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Natural resources endowment and economic growth: The West African Experience

Mohamed Jalloh [a*]

[a] Economic Policy Analysis Unit (EPAU) Macroeconomic Policy Department ECOWAS Commission, River Plaza Central Area , Abuja Nigeria

[*] Corresponding author : medjal99@yahoo.com

Abstract

This study aims at investigating the nexus between natural resource endowment and economic growth using a sample of West African countries. The study adopted a Barrow-type growth model to analyse the impact of natural resource wealth on economic growth. A dynamic panel estimation technique was employed using relevant data from West African Countries. The results from the panel regressions indicate that natural resource endowments have very minimal impact in terms of promoting economic growth in West Africa, more so in resource rich countries. In terms of relative effects, the results indicate that a 10% increase in natural resource export reduces growth in income per capita by approximately 0.4%. Part of the factors explaining this finding amongst others; include high corruption in the public sector as well as the frequency of civil conflicts in resource rich economies of West Africa. For the natural resources of the region to fully benefit its citizens, these countries require , urgently, to improve management of natural resource export revenues and to apply effective policy measures to eradicate/ mitigate incidences of rampant corruption in the public sector.

Introduction

The continent of Africa has being noted for having considerable amount of natural resources endowment. According to the United Nations Economic Commission for Africa (UNECA), the continent of Africa is known to have more than 40 percent of the world's reserves of Platinum Group Minerals (PGMs), phosphate, gold, cobalt, vanadium, vermiculite, chromite, manganese, and diamonds. The continent has also been ranked first in the production of platinum, gold, chromite, vanadium, cobalt, and diamonds. Africa's importance as a source of oil, gas and other energy resources is increasing. In 2006, gas and oil reserves alone stood at about 7.9% and 8.6% of the world's total production. It is also noted that Africa produces about 16 % of the world's uranium. Coal resources are concentrated in Southern Africa, with South Africa accounting for five percent of proven world coal resources and 98 percent of Africa's output.

Despite the abundance of natural resources in Africa, its distribution is not even across countries. While some countries are richly endowed with a wide range of natural resources, others barely have them. In West Africa, there is evidence of uneven distribution of natural resources member countries of the Economic Community of West African States (ECOWAS). Even prior to their attainment of independence, a good number of West African states are endowed

with one or other forms of mineral resources ranging from diamond, gold, iron ore, crude oil, aluminum, uranium, bauxite , manganese, tine and columbite. While Sierra Leone, Liberia and Cote d'Ivoire are known for being rich in diamond, Ghana and Nigeria are well known for Gold and Crude oil respectively. Bauxite and iron ore are also contributing significantly in countries like Guinea, Guinea Bissau, Sierra Leone and Liberia. Other West African countries including Senegal, Mali, Guinea Bissau and Togo are rich in phosphate. Apart from Nigeria that has produce crude oil since the 1960s, its discovery in West Africa is of recent development, with Ghana, Cote d'Ivoire, Liberia and Sierra Leone recently emerging as oil rich economies.

The question as to whether the discovery of natural resources has translated into improving the well-being of citizens of those countries or not has provoked a series of debates amongst economists over the last two decades. A good number of authors believed that the discovery of natural resources and the subsequent revenue generated thereof helped countries to address key socioeconomic concerns such as poverty, health, infrastructure, education and unemployment .Quite recently, however, proponents of the resource curse literature have linked the endowment of natural resources to a series of negative outcome like economic decline, corruption and autocratic rule (McNeish 2010). A number of studies, including Fearon and Laitin (2003), Humphreys (2005), and Ross (2006) have found a positive correlation between natural resources endowment and the onset of civil conflicts, particularly for oil and diamond rich economies. These findings has turned the optimistic notion on natural resource discovery into a more pessimistic one that saw the discovery of natural resources as more of a curse than a blessing for those economies in question. The so called resource curse argument which has been widely discussed in the economic literature hinges on the idea that natural resource abundance has the likelihood to impact negatively on economic growth rates (Gelb, 1988; Maloney, 2002; Ross 1999, 2001 , Auty, 1993; Sachs and Warner, 1995, 2001, Busby et al., 2004) . A common point of view is that the discovery of Natural resources have played a key role in the conflicts that have plagued a number of African countries over the last decade, both motivating and fuelling armed conflicts. It is also the case that revenues generated from the exploitation of natural resources are not only used for sustaining armies but also for personal enrichment and building political empires.

Statement of the research problem

Proponents of the resource curse literature have made the point that the possession of oil, natural gas, or other valuable mineral deposits or natural resources does not necessarily confer economic growth. A typical case in point is that, many African countries such as Angola, Sierra Leone, Nigeria, Sudan, and the Congo are rich in oil, diamonds, or other minerals, and yet their peoples continue to experience low per capita income and low quality of life. Meanwhile, the East Asian economies like Japan, Korea, Taiwan, Singapore and Hong Kong have achieved western-level standards of living despite being rocky islands (or peninsulas) with virtually no natural resources endowment. As noted by Jeffry (2010), the philosophy that natural resource riches are a curse rather than a blessing may seem paradoxical and has lead to

an extensive literature. A good number of ECOWAS member states[1] are largely endowed with one or more forms of natural resources (large forest reserves, marine resources, diamond, gold, manganese, phosphate, petroleum, iron ore, uranium, bauxite, manganese, tine and columbite). These resources have in one way or the other played a significant role in terms of boosting economic activities in their respective economies.

Prior to the discovery of mineral resources in West Africa, most of these countries were largely dependent on agricultural resources for the livelihood of their citizens. Apart from Cape Verde, The Gambia and Niger, Agriculture, Forestry, and Fishing is the largest sector for every other country in this region and it accounts for between 20% – 50% of GDP. West African nations are major producers of cocoa, rubber, cotton, and timber. This sector is a major revenue earner for a good number of these countries. For instance, while Liberia is noted for its large rubber plantation, Ghana, Nigeria , Cote d'Ivoire and Sierra Leone have huge potentials in Cocoa and coffee plantations. Also, while Senegal, Niger and Burkina Faso have huge potentials for groundnut, cotton and Sorghum production, Mali is noted for cotton, livestock, millet and rice. Fishing is also a major activity in most countries along the coast of West Africa , including, Senegal, Guinea, Guinea Bissau, Sierra Leone , Liberia, Cote d'Ivoire, Ghana, Togo , Benin and Nigeria.

The discovery of mineral and petroleum resources in West Africa has in one way or the other played a critical role in influencing the political economy of these countries. Apart from The Gambia that can hardly boast of any form of mineral resources, all other West African States have one or other forms of mineral resources. Diamond, Gold, Bauxite, iron ore, and recently crude oil are all part of Sierra Leone's endowment of mineral resources. Guinea is among the top five bauxite producers in the World, whilst   Ghana has abundant deposit of gold and recently discovered crude oil in commercial quantities. Nigeria has been leading in terms of crude oil production in West African for the past decades. An interesting question one would, however, like to ask is whether the presence or discovery of natural resources in West Africa has significantly impacted on the economies of these countries.

Over the past two decades, a good number of researchers have observed a link between natural resource discovery and the outbreak of civil conflicts (Collier and Goderis, 2007; Le Billon, Philippe, 2003; and Swanson, Philip, 2002) . In the case of West Africa, the civil wars in Sierra Leone and Liberia that left over a half million people dead, provides perhaps a good example of military political entrepreneurship driven by natural resource exploitation. With respect to human casualties, the war that ripped apart the Democratic Republic of Congo (DRC) remained to be the worst in recent times, resulting in over four million deaths, and is perhaps the greatest example of a resource-fuelled war. Similar civil conflicts have taken place in countries like Nigeria, Cote d'Ivoire, Guinea Bissau, and Mali. In Cote d'Ivoire, natural resources have been a major factor in financing the conflict, and once again, both the government and the rebels have used these resources to their advantage. It is now widely recognised that the rebels are illegally exploiting mineral

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[1] Cape Verde, Cote d'Ivoire, Ghana, Guinea, Guinea Bissau, Liberia, Niger, Nigeria, Senegal, Sierra Leone and Togo (constituting about 73% of ECOWAS Member States).

resources and cocoa to finance the war. Roger Blench (2004) noted that, in some parts of Nigeria, disputes that began with natural resource conflict over access to resources have become framed in religious terms, presumably to further the interests of urban politicians. Increasing availability of modern weapons has increased the intensity and violence of such disputes. The financing of civil conflicts through illegal diamond trade in countries like Angola, Liberia and Sierra Leone led to international condemnation of the trade in "conflict diamonds" and the subsequent launch of the Kimberley Process. Other contributors to the literature on natural resources discovery have also linked natural resource discovery and public sector corruption (Leite and Weidmann, 2002, Sala-i-Martin and Subramanian, 2003, and Isham et al., 2005). Aslaksen (2007), for instance, found that oil increases corruption in the samples of both democratic and non-democratic countries, whereas minerals increase corruption only in the sample of non-democratic countries. The question that one needs to ask at this juncture is that, why are natural resource abundance economies prone to poor economic performance? Some of the key reasons that a good number of economists[2] attempted to advance include issues ranging from the Dutch disease phenomenon, increased rent seeking behavior, corruption and undue bureaucracies, tendencies towards closed economic policies, and sometimes lack of labour-based learning and education. With a view to generate empirical evidence on the impact of natural resource abundance in the economies of West Africa, the following questions are worth raised in the context of ECOWAS member states: (i) are countries with abundant natural resource more corrupt than those with very little or without?, (ii) are natural resource abundance countries more prone to civil conflicts than their counterparts with very little or without?, (iii) are natural resource abundance countries growing faster than those with very little or without? The attempt to provide answers to these questions constituted the key problem of this research work.

Objectives of the study

This study aims at investigating the relationship between natural resources endowments and overall economic performance using data from ECOWAS member states. Specifically, the study seeks to determine:
i.   The relative effects of natural resources export on economic growth in West Africa
ii. The impact of corruption , government effectiveness and human capital endowments on growth in West Africa

An overview of natural resource endowments and growth performance in ECOWAS Member States.

The exploration of natural resources, in particular precious minerals and petroleum products, started in West Africa since colonial period. In Nigeria, for instance, the search for oil started far back in 1903 when two companies, Nigeria Properties (Limited) and the Nigeria and West African Development Syndicate (Limited) commenced exploration for bitumen, coal and oil (Jones, Geoffrey ; 1981). According to Jones,

geological investigations by Bernard A. Collins (1903-4, and 1904- 5) and A.H. Harrison (1904-5) officially confirmed the existence of vast bitumen deposits as well as the possibility of petroleum. Currently, Nigeria is the largest oil producer in Africa and among the top ten globally. Its effective pumping capacity is about 900 million barrels a year. Its recoverable reserves are estimated at 34 billion barrels. In recent years, the oil sector has accounted for over 40% of GDP, 95% of export receipts, and over 80 percent of government revenue. The sector is dominated by joint venture operations between the Nigerian government and six major international oil companies—Shell, Mobil, Chevron, Agip, Elf, and Texaco. Nigeria's reserves of natural gas were estimated at around 159 trillion cubic feet of proven reserves, being among the ten largest in the world. However, gas production is currently less significant economically. Nigeria also has reasonable deposits of solid minerals like tin, columbite, iron ore and gold.

