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NATURAL RESOURCES, CONFLICT AND GROWTH NEXUS

Shahida Wizarat

Director Research, Chief Editor Pakistan Business Review & HOD Economics, Institute of Business Management (IOBM), Karachi, Pakistan.

ABSTRACT

Using panel data and GMM estimators we find that conflict and less developed countries (LDCs) natural resources have a positive and significant impact on GDP in the developed countries (DCs), while the lagged value of the conflict coefficient has a negative and significant impact on GDP in the LDCs for the period 1980-2006. In the conflict model using panel data GMM estimates on oil, gas and coal production in the LDCs have a profound impact on world conflict.

Keywords: GDP, Conflict, Resource abundance, Resource curse, Dutch disease.
JEL Classification: F 54, C 33, O 47, Q 34.

INTRODUCTION

There has been a tremendous increase in conflict during the last decade, with quite devastating affects especially in developing countries. How is this affecting the economies in the developed and the developing world? Is the impact of conflict differential across countries? How is conflict affecting growth and growth affecting conflict? Are natural resource abundant economies more or less prone to conflict? And how does natural resource abundance affect growth? Is there a 'resource curse'? If so, how can we explain it? Can we attribute it to the 'Dutch Disease', rent seeking, institutional underdevelopment or conflict? Or is it due to a combination of these factors?

The present study addresses some of these issues of grave importance to the world today. Following this brief introduction, we go on to review the literature related with natural resources, conflict and growth in Section 2. In the light of our findings and observations, we go on to formulate growth and conflict models in Section 3. Section 4 contains estimates obtained from computing these models, while the study is summarized and recommendations presented in Section 5.

LITERATURE SURVEY

The literature on resource abundance and growth attributes the lack luster performance of resource abundant economies to the resource curse. A vast body of this literature has attributed the dismal performance to the Dutch Disease. This may be via the slow saving and investment route, e.g. Sachs and Warner (1997), (Gylfason, 1999; Gylfason, 2001), Gylfason and Gylfi (2003), Barbier (2002), Auty (2007), etc. The Dutch Disease explanation, may alternatively, be through the exchange rate mechanism, as for example in Corden and Neary (1982), Bulte *et al.* (2005). Some studies have emphasized the negative impact emanating from rent seeking and poor governance, and include Auty (2001), Torvik (2002), Gylfason and Zoega (2006). While there is a whole body of literature that attributes the slow growth of resource abundant economies to the absence of rule of law, property rights on account of institutional decay, etc. Notable among these are Vijayaraghavan and Ward (2001),Murshed (2004), Bulte *et al.* (2005), (Mehlum *et al.*, 2005; Mehlum *et al.*, 2006a; Mehlum *et al.*, 2006b), (Olsson, 2005; Olsson, 2006), Arezki and Ploeg (2006). Conflict has also been found to be an important factor in resource abundant economies, as for example,Easterly and Ross (1997), (Collier and Hoeffler, 1998; Collier and Nicholas, 2002; Collier, 2003), Ross (2002), Mejia (2004), Humphreys (2005), Lindgren (2006).

But there is difference of opinion on whether the impact of conflict on growth is positive or negative. Although these are different explanations of the impact of natural resources on growth, there are spillovers and interactions between them. For example, rent seeking and poor governance is likely to prevail in societies where institutions have not been developed. Similarly, if institutions have not been developed, the occurrence of conflict is more imminent. And so on and so forth. Exploring the negative relationship between natural resource intensity and growth, Sachs and Warner (1997) state that high natural resource abundance resulting in rent-seeking, corruption and poor governance lowers growth rate directly, while reduction in investment demand reduces it indirectly. Moreover, they state, that resource wealth encourages developing countries to pursue protectionist policies in order to mitigate the impact of the Dutch Disease. This lowers investment and growth rates directly. Another hypothesis advanced by Sachs and Warner is that natural resource abundant countries have higher overall demand and higher relative prices of non-traded goods, which affects the relative prices of investment goods. Another hypothesis advanced by them is that resource abundance causes increase in aggregate demand, shifting labor from sectors where there is greater learning by doing, causing reduction in labor productivity growth.[1]

[1]Sachs and Warner 1999explore whether natural resource booms are beneficial as propounded by the Big Push theory. They state that natural resource booms result in slower growth rates by resorting to Hirschman's 1958 backward and forward linkages. As revenues from booms are mostly consumed rather than invested, they state that in Ecuador the resource boom had a positive impact on per capita income, while in Chile and Columbia there was no effect, whereas in Bolivia, Mexico, Peru and Venezuela the per capita income actually declined both before and after the boom.

Exploring the differential growth performance of resource abundant and scarce economies, Anderson (1998) compares world's fastest growing economies like Japan, Hong Kong, Singapore, Taiwan, South Korea and China. The author finds a negative and statistically significant relationship between GDP growth rates and natural resource endowments and attributes this to "riches leading to sloth." Like Sachs and Warner, Anderson attributes this to distortions and states that removal of these distortions as a result of change in policies, Australia and New Zealand moved from poorest-performing to best-performing countries. Gylfason (1999) explains the resource curse by resorting to the second variant of the Dutch Disease model. In a two-sector model with tradable and non-tradable goods, an appreciation of the domestic currency in real terms lowers the price of tradable output, reduces investment, learning and growth. The increased volatility of the real exchange rate also leads to similar results.

