Harnessing natural resource wealth for economic growth:

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- Review of the facts
- Discussion of policy issues

Natural resources in Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Resource revenue</th>
<th>Resource exports</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% revenue</td>
<td>% GDP</td>
</tr>
<tr>
<td>Algeria</td>
<td>70.5</td>
<td>26.3</td>
</tr>
<tr>
<td>Angola</td>
<td>79.8</td>
<td>33.4</td>
</tr>
<tr>
<td>Cameroon</td>
<td>27.7</td>
<td>4.8</td>
</tr>
<tr>
<td>Rep. Congo</td>
<td>69.6</td>
<td>22.2</td>
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<tr>
<td>Eq. Guinea</td>
<td>85.2</td>
<td>24.4</td>
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<tr>
<td>Gabon</td>
<td>60.1</td>
<td>19.2</td>
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<tr>
<td>Libya</td>
<td>72.5</td>
<td>36.1</td>
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<tr>
<td>Nigeria</td>
<td>78.9</td>
<td>32.3</td>
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<tr>
<td>Sudan</td>
<td>49.8</td>
<td>8.3</td>
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<tr>
<td>Botswana</td>
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<td>20.6</td>
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<tr>
<td>Namibia</td>
<td>5.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>0.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Zambia</td>
<td>60.5</td>
<td>16.6</td>
</tr>
</tbody>
</table>

- Oil, Sub-Saharan Africa; produce 6.5 mbpd, export 5mbpd @ $30 barrel ≈ $50 billion pa ≈ ODA to Africa
- Uneven across countries
- Prospecting and discoveries: New finds: Uganda, Ghana
  Estimates of sub-soil wealth
Low savings and investment
- National accounts measures
- ‘Real saving’: Nigeria -30% GDP, Central Asia, 0%
Low education (enrolment, years of schooling)
High inequality
High volatility of exports and income
High incidence/duration of civil conflict
Resource booms are short-lived
Direct effect of price boom such as 2006-07:
  - Additional short run growth effect, raises GDP 2.5%
  - Additional long run (25 year) effect, reduces GDP 26%.
Slow growth:
  - each 1% point increase in the share of natural resources in GDP reduces growth by 0.09% per annum.

Correlates of resource abundance

- **Effects are conditional**: Countries with ‘good institutions’ do not have the resource curse.
- Why is governance particularly important for resource rich economies?
  - Inherently through government:
    - Assigning mineral rights
    - Revenues
    - Timescales and time-consistency
- What aspects of ‘good institutions’?
  - Checks and balances
- Natural resources undermine institutional quality
  - Corruption
  - Conflict; resources increase likelihood of civil war
  - Undermine accountability of the state
  - Enable bad policies to be maintained
  - Economic instability can undermine political stability
  - Effects are conditional.....if start with poor institutions....
Policy issues

What can be done to increase the chances of success?

- Necessary condition, a government committed to using resource wealth for the benefit of the citizens
  - Transparency: EITI
  - Codes of best practise – The Natural Resource Charter
- But lots of ways to get it wrong
  - Contracting with investors
  - Fiscal regimes
  - Consuming, saving, investing
  - Volatility
  - Absorption, adjustment and structural change

Policy issues: contracting with investors

**How should exploration/ extraction rights to allocated to private investors?**

- Prospecting – first come first served; Wild West & artisinal mining
  - Knowledge spillovers and gold rushes
  - Rent dissipation
  - Technical inefficiency
- Formal allocation procedure
  - Negotiation vs auctions
    - Context of imperfect and asymmetric information (geology and market).
    - Long term investments and time-consistency
- Auctions
  - Transparency
  - Competition is efficient in capturing surplus
- *but*
  - Multi-dimensional objectives – scoring auctions
  - Bundling lots
  - Attracting participation – prior geological survey information needed?
  - Negotiation vs auctions: Botswana
Policy issues: fiscal regime

How should the fiscal regime be designed?

- Principal–agent problem to design tax regime which:
  - Captures rent
  - Provides incentives for efficient extraction & future exploration
  - Shares risk
  - Delivers preferred time profile of revenue
  - Is 'sustainable' – avoid frequent renegotiation
    - Hold-up problem and expropriation risk.

- African experience:
  - Examples of good practice
    - Alternative models: tax-royalty; production sharing
    - High government 'take'.
  - Africa surely under-prospected; Hold-up & expropriation risk
  - Examples of contracts that have been negotiated poorly or under difficult circumstances
    - Zambian copper: 0.8% royalty, lower profit tax rate than rest of the economy, generous tax breaks.
    - Land deals for food/ bio-fuel?