Sierra Leone is another West African state that is richly endowed with a variety of solid minerals including diamonds, gold, rutile, bauxite, platinum and iron ore. Other identified minerals include chromite, lignite, clays, and base metals (copper, nickel, molybdenum, lead and zinc). The mining sector is the biggest foreign exchange earner for the country, accounting for about 90 % of total exports earnings, and about 30% of the country's GDP. Until very recently when iron ore production was restarted, rutile, diamonds and bauxite were the key minerals exported. The country's dependence on the mining sector is reflected by its high contribution to GDP and registered exports throughout most of the 1990s. Following a decade's long exploration of oil deposits along its coast, the country has formally announced the discovery of crude oil in November 2010 by Anardako Oil Company with approximately 135 net feet of oil pay in two Cretaceous-age fan systems.

Guinea is another West African country that has abundant natural resources. Guinea is known to have about 50% of the world's bauxite reserves, along with diamonds, gold, and other metals. Until 1990 mining accounted for more than 20% of its GDP, supplied over 90% of exports and provided approximately 70% of fiscal revenues. Financial problems, however, hindered the bauxite/alumina sector since the late 1980s. In 2002, mining activities accounted for an estimated 17% of GDP, while mineral exports represented nearly 90% of total export earnings and 20% of domestic government income. The country's solid minerals consisted mainly of aluminium, bauxite, diamond, gold, iron ore and salt. Other mineral resources included graphite, limestone, manganese, nickel, and uranium. According to Plunkert (2006), Guinea continued to rank among the world's top five producers of bauxite.

Mali's mineral sector is dominated by gold mining, the country being the third largest gold producer in Africa. Other mineral resources included bauxite, iron ore, diamond, limestone, manganese, nickel, petroleum, phosphates, tin, and uranium. Mali's Petroleum potential is promising and research and exploration are stepping up. Mali could also provide a strategic transport route for oil and gas exports and there is the possibility of connecting the Taoudeni basin to the European market through Algeria.

The mining industry in Ghana is dominated by gold, diamond, bauxite, and manganese. These are important sources of export and government revenue. For example, gold represented 34% of the country's exports (12% of GDP) in 2000-2003. In 2007 significant oil discoveries were made offshore of Ghana. Estimates of Ghana's oil

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[2] See for instance Codren and Neary (1982), Gelb (1988), Tornell and Lane (1999), Baland and Francois (2000), and Auty (1993).

reserves vary between 1bn and 1.5bn barrels. Commercial extraction has commenced and revenues from oil are expected to reported in the next reporting cycle (covering 2010 and 2011).

The Republic of Niger has large reserves of uranium and in 2003 was the fourth largest producer in the world. Although uranium exports accounted for 62% of exports by value and contributed 4.3% of government revenue in 2003, uranium-mining is a declining sector. Gold mining has been traditionally done at small scale, yet gold production started in Niger's first commercial mine at Samira in late 2004. Gold contribution to the economy remains modest. Niger officially became an oil producer in 2011 with the opening of the country's first refinery in Zinder. Niger expects to produce about 20,000 barrels of fuel a day, initially just for the local market. Oil reserves in Niger are estimated at 480 million barrels. Today, gold mining plays a significant role in Burkina Faso's economy. According to a report by the Extractive Industry Transparency Initiative (EITI) of 2010, gold production more than doubled since 2008, and constituted one of Burkina Faso's largest export products in addition to cotton. As at 2010, approximately sixty international companies - including Australian, Canadian and South African firms - were engaged in exploration and mining activities in Burkina Faso. Apart from gold, Burkina Faso is also known to have significant occurrences

of phosphates and manganese (see EITI 2010 report).

In spite of the current political crisis in Mali, the mining sector continues to flourish with very little deterrent on investors. According to a report by the Extractive Industry Transparency Initiative (EITI) of 2009 , Mali's mineral sector is dominated by gold mining, thus, resulting in making Mali the third largest gold producer in Africa. In 2009, gold exports from Mali alone accounted for more than 80% of the country's export earnings and approximately 8% of its GDP. Other mineral resources included bauxite, iron ore, diamond, limestone, manganese, nickel, petroleum, phosphates, tin, and uranium. Mali's petroleum potential is promising and research and exploration are stepping up.

Figure 1 shows the relationship between natural resource export and economic growth for ECOWAS member countries in 2010. As can be observed in figure 1, Cote d'Ivoire, Nigeria, Sierra Leone and Togo performed relatively well in terms of export of natural resources as a share of their GDP. In 2010 alone, the share of export of natural resources to each of these countries' GDP stood at around 37.0%, 37.7%, 27.8 % and 24.6% for Cote d'Ivoire, Nigeria, Sierra Leone and Togo respectively. These countries were followed by Liberia, Guinea, Ghana and Guinea Bissau with natural resources exports of around 17.8%, 16.9%, 14.7% and 13.2% of GDP respectively.
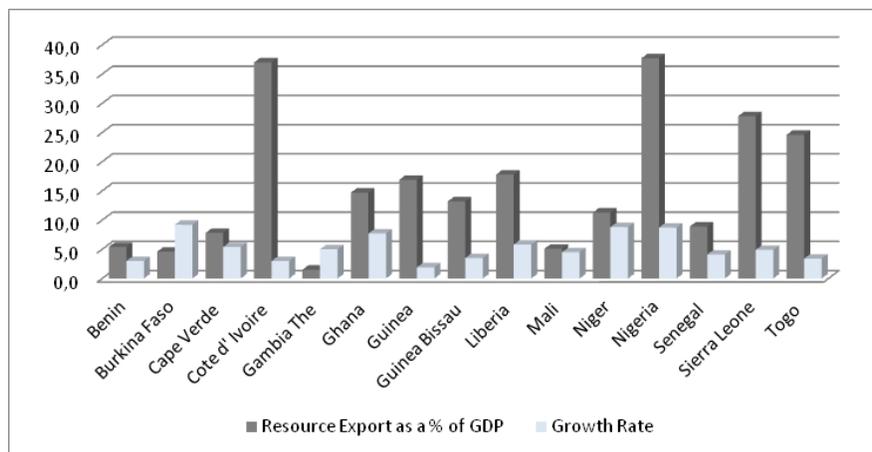

Figure 1. Natural Resources Export and Economic Growth in West Africa.
Source: World Trade Statistics and World Bank publications

At the extreme end of the spectrum, The Gambia happened to be the least in terms of natural resource export to GDP ratio. This is not surprising because The Gambia's economy is largely dependent on agricultural activities with virtually less precious mineral deposits such as clay, silica sand, titanium, tin and zircon.

As can be further observed in figure 1 above, countries with higher natural resource exports appear to exhibit lower growth rates as demonstrated by Cote d'Ivoire, Guinea, Sierra Leone and Togo. Nigeria's growth performance though not in tandem with its export of natural resources, it however, performed relatively better than other resource rich countries. Ghana, Niger and Cape Verde are few of those West African Countries where economic growth seems to be in tandem with natural resource export. At the other end of the spectrum, countries like The Gambia, Burkina Faso, Mali and Benin happened to attain moderate growth despite the fact that they have very low natural resource export as a percentage of their GDP. Though

it may be difficult to appraise the strength of correlation between economic growth and natural resource exports on the basis of Figure 1 as shown above, however, it provides a vivid comparison on the relationship between natural resource export and economic growth amongst West African Countries. Infact , the picture presented in figure 1 apparently provides a kind of evidence that is consistent with proponents of the resource course literature who argue that nations characterized with natural resource abundance are highly likely to exhibit lower growth rates than those without (Sachs and Warner, 1999: Papyrakis and Gerlagh, 2007; Ding and Field ,2005). As can be seen in Figures B1 – B15 of Appendix B, the relationship between natural resource export and economic growth appears vividly inverse especially for resource rich countries. This further provides support for the existence of the resource curse phenomenon amongst resource rich countries in West Africa.

This study would also like to find out whether the poor growth performance in resource rich countries could be explained corruption in the public sector. This is because; theories of natural resource booms have highlighted issues of rent seeking behavior (Tornell and Lane, 1999; Baland and Francois, 2000; Torvik, 2002) and political corruption under fragile institutions (Robinson et al, 2006). As a matter of fact, the poor growth performance as exhibited by some of the resource rich West African states could have some relationship with corruption in the public sector. As can be observed in figure 2, though almost all west African states appear to be rated relatively high in terms of corruption in the public sector, countries with more natural resource endowments like Cote d'Ivoire, Nigeria, Sierra Leone, Guinea, Liberia and Togo seem to be rated higher in terms of

public sector corruption through the rent seeking behavior of their public sectors. Thus, the poor performance in growth in some of the resource rich West African states may be linked with public sector corruption arising from rent seeking behavior leading to resource misallocation.

Ironically, The Gambia, Burkina Faso and Mali are examples of low natural resource base countries with relatively higher ranking in terms of public sector corruption perception index published by Transparency International. However, though Burkina Faso is ranked relatively high in terms of public sector corruption their growth performance was encouraging as compared to other highly rated corrupt West African States.
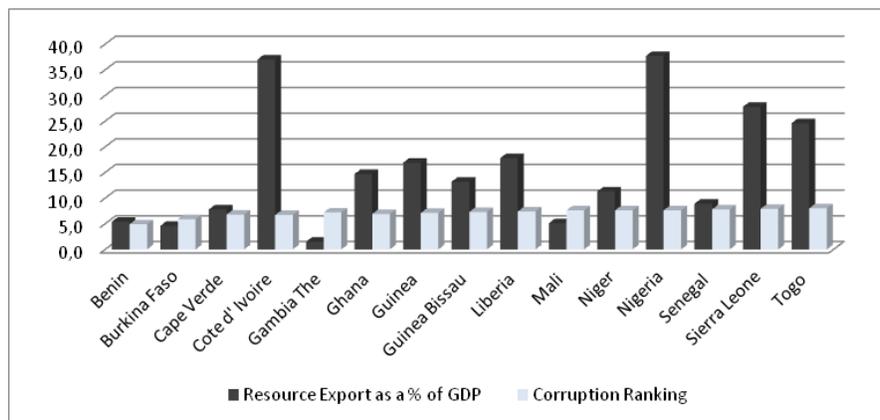

Figure 2. Natural Resource Endowment and Corruption in ECOWAS Member Countries.
Source: Transparency International and World Bank data 2010

Literature review

Review of the theoretical literature

It has been extensively argued in the economic literature that economies that are highly dependent on natural resources are characterized with booms and busts as the prices of raw materials fluctuate a great deal in world markets. It has also been noted that fluctuations in export earnings caused by instability in world market prices can trigger exchange rate volatility. The resultant volatility in exchange rates has the tendency of triggering some amount of uncertainty that can harmfully affect exports and foreign investment. A good number of authors (Codren and Neary,1982; Bruno and Sachs, 1982; Gelb, 1988) have advanced various arguments on natural resource abundance economies based on a phenomenon popularly known in the economic literature as the "Dutch disease", which assumes that the economy can be categorized into three key sectors: the tradable natural resource sector, the tradable non-resource (manufacturing) sector, and the non-traded sector. The argument purported by proponents of the Dutch disease is that, economies with larger natural resource sectors create a higher demand for non-tradable goods. As a consequence, there is disproportionate re-allocation of labor and capital from the tradable manufacturing sector to the natural resource sector. The resultant decline of activities in the manufacturing sector will thus increases economic dependence on natural resources, and thereby exposes economies

depending on natural resources to volatility of commodity prices. A key problem in this argument is that, it does not take into account the fact that in many economies, the resource and manufacturing sectors are not mutually exclusive. It should be noted that most manufactured products contain natural resources as inputs, and at the same time, the extraction of these natural resources requires the use of manufactured products such as machinery and refining plants as well. Some other harmful effects often linked with the Dutch disease phenomenon are the tendencies for the implementation of protectionist policies for affected lagging sector industries as well as high corruption in the public sector. In particular, Polterovich and Popov, (2006) has noted that the government may not be able to carry out effective and sound macroeconomic, social and industrial policies.