Stijns (2000) poses an important question, i.e. how were resource rich Britain, Germany and US able to use their natural resources to become world leaders in industrial production, while several resource abundant countries have slower rates of growth? He attributes this to a well defined property rights system, due to which a natural resource boom would not lead to a war of attrition. But due to lack of a well defined system, natural resource booms lead to rent seeking, income inequality, lack of consensus on economic policy formulation, etc. Empirical evidence for fuel and mineral reserves shows that natural resource abundance has not been an important determinant of growth. Stijns says that natural resources may affect growth both positively and negatively, but Dutch Disease symptoms are present in the case of oil, gas and land, while for coal the evidence is mixed. Invoking the developmental and predatory state models in the debate, Auty (2001) attributes the good performance of resource scarce countries to the competitive industrialization model, and resource-abundant countries' poor performance to their being predatory states. He says many resource-abundant countries grew very rapidly during the First Golden Age from 1870 to 1913 and the Second Golden Age from 1950 to1973. Using cross sectional data, Lederman and Maloney (2007) do not find support for a negative relationship between natural resource abundance and economic growth. Export concentration measured by the Herfindahl index and natural resource exports as a percentage of total exports has a negative impact on growth, which is extremely robust in cross sectional data, but not in panel data. Lederman and Maloney, therefore, refute the resource curse hypothesis.

Ortega and Gregorio (2007) comparing Scandinavian and Latin American economic developments find a positive effect of natural resource abundance on per capita income, and a less robust negative impact on the rate of growth. They state that the share of natural resources in GDP is positively correlated with income, but the share of natural resources in total exports is negatively correlated with growth rates. They state that the negative effect of natural resources on economic growth is offset by human capital, implying that natural resources have a negative effect in economies which do not invest in human capital. Pursuing the same theme, Maloney (2007) explored why natural

resource abundant countries such as Australia and Scandinavia developed, while Latin America lagged as it was unable to develop a technically qualified labor force like Spain and Portugal.

Citing the example of the US, a mineral abundant country that used its wealth to become the world leader in manufacturing, Wright and Jesse (2007) point out that the US economy used minerals to develop a resource based manufacturing. And with technological innovations as a result of advancements in science and technology, the US established industries based on these natural resources, such as petroleum products, steel, coal mining, rolling mills, meat and poultry, vegetable oils, grain mill and saw mill products, etc. The technology facilitated the discovery of new minerals, which led to the establishment of more industries. Similarly, Australia had huge gold, nickel, zinc and copper discoveries, which led to the establishment of mineral based industries like metal and steel, autos, industrial equipment, petroleum products, ships and chemicals in that country. The authors, therefore, conclude that a country that succeeds in developing its mineral base using technological advances would benefit from its mineral resources. The same is confirmed by Barbier (2002) who attributes the successful exploitation of abundant non-reproducible natural resources, mainly energy and mineral resources to the US economic performance during 1879–1940. But the same is not true for resource-abundant developing countries today. Gylfason and Zoega (2006) attribute the differential growth performance of resource-rich slow-growth economies and resource-poor high growth economies to saving and investment differentials. In economies where resources are wasted due to rent seeking, conflict and corruption, investment declines. They state that the adverse affect of natural resources on investment in human and social capital, affects investment in physical capital as well, due to complimentarity between education, institutional development and investment. Focusing on the transmission mechanism through which natural resource abundance negatively affects growth, Papyrakis and Reyer (2003) citing the British and German examples, where vast deposits of ore and coal played an important role in industrial revolutions in these countries, and the more recent example of Norway, shows that proper management of natural-resource abundance brought prosperity to these countries. They report a negative and highly significant relationship between economic growth and natural resources, i.e. a one percentage point increase in income from mineral resources, relative to total income, causes a decline in growth rate by 0.075% per year.[2]

Murshed (2004) states that point-source natural resources are more amenable to rent-seeking as compared with diffuse resources. Only six or seven point-source economies had average real per capita income growth rates higher than 2.5 per cent per annum between 1965 and 1999. These are Botswana, Chile, the Dominican Republic, Indonesia, Egypt and Tunisia. The impact of natural

[2] The same theme is pursued by Neumayer, E., 2004. who finds a positive link between growth on the one hand, and investment share and trade openness on the other.

resource endowment on economic performance is mainly determined by the type of natural resource endowment and institutional quality.[3]

Explaining the negative relationship between natural resource abundance and economic growth, Bulte *et al.* (2005) attribute it to the Dutch disease, rent seeking and institutional quality. In the Dutch disease explanation a resource boom causes a country's exchange rate to appreciate, due to which there is contraction in manufactured exports. The authors try to explore the impact of natural resources, through institutional quality, undernourishment, poverty, and other human development indicators. They state that human development is affected by institutional quality and income, both of which are affected by natural resource wealth. Bulte *et al.* (2005) report that point resources are associated with less democratic regimes and unproductive social institutions. Since these resources can be easily controlled by a small group, a highly skewed distribution of income is a consequence. Isham *et al.* (2005) show that countries exporting "point source" products have a double disadvantage. These countries are not only exposed to terms of trade shocks, but the institutional capability of responding to shocks is negatively related to export composition. Using two different sources of export data and classifications of export composition, they state that point source and coffee/cocoa exporting countries perform poorly in terms of governance indicators. On the other hand, countries exporting "diffuse" natural resource exports have enjoyed more robust growth. Arezki and Ploeg (2006) are among the very few that incorporate the impact of external factors, as they recognize that colonial empires robbed colonies of their natural resources and did not invest in institution building. They state that 'rapacious rent seeking' in a resource dependent country lowers per capita income. Their results confirm that institutions, openness and geography determine variations in income across countries and that resource curse is less severe for countries with good institutions.[4]

Pursuing the colonial argument further Travaglianti (2006) states that countries are amenable to political, economic and financial domination by their former colonial masters. He distinguishes between greed rebellion, which is on account of predation of rents from primary goods exports, and grievance rebellion which results from ethnicity or economic causes. Low institutional quality is central to the Travaglianti model, where natural resource abundance leads to negative economic growth as Dutch Disease occurs, crowding out manufacturing and service sectors. This results in loss of financial and human capital, causing income inequality to increase. And low levels of per capita income increases the risk of war, which has a negative impact on the economy, manufacturing and service sectors, causing decline in national and foreign investments. And low

[3] And if the effects of income and governance are taken into account, both point and diffuse resource abundance does not have a significant impact on development.

