# Introduction

- Non-renewable natural resources are a dominant feature of 50 economies, with population > 1.4 bn

- 24 countries > 75% of exports

- 13 countries > 40% of GDP

- 18 countries > 50% fiscal revenues

  (IMF, average 2000-05)

- Some of the best performing economies in the world – Botswana, Norway, Malaysia

- Some of the worst performing – Nigeria, Sierra Leone, DRC.

- This talk:

  – Review the facts

  – Discuss the policy issues

Correlates of resource abundance

- 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

NEGATIVE PARTIAL CORRELATION BETWEEN GROWTH AND
RESOURCE ABUNDANCE (exclude food, agriculture)

Figure: Growth and Natural Resources Abundance
Data source: World Development Indicators, 2006
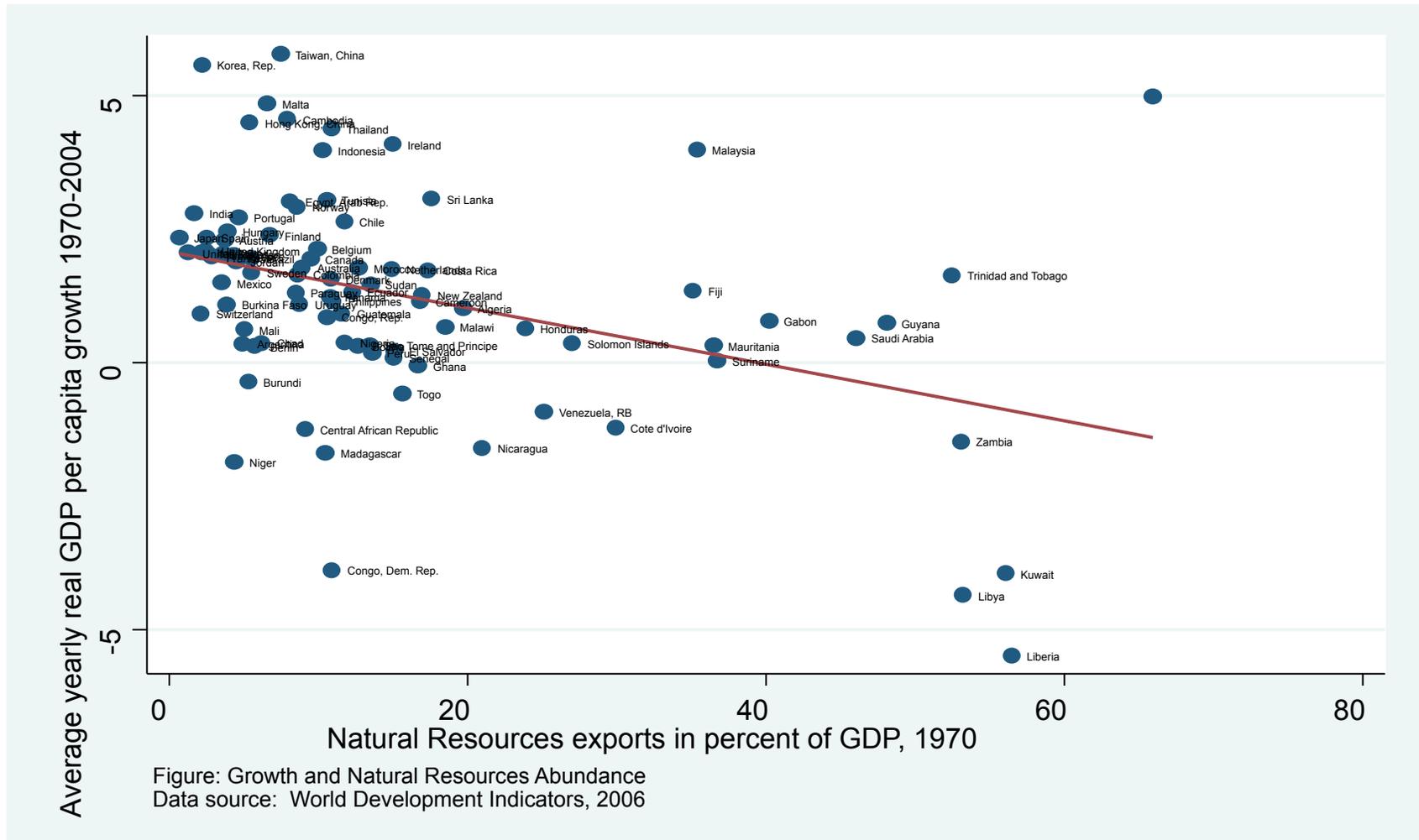
Source: World Bank Development Indicators 2006

