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Natural Resources, Economic Growth and Corruption

Introduction :

This paper explores whether natural resource abundance leads to higher growth followed by slower growth rates. Resource based export are characterized as fuels, ores and agriculture. Country which has high resource-based export on average tend to have lower growth rate.

This paper also reviews the relationship between natural resources and economic growth, and stresses how natural capital tends to create more corruption and undiversified economy, thereby impeding economic growth across countries and presumably also over time. The paper also discusses the need of resource rich countries to diversifying from natural capital for sustained growth rates. According to the "Prebish hypothesis", the practical policy implication was that developing countries should shun their dependency on natural resource exports, through state-led industrialization. Sachs and Warner(1995) explains how the great historical mistake of this thinking, however, was to recommend industrialization through prolonged import-substitution behind tariff and quota barriers, rather than through export promotion. State-led industrialization foundered almost everywhere that it was attempted.

Natural resource abundance creates opportunities for pen-seeking behavior and is an important factor in determining a country's level of corruption. In a simple growth model, there is an illustration of interrelationships between natural resources, corruption and economic growth and discuss potential anti-corruption policies. The growth effects of natural resource discoveries and anti-corruption policies crucially depend on the economy's state of development.

Interrelationship between Natural Resources, Corruption and Economic Growth.

Ever since the earth was inhabited, humans and other life forms have depended on things that exist freely in nature to survive. These things include water (seas and fresh water), land, soils, rocks, forests (vegetation), animals (including fish), fossil fuels and minerals. They are called Natural Resources and are the basis of life on earth. All these mentioned above are natural, and they exist in nature. No human created them. We tap into their supply to survive and also to function properly.

Wikipedia defines corruption as a form of dishonest or unethical conduct by a person entrusted with a position of authority, often to acquire personal benefit. Corruption may include many activities including bribery and embezzlement, though it may also involve

practices that are legal in many countries. Government, or 'political', corruption occurs when an office-holder or other governmental employee acts in an official capacity for personal gain. As a measure of corruption, we use the ICRG corruption index. The index is scored on a scale 0-6 with lower score indicating that "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans" (Knack and Keefer, 1995, p. 225)

There is empirical evidence that nations with abundant natural capital tend to have more corruption than other nations that are less well endowed with, or less dependent on, natural resources. This matters for growth because empirical evidence also indicates that trade, corruption, natural resources and investment is significantly related to economic growth across countries.

An innovative economy as opposed to natural-resource production economy, leads to higher standard of living as there will be more productivity and wealth in the economy. Natural-production driven economy will cause shrinkage in sectors that are not related to it. There will be numerous spillover benefits to different relatable businesses, however it will not result in diversified economy. As a

result, large share of human capital and resources will be allocated for natural resource production. This will cause shrinkage in other innovative and manufacturing sectors. According to Schleifer and Vishny (1993), malfunctioning government institutions severely harm economic performance through reduction in both incentives and opportunities to invest and innovate.

Economists have often belied their tradition as the dismal science by downplaying both earlier concerns about the limitations from exhaustible resources and the current alarm about potential environmental catastrophe. However, to dismiss today's ecological concerns out of hand would be reckless. Because boys have mistakenly cried "wolf" in the past does not mean that the woods are safe. (Nordhaus 1992, p. 2)

Analytical Model

Production function :