[4]The importance of institutions to the growth process is highlighted by Glyfason and Zoega 2006 who attribute poor institutions to be the major cause of low growth rates.

levels of development adversely impacts democracy, institutional quality, rent seeking and corruption. As a result of weak institutions, grievances are accumulated, giving rise to insurgencies. On the other hand, resources abundance along with strong institutions, leads to economic development and social change. The labor force is educated, democratic norms prevail, rule of law prevents rent seeking activities and grievances from accumulating, police and military are disciplined forces, institutions work within their defined spheres. In this scenario natural resources are not a curse, but a blessing.

Mehlum *et al.* (2006a) argue that resource-rich countries such as Nigeria, Zambia, Sierra Leone, Angola, Saudi Arabia and Venezuela have been growing slowly, while the resource-poor Asian Tigers i.e. Korea, Taiwan, Hong Kong and Singapore have been growing at spectacular rates, fuelling the suspicion that all resource rich countries are cursed. But high rates of growth have been witnessed for Botswana, Canada, Australia and Norway, which are rich in resources. Mehlum *et al.* (2006b) pose an interesting question: what would be the economic consequences of discovering natural resources in Afghanistan and Switzerland? Would the new wealth be a curse or a blessing in the two countries? Resource booms often become a curse rather than a blessing and give rise to lower growth rates, dysfunctional institutions and conflict. They conclude that being rich in natural resources often means being poor in material wealth i.e. the 'paradox of plenty'.

Olsson (2005) analysis is in the prey-predator model, where the link to output growth is through a citizen who produces an output whose production is hurt by the appropriative struggle. Olsson (2006) says that in Botswana and Namibia two factors are important: first, the strength of institutions of private property, and second, the nature of the extraction process. That is why African countries have a lower rate of GDP growth than the rest of the world. Olsson tried to explore the reasons for the negative relationship between diamond abundance and GDP growth rate and attribute this to the Dutch disease, i.e. the crowding-out of the manufacturing sector due to the inflow of resource rents. Using natural capital per capita in US $ as an indicator of resource abundance, Brunnschweiler (2007) challenged the resource curse hypothesis. Both OLS and 2SLS estimates reveal that mineral reserves had a positive impact on real GDP growth during 1970-2000, even when institutional quality is controlled. The author does not find that resource abundance has a negative impact on institutional quality through rent seeking and concludes that natural resource abundance is not a curse, but a boom.

Boschini *et al.* (2007) recognize that an important mechanism through which natural resources affect economic development is conflict and resources most prone to conflict are diamonds and oil. But they state that the appropriability effect of resources is more important than the conflict effect, and improvement in institutional quality can change the impact of resource abundance from being a curse to a blessing. Articulating the transmission mechanism between conflict and growth Mejia (2004) emphasizes the diversion of resources from productive to unproductive activities as pointed

out by Grossman and Kim (1995), the impact of conflict on investment in physical and human capital accumulation and the positive relationship between military expenditure and economic growth, via the impact of increase in productivity to infrastructure development, human capital formation and discipline.[5] The authors recognize that while there is consensus on the negative effect of conflict on economic growth, the channels through which conflict affects development are very diverse. Most researchers have attributed this to the diversion of resources to non-productive rent seeking activities; others emphasize the destruction of capital and wealth that comes with violent conflict. This gives rise to insecurity, rising interest rates, reduction in investment and crowding out resources on account of military expenditures. In their study of 54 large civil wars Collier (2003) states that the higher the share of primary commodity exports in GDP the higher the risk of conflict. Countries where the share of primary commodities in GDP is between 10 – 25 %, the risk of civil war increases by 11 – 29 % during the next five years, when other variables are held constant. And at high levels of per capita income, the risk of civil war is unlikely irrespective of the natural resource endowments of the country. Ross (2002) states that oil dependence is linked to conflict initiation rather than conflict duration, while gemstones, opium, coca and cannabis are not linked to conflict initiation, but to its duration. But agricultural commodities are neither linked to conflict initiation nor its duration. Humphreys (2005) breaks from past research on natural resources and conflict by articulating his "greedy outsiders mechanism".[6] He says instead of greed of rebels emphasized in the literature, natural resources are an incentive for third parties, i.e. corporations and states to bring about conflict. He gives the example of the escalation of civil war in the Democratic Republic of Congo as a result of the involvement of the latter's neighbors on account of their interest in the country's natural resources. Humphreys points out that the secessionist movement in Congo was supported by the Belgian firm Union Miner du Haut Katanga and escalated as a result of French oil corporation Elf.[7]

Koubi (2005) studied the consequences of inter and intra state wars for economic growth for a cross-section of countries for the period 1960-89. The study showed that cross-country differences

[5] Others argue that there is an inverse relationship between defense spending and growth and as pointed out by Deger, S. and S. Sen, 1983.

[6] The few studies that have recognized the impact of the external factor in exacerbating the resource curse impact in resource abundant countries includes Arezki and Ploeg 2006 discussed earlier.

[7] Another interesting theory propounded by him is the "domestic conflict premium mechanism" according to which groups that benefit from conflict prefer to continue fighting rather than winning, i.e. spoilers to peace. The "weak state mechanism" is another interesting concept articulated in the paper. According to Humphreys, states that are dependent on natural resources rather than taxation have weak state structures and are unable to withstand threats. Humphreys finds that natural resources affect conflict through its impact on state capacity, i.e. loot-able resources lead to conflict, with the impact determined by state strength. Countries dependent on agricultural commodities are at risk irrespective of their oil and diamond endowments. He also finds strong evidence to support the weak state structure rather than state capture hypothesis.

in economic growth are systematically related to the severity and duration of war. The author reports that countries engaged in severe and prolonged war performed poorly, but the effect of war through postwar economic reconstruction has a positive impact on account of growth-enhancing post war reconstruction. The study shows that an increase in war duration by 10% causes the average growth rate to increase by 2.1%.[8]

Limitations of Current Research

Causes of slow growth of resource abundant economies are generally stated to be internal rather than external. Although colonial powers have looted and plundered natural resources that belonged to Latin America, Asia, Africa, etc, and continue to do so today, the impact of the external factor on the growth rate of resource abundant countries has not received the attention that it deserves. Arezki and Ploeg (2006), Humphreys (2005), Koubi (2005) and (Travaglianti, 2006) are among the few that have taken cognizance of the external factor in explaining the phenomenon.

