Alan R Roe

Mining, Oil & Gas: Issues for African Economies

Maputo, Mozambique November 28th 2018
Further information

- Open Access
- https://www.wider.unu.edu/publication/extractive-industries
- https://global.oup.com
A few facts

Alguns factos
1. Extractives dependence in Africa has risen and is likely to continue to rise

1. Dependência da indústria extractiva na África aumentou e é provável que continue a aumentar
Extractives export dependence in Africa 1996-2014

Averages

Dependency 2014 = 58.9%
Change since 1996 = 19 % points

Export Dependence 2014 (%)  Change in Dependence since 1996 (% points)
Mining – where is dependency highest?
Further increases are likely
Future is promising with and without a climate change adjustment

**Investment in oil and gas and minerals may need to increase at more than double historical rates to meet new demand and replace existing supply**

**Annual investment requirements**

2012 $ billion

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth capital expenditure</th>
<th>Replacement capital expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995–2012</td>
<td>121</td>
<td>165</td>
</tr>
<tr>
<td>Supply expansion</td>
<td>299</td>
<td>451</td>
</tr>
<tr>
<td>Climate response</td>
<td>225</td>
<td>445</td>
</tr>
<tr>
<td>Total</td>
<td>749</td>
<td></td>
</tr>
</tbody>
</table>

**2013–30 scenarios**

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth capital expenditure</th>
<th>Replacement capital expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply expansion</td>
<td>110</td>
<td>215</td>
</tr>
<tr>
<td>Climate response</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td></td>
</tr>
</tbody>
</table>

**Minerals**

**Total cumulative investment in mining and oil and gas could be as high as $17 trillion by 2030**

Cobalt Price

Cobalt Skyrockets
As other commodities languish

Normalized As Of 08/22/2016
LME cobalt spot price
Bloomberg commodity index

Source: LME, Bloomberg
Lithium Price

Prices Soar
Lithium rises on electric car demand

- Lithium Price

Source: CRU Group

Forecast
Many African countries have huge unexploited resources

Example Guinea:
Guinea’s exceptionally high levels of reserves are nowhere near to being matched by its levels of bauxite production. For example, the world’s largest bauxite producer namely Australia has six times the Guinean level of annual production but reserves equal to only 65% of those located in Guinea.
LNG – Asia Drives Demand

LNG imports

- Other
- Southeast Asia
- India
- China

Share in global LNG trade (right axis)

2017  2025  2030  2035  2040

bcm

100%
80%
60%
40%
20%

100
80
60
40
20

UNU-WIDER
2. Increased dependence has been driven by high levels of FDI

2. Maior dependência tem sido impulsionada por altos níveis de IDE
### Stocks of FDI (Investimento Estrangeiro Direto) - $ million

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2010</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>1,554$</td>
<td>10,080</td>
<td>33,137</td>
</tr>
<tr>
<td>Guinea</td>
<td>263$</td>
<td>488$</td>
<td>4,314$</td>
</tr>
<tr>
<td>Guinea-Bissau</td>
<td>38</td>
<td>63</td>
<td>191</td>
</tr>
<tr>
<td>Liberia</td>
<td>3,247$</td>
<td>10,206</td>
<td>8,581$</td>
</tr>
<tr>
<td>Mali</td>
<td>132</td>
<td>1,964</td>
<td>3,989</td>
</tr>
<tr>
<td>Mauritania</td>
<td>140$</td>
<td>2,372$</td>
<td>7,079$</td>
</tr>
<tr>
<td>Niger</td>
<td>45</td>
<td>2,251</td>
<td>6,372</td>
</tr>
<tr>
<td>Nigeria</td>
<td>23,786</td>
<td>60,327</td>
<td>97,687</td>
</tr>
<tr>
<td>Cameroon</td>
<td>917$</td>
<td>3,099$</td>
<td>6,474$</td>
</tr>
<tr>
<td>Central African Republic</td>
<td>104</td>
<td>511</td>
<td>651$</td>
</tr>
<tr>
<td>Chad</td>
<td>576$</td>
<td>3,594$</td>
<td>5,439$</td>
</tr>
<tr>
<td>Congo</td>
<td>1,893$</td>
<td>9,262$</td>
<td>27,040$</td>
</tr>
<tr>
<td>Congo, Democratic Republic of the</td>
<td>617</td>
<td>9,368</td>
<td>22,527</td>
</tr>
<tr>
<td>Equatorial Guinea</td>
<td>1,060$</td>
<td>9,413$</td>
<td>13,715$</td>
</tr>
<tr>
<td>Gabon</td>
<td>55$</td>
<td>422</td>
<td>1,798</td>
</tr>
</tbody>
</table>

