decisions about savings rules and public expenditures and lock them in before pressures to

spend become irresistible. Henstridge reminds us that recognizing volatility matters as well, because it makes building a budget and managing fiscal and monetary policy harder. Ghana provides both a model of how governments can use this space to establish the institutional framework needed and a cautionary tale of how pressures to spend can undermine their efforts. Ghana's Petroleum Revenue Management Act 2011 together with its 2015 amendment were intended to establish the highest international standards of transparency and good governance in the management of petroleum revenue and savings. The law established processes for the collection, expenditure, investment, and accountability for the use of oil revenues, and a new Public Interest and Accountability Committee was set up to oversee the management of petroleum revenues.

Under the Act, the budget should receive 70 per cent or less of expected petroleum revenues based on a seven-year moving average price. The intention is that the residual is deposited in two institutions, the Ghana Stabilization Fund, designed to cushion government expenditure when there is a petroleum revenue shortfall and the Ghana Heritage Fund, a fund for future generations. Aryeetey and Ackah point out that weak fiscal management means that the rules are not followed. Successive finance ministers have used their power to 'cap' the Stabilization Fund and use the revenues released for debt service. This has led to the depletion of the Stabilization Fund to less than 20 per cent of its estimated value and rendered it incapable of smoothing government expenditure in case of oil revenue shortfalls.⁸

In Uganda, the five-year period after 2010 saw a substantial slow-down in activity in the oil sector. Wolf and Potluri note in chapter 14 that the government used the time to develop a more solid policy and legal framework for the oil sector. The Public Finance Management Act of 2015 included provisions for the management of oil resources and created a Petroleum Fund. Withdrawals from the fund support the annual budget, via transfers into the consolidated fund or investments in the Petroleum Revenue Investment Reserve, designed to be a sovereign wealth fund holding assets abroad. Appropriations to the reserve need authorization from parliament. The Medium-Term Budget Framework is required to outline expenditure priorities and clearly indicate expected annual withdrawals. The government has adopted the non-oil, non-grant deficit as a fiscal anchor, and every new parliament sets the deficit limit. While this allows government to react to unforeseen circumstances, it ties the fiscal rule to the political cycle. When a new government comes into power, the temptation to tap into the Investment Reserve fund to finance quick achievements is great.

⁸ See chapter 5.

3.5 The quality of public spending

The country studies suggest that two factors often undermine the quality of public spending out of resource revenues. These are the quality of project appraisal and selection and the budgeting of the recurrent costs of maintenance. In all the country cases, institutional structures and rules designed to address these issues appear to have been only partially successful.

In Ghana, the Petroleum Revenue Management Act lists several priority areas—agriculture, education, health, roads, alternative energy, security, potable water, sanitation, and environmental protection—in which the government can invest oil revenues. The minister of finance was to prioritize not more than four areas for the medium-term investment programme. Aryeetey and Ackah note that oil revenues were in practice spread over a wide range of projects outside the priority areas, leading to cost and time overruns. When the priority areas were set at five in 2018, a new challenge emerged, the need to ‘prioritize within priority expenditures.’ When government selects a priority area like agriculture, it is possible to spend funds for irrigation, fertilizer subsidies, seeds, agriculture training and extension, but there is no clear guidance as to how priorities among these are to be established.

Roe observes in chapter 8 that Mozambique’s recent poor record of debt management and growth reflects in part the consequences of three failures of decision-making in public investment. These were a failure to select public investments by reference to sound economic criteria, a systematic tendency to use overly optimistic predictions of prices, costs, and impacts, and a serious lack of information at the time of implementation on the likely rates of return on investments and their impact.

Liebenthal and Cheelo report that currently there is no public investment management system in place in Zambia.⁹ Although a Public Investment Planning Department has been established in the Ministry of National Development and Planning, it lacks authorizing legislation and capacity. No formal system for project identification, screening, or appraisal is in place, and economic analysis of proposed major investments is not undertaken. They conclude that mining revenues are likely to be pooled with other revenues towards honouring the public wage bill, interest payments on debt, and payments of arrears.