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?
  - For minerals, 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

Remainder of talk – policy issues
  - Contracting with investors
  - Fiscal regimes
  - Consuming, saving, investing
  - Volatility
  - Absorption, adjustment and structural change

Policy issues: 1) 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:
  - Context of imperfect and asymmetric information (geology and market).
  - Long term investments and time-consistency

- Negotiation vs auctions?
  - Transparency
  - Competition is efficient in capturing surplus

  but
  - Multi-dimensional objectives – scoring auctions
  - Bundling lots
  - Attracting participation – prior geological survey information needed?
  - Dominant party: Botswana

Policy issues: 2) 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' – avoids frequent renegotiation
    - Hold-up problem and expropriation risk.

- Experience:
  - Examples of good practise
    - Alternative models: tax-royalty; production sharing
    - High government 'take' (> 70%)
  - Many regions under-prospected/ developed; risk of hold-up
  - 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: 3) Consuming, saving, investing

How should resource revenues be used?

Historical record
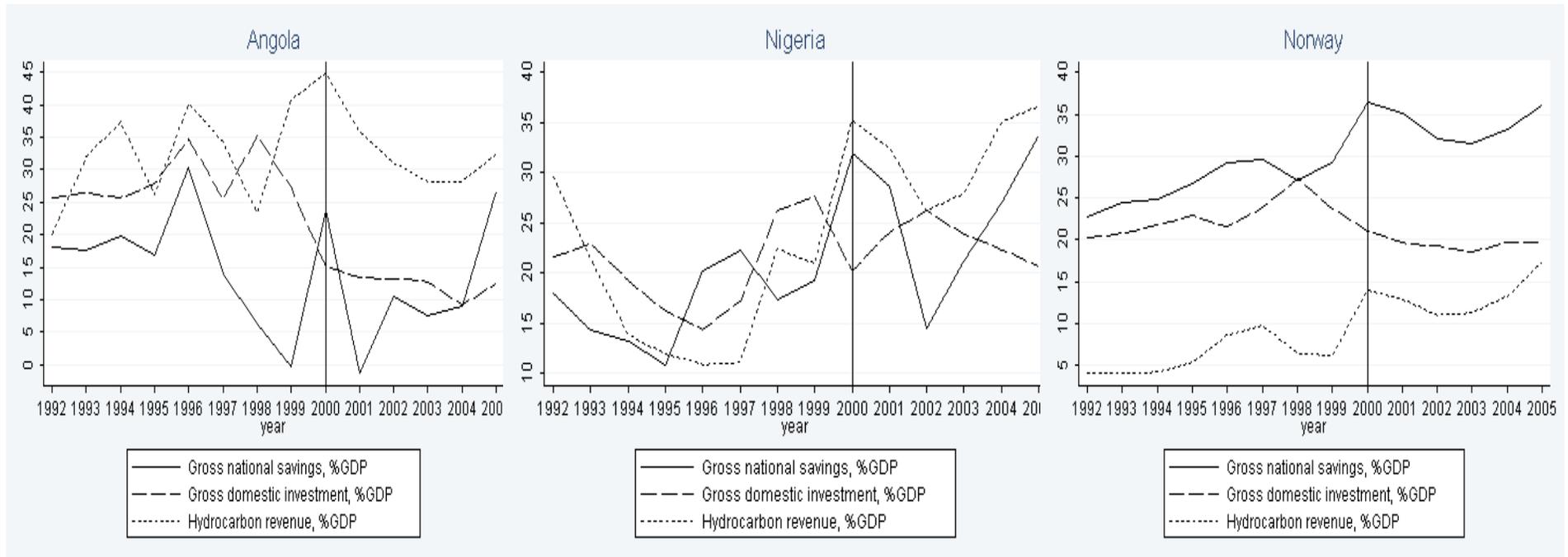
- Comparing oil booms (IMF):
    - 1974-81: Δexpend/ Δrevenue = 0.93
    - 2000-05: Δexpend/ Δrevenue = 0.55
- Most developing countries need to save more – but can save too much.

