Explaining Natural Resource Curse in Africa: The Role of the Dutch Disease and Institutions

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- In 2009, minerals (including petroleum) made up 64 percent of total merchandise exports in Africa
- Available estimates show that Africa is well endowed with oil reserves accounting for only 9.5 percent of total world proved oil reserves
- Africa accounts for only 7.9 percent of all global proved natural gas reserves
- The continent also accounts for 3.7 percent of total World coal reserves

- Other natural resources found in Africa include diamonds, silver and Gold among other precious stones
- A major puzzle in economic development is the existence of a negative correlation between economic growth and natural resources–**the natural resource curse**
- Countries with great natural resource wealth tended to grow more slowly than resource-poor countries in the post world-war II period

- In the past few decades however, the best economic performers have been the resource-poor Newly Industrializing Economies of East Asia–Korea, Taiwan, Hong Kong and Singapore
- It is important to understand the roots of failure in natural resource-led development
- The most common explanations for this are **the Dutch Disease, Insitutional Quality and Rent Seeking**
- Most current explanations for the Dutch Disease have a **crowding-out** logic.
- Natural Resources crowd-out activity x. Activity x drives growth. Therefore Natural Resources harm growth

- Sachs and Warner (1995, 1999) identify x with traded-manufacturing activities
- Gylfason et al. (1999), and Gylfason (2000) identify x with education (human capital)
- Natural resource abundance could also crowd-out entrepreneurial activity or innovation...
- ...i.e. if wages in the natural resource sector rise high enough to encourage potential innovators and entrepreneurs to work in the resource sector

- Given this background, we are asking ourselves **3 key questions**:

- What is the relationship between economic growth and natural resources in Africa?
- Can this relationship be explained by the Dutch Disease?
- Does the quality of the insitutions influence the direction and magnitude of this relationship?

- A number of empirical models have been used is assessing the linkage between the Dutch disease and NRC (see Sachs and Warner (1997; 2001); Gylfason et al., (1999)
- All these models, have used the average values of the different variables over specified periods of time.
- In addition, Gylfason et al.(1999) have used random effects framework to etimate a panel data model but using 5-year averages of their data
- This means that the models have not controlled for country specific attributes–although Sachs and warner (2001) argue that these effects do not influence NRC

- We propose to use panel data econometrics to overcome some of this challenges. This is because;
- It will help us exploit both time and spatial aspects of the data sets and eliminate the need of using averages of variables over long periods of time
- Using the fixed effects framework–which we will need to test for–will control for unobserved country specific effects.

- The general regression for testing natural resource curse will take the form

$$gDGP_{it} = \beta_0 + \beta_1 EPP_{it} + \sum_{i=1}^{N} \beta_i x_{it} + DRRC_i + AFD_i + c_i + \varepsilon_{it} \quad (1)$$

- Where, $gGDP_{it}$ is rate of growth of output; EPP_{it} is the share of primary products in total exports of a country– This is an estimate of natural resources
- The vector x_{it} consists of other control variables expected to influence growth such as: initial GDP of country, investment to GDP ratio, primary school enrollment rate, secondary school enrollment rate; measure of external debt, real exchange rate of country

- Others are openess of a country to trade; economic mismanagement index=$[\pi/(1+\pi)]$, where π is the annual inflation rate;
- $DRRC_i$ is dummy variable with a value of 1 for countries whose oil and mineral resources contribute over 10% of their total exports and zero otherwise; AFD_i is a dummy for anglophone and francophone countries with 1 for francophone;
- The variable c_i represents unobserved country specific attributes, while ε_{it} is the error term.The β_s are parameters to be estimated.

- The model will be in logs so the effects of different variables to real GDP per growth rate will be expressed as elasticities
- There are studies arguing that the use of export of primary products is not an adequate measure of GDP
- Brunnschweiler (2008) for instance, postulates that the inconsistencies in the empirical findings originate from the inappropriateness of resource abundance measurement to proxy natural resources in the empirical estimation.