Frequently governments make public investments without adequate provision in the budget for recurrent costs of maintenance. On average about 30 per cent of the infrastructure assets of a typical African country needs rehabilitation (Briceño-Garmendia et al. 2008). This reflects a legacy of underfunding for infrastructure maintenance, and over time represents a major waste of resources, since

⁹ See chapter 17.

the cost of rehabilitating infrastructure assets is several times higher than the cumulative cost of sound preventive maintenance. In the roads sector, for example, many countries fail to cover basic maintenance and rehabilitation needs and find themselves in a downward spiral with respect to road quality.

Lack of adequate provision for maintenance is especially dangerous in the case of spending out of resource revenues. Poor maintenance can seriously degrade the returns to investments, but investments in the domestic economy must offer higher returns than foreign assets, if they are to meet the investment rule. Some reallocation of resources from investment to maintenance merit consideration, particularly in countries that show low levels of maintenance expenditure. Liebenthal and Cheelo argue that in Zambia, multi-year budgeting of investment projects and protection of funding is not taken seriously and no standardized procedures are in place for project monitoring. They argue that maintenance of existing assets deserves a higher priority than much new construction.

Uganda was one of the early adopters of the Medium-Term Expenditure Framework, which in principle should accommodate better planning of maintenance expenditures. In practice, it has been less successful. Uganda established a Road Fund in 2010 with the mandate of funding maintenance on all roads. Despite the Fund, adequate resources are not devoted to routine and periodic maintenance of the main road networks. In fact, Uganda is one of the countries in Africa that has the largest divergence between actual and required spending on road maintenance (Ranganathan and Foster 2012).

4. The construction sector

Investing resource revenues requires public expenditures that transform resources ‘below the ground’ into physical assets ‘above the ground’. The construction sector is central to this process. Writing in chapter 3, Martina Kirchbirger argues that construction determines the ability to transform investment effort into investment outcomes in at least three ways. First, higher construction costs decrease the amount of infrastructure a country can afford for a given investment budget and tend to reduce maintenance expenditures and the lifespan of assets. Second, higher costs may affect project selection. If a minimum rate of return criteria is relied on to select projects, high construction costs will decrease the likelihood of choosing a project in a high cost sector. If construction costs differ systematically by sector, this will affect the composition of public spending. Third, there are important potential feedback effects. High construction costs can reduce the number of projects implemented in a given sector. Because contractors must often prove that they have experience in handling similar projects in the past, this restricts the type of contracts that a given firm can take on, limiting its ability to expand.

Because of the diversity of construction activities, cross-country evidence on the impact of higher construction costs on investment outcomes is limited. There is, however, evidence from a large sample of countries that higher construction costs are significantly associated with poorer road infrastructure. A 10 per cent increase in unit road-construction costs, for example, is associated with a country-level reduction of 0.7 per cent in the kilometres of paved roads per person and a 0.4-point reduction in the quality of the trade- and transport-related infrastructure index component of the World Bank Logistics Performance Index (Collier, Kirchberger, and Söderbom 2016).

In addition to its role in determining the efficiency of public investment, construction has an important direct link to the natural resource sector itself. The construction phase of a resource project begins once a contractor makes what is widely known as a 'final investment decision' (FID). Oil and gas projects differ from mining in terms of their level and sequencing of demands on the construction sector. Henstridge notes that the construction phase of an oil and gas project is when the big capital investment takes place. In oil and gas, this can amount to several billion dollars, much of which might be offshore. In mining, capital expenditure is lower in the construction stage, but it will often continue during the life of the project. In both cases, some of the capital investment is on highly specialized precision engineering, while other components of these projects are construction activities such as bricklaying, carpentry, metal works, plumbing, and electrical. The extent to which the domestic economy can benefit from the construction phase depends on the capacity of the sector to respond in terms of price and quality to the standards of the natural resource investors.