Policy issues: consuming, saving, investing

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

- Choices:
  - Level of saving
  - What assets?
    - Domestic/ Foreign
    - Public/ private – ultimate source of sustained growth
  - What spending channels?
    - Public expenditure
    - Government lending/ debt reduction
    - Transfer to private sector: tax cuts/ citizen dividends

- Economic/ political environment
  - Revenue is: temporary/ volatile/ forex/ public funds
  - Country is: capital scarce/ fiscally constrained

Policy issues: consuming, saving, investing

Two-period model:

$$c_2 = Y(\overline{K} + k, \overline{G} + g) + N_2 + r^*\left[y_1 + N_1 - c_1 - k - g(1 + \lambda)\right]$$

- *K, G* private capital, infrastructure stocks (complementary)
- First period non-resource income $\quad y_1 = Y(\overline{K}, \overline{G})$
- *k, g,* investments.
- N_1, N_2, resource revenue each period
- λ shadow premium on public funds
- *r* = 1* + rate of return on foreign assets
- r_K, r_G endogenous

Social planner, max *wrt k, g, c₁, c₂*

$$W = u(c_1) + u(c_2)/\rho$$

Policy issues: consuming, saving, investing

First order conditions wrt c_1, k, g:

$$u'(c_1) = (r*/\rho)u'(c_2) \qquad r_K = r* \qquad r_G = (1+\lambda)r*$$

Concentrate on growing consumption case; if $r* > \rho$, then $c_2 > c_1$.

I: The developed economy: *permanent income hypothesis.*
- Resource revenue is simply a shift in the budget constraint, present value $N_1 + N_2/r*$
- No change in λ, $r*$ ➔ no change in k, g.
- c_1, c_2 increase together.
- Accumulation of foreign assets (SWF) if $N_1 >> N_2$

This the basis of much standard advice – but fails to take into account
    -- key features of developing economies
    -- interactions between the public and private sectors.
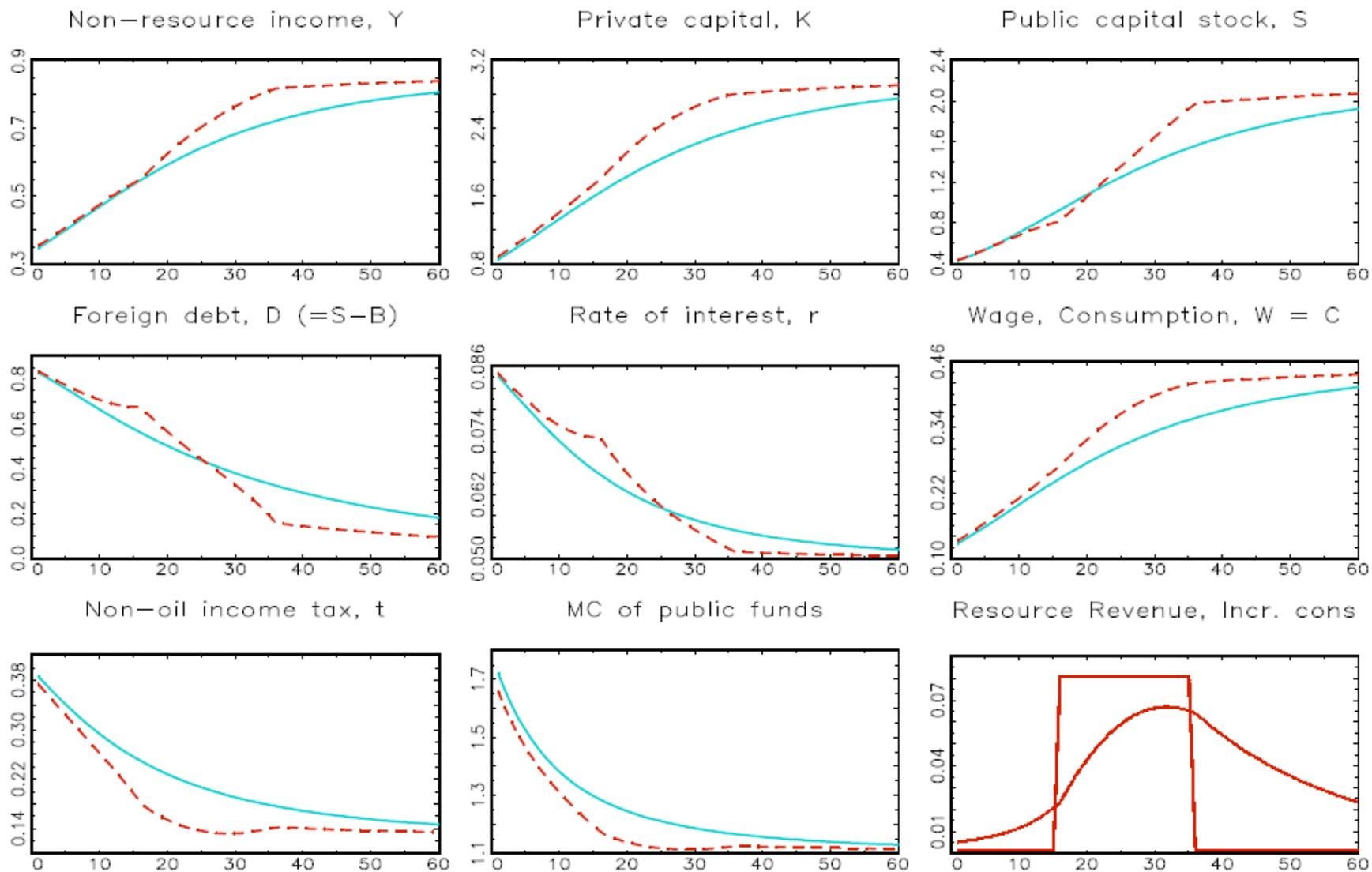
Policy issues; consuming, saving, investing