**Sudan** $1.1 billion in 2000 to **$26.5 billion by 2017**
3. FDI has resulted in some growth (in some African countries) but not much structural change

3. IDE impulsionou algum crescimento (em alguns países Africanos), mas poucas mudanças estruturais
Growth examples: Ghana, Tanzania

Source: Groningen Growth and Development Centre
Now the bad news - the record on structural transformation has been disappointing

For example: No increase in GDP share of manufacturing since late 1960s

- Africa’s share of manufacturing in GDP is less than half of the average for all developing countries

- Per capita manufactured exports are about 10 per cent of the developing country average.

- Africa’s share of global manufacturing is smaller today than in 1980
Growth rates Sub-Saharan Africa – not sustained
Who bears the cost of lower commodity prices?

Production costs for iron ore – 2008 to 2015 ($ per dmt)

Source: SNL Mine Economics database
Issues in managing extractives
A. Macroeconomic and fiscal management

Problemas na gestão da indústria extractiva?
A. Gestão macroeconômica e fiscal
1. Macroeconomic and fiscal management

Key policy decisions:

1. whether to borrow (and how much) in the period between discovery, construction (+5-8 years) and operation (1-2 more years)
2. what proportion of new revenues to spend?
3. what proportion of new spending to commit to public investment rather than consumption?
4. what proportion of any saving to be invested abroad (e.g. in an SWF)?
Theoretical answers

(i) A theoretical case for early stage borrowing can be made but has to be subject to realistic debt sustainability conditions – including the likely (limited) fiscal take from even socially productive public investments.

(ii) Capital scarcity suggests a short-term priority for public investment over consumption, but this result is qualified by:
   • possible absence of pipeline of productive investment projects
   • need to moderate total public spending in light of overall growth of domestic absorption – to avoid RER overvaluation.

(iii) Three reasons for investment in an SWF (future generations, a parking fund, a stabilisation function) require quite different types of funds.
The pre-source curse: lessons from Ghana 2007-2015

Issues include:

• Strong new institutions to manage the macro/fiscal challenges of extractives cannot necessarily be relied upon to hold back political pressures (to over spend) – Ghana

• Significant new discoveries lead rapidly to inflated expectations and to a perception of increased fiscal space even if increased revenues are delayed many years – Ghana 2008 (and Mozambique 2013/14)

• Contested electoral processes will intensify the pressures on incumbent governments to borrow and spend excessively – Ghana 2008 and 2012

• An unusually high level of fiscal disciple is needed to avoid spending being assigned excessively to white elephant investment projects and unproductive hikes in government recurrent spending

Bawumia and Halland 2017
Ghana - some outcomes

Figure 2: Total debt as percentage of GDP, 2000–14

Figure 11: Real GDP growth (per cent), 2000–15
Mozambique fiscal outcomes 2012-2018

Fiscal Tendencies (% of GDP)

Total Revenue  Balance before Grants  Grants  Balance after Grants  Interest on Public Debt

2012  2013  2014  2015  2016  2017  2018
There are other reasons why do investment booms fail?

Warner (2014) having studied 24 investment booms in 124 countries found these causes in many countries that had poor outcomes.