4.1 Construction costs

Kirchbirger argues that measuring the cost of construction across countries is difficult for several reasons. The construction sector produces highly differentiated outputs, such as roads, buildings, and bridges, making direct comparisons difficult. Different types of construction methods may also lead to very different unit costs. Evidence on construction costs in our case-study countries varies substantially, reflecting differences in project selection, market structure, origin of supplying firms, and bidding procedures.

In chapter 12, Geraldine Kikwasi and Cecilia Escalante observe that foreign contractors carry out most large-scale construction in Tanzania. Local Tanzanian contractors have a market share of just 33 per cent against 67 per cent for foreign contractors. While this poses problems from the point of view of capability building in the domestic construction sector, it means that the supply price of construction services on major public investment projects is less sensitive to domestic

supply constraints.¹⁰ Caesar Cheelo and Robert Liebenthal, writing in chapter 18, argue that while entry barriers in road construction, civil works, and mining are moderate in Zambia, the sector is highly concentrated and comprised of a set of oligopolies across the differentiated construction product groups. Information asymmetries offer significant possibilities for collusion, raising bid prices. In Uganda, Emanuele Colonnelli and Nicole Ntungire report that construction costs, particularly for civil works and non-residential buildings, have outpaced overall inflation significantly and appear to be accelerating. Although prices for the construction sector as a whole fell by 0.4 per cent between December 2016 and December 2017 (dampened by a slump in residential housing prices), prices for civil works rose by 3.1 per cent, reflecting the surge in public investment.¹¹

Where construction inputs are largely imported, or foreign firms dominate the industry, costs are subject to macroeconomic shocks. In chapter 6, Nkechie Owuo and Monica Lambon-Quayefio point to exchange rate volatility as a major source of price shocks in Ghana's construction sector. Heavy dependence on imported raw materials such as high-tensile steel and skilled and expatriate labour leads to higher costs during periods of exchange rate depreciation. Cheelo and Liebenthal find similar macro-driven price shocks in Zambia, including the adverse business shocks and uncertainty associated with the local currency collapse from mid-2015 through most of 2016.¹²

4.2 Firm capabilities in construction

Firm capabilities are the knowledge and working practices used by firms during production. Productivity is one dimension of capability. The other dimension is quality, which in construction embraces a much wider range of characteristics—for example design, adherence to standards, and ability to bid—than the technical characteristics of the product itself. Productivity and quality depend in turn on the knowledge of the individuals, both managers and workers, who make up the firm (Sutton 2012).

Because capabilities are hard to codify they are difficult to measure. To understand construction firm capabilities in Africa better, Kirchberger uses the World Bank major contracts award database which contains World Bank-financed prior-review contract awards from 2004–2018. She finds that sub-Saharan Africa lags other developing regions in supplying civil works to open bid contracts. Companies based outside the region supply about half of the contracts above US\$2 million in sub-Saharan Africa, and regional suppliers carry out less than one third of contracts of at least US\$50 million. Chinese and Indian firms have captured an increasing share of African contracts, while sub-Saharan African contractors are virtually inactive in other regions.

¹⁰ See chapter 12.

¹¹ See chapter 15.

¹² See chapter 18.

Zhang and Gutman (2015) suggest that most African construction firms lack the minimum capabilities needed to succeed in competitive bidding processes. Asher, Kirchberger, and Novosad (2018), for example, show that about 30 per cent of bids submitted for road maintenance contracts in Tanzania are disqualified immediately. Failure to conform to the terms, conditions, and specifications stipulated in the bidding documents is the main reason for disqualification. The requirement to submit all documents in English is an important barrier for smaller contractors.