Another popular argument in the economic literature on natural resource abundance has to do with the resource curse phenomenon. Proponents of the resource curse argument (Sachs and Warner, 1999: Papyrakis and Gerlagh, 2007; Ding and Field ,2005; and Bulte et al., 2005) argue that nations characterized with natural resource abundance are highly likely to exhibit lower growth rates than those without. Prebisch (1950) and Singer (1950) have argued that primary commodity exporters would suffer from a decline in the terms of trade, which would widen the gap between the rich industrial states and the poor resource exporting states. This is sometimes linked with a phenomenon known as immiserizing growth (Balassa, 1985;

Bhagwati, 1958a & 1958b; Johnson , 1967; Deardorff, 1973; Smith ,1976; and Samuelson, 1975). The main argument of the theory of immiserizing growth is centered or the idea that an open economy experiencing an expansion in its productive capacity (resulting either from economic growth or technological progress) can become worse off if its terms of trade deteriorate sufficiently and offset the beneficial effects of economic growth. Other researchers, including Nurske (1958) and Levin (1960) also noted that prices of primary exports are highly subjected to sharp fluctuations and thus states that relied on primary exports would find these fluctuations transferred to their domestic economies, making export revenues , and hence foreign exchange supplies unreliable. Resource rich countries are also noted for being characterized by income inequality owing to the high level of corruption in the public sector of most resource rich countries. Gelb (1988) notes that countries that are rich in natural resources are more incline to exhibit unequal income distribution than those without. Palley (2003) further notes that such countries are characterized by features such as having a larger share of their population living in poverty, exhibiting greater tendencies for corruption , having more authoritarian regimes that spend more on the military.

Since the last two decades, theories of natural resource booms have highlighted issues of rent seeking behavior (Tornell and Lane, 1999; Baland and Francois, 2000; Torvik, 2002) and political corruption under fragile institutions (Robinson et al, 2006). The production of natural resources is highly likely to generate some sort of economic rents. Gelb (1988) argues that governments earn most of their rents from the exploitation of natural resources. Isham et. al. (2003) provide an excellent review of the mechanisms whereby large revenues from natural resources enable governments to appease dissent and circumvent accountability, thereby insulating them from pressures for institutional reform; whereby governments successfully thwart pressures for modernization and institutional reform because their "budgetary revenues are derived from a small workforce that deploys sophisticated technical skills that can only be acquired abroad". Robinson et al (2006) formulates a theoretical model from which they discover that, by raising the value of being in power and by providing politicians with more resources which they can use to influence the outcome of elections, resource booms do have the tendency of increasing resource misallocation in the rest of the economy. To a very large extent, however, this relationship depends on the initial quality of institutions (political accountability). Several authors including Tornell and Lane (1999), Baland and Francois (2000), and Torvik (2002) have argued that countries without such institutions are highly likely to suffer from a political resource curse, and thus may increase their tendencies towards implementing inefficient activities through rent-seeking motivations.

The relationship between conflict and the extraction of natural resources seem not to be so clear-cut, however, resource-rich countries do appear to be more susceptible to conflict than the resource-poor. What has been noted generally is the fact the risk of conflict seems to be greatest when resource extraction accounts for a substantial proportion (around 30%) of a country's GDP: in other words, in countries which are largely dependent on the export of primary commodities such as metal ores, oil and gas, the risk of conflict is very high. Several studies have attempted to document the

relationship between natural resource abundance and civil conflicts (Ross 2004a; Humphreys 2005; Rohner, 2006). The economic literature have identified three key possible channels through which resource rich economies can be exposed to the risk of conflicts. Firstly, the export of natural resources provide opportunities for rebel predation during conflict and so can finance the escalation and sustainability of rebellion. Natural resources like diamond and oil provide high prospects for the financing of rebellion through such actions like kidnapping and ransoming of oil workers, tapping of pipelines and theft of oil, extortion rackets against oil companies or illicit mining and smuggling of diamonds. The most cited instances are those of the diamond-financed rebellions in Sierra Leone and Angola. In Nigeria too, particularly in the Southern oil rich State of Delta, armed criminals have been notorious in financing their operations through kidnapping oil foreign workers in exchange for offers of ransoms.

A second channel through which resource rich countries can be exposed to the risk of conflicts arises from the motivation to loot. Rebellions are sometimes motivated by the desire to capture some kind of economic rents, either during or after conflict. Weinstein (2005) purports a convincing argument that rebel recruits in countries that are endowed with valuable natural resources are highly likely to be motivated by the desire to loot rather than the pursuance of any political cause. Indeed, this loot seeking behavior of rebel recruits is highly prevalent during the lawless conditions that prevail during conflict than during peacetime. As noted by Collier and Hoeffler (2006), an intermediate position between the objective of wartime looting and the capture of the state is the secession of the resource-rich region. Thus, Lujala, Gleditsch, and Gilmore (2005) find that conflicts are more likely to be located in the areas of a country in which natural resources are extracted.

The third channel through which resource abundance may prompt civil conflict arises from the fact that governments of most resource-rich countries are less accountable to their citizens. It has been widely note in the literature that governments of most resource rich countries are highly inclined to hold on to power through vote-buying, voter intimidation and other forms of electoral fraud. Vicente (2007) and Collier and Vicente (2008) investigate vote-buying in two resource rich democracies[3] and show that it is both prevalent and effective. Besley (2006) find that there is a point at which elections fail to discipline those politicians whose interests are divergent from those of voters due to the prevalent of vote-buying. Collier and Hoeffler (2005) show that in conditions of poor governance, incumbents are far more likely to win elections than in conditions of good governance. In most cases, governments that win elections through vote-buying are likely to be unaccountable to their citizens. This lack of accountability by such governments has the tendency of triggering rebellions/civil conflicts that may have adverse consequences to the economy. Firstly, a government that lacks accountability to its citizens will be perceived by its citizens as highly corrupt. In a non-democratic setting, the only way to remove this type of government from power is through armed conflicts. So in many cases, when the citizen feel that they cannot easily change

[3] The two democratic countries of Sao Tome and Cape Verde were used in these studies to investigate the relationship between governments of resource rich countries and vote-buying.

their corrupt government through a democratic process , there is a high tendency that they will resort to taking arms against their governments. If, however, citizens are fully confident that they can easily change corrupt officials from governance through credible democratic processes, then the tendencies for civil conflicts arising from lack of accountability by government is likely to be mitigated.

Review of the empirical literature

As was mentioned before, a good number of researchers have arrived at similar conclusions that natural resource abundant economies have the tendency to grow more slowly than economies without substantial resources (Auty, 2001a; Rainis, 1991; Bulmer-Thomas, 1994; Sachs and Warner, 1995, 1997; Lal and Myint, 1996). In an attempt to investigate whether natural resource abundance leads to slower growth rates, Ding and Field (2005) endeavor to distinguish between natural resource dependence and natural resource endowment . They estimated two separate models using World Bank data and found that whilst natural resource dependence has a negative effect on growth rates, natural resource endowment has a positive and significant impact on growth. However, when a three-equation recursive model was estimated by introducing endogenous human capital and allowing for endogeneity in a resource dependence sector, the effects of natural resources on growth are found not to be statistically significant.

Many studies have provided some empirical evidence in support of the Dutch disease phenomenon (Auty and Evia, 2001; Rodriquez and Sachs, 1999; and Fardmanesh, 1991). A major problem with all of these papers is that they tend to predict a monotonic effect of resources on development that is not always consistent with the cross-country evidence (Acemoglu, Johnson and Robinson, 2002). Although the Dutch disease literature has a lengthy theoretical degree, it appears to be the empirically least important mechanism. For example, Spatafora and Warner (2001) examined 18 oil exporting developing countries covering a period running from the mid 1960s until the 1980s. They found that Dutch disease effects are strikingly absent.

Gelb (1988) provides an extensive empirical cross-country study of the Dutch disease phenomenon, where the effect of windfall on oil exporters was examined for a group of oil exporting countries, most of whom have spent large amounts of the windfall they gained in the wake of the 1973 oil boom. He finds that Ecuador, Iran, Nigeria and Trinidad and Tobago went through the Dutch disease, mainly due to a decline in Agriculture, over the first and second oil booms of 1972–81, while Algeria, Indonesia and Venezuela went through a strengthening of their non-oil tradable. However, virtually all countries in the study showed no Dutch disease in manufacturing. A possible explanation for the missing Dutch disease was that these sectors were initially too small, and that price controls and subsidies by the government combined with active promotion of the sector kept them from being adversely affected. Services, however, did expand dramatically as a share of output in GDP.

The study by Sala-i-Martin and Subramanian (2003) could also not find evidence of the Dutch disease in Nigeria due to oil price movement. This study highlighted an issue that is all too common in analyzing the impact of oil prices on macroeconomic variables in oil-

exporters, which is the importance of knowing the type of spending, and not only the quantity. In another study, Spatafora and Warner (1995) finds a positive link between terms of trade shocks in oil-exporting countries and their real exchange rate as well as public spending. They find that the reaction of public spending to shocks was stronger than that of private spending. However, they could not find evidence of the Dutch disease.

Ross (2001) found that oil rents do inhibit democratic governance not only in the Middle East, as formally claimed in previous empirical studies, but also in other oil exporting countries like Indonesia, Malaysia, Mexico and Nigeria. Moreover, oil does greater damage to democracy in oil-poor states than in oil-rich ones. Thus oil inhibits democracy even when exports are relatively small, particularly in poor states. The majority of studies investigating the economic growth-resource curse nexus use a version of the neoclassical growth model (Solow, 1956), augmented to include measures of human capital (from Mankiw et al.,1992) and such transmission mechanisms such as institutions, democracy or Dutch disease. Studies are yet to incorporate all these different transmission mechanisms in a single model for empirical analysis to assess their various implications for oil exporting African countries. This study intends to bridge this gap. On the relationship between resource abundance and civil conflict, Collier and Hoeffler (2001) find that the probability of a civil conflict is 0.5 percent in a country with limited natural resources, but 23 percent in a country where natural resources account for 26 percent of GDP. They further noted that, for a good number of countries, including Iraq, Nigeria, Sierra Leone, Venezuela, former Zaire, Zambia, and many others, the abundance in natural resources like oil or mineral wealth has not effectively translated into economic and social well-being for the majority of the population.