The literature review reveals that developed countries (DCs) such as USA, UK, Canada, Norway, Australia, etc, have benefitted from their natural resource wealth, while most of the less developed countries (LDCs) have not benefitted from their natural resource wealth. But no studies have tried to go far enough to quantify the benefits the rich countries derive from the natural resource wealth of the poor, which has continued as a colonial legacy decades after colonial rule came to an end.

And finally, many studies have shown that natural resources are a blessing for countries that have developed their institutions. While institutions are certainly very important for economic development, they might be acting as a proxy for some other variable, such as military might. Since the same countries that have well developed institutions also have brute force and military strength. Institutions might, therefore, be acting as a proxy for military might. Similarly, in Collier (2003) where the share of primary commodity exports in GDP increases the risk of conflict and higher level of per capita income reduces the onset of conflict, both the variables might be acting as proxies for other variables. For example, higher share of primary commodity exports in GDP might be acting as a proxy for military weakness and higher per capita income level might be acting as a proxy for military strength.

MODEL SPECIFICATION

Growth Model Formulation

Although growth dynamics are very different in the DCs as compared with the LDCs, no attempt has been made in the past to estimate separate growth models for the two groups. Many variables would affect GDP differently in the DCs as compared with the LDCs. For example, most of the

[8] This is in conformity with Organski, A.F.K. and J. Kugler, 1977.

Dutch Disease literature attributes the low growth rates of resource abundant countries to the "resource curse". While resource rich countries such as USA, Australia, Norway, UK, Holland, etc have been found to be benefitting from their resources. Similarly, conflict can have a destabilizing effect on growth in the LDCs on account of death, destruction, loss of infrastructure, uncertainty, etc. While most of the conflicts do not take place on DC soil and their work force and infrastructure are not affected as a result of conflict. Moreover, world conflicts increase the demand for arms and since arms are a permanent and large component of the domestic economy (Kidron, 1967) in the DCs, increase in conflict results in increasing arms exports from the DCs leading to increase in their GDPs. In view of these differential impacts emanating from many of our explanatory variables on the dependant variable, we have decided to estimate the models separately for the DCs and the LDCs. The list of countries in the two groups appearin Appendices 1A and B.

In the production function depicted in equation (1) the dependent variable Y is Gross Domestic Product in constant US $ in the year 2000. We have the usual explanatory variables like labor and capital in the equation. Labor is in terms of human resource development measured by the percentage of secondary school enrolment in total enrolment and is denoted by H. Capital is gross fixed capital formation in constant dollars in the year 2000 and is depicted by K. The impact of government expenditure on growth is measured by the percentage of final government consumption as a percentage of GDP and is denoted by EX. It is measured in constant US$ in 2000. We expect the coefficient on EX to be positive. Trade openness is measured in the usual way, i.e. exports + imports as a percentage of GDP. Natural resources depicted by F in equation 1 refer to the production of oil, gas and coal, where coal and oil production in is in million tons, taken from BP Statistical Review of World Energy 2009, while gas production given in the World Development Indicators (WDI) in billion cubic meters was converted into million cubic meters. Data on ore and metal exports from individual LDCs were obtained from the WDI. Data for the growth models have been taken from World Development Indicator (WDI) CD ROM 2009. The "new wrinkle" we have added to the study is the incorporation of conflict as an explanatory variable in a production function framework. We expect conflict to have a positive impact on growth in the DCs via the industrial military complex and a negative impact on growth in the LDCs on account of death, destruction of infrastructure, instability, etc in the LDCs. Conflict is in terms of world deaths in conflicts and has been taken from Leitenberg (2006).

Incorporating these variables, we write equation (1) as follows:

$$Y_{it} = \alpha_{ot} + \alpha_1 H_{it} + \alpha_2 K_{it} + \alpha_3 EX_{it} + \alpha_4 T_{it} + \alpha_5 WD + \alpha_6 F_{it} + \mu_{it} \text{-------- (1)}$$

where

Y = Gross Domestic Product (GDP)

H = Human resources

K = Gross fixed capital formation.

EX =Final government consumption / GDP)*100.

T = Trade Openness i.e. (Exports + Imports / GDP) * 100
WD = Conflict measured by world deaths in conflicts
F = Production of oil, gas and coal.
μ it = error term

Writing the equation in estimable form gives equation (2)

$$L(Yit) = \alpha ot + \alpha 1\, L(H it) + \alpha 2\, L(Kit) + \alpha 3\, L(EX it) + \alpha 4\, L(Tit) + \alpha 5\, L(WD) + \alpha 6\, L(F it) + \mu it \quad \text{---------- (2)}$$

Where L refers to natural logs.

Using a two year lag for the fuel variable we replace F by {F (t-2)}, i.e. DC natural resources lagged by two years and added {F LDC (-2)}, i.e. oil, gas and coal in LDCs lagged by two years to get equation (3).

$$L(Yit) = \alpha ot + \alpha 1\, L(H it) + \alpha 2\, L(Kit) + \alpha 3\, L(EX it) + \alpha 4\, L(Tit) + \alpha 5\, L(WD) + \alpha 6\, L\{F\, i\,(t-2)\} + \alpha 6\, L\{F\, LDC\,(-2)\} + \mu it \quad \text{---------- (3)}$$

Adding one year lagged GDP i.e. {Yi (t-1)} and two year lagged conflict, i.e. {WD (t-2)} to equation (3) we get equation (4)

$$L(Yit) = \alpha ot + \alpha 1\, L\{Yi\,(t-1)\} + \alpha 2\, L(H it) + \alpha 3\, L(Kit) + \alpha 4\, L(EX it) + \alpha 5\, L(Tit) + + \alpha 6\, L\{F\}\, i\,(t-2)\} + \alpha 7\, L(WD) + \alpha 8\, L\{WD\,(t-2)\} + \mu it \quad \text{---------- (4)}$$

All other variables are as listed above.