Policy issues: consuming, saving, investing

How should resource revenues be used?

- Consumption/ Domestic investment/ Foreign asset accumulation (SWF)

Given that,

- Revenue is:
  - Temporary
  - Foreign exchange
  - Public funds
  - Volatile

- Country is:
  - Capital scarce
  - Weak government capacity and institutions
Comparing oil booms (IMF):
- 1974-81: $\Delta \text{expend} / \Delta \text{revenue} = 0.93$
- 2000-05: $\Delta \text{expend} / \Delta \text{revenue} = 0.55$

Most developing countries need to save more – but can save too much.
Eg; ‘Bird in hand’ (Norwegian?) model; only consume the interest on a sovereign wealth fund

Policy issues: consuming, saving, investing

Issues:
- Inter-generational distribution of benefit?
  - Rights based – custodianship
  - Utilitarian – spread through time with bias towards poor

- What assets?
  - Domestic/ Foreign
  - Public/ private

- What spending channels?
  - Public expenditure
  - Government lending/ debt reduction
  - Transfer to private sector: tax cuts/ citizen dividends
**Policy issues: consuming, saving, investing**

Two-period model:

\[ c_2 = Y(K + k, G + g) + N_2 + r_w [y_1 - c_1 - k - (g - N_1)(1 + \lambda)] \]

- \( K, G \) capital, infrastructure stocks (complementary)
- First period non-resource income \( y_1 = Y(K, G) \)
- \( k, g, \) investments.
- \( N_1, N_2, \) resource revenue each period
- \( \lambda \) shadow premium on public funds
- \( r_w = 1 + \) rate of return on foreign assets
- \( r_w, r_G \) endogenous

Social planner, max wrt \( k, g, c_1, c_2 \)

\[ W = u(c_1) + Eu(c_2) / \rho \]

**Policy issues: consuming, saving, investing**

First order conditions wrt \( c_1, k, g \):

\[ u'(c_1) = \left( r_w / \rho \right) Eu'(c_2) \]

\[ r_K = r_w \quad r_G = (1 + \lambda)r_w \]

Concentrate on growing consumption case; if \( r_w > \rho \), then \( c_2 > c_1 \).

**I: The developed economy:** permanent income hypothesis.

- Resource revenue is simply a shift in the budget constraint, present value \( N_1 + N_2 / r_w \)
- No change in \( \lambda, r_w \) \( \rightarrow \) no change in \( k, g \).
- \( c_1, c_2 \) increase together.
- Accumulation of foreign assets (SWF) if \( N_1 >> N_2 \)
- Prudence \((u^{'''} > 0) \rightarrow \) increase saving in response to \( N_2 \) uncertainty
II: The developing economy: accelerating growth

- Resource revenue $r_w$ high and falls
  - Direct effect
  - Foreign debt reduction
- Resource revenue $\lambda$ high and falls
  - Finance $g$ without distortionary taxation.
- Increase $g$ ($\lambda$ and $r_w$)
- Increase $k$ (direct and complementarity)
- Consumption profile becomes flatter ($r_w/\rho$ falls)
- Compared to PIH:
  - Less saving ($c_1$ increase relatively more)
  - Saving goes to domestic investment rather than SWF

Use revenue to bring forwards development path rather than increase consumption in the far distant future.

Policy issues; consuming, saving, investing

$$u'(c_1) = \left(\frac{r_w}{\rho}\right)Eu'(c_2) \quad r_K = r_w \quad r_G = (1 + \lambda)r_w$$
**Policy issues; consuming, saving, investing:**

**III: The Ricardian economy: booming consumption**

- **2nd stage:** private sector, discount rate $\delta \geq \rho$
  
  Transfers $t_1, t_2$
  
  Access to international capital markets
  
  \[ V = u(c_1) + E[u\left(Y(K + k, \bar{G} + g) + t_2 + r_w[y_1 - c_1 - k + t_1]\right)]/\delta \]
  
  \[ u'(c_1) = \left(\frac{r_w}{\delta}\right)E[u'(c_2)] \]
  
  \[ r_k = r_w \]

- **1st stage:** government
  
  \[ W = u(c_1) + E[u\left(Y(K + k, \bar{G} + g) + N_2 + r_w[y_1 - c_1 - k + (N_1 - g)(1 + \lambda)]\right)]/\rho \]
  
  - $t_1, t_2$ disappear -- Ricardian consumers
  - Change in $g$ has no effect on $c_1, c_2$
  - Change in $g$ can change $k$, but effect is of no value so $r_g = (1 + \lambda)r_w$

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**Consuming, saving, investing: Ricardian consumers**

**III: The Ricardian economy: (continued)**

- Fall in $r_w$ $\Rightarrow$ private sector surge of investment and (especially, if $\delta \geq \rho$) consumption.
- Government prudence is irrelevant: eg, low $t_1$, high $t_2$ foreseen by private sector.