The country studies provide further evidence of limited firm capabilities. In Tanzania, for example, clients perceive that contractors lack qualified staff, exhibit poor knowledge of tendering procedures, and lack financial and project management skills.¹³ In chapter 9, Antonio Cruz, Francisco Fernandes, Fausto Mafambissa, and Francisco Pereira identify lack of planning and management capacity as a major constraint to the growth of local construction firms in Mozambique. Specialized technical services for large projects—such as feasibility studies, inspections, surveys, laboratory tests, and quality control—must be imported.

In chapter 15, Colonnelli and Ntungire report the results of a survey of contractors in Uganda. The firms responding to the survey are relatively young. Sixty-five per cent of firms started operations after 2004 and only 10 per cent began operations before 2000. Interestingly, the majority of owners (62 per cent) also own or run an additional business. Most of the firms have some standard management practice in place, and close to 100 per cent of top managers regularly hold meetings to discuss efficiency and quality expectations with their construction teams.

Zambia grades construction firms based on a mix of criteria, including the firm's previous contracts, number of professional and technical staff, financial position, and level of technology. The grading system is numeric from 1 to 6, with 1 as the highest grade and 6 the lowest. The majority (88 per cent) of firms in Zambia's construction sector in 2017 were in grades 4–6. These lower graded firms were generally less successful in winning bids and invested less in modern construction methods, technology, and basic ICT than higher graded companies.¹⁴

4.3 Materials, skills, finance

If construction faces bottlenecks in production, any surge in demand may force up costs and prices. As the supply curve becomes less elastic, the same shift in demand leads to a smaller increase in the quantity produced at a higher price. A recurrent theme in the country studies is the extent to which access to material inputs, skilled labour—particularly in engineering, technical disciplines, and skilled artisans—and access to finance limit the ability of firms to expand production.

¹³ See chapter 12.

¹⁴ See chapter 18.

Kikwasi and Escalante note that while the manufacturing of local construction materials such as cement, reinforcement steel, paints, concrete, and roofing materials has been increasing in Tanzania, quality is a challenge. Interviews with contractors and clients indicate that both perceive the high cost and low quality of construction materials, whether domestic or imported, as problems. Cruz, Fernandes, Mafambissa, and Pereira report that only about 15 per cent of the upstream construction value-chain originates in Mozambique. Local material inputs include floors, frames, doors and windows, tiles, roof tiles, cement and stones, and sand. All other upstream components are imported. Colonnelli and Ntungire observe that in Uganda 96 per cent of firms report checking the quality of materials before using them in production.¹⁵

In construction, bricklayers, welders, electricians, and plumbers are complementary to unskilled labour and capital. Lack of these skills can limit supply. In Ghana there is a current shortfall of 60,000 skilled artisans in the construction sector, and the gap is projected to increase to as many as 250,000 by 2020. Although there are large numbers of informal sector artisans and construction workers, they lack the skills and training required for modern construction projects. Lack of skilled labour similarly constrains the construction sector in Mozambique. Kikwasi and Escalante note that Tanzania has few engineering or architectural technicians and few skills at the middle management level. Most artisans lack formal training, including knowledge of basic construction theory and drawings. Drawing on their survey of contractors in Uganda, Colonnelli and Ntungire report that more than one out of three firms lack on-the-job training for new hires.¹⁶

In the case of hydrocarbons projects, the construction phase is the period of peak demand for a range of semi-skilled and skilled workers, such as construction workers, bricklayers, metalworkers, carpenters, plumbers, and electricians. In chapter 11, Henstridge estimates, for example, that the construction of LNG facilities in Tanzania would directly create some 4,000–5,000 jobs. The country studies suggest that there is unlikely to be an elastic supply of such workers to fill this demand.