With respect to the relationship between natural resource abundance and economic growth, Nankani (1980) shows that between 1960 and 1976, the developing world's leading hard-rock mineral exporters had a per-capita GDP growth rate of 1.9 percent, half the rate of a control group of non-mineral states. Using regression analysis to measure the impact of minerals and other resources exports on economic growth in a sample of ninety seven countries, Sachs and Warner (2000) find that states with a high ratio of natural resource exports to GDP had abnormally slow economic growth rates between 1971 and 1989. The results from their regressions remained significant even after controlling for a wide range of growth related variables. In another study of thirty Sub-Saharan African countries, Wheeler (1994) found a negative correlation between economic performance and the share of hard-rock minerals in total exports. Auty (1993) finds that both major oil exporters and hard rock minerals exporters performed less well than their resource poor counterparts.

On the contrary, however, Davis (1995) finds that between 1970 and 1991, twenty two developing states most dependent on minerals exports performed just as well as non-mineral states. Brunnschweiler and Bulte (2008) find that growth in GDP per capita from 1970 to 2000 is positively correlated with 1994 resource abundance. Similarly, Brunnschweiler (2008) finds that economic growth is negatively correlated with resource dependence but positively correlated with resource abundance. Michaels (2010) explores the effect of oil discoveries on economic growth and education and finds that the effects of oil discoveries in the southern United States were, "large

and beneficial." Specifically, this study finds that oil discoveries led to a sustained increase in income per capita.

A good number of studies (including Hall and Jones ,1999; Acemoglu et al. ,2002; Easterly and Levine ,1997; Dollar and Kraay, 2003; and Rodrik et al.,2002) have examined the relationship between political institutions and economic growth. Vijayaraghavan and Ward (2004) examined the relationship between institutional infrastructure and economic growth rates across 43 nations during the years 1975–1990. Using a neoclassical growth framework, they integrate a broad set of institutional variables used as proxy for the overall institutional infrastructure of an economy. The results from this study indicate that security of property rights and size of government are the most significant institutions that explain variations in economic growth rates.

Methodology

Model specification

In this study, we adopt a Barrow-type (1991) growth model to analyse the impact of resource wealth on economic growth. Following the works of Mankiw et al (1992) , Sala-i-Martin (1992) ,Sachs and Warner (1999), Lederman and Maloney (2002) and Hoeffler (2002), and by controlling for non-natural resource factors that influence long run growth[4], we specify a growth equation that accounts for the effects of natural resources as follows:

$$y_{it} = \alpha + \beta NR_{it} + \lambda X_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

Where y_{it} is the growth rate of per capita GDP in country i at time t, NR_{it} represent measures of natural resources abundance in country i at time t, X_{it} is a set of control variables, μ_i represents the unobserved country-specific effect and ε_{it} is the error term. In a more explicit form, equation 1 can be presented as follows:

$$\ln(y)_{it} = \alpha + \beta\ln(NR)_{it} + \lambda_1\ln(COR)_{it} + \lambda_2\ln(HUMC)_{it} + \lambda_3\ln(GE)_{it} + \mu_i + \epsilon_{it} \tag{2}$$

Where:

$\ln(y)_{it}$	= the natural log of GDP per capita in country i at time t
$\ln(NR)_{it}$	= the natural log of natural resource export as a share of GDP in county i at time t,
$\ln(COR)_{it}$	= the natural log of the corruption perception index of country i at time t,
$\ln(HUMC)_{it}$	= the natural log of the human capital of country i at time t
$\ln(GE)_{it}$	= the natural log of government effectiveness in country i at time t.
β	= measures the relative effects of natural resource endowment on per capita output
λ_i	= set of parameters capturing the relative effects of the control variables.

Following James and Aadland (2010) , we test the resource curse phenomenon by contrasting the null hypothesis H_0:$\beta \geq 0$ against the alternative hypothesis H_A:$\beta < 0$. A rejection of the null hypothesis in favor of the alternative hypothesis will thus provide evidence that resource abundance countries exhibit slower economic growth than resource poor countries.

Estimation techniques

Equation 2 is the basis upon which we estimate an empirical relationship between natural resource abundance and growth in per capita income amongst ECOWAS member states. As noted in equation 2 above, if the unobserved country-specific effects, μ_i, are uncorrelated with the explanatory variables (i.e. if μ_i is orthogonal to all the explanatory variables) then we can apply the pooled OLS estimator to fit our model. However, when there is a strong correlation between the unobserved individual component, μ_i and the regressors of the model, the pooled OLS estimator is biased and inefficient. In this situation, the fixed effects model is a suitable candidate for carrying out estimations of the model's parameters. If the standard random effects assumptions hold but the model does not actually contain an unobserved effect, the pooled OLS is efficient and all the associated pooled OLS statistics are asymptotically valid. To test for the absence of unobserved effect, we employ a simple AR(1) test for serial correlation. This test is appropriate because the idiosyncratic errors are serially uncorrelated under the null H_0 : $\sigma_\eta^2 = 0$, given that the explanatory variables are exogenous. The detection of serial correlation amongst the idiosyncratic errors thus validates the presence of unobserved effect. In many applications, however, the whole point of using panel data is to allow for the unobserved effects, η_i , to be arbitrarily correlated with the set of explanatory variables, thus necessitating the application of a fixed effects estimation procedure. In this study, the choice between the fixed effects and random effects model for the levels estimation will be based on the Hausman specification test. A large value of the Hausman test statistic leads to the rejection of the null hypothesis that the individual-specific effects are uncorrelated with the regressors and to the conclusion that fixed effects are present.

Following the approach by Levine et al (2000) and Beck et al (2000), we endeavor to establish the relationship between growth in real per capital GDP in country i at time t to some exogenous factors as specified in equation 2 above. With a view to addressing potential endogeneity in the data, we follow a dynamic panel approach (Arrelano and Bond, 1991; Arrelano and Bover, 1995; and Blundell and Bond, 1998) in estimating the specified growth equation . Such a dynamic panel estimation technique is being developed by applying first difference transformation from the following equation:

$$y_{i,t} - y_{i,t-1} = (\alpha - 1) y_{i,t-1} + \beta'X_{i,t} + \eta_i + \varepsilon_{i,t} \tag{3}$$

Where $y_{i,t} - y_{i,t-1}$ is the growth rate in real GDP per capita, $X_{i,t}$ is the set of explanatory variables, including our measures of natural resource abundance, η_i is the unobserved country-specific effect, and $\varepsilon_{i,t}$ is the error term. We proceed by rewriting equation (3) as:

$$y_{i,t} = \alpha y_{i,t-1} + \beta X_{i,t} + \eta_i + \varepsilon_{i,t} \tag{4}$$

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[4] The traditionally based neoclassical theory of growth has been focusing only on physical capita and labour inputs as the principal determinants of growth.

Now, by taking the first difference of both the endogenous and exogenous variables in equation (4), we have:

$$y_{i,t} - y_{i,t-1} = \alpha'(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \qquad (5)$$

As can be observed from equation (5) above, the lagged difference in per capita GDP is correlated with the error term, which by implication of the potential endogeneity of the explanatory variables X, necessitated the use of instrumental variables. To address this problem, the system difference estimator uses the lagged level of the explanatory variables as instruments under the conditions that the error term is serially uncorrelated and that that the lagged level of the explanatory variables are weakly exogenous.

Following Blundell and Bond (1998), we employ two specification tests. The first is a Sargan test of over-identification restriction which tests the validity of the instruments. The second is a test of second order serial correlation of the error term, which tests whether the error term in the differenced equation model follows a first order moving average process.

Data and sources

The data set used in this study is obtainable from the World Bank Development Indicators, Country Tables of the African Development Bank, World Trade Statistics, Transparency International and ECOMAC Data base. Since 1995, Transparency International Publishes the Corruption Perception Index (CPI) annually ranking countries by their perceived level of corruption, as determined by expert assessments and opinion surveys. The CPI generally defines corruption as the misuse of public power for private benefit. It ranks countries on a scale from 10 (no corruption) to 0 (highly corrupt). For purposes of this study , we reverse the Transparency International scale in ranking countries by subtracting the rank assigned by Transparency International from 10 (no corruption) so that highly corrupt countries will have higher numerical ranking for ease of comparison in terms of growth performance. The government effectiveness index (GE) also publish by Transparency International is a measure that captures the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation and the credibility of the government's commitment to such policies. The growth rate data is obtained from the World Bank Publications. We also consider the quality of a country's stock of human capital (HUMC) as part of its natural resources and therefore assesses its impact on economic growth by including it as one of the control variables in the specified model. This variable is obtainable from the World Bank Development Indicators.

Presentation and analysis of regression results

Presentation of results

The Study utilizes the Hausman specification test in choosing between the fixed and random effect models in estimating the specified equations in levels. The dynamic panel model (in which all the

variables are in first difference) is estimated following the approach by Arellano –Bond using Stata command. We use the overall sample which comprises of ECOWAS member states, excluding Liberia for which some data were missing. In order to capture differences in natural resource management policy between the Anglophone and Francophone countries, we categorise ECOWAS member states into two groups: those belonging to the West African Economic and Monetary Union (WAEMU) and those belonging to the West African Monetary Zone (WAMZ).

Whilst members states of WAEMU are mostly Francophone countries comprising of Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Mali, Niger, Senegal and Togo, those of the WAMZ are mostly the Anglophone West African countries comprising of The Gambia, Ghana, Liberia , Nigeria , Sierra Leone and Guinea. Guinea is the only francophone country that decided to align itself with the WAMZ.

On the basis of these sub-regional groupings, we then run separate regressions for each of the sub-economic region in order to assess whether differences in economic policies across francophone and Anglophone countries affect the relative effects of natural resource endowment on growth. The panel regression results for the overall sample of ECOWAS member states and those of the WAMZ and WAMEU sub-regions are presented in table 1.

The result from the Hausman specification test as shown in the lower section of table 1 consistently indicate that the individual unobserved country-specific effects are uncorrelated with the explanatory variables, suggesting that the fixed effects model is preferable to the random effects model for the levels regression estimates . Hence for the levels estimates, we only consider the results from the fixed effects estimates in our discussion of findings.

For the dynamic model, the results from the Sargan test, as shown in the lower section of table 1 indicate that the instruments are valid in all the dynamic panel regressions. Finally, the test for second order serial correlation shows no serious problem of serial correlation of the residuals from the dynamic panel regressions.