**Kazakhstan:** 2004-08:

- Govt saved 2/3rd oil revenue;
- SWF + reserves increased by $50bn$
- Private external debt increased by $30bn
Consuming, saving, investing: private sector response

**IV: The economy with capital controls: raising investment**

- **2nd stage;** private sector, discount rate $\delta \geq \rho$, transfers $t_1, t_2$
  
  Domestic investment but no access to international capital markets

  \[ V = u(c_1) + Eu(\bar{K} + \{y_1 - c_1 + t_1\}, \bar{G} + g) + t_2) / \delta \]

  \[ u'(c_1) = (t_2 / \delta) Eu'(c_2) \]

- **1st stage;** government

  Max $W$ wrt $t_1, t_2, g$: subject to budget and 2nd stage

  \[ W = u(c_1) + Eu(\bar{K} + \{y_1 - c_1 + t_1\}, \bar{G} + g) + N_2 + r_w [(N_1 - g)(1 + \lambda) - t_1)] / \rho \]

  \[
  \left[ \frac{c_1}{(1 + \lambda) r_w} u'(c_1) / \rho + \frac{u'(c_1) - (r_w / \rho)Eu'c_1)}{dc_1} / dg = 0 \right.
  
  \[
  \left[ r_k - r_w u'(c_2) / \rho + \frac{u'(c_1) - (r_w / \rho)Eu'(c_2)}{dc_1} / dt_1 = 0 \right.
  
  Incentive to increase $g$ & reduce $t_1$ to reduce current consumption

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Consuming, saving, investing: conclusions

- For capital scarce developing economy priority is to raise growth by *domestic* investment
- Role of infrastructure investment to increase private investment
- Requires public expenditure systems: honest & efficient
- Need to understand private sector response to various spending channels.

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![Spending channels diagram](image_url)
**Policy issues: volatility**

*How to handle extreme volatility?*

- Evidence that volatility a key factor in resource curse.
- Hard to reverse spending commitments that become unaffordable
- Role for stabilization fund to:
  a) Self-insure against periods of low price/ revenue
  b) ‘Park’ funds abroad when absorptive capacity is limited

Oil funds in practice: -- two objectives:
- Stabilization fund / savings (‘future generations’) fund:
- Need to keep clear separate objectives & importance

- 2005: 21 out 31 oil producers have funds (IMF);
  - 10 focus on stabilisation, 8 stabilisation and saving.
  - Stabilisation funds typically price or revenue contingent
  - Eg Trinidad and Tobago: 60% of ‘excess revenue’ (based on deviation of price from long moving average) placed in fund.

**Policy issues: volatility**

Design criteria: how big should a stabilization fund be?

- Is it possible to insure/hedge?
  - Mexico – incomplete and expensive.
- Cost of volatility to the domestic economy?
  - Consumption, investment
- Opportunities for borrowing in downturn?
  - High cost, possibly closed off. Shocks facilities.
- Stochastic process governing resource
  - Random walk; Flat and spikes
- Political risk – fund is lootable.
Absorption, adjustment and structural change

**How to manage the impact on other sectors?**

- Do resource revenues crowd out other activity?
  
  Eg. Increased spending on non-tradables may bid up prices & 
  crowd out production of tradables (Dutch disease)

- Not inevitable: need to understand supply response:
  - Unemployed resources: \[ \Delta Y = R/(marginal\ prop\ to\ import) \]
    (crowd-in production via Keynesian multiplier)
  - More generally – slope of supply curves.

- Short-run: ‘absorptive capacity’
  - Eg construction boom \[ \Rightarrow \] higher P not Q.
  - Response: openness; ‘investing in investment’

- Long-run: Dutch disease
  - Heterogeneous country experience: Malaysia vs Nigeria
  - Use revenues to raise productivity, make complementary 
    investments.

**Conclusions**

- Opportunity that must not be wasted again

- Complex economic and political economy issues
  - African governance much improved

- Guiding principles
  - Transparency
  - Competition
  - High savings – but for domestic investment
  - Promote flexible domestic supply response