$Y^s = F_1(K^s, L^s)$

$Y^i = F_2(K^i, L^i)$

Superscript s : a traded manufacturing sector

Superscript i : non-traded sector

Θ : Share of labor in the traded sector

$Y^s = F_1(K^s, \Theta H)$

$Y^i = F_2(K^i, (1-\Theta)H)$

Small k,

$k^s = K^s / \Theta H$

$k^i = K^i / [(1-\Theta)H]$

Factor income decomposition of GDP, give us,

$GDP = N + wH + n(K^s + K^i)$

$GDP = N + H(w+n)[k^i + \Theta(k^s - k^i)$

Superscript 'N' or 'n' : Natural resources sector

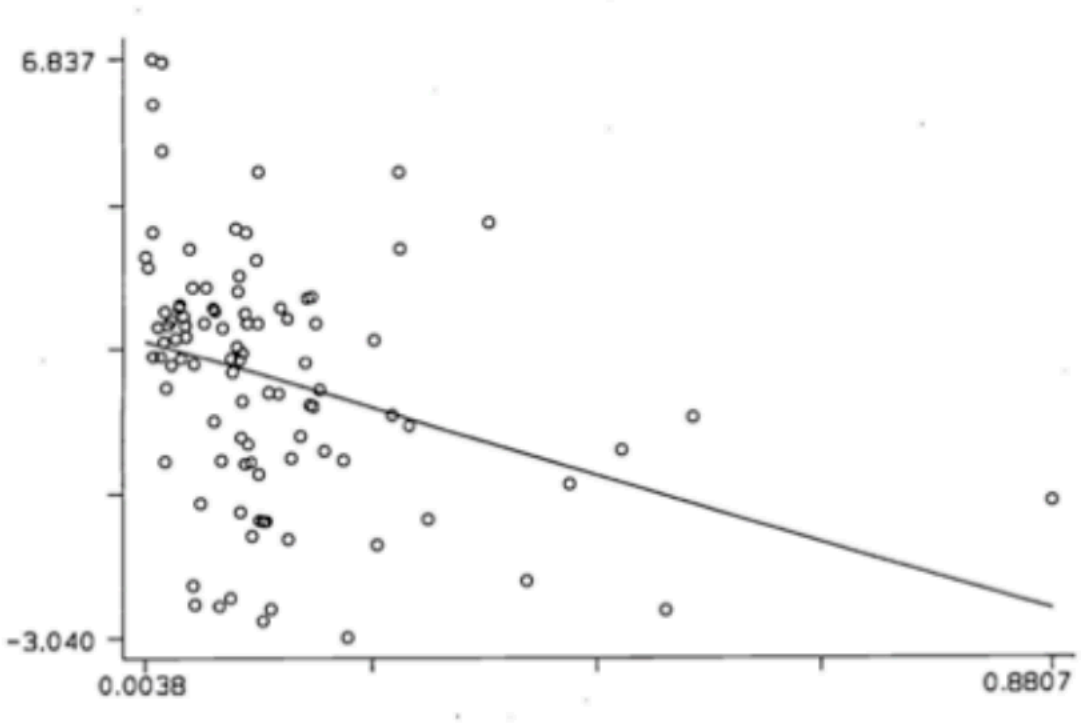
Wage : w

Taking derivative of GDP with respect to N, we get,

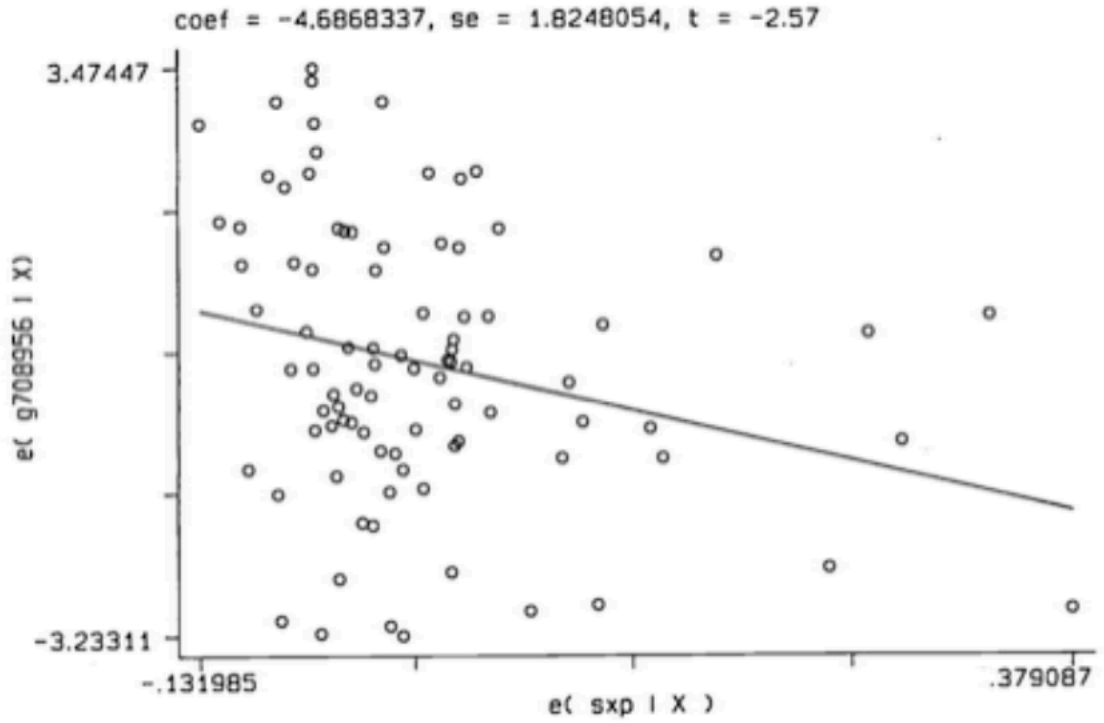
$$\partial GDP / \partial N = 1 + H(w+n)\ \partial\Theta / \partial N\ (k^s - k^i)$$