$$u'(c_1) = (r^*/\rho)u'(c_2) \qquad r_K = r^* \qquad r_G = (1+\lambda)r^*$$

II: The developing economy: accelerating growth

- Resource revenue ➔ r^* high and falls
  - Direct effect
  - Foreign debt reduction
- Resource revenue ➔ λ high and falls
  - Finance g without distortionary taxation.

- Increase g (λ and r^*)
- Increase k (direct and complementarity)
- Consumption profile becomes flatter (r^*/ρ 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.

Continuous time variant: using revenue to bring forwards development

Policy issues; consuming, saving, investing:

III: Interaction with the private sector: The Ricardian curse

- **2nd stage**; private sector, discount rate $\delta \geq \rho$

  Transfers t_1, t_2

  Access to international capital markets

  Max V wrt c_1, c_2, k:

  $$V = u(c_1) + u\left(Y(\overline{K} + k, \overline{G} + g) + t_2 + r*[y_1 - c_1 - k + t_1]\right)/\delta$$

  $$u'(c_1) = \left(r*/\delta\right)u'(c_2) \qquad r_K = r*$$

- **1st stage**; government

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

  $$t_2 = N_2 + r*\left[N_1 - g(1 + \lambda) - t_1\right]$$

  $$W = u(c_1) + Eu\left(Y(\overline{K} + k, \overline{G} + g) + N_2 + r*[y_1 - c_1 - k + N_1 - g(1 + \lambda)]\right)/\rho$$

  - 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 $r_G = (1 + \lambda)r*$
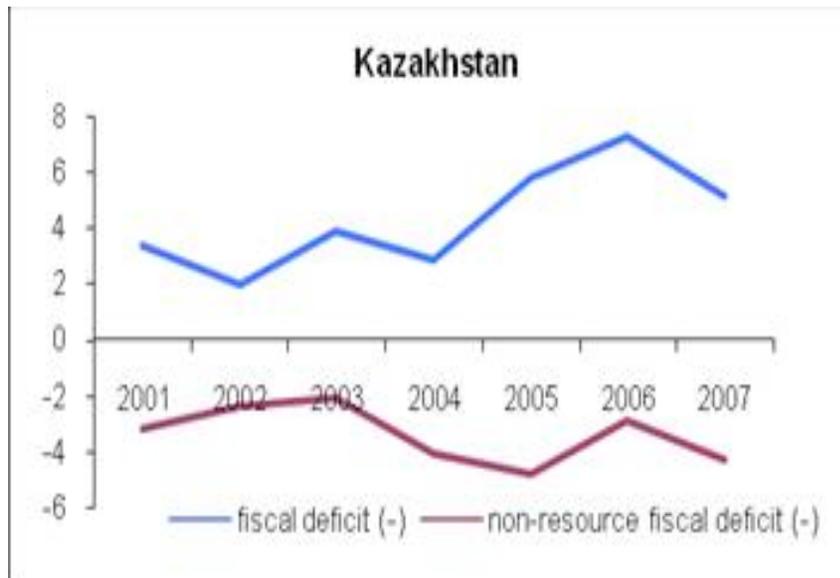
Consuming, saving, investing: Ricardian consumers