• Failure to select public investments by reference to sound economic criteria
• Systematic use over-optimistic predictions of prices, cost and impacts
• Failure to identify the likely (true) rates of return on investments and impacts
• Inertia - an investment once started was likely to continue to command finance even when the conditions needed for success deteriorated
• A high degree of vulnerability of the public investment decisions to abuse for personal or political motives.
Issues involving national oil companies (NOCs)

• NOCS often control a large proportion of national oil revenues – how best to integrate their macroeconomic impacts with those of central government?
• Critical need for clear commercial mandate distinguished from possible social obligations (e.g. avoid the problem of the Venezuela PDVSA)
• Revenue retention – too much retention (e.g. Sonagol) moves control from MinFin but too little (e.g. Petronas) limits its ability to carry out its designated functions
• Transparency, accounting and monitoring – how much oversight to assign to Parliament and to civil society (e.g. to avoid the Petrobras problem)
Lag between (a) discovery and (b) actual revenues to government was at least 12 years.
Issues in setting tax arrangements

Include:
• How to set taxes that deliver reasonable revenue to government without discouraging investment?
• how to sustain that fair share as prices move up and down?
  • any case for stability agreements?
  • any case for excess profits tax?
• how to achieve efficiency in tax collection to match the quality of tax design?
• how to allow for differential costs across different extractives projects?
• use general tax arrangements or set special arrangements for individual projects?
• how to better monitor and police transfer pricing and other tax abuses?
The inherent problems of setting tax rates - Zambia
Future production will fall - absent new investment

Tanzania example gold mining
Problems of anticipating future tax collections

Tanzania example - 2008

Study data
Issues in managing extractives

B. Structural transformation over time.

Problemas na gestão da indústria extractiva

B. Transformação estrutural ao longo do tempo
Framework for the broader economy-wide effects – transformation and diversification

Typical shares of total spending, per cent

First note the minority nature of the DIRECT government spend

This spend is also:
• probably slow to build up
• likely to be volatile over time
• likely to be time limited (given the depletable nature of the resource)

This suggests that it should:
• be very carefully planned taking account of pipelines of prepared projects
• be concentrated on high rate of return investments
• make full provision for ongoing recurrent costs
• Wherever possible work in a complementary fashion with relevant private investments – including both the operational and the social investments of extractives companies
Example Botswana

Public investment management in Botswana for many years involved:

- firm insistence on quality appraisal of each major project
- the full documentation of sound appraisals
- A rewards system for recognising and rejecting weak/ inadequate appraisals
- A rule of thumb that committed 18 - 21% of capital costs to cover ongoing recurrent costs

In short the system raised the status of TECHNICAL analysis and so helped to counter the narrowly POLITICAL motives for particular projects.
The DIRECT spend of the extractives companies is typically much larger

A standard policy route to achieve economic diversification is via Local Content policies (see later slide).

But there is a potential larger pay-off by recognising the significant gains in economic output and employment that can result from the INDIRECT spend associated with mining certain and possibly and oil & gas, particularly:

- via the spending of the relatively large wages paid to workers in these industries
- via the spending on inputs including labour of the direct suppliers to the extractive companies

The multiplier ratio from the DIRECT spend to the TOTAL has been found to be large (5 times or more) even in economies with a thin industrial structure. Example is Zambia
Africa Mining Vision (AMV)

The AMV was adopted by African heads of state and government in 2009.

It focuses on the mining sector’s potential to help transform economies through:

- more diversified growth involving most typically
  - a range of local content requirements and policies and
  - Various downstream ‘value-addition’ initiatives mainly beneficiation of unprocessed minerals

Significantly it also calls for individual *Country Mining Visions for Development*. 
Local content and other diversification policy examples

**Ghana:** The Petroleum Local Content and Local Participation Regulations, 2013 set out detailed targets for minimum local employment and procurement of services and goods in the oil and gas sector that gradually increase over ten years.

**Tanzania:** The 1997 Mineral Policy and the 2012 Mineral Act emphasized developing backward linkages to the mining sector, but left policy implementation largely to voluntary compliance.

**South Africa:** Mining rights holders are encouraged by the Mining Charter (2004) to procure an increasing percentage of their capital goods, consumables, and services from Black Economic Empowerment suppliers.

**Angola:** Sonangol requires that all goods and services not requiring vaguely defined ‘large capital investments and specialized know-how’ must be sourced from firms having more than 51 per cent of share capital owned by Angolan citizens (but subject to a price comparison with imports).