Lack of financing affects firms in the construction sector by making it difficult and costly to purchase or rent the equipment necessary to carry out a contract. As Colonnelli and Ntungire point out, rental markets for equipment are often missing. In Ghana, the Real Estate Developers Association identifies lack of affordable credit to the residential construction industry as a factor contributing to the increasing cost of housing. In Mozambique, surveys of contracting firms identify limited access to credit as a major constraint, and in Tanzania contractors lack the capital to acquire operating equipment and plant.¹⁷

¹⁵ See chapters 6, 9, 12, 15.

¹⁶ See chapters 6, 9, 12, 15.

¹⁷ See chapters 6 and 9.

In Uganda, Colonnelli and Ntungire find that lack of access to finance is especially acute for local construction firms. Rigidities in the domestic financial market and a lack of adequate collateral limit their ability to borrow. A survey of construction firms executing work on donor-financed road projects found that the typical amount of credit obtained by a foreign construction firm was twenty times larger than that obtained by a local construction firm. In Zambia, Cheelo and Liebenthal find that lower ranked firms in the national classification of contractors face significant challenges with access to finance.¹⁸

5. Rowing against the current: local content

In Africa's resource-abundant economies, production and exports are highly concentrated, and—apart from some non-traded services—there is little evidence of structural change. In addition, the extractive sectors in most sub-Saharan African countries have developed as enclaves. Local firms seldom make it to be suppliers and except for South Africa and Ghana, an indigenous service and supply sector for the mining industry has not developed to any significant extent. In response, as John Page notes in chapter 4, the African Heads of State and Government adopted the African Mining Vision (AMV) in 2009.

The Vision focused on the mining sector's potential to help transform economies through more diversified growth, and governments in resource-abundant countries have adopted a wide range of 'local content' and 'value addition' initiatives in pursuit of greater diversification. Local content regulations often require resource investors to expand national employment opportunities, procure from local suppliers, open equity to local partners, and encourage technology transfer. 'Value addition' concentrates on downstream processing of the extracted resource and promotion of related industries.

Ghana's local content and participation policy for oil and gas gives priority to Ghanaians in the award of oil blocks, oil field licenses, and in all projects awarding contracts in the oil and gas industry. In chapter 7, Charles Ackah and Asaah Mohammed note that Ghana also requires that all operators in the oil and gas industry must use goods and services made or sold in Ghana, as far as practicable. The policy further mandates that all petroleum operators provide training to Ghanaians in all aspects of petroleum sector technology and operations.

In chapter 10, Evelyn Dietsche and Ana Maria Esteves argue that in Mozambique, local content objectives are contained in a diverse range of policies, strategies, plans, laws, and regulations. Their objectives range from providing more short-term opportunities to local workers and enterprises to longer-term skills and enterprise

¹⁸ See chapters 15 and 18.

development. In addition, the government has chosen to interpret the term ‘corporate social responsibility’ (CSR) broadly. The government’s *Policy on Corporate Social Responsibility for the Mineral Resources and Extractive Industries* promotes local content at the sub-national and community level.

In chapter 13, Mia Ellis and Margaret McMillan point out that mining regulation in Tanzania has historically lacked specific instruments to promote local content. In 2017, however, the amended Mining Act started requiring that mineral right-holders give preference to goods produced or available in Tanzania, and to services provided by Tanzanian citizens or local companies. The 2015 Petroleum Act, the primary legislation governing the petroleum sector, contains requirements that license holders, contractors, and subcontractors give preference to goods produced or available in Tanzania and to services provided by Tanzanian citizens or companies.

Ritwika Sen reports in chapter 16, that the National Oil and Gas Policy in Uganda emphasizes expanding employment opportunities for citizens and supporting the development of national competencies to supply goods and services to the sector. In addition, the Production Sharing Agreements with licensed operators provide for the training and employment of suitably qualified Ugandans.