III: The Ricardian curse: *(continued)*

- Fall in r* ➜ private sector surge of investment and (especially, if δ ≥ ρ) 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 Ricardian economy with limited private access to international capital markets:

Suppose private sector can invest/ borrow only in the domestic economy, ie at r_K.

Government can now control domestic consumption by manipulating r_K

Government wants to 'over-invest' in g – high levels of public infrastructure to induce private sector saving and investment, and thereby counteract private over-consumption

Consuming, saving, investing: conclusions

- For capital scarce/ fiscally constrained 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.
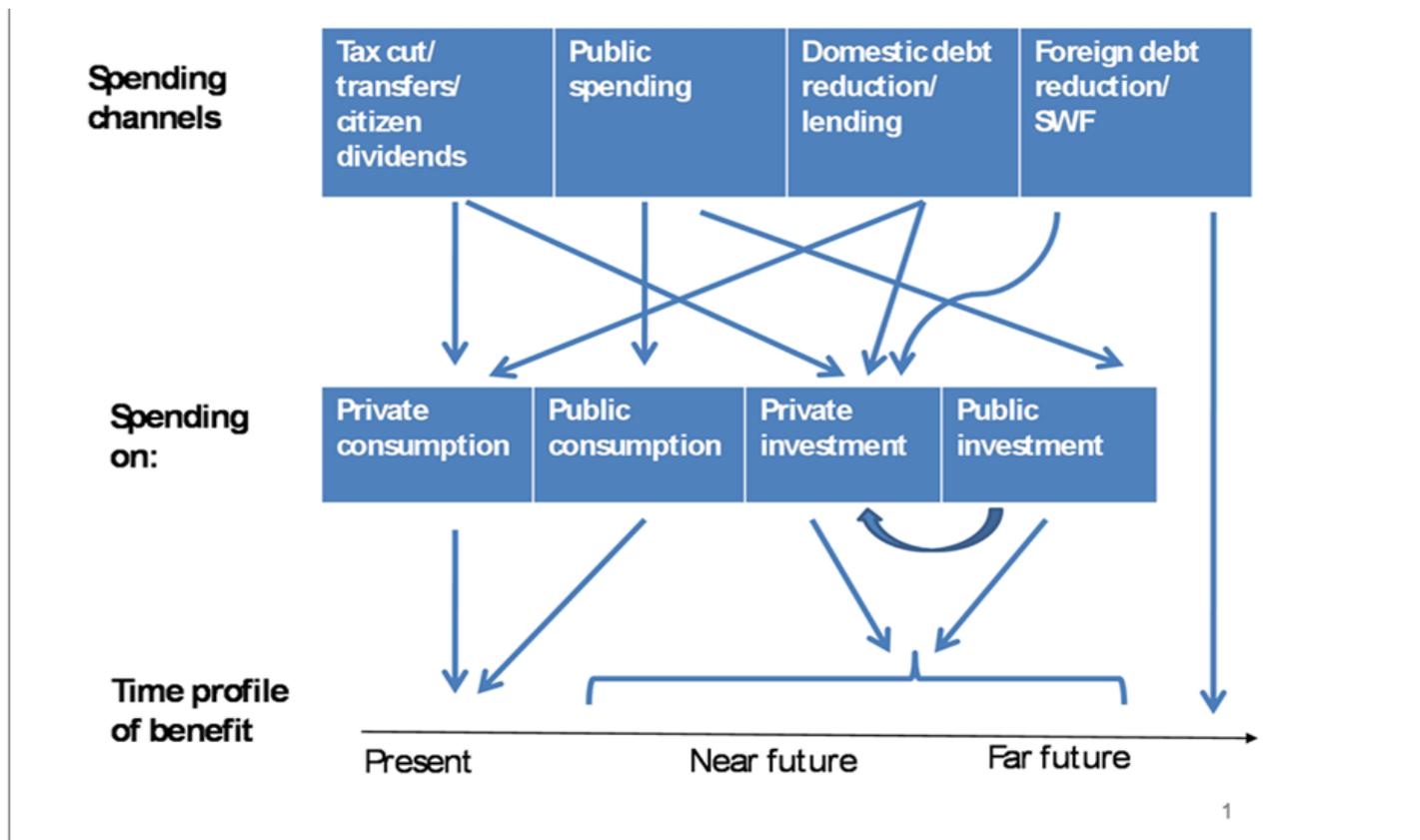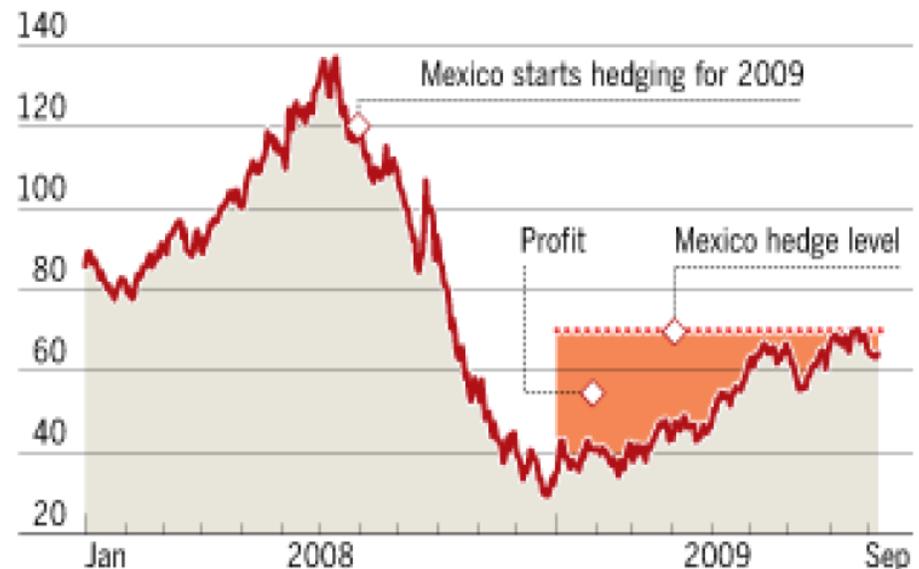
Policy issues: 4) volatility