Equations (2) and (3) have been used to estimate the models for the DCs, while equation (4) is beingused to estimate the model for the LDCs for the period 1980- 2006.

Conflict Model Formulation

The dependent variable in the conflict model measured by world deaths due to conflicts depicted by WD has been computed from deaths in individual countries taken from Leitenberg (2006). We have incorporated LDC natural resources as a separate independent variable in the conflict model. Fuel production in LDCs and ore and mineral exports from LDCs represented by F (LDC) and OM (LDC) respectively incorporate the impact of fuel, ores and minerals in poor countries as a factor instigating world conflict. Where fuel includes oil, gas, and coal production in million tons in LDCs taken from BP Statistical Review of World Energy 2009. Data on ore and metal exports from individual LDCs taken from the WDI have been aggregated together and used as a variable to explore the impact of ores and metals in promoting world conflict. In order to quantify the impact of the industrial military complex in increasing conflict, we are using armament exports by the DCs as an explanatory variable. The armament variable is in terms of export of arms from the DCs in constant 1990 prices and is taken from the WDIs.

Our conflict model is as depicted in equation (5):

$$WD = \beta o + \beta 1\ F(LDC) + \beta 2\ OM\ (LDC) + +\beta 3 GDP\ (DC) + \beta 4\ GDP\ DC\ (-1) + \beta 5\ ARM\ (DC) \quad \text{---------- (5)}$$

where

WD = world deaths in conflicts

F (LDC) = oil + gas + coal production in LDCs.

OM (LDC) = Ores + metal exports from LDCs.

GDP (DC) = GDP in the DCs.

GDP {DC (-1)} = GDP in DCs lagged by one year

ARM (DC) = Arms exports by DCs

Writing Eq. 5 in estimable form gives:

$$L\ (WD) = \beta o + \beta 1 L\{F\ (LDC)\} + \beta 2\ L\{M(\ LDC)\} + \beta 3\ L\{GDP(DC)\} + \beta 4\ L\{GDP\ DC\ (-1)\} + \beta 5\ Ln\ \{ARM\ (DC)\} \quad \text{---------- (6)}$$

EMPIRICAL FINDINGS

Growth Model Panel Data GMM Estimates

Having specified the model and data sources in the previous section we opted for the Generalized Method of Moments (GMM) option in Eviews 6 and 7[9] as OLS estimates are inappropriate in the presence of endogeneity.[10] Since we are using the panel data techniques, the non-stationarity of the variables is not a problem as pointed out by Garcia and Peron (1996) and the prior application of the unit root test is not necessary.

We are using panel data for 97 countries listed in Appendices 1A and B for the period 1980-2006. Panel data GMM estimates for the growth model for the DCs and the LDCs estimated by the use of Eq. 2, 3 and 4 for the period 1980-2006 are contained in Tables 1 to 3. Table 1 contains panel data GMM estimates for the period 1980-2006 for the DCs, where as expected, both physical capital and human capital's contribution to GDP is positive and significant. Notice the large magnitude of the coefficients, which are highly significant. Government expenditure and trade openness are also impacting positively and significantly on GDP. Natural resources include oil, gas and coal, which have a positive impact which is significant at the one percent level. The positive and highly significant contribution of the conflict coefficient, measured by world deathsin increasing GDP in

[9]Pedroni test for co integration can be applied by using Eviews 6 and 7, but the software does not have the Fully Modified Ordinary Least Squares. We will, therefore, confine ourselves to estimating the equation by the use of GMM.

[10] These are discussed in detail in Blundell, R.W. and R.J. Smith, 1991. , Blundell, R.W. and S.R. Bond, 1998., Blundell, R.W. and S.R. Bond, 2000. , Bond, S.R., 2002. etc.

the rich countries is a finding of great importance. It confirms the Marxist view that death and destruction in poor countries brings prosperity to the rich countries. The R-square is also very high, reflecting that physical capital, human capital, natural capital, government expenditure, trade openness and conflicts are able to explain 99 percent of the variations in GDP in the rich countries. Estimates derived by estimating equation 3 i.e. adding LDC fuel variable to the model and changing the specification of the natural resource variable by using a two year lag (Table 2) increases the size of the coefficient at the expense of a slight decline in its significance, which however is still significant at the 6 percent level. Notice the very large magnitude of the coefficient on LDC fuel, which is significant at the one percent level. All other coefficients maintain their positive and significant contribution to the dependant variable. Panel data GMM estimates for the LDCs were obtained by the use of equation 4 in which natural resources have been replaced by the same variable lagged by two years, world death lagged by two years and GDP lagged by one year. These estimates are contained in Table 3. It is interesting to note that lagged GDP has a large coefficient which is significant at the 100 percent confidence level. Physical capital, human capital and government expenditure have positive and significant impacts on GDP in the LDCs. The somewhat surprising result is the positive and significant impact of openness on GDP in the LDCs, which may be due to the inclusion of China in the group. It is interesting to note that while conflict has a positive impact on output in the DCs; it has a negative impact in the LDCs, which becomes significant when lagged by two years. This means that conflict resulting in deaths, destruction of infrastructure, causing instability and uncertainty causes decline in investments and output after two years in the LDCs. The negative coefficient on the natural resource variable is insignificant. Our finding, therefore, does not lend support to the resource curse phenomenon in resource abundant countries discussed in detail in Section 2.