Analysis of regression results

From the regressions results presented in table 1, it could be observed that the coefficient of the variable representing level of corruption as derived from the corruption perception index (COR) is consistently negative in all the regressions. For the fixed effects model, the coefficients of the corruption perception variable are significantly negative for the overall sample of ECOWAS member states as well as the WAMZ and WAEMU sub-regions. Accordingly, the results indicate that corruption has a negative and significant effect on growth in the ECOWAS region. The results from the fixed effects model are also consistent with those from the dynamic model for all the regressions. In terms of relative effects, the results from the dynamic model indicate that a 10% increase in corruption will retard growth in real income per capita by around 5.7% for the overall sample of ECOWAS member states. With regards to the two regional sub-groupings, a 10% increase in corruption will retard growth in income per capita by 1.2% and 9.5% in WAEMU and WAMZ sub-regions respectively. The results thus indicate that corruption has a more significantly negative effect on growth in WAMZ member countries as compared to their WAEMU counterpart. This is because,

Table 1. Panel estimation results: per capita income as the dependent variable

Variables	Results for the Overall ECOWAS Sample			Results for WAEMU Member States			Results for WAMZ Member States		
	Fixed Effects	Random Effects	Dynamic Model	Fixed Effects	Random Effects	Dynamic Model	Fixed Effects	Random Effects	Dynamic Model
Constant	-2.0462 (-2.78)**	-0.1904 (-0.29)	–	-0.9223 (-1.13)	1.6488 (3.07)	–	-4.0047 (-2.60)**	-2.1297 (-1.74)	–
Ln(Y)_1	–	–	0.7236 (28.30)***	–	–	0.0.6186 (9.70)***	–	–	0.67084 (3.17)***
Ln(COR)	-0.5794 (-4.10)***	- 0.6188 (-4.15)***	-0.5741 (-1.25)	-0.5211 (-3.18)***	-0.6015 (-3.32)***	-0.1232 (-1.21)	-0.61352 (-2.43)**	- 0.5916 (-2.31)**	-0.9503 (-1.86)*
Ln(GE)	-0.00274 (-0.04)	0.000981 (0.01)	0.06607 (3.26)***	-0.0418 (-0.45)	-0.0921 (-1.06)	0.0527 (1.11)	-0.0381 (-0.32)	- 0.3478 (-0.29)	1.0658 (1.05)
Ln(NR)	-0.0059 (-0.09)	-0.03215 (-0.48)	-0.0396 (-2.53)**	-0.04619 (-0.65)	-0.07571 (-1.02)	-0.05795 (-1.37)	-0.1278 (-0.87)	-0.09713 (-0.85)	-0.3782 (-0.56)
Ln(HUM)	2.3841 (11.29)**	1.7787 (9.64)***	0.3112 9 (6.34)***	2.1923 (.9.90)***	1.6488 (9.28)***	0.3570 (1.48)	2.8865 (6.08)***	2.33021 (5.48)***	0.7801 (2.46)**
No. of Obs.	150	150	150	90	90	90	60	60	60
R²	0.5582	0.5502	–	0.7190	0.7446	–	0.5350	0.5173	–
F-Statistics	F(4,131) = 42.1 (0.000)	Wald Chi2(4) = 133.6(0.000)	–	F(4,77) = 29.95(0.000)	Wald Chi2(4) = 132.45 (0.000)	–	F(5,50) = 15.3 (0.000)	Wald Chi2(4)= 51.4 (0.000)	–
Hausman Test	Chi2(4) = 24.53 (0.0382)		–	Chi2(4) = 24.53 (0.0382)		–	Chi2(4) = 8.76 (0.0675)		–
Test for second order Serial correlation	–	–	H₀ :No autocorrelation Z = -4.56 (0.000)	–	–	H₀ :No autocorrelation Z = -4.13 (0.000)	–	–	H₀ :No autocorrelation Z = -4.76 (0.000)
Sargan Test	–	–	Chi 2(39) = 14.9 (0.999)	–	–	Chi 2(39) = 52.52 (0.0288)	–	–	Chi 2(32) = 29.13 (0.6124)

Note: Where the variables are expressed in log form and t –values are reported in parenthesis , where (*) (**) and (***) implies significance of coefficient at the 10%, 5% and 1% level respectively. The variables entering the Dynamic model are in first difference and their coefficients are interpreted as growth elasticities. Both the fixed effects and random effects models are in levels. The dynamic model is based on the Arellano-Bond Estimation procedure.

when we critically examine the corruption perception index published by transparency international, we discover that that a good number of WAMZ member countries are highly ranked in terms of corruption than those of WAEMU member countries. As a result of this perceived high level of corruption in WAMZ member countries, the impact of corruption on growth is of a relatively higher magnitude than that of the WAEMU member countries.

This empirical evidence is further corroborated by figure A1 of Appendix A which shows the relationship between corruption and growth in income per capita in ECOWAS member states. As can be vividly observed from figure A1of Appendix A, a good number of WAMZ member states like Nigeria, Sierra Leone , Liberia and Guinea were ranked higher in terms of corruption when compared to WAEMU member countries like Benin, Burkina Faso, Cape Verde and Cote d'Ivoire . In fact Benin happened to be the least ranked country in terms of corruption amongst ECOWAS member states by Transparency International. In terms of growth performance amongst WAMZ countries, Nigeria, though highly ranked in terms of corruption, its growth performance stood at around 8.7% in 2010. Nigeria's growth performance was quite impressive when compared to Sierra Leone (which is also highly ranked in terms of corruption)

with a growth performance of around 4.9% in 2010. Despite Nigeria is highly ranked in terms of corruption, the hike in the price of crude oil, Nigeria's main export, may have partly accounted for its impressive growth in 2010. Thus, both the empirical finding from the study as well as the relationship depicted in figure A1 consistently supported the works of Tornell and Lane (1999), Baland and Francois (2000), Torvik (2002), and Robinson et al (2006) who find that the discovery of natural resources is highly likely to generate some sort of economic rents that may result to higher tendencies for corruption in the public sector.

The relationship between the variable representing government effectiveness (GE) and growth in income per capita is rather mixed. When we consider the fixed effect model, the coefficients of the government effectiveness variable are negative but rather insignificant in all the regression. However, on considering the dynamic panel estimation, the coefficients of the government effectiveness variable are positive but only significant for the overall ECOWAS sample. When we consider the WAMZ and WAEMU sub-groupings separately, the coefficients of the government effectiveness variable are positive but rather insignificant. Since the government effectiveness (GE) variable is an index that captures the perceptions

of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies, the results indicates that its impact on growth in income per capita is more effective at the regional level that at the sub-regional levels. In terms of relative effects, the results indicate that a 10% enhancement in government effectiveness in the ECOWAS region as a whole will induce growth in income per capita by approximately 1.0%. Though the results are positive for the two sub-regional groupings , they are rather insignificant . This therefore implies that, effective collaboration at the ECOWAS regional level in terms of enhancing government effectiveness has a more positive and significant effect on growth than at sub-regional levels.

With regards to the relationships between natural resource export (NR) and economic growth, the results from both the fixed effects and dynamic panel estimations are rather mixed. For the fixed effects estimates, while the results are positive for the overall ECOWAS sample and WAEMU, they are rather negative for the WAMZ region. However, the results from the fixed effects regression are all insignificant in terms of enhancing growth in income per capita. When we consider the results from the dynamic panel estimation, it could be observed that only the coefficient from the overall ECOWAS sample is negative and significant at the 5% level. For the WAMZ and WAEMU samples, the results are also negative but rather insignificant. In terms of relative effects, the results from the ECOWAS sample indicate that a 10% increase in natural resource export reduces growth in income per capita by approximately 0.4%. Given that a good number of West African Countries are highly endowed in natural resources, these finding lends support to the resource curse phenomenon. A good number of researchers have also arrived at similar conclusions that natural resource abundant economies have the tendency to grow more slowly than economies without substantial resources (Auty, 2001a; Rainis, 1991; Bulmer-Thomas, 1994; Sachs and Warner, 1995 & 2000, 1997; Lal and Myint, 1996).

Another plausible explanation for the negative relationship between natural resource abundance and growth in income per capita as found in this study could be linked to the high tendencies for civil conflicts in natural resource rich countries as noted by Collier and Hoeffler (2001). The study by Collier and Hoeffler (2001) find that the probability of a civil conflict is 0.5 % in a country with limited natural resources, but 23 % in a country where natural resources account for 26 % of GDP. They argued that, for a good number of countries, including Iraq, Nigeria, Sierra Leone, Venezuela, former Zaire, Zambia, and many others, the abundance of natural resources like oil or mineral wealth has not effectively translated into economic and social well-being for the majority of the population. As noted for the West African region, most of the civil conflicts, especially for countries like Sierra Leone, Liberia, Nigeria and Cote d'Ivoire, the abundance of natural resources may have accounted for part of the causes of their civil conflicts. In Sierra Leone, for instance, the ten year civil conflict was partly alleged to the scramble for the country's diamonds (the so called Blood Diamond War). In essence, the negative relationship between natural resource abundance and growth could also be partly explained by the outbreaks of civil conflicts that tremendously plagued the economies of these countries over the past two decades.

In terms of the relationship between the variable representing human capita (HUMC) and economic growth in West Africa, the results from both the fixed effect and dynamic panel regressions show a positive and significant impact on growth. On the basis of the estimates from the dynamic panel regressions, the coefficients of the human resource variable are positive in all the regressions but only significant for the overall ECOWAS sample and that of the WAMZ member states. In terms of relative effects, the results indicate that a 10% enhancement in the quality of human capital will induce a corresponding growth in income per capita by approximately 3.1% and 7.8% for the ECOWAS region as a whole and the WAMZ member states respectively. For the WAEMU sample, the results from the dynamic panel regression are rather insignificant. This therefore implies that the quality of human capital plays a significant role in promoting economic growth in the ECOWAS region and more so in WAMZ member countries.

Conclusion

This study attempted to investigate the nexus between natural resource endowment and economic growth using a sample of West African countries. Though the West African region is noted for having abundance natural resources, their distribution amongst member countries of the Economic Community of West Africa (ECOWAS) is quite uneven. Whilst some countries are richly endowed with a plethora of natural resources like Sierra Leone, Cote d'Ivoire, Liberia, Nigeria, Ghana, Guinea, Guinea Bissau and Togo, others like Burkina Faso and The Gambia have very minimal endowments of natural resources. To address the question as to whether natural resource rich countries performed better in terms of economic growth than those with limited resources, the study followed the works of Mankiw et al (1992), Sala-i-Martin (1992) ,Sachs and Warner (1999), Lederman and Maloney (2002) and Hoeffler (2002) by adopting a Barrow-type (1991) growth model to analyse the impact of natural resource wealth on economic growth. A dynamic panel data estimation technique was employed following the procedures by Arrelano and Bond (1991), Arrelano and Bover (1995), and Blundell and Bond (1998).

The results from the panel regressions indicate that natural resource endowments in West Africa have very minimal impact in terms of promoting economic growth, especially in resource rich countries. This finding is therefore in conformity with the resource curse literature which emphasis the point that natural resource abundant economies have the tendency to slowdown economic growth than economies without substantial resources. Part of the factors explaining this finding in the case of West Africa include amongst others, the gross mismanagement of natural resources exports revenues through high rates of corruption in the public sector as well as the frequency of civil conflicts in resource rich economies of West Africa.

For the natural resource endowments of the West Africa region to fully benefit its citizens in terms of improving their living standards so as to reduce the menace of poverty and starvation, there is an urgent need for countries of the West African region to improve on the management of natural resource revenues through putting in place effective policy measures to eradicate or rather mitigate incidences of rampant corruption in the public sector. The introduction of severe punitive measures for corrupt public officials like confiscation of illicit

wealth and property, imprisonment of public officers found guilty of corruption related crimes and rejection of such public officers from holding public offices, will significantly curb the adverse effects of corruption on economic growth. Such measures, if effectively implemented will reduce the tendencies for corruption, thereby increasing the potentials for resource rich countries in West Africa to effectively address the United Nations Millennium Development Goals (MDGs). Secondly, the Economic Community of West African States (ECOWAS) should continue its efforts and commitment on conflict prevention and resolution amongst member states so as to mitigate the adverse effects of civil conflicts on economic growth, especially in natural resource rich countries that are more prone to civil conflict as recently experienced by Sierra Leone, Liberia, Cote d'Ivoire, Mali and Guinea Bissau.