Efforts to increase local content have a long history in Zambia. The cornerstone of Zambia’s post-independence development was its state-led import substitution industrialization strategy (ISI). In chapter 19, Wilfred Lombe points out that in practice, public ownership of the mines and protection from import competition produced a local content development strategy for the mining sector. At its peak, it featured manufacturing of mining inputs such as rubber products, chemicals, non-metallic minerals, and metals and machinery. Privatization of the mining industry significantly reduced the scope for local content development. The current Development Agreements with the mining companies allow imports of capital equipment free of customs and excise and do not oblige mine owners to purchase inputs from Zambian suppliers.

5.1 The political economy of local content

Political pressures to ‘localize’ the benefits of a natural resources discovery are a reality faced by all governments of resource-abundant economies. The country case studies highlight two broad areas in which these political pressures are present. The first is pressure for policies favouring local employment, investment, and procurement along the extractives supply chain. These initiatives tend to reflect the interests of larger firms and more-skilled workers. The second emphasizes strengthening the link between the extractive sector and sub-national development, especially the development of communities where extractives operations are located.

Local content rules can be subject to abuse by ruling elites through awarding contracts, jobs, and opportunities to those supporting the ruling party or coalition. Ackah and Mohammed note that partisan politics has strongly influenced the Ghana Petroleum Commission—the body charged with implementing the local content initiative—since its establishment. Management and technical staff appointments to the Commission reflect party affiliation, and tenure in office depends on the tenure of the political party in power.¹⁹ Dietsche and Esteves contend that the Mozambique government has a range of laws in place to ensure that political elites and politically connected domestic entrepreneurs benefit from existing local content requirements.²⁰

In Tanzania, there are significant ties between politics and business, and there has been increasing concern that vested economic interests with ties to the ruling party will benefit from local content initiatives. The firms that participate in the extractive industries value chain are often relatively large, which means that benefits primarily accrue to a wealthier segment of the local population.²¹ In Zambia, the commonly held view is that while there is a proliferation of Zambians in labour-intensive jobs this is not so in technical and managerial roles. Non-industry stakeholders, including civil-society organizations, do not believe there is any well-defined career path for Zambians in the mining industry, and there are continuing questions concerning the value and effectiveness of supplier development programmes.²²

The sub-national dimension of development has become increasingly important for both host governments and the extractive industries themselves. Dietsche and Esteves note that in Mozambique, the political opposition is putting pressure on the government to devolve political power and promote local economic and social development. This pressure comes out in the recently approved *Implementation Guide* underpinning the government's *Policy on Corporate Social Responsibility for the Mineral Resources and Extractive Industries*, which provides guidance to firms on supporting local economic development.²³

Ackah and Mohammed describe how political pressures are building to address specific needs in affected communities in Ghana. Since the oil discovery, stakeholders, such as community leaders and civil society, have called for a share of the benefits of the oil industry to be channelled directly to communities affected by oil production and related activities. The petroleum MNCs have responded to the pressure. For example, all the 140 unskilled and semi-skilled workers employed in the contract for site preparation for the Onshore Gas Receiving Facility came from eighteen affected communities nearby. Companies from the same communities supplied catering services, driving, and hospitality services.²⁴

¹⁹ See chapter 7.

²⁰ See chapter 10.

²¹ See chapter 13.

²² See chapter 19.

²³ See chapter 10.

²⁴ See chapter 7.

5.2 Linking industry to the resource

The supply chains of multinational companies (MNCs) in resource extraction generally have a pyramid structure. The multinational company will have small number of lead subcontractors, many international and some local. Each lead subcontractor will then contract other companies to supply inputs. These are the so-called second-tier subcontractors or suppliers. The country studies indicate that the MNCs and their first-tier suppliers often prefer to operate almost exclusively with foreign second-tier suppliers, due to the limited capabilities of domestic firms.