How to handle extreme volatility?

- Evidence that volatility a key factor in resource curse.

1) **Hedging**
- Mexico: spent $1.5bn on option, earned $8bn

- Ecuador, Colombia, Algeria, Texas, Louisiana;

- Unlikely to become widespread?
  - Political risks when lose
  - Market impact of hedging:
    - Information
    - Market power

Mexico's oil gamble pays off
Mexico oil export price ($ per barrel)

Mexico starts hedging for 2009

Profit   Mexico hedge level

Sources: Thomson Reuters Datastream; FT research

Policy issues: volatility

2) Stabilization fund

Role for stabilization fund to:
  a) Self-insure against periods of low price/ revenue
  b) 'Park' funds abroad when absorptive capacity is limited

Resource funds in practise: -- two distinct objectives:
- Stabilization fund / savings ('future generations') fund:
- Need to keep clear separate objectives & importance
- 21 out 31 oil producers have funds (2005, 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.

Design criteria: how big should a stabilization fund be?

- Cost of volatility to the domestic economy?

- Opportunities for borrowing in downturn?

- Stochastic process governing resource?

- Political risk – fund is lootable?

Policy issues: volatility

3) Residual volatility

- Clear that will not feasible to fully insulate
    - 2008-early 2009, MENAP forex reserves fell $40 bn and non-oil growth fell 5% points.
    - Transmission channels other than revenue
        - Resource sector investment
        - Other private sector responses
        - Capital mobility – Zambia

- Therefore, also need domestic economy that can handle volatility
    - Market flexibility….. Labour, capital markets
    - Avoid hard to reverse commitments
    - Diversify…..

Policy issues: 5)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 propensity to import) (crowd-in production via Keynesian multiplier)

    - More generally – slope of supply curves.

- Short-run: 'absorptive capacity'

    - Eg construction boom ➔ 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
    - Governance improved – in some places

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

- Statement of best practise
    www.naturalresourcecharter.org