**Nigeria:** from 2000 onwards, commitment to the development of Nigerian expertise in oil operations and development of input suppliers was included among the criteria for award of concessions.

**Mozambique:** see later slide
Limitations of standard local content policies

Local procurement regulations have met with limited success;
(i) because of small size of local markets
(ii) insufficient capacity of appropriate local SMEs
(iii) weak implementation of regulations

But the more fundamental issues are that mandated targets:
(iv) may tie new supplier outputs to the existing extractive activities, and so
(v) may fail to support new transformative activities that can outlive extractives
(vi) may fail to help develop transferable skills and capacities
(vii) may raise production costs for extractives and so deter future new investment
(i.e. act as a hidden tax).
Limitations of some downstream policies

The mere presence of an unprocessed mineral does NOT assure that adding processed value locally is commercially sensible

- economies of scale may be absent – small domestic market – so high unit cost
- destination markets for processed product may be expensive to reach – also JIT management precludes distant suppliers
- source of cheap energy is often needed
- other inputs needed for processing may need to be imported in large quantities
- so processing *margins* may be small and also even *more volatile* than prices of unprocessed minerals

Many examples globally of how misplaced downstream policies have been hugely value REDUCING e.g. India and steel, Indonesia and bauxite processing
But some downstream does make good sense

Examples:

**Tanzania:** Gas to electricity generation using Mnazi Bay near shore natural gas

**Mozambique:** Gas to electricity generation (and other uses in RSA) using the natural gas from the Pande and Temane fields

**Botswana:** Diamond cutting based on clear commercial agreements with De Beers and experienced cutters in Europe
Beyond this difficult commercial decisions are needed

Example: Tanzania and (high cost) deep sea natural gas

Maximum input prices and projected volumes

<table>
<thead>
<tr>
<th>US$/mmBtu</th>
<th>Residential CNG (2 mmsc/d)</th>
<th>Commercial CNG (1 mmsc/d)</th>
<th>LNG (1,000 mmsc/d)</th>
<th>Fertiliser (70 mmsc/d)</th>
<th>Power (70 mmsc/d)</th>
<th>Methanol (160 mmsc/d)</th>
<th>GTL (700 mmsc/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 – 10</td>
<td>8 – 9</td>
<td>7 – 8</td>
<td>5 – 6</td>
<td>5 – 6</td>
<td>4 – 5</td>
<td>3 – 4</td>
<td>3 – 4</td>
</tr>
<tr>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
<td>$/mmBtu</td>
</tr>
</tbody>
</table>

Gas volumes

- 1,000 mmsc/d
- 750 mmsc/d
- 500 mmsc/d
- 250 mmsc/d
- 50 mmsc/d
A broadened approach

Could include:

(i) active encouragement of, and partnering with supplier development programmes by the companies
(ii) pro-active policies to remedy the constraints on the expansion of the many thousands of SMEs present in all African countries
(iii) active partnerships between companies and government in training to develop skills transferable across sectors
(iv) prioritization of new public investment on infrastructure to complement the massive investments of private capital
(v) efforts to use the global linkages of the companies to develop exportable capacity in the so-called “industries without smokestacks”
(vi) possibly using special export processing zones
How long do we have to achieve a transition - timing is critical?

Source: adapted from Stevens and Mitchell (2008).
….. Remember too the changing opportunities along the life cycle
Two examples from Mozambique

1. MOZAL- Empowerment linkage programme for SMEs (SMEELP)
   - a partnership involving external financial and other support from IFC
   - resulted in significant training upgrades for several SMEs and more than $53 million in incremental sales

   Similarly successful arrangements are seen in South Africa, Brazil and in other countries

2. Maputo Development Corridor (1996) involving:
   - major new infrastructure including road, rail, telecoms, electricity and a port, and helping to promote:
   - more active trade links to the South African industrial heartland of the Witswatersrand, to the important mining activities in Limpopo, and the large electricity generating areas of South Africa
   - a major industrial park, and further gas related activities.
Compare this with a missed opportunity from Tanzania.
Concentrated contributions of mining argues also for close attention to decentralization policies.
Thank you

See also UNU WIDER E4D

Any comments please to:
alan.roe14@gmail.com