Conflict Model GMM Estimates

For the conflict model panel data GMM estimates obtained by estimating equation 6 are contained in Table 4. We find that oil, gas and coal production in the LDCs has a profound impact on world conflict as revealed by the large coefficient on this variable, which is statistically significant at the one percent level. The finding vindicates the view that the tremendous escalation in conflict the world over is inspired by the greed of the rich to acquire the oil, gas and coal reserves of the less developed countries. Ores and metals in the LDCs are also fuelling global conflict as revealed by the large coefficient, which is significant at the 6 percent level. The contribution of the industrial military complex in fuelling world conflict comes out very forcefully by the very large coefficient on arms export by DCs, which is highly significant. The same is corroborated by the lagged coefficient on DC GDP which is highly significant.

Our finding that natural resources are not a curse corroborate the findings of Lederman and Maloney (2007), Arezki and Ploeg (2006) and Brunnschweiler (2007). We find that the transmission mechanism of resource abundance on output is through conflict. It is only when high

performing countries are engaged in conflict that their performance nose dives. These findings lend support to Gylfason and Zoega (2006) who state that Botswana had remarkable growth performance due to the absence of conflict and Sierra Leone remained poor as it remained bogged down with conflict. Our stance that the transmission mechanism is via conflict supports Arezki and Ploeg (2006), Boschini *et al.* (2007), Mejia (2004), Koubi (2005) and (Collier and Hoeffler, 1998) stances that increase in defense capabilities of a country reduces conflict. Our finding that the rich countries lust and greed to acquire poor countries natural resources give rise to conflict lends support to Humphreys (2005) "greedy outsiders' mechanism" in instigating conflict.

SUMMARY AND CONCLUSION

In the existing literature, barring a few exceptions, the impact of the external factor in explaining the growth phenomenon is almost non-existent. Slow growth of resource abundant LDCs has been attributed to internal factors only. The transfer of wealth from Latin America, Asia, Africa, the Caribbean, etc, does not feature much in the literature. While the positive contribution of natural resource wealth on growth in the USA, UK, Canada, Norway and Australia has been recognized. There is also recognition of the fact that many countries that belong to the Less Developed Countries (LDC) category have not benefitted from their natural resource wealth, but there is no recognition of the benefits the DCs have enjoyed from the natural resource wealth of the LDCs, as happened not only during colonial rule, but continues today. This study has tried to quantify the benefits the DCs are enjoying from the natural resource wealth of the LDCs. Although the growth dynamics are very different in the DCs as compared with the LDCs, previous research did not estimate separate models for the two groups. Many variables would affect growth differently in the DCs as compared with the LDCs. Conflict, for example, can have a destabilizing effect on growth in the LDCs on account of death, destruction, loss of infrastructure, uncertainty, etc. Whereas, most of the conflicts do not take place on DC soils and do not affect their work force and infrastructure. On the other hand, conflicts increase the demand for arms manufactured mostly in the DCs, which increases their exports, expanding the level and growth rate of their GDP. In view of the differential impacts of many of the explanatory variables on the dependant variable, we have estimated these models separately for the DCs and the LDCs using panel data for 97 countries for the period 1980-2006. Due to the use of panel data techniques, the non-stationarity of the variables is not a problem. And the Generalized Method of Moments (GMM) option in Eviews 6 and 7 enabled us to overcome the problem of endogeneity.

In the panel data GMM estimates for the DCs for the period 1980-2006, physical capital, human capital, government expenditure, trade openness and natural resources have a positive and significant impact on output. The positive and highly significant contribution of conflict, measured by world deaths in increasing GDP in the rich countries confirms the Marxist view that death and destruction in the poor countries brings prosperity to the rich countries. The high value of the R-

square reflects that physical capital, human capital, natural capital, government expenditure, trade openness and conflict explain 99 percent of the variation in rich countries GDP. When LDC fuel variable is added to the model and the specification of the natural resource variable is changed by using a two year lag, there is increase in the size of the coefficient at the expense of a slight decline in significance, which is still significant at the 6 percent level. While the magnitude of the coefficient on LDC fuel is very large and significant at the one percent level. In the panel data GMM estimates for the LDC model lagged GDP has a large coefficient which is significant at the 100 percent confidence level. Physical capital, human capital and government expenditure also have a positive and significant impact on LDC GDP. And while conflict has a positive impact on GDP in the DCs as observed earlier, it has a negative impact in the LDCs, which becomes significant when lagged by two years, reflecting that conflict resulting in death, destruction of infrastructure, causing instability and uncertainty causes decline in investment and output in the LDCs after two years.

In the panel data conflict model GMM estimates on oil, gas and coal production in the LDCs have a profound impact on world conflict as revealed by the large coefficient on this variable, which is statistically significant at the one percent level. Our results show that escalation in conflict at the global level is inspired by the lust of the rich to acquire the oil, gas and coal reserves of poor countries. Ores and metals in the LDCs are also fuelling global conflict, as revealed by its large coefficient, which is significant at the 6 percent level. The contribution of the industrial military complex in fuelling world conflict comes out very forcefully by the very large and highly significant coefficient on DC arms export. The lagged coefficient on DC GDP which is highly significant, shows that increase in DC GDP resulting in increased supply of armaments increases conflict in the following year.

REFERENCES

Anderson, K., 1998. Are resource abundant economies disadvantaged? The Australian Journal of Agricultural and Resourse Economics, 42(1): 1-23.

Arezki, R. and F.v.d. Ploeg, 2006. Can the natural resource curse be turned into a blessing? Role of Trade Polices and Institutions.

Auty, R.M., 2001. The political economy of resource driven growth. European Economic review, 45(4/6): 839-846.

Auty, R.M., 2007. Natural resource, capital accumulation and the resource curse. Ecological Economics, 61(4): 627-634.

Barbier, E.B., 2002. The role of natural resources in economic development. Australian Economic Papers, 42(2): 253-227.