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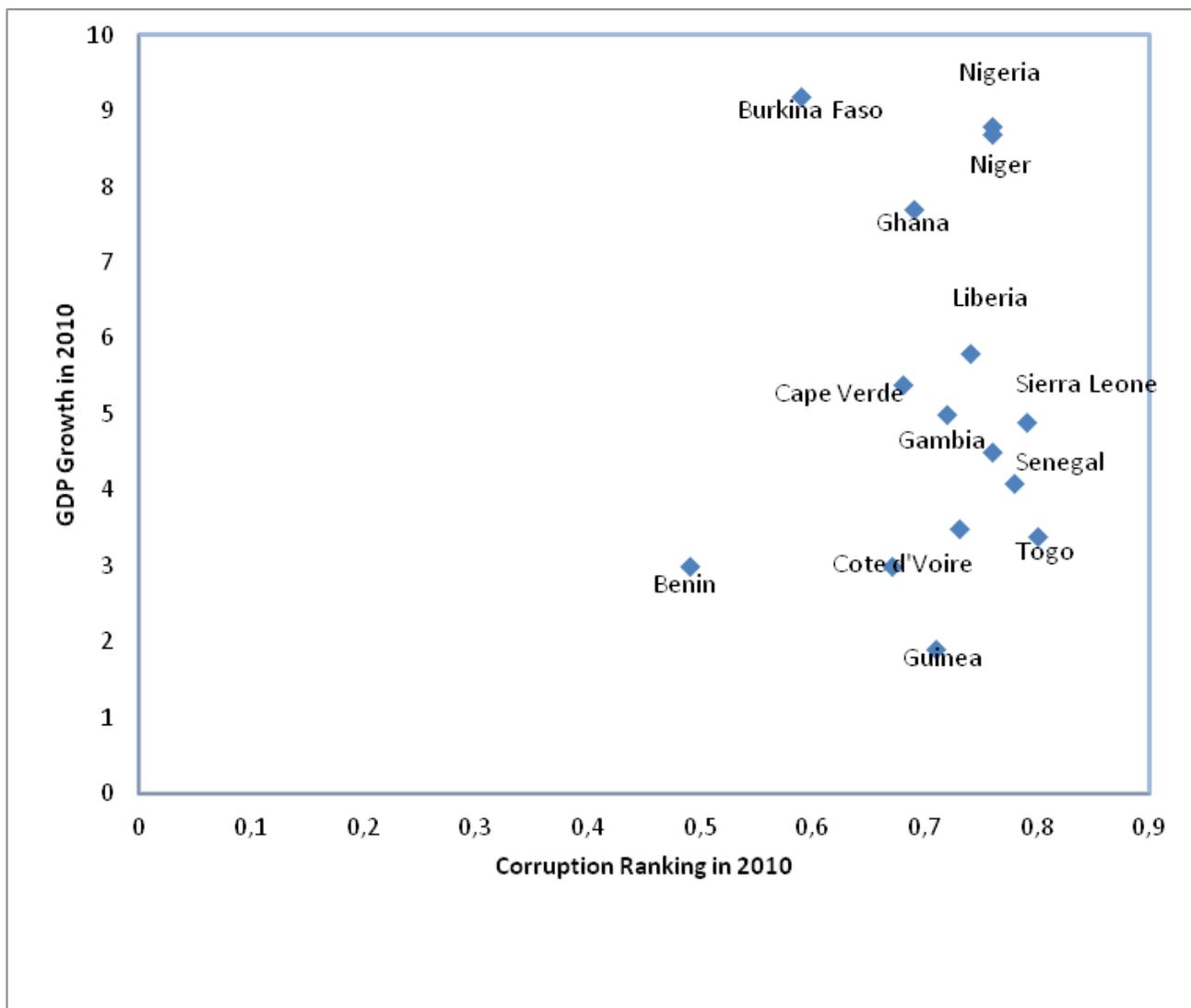Wheeler, D (1994) ,"Sources of Stagnation in Sub-Sahara Africa". World Development 12.