Ackah and Mohammed find that most Ghanaian companies are concentrated at the lower end of the petroleum supply chain, competing to provide services such as catering and hospitality, logistics, freight forwarding, and waste management. Two notable exceptions are in metal fabrication, where some indigenous Ghanaian companies are making impressive strides, and in the installation of subsea infrastructure.²⁵ Dietsche and Esteves suggest that two types of firms are attempting to enter the resource value chain in Mozambique. One group includes specialist firms that offer geological, laboratory, logistics, transport maintenance, and waste management services. These companies tend to be larger and their capabilities, while not at the level of certified suppliers, are sufficiently high that targeted supplier development initiatives might be successful. The second group of firms—composed primarily of micro enterprises selling catering services, office consumables, construction materials, camping equipment, chemicals, and HVAC equipment—lacks the capabilities to benefit from targeted interventions.²⁶

Ellis and McMillan conclude that in Tanzania, the domestic industrial base cannot compete effectively with global suppliers. Based on analysis of the Industrial Census they show that foreign and jointly owned firms spend significantly more on imported materials than on locally sourced materials and that average spending on services is much greater than average spending on materials. They identify the ‘missing middle’—the small number of productive small and medium enterprises (SMEs) in manufacturing—as a major reason why the extractive companies have difficulty finding qualified local partners.²⁷

Ritwika Sen uses unit record transaction data to map the network of domestic suppliers in Uganda’s natural resource value chain. She finds that although there is a population of local goods and service providers that sell to the sector, retail and wholesale services dominate these transactions, including the purchase of imported products such as motor vehicle parts and accessories, motor vehicles, and machinery. The manufacturing sector ranks second among suppliers, in terms of connections in the network (about 10 per cent of the total). A handful of manufacturing firms dominate the supplier network. These include manufacturers of

²⁵ See chapter 7.

²⁶ See chapter 10.

²⁷ See chapter 13.

plastic products, fabricated metal products, batteries and accumulators, cement, and plaster and lime. She also finds that the accommodation and food service sector, and water supply, sewerage, and waste management are under-prepared to service the industry.²⁸

Wilfred Lombe finds that lack of access to engineering expertise and production technology and low-quality control standards limit backward linkages in Zambia. However, Zambia has had greater success in developing forward linkages to copper production. Copper exports are mostly in smelted and refined forms, representing several value-added stages beyond mining. Further downstream, one company has historically undertaken processing of refined copper into rods and wire, and reports state that a large Chinese investment has increased exports of semi-fabricates.²⁹

6. Conclusions

Natural resources represent a major opportunity for Africa's growing number of resource-abundant economies, and one accompanied by substantial risks. Success or failure in managing these risks largely depends on the investment of the rents from natural resource extraction. This fact places a burden on public financial management and public investment planning. The country studies show that some countries have responded to the news of a resource windfall by increasing public expenditure and accumulating debt. In addition, they have neglected two important areas of public expenditure management. The first is ensuring that the public investments selected are in fact sound. The second is making systematic provision in the budget for the recurrent costs of maintaining new assets. In chapter 20, we propose a set of institutional reforms designed to address these issues.

Investing resource revenues requires transforming resource rents into physical assets through public expenditures. The construction sector is central to this process. The country studies point to several constraints to the expansion of construction, beginning with a lack of capable African firms. Firms lack qualified staff, have poor knowledge of tendering procedures, and lack the financial management and project management skills needed to compete for major infrastructure projects. The cost and quality of material inputs, lack of skilled technicians and artisans, and limited access to finance also constrain the ability of construction firms to respond to demand increases. We address some initiatives needed to relieve these constraints in the concluding chapter.

Because they control access to the resource, governments can seek to integrate local suppliers into the resource value chain through local content and

²⁸ See chapter 16.

²⁹ See chapter 19.

value-addition initiatives. Our country studies indicate that these initiatives have not been uniformly successful. Most countries have had considerable success with the hiring and skilling-up of local labour. In contrast, local procurement initiatives have met with mixed results for several reasons, including the scarcity of small and medium enterprises capable of meeting industry quality and price standards in the procurement of goods and services. However, governments can take several initiatives to expand the options for diversification. We turn to those in chapter 20.

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