Blundell, R.W. and S.R. Bond, 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1): 115-143.

Blundell, R.W. and S.R. Bond, 2000. Gmm estimation with persistent panel data: An application to production functions. Econometric Reviews, 19(3): 321-340.

Blundell, R.W. and R.J. Smith, 1991. Initial conditions and efficient estimation in dynamic panel data models. Journal of Econometrics, 87(1): 115-143.

Bond, S.R., 2002. Dynamic panel data models: A guide to micro data methods and practice. Portuguese Economic Journal, 1(2): 141-162.

Boschini, A.D., Jan Patterson and R. Jasper, 2007. Resource curse or not: A question of appropriability. Scandinavian Journal of Economics, 109(3): 593-617.

Brunnschweiler, C.N., 2007. Cursing the blessing? Natural resource abundance. Institutions and Economic Growth, World Development, 36(3): 399-419.

Bulte, E.H., D. Richard and D. Robert, 2005. Resource intensity, institutions and development. World Development, 33(7): 1029-1044.

Collier, P., 2003. National resources, development and conflict: Channels of causation and policy interventions. Oxford University and World Bank.

Collier, P. and A. Hoeffler, 1998. On economic causes of civil war. Oxford Economic Papers.

Collier, P. and S. Nicholas, 2002. Understanding civil war: A new agenda. Journal of Conflict Resolution, 46(1): 3-12.

Corden, W.M. and J.P. Neary, 1982. Booming sector and de-industrialization in a small open economy. Austria: International Institute for Applied Systems Analysis.

Deger, S. and S. Sen, 1983. Military expenditure, spin-off and economic development. Journal of Development Economics, 13(1/2): 67-83.

Easterly, W. and L. Ross, 1997. Africa's growth tragedy: Policies and ethnic divisions. Quarterly Journal of Economics, 112(4): 1203-1250.

Garcia, R. and P. Peron, 1996. An analysis of the real interest rate under regime shifts. Review of Economics and Statistics, 78(1): 111-125.

Grossman, H.I. and M. Kim, 1995. Swords or plowshares? A theory of the security of claims to property. Journal of Political Economy, 103(6): 1275-1288.

Gylfason, T., 1999. Natural resources and economic growth: A nordic perspective on the dutch disease

Gylfason, T., 2001. Lessons from the dutch disease: Causes, treatment, and cures, statoil-econ conference volume.

Gylfason, T. and Z. Gylfi, 2003. Inequality and economic growth: Do natural resources matter? Inequality and Growth: Theory and Policy Implications (MIT Press, Cambridge, MA).

Gylfason, T. and G. Zoega, 2006. Natural resources and economic growth: The role of investment. The World Economy, Blackwell Publishing, Oxford.

Humphreys, M., 2005. Natural resources, conflict and conflict resolution. Journal of Conflict Resolution, 49(4): 508-537.

Isham, Jonathan, W. Michael, P. Lant and B. Gwen, 2005. The varieties of resource experience: Natural resource export structures and the political economy of economic growth. The World Bank Economic Review, 19(2): 141-174.

Kidron, M., 1967. A permanent arms economy. International Socialism (1st series), No 28, Spring 1967.

Koubi, V., 2005. War and economic performance. Journal of Peace Research, 42(1): 67-82.

Lederman, D. and W. Maloney, F., 2007. Natural resources neither curse nor destiny. Stanford University Press and the World Bank.

Leitenberg, M., 2006. Deaths in wars and conflicts in the 20th century 3rd Edn: Cornell University Peace Studies Program me, Occasional Paper no 29.

Lindgren, G., 2006. Studies in conflict economies and economic growth, report no. 72, department of peace and conflict research. Uppsala University, Uppsala.

Maloney, W.F., 2007. Missed opportunities: Innovation and resource-based growth in latin america", natural resources neither curse nor destiny. The World Bank and Stanford University Press.

Mehlum, H., M. Karl and T. Ragnar, 2005. Institutions and the resource curse.

Mehlum, H., M. Karl and T. Ragnar, 2006a. Cursed by resources or institutions? The World Economy, Blackwell Publishing, Oxford.

Mehlum, H., M. Karl and T. Ragnar, 2006b. Institutions and the resource curse. The Economic Journal, 116(508): 1-20.

Mejia, D., 2004. Conflict & economic growth. A Survey of the Theoretical Links, Internet, November.

Murshed, S.M., 2004. When does natural resource abundance lead to a resource curse? Discussion Paper 04-01, March.

Neumayer, E., 2004. Does the "resource curse" hold for growth in genuine income as well? . World Development, 32(10): 1627-1640.

Olsson, O., 2005. Conflict diamonds. Journal of Development Economics, 82(2): 267-286.

Olsson, O., 2006. Diamonds are a rebel's best friend. The World economy, Blackwell Publishing, Oxford, MA.

Organski, A.F.K. and J. Kugler, 1977. The costs of major wars: The phoenix factor. American Political Science Review, 71(4): 1347-1366.

Ortega, C.B. and J. Gregorio, de, 2007. The relative richness of the poor? Natural resources, human capital, and economic growth in natural resources neither curse nor destiny. The World Bank and Stanford University Press.

Papyrakis, E. and G. Reyer, 2003. Natural resources: A blessing or a curse, internet.

Ross, M., 2002. What do we know about natural resources and civil war? Journal of Peace Research, 41(3): 337-356.

Sachs, J.D. and A. Warner, M. Warner 1997. National resource abundance and economic growth, centre for international development, harvard institute of international development. Harvard University, Cambridge.

Stijns, J.P.C., 2000. National resource abundance and economic growth revisited. Department of Economics, University of California at Berkeley, November.

Torvik, R., 2002. Natural resources, rent seeking and welfare. Journal of Development Economics, 67(2): 455-470.

Travaglianti, M., 2006. The role of the state in the natural resources and civil war paradigm. Jean Monnet Centre Euro Med, Department of Political Studies, University of Catania, October.