Figure A1. Corruption Ranking and Economic Growth in ECOWAS member states.
Source: Transparency International, World Bank and authors' calculation.
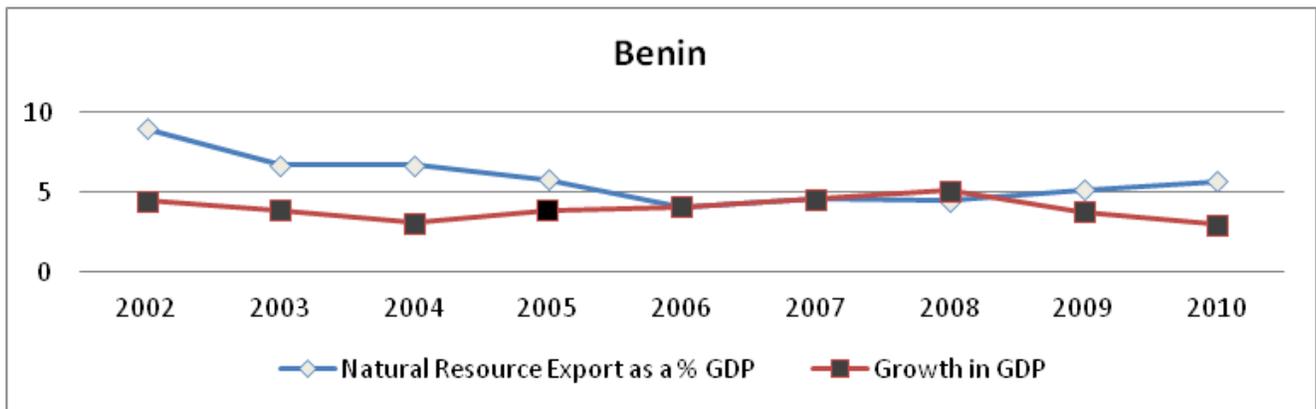
Figure B1. Natural Resource Export and Economic Growth in Benin (2002 - 2010).
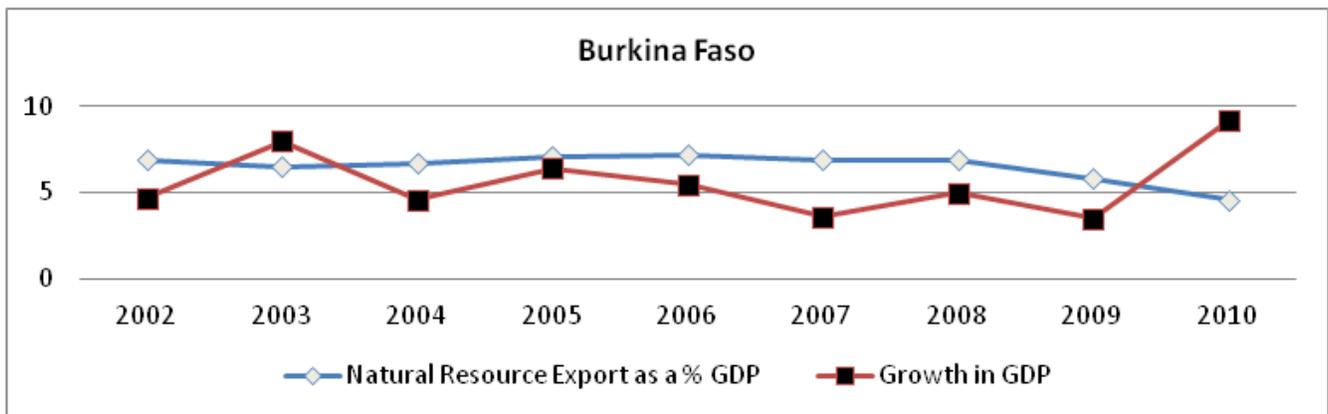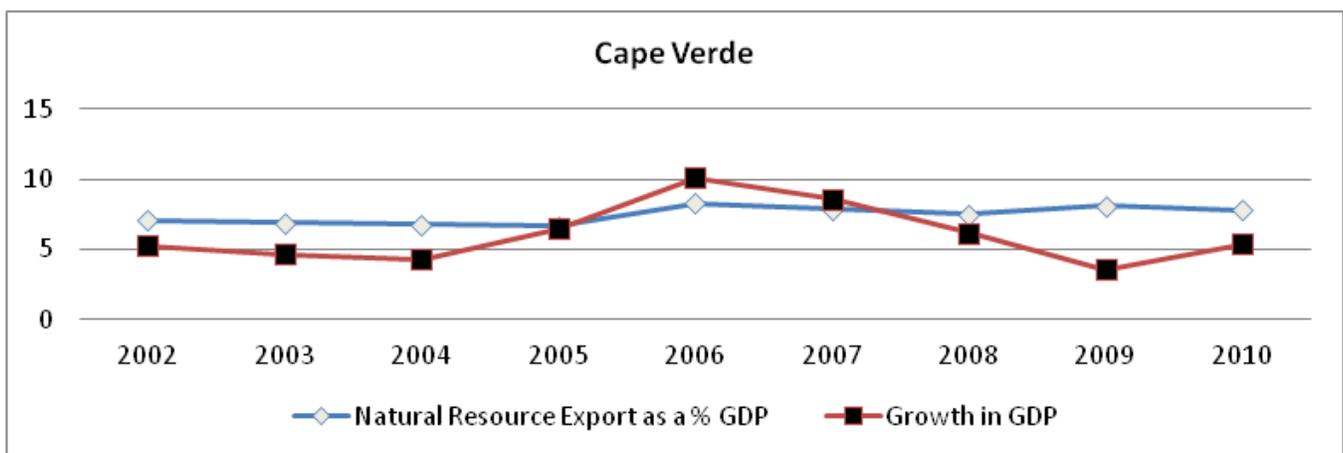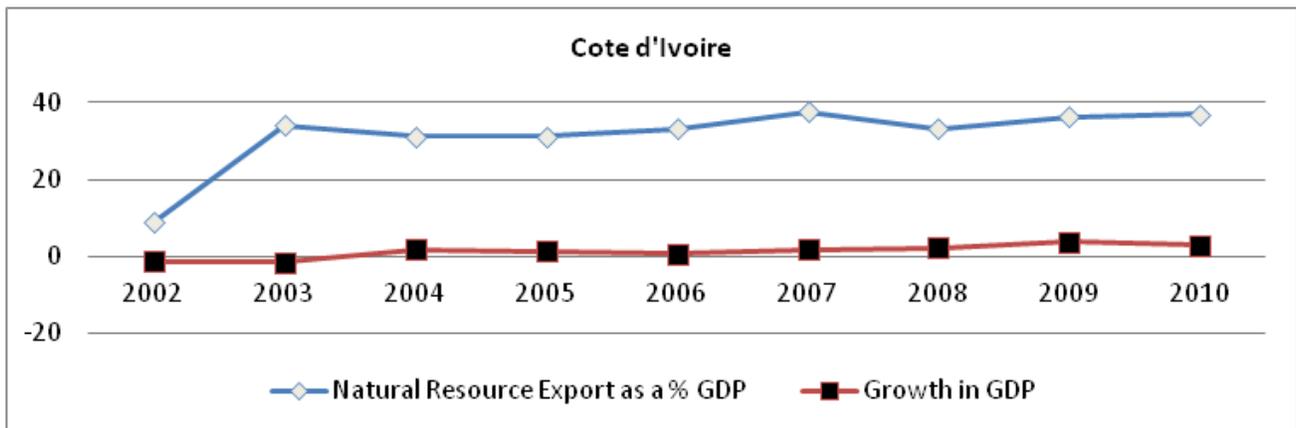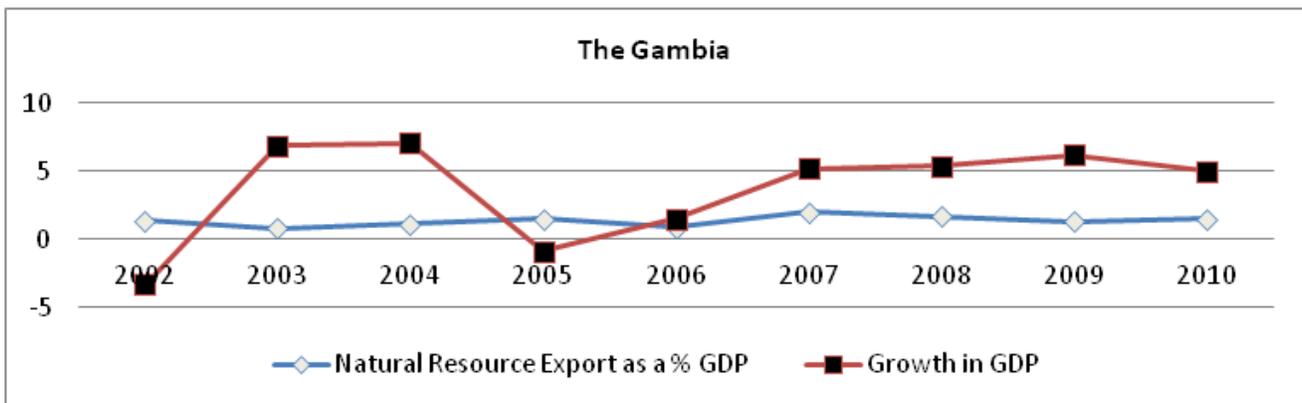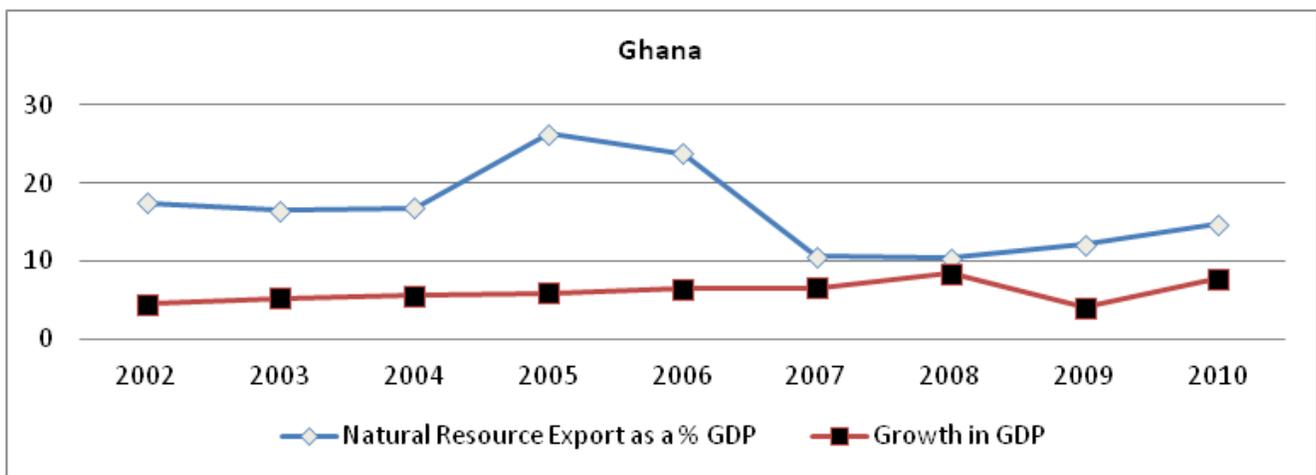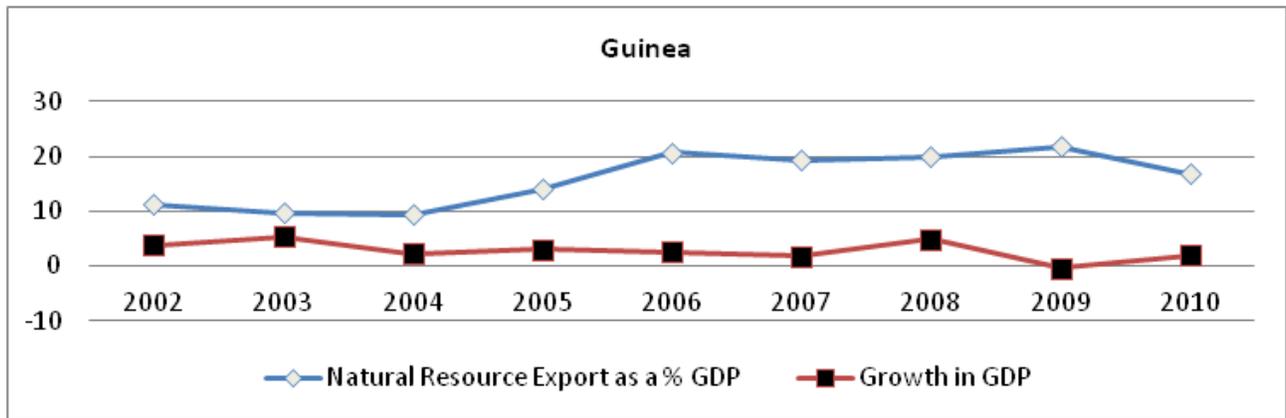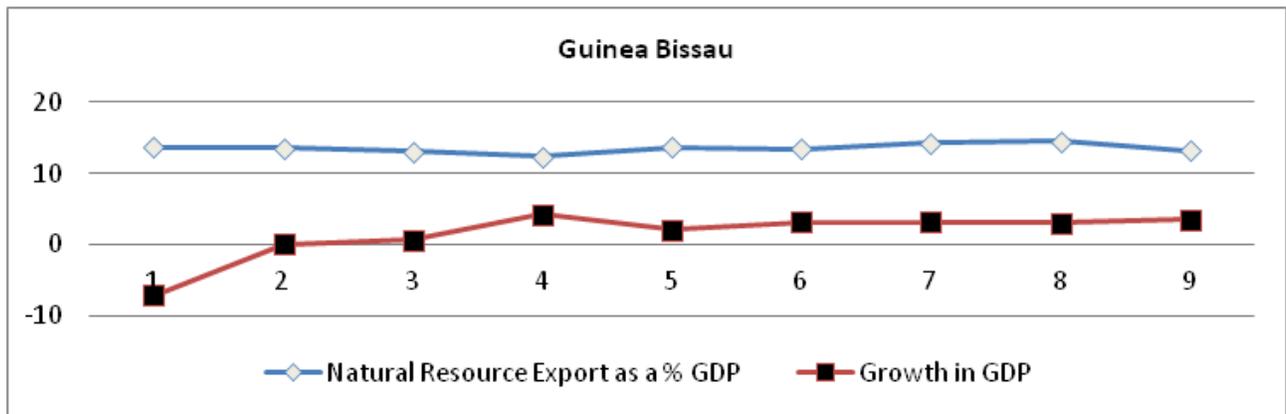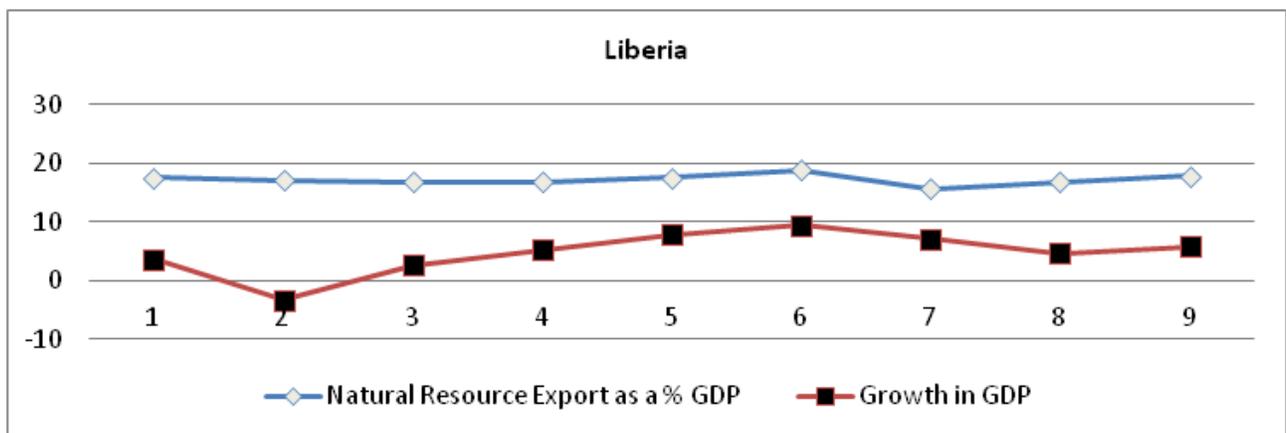Source: Transparency International, World Bank and authors' calculation.

Figure B2. Natural Resource Export and Economic Growth in Burkina Faso (2002 - 2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B3. Natural Resource Export and Economic Growth in Cape Verde (2002 - 2010).
Source: Transparency International, World Bank and authors' calculation.