- For this reason we propose to run other regressions and replace the EPP variable with measures such as: 1) export of ores and metals as a share of GDP; 2) share of mineral production (which excludes ores. Note it is production not export (Boschini et al.,2007);
- Others are; 3) total natural capital–which is measure that includes subsoil assets, timber resources,non-timber forest recourses, protected areas, cropland, and pastureland; and 4) subsoil assets–which include energy resources and other mineral resources (Sarmidi et al., 2013)

- As argued earlier, the Dutch disease has a crowding out effect.
- We therefore intend to test whether it crowds out traded manufacturing sector in the continent
- Based on Sachs Warner (1995; 1999; 2001), positive wealth shocks from the natural resource sector–along with consumer preferences that translate this into higher demand for non-traded goods–creates excess demand for non-traded products
- This drives up non-traded prices, including particularly non-traded input costs and wages

- This in turn squeezes profits in traded activities such as manufacturing that use those non-traded products as inputs yet sell their products on international markets at relatively fixed international prices.
- The decline in manufacturing then has ramifications that grind the growth process to a halt
- We need to test whether natural resource abundance is indeed correlated with higher non-traded prices across countries
- If the non-traded prices in resource-abundant countries are higher than the traded prices it follows that the general price level–weighted average of the two–will be higher in resource abundant countries

- There are two challenges however:
- 1) It is difficult to observe non-traded prices directly
- 2) National price levels tend to be positively associated with levels of income across countries
- We need to test for overvaluation to see whether natural resource intensive economies had higher price levels after controlling for relationship in (2) above

- Take a ratio of the country's purchasing power parity exchange rate to its nominal exchange rate. This is the relative price level

$$\frac{yp_{it}/E}{ypI_{it}} \tag{2}$$

- where yp_{it}/E is the GDP in US dollars measured by using local current prices and the nominal US dollar exchange rate
- ypI_{it} is the same GDP evaluated at international prices. These international prices are averages across many countries of prices for certain goods, and therefore do not vary by country

- We run a regression of the relative price level against natural resources and real GDP to control for income effect. Other control variables can also be included.
- The regression takes the form

$$log\frac{yp_{it}/E}{ypI_{it}} = \beta_0 + \beta_1 logRGDP + \beta_2 logEPP + ... \qquad (3)$$

- This equation will be run using diffrent regressors as explained before to replace EPP
- We can also include investment in education to test whether there is crowding out on human capital

- The Dutch disease may not explain why some countries which are rich in NR are experiencing high growth rates e.g. Botswana
- Would insitutions play a role in explaining NRC? We include the insitutional variables to Eq. (1) and use Threshold Regression (Sarmidi et al., 2013)

$$gDGP_{it} = \begin{cases} \beta_0^1 + \beta_1^1 EPP_{it} + \beta_2^1 INS_{it}^1 + \sum_{i=1}^{N} \beta_i^1 x_{it}^1 \\ +DRRC_i^1 + AFD_i^1 + c_i^1 + \varepsilon_{it}^1 \\ if\ INS_{it} \leq \lambda \\ \beta_0^2 + \beta_1^2 EPP_{it} + \beta_2^2 INS_{it}^2 + \sum_{i=1}^{N} \beta_i^2 x_{it}^2 \\ +DRRC_i^2 + AFD_i^2 + c_i^2 + \varepsilon_{it}^2 \\ if\ INS_{it} < \lambda \end{cases} \quad (4)$$

- where INS is level of institutional development and is the threshold variable used to split the sample into regimes or groups
- Institutions act as sample-splitting (or threshold) variables
- λ is the unknown threshold parameter.
- This type of modeling strategy allows the role of natural resources to differ depending on whether institutions are below or above some unknown level of λ.
- interaction term between institutions and natural resources

- We can also interact institutions and natural resources to determine whether any positive impacts of natural resources could be driven by resource-rich countries with high institutional quality
- This scenario is highly unlikely in Africa since countries fitting this description in Africa are very few.
- This is done by estimating;

$$gDGP_{it} = \beta_0 + \beta_1 EPP_{it} + \beta_2 INS_{it} + \beta_3 (EPP * INS)_{it} + \sum_{i=1}^{N} \beta_i x_{it} + DRRC_i + AFD_i + c_i + \varepsilon_{it} \quad (5)$$

- The World Bank (natural capital, subsoil assets etcc.)
- Penn World Tables (Investment, trade openness etc.)j
- International Country Risk Guide (ICRG) for insitutional dataset
- Sachs and warner (1997)
- World development indicators (GDP etc.)
- Minerals Yearbook
- Other relevant sources

- **Thanks For Listening**