Vijayaraghavan, M. and W. Ward, 2001. Institutions and economic growth. Empirical Evidence for a Cross-National Analysis, Working Papers 112952.

Wright, G. and C. Jesse, 2007. Resource-based growth: Past and present. Natural Resources Neither Curse nor Destiny: Stanford University Press and World Bank Publication.

Table-1. Panel Data GMM Estimates for the DCs (1980-2006)

(Eq. 2 estimates) Dependent Variable: Y = GDP

Method: Panel Generalized Method of Moments

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Constant	13.64202	0.149030	91.53867	0.0000
Human Resources	0.124338	0.010200	12.18993	0.0000
Capital	0.881604	0.009894	89.10042	0.0000
GOVT Expenditure	0.247201	0.023338	10.59205	0.0000
Trade openness	0.041002	0.014323	2.862730	0.0044
World Death	0.016005	0.005715	2.800546	0.0053
Oil +Gas+Coal	0.014431	0.006026	2.394976	0.0170
R-squared		0.993091		

Table -2. Panel Data GMM Estimates for DCs (1980-2006)

(Eq. 3 estimates with LDC Fuel Variable)

Dependent Variable: Y = GDP

Method: Panel Generalized Method of Moments

Variable	*Coefficient*	*t-Statistic*	*Prob.*
Human Resources	0.061034	2.523217	0.0120
Capital	0.807631	22.96231	0.0000
Oil+Coal+Gas(-2)	0.046266	1.880264	0.0607
World Death	0.015151	2.696610	0.0073
Govt Exp	0.242591	10.24390	0.0000
Openness	0.033758	2.158722	0.0314
LDC (Oil+Coal+Gas)(-1)	0.663579	2.482079	0.0134
Constant	9.931002	6.606081	0.0000
R-squared	0.993632	Mean dependent var	26.22131
Adjusted R-squared	0.993508	S.D. dependent var	1.488312
S.E. of regression	0.119914	Sum squared resid	6.686395
Durbin-Watson stat	0.153489	J-statistic	35.64553
Instrument rank	12.00000		

Table-3. Panel Data GMM Estimates for the LDCs* (1980-2006) (Eq. 4 Estimates)

Dependent Variable: Y = GDP

Method: Panel Generalized Method of Moments

Variable	**Coefficient**	**t-Statistic**	**Prob.**
Constant	0.98	2.28	0.0226
GDP(-1)	0.86	87.23	0.0000
GOVT Expenditure	0.16	3.42	0.0007
Openness	0.09	3.08	0.0022
Human Resources	0.07	6.23	0.0000
Capital	0.06	5.15	0.0000
Oil + Gas + Coal (t -2)	-0.007	-0.22	0.03
World Death	-0.03	-0.83	0.4061
World Death (t-2)	-0.017985	-1.75	0.0823

R-squared	0.93
Adjusted R-squared	0.92
Durbin-Watson stat	2.01

Table-4. Conflict Model GMM Estimates

(Equation 6 Estimates)
Dependent Variable: WD
Method: Generalized Method of Moments

Variable	**Coefficient**	t-Statistic	**Prob.**
Oil + Gas + Coal (LDC)	1.418989	2.636866	0.0163
Ores & Metals (LDC)	1.258376	2.202772	0.0402
GDP (DC)	0.086714	0.920089	0.3691
GDP (DC) (-1)	0.137572	2.293814	0.0334
ARM EXP (DC)	3.634746	4.942373	0.0001
Constant	-91.43165	-3.957614	0.0008
R-squared	0.657544	Mean dependent var	13.05603
Adjusted R-squared	0.549401	S.D. dependent var	0.915692
S.E. of regression	0.614674	Sum squared resid	7.178658

Appendix-1. A

List of DCs for Growth and Conflict Models Estimation

1	Australia
2	Austria
3	Belgium
4	Canada
5	Denmark
6	Finland
7	France
8	Germany
9	Hungary
10	Iceland
11	Ireland
12	Italy
13	Japan
14	New Zealand
15	Norway
16	Spain
17	Sweden
18	Switzerland
19	United Kingdom
20	United States

Appendix-1. B

List of LDCs for Growth and Conflict Models Estimation

1	Algeria	32	Guatemala	63	South Africa
2	Antigua and Barbuda	33	Guinea-Bissau	64	Sri Lanka
3	Argentina	34	Guyana	65	St. Vincent and the Grenadines
4	Azerbaijan	35	Honduras	66	Sudan
5	Bangladesh	36	Hong Kong, China	67	Swaziland
6	Belize	37	India	68	Syrian Arab Republic
7	Benin	38	Indonesia	69	Thailand
8	Bolivia	39	Jordan	70	Togo
9	Bosnia and Herzegovina	40	Kenya	71	Trinidad and Tobago
10	Botswana	41	Korea, Rep.	72	Tunisia
11	Brazil	42	Lesotho	73	Uruguay
12	Bulgaria	43	Luxembourg	74	Venezuela, RB
13	Burkina Faso	44	Madagascar	75	Zambia
14	Cameroon	45	Malawi	76	Zimbabwe
15	Chad	46	Malaysia	77	Russian Federation
16	Chile	47	Mali		
17	China	48	Mauritania		
18	Colombia	49	Mauritius		
19	Comoros	50	Mexico		
20	Congo, Dem. Rep.	51	Morocco		
21	Costa Rica	52	Mozambique		
22	Cote d'Ivoire	53	Namibia		
23	Dominican Republic	54	Nicaragua		
24	Ecuador	55	Nigeria		
25	Egypt, Arab Rep.	56	Pakistan		
26	El Salvador	57	Panama		
27	Ethiopia	58	Paraguay		
28	Gabon	59	Peru		
29	Gambia,	60	Philippines		
30	Ghana	61	Rwanda		
31	Greece	62	Senegal		