Rise in N will increase GDP in period 1, but it will also have less of an impact in the long term growth in future periods. Let's assume that in period 1, the younger generation are endowed from the resource proceeds. This will increase demand of goods on the non-traded goods. The manufacturing sector, s, will see decline in their labor, θ. From the equation above, GDP will also decline if θ goes down. However, it would also depend on the capital in both sectors (k^s - k^i). There is a possibility that if k^i is more capital intensive than k^s, then the decline in employment of manufacturing can be overpowered by the rise in employment in non-traded sector, which will raise the GDP more.

Human capital will decline in period 2 because θ declined. We know that $\partial\theta/\partial N$ will be negative.



The above graph shows the simple association between growth per-capita between 1970 and 1989 (vertical axis) and the share of natural resource exports in GDP in 1971 (horizontal axis). The regression line has a slope of -5.1 and a t-ratio of -3.2



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Empirical Results

$$\text{Corruption} = X + \beta_1 \text{ Openness Trade} + \beta_2 \text{ Political Instability} + \beta_3 \text{ Rule of Law} + \beta_4 \text{ Natural Resources}$$

$$\ln(Y^{1900} / Y^{1970}) / 20 = Z\,\beta + \delta_1 \ln(Y^{1970}) + \delta_2 \text{ Natural Resources} + \delta_3 \text{ Corruption} + e$$

The set of additional conditioning variables, Z, includes the rate of economic growth over the period 1970-90 and for sub-Saharan countries a dummy variable.

We will analyze the effect of corruption on growth. Here, Y stands for GDP per person. Trade openness refers to the outward or inward orientation of a given country's economy. Outward orientation refers to economies that take significant advantage of the opportunities to trade with other countries. Inward orientation refers to economies that overlook taking or are unable to take advantage of the opportunities to trade with other countries. The degree of global trade openness existing in countries is measured on a number of economic issues and tracked in the Open Markets Index(OMI).

Political instability can be defined in three ways : A first approach is to define it as the propensity for regime or government

change. A second is to focus on the incidence of political upheaval or violence in a society, such as assassinations, demonstrations, and so forth. A third approach focuses on instability in policies rather than instability in regimes (i.e., the degree to which fundamental policies of, for instance, property rights are subject to frequent changes). There are also a number of indices designed to measure the level of political instability in countries. The rule of law is a multidimensional concept, encompassing a variety of discrete components from security of person and property rights, to checks on government and control of corruption.

However, there are outliers, country like Norway has benefited from natural resource production economy. The income from oil industry has increased the welfare of Norwegians. They went from being a poor to a prosperous nation. Instead of scooping up profits and splurge on spending, they saved it up. They created a huge treasury for the entire country called sovereign wealth fund. It is now worth $1 trillion dollar. They created this fund with the idea that the major share of profit has to be to the citizens. They put social infrastructure in place to root out corruption. They don't dig more than 4% of the fund per year. It usually has a surplus and keeps growing for the future generation. They have national ethos of sharing the wealth. Some argue that it's a special case since they have a small population and large oil reserve. However, the forward thinking

plan has paid off better than other countries with similar natural abundance. The sovereign wealth fund has become so big that they can use money from it's yearly return to generate other things. The country also is actively moving towards renewable energy resources with huge state subsidies.

The Growth Effects of Natural Resources-1

	NR1	NR2	NR3	NR4
Corruption	# 0.8	# 0.95	# 0.93	# 0.93
Agriculture	3.35	2.37	0.87	2.49
Food	# -11.33	# -11.03	** -8.91	** -9.19
Fuel	3.51	-1.40	-1.23	-1.55
Ores	* -3.59	-2.81	-2.63	-3.14
Initial Income	#-2.16	#-2.02	# -2.22	# -2.1
Africa : Commodity Price Change	# -0.1	# -0.1	# -0.08	# -0.08
Trade Term	# 0.25	# 0.35	# 0.33	# 0.32
Investment / GDP	0.22	0.81	* 0.99	** 1.16
Openness Trade	1.02	* 1.05	* 1.05	** 1.09
Non-Africa : Commodity Price Change	-0.04	-0.04	-0.04	-0.03
Government Consumption			# -10.05	# -10.07
Fuels : Public Participation				-0.30
Ores : Public Participation				0.56
Constant	17.82	15.35	17.82	16.32
Adjusted R-Sq	0.67	0.59	0.65	0.65
No. Observations	72	72	72	72

1% significance level : #

5% significance level : **

10% significance level : *

A higher score on the corruption index indicates more corruption

NR1 : Fuel as independent variables.