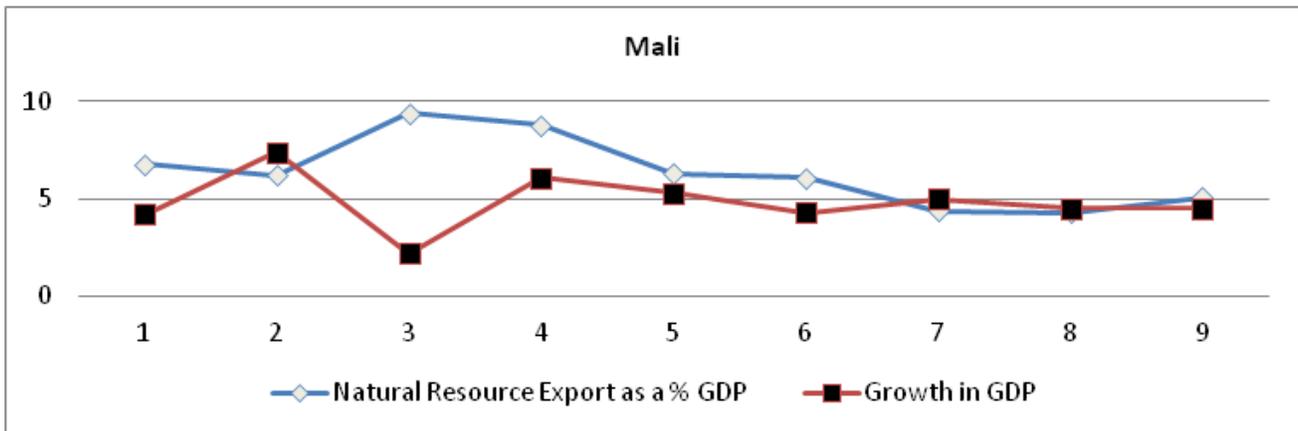**Figure B4.** Natural Resource Export and Economic Growth in Cote d'Ivoire (2002 - 2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B5. Natural Resource Export and Economic Growth in The Gambia (2002 - 2010).
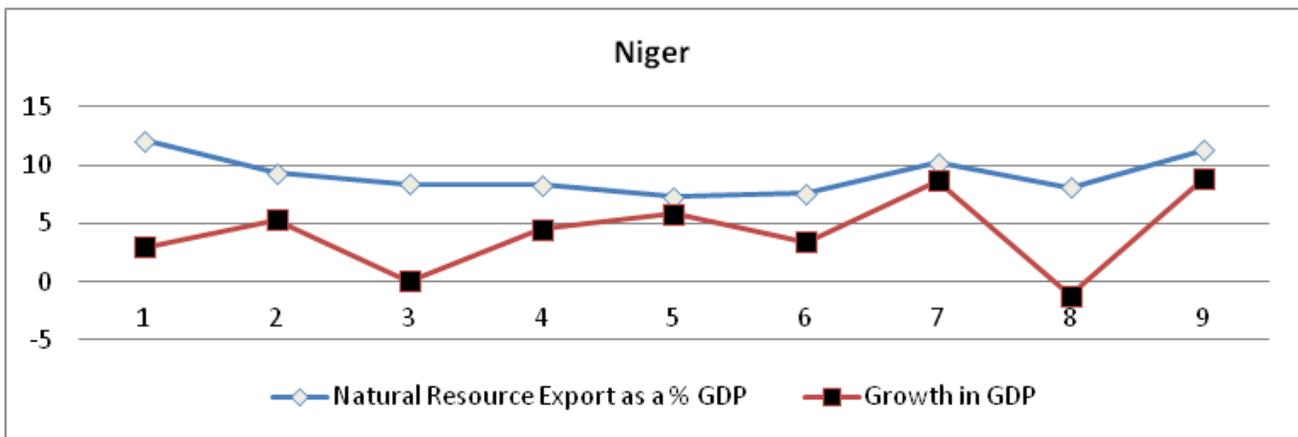Source: Transparency International, World Bank and authors' calculation.

Figure B6. Natural Resource Export and Economic Growth in Ghana (2002 - 2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B7. Natural Resource Export and Economic Growth in Guinea (2002 - 2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B8. Natural Resource Export and Economic Growth in Guinea Bissau (2002 -2010).
Source: Transparency International, World Bank and authors' calculation.
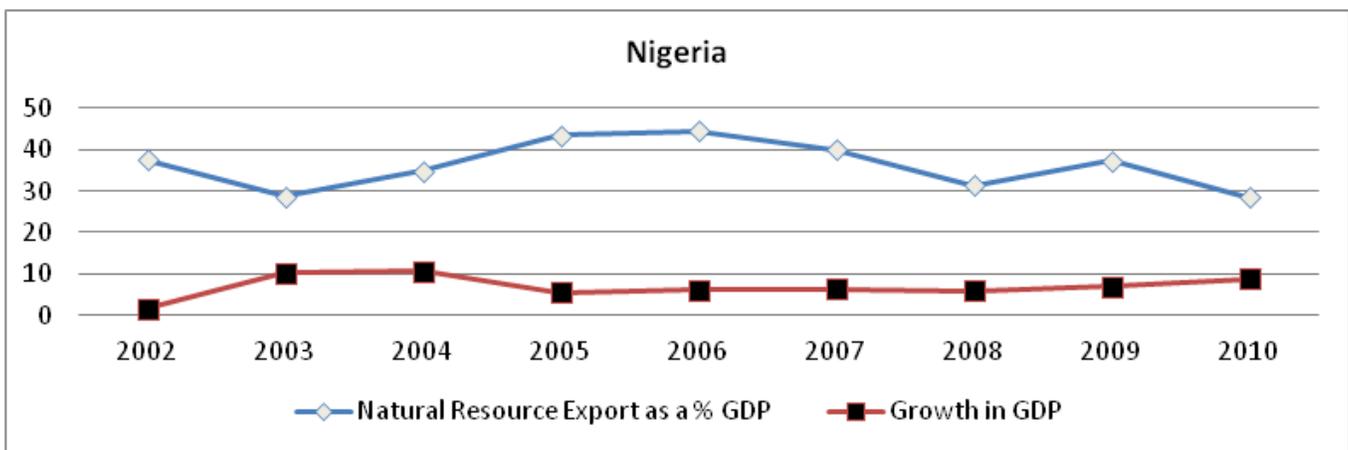

Figure B9. Natural Resource Export and Economic Growth in Liberia (2002 -2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B10. Natural Resources Export and Economic Growth in Mali (2002 -2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B11. Natural Resources Export and Economic Growth in Niger (2002 -2010).
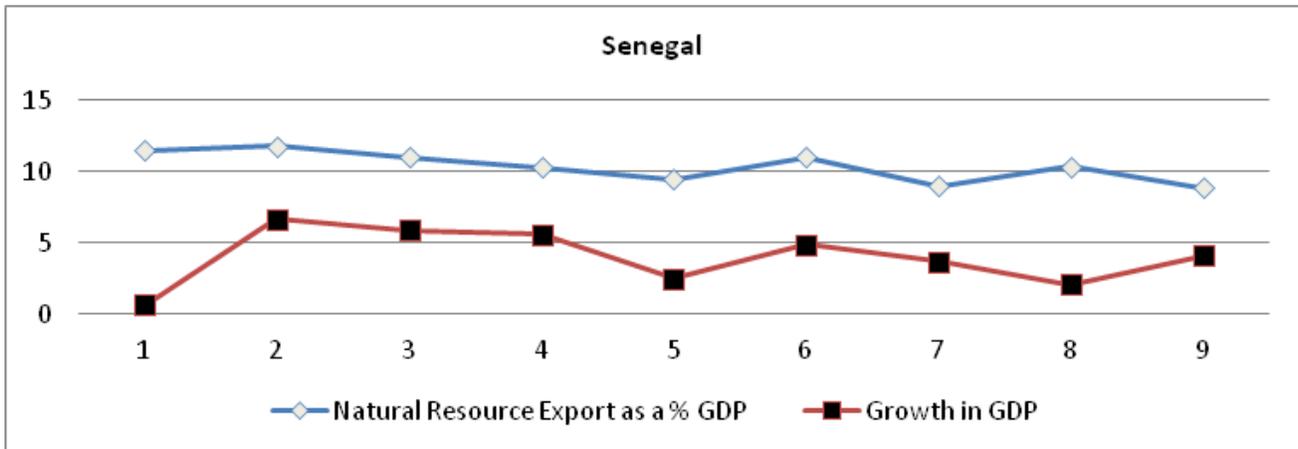Source: Transparency International, World Bank and authors' calculation.

Figure B12. Natural Resources Export and Economic Growth in Nigeria (2002 -2010).
Source: Transparency International, World Bank and authors' calculation.

Figure B13. Natural Resources Export and Economic Growth in Senegal (2002 -2010).
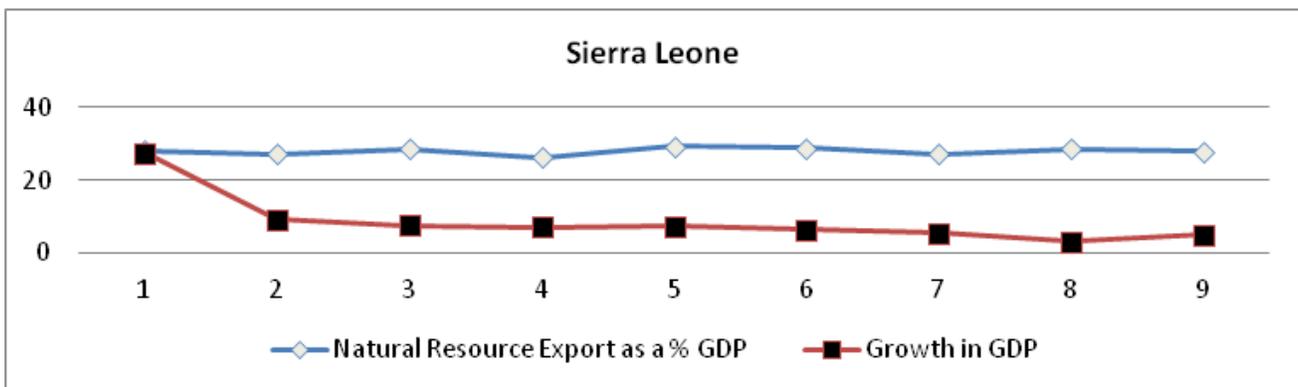Source: Transparency International, World Bank and authors' calculation.

Figure B14. Natural Resources Export and Economic Growth in Sierra Leone (2002 -2010).
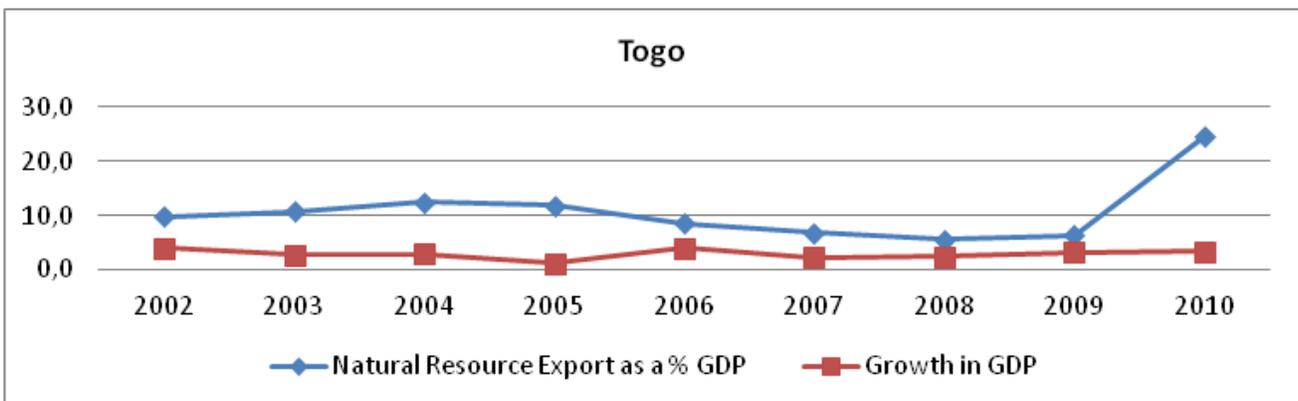Source: Transparency International, World Bank and authors' calculation.

Figure B15. Natural Resources Export and Economic Growth in Togo (2002 -2010).
Source: Transparency International and World Bank Development Indicators.