NR2 & NR3 & NR4 : residuals from regressing each of the components of 'Natural Resources' on a set of geographical dummy variables (Africa, Mideast, Latin America, Other Non-Industrial and Industrial).

From running the regression on our data, we learned that Corruption for NR1, NR2, NR3 and NR4 are in all 1% significance level and their Adjusted R-Sq are in the range of 0.59 to 0.67. With negative coefficient on initial income, with the accordance to our model, long-term growth is negatively affected by level of corruption. And more resource dependencies lead to more corruption, which leads to negatively affecting long term growth.

Diversification from Natural Resources

For long-term economic growth, economic diversification is imperative to a country. However, many resource-rich countries fail to diversify beyond their natural resources income like mining, gas, oil etc. The countries that are heavily dependent on natural resources can face serious challenges in sustaining growth because of volatility in prices for those resources. Recently, swing in oil prices has created challenges for countries like Saudi Arabia, Russia and Venezuela who were heavily dependent on the income from oil. As we observed from our

analytical model, being rich in natural resources can hurt macroeconomic stability such as manufacturing sector.

While abundance of natural resources creates better conditions for diversification because of more wealth, such efforts encounter difficulties in resource-dependent countries. Country like Norway has created a Sovereign Wealth fund from their oil income to diversify from their resource income. It's a progress in right direction towards diversification, however, the country is still majorly reliant on the oil for it's income.

It is interesting to see countries like Saudi Arabia and Norway pursuing for renewable energy even though it cannibalizes their major source of income from oil. The bet might pay off as renewables are infinite and sustainable unlike oil which is finite. This is an act of diversifying their economy, which is like a hedge against the oil industry from potential loses that it might incur in the future.

Our Empirical Result showed that with abundance natural resources there is more corruption. Corruption had created income inequality and poor job creation in oil dependence countries in middle east, which caused widespread civil unrest as seen in the Arab Spring since early 2011. Diversification for resource-rich economies is inevitable to reduce risks associated with high dependence on commodity

export-growth models and to limit the impact of fluctuations of commodity prices on domestic economies.

In addition, many of the policy and institutional factors that enable countries to manage resource wealth well are equally important for their ability to diversify into other sectors. One important criterion is whether the country has the capacity to smooth out the high macroeconomic volatility that large export price swings can transmit to mono-exporters. If not, it will be far more difficult to sustain investment in the non-resource traded sectors, which will be destabilized by large swings in the real exchange rate. Cross-country studies also suggest that the impact of resources on growth is not homogeneous. It depends on whether the country is well-endowed with human capital and right "governance or institutional" as complementary to natural resources. Without these, the country is more likely to experience a "resource curse". There is also evidence that countries with lower levels of these complementary assets will find it more difficult to diversify and to advance up the export technology ladder. This suggests that in the long run countries need a balanced endowment of factors to grow. Resource wealth offers opportunities for countries to build human and institutional capital, but many lag badly in these areas. Resource wealth also offers countries a choice of whether to invest it in ways that decrease costs and increase productivity in the

non-resource traded sectors or to spend it in other ways that will lock in resource dependence.

CONCLUSION

Some countries with a strong resource base have managed to diversify their economies and exports, but many have not. Although there is evidence that diversifying economies can expect to do better over the long run, the urgency of the issue will vary across countries. The countries that are heavily dependent on natural resources can face serious challenges in sustaining growth because of volatility in prices for those resources. Having human capital and right "governance or institutional" can help countries from getting out of the "resource curse" of low growth rate in the long term. Lacking right "governance or institutional" will give rise to corruption. Natural-production driven economy will cause shrinkage in sectors that are not related to it. We observed from our analytical model, being rich in natural resources can hurt macroeconomic stability such as manufacturing sector. From our model and data, we saw that corruption and natural resources is significantly related to economic growth across countries. Natural resource abundance creates opportunities for pen-seeking behavior and is an important factor in determining a country's level of corruption.

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